

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	<u>12.2</u>
Reference	<u> </u>
Report Sect.	<u>4</u>
Reference	<u>80</u>

Reviewed

**USS CLAIRTON WORKS
A DIVISION OF USX CORPORATION
CLAIRTON, PENNSYLVANIA**

**Report on

COMPLIANCE DEMONSTRATION
NO. 19 BATTERY COMBUSTION STACK**

SEPTEMBER 1994

**Prepared By
Advanced Technology Systems, Inc.
3000 Tech Center Drive
Monroeville, Pennsylvania 15146 - 3055**

Project No. IKM-0204



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

RECEIVED

October 14, 1994 OCT 19 1994

DEPUTY DIRECTOR'S OFFICE
Department of Environmental Quality

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

Deputy Director
Allegheny County Health Department
Department of Air Quality
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

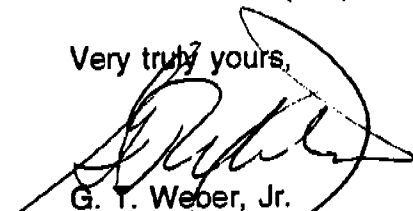
Gentlemen:

Subject: #19 Battery Stack Compliance Demonstration
USS Clairton Works

I am enclosing with this letter the mass emission report on #19 Battery Combustion Stack. The compliance demonstration was conducted at USS Clairton Works, a division of USX Corporation, on August 24, 1994.

For questions regarding this report please call William C. Graeser at (412) 233-1467

Very truly yours,



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

GTW/BAC
Enclosure



TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY.....	iii
1.0 INTRODUCTION.....	1
2.0 METHODOLOGIES.....	2
3.0 RESULTS.....	4

LIST OF TABLES

Table 1	Particulate Matter Emissions Data.....	5
---------	--	---

APPENDICES

APPENDIX A	TEST PROTOCOL, FIELD DATA SHEETS, CALIBRATION RESULTS
APPENDIX B	PLANT OPERATIONAL DATA
APPENDIX C	GRAVIMETRIC RESULTS, EMISSIONS CALCULATIONS

EXECUTIVE SUMMARY

On August 24, 1994, a compliance test program was conducted for USS Clairton Works, Clairton, Pennsylvania, on the #19 Battery Combustion Stack. The purpose of the testing was to determine the (1) concentration and mass emission rate of particulate matter, and (2) presence and extent of visible emissions from the stack as required by the Second Consent Decree (Civil Action Nos. 79-709, 91-329), Chapter V (Compliance Requirements - Clairton Works), Section F (Combustion Stacks), Specific Items 1, 3, and 4.

The results of the testing showed an average particulate matter concentration and emission rate of 0.0143 grains per dry standard cubic foot (gr/dscf) and 8.80 pounds per hour (lb/hr), respectively. As promulgated by the Second Consent Decree, Chapter V, Section F.1.a, the allowable particulate matter concentration for #19 Battery Combustion Stack is 0.030 gr/dscf. Thus, the particulate matter emissions from the stack are less than the allowable concentration.

During the test periods, the maximum opacity of the exhaust gas was ten percent. As promulgated by the Second Consent Decree, Chapter V, Sections F.2.b and F.3, 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. Thus, the observed opacities were less than the allowable values.

1.0 INTRODUCTION

On August 24, 1994, a compliance test program was conducted for USS Clairton Works, Clairton, Pennsylvania, on the #19 Battery Combustion Stack. The purpose of the testing was to determine the (1) concentration and mass emission rate of particulate matter, and (2) presence and extent of visible emissions from the stack as required by the Second Consent Decree (Civil Action Nos. 79-709, 91-329), Chapter V (Compliance Requirements - Clairton Works), Section F (Combustion Stacks), Specific Items 1, 3, and 4.

Testing was performed by Messrs. Richard Casselberry and Thomas Morgan of Advanced Technology Systems, Inc. (previously the Monroeville, Pennsylvania-based Air Emissions Measurement Group of Chester Environmental) and Mr. Lance Grumling of Environmental Technical Services under the direction of Mr. Bernie Clark of Chester Environmental. All test procedures were witnessed by Mr. Phil Lawrence of the Allegheny County Health Department - Department of Air Quality (DAQ).

