

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.

AP-42 Section 12.2
Reference _____
Report Sect. 4
Reference 56

revised

¹⁹⁹⁰
**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE
#14 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. 601050-03

NOVEMBER 1990

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ABSTRACT

On June 20, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #14 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 0.012 gr/dscf and 3.31 lb/hr, respectively. The allowable concentration is 0.015 gr/dscf. Thus, the emissions from the stack are in compliance. The visible emissions observed from the stack during the tests were also in compliance.

1.0 INTRODUCTION

On June 20, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #14 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, Daniel Keller, and John Shimshock of Keystone, and Richard Casselberry of Environmental Technical Services (ETS). Keystone and ETS are sister companies under the Chester Environmental Group. Visible emissions determinations were performed by Jim McKoy of ETS. All test procedures were witnessed by Phil Lawrence of the Allegheny County Health Department.

2.0 METHODOLOGIES

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

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

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

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

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



3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146

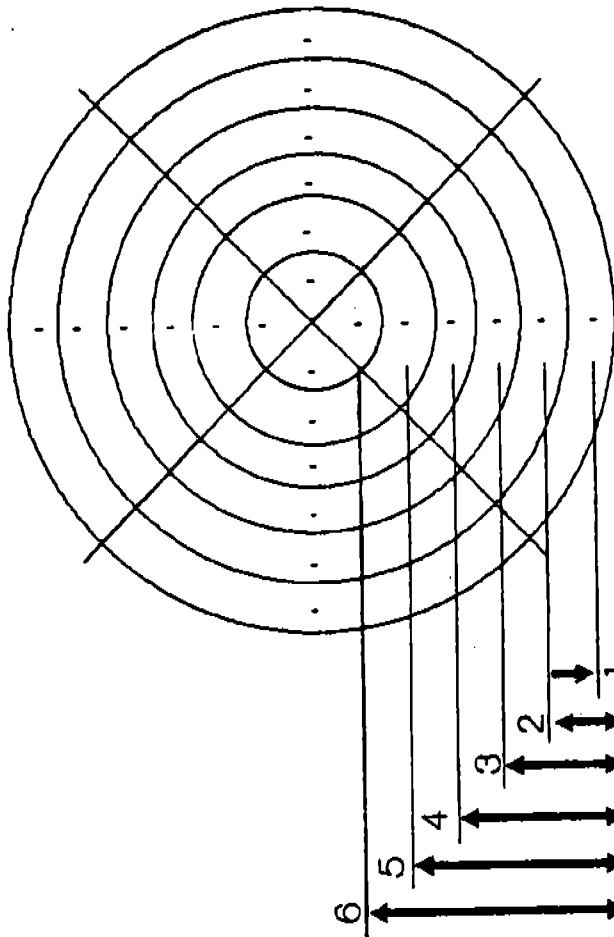
SKETCH SHEET

NAME

DATE

DRAWN

CHECKED

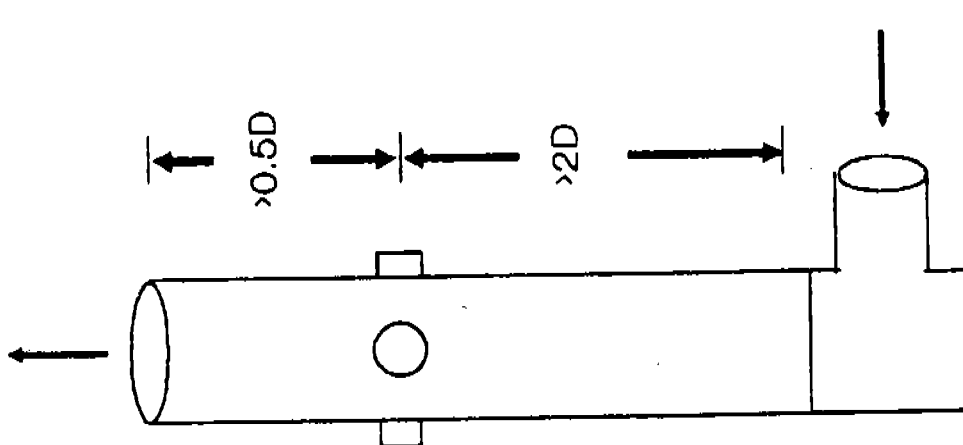


Distance
(in.)

2.6
8.0
14.2
21.3
30.0
42.7

Traverse
Point

1 2 3 4 5 6



Stack Diameter (in.) = 120
D

ACTIVITY
No.

REVISION

2-1a

Figure 2-1 Schematic Diagram of the Stack and Traverse Points

Figure 2-1

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 0.012 grains per dry standard cubic foot (gr/dscf) and 3.31 pounds per hour (lb/hr), respectively.

As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the particulate matter standard for #14 Battery Combustion Stack is 0.015 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.

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

<u>Test #</u>	<u>Sample Volume (mL)</u>	<u>Concentration (mg/L)</u>	<u>Total Sulfate (mg)</u>
1	750	31.5	23.6
2	890	40.8	36.4
3	880	51.9	45.6

**USS CLAIRTON WORKS
CLAIRTON, PA**

TABLE 3-1

PARTICULATE MATTER EMISSIONS DATA

<u>EMISSIONS</u>	<u>TEST #1</u>	<u>TEST #2</u>	<u>TEST #3</u>	<u>AVERAGE</u>
gr/dscf	0.012	0.016	0.009	0.012
lb/hr	3.00	4.52	2.41	3.31

**STACK
CONDITIONS**

Flow (acfm)	68016	73645	66674	69445
Flow (scfm)	35663	38666	35292	36540
Moisture Content (%)	15.08	15.16	13.58	14.61
Stack Temp. (°F)	517	516	508	514

**SAMPLING
CONDITIONS**

Sampling Time (min)	120	120	120	
Sample Volume (scfd)	75.521	83.939	77.739	
Isokinetics (%)	96.80	99.32	98.94	

Copies of the field data sheets for the visible emissions determinations can be found in Appendix F. All visible emissions observed during the three tests were less than or equal to 15% opacity. As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the visible emissions shall not equal or exceed 20% opacity for a period or periods aggregating in excess of 3 minutes in any 60-minute period and shall never equal or exceed 60% opacity. Thus, the emissions are in compliance.

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE NUMBER 14 BATTERY COMBUSTION STACK**

**APPENDIX A
OPERATIONAL RECORDS**

UNITED STATES STEEL CORPORATION
LANTON CORE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 45

12 Hrs. Beginning 12:00 AM

Date 6-20-90

BATTERY NO. <u>B-14</u>				BATTERY NO. <u>A-13</u>				BATTERY NO. <u>B-13</u>			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1	2 48	3 22		1	3 02	3 40		1	3 12	3 50	
3	3 24	4 00		3	3 42	4 10		3	3 52	4 22	
5	4 02	4 34		5	4 12	4 46		5	4 24	5 00	
7	4 36	5 10		7	4 48	5 22		7	5 02	5 34	
9	5 12	5 46		9	5 24	6 00		9	5 36	6 10	
11	5 48	6 22		11	6 02	6 34		11	6 12	6 46	
13	6 24	7 04		13	6 36	7 15		13	6 48	7 26	
15	7 06	7 38		15	7 17	7 51		15	7 28	8 02	-5-
17	7 40	8 19		17	7 53	8 30		17	8 04	8 52	
19	8 21	9 04		19	8 32	9 20		19	8 54	9 31	
21	9 06	9 49		21	9 23	10 00		21	9 33	10 12	
23	9 51	10 35		23	10 02	11 47		23	10 14	11 57	
25	10 37			25	10 49			25	10 59		
27				27				27			
29				29				29			
31	X X X X			31				31	X X X X		
2				2				2			
4				4				4			
6				6				6			
8				8				8			
10				10				10			
12				12				12			
14				14				14			
16				16				16			
18				18				18			
20	11 15	11 46		20	11 26	12 00		20	11 03	11 35	
22	11 49	12 02		22	12 02	12 34		22	11 37	12 10	
24	12 24	1 00		24	12 36	1 10		24	12 12	12 46	
26	1 02	1 34		26	1 12	1 46		26	12 49	1 22	
28	1 36	2 10		28	1 48	2 22		28	1 34	2 00	
30	2 12	2 46		30	2 24	3 00		30	2 02	2 34	
1	X X X X			1	X X X X			1	X X X X		
2	X X X X			2	X X X X			2	X X X X		

REMARKS:

Condition of Signals OK Condition of Pusher OK

HOURLY REPORT OF OPERATION							
TIME	OVENS PUSHED	OVENS CHARGED	OVENS DISCHARGED	TIME	OVENS PUSHED	OVENS CHARGED	OVENS DISCHARGED
11:42	5	5		5:42	5	5	
12:1	5	5		6:17	5	5	
1:2	5	5		7:8	5	5	
2:3	5	5		8:9	4	4	
3:4	5	5		9:10	4	4	
4:5	5	5		10:11	5	5	
5:0	5	5		11:12	5	5	

Total Ovens Pushed 56

Total Ovens Charged 56

Pusherman ME

Signature ME

UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 5

12 Hrs. Beginning 12:00A.M.

Date 6-20-90

BATTERY NO. <u>15-A</u>				BATTERY NO. <u>15-B</u>				BATTERY NO. <u>14-A</u>			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1	2 20	2 48		1	2 30	3 34		1	2 40	3 45	
3	2 50	3 55		3	3 36	4 05		3	3 47	4 15	
5	3 57	4 25		5	4 07	4 36		5	4 17	4 47	
7	4 27	4 57		7	4 38	5 07		7	4 49	5 18	
9	4 59	5 30		9	5 09	5 42		9	5 20	5 54	
11	5 32	6 06		11	5 44	6 18		11	5 40	6 30	
13	6 08	6 42		13	6 20	7 10		13	6 32	7 23	
15	6 44	7 33		15	7 12	7 43		15	7 25	7 56	
17	7 25	8 14		17	7 45	8 28		17	7 58	8 40	
19	8 16	9 00		19	8 30	9 14		19	8 42	9 28	
21	9 02	9 45		21	9 20	9 56		21	9 30	10 08	
23	9 47	10 33		23	9 58	10 43		23	10 10	10 15	
25	10 35			25	10 45			25	10 55		
27				27				27			
29				29				29			
31				31				31			
2				2				2			
4				4				4			
6				6				6			
8				8				8			
10				10				10			
12				12				12			
14				14				14			
16				16				16			
18		11 07		18		11 18		18		11 29	
20	11 09	11 40		20	11 20	11 50		20	11 31	12 02	
22	11 42	12 11		22	11 52	12 22		22	12 04	12 32	
24	12 13	12 44		24	12 24	12 52		24	12 35	1 07	
26	12 46	1 17		26	12 58	1 27		26	1 09	1 37	
28	1 19	1 47		28	1 29	1 56		28	1 39	2 07	
30	1 49	2 18		30	1 58	2 28		30	2 09	2 38	
1	X	X	19/19	1	X	X	19/19	1	X	X	19/19
2				2				2			

