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 61

Reviewed

1992

USS CLAIRTON WORKS

COMPLIANCE DEMONSTRATION
#13 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: 605033-01

APRIL 1992

~~C.J. Goetz~~
~~AHF~~
~~WGG/WLC~~
~~aw~~ 4/30

USS
Clairton Works
400 State Street
Clairton, PA 15025

RECEIVED
APR 2 [illegible]

April 20, 1992

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

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

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

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

Gentlemen:

Subject: Compliance Demonstration
Clairton Battery #13

Please find enclosed with this letter the report on Battery #13 compliance mass emission stack test, conducted at USS Clairton Works, Division of USX Corporation, on March 12, 1992.

Please refer questions concerning this report to William C. Graeser at 233-1467.

Very truly yours,

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

GTW/BAC
Attachment

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ABSTRACT

On March 12, 1992, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #13 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, as required by the Amended Mon Valley Consent Decree, is 0.015 gr/dscf. The results of three test runs produced an average particulate matter concentration and emission rate of 0.007 gr/dscf and 2.05 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. No visible emissions were observed from the stack during any of the three tests. Thus, the visible emissions are in compliance.

1.0 INTRODUCTION

On March 12, 1992, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #13 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, Samuel Woodring, and David Beranek. Visible emissions determinations were performed by Charles Davis of Environmental Technical Services (ETS). Keystone and ETS are sister companies 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

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 operating conditions. Greater than 50 dry standard cubic feet of sample gas was collected during each test run.

The process exhausts through a 120 inch 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 point was sampled for 5 minutes, thus bringing the total sampling time to 120 minutes. A schematic diagram of the 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 Fyrite apparatus as specified by EPA Method 3. Gas concentrations were used to obtain molecular weight of the process gas.

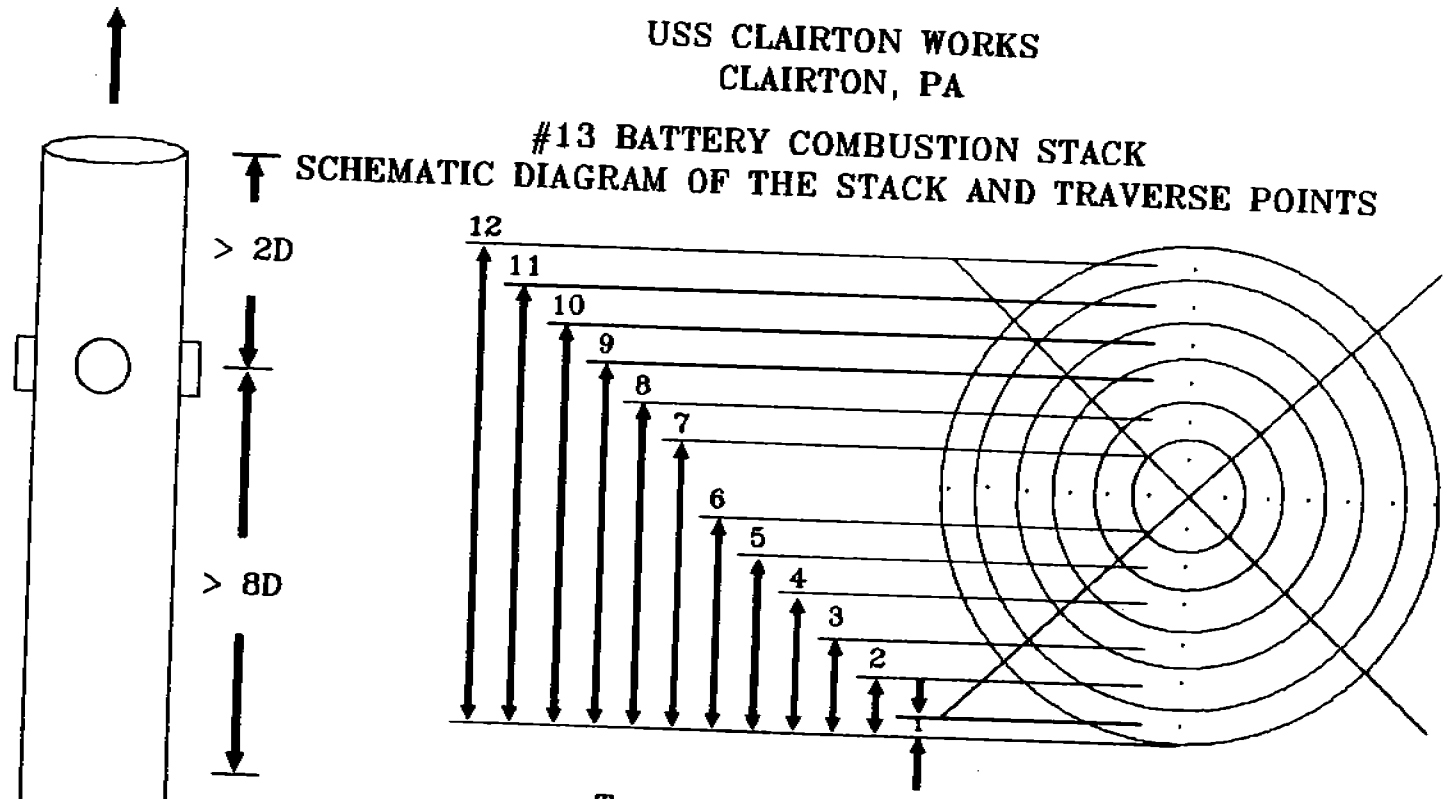
Percent moisture content, by volume, of the exhaust gas was determined by measuring the weight gain of the four sample train impingers in accordance with EPA Method 4.

As specified by EPA Method 5, each sample 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 a water rinse followed by an acetone rinse of both the front-half and back-half components of the sample train, as per Section 139.12 of the PA DER particulate matter test methods. The water soluble and water insoluble portions of the front-half of the sampling train was determined as a total; that is, the water rinse was not filtered to determine soluble and

FIGURE 2-1

USS CLAIRTON WORKS
CLAIRTON, PA

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



Traverse Point	Distance (in.)	Traverse Point	Distance (in.)
1	2.6	7	77.3
2	8.0	8	90.0
3	14.2	9	98.7
4	21.3	10	105.8
5	30.0	11	112.0
6	42.7	12	117.5

Stack Diameter (D) = 120 in.

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

insoluble portions. Front-half acetone and water rinses were evaporated to dryness, desiccated, and weighed to a constant weight. 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. The back-half water rinses and first three impinger solutions were combined and then filtered under suction through a preweighed 0.22 micrometer membrane filter. The filter used to capture the insoluble material was dried, desiccated, and weighed to a constant weight. After filtration, the soluble back-half water was extracted with chloroform and ethyl ether. The extracts were evaporated to dryness, desiccated, and weighed to a constant weight. The filtrate, or remaining water from the extraction process, was then submitted for sulfate analysis via ion chromatography. Back-half acetone rinses were evaporated to dryness, desiccated, and weighed to a constant weight. Sample train filters were desiccated for 24 hours, and particulate matter weight was determined gravimetrically. Rinse residue weights and filter weights were measured to the nearest 0.1 mg. One acetone blank and one deionized distilled water blank was prepared in the same manner as the test sample rinses. The blank residue weights were subtracted from the test sample residue weights. After blank correction, front-half water and acetone rinse residue weights, sample train filter weights, and back-half water insoluble 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. Visible emission readings were recorded for the duration of each particulate matter test.

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.

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 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 test results have been summarized in Table 3-1. The results of the testing showed an average particulate matter concentration and emission rate of 0.007 grains per dry standard cubic feet (gr/dscf) and 2.05 pounds per hour (lb/hr), respectively. As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the allowable particulate matter concentration for #13 Battery Combustion Stack is 0.015 gr/dscf (a Lowest Achievable Emission Rate (LAER) standard). Thus, the particulate matter emissions from the stack are in compliance.

Tables 3-1 also lists other pertinent stack and sampling parameters which include 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 (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 gas volume sampled for each 120 minute test was greater than 50 dry standard cubic feet. 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 92.0 percent, 90.4 percent, and 94.2 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

#13 BATTERY COMBUSTION STACK
PARTICULATE MATTER EMISSIONS DATA

		Run 1	Run 2	Run 3	Average
Test Number		CLR-13BS-1	CLR-13BS-2	CLR-13BS-3	
Test Date		3/12/92	3/12/92	3/12/92	
Mass Emission Rate and Concentration					
Particulate Matter	(lb/hr)	1.969	2.171	2.023	2.054
	(gr/DSCF)	0.0068	0.0070	0.0072	0.0070
Stack Conditions					
Average Flow Rate	(ACFM)	68978	72367	65766	69037
Standard Flow Rate	(SCFM)	38694	41908	37777	39460
Temperature	(°F)	451.1	422.5	429.5	434.4
Moisture Content	(%)	12.9	13.2	12.9	13.0
Sampling Conditions					
Test times		9:20 to 9:50	11:55 to 12:25	14:34 to 15:04	
		9:54 to 10:24	12:30 to 13:00	15:09 to 15:39	
		10:27 to 10:57	13:05 to 13:35	15:44 to 16:14	
		11:00 to 11:30	13:40 to 14:10	16:18 to 16:48	
Sampling Time	(minutes)	120	120	120	
Sample Volume	(DSCF)	78.204	82.949	78.182	
Isokinetics	(%)	92.0	90.4	94.2	

Copies of the field data sheets for the visible emissions readings can be found in Appendix E. As promulgated by the Amended Mon Valley Consent Decree, Paragraph V. A. (6), the "visible emissions shall not equal or exceed 20 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." No visible emissions were observed during any of the three tests. Thus, the visible emissions are in compliance.

A summary table of the analytical results for sulfate analysis on the soluble back-half water can be found in Table 3-2. A copy of the analytical report for sulfate analysis can be found in Appendix F.

