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

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

USS CLAIRTON WORKS
1992
COMPLIANCE DEMONSTRATION
#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 NUMBER: 605058-01

AUGUST 1992

WGG/WUC ~~AHF~~

RECEIVED

SEP 0 8 1992

DEPUTY DIRECTOR'S OFFICE
Bureau of Air Pollution Control

U. S. Steel
Clairton Works
400 State Street
Clairton, PA 15025-1855

September 2, 1992

Director
Bureau of Air Quality Control
Department of Environmental Resources
P.O. Box 2063
Harrisburg, PA 17120

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

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

Office of Chief Counsel
Western Region
Department of Environmental Resources
400 Waterfront Drive
Pittsburgh, PA 15222-4745

Gentlemen:

Subject: Compliance Demonstration
Clairton Battery Stack #19

Please find enclosed with this letter the mass emission report on #19 Battery combustion stack. The compliance demonstration was conducted at USS Clairton Works, a division of USX Corporation, on July 30, 1992.

For further details on this report, please contact William C. Graeser at (412) 233-1467.

Very truly yours,

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

9/10/92
H. Patel
Please have this reviewed & commented on as necessary. Please return. Thanks
Bill Gibson

Reviewed by Phil Lawrence per Carl Hearst 9/18/92

GTW/BAC
Attachment

Steel the recycled material

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ABSTRACT

On July 30, 1992, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #19 Battery Combustion Stack. The purpose of the testing was to determine the (1) concentration and mass emission rates of particulate matter, and (2) presence and extent of visible emissions from the stack as required by the Amended Mon Valley Consent Decree, Paragraph V. A. (6) and Appendix 4. A.

The allowable particulate matter concentration for #19 Battery Combustion Stack, as required by the Amended Mon Valley Consent Decree, is 0.030 gr/dscf. The results of three test runs produced an average particulate matter concentration and emission rate of 0.0063 gr/dscf and 3.55 lb/hr, respectively. Thus, the particulate matter emissions from the stack are in compliance. The Amended Mon Valley Consent Decree requires that visible emissions shall not equal or exceed 20 percent opacity for a period or periods aggregating in excess of 3 minutes in any 60-minute period and shall never equal or exceed 60 percent opacity. The highest visible emissions reading recorded during the three test runs was 15 percent opacity, thus, the visible emissions are in compliance.

1.0 INTRODUCTION

On July 30, 1992, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #19 Battery Combustion Stack. The purpose of the testing was to determine the (1) concentration and mass emission rate of particulate matter, and (2) presence and extent of visible emissions from the stack as required by the Amended Mon Valley Consent Decree, Paragraph V. A. (6) and Appendix 4. A.

Testing was performed by the Air Quality Engineering Division of Keystone Environmental Resources, Inc. (Keystone). The test crew was comprised of Richard Casselberry, Thomas Morgan, and David Beranek. Visible emissions determinations were performed by James McKoy of Environmental Technical Services (ETS). Keystone and ETS are divisions of the Chester Environmental Group. All test procedures were witnessed by Phil Lawrence of the Allegheny County Health Department Bureau of Air Pollution Control (BAPC).

2.0 METHODOLOGIES

The compliance test program followed the USS-approved emissions measurement test protocol which can be found in Appendix A.

Particulate matter sampling was performed in accordance with EPA Stationary Source Sampling Methods 1 through 5 and Sections 139.11 and 139.12 of the Pennsylvania Department of Environmental Resources (PA DER) Source Testing Manual. Three two-hour tests were executed during normal, maximum operation and production of the battery.

The process exhausts through a 186 inch inside 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 four equally spaced ports, with six traverse points sampled per port. Each traverse point was sampled for 5 minutes, thus bringing the total sampling time to 120 minutes for each test run. A schematic diagram of the combustion stack and traverse points can be found in Figure 2-1.

In accordance with EPA Method 2, velocities and volumetric flow rates of the exhaust gas were determined using a calibrated S type pitot tube. Positive and negative pitot lines were leak-checked at the beginning and end of each test run. Gas velocity differential pressures along with stack gas temperatures were recorded at each sampling point.

At the beginning and end of each test, gas concentrations of CO_2, O_2, and N_2 (by difference) were determined with the use of a Bacharach "Fyrite" apparatus as specified by EPA Method 3. Gas concentrations were used to obtain dry molecular weight of the process gas.

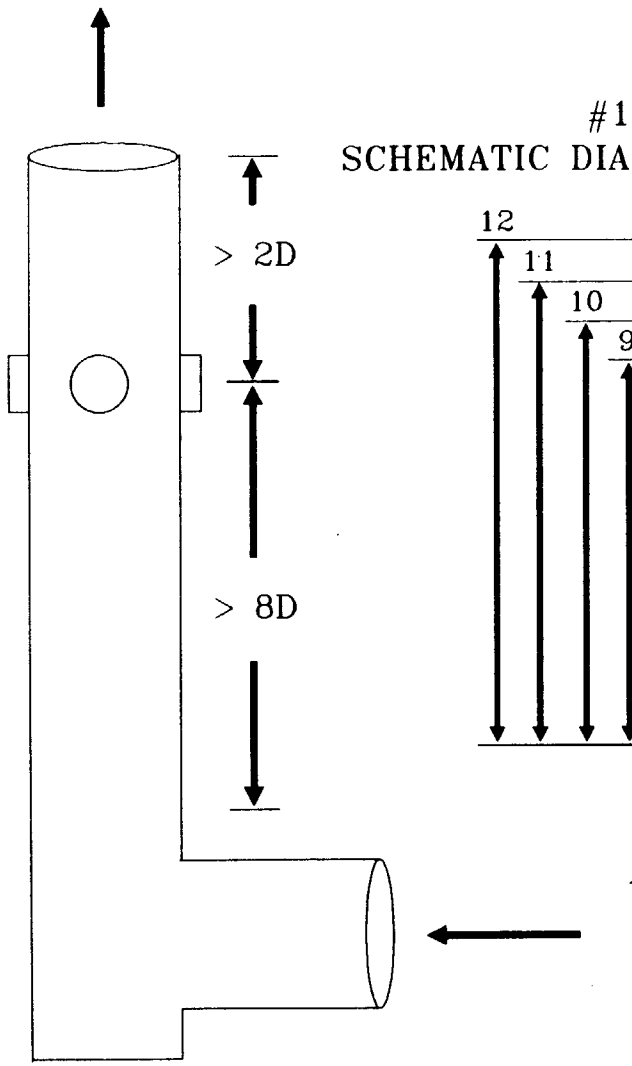
Percent moisture content, by volume, of the exhaust gas was determined by measuring the weight gain of the four sample train impingers in accordance with EPA Method 4.

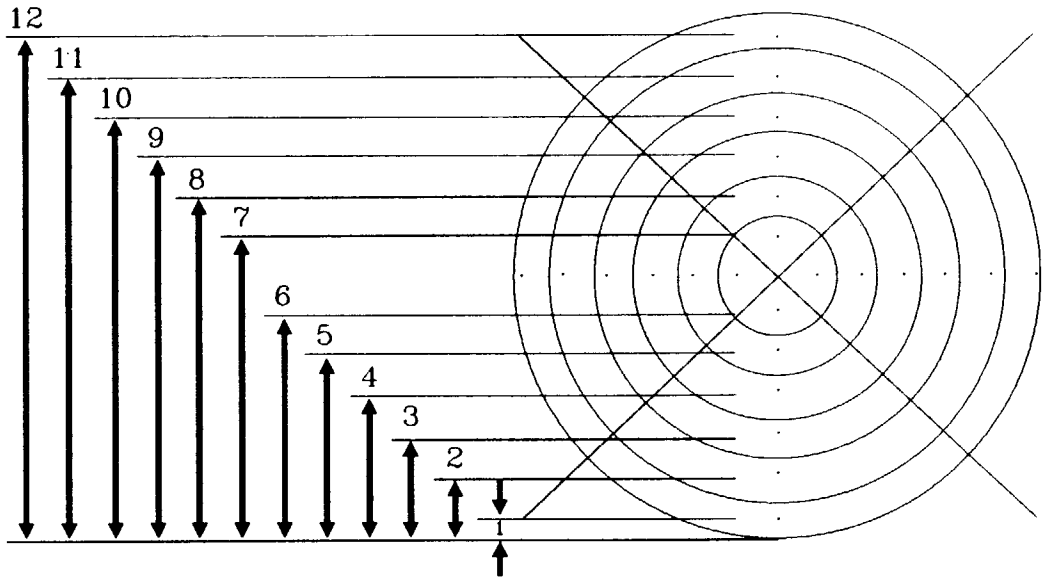
As specified by EPA Method 5, each sampling train was assembled as required by the method, leak-checked on site at the beginning and end of each test run, and operated such that isokinetic conditions were maintained. Clean up of the sampling train included an acetone rinse of the front-half components of the sample train. The acetone rinses were

FIGURE 2-1

USS CLAIRTON WORKS
CLAIRTON, PA

#19 BATTERY COMBUSTION STACK
SCHEMATIC DIAGRAM OF THE STACK AND TRAVERSE POINTS





Stack Diameter (D) = 186 in.

Traverse Point	Distance (in.)	Traverse Point	Distance (in.)
1	4.0	7	119.9
2	12.5	8	139.5
3	22.0	9	153.0
4	33.0	10	164.0
5	46.5	11	173.5
6	66.2	12	182.0

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

evaporated to dryness, desiccated, and weighed to a constant weight. The sample train filters were dried, desiccated for 24 hours, and weighed to a constant weight. Rinse residue weights and filter weights were measured to the nearest 0.1 mg. One acetone blank was prepared in the same manner as the test sample acetone rinses. The blank residue weight was subtracted from the test sample rinse residue weights. Front-half acetone rinse residue weights (after blank correction) and sample train filter weights were used to determine total particulate matter catch.

All visible emissions determinations were performed in accordance with EPA Stationary Source Sampling Method 9.

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 B.

All sampling equipment was calibrated and 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 BAPC can be found in Appendix C.

Copies of the field data sheets for the particulate matter sampling can be found in Appendix D. The emissions calculations for each test can be found in Appendix E.

The test results for particulate matter have been summarized in Table 3-1. As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the allowable particulate matter concentration for #19 Battery Combustion Stack is 0.030 gr/dscf. The results of the testing yielded an average particulate matter concentration and emission rate of 0.0063 grains per dry standard cubic feet (gr/dscf) and 3.55 pounds per hour (lb/hr), respectively. The actual particulate matter concentration is less than the allowable concentration, thus, the particulate matter emissions from the stack are in compliance.

Table 3-1 also lists other pertinent stack and sampling parameters which include stack gas flow rate expressed in units of actual cubic feet per minute (acfm) and standard cubic feet per minute (scfm), moisture content of the stack gas (percent by volume), stack gas temperature (^{o}F), gas volume sampled for each test in units of dry standard cubic feet (dscf), 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 percent and 110 percent is considered acceptable. Isokinetic values for the three test runs were 104.1 percent, 103.1 percent, and 98.2 percent; therefore, all values were within the acceptable range. Actual test sampling times have also been included in Table 3-1.

TABLE 3-1

USS CLAIRTON WORKS
CLAIRTON, PA

#19 BATTERY COMBUSTION STACK
PARTICULATE MATTER EMISSIONS DATA

		Run 1	Run 2	Run 3	Average
Test Number		CLR-19CS-1	CLR-19CS-2	CLR-19CS-3	
Test Date		7-30-92	7-30-92	7-30-92	
Mass Emission Rate and Concentration					
Particulate Matter	(lb/hr)	3.27	4.55	2.84	3.55
	(gr/dscf)	0.0060	0.0079	0.0049	0.0063
Stack Conditions					
Average Flow Rate	(acfm)	135267	142115	137738	138373
Standard Flow Rate	(scfm)	73600	78160	77364	76375
Temperature	(°F)	488.3	478.1	458.6	475.0
Moisture Content	(%)	13.8	13.7	12.6	13.3
Sampling Conditions					
Test times		8:07 to 8:37	10:48 to 11:18	14:10 to 14:40	
		8:40 to 9:10	11:22 to 11:52	14:43 to 15:13	
		9:15 to 9:45	12:19 to 12:49	15:25 to 15:55	
		9:49 to 10:19	12:54 to 13:24	16:00 to16:30	
Sampling Time	(minutes)	120	120	120	
Sample Volume	(dscf)	41.976	44.203	42.170	
Isokinetics	(%)	104.1	103.1	98.2	

Visible emissions data is summarized in Table 3-2. Visible emissions were recorded continuously for all three test runs. As promulgated by the Amended Mon Valley Consent Decree, Paragraph V. A. (6), the "visible emissions shall not equal or exceed 20 percent opacity for a period or periods aggregating in excess of 3 minutes in any 60-minute period and shall never equal or exceed 60 percent opacity." Visible emissions readings recorded during the three tests did not exceed 15 percent, thus, the visible emissions are in compliance. Copies of the field data sheets for the visible emissions readings can be found in Appendix F.