REMARKS:

Condition of Signals

Condition of Pusher

HOURLY REPORT OF OPERATION

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED
11-12	5	5		5-6	5	5	
12-1	6	6		6-7	4	4	
1-2	6	6		7-8	5	5	
2-3	5	5		8-9	3	3	
3-4	3	3		9-10	5	5	
4-5	6	6		10-11	4	4	
	31	31			26	26	

Total Ovens Pushed 57

Total Ovens Charged 57

Pusherman

Battery Foreman

UNITED STATES STEEL CORPORATION
LAINTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 75

12 Hrs. Beginning 12:00 P.M.

Date: 6-20-90

BATTERY NO. <u>14B</u>				BATTERY NO. <u>13A</u>				BATTERY NO. <u>13B</u>			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1	10 34			1	10 44			1	10 33		
3				3				3			
5				5				5			
7				7				7			
9				9				9			
11				11				11			
13				13				13			
15				15				15			
17				17				17			
19				19				19			
21				21				21			
23				23				23			
25		11 43		25		12 00		25		12 11	
27	11 45	12 31		27	12 02	12 41		27	12 15	1 03	
29	12 35	1 18		29	12 43	1 52		29	1 03	1 39	
31	1 20	1 54		31	1 58	2 27		31	=	=	=
2	1 20	2 06		2	1 20	2 06		2	1 41	2 20	
4	1 22	2 35		4	2 08	2 47		4	2 22	2 57	
6	2 37	4 34	*	6	2 49	3 26		6	2 55	3 41	
8	3 15	3 24		8	3 28	3 48		8	3 43	4 25	
10	4 02	4 09		10	4 12	4 30		10	4 27	5 02	
12	4 41	5 13		12	4 53	5 23		12	5 04	5 34	
14	5 15	5 44		14	5 25	5 56		14	5 36	6 06	
16	5 46	6 17		16	5 58	6 27		16	6 08	6 37	
18	6 19	6 47		18	6 29	6 57		18	6 39	7 09	
20	6 49	7 54		20	6 59	8 04		20	7 45	8 15	
22	7 57	8 26		22	8 06	8 36		22	8 17	8 47	
24	8 28	8 57		24	8 38	9 07		24	8 49	9 17	
26	8 59	9 27		26	9 09	9 37		26	9 19	9 47	
28	9 29	9 57		28	9 39	10 10		28	9 49	10 21	
30	9 59	10 32		30	10 12	10 42		30	10 23	10 53	
OTO	-	+	16/18	OTO	X	X	X	OTO	O	P	O
OTO	+	-	16/18	OTO	X	X	X	OTO	P	O	P

REMARKS:

Condition of Signals OK

Condition of Pusher: OK

HOURLY REPORT OF OPERATION

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED
1-1	1	1		5-1	6	6	
1-2	5	5		5-2	6	6	
1-3	5	5		5-3	2	2	
2-1	5	5		5-4	6	6	
2-2	3	4		5-5	6	6	
2-3	5	4		5-6	5	5	
	24	24			31	31	

HI JOE
 Total Ovens Pushed 55
 Total Ovens Charged 55
 Pusherman ME
 Battery Foreman YOU

UNITED STATES STEEL CORPORATION
CLAIRTON CORE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 5

12 Hrs. Beginning 12:00 P M

Date 6-20-90

BATTERY NO. <u>15A</u>				BATTERY NO. <u>15B</u>				BATTERY NO. <u>14A</u>			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1	10 27			1	10 38			1	10 57		
3				3				3			
5				5				5			
7				7				7			
9				9				9			
11				11				11			
13				13				13			
15				15				15			
17				17				17			
19				19				19			
21				21				21			
23				23				23			
25		11 40		25		11 50		25			
27	11 42	12 18		27	11 55	12 31		27	12 12	11 05	
29	12 20	12 24		29	12 40	1 23		29	12 50	12 59	
31	12 26	1 13		31	X X X X			31	1 05	1 10	
2	1 15	1 46		2	1 25	2 00		2	1 05	1 40	
4	1 48	2 36		4	2 04	2 49		4	2 13	2 20	
6	2 32	3 14		6	2 43	3 25		6	2 54	3 09	
8	3 10	4 02		8	3 12	4 10		8	3 38	3 49	
10	3 56	4 39		10	4 07	4 50		10	4 21	4 28	
12	4 35	5 05		12	4 47	5 13		12	4 57	5 24	
14	5 09	5 37		14	5 17	5 42		14	5 33	5 58	
16	5 42	6 08		16	5 53	6 18		16	6 05	6 33	
18	6 14	6 26		18	6 24	6 39		18	6 35	7 06	
20	6 45	7 47		20	6 52	7 54		20	7 42	8 09	
22	7 51	8 17		22	8 01	8 26		22	8 12	8 37	
24	8 22	8 47		24	8 13	8 58		24	8 43	9 11	
26	8 54	9 22		26	9 04	9 50		26	9 14	9 40	
28	9 24	9 52		28	9 35	10 01		28	9 45	10 12	
30	9 55	10 08		30	10 08	10 22		30	10 17	10 44	
1	X	X	10/19	1	X	X	10/18	1	X	X	10/18
2	X	X		2	X	X		2	X	X	

REMARKS:

Condition of Signals

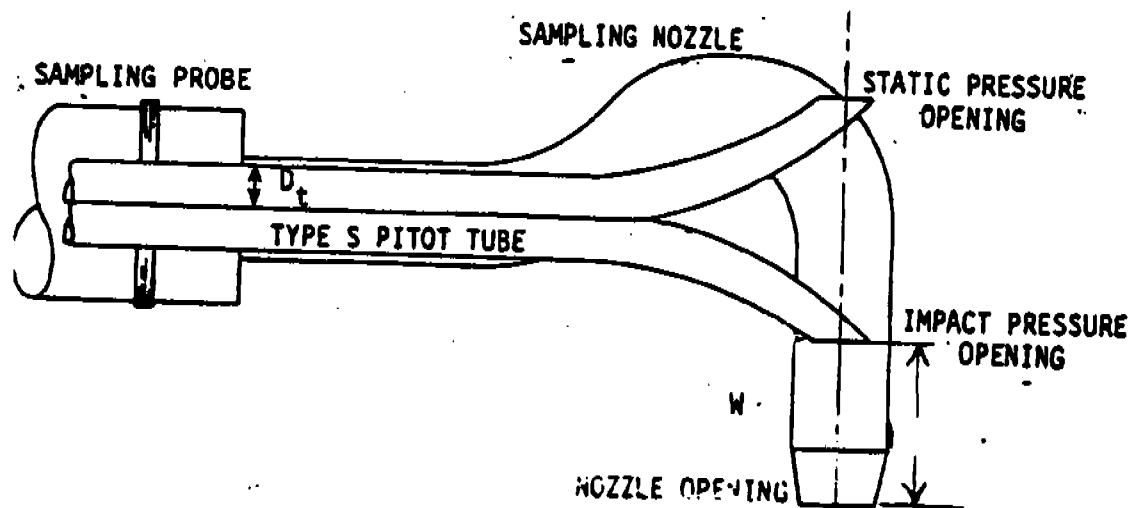
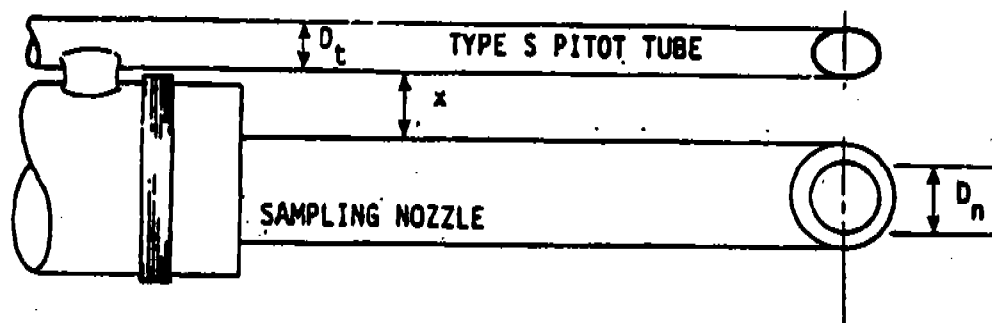
Condition of Pusher

HOURLY REPORT OF OPERATION

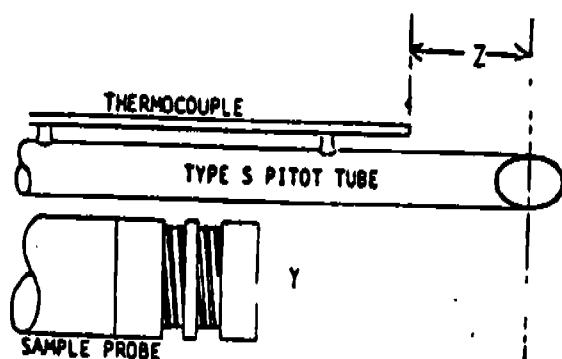
TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	
11-12	2	3		8-9	5	6		Total Ovens Pushed 56
12-1	5	4		9-10	6	5		Total Ovens Charged 55
1-2	5	5		10-11	2	3		
2-3	5	4		11-12	6	6		
3-4	4	4			6	5		Pusherman
4-5	5	5			5	5		Battery Foreman
	26	25			30	30		

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE NUMBER 14 BATTERY COMBUSTION STACK**