TABLE 3-2

USS CLAIRTON WORKS
CLAIRTON, PA

#13 BATTERY COMBUSTION STACK
SULFATE ANALYSIS OF BACK-HALF WATER

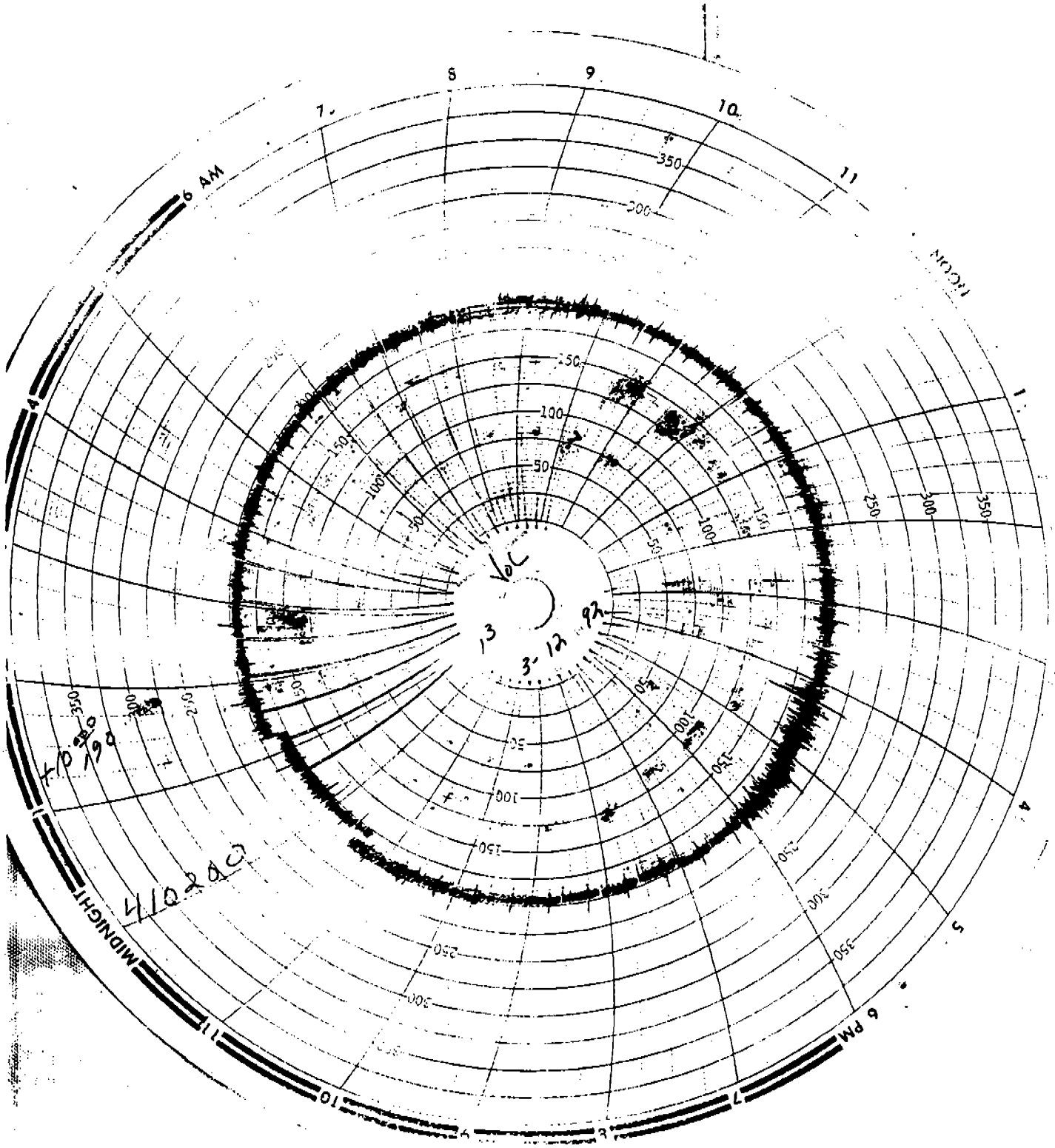
Test Number	Sulfate Concentration (mg/L)	Sample Volume (L)	Total Sulfate (mg)
CLR-13BS-1	23.64	900	21.28
CLR-13BS-2	19.93	750	14.95
CLR-13BS-3	17.03	900	15.33

COMPLIANCE DEMONSTRATION
#13 BATTERY COMBUSTION STACK

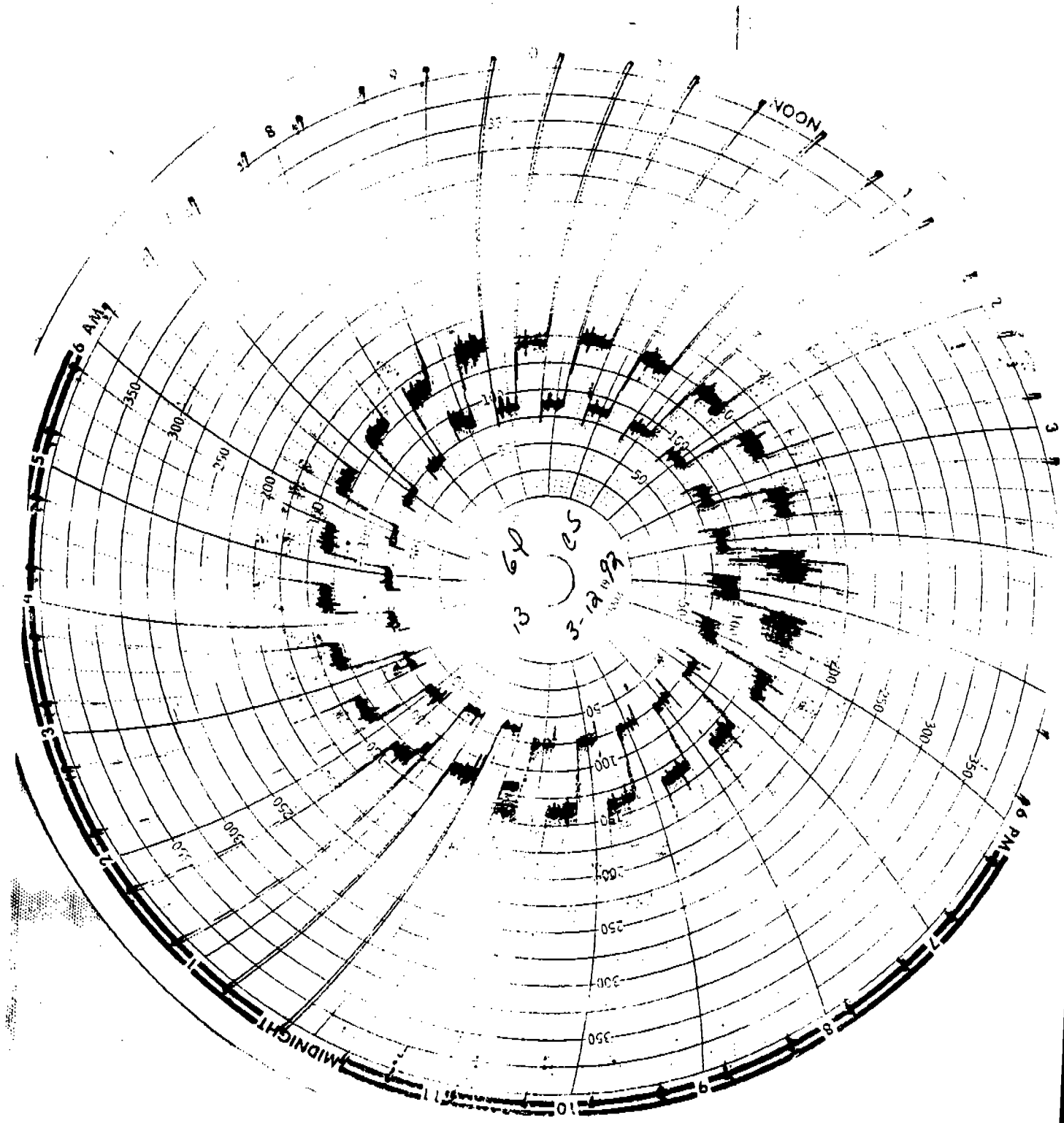
USS CLAIRTON WORKS
CLAIRTON, PA

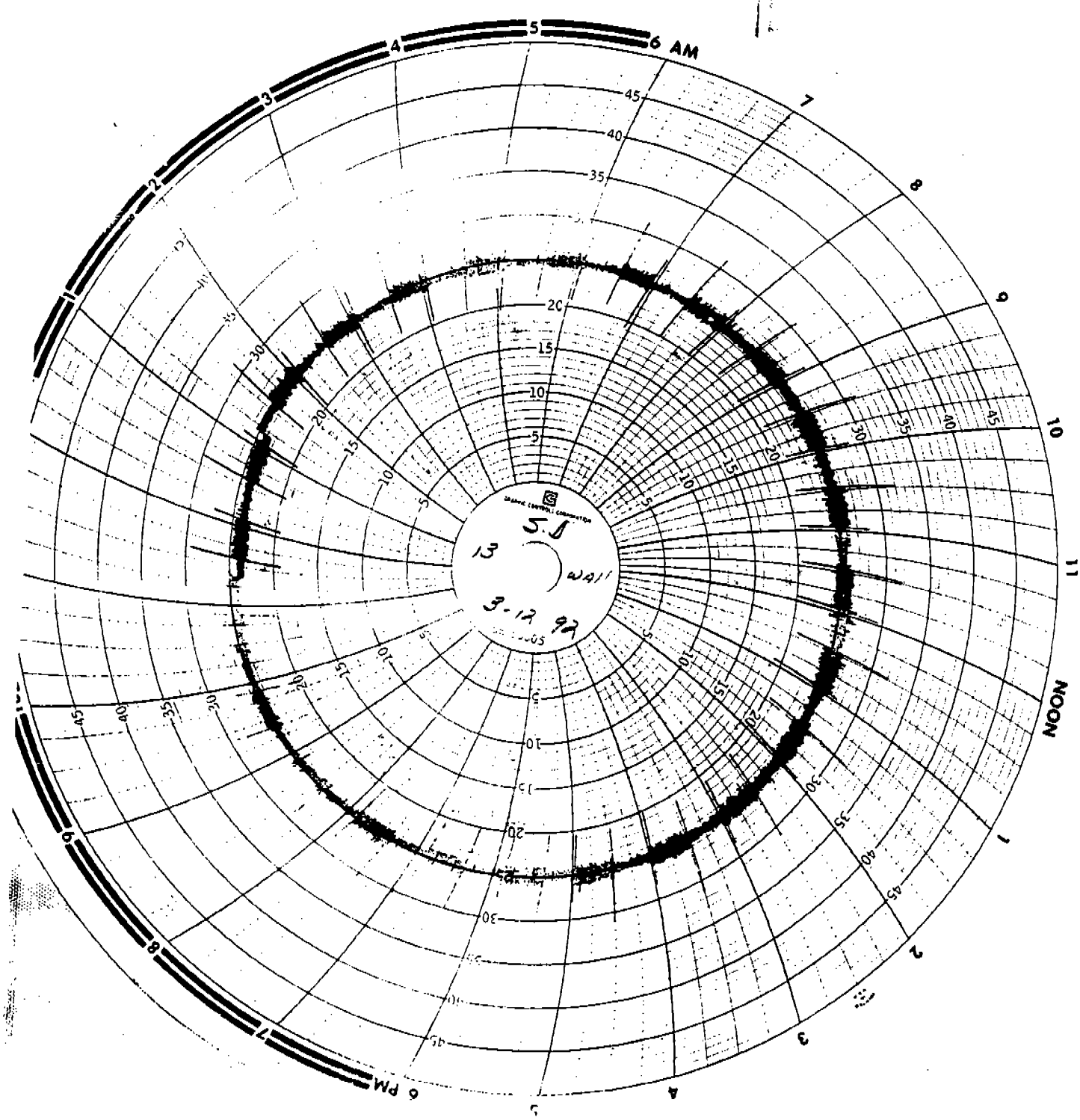
APPENDIX A

OPERATIONAL DATA


6 AM
7
8
9
10
11
NOON
1
2
3
4
5
6 PM
7
8
9
10
11
MIDNIGHT
350
300
250
200
150
100
50

NOON
MIDNIGHT
6 AM
6 PM


NOON
6 AM
6 PM
MIDNIGHT
6P
CS
13
3-12 1992


6 AM
NOON
6 PM
S.D
13
WALL
3-12 92

CC-10295 REV. (16)
03.001.0020

UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 5
12 Hrs. Beginning 12:00 PM
DATE 3-12-92