TABLE 3-2

USS CLAIRTON WORKS
CLAIRTON, PA

#19 BATTERY COMBUSTION STACK
VISIBLE EMISSIONS DATA

Observation Date	7-30-92
Observation Time	8:00 to 4:30
Total Number of Readings	2040
Number of Readings with Opacity ≤ 20%	2040
Greatest Opacity	15%

COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX A

TEST PROTOCOL

KEYSTONE
ENVIRONMENTAL RESOURCES LTD.

TEST PROTOCOL
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

Particulate matter sampling will be performed in accordance with EPA Stationary Source Sampling Methods 1 through 5 (40 CFR, Part 60, Appendix A) and Sections 139.11 and 139.12 of the Pennsylvania Department of Environmental Resources (PA DER) Source Testing Manual. Three two-hour tests will be executed during normal operating conditions. Greater than 50 dry standard cubic feet of sample gas will be collected during each test run.

The process exhausts through a 186 inch diameter stack. A total of 24 traverse points (12 per diameter) will be sampled; the traverse points will be calculated in accordance with EPA Method 1. Sampling will be conducted through four equally spaced ports, with six traverse points sampled per port. Each point will be sampled for 5 minutes, thus bringing the total sampling time to 120 minutes.

In accordance with EPA Method 2, velocities and volumetric flow rates of the exhaust gas will be determined using a calibrated S type pitot tube. Positive and negative pitot lines will be leak-checked at the beginning and end of each test run. Gas velocity differential pressures along with stack gas temperatures will be recorded at each sampling point. Static pressure of the exhaust gas stream will be measured with the same pitot tube.

At the beginning and end of each test, gas concentrations of CO_2, O_2, and N_2 (by difference) will be determined with the use of a Bacharach "Fyrite" apparatus as specified by EPA Method 3. Gas concentrations will be used to obtain molecular weight of the process gas.

Percent moisture content, by volume, of the exhaust gas will determined by measuring the weight gain of the four sample train impingers in accordance with EPA Method 4.

As specified by EPA Method 5, each sample train will be assembled as required by the method, leak-checked on site at the beginning and end of each test run, and operated such that isokinetic conditions are maintained. Clean up of the sampling train will include an acetone rinse of the front-half components of the sample train. Front-half acetone rinses will be evaporated to dryness, desiccated, and weighed to a constant weight. Sample train glass fiber filters will be desiccated for 24 hours, and particulate matter weight will be determined gravimetrically. Rinse residue weights and filter weights will be measured to the nearest 0.1 mg. One acetone blank will be prepared in the same manner as the test sample rinses. The blank residue weight will be subtracted from the test sample residue weights. After blank correction, front-half acetone rinse residue weights and sample train filter weights will be used to determine total particulate matter catch. Clean up and analytical procedures will follow the methodology of EPA Method 5.

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

A report summarizing the compliance test program will be submitted within 60 days following completion of field work. The report will describe test methodologies utilized and present a textual and tabular summary of the emissions results and related sampling information. Copies of operational data will be included in the report to verify that all testing was performed during periods of normal plant operation. Also incorporated into the report will be copies of the pre-test calibration results, post-test calibration results, the results of an audit conducted with a critical orifice provided by the Allegheny County Health Department Bureau of Air Pollution Control, field data sheets for the particulate matter sampling and visible emissions determinations, emissions calculations, and analytical results for each test.

COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX B

OPERATIONAL DATA

KEYSTONE
ENVIRONMENTAL RESOURCES LTD.

CC-10295 REV. 1161
03.001.0020
UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 7
12 Hrs. Beginning 12:00 A M
Date 7-30-92

BATTERY NO. A-19

OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1					
3	X	X	X	X	
5	12	25	12	34	
7	12	36	12	46	
9	12	48	1	01	
11	1	03	1	14	
13	1	16	1	26	
15	1	28	1	36	
17	1	38	1	50	
19	1	52	2	03	
21	2	05	2	32	
23	2	24	2	44	
25	2	46	2	55	
27	2	57	3	12	
29	3	14	3	28	
31	X	X	X	X	
2					Pass-up
4	X	X	X	X	Pass-up
6					
8					
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30	X	X	X	X	
1	X	X	X	X	
2	X	X	X	X	

BATTERY NO. B-19

OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1					
3					
5					
7					
9					
11					
13					
15					
17					
19					
21					
23					
25					
27					
29					
31	X	X	X	X	
2	3	50	3	59	
4	3	41	4	5	
6	3	53	4	—	
8	4	05	4	11	
10	4	17	4	23	
12	4	29	4	34	
14	4	41	4	47	
16	4	52	4	58	
18	5	03	5	09	
20	5	20	5	26	
22	5	31	5	37	
24	5	42	5	47	
26	5	53	5	58	
28	6	04	6	10	
30	X	X	X	X	
1	X	X	X	X	
2	X	X	X	X	

BATTERY NO. C-19

OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1	6	18	6	23	
3	6	29	6	34	
5	6	41	6	46	
7	6	50	6	56	
9	7	59	8	15	
11	8	41	8	59	
13	8	57	9	15	
15	9	11	9	29	
17	9	23	9	48	
19	9	35	9	59	
21	9	50	10	07	
23	10	08	10	30	
25					Pass-up
27	10	20	10	37	
29	10	34	10	59	
31	X	X	X	X	
2					
4					
6					
8					
10					
12					
14					
16					
18			11	23	
20			11	36	
22	11	25	12	05	
24	11	38	12	16	
26	—	—	—	—	
28	12	07	12	23	
30	X	X	X	X	
1	X	X	X	X	
2	X	X	X	X	

REMARKS:
13/13 14/14 17/19

Condition of Signals

Condition of Pusher

HOURLY REPORT OF OPERATION

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED
11	2	2	
12	4	5	
1-3	5	5	
3-2	4	4	
5	4	4	
5-6	5	6	
	24	26	

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED
7	5	5	
8	5	5	
8-7	1	0	
8	2	2	
9-11	4	4	
11-10	3	4	
	20	20	

Total Ovens Pushed 44/46
Total Ovens Charged

Pusherman

Battery Foreman

CC-10295 REV. 1161
03.001.0020
UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 1
12 Hrs. Beginning 12:00 P M.
Date 7-30-92

BATTERY NO. A-19

OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1					
3					
5					
7	8	16	8	50	
9	8	28	9	—	
11	8	40	9	18	
13	8	52	9	36	
15	9	03	9	45	
17	9	20	9	56	
19	9	38	10	08	
21	9	47	10	18	
23	9	58	10	28	
25	10	10	10	38	
27	10	20	10	48	
29	10	30	10	55	
31					
2					PASS-UP
4					PASS-UP
6	11	13	11	23	
8	11	25	11	49	
10	11	47	11	58	
12	12	00	12	10	
14	12	12	12	23	
16	12	25	12	35	
18	12	37	12	58	
20	12	56	1	11	
22	1	06	1	28	
24	1	19	1	39	
26	1	30	1	55	
28	1	40	2	02	
30					N/A
1					
2					

BATTERY NO. B-19

OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1	1	53	2	26	
3	2	04	2	33	
5	2	24	2	38	
7	2	36	2	45	
9	2	41	3	33	
11	2	52	3	46	
13	3	15	4	04	
15	3	35	4	15	
17	3	48	4	32	
19	4	08	4	46	
21	4	17	4	57	
23	4	34	5	13	
25	4	48	5	23	
27	4	59	5	33	
29	5	15	5	46	
31					
2	10	46			
4	10	50			
6					
8					
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					N/A
1					
2					

BATTERY NO. C-19

OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1					
3					
5					
7					
9					
11					
13					
15					
17					
19					
21					
23					
25					
27					
29					
31					
2	5	25	5	48	
4	5	35	6	13	
6	5	48	6	32	
8	5	59	6	46	
10	6	15	6	53	
12	6	34	7	03	
14	6	47	7	13	
16	6	55	7	26	
18	7	05	7	38	
20	7	14	7	50	
22	7	28	8	02	
24	7	40	8	14	
26	7	52	8	21	
28	8	04	8	38	
30					N/A
1					
2					

REMARKS:

24/24 17/15 14/14

Condition of Signals

Condition of Pusher

HOURLY REPORT OF OPERATION

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED
11-12	3	3	
12-1	5	4	
1-2	5	4	
2-3	5	5	
3-4	3	2	
4-5	5	5	
	26	23	

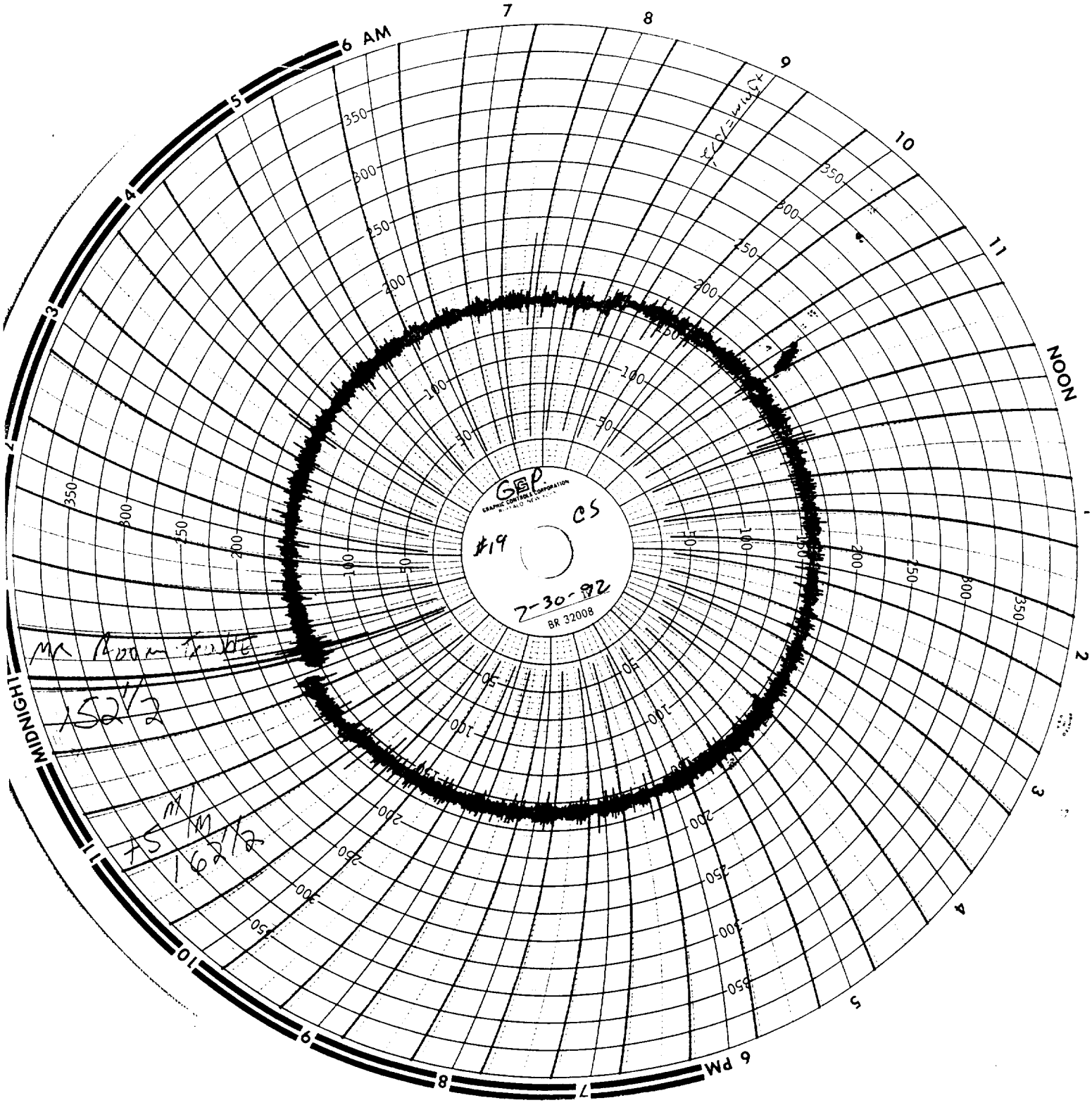
TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED
5-6	5	5	
6-7	4	4	
7-8	5	5	
8-9	5	5	
9-10	5	5	
10-11	5	6	
	29	30	