2.0 METHODOLOGIES

The compliance test program was conducted in accordance with the emissions measurement test protocol, which can be found in Appendix A.

Particulate matter sampling was performed in accordance with EPA Stationary Source Sampling Methods 1 through 5. 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 186 inch diameter stack at stack platform level. 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.

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 carbon dioxide (CO₂), oxygen (O₂), and nitrogen (N₂ - by difference) were determined with the use of Fyrite apparatus as specified by EPA Method 3. Gas concentrations were used to obtain dry molecular weight of the process gas.

Percent moisture content, by volume, of the exhaust gas was determined by measuring the weight gain of the four sample train impingers and knowledge of the dry gas volume sampled 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 an acetone rinse of the front-half components of the sample train. Front-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 was prepared in the same manner as the test sample rinses. The blank residue weight was subtracted from the test sample residue weights. After blank correction, front-half acetone rinse residue weights and sample train filter weights were used to determine total particulate matter catch.

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

3.0 RESULTS

The test results have been summarized in Table 1. The results of the testing showed an average particulate matter concentration and emission rate of 0.0143 grains per dry standard cubic foot (gr/dscf) and 8.80 pounds per hour (lb/hr), respectively. As promulgated by the Second Consent Decree, Chapter V, Section F.1.a, the allowable particulate matter concentration for #19 Battery Combustion Stack is 0.030 gr/dscf. Thus, the particulate matter emissions from the stack are less than the allowable concentration.

Table 1 also lists other pertinent stack and sampling parameters which include stack gas flow rate in units of actual cubic feet per minute (acfm), standard cubic feet per minute (scfm), and dry standard cubic feet per minute (dscfm), stack gas temperature ($^{\circ}\text{F}$), moisture content of the stack gas (percent by volume), gas volume sampled for each test in units of dry standard cubic feet (dscf), and the isokinetics value for each test. The isokinetics value is equal to the ratio of the average linear gas velocity sampled through the probe nozzle to the average stack gas velocity. An isokinetics value between 90 percent and 110 percent is considered acceptable. All isokinetic values were within the acceptable range of values. The gas volume sampled for each 120 minute test was greater than 50 dry standard cubic feet. Actual test sampling times have also been included in Table 1.

Copies of all field data sheets, including the visible emissions readings, can be found in Appendix A. As promulgated by the Second Consent Decree, Chapter V, Sections F.1.b and F.3, 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. During the test periods, the maximum opacity of the exhaust gas was ten percent. Thus, the observed opacities were less than the allowable values.

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 DAQ can be found in Appendix A. All testing was performed during periods of normal plant operation. Copies of the plant operational data can be found in Appendix B. The gravimetric results and the emissions calculations for each test can be found in Appendix C.

**COMPLIANCE DEMONSTRATION
NO. 19 BATTERY COMBUSTION STACK**

**USS CLAIRTON WORKS
A DIVISION OF USX CORPORATION
CLAIRTON, PENNSYLVANIA**

APPENDIX A

**TEST PROTOCOL, FIELD DATA SHEETS, CALIBRATION
RESULTS**

ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.

**TEST PROTOCOL
COMPLIANCE DEMONSTRATION
#19 BATTERY COMBUSTION STACK**

**USS CLAIRTON WORKS
CLAIRTON, PA**

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

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

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

At the beginning and end of each test, gas concentrations of CO₂, O₂, and N₂ (by difference) will be determined with the use of Fyrite apparatus as specified by EPA Method 3. Gas concentrations will be used to obtain molecular weight of the process gas on a dry basis.