**APPENDIX B
PRE-TEST AND POST-TEST
CALIBRATION AND AUDIT RESULTS**



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



$W \geq 0$
 $x \geq 3/4"$ for 1/2" Nozz
 $y \geq 3"$
 $z \geq 2"$

GEOMETRIC PITOT CALIBRATION

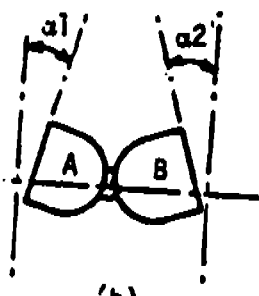
Probe No. 7-81

Date 7-24-70

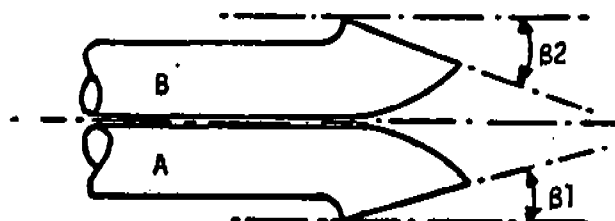
Initials 7/11

pre-test

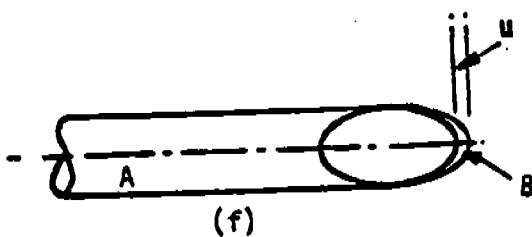
$\alpha 1 = .5^\circ$
 $\alpha 2 = 4^\circ$
 $\beta 1 = 1^\circ$
 $\beta 2 = 2^\circ$
 $A = 1.57$
 $\mu = .054$
 $V = .082$
 $W = 2.0$
 $X = .880$
 $Y = \approx 3''$
 $Z = \approx 2'$
 $D_t = .377$



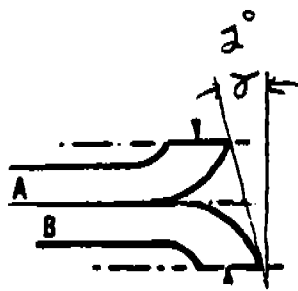
$\alpha 1, \alpha 2 < 10^\circ$



$\beta 1, \beta 2 < 5$

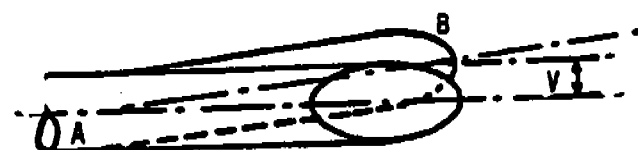


(f)

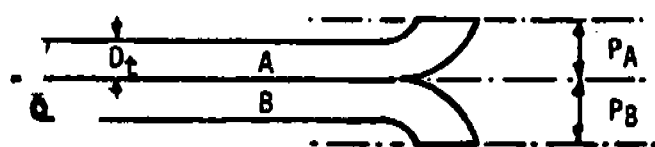


$$\mu = A \sin \theta$$

$$V = A \sin \theta$$



A-SIDE PLANE



B-SIDE PLANE

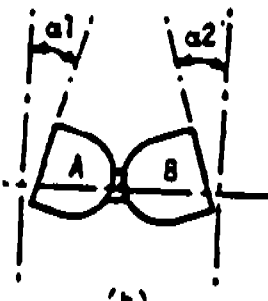
$$\begin{aligned}
 &.325 \qquad .565 \\
 &1.05 D_t < P < 1.50 D_t \\
 &P_A = P_B \\
 &2.10 D_t < A < 3.00 D_t \\
 &.791 \qquad 1.131
 \end{aligned}$$

GEOMETRIC PITOT CALIBRATION

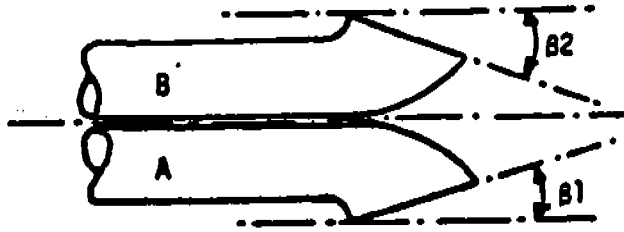
Probe No. 1-1
 Date 6/29/90
 Initials HTS

post-test

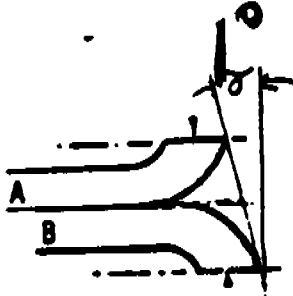
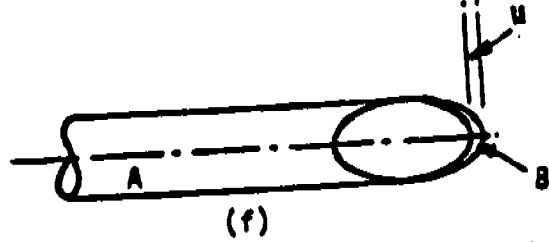
$\alpha 1 = 2^\circ$
 $\alpha 2 = 1^\circ$
 $\beta 1 = 2^\circ$
 $\beta 2 = 4^\circ$
 $A = 1.059$
 $u = .018$
 $V = 0$
 $W = 0$
 $X = 2.74"$
 $Y = 2.3"$
 $Z = 2.2"$
 $U_t = 380$



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

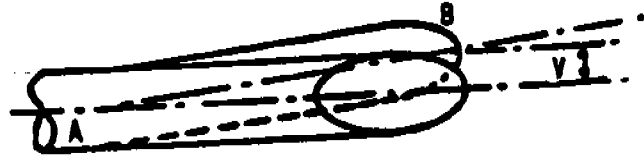


$\beta 1, \beta 2 < 5^\circ$

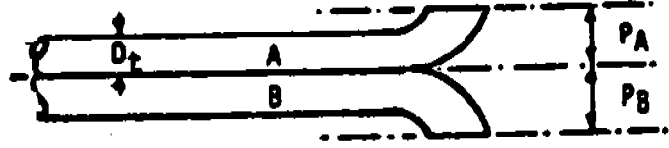


$$u = A \sin \gamma$$

$$V = A \sin \theta$$



A-SIDE PLANE



B-SIDE PLANE

.399 .570
 $1.05 D_t < P < 1.50 D_t$
 $P_A = P_B$
 $2.10 D_t < A < 3.00 D_t$
 .798 1.14

GEOMETRIC PITOT CALIBRATION

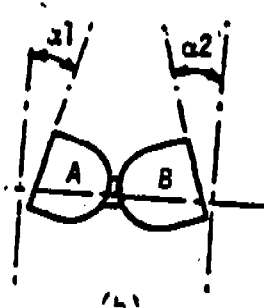
Probe No. 7-2

Date 7-24-90

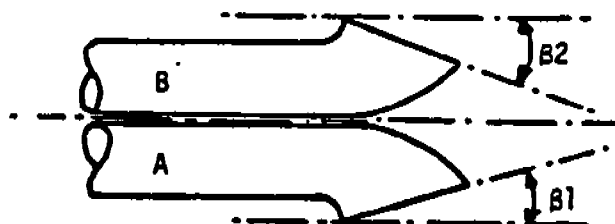
Initials TS/11

$\alpha 1 = 1^\circ$
 $\alpha 2 = 3^\circ$
 $\beta 1 = 4^\circ$
 $\beta 2 = 1^\circ$
 $A = .962$
 $u = .067$
 $V = .033$
 $W = \geq 0$
 $X = .989$
 $Y = \geq 3''$
 $Z = \geq 2''$
 $U_t = .376$

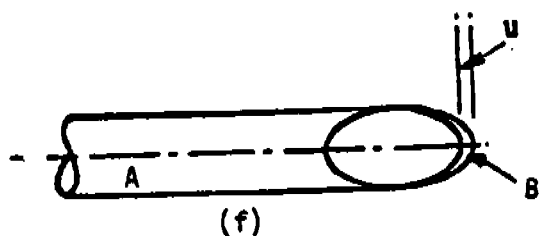
pre-test



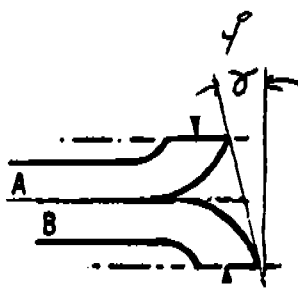
$\alpha 1, \alpha 2 < 10^\circ$



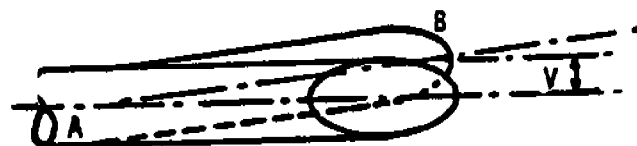
$\beta 1, \beta 2 < 5^\circ$



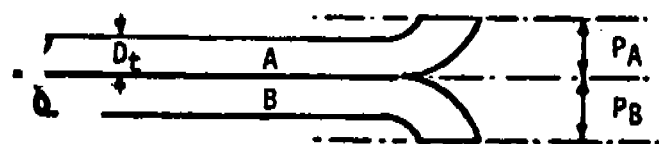
(f)



$u = A \sin \theta$
 $V = A \sin \theta$



A-SIDE PLANE



B-SIDE PLANE

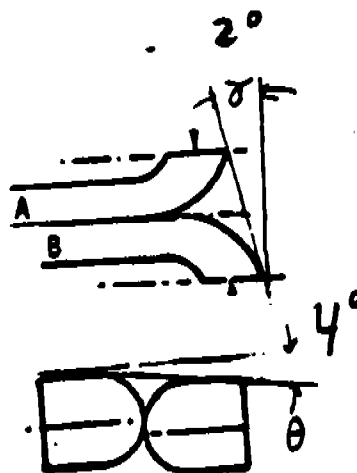
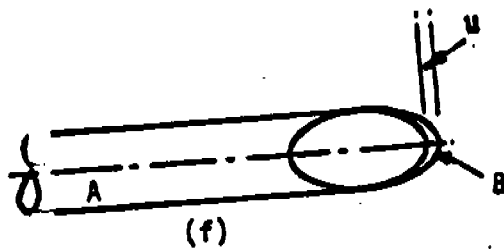
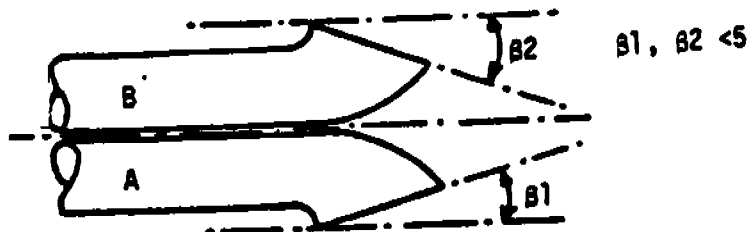
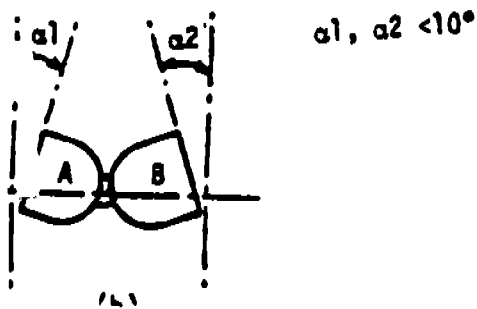
394 564
 $1.05 D_t < P < 1.50 D_t$
 $P_A = P_B$
 $2.10 D_t < A < 3.00 D_t$
 789 1128