Total Ovens Pushed 55

Total Ovens Charged 53

Pusherman

Battery Foreman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MIDNIGHT
6 PM
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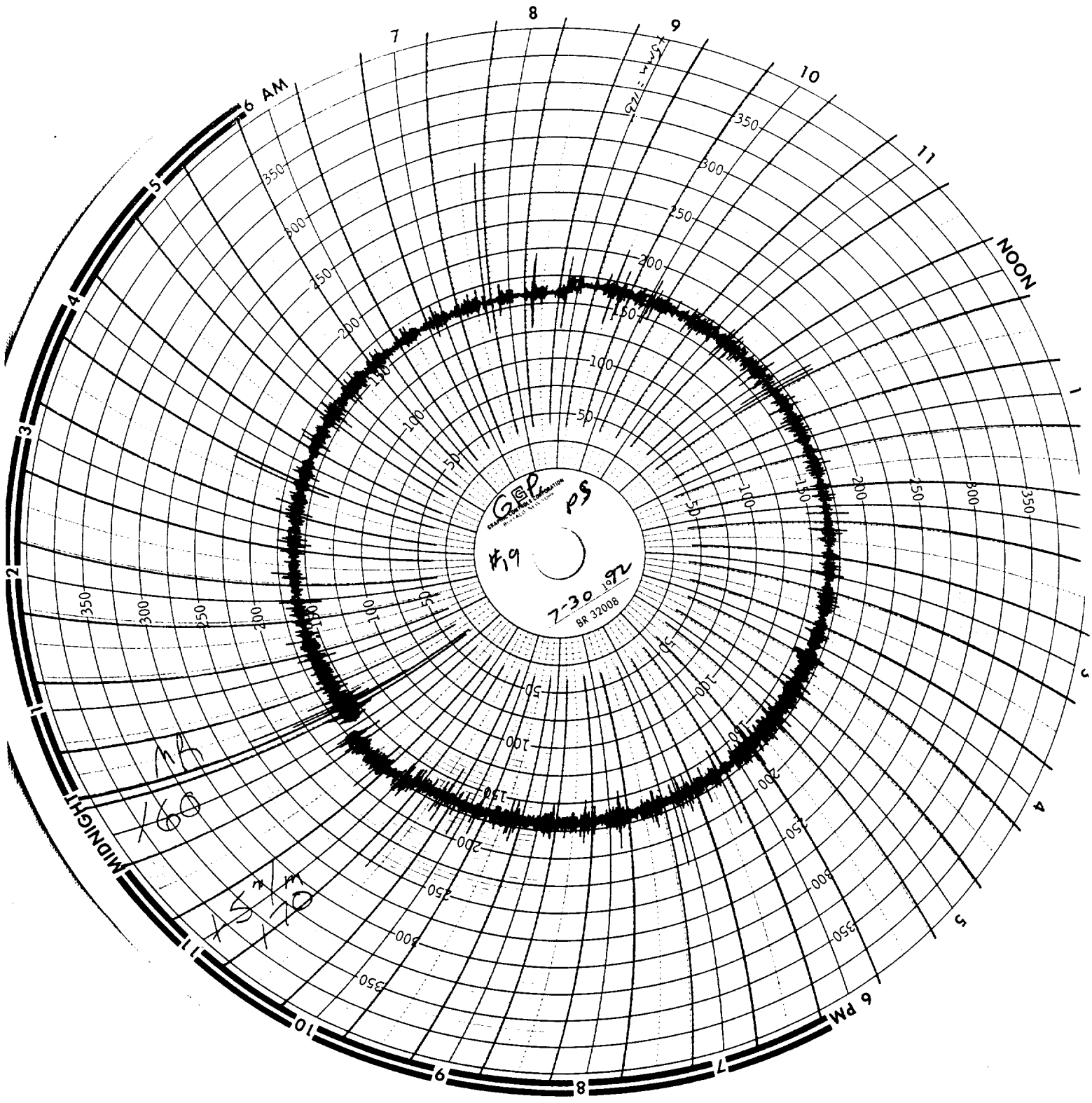
GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
#19
CS
2-30-92
BR 32008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BUFFALO, NEW YORK
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7-30 1992
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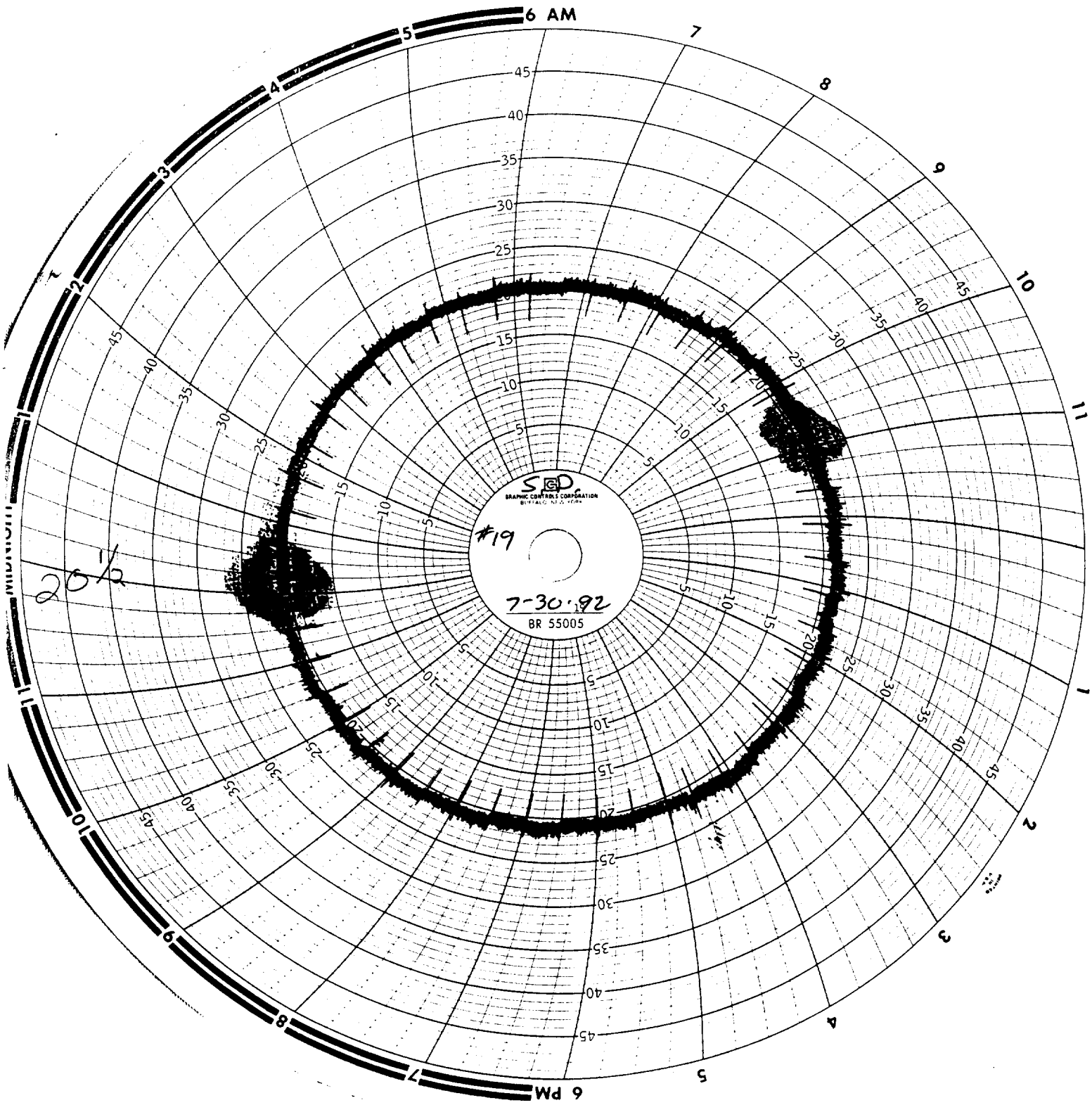
15 m/m
170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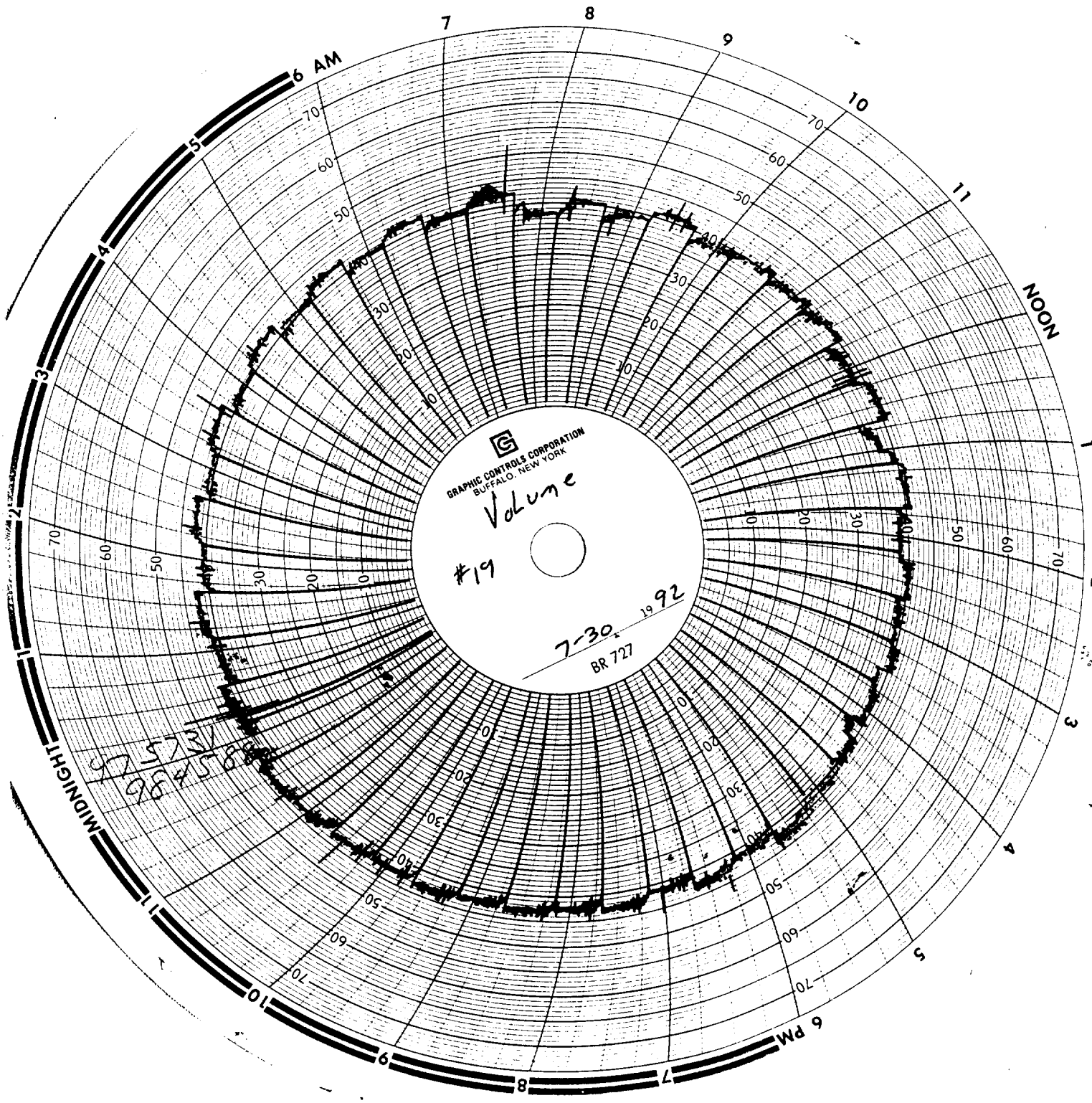
BR 55005
20 1/2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NOON
6 PM
MIDNIGHT
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
Volume
#19
7-30
19 92
BR 727

COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX C

CALIBRATION RESULTS

KEYSTONE
ENVIRONMENTAL RESOURCES LTD.

CONTROL BOX CALIBRATION

THREE POINT CALIBRATION

BOX # 4 BP 28.9
DATE 06-03-92 OPERATOR RPC

	WET TEST METER				DRY TEST METER					METER	ORIFICE
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	COEFFICIENT Y	COEFFICIENT ΔH@
START			0.000	28.90				0.50	525.800		
HALF		73.0			93.0	89.0	91.0				
STOP	12.17		5.000						531.165		
CALCULATION	12.17	533.0	5.013	28.90			551.0	28.94	5.365	0.9646	1.667
START			0.000	28.90				1.00	531.500		
HALF		73.0			94.0	90.0	92.0				
STOP	8.85		5.000						536.800		
CALCULATION	8.85	533.0	5.013	28.90			552.0	28.97	5.300	0.9770	1.760
START			0.000	28.90				2.00	537.600		
HALF		73.0			94.0	90.0	92.0				
STOP	6.40		5.000						542.899		
CALCULATION	6.40	533.0	5.013	28.90			552.0	29.05	5.299	0.9747	1.841
AVERAGE										0.9721	1.756

POST TEST

BOX # 4 BP 29.00
DATE 08-13-92 OPERATOR RPC

	WET TEST METER				DRY TEST METER					METER	ORIFICE
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	COEFFICIENT Y	COEFFICIENT ΔH@
START			0.000	29.00				0.85	178.900		
HALF		75.0			86.0	85.0	85.5				
STOP	9.58		5.000						184.095		
CALCULATION	9.58	535.0	5.013	29.00			545.5	29.06	5.195	0.9817	1.781
START			0.000	29.00				0.85	184.400		
HALF		75.0			89.0	88.0	88.5				
STOP	9.72		5.000						189.602		
CALCULATION	9.72	535.0	5.013	29.00			548.5	29.06	5.202	0.9858	1.823
START			0.000	29.00				0.85	189.900		
HALF		75.0			90.0	90.0	90.0				
STOP	9.58		5.000						195.111		
CALCULATION	9.58	535.0	5.013	29.00			550.0	29.06	5.211	0.9868	1.766
AVERAGE										0.9847	1.790
DIFFERENCE										-1.28%	-1.92%