BATTERY NO. 13 A				BATTERY NO. 13 B				BATTERY NO.			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1	9 13	9 29	-	1	3 56	4 03		1			
3	9 23	10 18	-	3	4 05	4 11		3			
5	9 31	10 24		5	4 13	4 51		5			
7	10 20	10 32		7	4 53	5 00		7			
9	10 26			9	5 02	5 06		9			
11	10 34			11	5 08	5 39		11			
13				13	5 41	5 45		13			
15				15	5 47	7 23		15			
17				17	5 56	7 30		17			
19				19	7 25	7 40		19			
21				21	7 32	8 11		21			
23				23	7 42	8 26		23			
25				25	8 13	8 36		25			
27				27	8 28	9 11		27			
29				29	8 38	9 21		29			
31								31			
2				2				2			
4				4				4			
6				6				6			
8	12 02	12 10		8				8			
10	12 08	12 18		10				10			
12	12 14	12 48		12				12			
14	12 50	12 57		14				14			
16	12 59	1 04		16				16			
18	1 06	1 39		18				18			
20	1 41	1 46		20				20			
22	1 48	1 55		22				22			
24	1 57	2 27		24				24			
26	2 29	2 36		26				26			
28	2 38	2 43		28				28			
30	3 13	3 54		30				30			
								1			
								2			

18/16

15/15

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	0	0	2-2	5-6	5	4	8-7
12-1	5	4	8-7	6-7	0	0	3-2
1-2	4	4	7-7	7-8	3	3	5-5
2-3	2	3	5-6	8-9	3	3	6-6
3-4	2	4	5-4	9-10	3	3	5-5
4-5	3	3	6-6	10-11	3	3	5-5
	16	15			17	16	

Total Ovens Pushed 33
Total Ovens Charged 31

Pusherman
Battery Foreman (R Wm)

MAR 13 '92 11:46 FROM COKING OFFICE TO BOB BROWN PAGE.001

CG-10298 REV. 1181
03.001.0020

UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. #5
12 Hrs. Beginning 12:00 AM
Date 3-18-92

BATTERY NO. 13A						BATTERY NO. 13B						BATTERY NO.					
OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES	OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES	OVEN NO.	TIME PUSHED		TIME CHARGED		NOTES
1						1						1					
3			11	13	-	3						3					
5	11	15	11	48	-	5						5					
7	11	50	11	57	-	7						7					
9	11	59	12	08	-	9						9					
11	12	10	12	47	-	11						11					
13	12	49	12	56	-	13						13					
15	12	58	1	03	-	15						15					
17	1	05	1	42	-	17						17					
19	1	44	1	49	-	19						19					
21	1	51	1	56	-	21						21					
23	1	58	2	34	-	23						23					
25	2	36	2	41	-	25						25					
27	2	43	3	44	-	27						27					
29	3	46	3	51	-	29						29					
31	3	53	4	29	-	31						31					
2	10	27	10	36	-	2	4	31	4	37	-	2					
4	10	38	10	44	-	4	4	39	4	44	-	4					
6	10	46	10	58	-	6	4	46	5	23	-	6					
8						8	5	25	5	30	-	8					
10						10	5	32	5	37	-	10					
12						12	5	39	6	17	-	12					
14	17					14	6	19	6	23	-	14					
16		18				16	6	25	6	30	-	16					
18						18	7	15	8	00	-	18					
20						20	8	02	8	09	-	20					
22						22	8	11	8	17	-	22					
24						24	8	19	9	20	-	24					
26						26	9	22	9	27	-	26					
28						28	9	29	9	46	-	28					
30						30	9	42	10	25	-	30					
1						1						1					
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
1	3	3		5	3	3	
2	3	3		6	2	3	
3	4	4		7	1	0	
4	2	2		8	3	3	
5	2	2		9	3	3	
6	3	3		10	3	4	
	17	17			15	16	

Total Ovens Pushed 32
Total Ovens Charged 33

Pusherman

Battery Foreman R. [illegible]

MAR 13 '92 11:47 FROM COKING OFFICE TO BOB BROWN PAGE.002

COMPLIANCE DEMONSTRATION
#13 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX B

CALIBRATION RESULTS

CONTROL BOX CALIBRATION

THREE POINT CALIBRATION

BOX # 1 BP 29.00
DATE 02-11-92 OPERATOR RPC

	WET TEST METER				DRY TEST METER						
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	METER CORRECTY	ORIFICE COEFFICIENT ΔH@
START			0.000	29.00					463.100		
HALF		70.0			90.0	83.0	86.5	0.50			
STOP	12.57		5.000						468.381		
CALCULATION	12.57	530.0	5.013	29.00			546.5	29.04	5.281	0.9775	1.767
START			0.000	29.00					468.800		
HALF		70.0			94.0	85.0	89.5	1.00			
STOP	8.87		5.000						474.081		
CALCULATION	8.87	530.0	5.013	29.00			549.5	29.07	5.281	0.9816	1.750
START			0.000	29.00					474.800		
HALF		70.0			97.0	88.0	92.5	2.00			
STOP	6.30		5.000						480.078		
CALCULATION	6.30	530.0	5.013	29.00			552.5	29.15	5.278	0.9850	1.756
AVERAGE										0.9814	1.757

POST TEST

BOX # 1
DATE 3-30-92

BP 28.75
OPERATOR RPC

	WET TEST METER				DRY TEST METER						
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	METER CORRECT Y	ORIFICE COEFFICIENT ΔH@
START			0.000	28.75					270.400		
HALF		72.0			121.0	108.0	114.5	1.80			
STOP	6.73		5.000						275.895		
CALCULATION	6.73	532.0	5.013	28.75			574.5	28.88	5.495	0.9806	1.763
START			0.000	28.75					276.100		
HALF		72.0			123.0	112.0	117.5	1.80			
STOP	6.73		5.000						281.624		
CALCULATION	6.73	532.0	5.013	28.75			577.5	28.88	5.524	0.9805	1.753
START			0.000	28.75					281.900		
HALF		72.0			129.0	114.0	121.5	1.80			
STOP	6.75		5.000						287.441		
CALCULATION	6.75	532.0	5.013	28.75			581.5	28.88	5.541	0.9843	1.752
AVERAGE										0.9818	1.756
DIFFERENCE										-0.04%	0.09%

PRE-TEST MAGNEHELIC CALIBRATION

BOX# 1
DATE 01-14-92
OPERATOR RPC

0 to 10" H2O RANGE

MAGNEHELIC Δ P	MANOMETER
0.50	0.50
1.00	1.05
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 02-11-92
OPERATOR RPC

	START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
DRY	461.970	462.152	0.182	10.000	-0.002
WET	0.000	0.161	0.161		

PYROMETER CALIBRATION

DATE 04-28-88
OPERATOR AGL

mV input	TARGET 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 01-14-92
OPERATOR RPC

mV input	TARGET TEMP °F	TEMP READING °F
0.18	40	40.0
0.40	50	50.0
0.84	70	69.0
1.29	90	89.0
1.74	110	109.0
2.66	150	149.0
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# 1
DATE 3-30-92
OPERATOR RPC

0 to 10" H2O RANGE

MAGNEHELIC ΔP	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 ΔP	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 ΔH	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 3-30-92
OPERATOR RPC

	START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
DRY	268.945	269.161	0.216	10.000	-0.004
WET	0.000	0.190	0.180		

PYROMETER CALIBRATION
DATE 04-28-88
OPERATOR AGL

mV input	TARGET 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 3-30-92
OPERATOR RPC

mV input	TARGET TEMP °F	TEMP READING °F
0.18	40	40.0
0.40	50	50.0
0.84	70	70.0
1.29	90	89.0
1.74	110	109.0
2.66	150	150.0
3.82	200	200.0
6.09	300	301.0
8.31	400	400.0
10.57	500	499.0

::

QA ORIFICE AUDIT

AGENCY BAPC
DATE 10-28-91
OPERATOR RPC

RUN	1		2		3	
INITIAL CF	341.500		348.775		356.050	
FINAL CF	348.746		356.026		363.314	
DIFFERENCE	7.246		7.251		7.264	
	IN	OUT	IN	OUT	IN	OUT
TEMP INITIAL	80	78	80	80	81	80
TEMP 5 MIN	79	79	81	80	81	80
TEMP 10 MIN	80	79	81	80	81	80
TEMP 15 MIN	80	79	81	80	81	80
TEMP AVG	79.25	TEMP R 539.25	80.375	TEMP R 540.375	80.5	TEMP R 540.5
TIME MINUTES	15		15		15	
	IN WATE	IN HG	IN WATER	IN HG	IN WATER	IN HG
ORIFICE	0.70	0.05	0.70	0.05	0.70	0.05
BARA PRESSURE	29.11	29.16	29.11	29.16	29.11	29.16
	F	C	F	C	F	C
AMBIENT TEMP.	75.0	23.9	75.0	23.9	75.0	23.9
VACUUM IN HG	23		23		23	
STD CF	6.941		6.931		6.942	
DGM CAL Y	1.0033		1.0033		1.0033	
VOL. SCF	0.1972		0.1969		0.1973	

KEYSTONE ENVIRONMENTAL RESOURCES

QA ORIFICE AUDIT

AGENCY	BAPC	DATE	4-7-92	B.P.	28.85
OPERATOR	KS	BOX #	1		

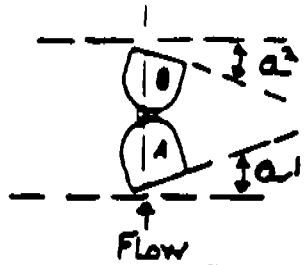
RUN	1		2		3	
INITIAL CF	705.035		712.272		719.628	
FINAL CF	712.272		719.628		727.118	
DIFFERENCE	7.237		7.356		7.490	
	IN	OUT	IN	OUT	IN	OUT
TEMP INITIAL	76	72	83	79	93	87
TEMP 5 MIN	77	74	86	82	95	88
TEMP 10 MIN	79	75	88	84	96	89
TEMP 15 MIN	81	77	92	86	99	91
		TEMP R		TEMP R		TEMP R
TEMP AVG	76.375	536.375	85	545	92.25	552.25
TIME MINUTES	15.00		15.00		15.00	
	IN WATER	IN HG	IN WATER	IN HG	IN WATER	IN HG
ORIFICE P	0.67	0.05	0.67	0.05	0.67	0.05
METER PRESSURE		28.90		28.90		28.90
	F	C	F	C	F	C
AMBIENT TEMP.	70.0	21.1	70.0	21.1	70.0	21.1
VACUUM IN HG	19.0		19.0		19.0	
DGM CAL Y	0.9814		0.9814		0.9814	
STD CF	6.779		6.781		6.814	
STD CUBIC METERS	0.1920		0.1920		0.1930	

GEOMETRIC PITOT CALIBRATION

Caliper # XCF59
Precheck ✓
Post Check

Probe #: 10-2
Date: 2-27-92
Initials: [illegible]