GEOMETRIC PITOT CALIBRATION

Probe No. 7-1
 Date 6-29-90
 Initials ATS

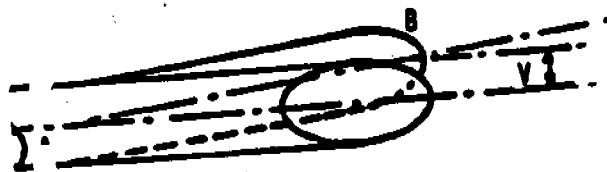
$\alpha_1 = 4^\circ$
 $\alpha_2 = 3^\circ$
 $\beta_1 = 1^\circ$
 $\beta_2 = 3^\circ$
 $A = .988$
 $u = .034$
 $v = .069$
 $w = > 0$
 $x = > 3/4"$
 $y = > 3/4"$
 $z = > 2"$
 $D_t = .385$

post-test

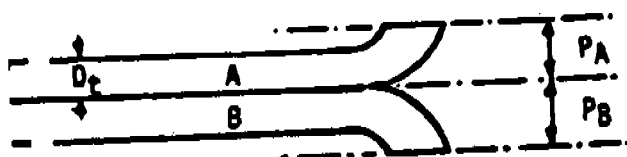


$$u = A \sin \gamma$$

$$v = A \sin \theta$$



A-SIDE PLANE



.404 .5775
 $1.05 D_t < P < 1.50 D_t$
 $P_A = P_B$
 $2.10 D_t < A < 3.00 D_t$
 .808 1.155

CONTROL BOX CALIBRATION

THREE POINT CALIBRATION

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

	TIME	WET TEST METER			PRESSURE	DRY TEST METER				AVG	ORIFICE	VOLUME	METER CORRECT	ORIFICE COEFFICE	
		TEMP	VOLUME			TEMP IN	TEMP OUT	TEMP							
		T _W	V _M	P _W	T _I	T _O	T _A	P _D	V _D	Y	H ₂				
START				0.000	29.10							0.50	464.200		
HALF			78.0				94.0		92.0	93.0					
STOP	11.50			5.000									469.118		
CALCULATION	11.50		538.0	5.057	29.10					553.0	29.14	4.918	1.0555	1.475	
START				0.000	29.10							1.00	470.000		
HALF			78.0				98.0		91.0	94.5					
STOP	8.43			5.000									474.977		
CALCULATION	8.43		538.0	5.057	29.10					554.5	29.17	4.977	1.0445	1.580	
START				0.000	29.10							2.00	476.000		
HALF			78.0				99.0		92.0	95.5					
STOP	6.12			5.000									480.920		
CALCULATION	6.12		538.0	5.057	29.10					555.5	29.25	4.920	1.0558	1.663	
AVERAGE													1.0519	1.573	

POST TEST

BOX NO. 1
 DATE 6-25-90
 BP 28.94
 OPERATOR DRK

	TIME	WET TEST METER			DRY TEST METER							METER	ORIFICE
		TEMP	VOLUME	PRESSURE	TEMP IN	TEMP OUT	TEMP AVG	ORIFICE	VOLUME	CORRECT	COEFFICE		
		T _W	V _M	P _W	T _I	T _O	T _A	P _D	V _D	Y	H ₂		
START				0.000	28.94						1.00	88.800	
HALF			82.0				95.0	87.0	91.0				
STOP	8.88			5.000								93.752	
CALCULATION	8.88		542.0	5.057	28.94					551.0	29.01	4.952	1.0354 1.801
START				0.000	28.94						1.00	94.000	
HALF			81.0				98.0	90.0	94.0				
STOP	8.87			5.000								99.095	
CALCULATION	8.87		541.0	5.057	28.94					554.0	29.01	5.095	1.0137 1.781
START				0.000	28.94						1.00	99.300	
HALF			81.0				100.0	91.0	95.5				
STOP	8.88			5.000								104.418	
CALCULATION	8.88		541.0	5.057	28.94					555.5	29.01	5.118	1.0119 1.780
AVERAGE													1.0203 1.787
DIFFERENCE													3.10% -12.01%

MAGNETIC CALIBRATION

DATE 6-25-90
OPERATOR DRK

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

LEAK CHECK

DATE 6-25-90
OPERATOR DRK

	START CF	STOP CF	VOL	TIME	LEAK RATE
DRY	576.760	576.960	0.200	10.000	-0.001
WET	0.000	0.190	0.190		

PYROMETER CALIBRATION

DATE 04-28-88
OPERATOR AGL

PYROMETER CHECK

DATE 6-25-90
OPERATOR DRK

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

mV input °F	temp °F	temp rdg
0.18	40	40.0
0.40	50	50.0
0.84	70	70.0
1.29	90	90.0
1.74	110	110.0
2.66	150	150.0
3.82	200	200.0
6.09	301	300.0
8.31	400	400.0
10.57	500	500.0

Name: KYSTON Env. ResourcesPhone: 825-9761Date 6/1/90 Train ID Box 1 DGM Cal. Factor, Y L0350Orifice No. BAPL3Type of Meter Box NAPP 100 Type of Pump Diaphragm

		Run Number			
		Example	<u>1</u>	<u>2</u>	<u>3</u>
DGM					
Final reading	ft ³	<u>966.461</u>	<u>354.711</u>	<u>362.433</u>	<u>370.285</u>
Initial reading	ft ³	<u>946.602</u>	<u>347.500</u>	<u>355.400</u>	<u>363.000</u>
Difference, V _m	ft ³	<u>9.859</u>	<u>7.211</u>	<u>7.253</u>	<u>7.285</u>
Percent Accuracy, ZA					
Inlet/Outlet temperatures					
Initial	°F.	<u>103.88</u>	<u>82.179</u>	<u>84.183</u>	<u>87.180</u>
After 5 minutes		<u>110.38</u>	<u>83.180</u>	<u>86.184</u>	<u>88.180</u>
After 10 minutes		<u>111.788</u>	<u>84.181</u>	<u>87.185</u>	<u>88.180</u>
Final		<u>112.789</u>	<u>87.182</u>	<u>87.185</u>	<u>88.187</u>
Avg. temperature, t _d	°F/°R	<u>99.3/559.3</u>	<u>81.9/546.9</u>	<u>85.1/545.1</u>	<u>87.1/547</u>
Time, θ	min	<u>15.0</u>	<u>15.0</u>	<u>15.0</u>	<u>15.0</u>
Orifice man. rdg., delta H		<u>1.35</u>	<u>.65</u>	<u>.65</u>	<u>.65</u>
Bar. pressure, P _{bar}		<u>29.75</u>	<u>29.13</u>	<u>29.13</u>	<u>29.13</u>
Ambient temperature, t _a	°F/°C	<u>74/23.3</u>	<u>72°/22°</u>	<u>72°/22°</u>	<u>72°/22°</u>
Pump vacuum	in. Hg	<u>18.8</u>	<u>19.0</u>	<u>19.0</u>	<u>19.0</u>
V _m (std)	ft ³	<u>9.2815</u>			
DGM cal. factor, Y _c		<u>1.0593</u>			
*V _m (std) (M)	m ³	<u>0.2659</u>			

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

Data Sheet

VOLUMETRIC FLOW DEVICE CALCULATION SHEET

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

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

$Vm(std)' = \frac{(7.211)(1.0350)(.9743)(.9751)}{29.92}$

$Vm(std)' = \underline{2.091} \text{ ft}^3 \text{ (round to 3 decimals)}$

Run #2 $Vm(std)' = \frac{(7.253)(1.0350)(.9686)(.9751)}{29.92}$

$Vm(std)' = \underline{2.090} \text{ ft}^3$

Run #3 $Vm(std)' = \frac{(7.285)(1.0350)(.9653)(.9751)}{29.92}$

$Vm(std)' = \underline{2.097} \text{ ft}^3$

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

$Vstd(M) = \underline{2.093} \text{ ft}^3$

.....
(To Be Completed By Auditor)

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

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

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

Phone: 825-9761Name: Keystone Env. ResFile # 6-25-90 Train ID Box 1 DGM Cal. Factor, Y 1.0519 Orifice No. BAPC#3Type of Meter Box Napp 100 Type of Pump Diaphragm

		Run Number			
		Example	1	2	3
DGM					
Final reading	ft ³	966.461	114,340	121,375	128,575
Initial reading	ft ³	946.602	107,300	114,400	121,400
Difference, V _m	ft ³	9.859	7,040	6,975	6,975
Percent Accuracy, ZA					
Inlet/Outlet temperatures					
Initial	°F.	108/88	92/92	89/89	89/89
After 5 minutes		110/88	91/90	90/89	91/90
After 10 minutes		111/88	91/90	90/89	92/90
Final		112/89	90/89	90/90	92/91
Avg. temperature, t _d	°F/°R	99.3/559.3	90.6/550.6	89.5/549.5	90.9/550.9
Time, θ	min	15.0	15.0	15.0	15.0
Orifice man. rdg., delta H		1.35	1.70	1.70	1.70
Bar. pressure, P _{bar}		29.75	28.94	28.94	28.94
Ambient temperature, t _a	°F/°C	74/23.3	74/23.3	74/23.3	74/23.3
Pump vacuum	in. Hg	18.8	19.0	19.0	19.0
V _m (std)	ft ³	9.2815			
DGM cal. factor, Y _c		1.0593			
*V _m (std) (M)	m ³	0.2629			

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

Data Sheet

B-11

Box #1

Box 1

VOLUMETRIC FLOW DEVICE CALCULATION SHEET

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

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

$Vm(std)' = \underline{(7.040)(1.0519)(.9590)(.9690)}$

$Vm(std)' = \underline{6.982} \text{ ft}^3 \text{ (round to 3 decimals)}$

Run #2 $Vm(std)' = \underline{(6.975)(1.0519)(.9608)(.9690)}$

$Vm(std)' = \underline{6.831} \text{ ft}^3$

Run #3 $Vm(std)' = \underline{(6.975)(1.0519)(.9591)(.9690)}$

$Vm(std)' = \underline{6.819} \text{ ft}^3$

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

$Vstd(M) = \underline{6.844} \text{ ft}^3$

.....
(To Be Completed By Auditor)