PRE-TEST MAGNEHELIC CALIBRATION

BOX# 4
DATE 06-03-92
OPERATOR RPC

0 to 10" H2O RANGE

MAGNEHELIC Δ P	MANOMETER
0.50	0.50
1.00	1.00
2.00	2.00
4.00	4.00
6.00	6.00
8.00	8.00

0 to 0.50" H2O RANGE

MAGNEHELIC Δ P	MANOMETER
0.50	0.50
0.40	0.40
0.30	0.30
0.20	0.20
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	0.50

PRE-TEST LEAK CHECK

DATE 06-03-92
OPERATOR RPC

	START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
DRY	508.320	508.433	0.113	10.000	-0.000
WET	0.000	0.111	0.111		

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
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

PRE-TEST PYROMETER CHECK

DATE 06-03-92
OPERATOR RPC

mV input	TEMP °F	TEMP READING °F
0.18	40	40.0
0.40	50	50.0
0.84	70	69.0
1.29	90	90.0
1.74	110	109.0
2.66	150	150.0
3.82	200	200.0
6.09	300	300.0
8.31	400	400.0
10.57	500	500.0

POST-TEST MAGNEHELIC CALIBRATION

BOX# 4
DATE 08-13-92
OPERATOR RPC

0 to 10" H2O RANGE

MAGNEHELIC DELTA P	MANOMETER
0.50	0.50
1.00	1.00
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	0.50
0.40	0.40
0.30	0.30
0.20	0.20
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	0.50

POST-TEST LEAK CHECK

DATE 08-13-92
OPERATOR RPC

	START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
DRY	161.350	161.536	0.186	10.000	0.000
WET	0.000	0.188	0.188		

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
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

POST-TEST PYROMETER CHECK

DATE 08-13-92
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	90.0
1.74	110	111.0
2.66	150	150.0
3.82	200	200.0
6.09	300	302.0
8.31	400	402.0
10.57	500	502.0

QA ORIFICE AUDIT

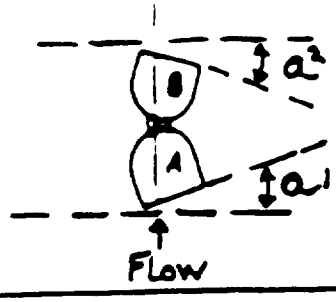
AGENCY BAPC DATE 06-03-92 B.P. 28.90
OPERATOR RPC BOX # 4

RUN	1		2		3	
INITIAL CF	485.000		492.800		500.680	
FINAL CF	492.575		500.393		508.243	
DIFFERENCE	7.575		7.593		7.563	
	IN	OUT	IN	OUT	IN	OUT
TEMP INITIAL	81	80	84	82	86	83
TEMP 5 MIN	82	80	86	82	87	83
TEMP 10 MIN	82	80	85	84	89	85
TEMP 15 MIN	84	82	86	83	90	86
		TEMP R		TEMP R		TEMP R
TEMP AVG	81.375	541.375	84	544	86.125	546.125
TIME MINUTES	15.00		15.00		15.00	
	N WATE	IN HG	IN WATER	IN HG	IN WATER	IN HG
ORIFICE	0.65	0.05	0.65	0.05	0.65	0.05
METER PRESSURE		28.95		28.95		28.95
	F	C	F	C	F	C
AMBIENT TEMP.	76.0	24.4	76.0	24.4	76.0	24.4
VACUUM IN HG	19.0		19.0		19.0	
DGM CAL Y	0.9721		0.9721		0.9721	
STD CF	6.975		6.958		6.903	
STD CUBIC METERS	0.1975		0.1970		0.1955	

GEOMETRIC PITOT CALIBRATION

Caliper # XLF-59
Precheck ✓
Post Check

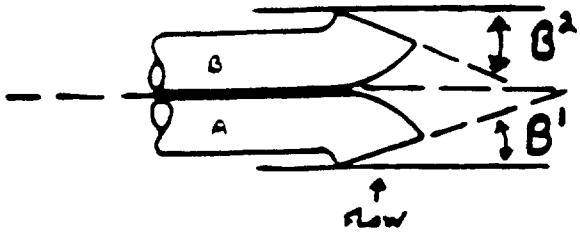
Probe #: 10-2
Date: 4-24-92
Initials: RM

① 

a^1 = 6.0°
a^2 = 1.0°
a^1, a^2 = <10°

B^1 = 1.0°
B^2 = 0.5°
B^1, B^2, = <5°

F = 0.918"

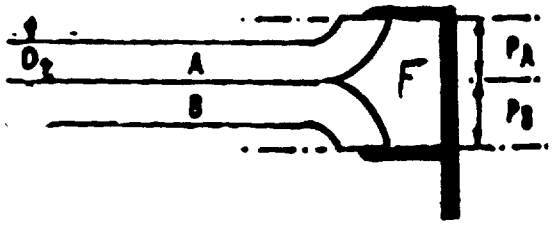
② 

μ = 0.0080 — μ = ≤ 0.1250" (μ = F TAN γ)

V = 0.0160 — V = ≤0.03125" (V = F TAN θ)

W = 0.164 — W ≥ 0"

X = 0.884 — X ≥ 0.750" (3/4" using 1/2" nozzle)

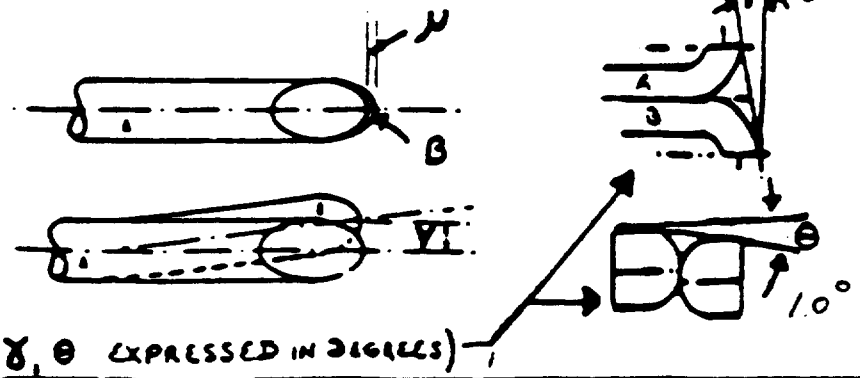
③ 

1.05 D_t < P < 1.50 D_t
$P_A = P_B$
2.10 D_t < A < 3.00 D_t

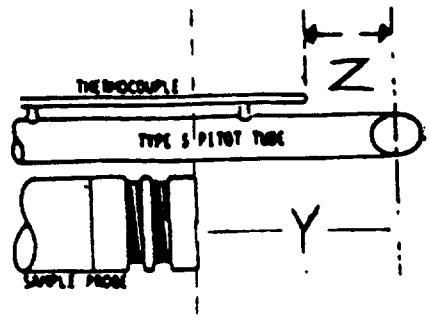
Y = 5.740 — Y ≥ 3.0"

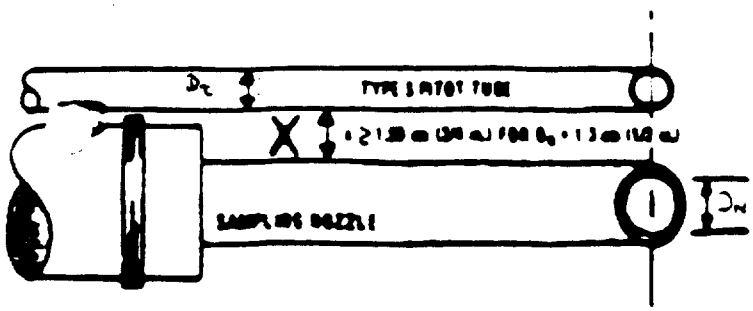
Z = 3.130 — Z > 2.0"

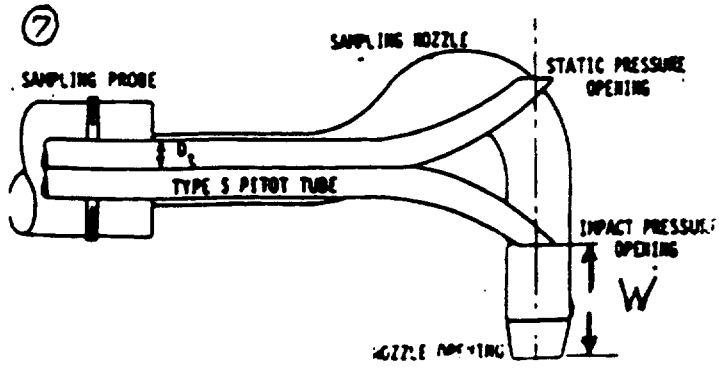
D_t = 0.377 — D_t > .1875" to .375" (3/16" to 3/8")

④ 

(γ, θ EXPRESSED IN DEGREES)

⑥ 

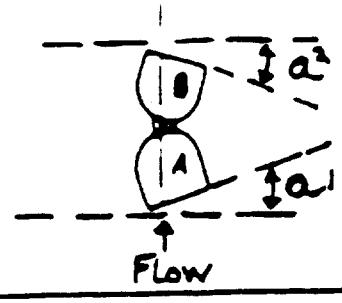
⑤ 

⑦ 

GEOMETRIC PITOT CALIBRATION

Caliper # XCF-59
Precheck ✓
Post Check

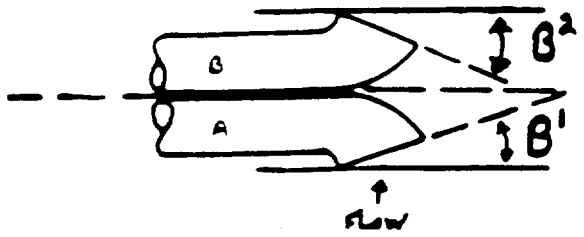
Probe #: 10-3
Date: 4-24-98
Initials: [illegible]

① 

a¹ = 5.0°
a² = 1.5°
a¹, a² = <10°

B¹ = 1.5°
B² = 1.0°
B¹, B², = <5°

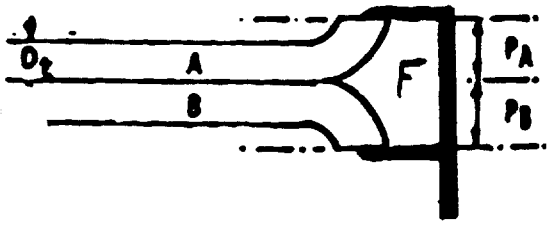
F = 1.000"

② 

μ = 0.0087" — μ = ≤ 0.1250" (μ = F TAN γ)

V = 0.0175 — V = ≤0.03125" (V = F TAN θ)

W = 0.167 — W ≥ 0"

③ 

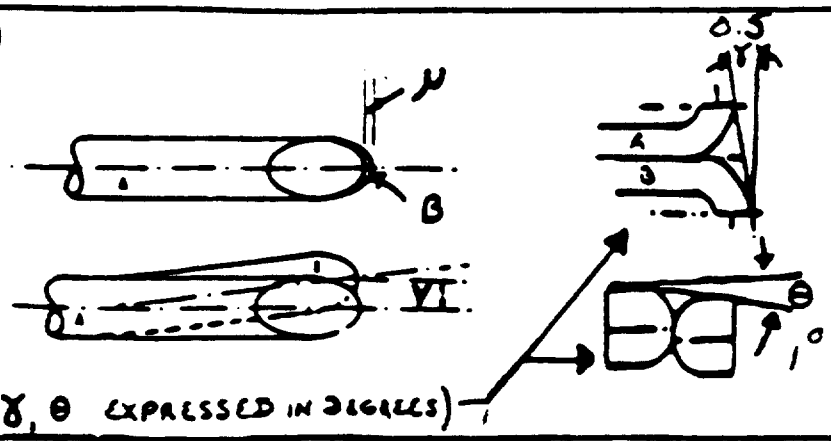
1.05 D_t < P_A < 1.50 D_t
$P_A = P_B$
2.10 D_t < P_B < 3.00 D_t

X = 0.845 — X ≥ 0.750" (3/4" using 1/2" nozzle)

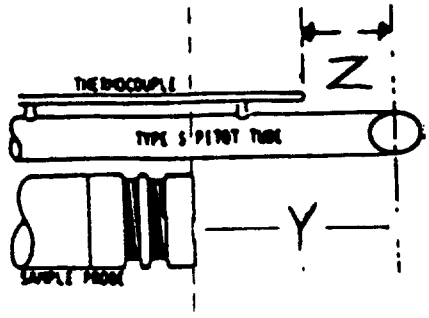
Y = 5.833 — Y ≥ 3.0"

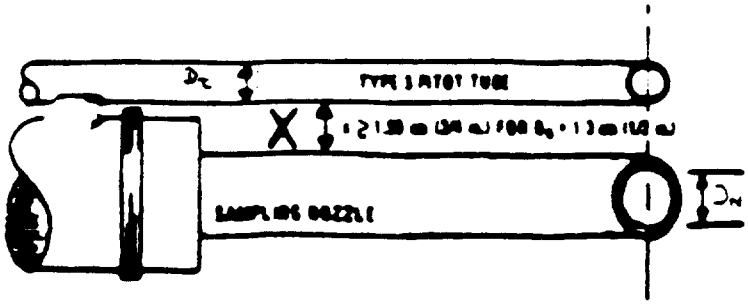
Z = 2.644 — Z > 2.0"