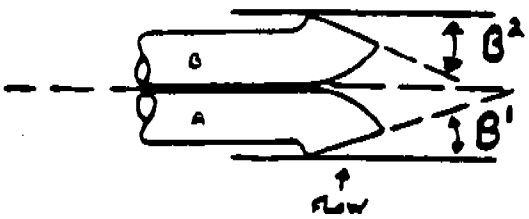
①



a^1 = 5°
a^2 = 2°
a^1, a^2 = <10°

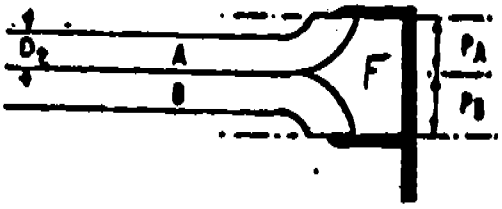
B^1 = 1°
B^2 = 1°
B^1, B^2, = <5°

②



F = 0.905"
μ = 0.0078 — β = ≤ 0.1250" (μ = F TAN γ)
V = 0.0078 — V = ≤0.03125" (V = F TAN θ)
W = 0.256 — W ≥ 0"

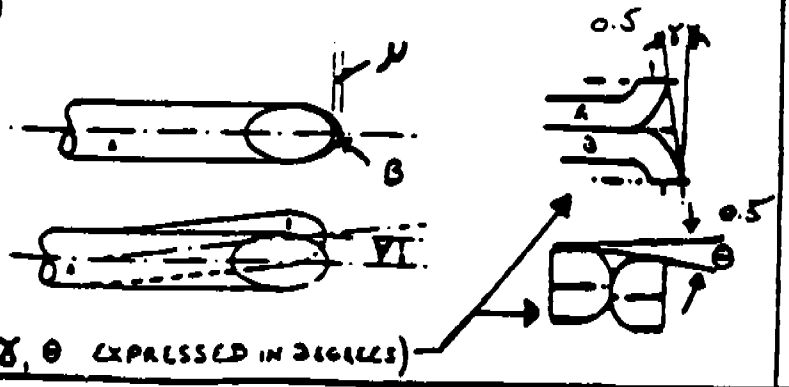
③



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

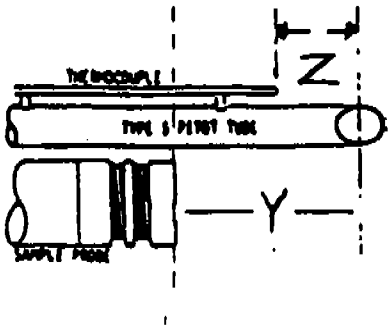
X = 0.926 — X ≥ 0.750" (3/4" using 1/2" nozzle)
Y = 5.770 — Y ≥ 3.0"
Z = 3.724 — Z > 2.0"
D_t = 0.378 — D_t > .1875" to .375" (3/16" to 3/8")

④

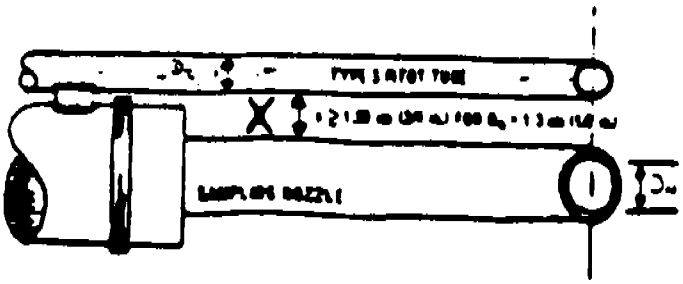


(γ, θ EXPRESSED IN DEGREES)

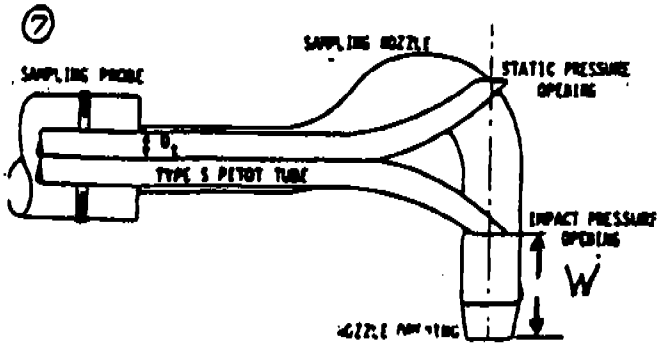
⑥



⑤



⑦

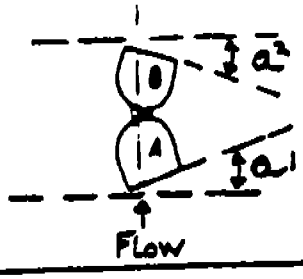


GEOMETRIC PITOT CALIBRATION

Caliper # XLF59
Precheck ✓
Post Check

Probe #: 10-3
Date: 2-27-98
Initials: [illegible]

①



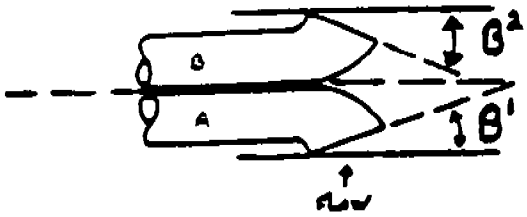
a¹ = 5°
a² = 1°
B¹ = 2°
B² = 2°

a¹, a² = <10°

B¹, B², = <5°

F = 0.996"

②



β = 0.0174 — β = ≤ 0.1250" (β = F TAN γ)

V = 0.0174 — V = ≤0.03125" (V = F TAN θ)

W = 0.180 — W ≥ 0"

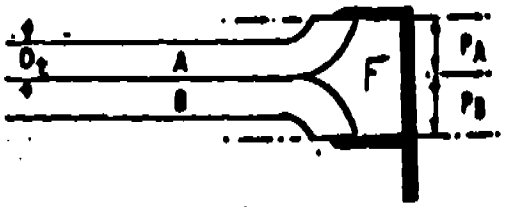
X = 0.834 — X ≥ 0.750" (3/4" using 1/2" nozzle)

Y = 5.816 — Y ≥ 3.0"

Z = 2.540 — Z > 2.0"

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

③

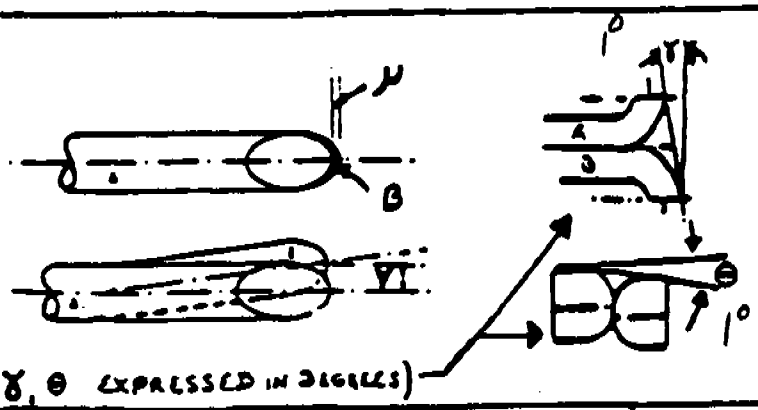


1.05 D_t < d < 1.50 D_t

P_A = P_B

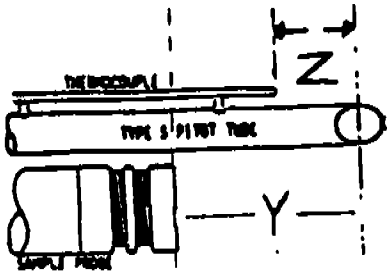
2.10 D_t < d < 3.00 D_t

④

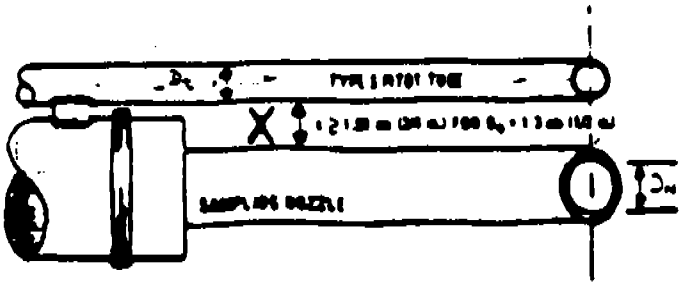


(γ, θ EXPRESSED IN DEGREES)

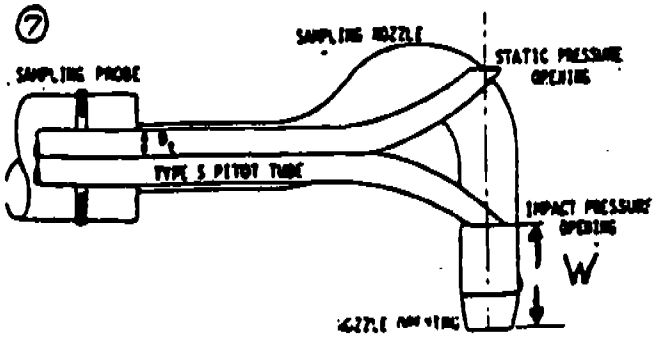
⑥



⑤



⑦

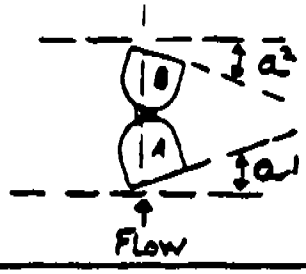


GEOMETRIC PITOT CALIBRATION

Caliper # XEF 59
Precheck
Post Check ✓

Probe #: 10-2
Date: 3/31/92
Initials: JJW

①

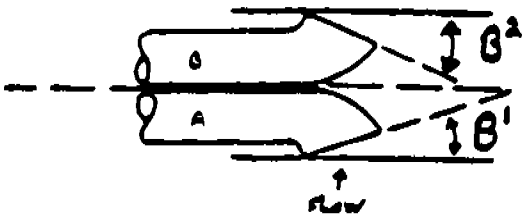


a^1 = 2.0
a^2 = 1.5 — $a^1, a^2 = <10°$

B^1 = 1.0
B^2 = 1.0 — $B^1, B^2, = <5°$

F = .914 "

②

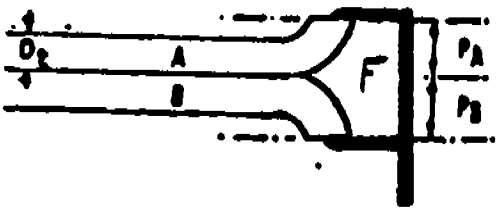


μ = .008 — $\mu = \leq 0.1250"$ ($\mu = F \tan \gamma$)

V = .0115 — $V = \leq 0.03125"$ ($V = F \tan \theta$)