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

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

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

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE NUMBER 14 BATTERY COMBUSTION STACK**

**APPENDIX C
FIELD DATA SHEETS
FOR PARTICULATE MATTER EMISSIONS**

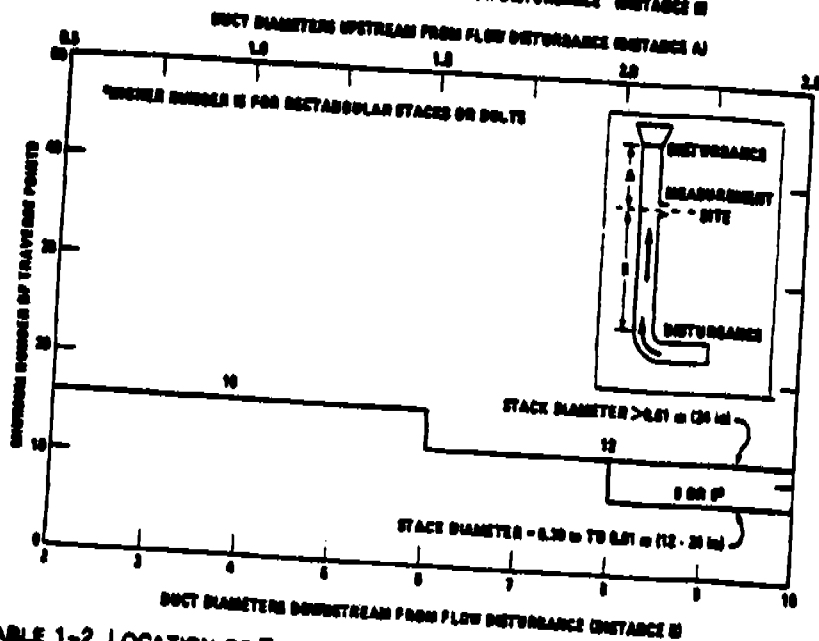
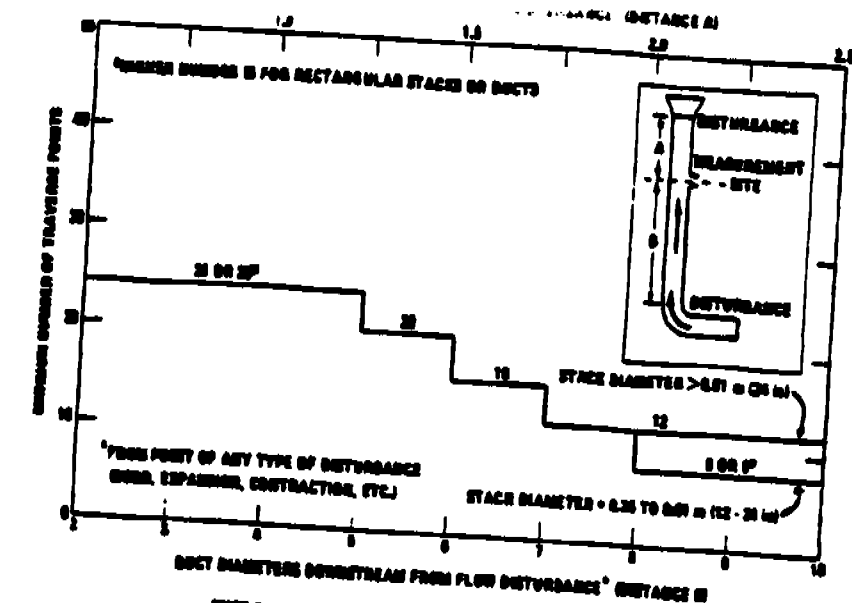


TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS
(Percent of stack diameter from inside wall to traverse point)

Traverse point number on a diameter	Number of traverse points on a diameter—											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	86.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.6	3.2
3		75.0	29.8	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			86.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.8	80.8	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				88.5	77.4	64.4	38.8	28.3	23.6	20.4	18.0	16.1
8				96.8	86.4	75.0	63.4	37.5	29.6	25.0	21.6	19.4
9					91.8	82.3	73.1	62.5	38.2	30.8	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.6	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	36.8
13							94.3	87.5	81.2	75.0	66.6	60.2
14							98.2	91.8	86.4	79.8	72.8	67.7
15								96.1	90.1	83.5	76.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.8	90.3	85.4	80.8
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	94.6
23												98.9
24												98.9

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

Number of traverse points	Notes
9	
12	
16	
20	
24	
28	
32	
36	
40	

ONE
HUBBS, INC.

Christon

DATE: 6-20-90

TEST NO.: CR-C5H-1

NOZZLE: #52 0.556

OPERATOR: _____

STATIC PRESSURE: -1.2

LEADER: _____

PORT DIRECTION: A, B

BAROMETRIC PRESSURE: 29.12

STACK SAMPLING DATA SHEET

DATE: 6-12-90

METER CORRECTION: 1.0519

PITOT CORRECTION: 0.84

CONTROL BOX NO.: 1

NOMOGRAPH SET POINT: _____

LENGTHS OF UMBILICAL _____ x 25' _____ x 50'

HOT BOX NO.: Z

COLD BOX NO.: Z

PROBE NO.: 7-2

FILTER NO.: 387

STACK DIA.: 120"

No	Meter Reading (dry) CF	Velocity ft/min	Orifice d in. H ₂ O		Meter Temp °F		Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/F	Hot Box °F	Comments
			Req.	Act.	In	Out						
1	638.020	0.040	1.46	1.46	68	63	6.0	517	260	268°F Exhaust	250	5 min/pt
		0.035	1.27	1.27	75	66	6.0	522				
		0.035	1.27	1.27	79	68	6.0	527				
		0.035	1.30	1.30	82	71	6.0	531				
		0.035	1.30	1.30	83	72	6.0	494		56°F		
2	656.960	0.035	1.30	1.30	85	74	6.0	490				
3	656.960	0.040	1.48	1.48	84	76	6.0	520				
		0.040	1.51	1.51	87	77	6.0	533		43°F		
		0.035	1.32	1.32	89	79	6.0	538				
		0.030	1.13	1.13	89	79	5.0	544				
		0.030	1.13	1.13	90	80	5.0	490				
3	675.535	0.020	0.76	0.76	90	81	4.0	482				

ORSAT

CHECK	Rate	ORSAT		PITOT LEAK CHECK		Impinger No.	Final	Initial	Difference
		1	2	POS.	NEG.				
B.	CO ₂	4.5	3.5			1	147.1	531.9	215.2
	O ₂	10.5	10.5			2	540.2	994.8	45.4
	CO	0	0	OK 15 sec	OK 15 sec	3	484.0	978.8	5.2
	N	85.0	86.0			4	605.4	986.8	18.6
									100 mL H ₂ O
									100 mL H ₂ O
									empty
									5.1.6.6.6.2

Christon
combustion Stack #1
stacking monitor
stacking monitor

STONE
FATAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

DATE: 6-20-90 ΔH@: 1.573 (6-12-90) HOT BOX NO.: 2
 TEST NO.: C.R. - CS4-1 METER CORRECTION: 1.0579 COLD BOX NO.: 2
 NOZZLE: #52 0.556 PITOT CORRECTION: 0.84 PROBE NO.: 7-2
 STATIC PRESSURE: -1.2 CONTROL BOX NO.: 1 FILTER NO.: 387
 PORT DIRECTION: C.D NOMOGRAPH SET POINT: STACK DIA.: 120"
 BAROMETRIC PRESSURE: 29.12 LENGTHS OF UMBILICAL x 25' x 50'

Time	Meter Reading (dry) CF	Velocity HD in. H ₂ O	Orifice & H in. H ₂ O	Meter Temp in °F	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/F	Hot Box °F	Comments
7:09:57	675.535	0.035	1.32-1.32	86	6.0	515	260	48°F Feet Down	250	5 min/st
		0.040	1.53	91	6.0	538				
		0.035	1.34	91	6.0	535				
		0.035	1.34	92	6.0	538		46°F		
		0.030	1.15	93	5.0	483				
10:27	693.655	0.010	0.38	91	3.0	480		45°F		
10:31	693.655	0.040	1.53	91	6.0	524				
		0.040	1.53	95	6.0	513				
		0.040	1.52	96	6.5	550				
		0.040	1.52	97	6.5	557		48°F		
		0.030	1.14	96	5.5	483				
11:01	713.675	0.020	0.76	96	4.5	480				

WAK CHECK
 in. Hg. Rate

ORSAT
 1 2
 CO₂ ☐ ☐
 O₂ ☐ ☐
 CO ☐ ☐
 N ☐ ☐

PITOT LEAK CHECK
 1 2 3 4
 POS. NEG.

Impinger No. Final Initial Difference

STONE
RESOURCES, INC.