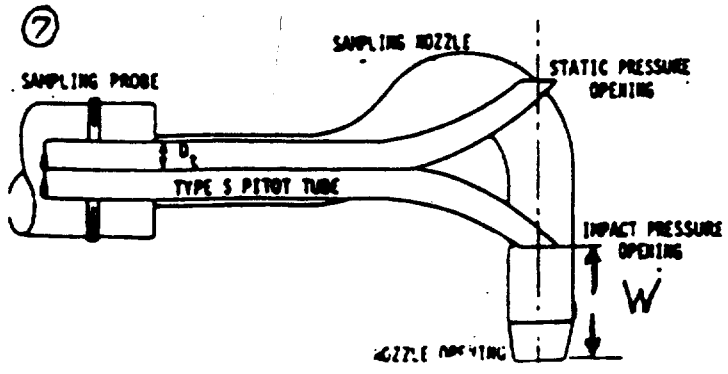
D_t = 0.376 — D_t > .1875" to .375" (3/16" to 3/8")

④ 

(γ, θ EXPRESSED IN DEGREES)

⑥ 

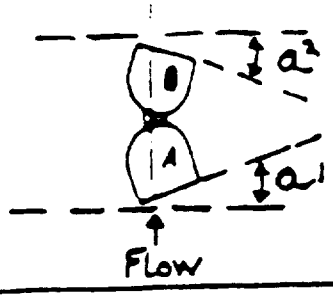
⑤ 

⑦ 

GEOMETRIC PITOT CALIBRATION

Caliper # XLF-39
Precheck
Post Check ✓

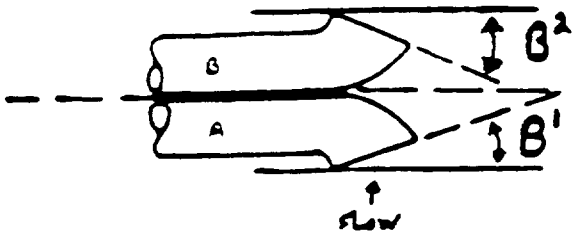
Probe #: 10-2
Date: 7-31-92
Initials: [illegible]

① 

a^1 = 45°
a^2 = 0°
$a^1, a^2 = <10°$

B^1 = 0.5°
B^2 = 0.5°
$B^1, B^2, = <5°$

F = 0.909"

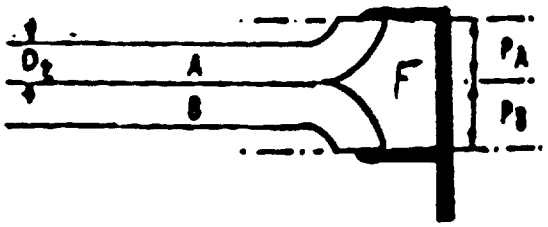
② 

μ = 0 — $\mu = \leq 0.1250"$ ($\mu = F \tan \gamma$)

V = 0 — $V = \leq 0.03125"$ ($V = F \tan \theta$)

W = 0.221 — $W \geq 0"$

X = 0.954 — $X \geq 0.750"$ (3/4" using 1/2" nozzle)

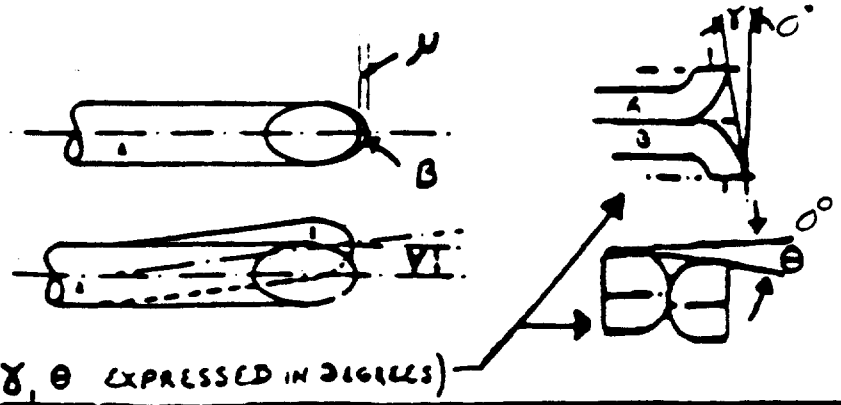
③ 

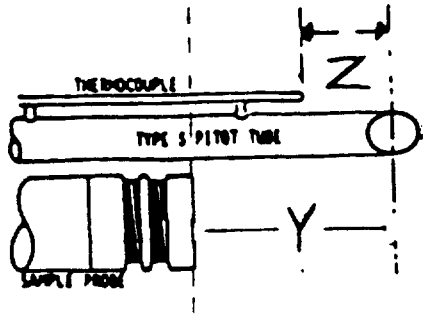
$1.05\ D_t \leq A \leq 1.50\ D_t$
$P_A = P_B$
$2.10\ D_t \leq A \leq 3.00\ D_t$

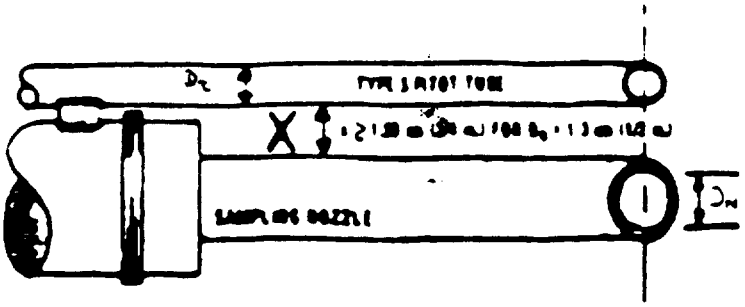
Y = 3.761 — $Y \geq 3.0"$

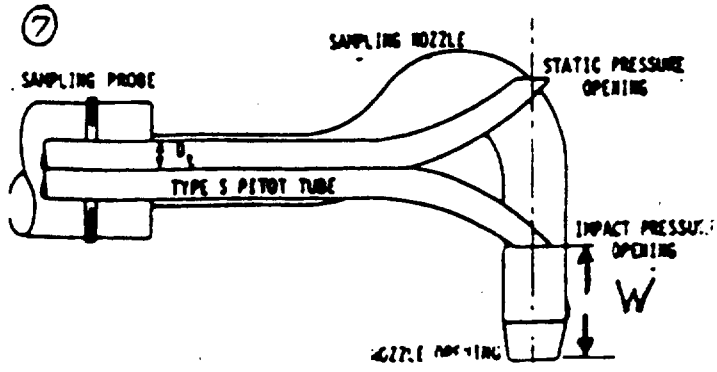
Z = 2.771 — $Z > 2.0"$

D_t = 0.375 — $D_t > .1875"$ to $.375"$ (3/16" to 3/8")

④ 

⑥ 

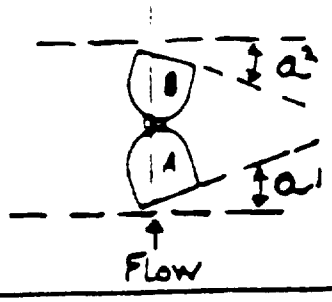
⑤ 

⑦ 

GEOMETRIC PITOT CALIBRATION

Caliper # XCF-59
Precheck
Post Check 4

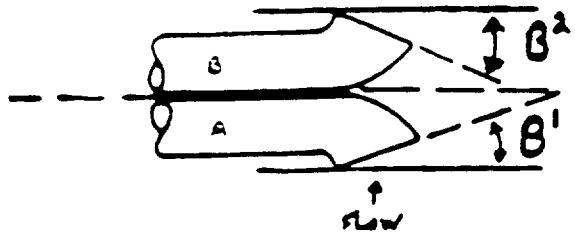
Probe #: 10-3
Date: 7-31-92
Initials: KMT

① 

a¹ = 5.0°
a² = 1.0°
a¹, a² = <10°

B¹ = 1.0°
B² = 1.5°
B¹, B², = <5°

F = 0.996"

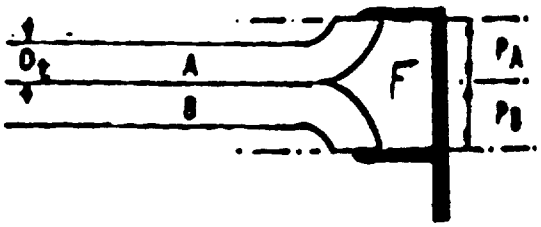
② 

μ = 0 — μ = ≤ 0.1250" (μ = F TAN γ)

V = 0 — V = ≤0.03125" (V = F TAN θ)

W = 0.127 — W ≥ 0"

X = 1.089 — X ≥ 0.750" (3/4" using 1/2" nozzle)

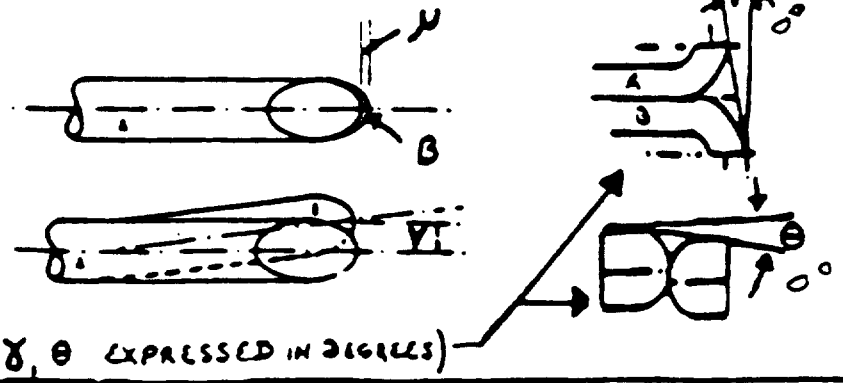
③ 

1.05 D_t < A < 1.50 D_t
$P_A = P_B$
2.10 D_t < B < 3.00 D_t

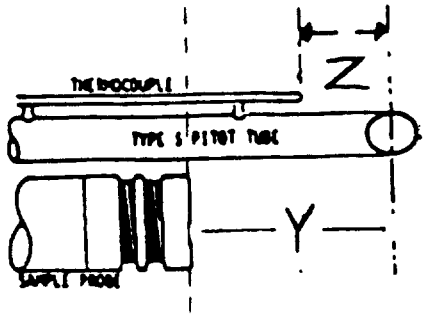
Y = 5.856 — Y ≥ 3.0"

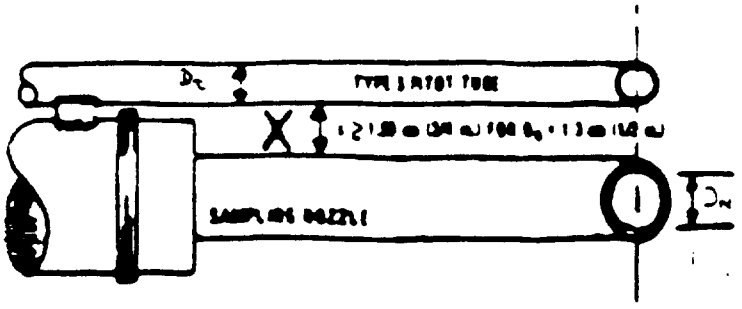
Z = 2.659 — Z > 2.0"

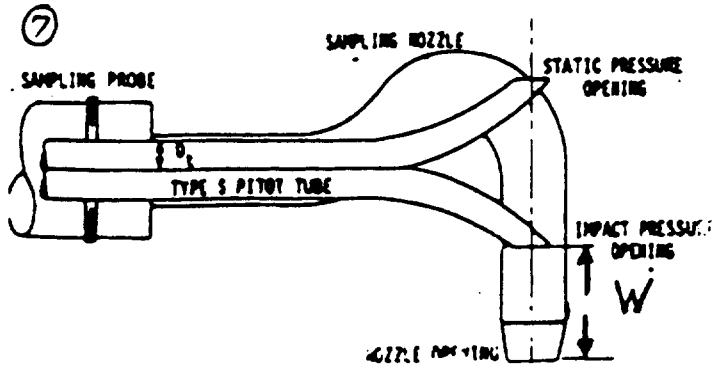
D_t = 0.375 — D_t > .1875" to .375" (3/16" to 3/8")

④ 

(γ, θ EXPRESSED IN DEGREES)

⑥ 

⑤ 

⑦ 

COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX D

FIELD DATA SHEETS

KEYSTONE
ENVIRONMENTAL RESOURCES LTD.