W = .245 — $W \geq 0"$

③



$1.05\ D_t < d < 1.50\ D_t$
$P_A = P_B$
$2.10\ D_t < l < 3.00\ D_t$

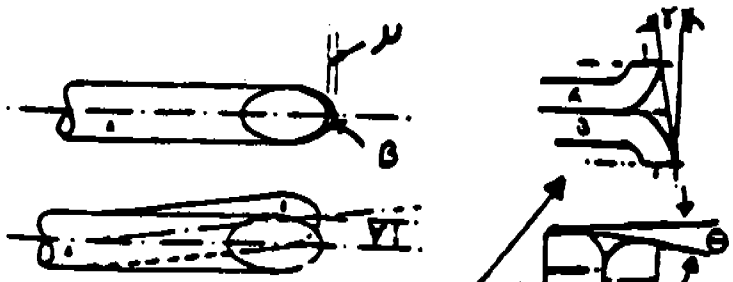
X = .945 — $X \geq 0.750"$ (3/4" using 1/2" nozzle)

Y = 6.0 — $Y \geq 3.0"$

Z = 2.15 — $Z > 2.0"$

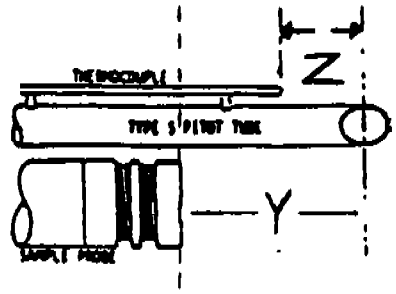
D_t = .256 — $D_t > .1875"$ to $.375"$ (3/16" to 3/8")

④

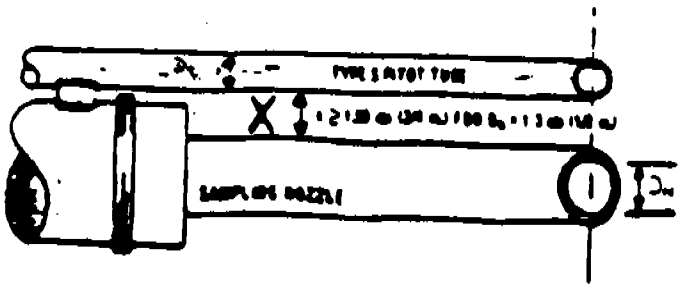


(γ, θ EXPRESSED IN DEGREES)

⑥



⑤



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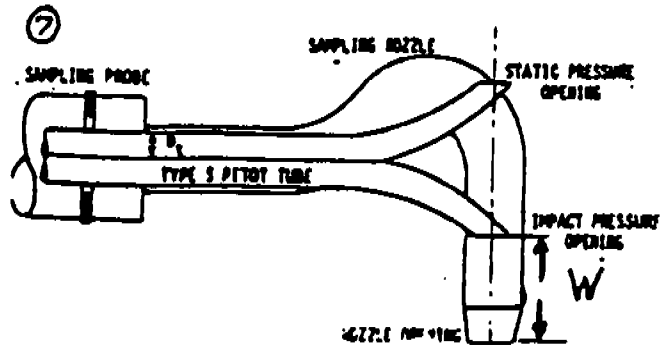
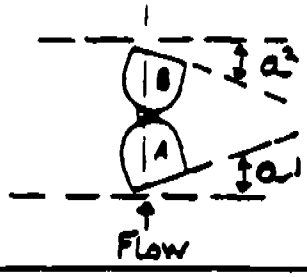


GEOMETRIC PITOT CALIBRATION

Caliper # XZF 59
Precheck
Post Check ✓

Probe #: 10-3
Date: 3/31/92
Initials: STA

①

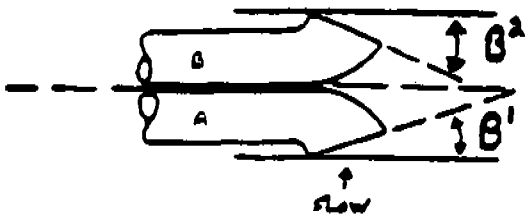


a^1 = 3.0
a^2 = 4.0
$a^1, a^2 = <10°$

B^1 = 1.5
B^2 = 2.5
$B^1, B^2, = <5°$

F = 1.023 "

②



μ = 0.0268 — $\mu = \leq 0.1250"$ ($\mu = F \tan\gamma$)

V = .00805 — $V = \leq 0.03125"$ ($V = F \tan\theta$)

W = .158 — $W \geq 0"$

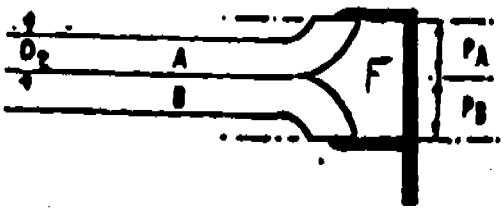
X = 1.025 — $X \geq 0.750"$ (3/4" using 1/2" nozzle)

Y = 6.0 — $Y \geq 3.0"$

Z = 2.75 — $Z > 2.0"$

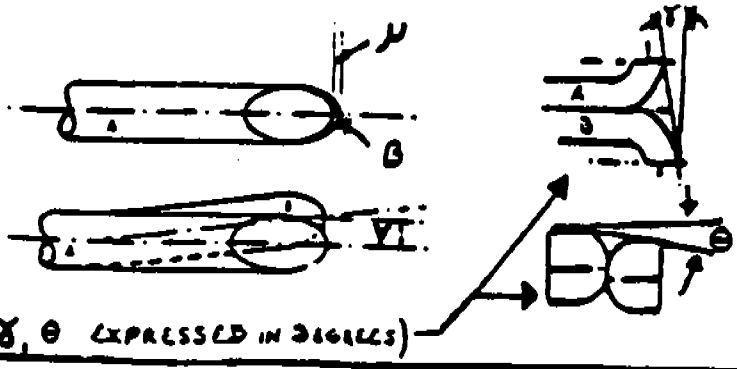
D_t = .287 — $D_t > .1875"$ to .375" (3/16" to 3/8")

③



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

④



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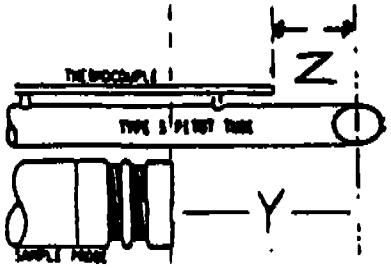

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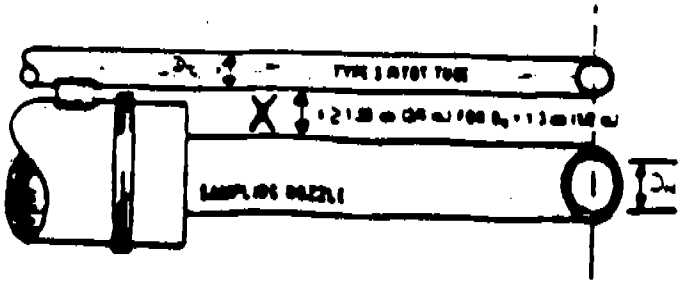

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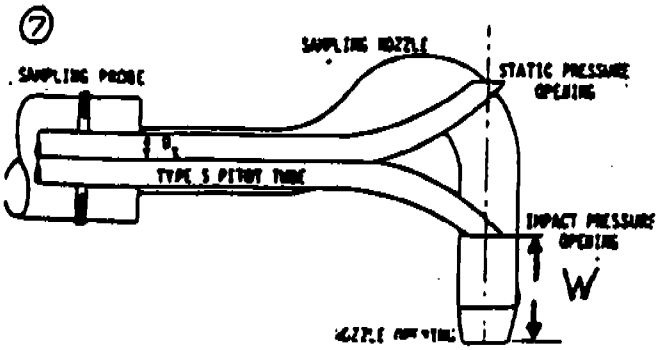


COMPLIANCE DEMONSTRATION
#13 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX C

FIELD DATA SHEETS

1 & 2

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USS Clairton
DATE: 3-12-92
ΔH@: 1.757 2-11-92
HOT BOX NO.: 1
LOCATION: #13 Battery Stack
TEST NO.: CLR-13BS-1
METER CORRECTION: 0.9814
COLD BOX NO.: 1
ACTIVITY NO.:
NOZZLE: #52 0.550
PITOT CORRECTION: 0.84
PROBE NO.: 10-2 (2-12-92
CONTROL BOX OPERTOR: DB
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 778
PROBE HANDLER: RC, SW
PORT DIRECTION: A, B
NOMOGRAPH SET POINT: —
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.05
LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
A	42.7	920	557.218	0.06	1.93	1.93	55	47	9.0	483	250	ICED BATH	250	5 mm/pt
	30.0	"		0.046	1.74	1.74	55	47	8.5	486		<68°F		
	21.3			0.04	1.54	1.54	56	47	8.5	492	250			
	14.2			0.03	1.15	1.15	56	47	6.5	493		58	220	
	8.0			0.03	1.15	1.15	56	47	6.0	490				
A	2.6	950	576.904	0.015	0.57	0.57	56	48	3.5	495	250	50	230	
B	42.7	954	576.904	0.03	1.15	1.15	57	50	5.0	483				
	30.0			0.03	1.15	1.15	60	51	5.0	476	250			
	21.3			0.03	1.15	1.15	59	51	5.0	448				
	14.2			0.03	1.15	1.15	59	51	5.0	456	250			
	8.0			0.025	0.98	0.98	59	51	4.5	463				%H_2O = 16.5
B	2.6	1024	594.315	0.03	1.15	1.15	60	51	5.0	470	250			mw = 27.4

LEAK CHECK

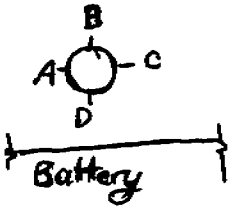
	in. Hg.	Rate
Before	5.0	0.009
After	10.0	0.008

	1	2
CO_2	2.0	
O_2	12.0	
CO		
N		

PITOT LEAK CHECK

POS.	NEG.
OK 15sec	OK 15sec
OK 15sec	OK 15sec

Impinger No.	Final	Initial	Difference
1	711.2	558.3	152.9
2	625.4	563.9	61.5
3	467.4	455.0	12.4
4	648.8	630.4	18.4
5			



2 of 2

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USS Clairton
DATE: 3-12-92
ΔH@: 1.757
HOT BOX NO.: 1
LOCATION: #13 Battery Stack
TEST NO.: CLR-13BS-1
METER CORRECTION: 0.9841
COLD BOX NO.: 1
ACTIVITY NO.:
NOZZLE: #52 0.550
PITOT CORRECTION: 0.84
PROBE NO.: 10-2
CONTROL BOX OPERTOR: DB
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 778
PROBE HANDLER: RC, SW
PORT DIRECTION: C, D
NOMOGRAPH SET POINT: —
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.05
LENGTHS OF UMBILICAL: ___ x 25' 1 x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
C	42.7	1027	594.315	0.045	1.74	1.74	60	52	6.5	473	250			
	30.0			0.05	1.95	1.95	65	54	8.0	492				
	21.3			0.035	1.37	1.37	64	54	5.5	425	250		230	
	14.2			0.025	0.98	0.98	62	54	3.5	423				
	8.0			0.03	1.17	1.17	61	54	3.5	402			230	
C	2.6	1057	612.842	0.015	0.59	0.59	60	53	3.5	423				
D	42.7	1100	612.842	0.05	1.95	1.95	61	53	8.0	416	250		230	
	30.0			0.055	2.15	2.15	65	54	9.0	428				
	21.3			0.06	2.34	2.34	65	55	10.0	454	250		230	
	14.2			0.055	2.15	2.15	65	55	9.0	469				
	8.0			0.05	1.95	1.95	64	54	8.5	443				
D	2.6	1130	637.049	0.045	1.76	1.76	64	55	8.5	463	250		230	