STACK SAMPLING DATA SHEET

DATE: 6-20-90 $\Delta H @$ 1.573 (6-12-90) HOT BOX NO.: 6
 TEST NO.: CUR-C5H-2 METER CORRECTION: 1.0579 COLD BOX NO.: 6
 NOZZLE: #52 0.536 PITOT CORRECTION: 0.84 PROBE NO.: 7-1
 STATIC PRESSURE PS: -1.2 CONTROL BOX NO.: 1 FILTER NO.: 408
 PORT DIRECTION: D, C NOMOGRAPH SET POINT: 120"
 BAROMETRIC PRESSURE: 29.12 LENGTHS OF UMBILICAL x 25' x 50'

Time	Meter Reading (dry) CF	Velocity HD in. H ₂ O	Orifice ΔH in. H ₂ O	Meter Temp in °F	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp °C/F	Hot Box °F	Comments
1125	713.960	0.040	1.52	97	6.0	522	260	268°F Incl. Down	250	5 min pt
		0.040	1.55	100	6.0	530				
		0.040	1.55	100	6.0	535				
		0.040	1.55	100	6.0	539				
1155	735.351	0.040	1.55	101	6.0	547		55°F		
		0.035	1.36	101	5.0	489				
1159	735.351	0.040	1.55	97	6.0	507				
		0.040	1.58	101	6.0	528				
		0.040	1.58	102	6.0	532				
		0.040	1.58	103	6.0	536				
		0.040	1.58	103	6.0	494				
229	756.157	0.025	0.98	104	4.0	488				

ORSAT

n. Hg.	Rate	PITOT LEAK CHECK			
		CO ₂	O ₂	CO	N
0	<0.07 Cfm	4.5	10.0	0	0
0	0.005 Cfm	0	0	OK 15 sec	85.0

Impinger No.	Final	Initial	Difference
1	805.5	549.7	255.8
2	584.8	550.5	34.3
3	468.6	463.5	5.1
4	601.5	638.7	22.8

100 ml H₂O
 100 ml H₂O
 empty
 5.7 cc Gas

STACK SAMPLING DATA SHEET

DATE: 6-20-90 ΔH@: 1.573 (6-12-90) HOT BOX NO.: 6
 TEST NO.: C12-C54-2 METER CORRECTION: 1.0579 COLD BOX NO.: 6
 NOZZLE: #52 0.956 PITOT CORRECTION: 0.84 PROBE NO.: 7-1
 STATIC PRESSURE PS: -1.2 CONTROL BOX NO.: 1 FILTER NO.: 408
 PORT DIRECTION: A, B NOMOGRAPH SET POINT: 120"
 BAROMETRIC PRESSURE: 29.12 LENGTHS OF UMBILICAL 25' x 50'

Time	Meter Reading (dry) CF	Velocity HD in. H ₂ O	Orifice a H in. H ₂ O	Reg.	Act.	Meter Temp in °F	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/F	Hot Box °F	Comments
1232	756.657	0.050	1.97	1.97	1.97	96	8.0	520	260	46°F Dead Run	250	5 min pt
		0.050	1.97	1.97	1.97	95	8.0	538				
		0.050	1.94	1.94	1.94	95	8.0	544		43°F		
		0.045	1.75	1.75	1.75	95	7.0	578				
		0.040	1.85	1.85	1.85	96	6.5	458				
1302	779.574	0.025	1.04	1.04	1.04	96	4.5	447		50°F		
1306	779.574	0.045	1.76	1.76	1.76	97	7.5	521				
		0.040	1.57	1.57	1.57	98	7.0	531				
		0.040	1.56	1.56	1.56	99	7.0	533		56°F		
		0.030	1.17	1.17	1.17	100	5.0	511				
		0.025	1.00	1.00	1.00	100	5.0	510				
1336	800.364	0.040	1.60	1.60	1.60	100	7.5	496				

AK CHECK

in. Hg.	Rate

ORSAT

	1	2
CO ₂		
O ₂		
CO		
N		

PITOT LEAK CHECK

	1	2	3	4
POS.				
NEG.				

Impinger No.

Final	Initial	Difference

STONE
U.S. RESOURCES, INC.

STACK SAMPLING DATA SHEET

DATE: 6-20-90 ΔH@: 1.573 (6-12-90) HOT BOX NO.: 7
 TEST NO.: CL2 - CSH-3 METER CORRECTION: 1.0519 COLD BOX NO.: 7
 NOZZLE: #52 0.556 PITOT CORRECTION: 0.87 PROBE NO.: 7-1
 STATIC PRESSURE PS: -1.2 CONTROL BOX NO.: 1 FILTER NO.: 420
 PORT DIRECTION: A, B NOMOGRAPH SET POINT: 120" STACK DIA.: 120"
 BAROMETRIC PRESSURE: 29.12 LENGTHS OF UMBILICAL x 25' x 50'

Time	Meter Reading (dry) CF	Velocity HD in. H ₂ O	Orifice & H ₂ O Reg. Act.	Meter Temp In °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp °C °F	Hot Box °F	Comments
402	800.511	0.035	1.36 1.36	96 94	4.5	576	260	26.5°F Feed Down	250	5 min / pt
		0.040	1.53 1.55	101 94	5.0	520				
		0.040	1.55 1.55	103 94	5.0	524				
		0.040	1.55 1.55	104 94	5.0	527				
		0.025	0.97 0.97	104 95	3.5	505				
432	821.219	0.035	1.39 1.39	103 94	5.0	496				
435	821.219	0.045	1.78 1.78	102 95	6.0	503				
		0.045	1.76 1.76	104 95	6.0	523				
		0.030	1.18 1.18	103 94	4.0	528				
		0.030	1.20 1.20	102 94	4.0	508				
		0.030	1.20 1.20	102 94	4.0	503				
505	841.715	0.040	1.60 1.60	102 94	5.0	493		50°F		

CHECK		ORSAT		PITOT LEAK CHECK		Impinger No.		Difference	
1. Hg.	Rate	1	2	POS.	NEG.	1	2	Final	Initial
CO ₂	20.0%	11.0	11.5	15 Sec	15 Sec	751.6	554.5	545.8	205.8
O ₂	20.0%	3.5	4.5	15 Sec	15 Sec	554.5	522.4	522.4	32.1
CO	20.0%	0	0	15 Sec	15 Sec	451.3	447.6	447.6	3.7
N	20.0%	85.5	84.0	15 Sec	15 Sec	661.9	644.4	644.4	17.5

120 ml H₂O
 120 ml H₂O
 empty
 Silica Gel

STACK SAMPLING DATA SHEET

DATE: 6-20-90 AL@: 1.573 (6-12-90) HOT BOX NO.: 7
 TEST NO.: CUR-0514-3 METER CORRECTION: 1.0579 COLD BOX NO.: 7
 NOZZLE: #52 0.556 PITOT CORRECTION: 0.04 PROBE NO.: 7-1
 STATIC PRESSURE P: -1.2 CONTROL BOX NO.: 1 FILTER NO.: 420
 PORT DIRECTION: C, D NOMOGRAPH SET POINT: 120" STACK DIA.: 120"
 BAROMETRIC PRESSURE: 29.12 LENGTHS OF UMBILICAL 25' 50'

Time	Meter Reading (dry) CF	Velocity ft/min	Oxidant in. H ₂ O	Reg.	Act.	Meter Temp in. °F	Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp °C/F	Hot Box °F	Comments
1510	841.715	0.046	1.57	1.57	1.16	96	92	5.0	508	260	268°F Feed Burn	250	5 min. pot
		0.030	1.18	1.18	1.16	100	92	4.0	525				
		0.030	1.16	1.16	1.16	100	92	4.0	505				
		0.035	1.39	1.39	1.39	101	92	5.0	509				
		0.035	1.39	1.39	1.39	101	91	5.0	500		55°F		
1540	860.920	0.015	0.60	0.60	0.60	101	92	2.5	482				
1542	860.920	0.040	1.59	1.59	1.59	99	92	5.0	495				
		0.030	1.19	1.19	1.19	101	93	4.0	526				
		0.030	1.19	1.19	1.19	101	93	4.0	502				
		0.030	1.19	1.19	1.19	103	93	4.0	505				
		0.030	1.19	1.19	1.19	101	93	4.0	494				
1612	880.367	0.025	0.99	0.99	0.99	101	93	4.0	492				

AK CHECK

in. Hg.	Rate

ORSAT

CO ₂	1	2
O ₂		
CO		
N		

PITOT LEAK CHECK

1	POS.	NEG.
2		
3		
4		

Impinger No.

Final	Initial	Difference

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE NUMBER 14 BATTERY COMBUSTION STACK**

**APPENDIX D
PARTICULATE MATTER
EMISSIONS CALCULATIONS**

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION
STACK 14

DATE:6/20/90
CHARGE #: ...150-601050
TEST #:CLR-CS14-1

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01156	3.00147

2. STACK CONDITIONS

FLOW (ACFM)	68016.
(SCFM)	35663.
MOISTURE CONTENT (%)	15.08
STACK TEMPERATURE (F)	517.1

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	75.521
PERCENT ISOKINETIC	96.80

AIR QUALITY ENGINEERING
USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-1 6/20/90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY) CF	DELTA P IN. H2O	ORIFICE DELTA H REQ ACT	METER TEMP DEG F IN OUT	VACUUM IN. HG.	STACK TEMP DEG	CORRECTED VELOCITY FFT/SEC
42.7A	850.0	638.020	.040	1.46 1.46	68. 63.	6.0	516.	15.9
30.0			.035	1.27 1.27	75. 66.	6.0	522.	14.9
21.3			.035	1.27 1.27	79. 68.	6.0	527.	14.9
14.2			.035	1.30 1.30	82. 71.	6.0	531.	15.0
8.0			.035	1.30 1.30	83. 72.	6.0	494.	14.7
2.6A	920.0	656.960	.035	1.30 1.30	85. 74.	6.0	490.	14.6
47.2B	923.0	656.960	.040	1.48 1.48	84. 76.	6.0	520.	15.9
30.0			.040	1.51 1.51	87. 77.	6.0	533.	16.0
21.3			.035	1.32 1.32	89. 79.	6.0	538.	15.0
14.2			.030	1.13 1.13	89. 79.	5.0	544.	13.9
8.0			.030	1.13 1.13	90. 80.	5.0	490.	13.6
2.6B	953.0	675.535	.020	.76 .76	90. 81.	4.0	482.	11.0
42.7C	957.0	675.535	.035	1.32 1.32	86. 81.	6.0	515.	14.8
30.0			.040	1.53 1.53	91. 81.	6.0	538.	16.0
21.3			.035	1.34 1.34	91. 82.	6.0	535.	15.0
14.2			.035	1.34 1.34	92. 82.	6.0	538.	15.0
8.0			.030	1.15 1.15	93. 83.	5.0	483.	13.5
2.6C	1027.0	693.655	.010	.38 .38	91. 84.	3.0	480.	7.8
42.7D	1031.0	693.655	.040	1.53 1.53	91. 85.	6.0	524.	15.9
30.0			.040	1.53 1.53	95. 86.	6.0	543.	16.1
21.3			.040	1.52 1.52	96. 86.	6.5	550.	16.1
14.2			.040	1.52 1.52	97. 87.	6.5	554.	16.2
8.0			.030	1.14 1.14	96. 87.	5.5	483.	13.5
2.6D	1101.0	713.675	.020	.76 .76	96. 87.	4.5	480.	11.0