STACK SAMPLING DATA SHEET

CLIENT USS Clairton Works | TEST DATE 7-30-92 | ORIFICE CORRECTION 1.756 | HOT BOX NO. 2
TEST UNIT #19 Battery Stack | TEST NO. CLR-19CS-1 | METER CORRECTION 0.9721 | COLD BOX NO. 2
PROJECT NO. 60505801 | NOZZLE (SIZE,#) 0.428" #50 | CALIBRATION DATE 6-3-92 | PROBE NO. 10-3 (5-18-92)
CONTROL BOX OPERATOR DB | STATIC PRESSURE -1.4 | PITOT CORRECTION 0.84 | FILTER NO. 847
BAROMETRIC PRESSURE 29.34 | PORT DIRECTION C,B,A | CONTROL BOX NO. 4 | STACK DIA. 186"

	Traverse Point (inches)	Time	Dry Gas Meter Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Req'd. (in. H20)	Orifice ΔH Act. (in. H20)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°C/°F)	Hot Box Temp. (°F)	Comments
C	66.2	800	010.220	0.025	0.40	0.40	69	67	3.0	501	250	ICE BATH 48°F	250	5 min/pt
	46.5			0.030	0.47	0.45	69	69	3.0	500				
	33.0			0.030	0.47	0.45	74	74	3.0	497				
	22.0			0.025	0.40	0.40	74	75	3.0	501				
	12.5			0.025	0.40	0.40	77	77	3.0	500				
C	4.0	837	022.147	0.025	0.40	0.40	77	77	3.0	498				
B	66.2	840	022.147	0.025	0.40	0.40	78	78	3.0	480				
	46.5			0.025	0.40	0.40	80	80	3.0	475				
	33.0			0.02	0.31	0.30	82	83	2.5	510				
	22.0			0.015	0.24	0.25	83	84	2.0	506				
	12.5			0.015	0.24	0.25	83	85	2.5	503				
B	4.0	910	031.833	0.010	0.16	0.15	85	83	2.0	510				
A	66.2	915	031.833	0.015	0.24	0.25	84	85	2.5	480				Tstk = 490
	46.5	920		0.010	0.16	0.15	84	86	2.0	482				Pbar = -1.4
	33.0	925		0.010	0.16	0.15	84	87	2.0	450				Estimates:
	22.0	930		0.010	0.16	0.15	84	87	2.0	453				MW= 28
	12.5	935		0.020	0.31	0.30	84	87	2.5	470				%H2O= 12.0
A	4.0	945	040.118	0.010	0.16	0.16	85	88	2.0	483				

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DGM Rate (cfm)
Before	5.0	0.014
After	5.5	0.004

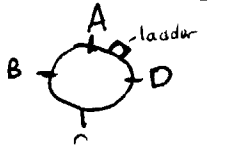
PITOT LEAK CHECK

	Positive	Negative
Before	OK 15sec	OK 15sec
After		

	1	2
CO2	3.5	3.5
O2	13.5	13.5
CO		
N2		

Impinger No.	Impinger Contents	Final	Initial	Difference
1.	100mL DI H_2O	670.6	549.8	120.8
2.	"	582.2	569.7	12.5
3.	Empty	390.6	389.2	1.4
4.	Silica Gel	648.6	641.3	7.3
5.				

Pt 837



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

CLIENT USS Clairton Works | TEST DATE 7-30-92 | ORIFICE CORRECTION 1.756 | HOT BOX NO. 2
TEST UNIT #19 Battery Stack | TEST NO. CLR-1905-1 | METER CORRECTION 0.9721 | COLD BOX NO. 2
PROJECT NO. 605058-01 | NOZZLE (SIZE,#) 0.428 #50 | CALIBRATION DATE 6-3-92 | PROBE NO. 10-3
CONTROL BOX OPERATOR DB | STATIC PRESSURE -1.4 | PITOT CORRECTION 0.84 | FILTER NO. 847
BAROMETRIC PRESSURE 29.34 | PORT DIRECTION D | CONTROL BOX NO. 4 | STACK DIA. 186"

	Traverse Point (inches)	Time	Dry Gas Meter Reading (dcf)	Pitot Δ P (in. H2O)	Orifice Δ H Req'd. (in. H2O)	Orifice Δ H Act. (in. H2O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°C/°F)	Hot Box Temp. (°F)	Comments
D	66.2	949	040.118	0.045	0.71	0.70	85	86	3.5	476				5 min/pt
	46.5	5		0.060	0.94	0.95	86	89	4.0	484				
	33.0	10		0.05	0.79	0.80	88	89	4.0	481				
	22.0	15		0.05	0.79	0.80	89	90	4.0	478				
	12.5	20		0.04	0.63	0.65	90	90	3.5	504				
D	4.0	1019 20	065.372	0.02	0.31	0.30	90	91	3.0	496				
														Estimates:
														MW= 28
														%H2O= 12.0

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DGM Rate (cfm)
Before		
After		

PITOT LEAK CHECK

	Positive	Negative
Before		
After		

	1	2
CO2		
O2		
CO		
N2		

Impinger No.	Impinger Contents	Final	Initial	Difference
1.				
2.				
3.				
4.				
5.				

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

16.

STACK SAMPLING DATA SHEET

CLIENT USS Clairton Works	TEST DATE 7-30-92	ORIFICE CORRECTION 1.756	HOT BOX NO. 6
TEST UNIT #19 Battery Stack	TEST NO. CLR-19CS-2	METER CORRECTION 0.9721	COLD BOX NO. 6
PROJECT NO. 605058-01	NOZZLE (SIZE,#) 0.428 #56	CALIBRATION DATE 6-3-92	PROBE NO. 10-2 (5-18-92)
CONTROL BOX OPERATOR	STATIC PRESSURE -1.4	PITOT CORRECTION ~~0.84~~ 0.84	FILTER NO. 846
BAROMETRIC PRESSURE 29.34	PORT DIRECTION D,A,B	CONTROL BOX NO. 4	STACK DIA. 186"

	Traverse Point (inches)	Time	Dry Gas Meter Reading (dcf)	Pitot ΔP (in. H2O)	Orifice ΔH Req'd. (in. H20)	Orifice ΔH Act. (in. H20)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°C/°F)	Hot Box Temp. (°F)	Comments
D	66.2	1048	056.052	0.050	0.79	0.80	89	90	3.0	507	250	Ice Bath 268°F	250	5 min/pt
	46.5			0.065	1.06	1.05	91	92	3.5	498				
	33.0			0.05	0.82	0.80	92	93	3.0	485				
	22.0			0.055	0.90	0.90	92	93	3.0	477				
	12.5			0.045	0.73	0.75	92	93	3.0	480				
D	4.0	1118	072.329	0.040	0.65	0.65	92	93	3.0	479				
A	66.2	1122	072.329	0.030	0.49	0.50	91	93	3.0	439				
	46.5			0.035	0.57	0.60	92	94	3.0	470				
	33.0			0.025	0.41	0.40	92	94	3.0	462				
	22.0			0.020	0.33	0.35	92	94	2.5	459				
	12.5			0.020	0.33	0.35	94	95	2.5	447				Delay
A	4.0	1162	084.311	0.025	0.41	0.40	93	95	2.5	451				Replace heater
B	66.2	1219	084.311	0.025	0.41	0.40	91	94	3.0	507				cone assembly
	46.5			0.020	0.33	0.35	92	93	3.0	493				
	33.0			0.015	0.24	0.25	91	93	3.0	488				Estimates:
	22.0			0.020	0.33	0.35	91	93	2.5	479				MW= 28
	12.5			0.010	0.16	0.15	92	93	2.5	463				%H2O= 12.0
B	4.0	1249	093.607	0.005	0.08	0.10	92	94	2.0	481				

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DGM Rate (cfm)
Before	5.0	0.012
After	5.0	0.006

PITOT LEAK CHECK

	Positive	Negative
Before		
After		

	1	2
CO2	3.0	3.0
O2	14.0	13.5
CO		
N2		

Impinger No.	Impinger Contents	Final	Initial	Difference
1.	100mL DI H2O	673.3	549.8	123.5
2.	"	563.8	549.7	14.1
3.	Empty	399.0	397.2	1.8
4.	Silica Gel	679.5	670.7	8.8
5.				

AQE 2/92

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

CLIENT USS Clairton Works | TEST DATE 7-30-92 | ORIFICE CORRECTION 1.766 | HOT BOX NO. 6
TEST UNIT #19 Battery Stack | TEST NO. CLR-19CS-2 | METER CORRECTION 0.9721 | COLD BOX NO. 6
PROJECT NO. 605058-01 | NOZZLE (SIZE,#) 0.428 #56 | CALIBRATION DATE 6-3-92 | PROBE NO. 10-2
CONTROL BOX OPERATOR DB | STATIC PRESSURE -1.4 | PITOT CORRECTION 0.84 | FILTER NO. 846
BAROMETRIC PRESSURE 29.34 | PORT DIRECTION C | CONTROL BOX NO. 4 | STACK DIA. 186"

	Traverse Point (inches)	Time	Dry Gas Meter Reading (dcf)	Pitot Δ P (in. H2O)	Orifice Δ H Req'd. (in. H2O)	Orifice Δ H Act. (in. H2O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°C/°F)	Hot Box Temp. (°F)	Comments
C	66.2	1254	093.607	0.020	0.33	0.35	93	95	2.5	451				5 min/pt
	46.5			0.025	0.41	0.40	94	96	3.0	469				
	33.0			0.030	0.49	0.50	95	97	3.0	493				
	22.0			0.025	0.41	0.40	97	95	3.0	523				
	12.5			0.020	0.33	0.35	94	96	3.0	489				
C	4.0	1324	104.543	0.010	0.16	0.15	94	96	2.5	485				
														Estimates:
														MW= 28
														%H2O= 12.0

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DGM Rate (cfm)
Before		
After		

PITOT LEAK CHECK

	Positive	Negative
Before		
After		

	1	2
CO2		
O2		
CO		
N2		

Impinger No.	Impinger Contents	Final	Initial	Difference
1.				
2.				
3.				
4.				
5.				

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

CLIENT USS Clairton Works	TEST DATE 7-30-92	ORIFICE CORRECTION 1.756	HOT BOX NO. 8
TEST UNIT #19 Battery Stack	TEST NO. CLR-19CS-3	METER CORRECTION 0.9721	COLD BOX NO. 8
PROJECT NO. 6050558-01	NOZZLE (SIZE,#) 0.428 #50	CALIBRATION DATE 6-3-92	PROBE NO. 10-3 (5-18-92)
CONTROL BOX OPERATOR DB	STATIC PRESSURE -1.4	PITOT CORRECTION 0.84	FILTER NO. 850
BAROMETRIC PRESSURE 29.34	PORT DIRECTION C,B,A	CONTROL BOX NO. 4	STACK DIA. 186"

	Traverse Point (inches)	Time	Dry Gas Meter Reading (dcf)	Pitot Δ P (in. H2O)	Orifice Δ H Req'd. (in. H20)	Orifice Δ H Act. (in. H20)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°C/°F)	Hot Box Temp. (°F)	Comments
C	66.2	1410	104.770	0.015	0.24	0.25	91	93	2.0	511	250	Ice Bath	250	5 min/pt
	46.5			0.015	0.24	0.25	92	94	2.0	485		<68°F		
	33.0			0.015	0.24	0.25	93	93	2.5	441				
	22.0			0.02	0.33	0.35	93	94	2.5	461				
	12.5			0.02	0.33	0.35	93	95	2.5	453				
C	4.0	1440	115.788	0.08	1.31	1.30	94	95	3.5	470				
B	66.2	1443	115.788	0.025	0.41	0.40	95	96	2.5	441				
	46.5			0.025	0.41	0.40	96	97	2.5	437				
	33.0			0.015	0.24	0.25	97	99	2.5	448				
	22.0			0.015	0.24	0.25	99	100	2.5	451				
	12.5			0.02	0.33	0.35	99	101	3.0	447				
B	4.0	1513	125.755	0.01	0.16	0.15	100	102	2.0	460				
A	66.2	1525	125.755	0.02	0.33	0.35	101	99	2.5	434				
	46.5			0.01	0.16	0.15	100	102	2.0	471				
	33.0			0.02	0.33	0.35	100	101	2.5	442				
	22.0		0.03	0.015	0.51	0.50	99	101	3.0	459				Estimates:
	12.5			0.02	0.33	0.35	98	100	2.5	463				MW= 28.0
A	4.0	1555	136.271	0.03	0.51	0.50	99	101	3.0	471				%H2O= 12.0

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DGM Rate (cfm)
Before	5.0	0.019
After	5.0	0.012

PITOT LEAK CHECK

	Positive	Negative
Before	OK 15sec	OK 15sec
After	OK 15sec	OK 15sec

	1	2
CO2	2.5	3.0
O2	14.0	14.0
CO		
N2		

Impinger No.	Impinger Contents	Final	Initial	Difference
1.	100mL DI H2O	651.1	541.3	109.8
2.	"	545.1	535.4	9.7
3.	Empty	445.6	444.4	1.2
4.	Silica Gel	588.8	580.6	8.2
5.				