LEAK CHECK

	in. Hg.	Rate
Before		
After		

	1	2
CO_2		
O_2		
CO		
N		

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

Pg 1 of 2

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USS Clairton
DATE: 3-12-92
ΔH@: 1.757 2-11-92
HOT BOX NO.: 3
LOCATION: #13 Battery Stack
TEST NO.: CLR-1385-2
METER CORRECTION: 0.9814
COLD BOX NO.: 3
ACTIVITY NO.:
NOZZLE: #5 0.550
PITOT CORRECTION: 0.84
PROBE NO.: 10-3 (2-12-92
CONTROL BOX OPERTOR: RK
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 779
PROBE HANDLER:
PORT DIRECTION: D,C
NOMOGRAPH SET POINT: —
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.05
LENGTHS OF UMBILICAL ____ x 25' 1 x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Req.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
D	42.7	11:55	637.354	.05	1.97	1.97	57	52	12.0	399	250	48°F	250	
	30.0			.05	1.77	1.77	58	52	12.0	399	–			
	21.3			.045	1.77	1.77	57	51	12.0	408	250	45	240	
	14.2			.05	1.97	1.97	57	51	12.0	438				
	8.0			.04	1.58	1.59	57	51	11.5	420	250	45	240	
D	2.6	12:25	658.436	.03	1.18	1.18	57	57	8.5	328				
C	42.7	12:30	658.436	.05	2.02	2.02	53	53	12.0	451	250	46	245	
	30.0			.045	1.81	1.81	64	50	12.0	475				
	21.3			.045	1.81	1.81	60	54	12.0	425	255	48	250	
	14.2			.04	1.61	1.61	60	54	10.5	397				
	8.0			.035	1.41	1.41	59	54	9.5	391	250	47	250	16.5
C	2.6	13:00	679.430	.035	1.41	1.41	60	53	9.5	400				27.4

LEAK CHECK

	in. Hg.	Rate
Before	5.0	0.012
After	13.0	0.017

	1	2
CO_2	3.0	3.0
O_2	12.5	12.5
CO		
N		

PITOT LEAK CHECK

POS.	NEG.
OK 15sec	OK 15sec
OK 15sec	OK 15sec

Impinger No.	Final	Initial	Difference
1	659.8	541.9	157.9
2	641.0	582.5	58.5
3	485.4	458.7	16.7
4	693.6	659.5	34.1
5			

Pg 2 of 2

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: LBS - CLAIRTON
DATE: 03-12-92
ΔH@: 1.757 (02-11-92)
HOT BOX NO.: 3
LOCATION: #13 BATTERY STACK
TEST NO.: CLR-13BS-2
METER CORRECTION: -.9814
COLD BOX NO.: 3
ACTIVITY NO.:
NOZZLE: #52 .550
PITOT CORRECTION: .84
PROBE NO.: 10-3
CONTROL BOX OPERTOR: R/C
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 779
PROBE HANDLER:
PORT DIRECTION: B, A
NOMOGRAPH SET POINT: —
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.05
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Req.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
			679.430											
B	42.7	1305	679.430	.045	1.81	1.81	57	53	12.5	423	250	<68	250	
	30.0			.045	1.81	1.81	61	54	12.5	439				
	21.3			.045	1.81	1.81	63	55	12.5	456	250	40	255	
	14.2			.035	1.41	1.41	62	56	9.5	465				
	8.0			.035	1.41	1.41	62	56	9.5	461	250	42	255	
B	2.6	1335	700.110	.03	1.21	1.21	62	56	7.5	450				
A	42.7	1340	700.110	.05	2.02	2.02	60	54	12.5	422	250	40	255	
	30.0			.05	2.02	2.02	62	55	12.5	412				
	21.3			.045	1.81	1.81	62	55	12.0	420	250	40	255	
	14.2			.045	1.81	1.81	61	54	12.0	412				
	8.0			.04	1.61	1.61	60	54	10.0	400	250	40	250	moisture 16.5%
A	2.6	1410	722.141	.035	1.41	1.41	63	55	8.5	400				vs 27.4

LEAK CHECK

	in. Hg.	Rate
Before		
After	13.0	<0.017

	1	2
CO_2	3.0	3.0
O_2	12.5	12.5
CO		
N		

PITOT LEAK CHECK

POS.	NEG.
OK 15 sec	OK 15 sec

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USS-CLAIRTON
DATE: 03-12-92
ΔH@: 1.757 (02-11-92)
HOT BOX NO.: 7
LOCATION: #13 BATTERY STACK
TEST NO.: CLR-1385-3
METER CORRECTION: .9814
COLD BOX NO.: 7
ACTIVITY NO.:
NOZZLE: 550 * 50
PITOT CORRECTION: 0.84
PROBE NO.: 10-2 (2-12-92)
CONTROL BOX OPERTOR: DG
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 725
PROBE HANDLER: SW, RC
PORT DIRECTION: A, B
NOMOGRAPH SET POINT: —
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.05
LENGTHS OF UMBILICAL ___ x 25' 1 x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
		1434												
A	42.7	2511	722.467	0.05	1.88	1.88	57	54	5.0	477	250	ICE BATH <68°F	250	5 min/pt
	30.0			0.05	1.88	1.88	63	56	5.0	402				
	21.3			0.04	1.50	1.50	64	54	4.5	411	250		210	Installed new heater core
	14.2			0.04	1.60	1.60	64	54	4.5	405				
	8.0			0.03	1.13	1.13	64	55	3.5	380	250		220	
A	2.6	1504	743.262	0.03	1.13	1.13	64	56	3.5	387				
B	42.7	1509	743.262	0.045	1.69	1.69	60	55	5.0	426	250			
	30.0			0.035	1.41	1.41	65	56	5.0	453				
	21.3			0.04	1.61	1.61	65	56	5.0	468	250			
	14.2			0.035	1.41	1.41	66	56	5.0	464				
	8.0			0.035	1.41	1.41	65	56	4.5	448	250			MW = 27.4
B	2.6	1539	763.837	0.015	0.61	0.61	63	56	2.5	452				%H2O = 16.5

LEAK CHECK

	in. Hg.	Rate
Before	5.0	0.010
After	6.0	0.007

	1	2
CO_2	3.0	
O_2	12.5	
CO		
N		

PITOT LEAK CHECK

POS.	NEG.
OK 15sec	OK 15sec
OK 15sec	OK 15sec

Impinger No.	Final	Initial	Difference
1	712.0	544.1	167.9
2	614.8	562.3	52.5
3	441.1	435.1	6.0
4	676.2	658.0	18.2
5			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT USX- CLAIRTON
LOCATION: 13 BATTERY STACK
ACTIVITY NO.:
CONTROL BOX OPERTOR:
PROBE HANDLER:
CLEAN UP:

DATE: 03-12-92
TEST NO.: CLR-1365-3
NOZZLE: 0.550 #52
STATIC PRESSURE Ps: -1.2
PORT DIRECTION: C, D
BAROMETRIC PRESSURE: 29.05

ΔH@: 1.757 (02-11-92)
METER CORRECTION: .9814
PITOT CORRECTION: .84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT: —
LENGTHS OF UMBILICAL ____ x 25' 1 x 50'

HOT BOX NO.: 7
COLD BOX NO.: 7
PROBE NO.: 10-2
FILTER NO.: 725
STACK DIA.: 120"

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Req.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
C	42.7	1544	763.837	0.03	1.21	1.21	59	56	3.5	360	250		230	
	30.0			0.025	1.01	1.01	63	55	3.5	390				
	21.3			0.03	1.21	1.21	64	55	4.0	392			250	
	14.2			0.025	1.01	1.01	64	56	4.0	392	250			
	8.0			0.02	0.81	0.81	64	56	3.0	385			250	
C	2.6	1614	781.340	0.02	0.81	0.81	64	56	3.0	390				
D	42.7	1618	781.340	0.055	2.24	2.24	63	56	6.0	442	250		260	
	30.0			0.055	2.24	2.24	67	56	6.0	468				
	21.3			0.05	2.04	2.04	68	57	6.0	475	250		250	
	14.2			0.04	1.63	1.63	69	57	5.5	480				
	8.0			0.025	1.01	1.01	66	57	3.5	487	250		240	
D	2.6	1648	802.915	0.02	0.81	0.81	65	57	3.0	490				

LEAK CHECK

	in. Hg.	Rate
Before		
After		

	1	2
CO_2	23.0	22.8
O_2	12.5	
CO		
N		

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

COMPLIANCE DEMONSTRATION
#13 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX D

EMISSIONS CALCULATIONS

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
#13 BATTERY STACK

DATE: 3-12-92
CHARGE #: ...150-605033
TEST #: CLR-13BS-3

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00717	2.02322

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2. STACK CONDITIONS

FLOW (ACFM)	65766.
(SCFM)	37777.
MOISTURE CONTENT (%)	12.85
STACK TEMPERATURE (F)	429.8

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	78.182
PERCENT ISOKINETIC	94.21

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
CLR-13BS-3

#13 BATTERY STACK
3-12-92

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 FFT/SEC
42.7A	1434.0	722.467	.050	1.88	1.88	57.	54.	5.0	477.	17.3
30.0			.050	1.88	1.88	63.	55.	5.0	402.	16.6
21.3			.040	1.50	1.50	64.	54.	4.5	411.	15.0
14.2			.040	1.50	1.50	64.	54.	4.5	405.	14.9
8.0			.030	1.13	1.13	64.	55.	3.5	380.	12.7
2.6A	1504.0	743.262	.030	1.13	1.13	64.	56.	3.5	387.	12.8
42.7B	1509.0	743.262	.045	1.69	1.69	60.	55.	5.0	426.	16.0
30.0			.035	1.41	1.41	65.	56.	5.0	453.	14.3
21.3			.040	1.61	1.61	65.	56.	5.0	458.	15.4
14.2			.035	1.41	1.41	66.	56.	5.0	464.	14.4
8.0			.035	1.41	1.41	65.	56.	4.5	448.	14.3
2.6B	1539.0	763.837	.015	.62	.61	63.	56.	2.5	452.	9.4
42.7C	1544.0	763.837	.030	1.21	1.21	59.	56.	3.5	360.	12.6
30.0			.025	1.01	1.01	63.	55.	3.5	390.	11.7
21.3			.030	1.21	1.21	64.	55.	4.0	392.	12.8
14.2			.025	1.01	1.01	64.	56.	4.0	392.	11.7
8.0			.020	.81	.81	64.	56.	3.0	385.	10.4
2.6C	1614.0	781.340	.020	.81	.81	64.	56.	3.0	390.	10.4
42.7D	1618.0	781.340	.055	2.24	2.24	63.	56.	6.0	442.	17.9
30.0			.055	2.24	2.24	67.	56.	6.0	468.	18.1
21.3			.050	2.04	2.04	68.	57.	6.0	475.	17.3
14.2			.040	1.63	1.63	69.	57.	5.5	480.	15.5
8.0			.025	1.01	1.01	66.	57.	3.5	487.	12.3
2.6D	1648.0	802.915	.020	.81	.81	65.	57.	3.0	490.	11.0