O R S A T
CO2 4.0
O2 10.5
CO .0
N 85.5

IMPINGER NO. 1 215.2
2 45.4
3 5.2
4 .0
ABSORBED H2O 18.6

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	4-24-90

LEAK CHECK

	RATE	IN. HG
INITIAL LT	0.02CFM	5.0
FINAL LT	0.02CFM	6.5

CONTROL BOX NO. 1

PROBE NO. 7-2

NOZZLE NO. 52

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-1 6/20/90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.12
B.	AVG. DELTA H (IN H2O).....	1.26
C.	METER PRESSURE (IN. HG.).....	29.21
D.	STATIC PRESSURE (IN. H2O).....	-1.20
E.	STATIC PRESSURE (IN. HG.).....	-.088
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.03
G.	STACK DIAMETER (IN.).....	120.00
H.	STACK AREA (SQ. FT.).....	78.54
	NOZZLE DIAMETER.....	.5560
I.	NOZZLE AREA (SQ. FT.).....	.001686
J.	AVG. STACK TEMP (DEG. R.).....	977.1
K.	AVG. METER TEMP (DEG. R.).....	543.6
L.	CONDENSATE VOL. (ML).....	265.8
M.	ABSORBED H2O (ML).....	18.6
N.	TOTAL H2O (ML).....	284.4
O.	METERED GAS (CF).....	75.655
P.	GAS METER CORRECTION.....	1.0519
Q.	CORRECTED METERED GAS (CF).....	79.581
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)).....	14.130
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	93.712
T.	PERCENT H2O (100R/S).....	15.08
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	15.08
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	75.521

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	.8492	X	44.0	=	1.49
CO	.000	X	.8492	X	28.0	=	.00
O2	.105	X	.8492	X	32.0	=	2.85
N2	.855	X	.8492	X	28.2	=	20.48
H2O		X	T/100 = .1508	X	18.0	=	2.71
					MOLECULAR WEIGHT OF STACK GAS	=	27.54

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	14.43
	[85.49*W*SQRT((J*DELTA P)/(V*F))]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	68016.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	35663.
	STACK FLOW RATE (DRY).....	30286.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	96.80
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-1 6/20/90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.03860	.00000	.01620

PARAMETER	INSOL.MATL. IN IMP. (G)	SOLUBLE MATL. IN IMP. (G)
PARTICULATE	.00190	.00500

PARTICULATE	.06170
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ALL MATLS.	.06170
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PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01156	3.00147

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

AIR QUALITY ENGINEERING
USX CLAIRTON COKE WORKS
COMBUSTION
STACK 14

DATE:6/20/90
CHARGE #: ...150-601050
TEST #:CLR-CS14-2

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01607	4.51929

2. STACK CONDITIONS

FLOW (ACFM)	73645.
(SCFM)	38666.
MOISTURE CONTENT (%)	15.16
STACK TEMPERATURE (F)	515.8

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	83.939
PERCENT ISOKINETIC	99.32

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-2 6/20/90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER	DELTA P	ORIFICE		METER		VACUUM	STACK	CORRECTED
		READING (DRY) CF		DELTA H	TEMP	TEMP	TEMP		VELOCITY	
			IN. H2O	REQ	ACT	DEG F	IN OUT	IN. HG.	DEG F	FT/SEC
42.7D	1125.0	713.960	.040	1.52	1.52	97.	91.	6.0	522.	15.9
30.0			.040	1.55	1.55	100.	92.	6.0	535.	16.0
21.3			.040	1.55	1.55	100.	92.	6.0	535.	16.0
14.2			.040	1.55	1.55	100.	91.	6.0	539.	16.0
8.0			.040	1.55	1.55	101.	91.	6.0	547.	16.1
2.6D	1155.0	735.351	.035	1.36	1.36	101.	92.	5.0	489.	14.6
42.7C	1159.0	735.351	.040	1.55	1.55	97.	91.	6.0	507.	15.8
30.0			.040	1.58	1.58	101.	92.	6.0	528.	15.9
21.3			.040	1.58	1.58	101.	93.	6.0	532.	16.0
14.2			.040	1.58	1.58	103.	93.	6.0	536.	16.0
8.0			.040	1.58	1.58	103.	94.	6.0	494.	15.7
2.6C	1229.0	756.657	.025	.98	.98	104.	95.	4.0	488.	12.4
42.7B	1232.0	756.657	.050	1.97	1.97	103.	96.	8.0	520.	17.8
30.0			.050	1.97	1.97	104.	95.	8.0	538.	17.9
21.3			.050	1.94	1.94	104.	95.	8.0	544.	18.0
14.2			.045	1.75	1.75	105.	95.	7.0	518.	16.8
8.0			.040	1.65	1.65	105.	96.	6.5	458.	15.4
2.6B	1302.0	779.514	.025	1.04	1.04	104.	96.	4.5	447.	12.1
42.7A	1306.0	779.514	.045	1.76	1.76	104.	97.	7.5	521.	16.9
30.0			.040	1.57	1.57	107.	98.	7.0	531.	16.0
21.3			.040	1.56	1.56	108.	99.	7.0	533.	16.0
14.2			.030	1.17	1.17	108.	100.	5.0	511.	13.7
8.0			.025	1.00	1.00	108.	100.	5.0	510.	12.5
2.6A	1336.0	800.364	.040	1.60	1.60	108.	100.	7.5	496.	15.7

O R S A T
CO2 4.5
O2 10.3
CO .0
N 85.3

IMPINGER NO. 1 255.8
2 34.3
3 5.1
4 .0
ABSORBED H2O 22.8

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	4-24-90

LEAK CHECK

	RATE	IN. HG
INITIAL LT	0.02CFM	5.0
FINAL LT	0.02CFM	8.0

CONTROL BOX NO. 1

PROBE NO. 7-1

NOZZLE NO. 52

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-2 6/20/90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.12
B.	AVG. DELTA H (IN H2O).....	1.54
C.	METER PRESSURE (IN. HG.).....	29.23
D.	STATIC PRESSURE (IN. H2O).....	-1.20
E.	STATIC PRESSURE (IN. HG.).....	-.088
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.03
G.	STACK DIAMETER (IN.).....	120.00
H.	STACK AREA (SQ. FT.).....	78.54
	NOZZLE DIAMETER.....	.5560
I.	NOZZLE AREA (SQ. FT.).....	.001686
J.	AVG. STACK TEMP (DEG. R.).....	975.8
K.	AVG. METER TEMP (DEG. R.).....	559.0
L.	CONDENSATE VOL. (ML).....	295.2
M.	ABSORBED H2O (ML).....	22.8
N.	TOTAL H2O (ML).....	318.0
O.	METERED GAS (CF).....	86.404
P.	GAS METER CORRECTION.....	1.0519
Q.	CORRECTED METERED GAS (CF).....	90.888
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	16.235
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	107.123
T.	PERCENT H2O (100R/S).....	15.16
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	15.16
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	83.939

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	.8484	X	44.0	=	1.68
CO	.000	X	.8484	X	28.0	=	.00
O2	.102	X	.8484	X	32.0	=	2.78
N2	.853	X	.8484	X	28.2	=	20.40
H2O		X	T/100= .1516	X	18.0	=	2.73
					MOLECULAR WEIGHT OF STACK GAS	=	27.59

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	15.63
	[85.49*W*SQRT((J*DELTA P)/(V*F))]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	73645.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	38666.
	STACK FLOW RATE (DRY).....	32806.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	99.32
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-2 6/20/90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.04320	.00000	.04330

PARAMETER	INSOL.MATL. IN IMP. (G)	SOLUBLE MATL. IN IMP. (G)
PARTICULATE	.00110	.00730

PARTICULATE .09490

ALL MATLS. .09490

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01607	4.51929

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

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION
STACK 14

DATE:6/20/90

CHARGE #: ...150-601050

TEST #:CLR-CS14-3

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00923	2.41340

2. STACK CONDITIONS

FLOW (ACFM)	66676.
(SCFM)	35293.
MOISTURE CONTENT (%)	13.58
STACK TEMPERATURE (F)	507.9

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	77.739
PERCENT ISOKINETIC	98.94

AIR QUALITY ENGINEERING
USX CLAIRTON COKE WORKS
COMBUSTION **STACK 14**
CLR-CS14-3 **6/20/90**

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY) CF	DELTA P IN. H2O	ORIFICE DELTA H REQ ACT	METER TEMP DEG F IN OUT	VACUUM IN. HG.	STACK TEMP DEG	CORRECTED VELOCITY FFT/SEC
42.7A	1402.0	800.541	.035	1.36 1.36	96. 94.	4.5	516.	14.6
30.0			.040	1.55 1.55	101. 94.	5.0	520.	15.6
21.3			.040	1.55 1.55	103. 94.	5.0	524.	15.7
14.2			.040	1.55 1.55	104. 94.	5.0	527.	15.7
8.0			.025	.97 .97	104. 95.	3.5	505.	12.3
2.6A	1432.0	821.219	.035	1.39 1.39	103. 94.	5.0	496.	14.4
42.7B	1435.0	821.219	.045	1.78 1.78	102. 95.	6.0	503.	16.4
30.0			.045	1.76 1.76	104. 95.	6.0	523.	16.6
21.3			.030	1.18 1.18	103. 94.	4.0	528.	13.6
14.2			.030	1.20 1.20	102. 94.	4.0	508.	13.5
8.0			.030	1.20 1.20	102. 94.	4.0	503.	13.4
2.6B	1505.0	841.715	.040	1.60 1.60	102. 94.	5.0	493.	15.4
42.7C	1510.0	841.715	.040	1.57 1.57	96. 92.	5.0	508.	15.5
30.0			.030	1.18 1.18	100. 92.	4.0	525.	13.6
21.3			.030	1.16 1.16	100. 92.	4.0	505.	13.4
14.2			.035	1.39 1.39	101. 92.	5.0	509.	14.5
8.0			.035	1.39 1.39	101. 91.	5.0	500.	14.5
2.6C	1540.0	860.920	.015	.60 .60	101. 92.	2.5	482.	9.4
42.7D	1542.0	860.920	.040	1.59 1.59	99. 92.	5.0	495.	15.4
30.0			.030	1.19 1.19	101. 93.	4.0	526.	13.6
21.3			.030	1.19 1.19	101. 93.	4.0	502.	13.4
14.2			.030	1.19 1.19	103. 93.	4.0	505.	13.4
8.0			.030	1.19 1.19	101. 93.	4.0	494.	13.4
2.6D	1612.0	880.367	.025	.99 .99	101. 93.	4.0	492.	12.2