KEYSTONE ENVIRONMENTAL RESOURCES, INC

STACK SAMPLING DATA SHEET

CLIENT USS Clairton Works | TEST DATE 7-30-92 | ORIFICE CORRECTION 1.756 | HOT BOX NO. 8
TEST UNIT #19 Battery Stack | TEST NO. CLR-19C5-3 | METER CORRECTION 0.9721 | COLD BOX NO. 8
PROJECT NO. 605058-01 | NOZZLE (SIZE,#) 0.428 #50 | CALIBRATION DATE 6-3-92 | PROBE NO. 10-3
CONTROL BOX OPERATOR DB | STATIC PRESSURE -1A | PITOT CORRECTION 0.84 | FILTER NO. 850
BAROMETRIC PRESSURE 29.34 | PORT DIRECTION D | CONTROL BOX NO. 4 | STACK DIA. 186"

	Traverse Point (inches)	Time	Dry Gas Meter Reading (dcf)	Pitot Δ P (in. H2O)	Orifice Δ H Req'd. (in. H2O)	Orifice Δ H Act. (in. H2O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°C/°F)	Hot Box Temp. (°F)	Comments
D	66.2	1600	136.271	0.045	0.77	0.75	96	98	3.0	440				
	46.5			0.05	0.85	0.85	97	98	3.5	449				5 min/pt.
	33.0			0.06	0.85	0.85	97	98	3.5	457				
	22.0			0.045	0.77	0.76	97	98	3.5	463				
	12.5			0.035	0.60	0.60	96	98	3.0	472				
D	4.0	1630	151.376	0.025	0.43	0.45	96	98	3.0	480				

Estimates:
MW= 28.0
%H2O= 12.0

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DGM Rate (cfm)
Before		
After		

PITOT LEAK CHECK

	Positive	Negative
Before		
After		

	1	2
CO2		
O2		
CO		
N2		

Impinger No.	Impinger Contents	Final	Initial	Difference
1.				
2.				
3.				
4.				
5.				

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX E

EMISSIONS CALCULATIONS

KEYSTONE
ENVIRONMENTAL RESOURCES LTD.

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
#19 COMBUSTION STACK COMPLIANCE TES

DATE: 7-30-92
CHARGE #: ...150-605058
TEST #: CLR-19CS-1

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00602	3.27360

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2. STACK CONDITIONS

FLOW (ACFM)	135267.
(SCFM)	73600.
MOISTURE CONTENT (%)	13.76
STACK TEMPERATURE (F)	488.3

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	41.976
PERCENT ISOKINETIC	104.08

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-1 7-30-92

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
66.2C	807.0	10.220	.025	.40	.40	69.	67.	3.0	501.	12.4
46.5			.030	.47	.45	69.	69.	3.0	500.	13.5
33.0			.030	.47	.45	74.	74.	3.0	497.	13.5
22.0			.025	.40	.40	74.	75.	3.0	501.	12.4
12.5			.025	.40	.40	77.	77.	3.0	500.	12.4
4.0C	837.0	22.147	.025	.40	.40	77.	77.	3.0	498.	12.3
66.2B	840.0	22.147	.025	.40	.40	78.	78.	3.0	480.	12.2
			.025	.40	.40	80.	80.	3.0	475.	12.2
			.020	.31	.30	82.	83.	2.5	510.	11.1
			.015	.24	.25	83.	84.	2.0	506.	9.6
			.015	.24	.25	83.	85.	2.5	503.	9.6
4.0B	910.0	31.833	.010	.16	.15	85.	83.	2.0	510.	7.9
66.2A	915.0	31.833	.015	.24	.25	84.	85.	2.5	480.	9.5
			.010	.16	.15	84.	86.	2.0	482.	7.7
			.010	.16	.15	84.	87.	2.0	450.	7.6
			.010	.16	.15	84.	87.	2.0	453.	7.6
			.020	.31	.30	84.	87.	2.5	470.	10.9
4.0A	945.0	40.118	.010	.16	.15	85.	88.	2.0	483.	7.7
66.2D	949.0	40.118	.045	.71	.70	85.	86.	3.5	476.	16.4
			.060	.94	.95	86.	89.	4.0	484.	19.0
			.050	.79	.80	88.	89.	4.0	481.	17.3
			.050	.79	.80	89.	90.	4.0	478.	17.3
			.040	.63	.65	90.	90.	3.5	504.	15.7
4.0D	1019.0	55.372	.020	.31	.30	90.	91.	3.0	496.	11.0

O R S A T		IMPINGER NO.	
CO2	3.5	1	120.8
O2	13.5	2	12.5
CO	.0	3	1.4
N	83.0	4	.0
		ABSORBED H2O	7.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.756	6-3-92
METER	0.9721	6-3-92
PITOT	0.84	5-18-92

LEAK CHECK

	RATE	IN.HG
INITIAL	0.014 CFM	5.0
FINAL	0.004 CFM	5.5

CONTROL BOX NO. 4 PROBE NO. 10-3 NOZZLE NO. 50

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-1 7-30-92

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.	29.34
B.	AVG. DELTA H (IN H2O)	.40
C.	METER PRESSURE (IN. HG.)	29.37
D.	STATIC PRESSURE (IN. H2O)	-1.40
E.	STATIC PRESSURE (IN. HG.)	-.103
F.	STACK PRESSURE (IN. HG.) (A+E)	29.24
G.	STACK DIAMETER (IN.)	186.00
H.	STACK AREA (SQ. FT.)	188.69
	NOZZLE DIAMETER	.4280
I.	NOZZLE AREA (SQ. FT.)	.000999
J.	AVG. STACK TEMP (DEG. R.)	948.3
K.	AVG. METER TEMP (DEG. R.)	542.3
L.	CONDENSATE VOL. (ML)	134.7
M.	ABSORBED H2O (ML)	7.3
N.	TOTAL H2O (ML)	142.0
O.	METERED GAS (CF)	45.152
P.	GAS METER CORRECTION	.9721
Q.	CORRECTED METERED GAS (CF)	43.892
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	7.001
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	50.893
T.	PERCENT H2O (100R/S)	13.76
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	13.76
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	41.976

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-T/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	.035	X	.8624	X	44.0	=	1.33
CO	.000	X	.8624	X	28.0	=	.00
O2	.135	X	.8624	X	32.0	=	3.73
N2	.830	X	.8624	X	28.2	=	20.19
H2O		X	T/100= .1376	X	18.0	=	2.48
					MOLECULAR WEIGHT OF STACK GAS	=	27.72

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	11.95
Y.	AVG. FLOW RATE (CFM) (X*H*60)	135267.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	73600.
	STACK FLOW RATE (DRY)	63475.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	104.08

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-1 7-30-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.01120	.00000	.00520

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

PARTICULATE	.01640
ALL MATLS.	.01640

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00602	3.27360

Emission rates are based on EPA Method 5.

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
#19 COMBUSTION STACK COMPLIANCE TES

DATE: 7-30-92
CHARGE #: ...150-605058
TEST #: CLR-19CS-2

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00787	4.55489

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2. STACK CONDITIONS

FLOW (ACFM)	142115.
(SCFM)	78160.
MOISTURE CONTENT (%)	13.65
STACK TEMPERATURE (F)	478.1

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	44.203
PERCENT ISOKINETIC	103.08

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-2 7-30-92

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	1048.0	56.052	.050	.79	.80	89.	90.	3.0	507.	17.6
46.5			.055	1.06	1.05	91.	92.	3.5	498.	18.3
33.0			.050	.82	.80	92.	93.	3.0	485.	17.4
22.0			.055	.90	.90	92.	93.	3.0	477.	18.1
12.5			.045	.73	.75	92.	93.	3.0	480.	16.4
4.0D	1118.0	72.329	.040	.65	.65	92.	93.	3.0	479.	15.5
66.2A	1122.0	72.329	.030	.49	.50	91.	93.	3.0	439.	13.1
			.035	.57	.60	92.	94.	3.0	470.	14.4
			.025	.40	.40	92.	94.	3.0	462.	12.1
			.020	.33	.35	92.	94.	2.5	459.	10.8
			.020	.33	.35	94.	95.	2.5	447.	10.8
4.0A	1152.0	84.311	.025	.41	.40	93.	95.	2.5	451.	12.0
66.2B	1219.0	84.311	.025	.41	.40	91.	94.	3.0	507.	12.4
			.020	.33	.35	92.	93.	3.0	493.	11.0
			.015	.24	.25	91.	93.	3.0	488.	9.5
			.020	.33	.35	91.	93.	2.5	479.	10.9
			.010	.16	.15	92.	93.	2.5	463.	7.7
4.0B	1249.0	93.607	.005	.08	.10	92.	94.	2.0	481.	5.5
66.2C	1254.0	93.607	.020	.33	.35	93.	95.	2.5	451.	10.8
			.025	.41	.40	94.	96.	3.0	469.	12.2
			.030	.49	.50	95.	97.	3.0	493.	13.5
			.025	.41	.40	97.	95.	3.0	523.	12.5
			.020	.33	.35	94.	96.	3.0	489.	11.0
4.0C	1324.0	104.543	.010	.16	.15	94.	96.	2.5	485.	7.8

O R S A T			
CO2	3.0	IMPINGER NO. 1	123.5
O2	13.8	2	14.1
CO	.0	3	1.8
N	83.3	4	.0
		ABSORBED H2O	8.8

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.756	6-3-92
METER	0.9721	6-3-92
PITOT	0.84	5-18-92

LEAK CHECK

	RATE	IN.HG
INITIAL	0.012 CFM	5.0
FINAL	0.006 CFM	5.0

CONTROL BOX NO. 4 PROBE NO. 10-2 NOZZLE NO. 56

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-2 7-30-92

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.34
B.	AVG. DELTA H (IN H2O).....	.47
C.	METER PRESSURE (IN. HG.).....	29.37
D.	STATIC PRESSURE (IN. H2O).....	-1.40
E.	STATIC PRESSURE (IN. HG.).....	-.103
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.24
G.	STACK DIAMETER (IN.).....	186.00
H.	STACK AREA (SQ. FT.).....	188.69
	NOZZLE DIAMETER.....	.4280
I.	NOZZLE AREA (SQ. FT.).....	.000999
J.	AVG. STACK TEMP (DEG. R.).....	938.1
K.	AVG. METER TEMP (DEG. R.).....	553.2
L.	CONDENSATE VOL. (ML).....	139.4
M.	ABSORBED H2O (ML).....	8.8
N.	TOTAL H2O (ML).....	148.2
O.	METERED GAS (CF).....	48.491
P.	GAS METER CORRECTION.....	.9721
Q.	CORRECTED METERED GAS (CF).....	47.138
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	7.451
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	54.590
T.	PERCENT H2O (100R/S).....	13.65
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	13.65
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	44.203

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-T/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	.030	X	.8635	X	44.0	=	1.14
CO	.000	X	.8635	X	28.0	=	.00
O2	.138	X	.8635	X	32.0	=	3.80
N2	.832	X	.8635	X	28.2	=	20.27
H2O		X	T/100= .1365	X	18.0	=	2.46
					MOLECULAR WEIGHT OF STACK GAS	=	27.67

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	12.55
	[85.49*W*SQRT{(J*DELTA P)/(V*F)}]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	142115.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	78160.
	STACK FLOW RATE (DRY).....	67491.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	103.08
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-2 7-30-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.01280	.00000	.00980

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

PARTICULATE	.02260
ALL MATLS.	.02260

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00787	4.55489

Emission rates are based on EPA Method 5.

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
#19 COMBUSTION STACK COMPLIANCE TES

DATE: 7-30-92
CHARGE #: ...150-605058
TEST #: CLR-19CS-3

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00489	2.83623

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2. STACK CONDITIONS

FLOW (ACFM)	137738.
(SCFM)	77364.
MOISTURE CONTENT (%)	12.60
STACK TEMPERATURE (F)	458.6

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	42.170
PERCENT ISOKINETIC	98.15

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-3 7-30-92

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
66.2C	1410.0	104.770	.015	.24	.25	91.	93.	2.0	511.	9.6
46.5			.015	.24	.25	92.	94.	2.0	485.	9.5
33.0			.015	.24	.25	93.	93.	2.5	441.	9.3
22.0			.020	.33	.35	93.	94.	2.5	461.	10.8
12.5			.020	.33	.35	93.	95.	2.5	453.	10.8
4.0C	1440.0	115.788	.080	1.31	1.30	94.	95.	3.5	470.	21.7
66.2B	1443.0	115.788	.025	.41	.40	95.	96.	2.5	441.	12.0
			.025	.41	.40	96.	97.	2.5	437.	11.9
			.015	.24	.25	97.	99.	2.5	448.	9.3
			.015	.24	.25	99.	100.	2.5	451.	9.3
			.020	.33	.35	99.	101.	3.0	447.	10.7
4.0B	1513.0	125.755	.010	.16	.15	100.	102.	2.0	460.	7.6
66.2A	1525.0	125.755	.020	.33	.35	101.	99.	2.5	434.	10.7
			.010	.16	.15	100.	102.	2.2	471.	7.7
			.020	.33	.35	100.	101.	2.5	442.	10.7
			.030	.51	.50	99.	101.	3.0	459.	13.2
			.020	.33	.35	98.	100.	2.5	463.	10.8
4.0A	1555.0	136.271	.030	.51	.50	99.	101.	3.0	471.	13.3
66.2D	1600.0	136.271	.045	.77	.75	96.	98.	3.0	440.	16.0
			.050	.85	.85	97.	98.	3.5	449.	17.0
			.050	.85	.85	97.	98.	3.5	457.	17.1
			.045	.77	.75	97.	98.	3.5	463.	16.2
			.035	.60	.60	96.	98.	3.0	472.	14.4
4.0D	1630.0	151.376	.025	.43	.45	96.	98.	3.0	480.	12.2