O R S A T	
CO2	3.0
O2	12.5
CO	.0
N	84.5

IMPINGER NO.	1	167.9
	2	52.5
	3	6.0
	4	.0
ABSORBED H2O		18.2

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.757	2-11-92
METER	0.9814	2-11-92
PITOT	0.84	2-12-92

LEAK CHECK

	RATE		IN.HG
INITIAL	0.010	CFM	5.0
FINAL	0.007	CFM	6.0

CONTROL BOX NO. 1

PROBE NO. 10-2

NOZZLE NO. 52

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #13 BATTERY STACK
CLR-13BS-3 3-12-92

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.05
B.	AVG. DELTA H (IN H2O)	1.38
C.	METER PRESSURE (IN. HG.)	29.15
D.	STATIC PRESSURE (IN. H2O)	-1.20
E.	STATIC PRESSURE (IN. HG.)	-.088
F.	STACK PRESSURE (IN. HG.) (A+E)	28.96
G.	STACK DIAMETER (IN.)	120.00
H.	STACK AREA (SQ. FT.)	78.54
	NOZZLE DIAMETER	.5500
I.	NOZZLE AREA (SQ. FT.)	.001650
J.	AVG. STACK TEMP (DEG. R.)	889.8
K.	AVG. METER TEMP (DEG. R.)	519.9
L.	CONDENSATE VOL. (ML)	226.4
M.	ABSORBED H2O (ML)	18.2
N.	TOTAL H2O (ML)	244.6
O.	METERED GAS (CF)	80.448
P.	GAS METER CORRECTION	.9814
Q.	CORRECTED METERED GAS (CF)	78.952
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	11.646
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	90.598
T.	PERCENT H2O (100R/S)	12.85
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.85
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	78.182

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	.030	X	.8715	X	44.0	=	1.15
CO	.000	X	.8715	X	28.0	=	.00
O2	.125	X	.8715	X	32.0	=	3.49
N2	.845	X	.8715	X	28.2	=	20.77
H2O		X	T/100= .1285	X	18.0	=	2.31
					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))]	13.96
Y.	AVG. FLOW RATE (CFM) (X*H*60)	65766.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	37777.
	STACK FLOW RATE (DRY)	32921.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	94.21

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #13 BATTERY STACK
CLR-13BS-3 3-12-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.00600	.00000	.03020

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00020	.01030

PARTICULATE	.04670
ALL MATLS.	.04670

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00717	2.02322

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

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
#13 BATTERY STACK

DATE: 3-12-92
CHARGE #: ...150-605033
TEST #: CLR-13BS-2

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00696	2.17115

2. STACK CONDITIONS

FLOW (ACFM)	72367.
(SCFM)	41908.
MOISTURE CONTENT (%)	13.19
STACK TEMPERATURE (F)	422.5

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	82.949
PERCENT ISOKINETIC	90.44

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA — #13 BATTERY STACK
CLR-13BS-2 — 3-12-92

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 FFT/SEC
42.7D	1155.0	637.354	.050	1.97	1.97	57.	52.	12.0	399.	16.6
30.0			.050	1.97	1.97	58.	52.	12.0	399.	16.6
21.3			.045	1.77	1.77	57.	51.	12.0	408.	15.8
14.2			.050	1.97	1.97	57.	51.	12.0	438.	17.0
8.0			.040	1.58	1.58	57.	51.	11.5	420.	15.0
2.6D	1225.0	658.436	.030	1.18	1.18	57.	51.	8.5	378.	12.7
42.7C	1230.0	658.436	.050	2.02	2.02	58.	53.	12.0	451.	17.1
30.0			.045	1.81	1.81	64.	50.	12.0	475.	16.5
21.3			.045	1.81	1.81	60.	54.	12.0	425.	16.0
14.2			.040	1.61	1.61	60.	54.	10.5	397.	14.8
8.0			.035	1.41	1.41	59.	54.	9.5	391.	13.8
2.6C	1300.0	679.430	.025	1.41	1.41	60.	53.	9.5	400.	11.8
42.7B	1305.0	679.430	.045	1.81	1.81	57.	53.	12.5	423.	16.0
30.0			.045	1.81	1.81	61.	54.	12.5	439.	16.1
21.3			.045	1.81	1.81	63.	55.	12.5	456.	16.3
14.2			.035	1.41	1.41	62.	56.	9.5	465.	14.4
8.0			.035	1.41	1.41	62.	56.	9.5	461.	14.4
2.6B	1335.0	700.110	.030	1.21	1.21	62.	56.	7.5	450.	13.3
42.7A	1340.0	700.110	.050	2.02	2.02	65.	54.	12.5	422.	16.8
30.0			.050	2.02	2.02	62.	55.	12.5	412.	16.7
21.3			.045	1.81	1.81	62.	55.	12.0	420.	16.0
14.2			.045	1.81	1.81	61.	54.	12.0	412.	15.9
8.0			.040	1.61	1.61	60.	54.	10.0	400.	14.9
2.6A	1410.0	722.141	.035	1.41	1.41	63.	55.	8.5	400.	13.9

O R S A T	
CO2	3.0
O2	12.5
CO	.0
N	84.5

IMPINGER NO.	1	157.9
	2	58.5
	3	16.7
	4	.0
ABSORBED H2O		34.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.757	2-11-92
METER	0.9814	2-11-92
PITOT	0.84	2-12-92

LEAK CHECK

	RATE		IN.HG
INITIAL	0.012	CFM	5.0
FINAL	0.017	CFM	13.0

CONTROL BOX NO. 1 — PROBE NO. 10-3 — NOZZLE NO. 52

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #13 BATTERY STACK
CLR-13BS-2 3-12-92

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.05
B.	AVG. DELTA H (IN H2O).....	1.69
C.	METER PRESSURE (IN. HG.).....	29.17
D.	STATIC PRESSURE (IN. H2O).....	-1.20
E.	STATIC PRESSURE (IN. HG.).....	-.088
F.	STACK PRESSURE (IN. HG.) (A+E).....	28.96
G.	STACK DIAMETER (IN.).....	120.00
H.	STACK AREA (SQ. FT.).....	78.54
	NOZZLE DIAMETER.....	.5500
I.	NOZZLE AREA (SQ. FT.).....	.001650
J.	AVG. STACK TEMP (DEG. R.).....	882.5
K.	AVG. METER TEMP (DEG. R.).....	516.8
L.	CONDENSATE VOL. (ML).....	233.1
M.	ABSORBED H2O (ML).....	34.1
N.	TOTAL H2O (ML).....	267.2
O.	METERED GAS (CF).....	84.787
P.	GAS METER CORRECTION.....	.9814
Q.	CORRECTED METERED GAS (CF).....	83.210
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	12.638
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	95.848
T.	PERCENT H2O (100R/S).....	13.19
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	13.19
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	82.949

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	.030	X	.8681	X	44.0	=	1.15
CO	.000	X	.8681	X	28.0	=	.00
O2	.125	X	.8681	X	32.0	=	3.47
N2	.845	X	.8681	X	28.2	=	20.69
H2O		X	T/100= .1319	X	18.0	=	2.37
					MOLECULAR WEIGHT OF STACK GAS	=	27.68

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	15.36
	[85.49*W*SQRT((J*DELTA P)/(V*F))]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	72367.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	41908.
	STACK FLOW RATE (DRY).....	36383.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	90.44
	(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
CLR-13BS-2

#13 BATTERY STACK
3-12-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.00650	.00000	.02980

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00120	.01000

PARTICULATE	.04750
ALL MATLS.	.04750

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00696	2.17115

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

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA
#13 BATTERY STACK

DATE: 3-12-92
CHARGE #: ...150-605033
TEST #: CLR-13BS-1

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00681	1.96874

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2. STACK CONDITIONS

FLOW (ACFM)	68978.
(SCFM)	38694.
MOISTURE CONTENT (%)	12.88
STACK TEMPERATURE (F)	451.1

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	78.204
PERCENT ISOKINETIC	92.03

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #13 BATTERY STACK
CLR-13BS-1 3-12-92

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 FFT/SEC
42.7A	920.0	557.218	.050	1.93	1.93	55.	47.	9.0	483.	17.5
30.0			.045	1.74	1.74	55.	47.	8.5	486.	16.6
21.3			.040	1.54	1.54	56.	47.	8.5	492.	15.7
14.2			.030	1.15	1.15	56.	47.	6.5	493.	13.6
8.0			.030	1.15	1.15	56.	47.	6.0	490.	13.6
2.6A	950.0	576.904	.015	.57	.57	56.	48.	3.5	495.	9.6
42.7B	954.0	576.904	.030	1.15	1.15	57.	50.	5.0	483.	13.5
30.0			.030	1.15	1.15	60.	51.	5.0	476.	13.5
21.3			.030	1.15	1.15	59.	51.	5.0	448.	13.3
14.2			.030	1.15	1.15	59.	51.	5.0	456.	13.3
8.0			.025	.98	.98	59.	51.	4.5	463.	12.2
2.6B	1024.0	594.315	.030	1.15	1.15	60.	51.	~~470.0~~ 5.0	~~250~~.470	11.7
42.7C	1027.0	594.315	.045	1.74	1.74	60.	52.	6.5 DCB	473.	16.5
30.0			.050	1.95	1.95	65.	54.	8.0	492.	17.5
21.3			.035	1.37	1.37	64.	54.	5.5	425.	14.1
14.2			.025	.98	.98	62.	54.	3.5	423.	11.9
8.0			.030	1.17	1.17	61.	54.	3.5	402.	12.9
2.6C	1057.0	612.842	.015	.59	.59	60.	53.	3.5	423.	9.2
42.7D	1100.0	612.842	.050	1.95	1.95	61.	53.	8.0	416.	16.8
30.0			.055	2.15	2.15	65.	54.	9.0	428.	17.8
21.3			.060	2.34	2.34	65.	55.	10.0	454.	18.8
14.2			.055	2.15	2.15	65.	55.	9.0	469.	18.2
8.0			.050	1.95	1.95	64.	54.	8.5	443.	17.1
2.6D	1130.0	637.049	.045	1.76	1.76	64.	55.	8.5	463.	16.4

O R S A T

CO2	2.0
O2	12.0
CO	.0
N	86.0

IMPINGER NO. 1	152.9
2	61.5
3	12.4
4	.0
ABSORBED H2O	18.4

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.757	2-11-92
METER	0.9814	2-11-92
PITOT	0.84	2-12-92

LEAK CHECK

	RATE	IN.HG
INITIAL	0.009 CFM	5.0
FINAL	0.008 CFM	10.0

CONTROL BOX NO. 1 PROBE NO. 10-2 NOZZLE NO. 52

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #13 BATTERY STACK
CLR-13BS-1 3-12-92