O R S A T
CO2 11.3
O2 4.0
CO .0
N 84.8

IMPINGER NO. 1 205.8
2 32.1
3 3.7
4 .0
ABSORBED H2O 17.5

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	4-24-90

LEAK CHECK

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

CONTROL BOX NO. 1

PROBE NO. 7-1

NOZZLE NO. 52

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
COMBUSTION STACK 14
CLR-CS14-3 6/20/90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.12
B.	AVG. DELTA H (IN H2O).....	1.32
C.	METER PRESSURE (IN. HG.).....	29.22
D.	STATIC PRESSURE (IN. H2O).....	-1.20
E.	STATIC PRESSURE (IN. HG.).....	-.088
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.03
G.	STACK DIAMETER (IN.).....	120.00
H.	STACK AREA (SQ. FT.).....	78.54
	NOZZLE DIAMETER.....	.5560
I.	NOZZLE AREA (SQ. FT.).....	.001686
J.	AVG. STACK TEMP (DEG. R.).....	967.9
K.	AVG. METER TEMP (DEG. R.).....	557.3
L.	CONDENSATE VOL. (ML).....	241.6
M.	ABSORBED H2O (ML).....	17.5
N.	TOTAL H2O (ML).....	259.1
O.	METERED GAS (CF).....	79.826
P.	GAS METER CORRECTION.....	1.0519
Q.	CORRECTED METERED GAS (CF).....	83.969
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	13.195
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	97.164
T.	PERCENT H2O (100R/S).....	13.58
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	13.58
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	77.739

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	.112	X	.8642	X	44.0	=	4.28
CO	.000	X	.8642	X	28.0	=	.00
O2	.040	X	.8642	X	32.0	=	1.11
N2	.848	X	.8642	X	28.2	=	20.65
H2O		X	T/100= .1358	X	18.0	=	2.44
MOLECULAR WEIGHT OF STACK GAS							= 28.48

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	14.15
	[85.49*W*SQRT((J*DELTA P)/(V*F))]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	66676.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	35293.
	STACK FLOW RATE (DRY).....	30500.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	98.94
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
 COMBUSTION STACK 14
 CLR-CS14-3 6/20/90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.03800	.00000	.00760

PARAMETER	INSOL.MATL. IN IMP. (G)	SOLUBLE MATL. IN IMP. (G)
PARTICULATE	.00100	.00810

PARTICULATE	.05470
-------------	--------

ALL MATLS.	.05470
------------	--------

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00923	2.41340

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

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE NUMBER 14 BATTERY COMBUSTION STACK**

**APPENDIX E
ANALYTICAL RESULTS**

RJ Lee Group

The Materials Characterization Specialists

July 24, 1990

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

Re: RJ Lee Project Number: CHH007012
Customer Purchase Order: 5598

Dear Pat:

At your request, we examined 3 samples, provided by you for total sulfate (SO_4^{2-}) content. The solutions contained a mixture of isopropyl alcohol and water and were prepared for analysis by evaporation of a 100 ml aliquot to 25ml and rediluting back to the original 100ml volume. This removed the alcohol. The samples were then analyzed along with standard sulfate solutions on a Dionex 2000i ion chromatography unit. Results are calculated as milligrams per liter and then converted, total milligrams using the volumes of the solutions that you provided. These results are reported on the enclosed table. The precision of this analysis is $\pm 5\%$ of the value reported.

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

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

Sincerely,


Gary A. Cooke
Manager, Analytical Chemistry

GAC/ljm
Enclosure

E-1

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE NUMBER 14 BATTERY COMBUSTION STACK**

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

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKey

DATE: 20 June 1990

FACILITY: USC Clinton works

OBSERVATION: START TIME: 8:50 AM

END TIME: 9:50 AM

OBSERVATION POINT:

Wabash Employee Bath house lot
14

SOURCE: Betty Draft Stack

DISTANCE: 0.430'

DIRECTION FROM: S'6E'

HEIGHT: 0.200'

WIND:

SPEED: 6. m.p.h.

DIRECTION: → SC

TEMPERATURE: 61° 62°

SKY CONDITION: hazy

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: 240

No. READINGS ≥ 20% 0

No. READINGS ≥ 60% 0

GREATEST OPACITY: 0

CREW: _____ FOREMAN: _____

COMMENTS: _____

14 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
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
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	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
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

change over

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay

DATE: 20 June, 1990

FACILITY: West Clinton Works

OBSERVATION: START TIME: 9:50 AM

END TIME: 10:50 AM

OBSERVATION POINT:

Wabash Employee Bath house lot

SOURCE: Battery Inlet Stack

DISTANCE: 435'

DIRECTION FROM: S 6 E

HEIGHT: 200'

WIND:

SPEED: 6-10 MPH

DIRECTION: SE

TEMPERATURE: 61°-65°

SKY CONDITION: 7/8 B24

BACKGROUND: SKY

READING CONDITIONS: FAIR

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: _____ FOREMAN: _____

COMMENTS: _____

#14 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
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
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	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 20 June 1990

FACILITY: US 4 Clinton Works

OBSERVATION: START TIME: 10:50 AM

END TIME: 11:01

OBSERVATION POINT:

Wabash Employee Bath House lot

#14

SOURCE: Battery Plant Stack

DISTANCE: 2400'

DIRECTION FROM: SSE

HEIGHT: 200'

WIND:

SPEED: 8 mph

DIRECTION: → SSE

TEMPERATURE: 65°

SKY CONDITION: Hazy

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: _____

No. READINGS ≥ 20% _____

No. READINGS ≥ 60% _____

GREATEST OPACITY: _____

CREW: _____ FOREMAN: _____

COMMENTS: _____

#14 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				
13				
14				
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58				
59				

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay

DATE: 20 June, 1990

FACILITY: USC/Clinton works

OBSERVATION: START TIME: 11:25

END TIME: 12:05

OBSERVATION POINT:

Wobash Employee Bath Room - #14

SOURCE: Battery Inlet Stack

DISTANCE: 0.425'

DIRECTION FROM: S'66"

HEIGHT: 200'

WIND:

SPEED: 10- mph

DIRECTION: → SW

TEMPERATURE: 70°-73°

SKY CONDITION: clear

BACKGROUND: sky

READING CONDITIONS: fair

COLOR OF EMISSION: X/A

TOTAL No. OF READINGS: 360

No. READINGS ≥ 20% 0

No. READINGS ≥ 60% 0

GREATEST OPACITY: 0

CREW: _____ FOREMAN: _____

COMMENTS: _____

#14 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
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
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	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay

DATE: 20 June 1970

FACILITY: USC Clintonville

OBSERVATION: START TIME: 12:25 PM

END TIME: 1:25 PM

OBSERVATION POINT:

Wobash Employee Lot

SOURCE: #14 Stack

DISTANCE: 0.440'

DIRECTION FROM: SE

HEIGHT: 0.200'

WIND:

SPEED: 10 m.p.h.

DIRECTION: SE

TEMPERATURE: 73°-78

SKY CONDITION: Cloud

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: Gray

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 15%

CREW: FOREMAN:

COMMENTS:

#14 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
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
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	0	0	0	0
32	0	0	0	0
33	0	0	15	5
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay

DATE: 20 June, 1990

FACILITY: USS Kilauea

OBSERVATION: START TIME: 1:25 PM

END TIME: 1:36

OBSERVATION POINT:

W. Beach Employees Haul Rd Bath :30

14

SOURCE: Battery draft stock

DISTANCE: 0.450' :35

DIRECTION FROM: S 8 E :35

HEIGHT: 200 :35

WIND:

SPEED: 10 m.p.h.

DIRECTION: SE

TEMPERATURE: 74-78

SKY CONDITION: uncat

BACKGROUND: sky :45

READING CONDITIONS: Fair

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: 49

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: _____ FOREMAN: _____

COMMENTS: _____

14 Stock

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
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VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 20 June, 1990

FACILITY: USC Clinton works

OBSERVATION: START TIME: 2:02 PM

END TIME: 3:02 PM

OBSERVATION POINT:

Wobash Employee Bath House
#14

SOURCE: Battery Draft Stack

DISTANCE: 0.435'

DIRECTION FROM: S"OR"

HEIGHT: 0.200'

WIND:

SPEED: 14 m.p.h

DIRECTION: 75°

TEMPERATURE: 76°

SKY CONDITION: Overcast

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: Grey

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 10%

CREW: _____ FOREMAN: _____

COMMENTS: _____

#14 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
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
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	5	5	10	5
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	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 20 June, 1990

FACILITY: USC/airbase

OBSERVATION: START TIME: 3:02 PM
END TIME: 4:02 PM

OBSERVATION POINT: Wobash Employee Bath house
#14

SOURCE: Battery Dr. #14 Stack

DISTANCE: 0.450'

DIRECTION FROM: SSE

HEIGHT: 0.300'

WIND:

SPEED: 12-MPH

DIRECTION: SE

TEMPERATURE: 76°

SKY CONDITION: overcast

BACKGROUND: sky

READING CONDITIONS: fair

COLOR OF EMISSION: 11/A

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: FOREMAN:

COMMENTS:

#14 Stack

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
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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
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
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

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30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
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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
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56	0	0	0	0
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58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 20 June 1990

FACILITY: USC Clinton works

OBSERVATION: START TIME: 4:02

END TIME: _____

OBSERVATION POINT: 0864 :07

Wash. Employee House lot
#14

SOURCE: Battery brook stack

DISTANCE: 455' :12

DIRECTION FROM: S'OF' stopped

HEIGHT: 200'

WIND:

SPEED: 12-mph :17

DIRECTION: → S.E.

TEMPERATURE: 73°

SKY CONDITION: partly cloudy & Rain

BACKGROUND: SKY :22

READING CONDITIONS: fair

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: 44 :27

No. READINGS ≥ 20% 0

No. READINGS ≥ 60% 0

GREATEST OPACITY: 0

CREW: _____ FOREMAN: _____

COMMENTS: _____

#14 Stack

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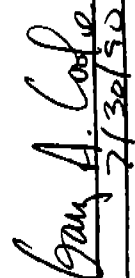
Table I

CHH007012

For Keystone Environmental

Client Sample Number	RJ Lee Sample Number	SO ₄ ²⁻ (mg/l)	Solution vol (ml)	SO ₄ ²⁻ Total Mg
CLR-14CS-1	90134	31.5	750	23.6
CLR-14CS-2	90135	40.8	890	36.4
CLR-14CS-3	90136	51.9	880	45.6

E-2

Authorized Signature _____
Date _____


 7/30/90
RJ Lee Group, Inc.
Headquarters350 Hochberg Road
Monroeville, PA 15146(412) 325-1776
FAX (412) 733-1799

Date: 6/25/90

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PARTICULATE REPORTING FORM

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