O R S A T			
CO2	2.8	IMPINGER NO. 1	109.8
O2	14.0	2	9.7
CO	.0	3	1.2
N	83.3	4	.0
		ABSORBED H2O	8.2

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.756	6-3-92
METER	0.9721	6-3-92
PITOT	0.84	5-18-92

LEAK CHECK

	RATE	IN.HG
INITIAL	0.019 CFM	5.0
FINAL	0.012 CFM	5.0

CONTROL BOX NO. 4 PROBE NO. 10-3 NOZZLE NO. 50

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-3 7-30-92

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.34
B.	AVG. DELTA H (IN H2O)	.46
C.	METER PRESSURE (IN. HG.)	29.37
D.	STATIC PRESSURE (IN. H2O)	-1.40
E.	STATIC PRESSURE (IN. HG.)	-.103
F.	STACK PRESSURE (IN. HG.) (A+E)	29.24
G.	STACK DIAMETER (IN.)	186.00
H.	STACK AREA (SQ. FT.)	188.69
	NOZZLE DIAMETER	.4280
I.	NOZZLE AREA (SQ. FT.)	.000999
J.	AVG. STACK TEMP (DEG. R.)	918.6
K.	AVG. METER TEMP (DEG. R.)	557.3
L.	CONDENSATE VOL. (ML)	120.7
M.	ABSORBED H2O (ML)	8.2
N.	TOTAL H2O (ML)	128.9
O.	METERED GAS (CF)	46.606
P.	GAS METER CORRECTION	.9721
Q.	CORRECTED METERED GAS (CF)	45.306
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	6.529
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	51.835
T.	PERCENT H2O (100R/S)	12.60
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.60
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	42.170

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100		MOISTURE CORRECTION (1-T/100)		MOLECULAR WEIGHT		WEIGHT PER MOLE
CO2	.027	X	.8740	X	44.0	=	1.06
CO	.000	X	.8740	X	28.0	=	.00
O2	.140	X	.8740	X	32.0	=	3.92
N2	.832	X	.8740	X	28.2	=	20.52
H2O		X	T/100= .1260	X	18.0	=	2.27
					MOLECULAR WEIGHT OF STACK GAS	=	27.76

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	12.17
Y.	AVG. FLOW RATE (CFM) (X*H*60)	137738.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	77364.
	STACK FLOW RATE (DRY)	67619.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	98.15

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #19 COMBUSTION STACK
CLR-19CS-3 7-30-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.00940	.00000	.00400

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

PARTICULATE	.01340
ALL MATLS.	.01340

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00489	2.83623

Emission rates are based on EPA Method 5.

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

ANALYTICAL REPORTING FORM

CLIENT USS ~~USX~~ - Clairton Steel
PLANT LOCATION #19 Combustion Stack
PROJECT NUMBER 605058-01
UNIT TESTED #19CS

TEST DATE 7/30/92
DATE RECEIVED 7/31/92
DATE ANALYZED 8/3/92
ANALYTICAL METHOD EPA METHOD 5

Test Number	Component	Cyclone Weight Units ( )	Filter Weight Units (GRAMS)	Insoluble Portion of Front Half Units ( )	0.22μ Filter Insoluble Portion of Back Half Units ( )	Soluble Portion of Back Half Units ( )	Soluble Portion of Front Half Units (GRAMS)	Chloroform/ Ethyl Ether Extract Units ( )
CLR-19CS-1	Particulate		0.0112				0.0060	
							(0.0052)	
CLR-19CS-2	Particulate		0.0128				0.0106	
							(0.0098)	
CLR-19CS-3	Particulate		0.0094				0.0048	
							(0.0040)	
CLR-19CS-Acet-Blk.	Particulate						0.0008	

Extraction Method —
Solvent —

Analyst's Signature Patricia Stockton
Date 8/3/92

Comments ~~None~~ Soluble front half weights in parentheses equal sample weight less the acetone blank.

AQE 3/92

COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX F

VISIBLE EMISSIONS DATA

KEYSTONE
ENVIRONMENTAL RESOURCES LTD.

VISIBLE EMISSIONS OBSERVATIONS FORM

Cty

#19 STACK

OBSERVER: McKoy/Hughes

DATE: 30 July, 1992

FACILITY: USX Clairton works

OBSERVATION: START TIME: 8:00

END TIME: 9:00

OBSERVATION POINT:

Wabash Employee Parking Lot #19

SOURCE: BATTERY draft Stack

DISTANCE: ~550 ft

DIRECTION FROM: S "OF"

HEIGHT: ~200 Ft

WIND:

SPEED: 5 m.p.H

DIRECTION: ≥ South

TEMPERATURE: 64°

SKY CONDITION: over Cast

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 15%

CREW: [illegible] FOREMAN: R. Smith

COMMENTS:

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

Cty

VISIBLE EMISSIONS OBSERVATIONS FORM

#19 STACK

OBSERVER: McKay / Cost A

DATE: 30 July 1992

FACILITY: US Clairton Works

OBSERVATION: START TIME: 9:00

END TIME: 10:00

OBSERVATION POINT:

Wabash Bath House Lot #19

SOURCE: Battery Draft Stack Ended

DISTANCE: ~ 550 ft

DIRECTION FROM: S 0 ft "

HEIGHT: ~ 200 ft

WIND:

SPEED: 5 - m.p.h

DIRECTION: → S

TEMPERATURE: 67°

SKY CONDITION: Cloudy

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 15%

CREW: D FOREMAN: R. Smith

COMMENTS:

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

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy / Costa (City)

DATE: 30 July 1992

FACILITY: USS Clairton Works

OBSERVATION: START TIME: 10:00

END TIME: 11:00

OBSERVATION POINT:

Wabash Bath House Lot #19

SOURCE: Battery Draft Stack

DISTANCE: ~550 Ft

DIRECTION FROM: S to E

HEIGHT: ~200 Ft

WIND:

SPEED: Calm-P-A

DIRECTION: → S-E

TEMPERATURE: 67°

SKY CONDITION: Cloudy

BACKGROUND: SKY

READING CONDITIONS: Rain

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 10%

CREW: 1 FOREMAN: R. Smith

COMMENTS: ---

#19 STACK

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	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	Start (2 P.D)
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	End
18	0	0	0	0	
19	0	0	0	0	
20	0	0	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	5	5	5	5	
32	5	5	5	5	
33	5	5	5	5	
34	5	5	5	5	
35	5	5	5	5	
36	5	5	5	5	
37	5	5	5	5	
38	5	5	5	5	
39	5	5	5	5	
40	5	5	5	5	
41	5	5	10	5	
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: McKay/CK/CosTA

DATE: 30 July 1992

FACILITY: USS Clairton Works

OBSERVATION: START TIME: 11:00

END TIME: 12:00

OBSERVATION POINT:
Wabash Bath House Lot
#19

SOURCE: Battery Draft Stack #19 STACK

DISTANCE: ~550 ft

DIRECTION FROM: S of "

HEIGHT: ~200 ft

WIND:

SPEED: 5 m.p.h.

DIRECTION: → S

TEMPERATURE: 68°

SKY CONDITION: Cloudy

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20%: 0

No. READINGS >= 60%: 0

GREATEST OPACITY: 15%

CREW: D FOREMAN: R. Smith

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

Ended

(2 RA)

30	5	5	5	5
31	5	5	5	5
32	5	5	5	5
33	5	5	5	5
34	5	5	5	5
35	5	5	5	5
36	5	5	5	5
37	5	5	5	5
38	5	5	5	5
39	5	5	5	5
40	5	5	5	5
41	5	5	5	5
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	5	5	5	5

Ended

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay/Costa Cty

DATE: 30 July 1992

FACILITY: USX Clairton Works

OBSERVATION: START TIME: 12:00

END TIME: 1:00

OBSERVATION POINT: Wabash Employee Parking Lot #19

SOURCE: Battery Drop Stack

DISTANCE: ~550 Ft

DIRECTION FROM: S of

HEIGHT: ~200 Ft

WIND:

SPEED: 5-M-P-H

DIRECTION: → S

TEMPERATURE: 74°

SKY CONDITION: Cloudy

BACKGROUND: Sky

READING CONDITIONS: Rain

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20%: 0

No. READINGS >= 60%: 0

GREATEST OPACITY: 15%

CREW: D FOREMAN: R. Smith

COMMENTS:

#19 STACK

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	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	15	15	10
14	10	15	15	15
15	10	10	10	10
16	15	10	10	10
P²B 17	10	10	10	10
18	10	15	10	15
19	15	15	10	10
20	10	10	10	10
21	10	10	5	5
22	5	5	5	5
23	5	5	5	5
24	5	5	5	5
25	5	5	5	5
26	5	5	5	5
27	0	5	0	0
28	5	5	5	0
29	0	0	0	0

30	0	0	0	0
31	5	5	5	5
32	5	5	5	5
33	5	5	5	5
34	5	5	5	5
35	5	5	5	5
36	5	5	5	5
37	5	5	5	5
38	5	5	5	5
39	5	5	5	5
40	5	5	5	5
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
Ended 47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
P²C 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

OBSERVER: Jmckay

DATE: 30 July 1992

FACILITY: USX Clairton Works

OBSERVATION: START TIME: 1:00

END TIME: 2:00

OBSERVATION POINT: Wabash Employee Parking Lot #19

SOURCE: Battery Draft STACK

DISTANCE: ~550 Ft

DIRECTION FROM: S'b E''

HEIGHT: ~200 Ft

WIND:

SPEED: 5-m-p-h

DIRECTION: ⇒ S-E

TEMPERATURE: 74°

SKY CONDITION: Cloudy

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20%: 0

No. READINGS >= 60%: 0

GREATEST OPACITY: 15%

CREW: D FOREMAN: R Smith

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

30	5	5	5	5
31	5	5	5	5
32	5	5	5	5
33	5	5	5	5
34	5	5	5	5
35	5	5	5	5
36	5	5	5	5
37	5	5	5	5
38	5	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

OBSERVER: James E. McKay

DATE: 30 JULY 1992

FACILITY: USE Clinton Works

OBSERVATION: START TIME: 2:00

END TIME: 3:00

OBSERVATION POINT:

Wabash Employee Parking Lot #19

SOURCE: Battery Buff Stack PC 3

DISTANCE: ~ 550 Ft

DIRECTION FROM: S of

HEIGHT: ~ 200 Ft

WIND:

SPEED: 5 - m-p-H

DIRECTION: → S-W

TEMPERATURE: 82°

SKY CONDITION: P Cloudy

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 5%

CREW: D FOREMAN: R. Smith

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

End 3 PB

30	5	5	5	5
31	5	5	5	5
32	5	5	5	5
33	5	5	5	5
34	5	5	5	5
35	5	5	5	5
36	5	5	5	5
37	5	5	5	5
38	5	5	5	5
39	5	5	5	5
40	5	5	5	5
41	5	5	5	5
42	5	5	5	5
43	5	5	5	5
44	5	5	5	5
45	0	0	0	0
46	0	0	5	5
47	5	5	5	5
48	5	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

OBSERVER: James E. McKay

DATE: 30 July, 1992

FACILITY: US Clairton Works

OBSERVATION: START TIME: 3:00

END TIME: 4:00

OBSERVATION POINT: Wabash Employee Works #19

SOURCE: Battery Draft Stack

DISTANCE: ~550 ft

DIRECTION FROM: 5'0F"

HEIGHT: ~200 ft

WIND:

SPEED: 8 m.p.H

DIRECTION: → S E

TEMPERATURE: 84°

SKY CONDITION: Cloudy & Rain

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 15%

CREW: D FOREMAN R. Smith

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	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	5	5	5	10
14	10	10	10	10
15	10	10	10	10
16	10	10	10	10
17	10	10	5	5
18	5	5	5	5
19	5	5	5	5
20	5	5	5	5
21	5	5	5	5
22	5	5	5	5
P3A 23	5	5	5	5
24	10	10	10	10
25	15	15	15	15
26	10	10	10	10
27	10	10	10	10
28	10	10	5	5
29	10	10	5	10

30	10	10	10	10
31	10	10	10	10
32	10	10	10	10
33	10	10	10	10
34	10	10	10	10
35	10	5	5	5
36	5	5	5	5
37	5	5	5	5
38	5	5	5	5
39	5	5	5	5
40	5	5	5	5
41	5	5	5	5
42	5	5	5	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
End P3D 57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

#19 STACK

OBSERVER: James Enckson

DATE: 30 July, 1992

FACILITY: USX Clairton Works

OBSERVATION: START TIME: 4:00

END TIME: 4:30

OBSERVATION POINT: Wabash Employee Parking Lot #19

SOURCE: Boatang Draft Stack

DISTANCE: ~350 Ft

DIRECTION FROM: S'ely

HEIGHT: ~200 Ft

WIND:

SPEED: 7-m-p-H

DIRECTION: → S-E

TEMPERATURE: 80°

SKY CONDITION: Clouds & Rain

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 120

No. READINGS >= 20%: 0

No. READINGS >= 60%: 0

GREATEST OPACITY: 15%

CREW: 1 FOREMAN:

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

End

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				