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.05
B.	AVG. DELTA H (IN H2O)	1.45
C.	METER PRESSURE (IN. HG.)	29.16
D.	STATIC PRESSURE (IN. H2O)	-1.20
E.	STATIC PRESSURE (IN. HG.)	-.088
F.	STACK PRESSURE (IN. HG.) (A+E)	28.96
G.	STACK DIAMETER (IN.)	120.00
H.	STACK AREA (SQ. FT.)	78.54
	NOZZLE DIAMETER	.5500
I.	NOZZLE AREA (SQ. FT.)	.001650
J.	AVG. STACK TEMP (DEG. R.)	911.1
K.	AVG. METER TEMP (DEG. R.)	515.8
L.	CONDENSATE VOL. (ML)	226.8
M.	ABSORBED H2O (ML)	18.4
N.	TOTAL H2O (ML)	245.2
O.	METERED GAS (CF)	79.831
P.	GAS METER CORRECTION	.9814
Q.	CORRECTED METERED GAS (CF)	78.346
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	11.582
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	89.928
T.	PERCENT H2O (100R/S)	12.88
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.88
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	78.204

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	.020	X	.8712	X	44.0	=	.77
CO	.000	X	.8712	X	28.0	=	.00
O2	.120	X	.8712	X	32.0	=	3.35
N2	.860	X	.8712	X	28.2	=	21.13
H2O		X	T/100= .1288	X	18.0	=	2.32
					MOLECULAR WEIGHT OF STACK GAS	=	27.56

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT((J*DELTA P)/(V*F))]	14.64
Y.	AVG. FLOW RATE (CFM) (X*H*60)	68978.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	38694.
	STACK FLOW RATE (DRY)	33711.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	92.03

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USS CLAIRTON WORKS
CLAIRTON, PA #13 BATTERY STACK
CLR-13BS-1 3-12-92

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.00370	.00000	.02880

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00210	.01260

PARTICULATE	.04720
ALL MATLS.	.04720

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00681	1.96874

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

COMPLIANCE DEMONSTRATION
#13 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX E

VISIBLE EMISSIONS DATA

VISIBLE EMISSIONS OBSERVATIONS FORM

13 STACK

OBSERVER: Chuck Davis

DATE: 3-12-92

FACILITY: USS. Clairton

OBSERVATION: START TIME: 9:20

END TIME: _____

OBSERVATION POINT:

Parking lot walkway

SOURCE:

DISTANCE: 600'

DIRECTION FROM: _____

HEIGHT: _____

WIND:

SPEED: 16'

DIRECTION: South West

TEMPERATURE: 20°

SKY CONDITION: Cloudy

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: _____

TOTAL No. OF READINGS: _____

No. READINGS >= 20% _____

No. READINGS >= 60% _____

GREATEST OPACITY: _____

CREW: _____ FOREMAN: _____

COMMENTS: _____

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

Page 2 of 6

VISIBLE EMISSIONS OBSERVATIONS FORM

13 STACK

OBSERVER: Chuck Davis

DATE: 3-12-92

FACILITY: USS Charleston

OBSERVATION: START TIME: 1028

END TIME: _____

OBSERVATION POINT:

_____

SOURCE:

DISTANCE: 600

DIRECTION FROM: _____

HEIGHT: _____

WIND:

SPEED: 18

DIRECTION: WEST

TEMPERATURE: 24°

SKY CONDITION: Cloudy

BACKGROUND: Sky

_____

READING CONDITIONS: Fair

COLOR OF EMISSION: _____

TOTAL No. OF READINGS: _____

No. READINGS >= 20% _____

No. READINGS >= 60% _____

GREATEST OPACITY: _____

CREW: ____ FOREMAN: _____

COMMENTS: _____

_____

_____

PORT "C"				
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

PORT "D"				
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

13 STACK

OBSERVER: Chuck Davis

DATE: 3-12-98

FACILITY: USS Clairton

OBSERVATION: START TIME: 11:55

END TIME: _____

OBSERVATION POINT:

Parking Lot Wallbash

SOURCE:

DISTANCE: 600

DIRECTION FROM: _____

HEIGHT: _____

WIND:

SPEED: 15

DIRECTION: West

TEMPERATURE: 25°

SKY CONDITION: Cloudy

BACKGROUND: Sky + Clouds

READING CONDITIONS: Fair

COLOR OF EMISSION: _____

TOTAL No. OF READINGS: _____

No. READINGS >= 20% _____

No. READINGS >= 60% _____

GREATEST OPACITY: _____

CREW: ____ FOREMAN: _____

COMMENTS: _____

PORT "D"				
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

PORT "C"				
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

13 STACK

OBSERVER: Chuck Davis

DATE: 3-12-92

FACILITY: USS Clairton

OBSERVATION: START TIME: 1908

END TIME: _____

OBSERVATION POINT:

Parking Lot Wall Bash

SOURCE:

DISTANCE: 600'

DIRECTION FROM: _____

HEIGHT: _____

WIND:

SPEED: 16

DIRECTION: West

TEMPERATURE: 26°

SKY CONDITION: Cloudy

BACKGROUND: Sky + Clouds

READING CONDITIONS: Fair

COLOR OF EMISSION: _____

TOTAL No. OF READINGS: _____

No. READINGS >= 20% _____

No. READINGS >= 60% _____

GREATEST OPACITY: _____

CREW: ____ FOREMAN: _____

COMMENTS: _____

Port "B"				
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

Port "A"				
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

13 STACK

OBSERVER: Chuck Davis

DATE: 3-12-92

FACILITY: USS Charleston

OBSERVATION: START TIME: 2:34

END TIME: _____

OBSERVATION POINT: Parking Lot walkway

SOURCE:

DISTANCE: 600'

DIRECTION FROM: _____

HEIGHT: _____

WIND:

SPEED: 17

DIRECTION: WEST

TEMPERATURE: 77°

SKY CONDITION: Cloudy

BACKGROUND: Sky + Clouds

READING CONDITIONS: Rain

COLOR OF EMISSION: _____

TOTAL No. OF READINGS: _____

No. READINGS >= 20% _____

No. READINGS >= 60% _____

GREATEST OPACITY: _____

CREW: ____ FOREMAN: _____

COMMENTS: _____

	PORT "A"					PORT "B"			
0	0	0	0	0	1505 30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Page #6. of 6

VISIBLE EMISSIONS OBSERVATIONS FORM

13 STACK

OBSERVER: Chuck Davis

DATE: 3-12-92

FACILITY: USS. Charton

OBSERVATION: START TIME: 15:44

END TIME: _____

OBSERVATION POINT:

Parking Lot wallbash

SOURCE:

DISTANCE: 600'

DIRECTION FROM: _____

HEIGHT: _____

WIND:

SPEED: 18

DIRECTION: west

TEMPERATURE: 28°

SKY CONDITION: Cloudy

BACKGROUND: Sky + Clouds

READING CONDITIONS: Fair

COLOR OF EMISSION: _____

TOTAL No. OF READINGS: _____

No. READINGS >= 20% _____

No. READINGS >= 60% _____

GREATEST OPACITY: _____

CREW: ____ FOREMAN: _____

COMMENTS: _____

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

COMPLIANCE DEMONSTRATION
#13 BATTERY COMBUSTION STACK

USS CLAIRTON WORKS
CLAIRTON, PA

APPENDIX F

SULFATE ANALYSIS

RJ LeeGroup, Inc.

350 Hochberg Road • Monroeville, PA 15146
412/325-1776 • FAX 412/733-1799

March 20, 1992

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

RE: RJ Lee Group Project Number CHH203038
Keystone Purchase Order Number B-7185
Keystone Project/Account Number 605033-01

Dear Pat:

At your request, we analyzed four samples, provided by you, for total sulfate (SO_4^{-2}) content. The solutions contained a mixture of chloroform and ethyl ether and were prepared for analysis by evaporating a 100 ml aliquot to 10 ml and rediluting back to the original volume of 100 ml with deionized water. This removed the chloroform and ethyl ether. The samples were then analyzed along with standard sulfate solutions on a Dionex 2120i ion chromatograph.

Results are calculated as milligrams per liter and then converted to total milligrams using the volumes of the solutions that you provided. These results are reported in the enclosed Table I. The precision of this analysis is ±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. 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 thirty (30) days before discarding. A shipping and handling fee will be assessed for the return of any samples.

If you have any questions about this report, or if I can be of further assistance, please let me know.

Sincerely,

Kimberly S. DiNatale

Kimberly S. DiNatale
Project Manager, Analytical Chemistry

KSD/dcd
Enclosure

Plant: USX - CLAIRTON "13" STACK 3/12/92 **Date:** 3/16/92

Activity No. 605033-01

PARTICULATE REPORTING FORM

Test Number	Component	Molecular Weight	Cyclone Weight	Filter Weight (g) PARTICULATE	Insol. Part. in Front Half	Insol. Part. in Back Half (g) .22M millipore	Soluble Part. in Back Half (g) ACETONE	Soluble Part. in Front Half (g) WATER + ACETONE
CLR-"13"BS-1	Particulate	—	—	0.0037	—	0.0021	0.0126	0.0288
CLR-"13"BS-2	Particulate	—	—	0.0065	—	0.0012	0.0100	0.0298
CLR-"13"BS-3	Particulate	—	—	0.0060	—	0.0002	0.0103	0.0302
		BLANKS	H_2O	0.0000				
			ACETONE	0.0000				
		.22M	MILLIPORE	0.0000				

Table I

RJ Lee Group Project Number CHH203038
For: Keystone Environmental Resources, Inc.

SULFATE ANALYSIS

Keystone Identification	RJ Lee Group Sample Number	ppm	Volume (ml)	Total mg	Analytical Method
CLR-13-BS-Blank	100088	0.277	800	0.222	IC
CLR-13-BS-1	100085	23.64	900	21.28	IC
CLR-13-BS-2	100086	19.93	750	14.95	IC
CLR-13-BS-3	100087	17.03	900	15.33	IC

Authorized Signature
Date 3/1/92

RJ Lee Group, Inc.
Headquarters

350 Hochberg Road
Monroeville, PA 15146

(412) 325-1776
FAX (412) 733-1799

CHAIN OF CUSTODY RECORD

PLANT CODE: 605033-01
PROJECT NAME: CLR
SAMPLERS (Signature):

STA NO	DATE	TIME	[illegible]	[illegible]	[illegible]	STATION LOCATION	NUMBER OF CONTAINERS	SOY by I.C.								CONDUCTIVITY	pH	REMARKS OBSERVATIONS
	3/12/92		✓	✓		CLR-13BS-1	1											Total Vol. 900
	3/12/92		✓	✓		CLR-13BS-2	1											Total Vol. 750
	3/12/92		✓	✓		CLR-13BS-3	1											Total Vol. 900
	3/12/92		✓			CLR-13BS-BLANK	1											Total Vol. 800

Samples have been extracted with chloroform and ether.

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Patrick J. Stockton	3/17/92						
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time	Ice Chest Temp °C	Ice Chest #

Chain of Custody Tag #

DISTRIBUTION: Original accompanies shipment; Copy to Coordinator Field Files.