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

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

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

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

**USS CLAIRTON WORKS
CLAIRTON, PA**

TABLE 1

**#19 BATTERY COMBUSTION STACK
PARTICULATE MATTER EMISSIONS DATA**

		Run 1	Run 2	Run 3	Average
Test Number		CLR-BS#19-1	CLR-BS#19-2	CLR-BS#19-3	
Test Date		08-24-94	08-24-94	08-24-94	
<u>Mass Emissions Rate and Concentration</u>					
Particulate Matter	(lb/hr)	8.18	8.10	10.11	8.80
	(gr/dscf)	0.0133	0.0132	0.0165	0.0143
<u>Stack Conditions</u>					
Flow Rate	(acfm)	151700	152100	152300	152000
	(scfm)	83900	83600	83500	83700
	(dscfm)	71700	71500	71400	71500
Temperature	(°F)	482	487	490	486
Moisture Content	(%)	14.6	14.5	14.5	14.5
<u>Sampling Conditions</u>					
Test times		0810	1051	1335	
		to 0840	to 1121	to 1405	
		0843	1124	1408	
		to 0913	to 1154	to 1438	
		0916	1157	1442	
		to 0946	to 1227	to 1512	
		0949	1230	1516	
		to 1019	to 1300	to 1546	
Sampling Time	(minutes)	120	120	120	
Sample Volume	(dscf)	62.579	61.192	63.594	
Isokinetics	(%)	104.8	102.8	107.0	

STACK SAMPLING DATA SHEET

Page 1 of 2

CLIENT USS-CLARION TEST DATE 08-24-94 (Loc) OFFICE CORRECTION (Δ Hg) 1.937 HOT/COLD BOX NO. 1
 TEST UNIT # 19 BATTERY TEST NO. 455-CLC-AS19-1 METER CORRECTION (V) 1.0172 PROBE NO. 10-3
 PROJECT NO. JK-08204 NOZZLE (SIZE, #) 0.490 CALIBRATION DATE 06-20-94 FILTER NO. 1341
 TEST CREW RCC TM STATIC PRESSURE -1.2 PITOT CORRECTION 0.84 STACK DIA. 18"
 BAROMETRIC PRESSURE 29.60 PORT DIRECTION EAST, SOUTH CONTROL BOX NO. 57A PORT SIZE 4.0"

Traverse Point (feet)	Time	Dry Gas Meter Reading (scf)	Phot A P (in. Hg)	Required (in. Hg)	Actual (in. Hg)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°F)	Hot Box Temp. (°F)	Comments
66.2	08:10	405.338	0.05	1.46	1.46	61	61	3.0	489	2350	500	2350	5 min./point
46.5			0.05	1.46	1.46	79	63	3.0	486				
33.0			0.03	0.87	0.87	84	63	2.5	469				
23.0			0.02	0.58	0.58	87	66	2.0	470				
12.5			0.02	0.58	0.58	89	67	2.0	460				
4.0	08:40	419.600	0.03	0.87	0.87	92	70	2.5	469				
66.2	08:43	419.600	0.05	1.46	1.46	80	73	3.5	470				
46.5			0.04	1.16	1.16	96	74	2.5	475				
33.0			0.04	1.16	1.16	99	76	2.5	481				
22.0			0.05	1.46	1.46	102	77	3.5	490				
12.5			0.03	0.87	0.87	103	79	2.5	486				
4.0	08:13	437.940	0.05	1.46	1.46	105	80	3.5	492				

Estimates:

MW = 27.9

%H₂O = 12%

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DNH Rate (cfm)
Before	50	0.0115
After	6.0	0.0115

PITOT LEAK CHECK

	Positive	Negative
Before	0.5/1.5	0.5/1.5
After	1.5/1.5	0.5/1.5

	CO ₂	O ₂	CO	N ₂
Before	4.0	12.0	0	84.0
After	4.0	12.0	0	84.0

Impinger

No.

Impinger Contents

Final

Initial

Difference

1.	100% ALKAL	740.4	564.6	178.8
2.	100% DI H ₂ O	575.8	548.5	27.3
3.	EMPTY	452.5	448.4	4.1
4.	SWINE GAS	647.2	631.7	15.5
5.				
6.				
7.				
8.				

2102-9

225.79

8

ATS

STACK SAMPLING DATA SHEET

Page 1 of 2

CLIENT U.S. - CHEMIRON WORKS

TEST DATE 08-24-94 (used)

OFFICE CORRECTION (ΔH₀) 1.837 HOT/COLD BOX NO. 2

TEST UNIT 119 BATTERY STREET

TEST NO. 455-CLC-85#9-A

METER CORRECTION (V) 1.0172 PROBE NO. 12-2

PROJECT NO. 7101-10201

NOZZLE (SIZE #) 0.490

CALIBRATION DATE 06-20-94 FILTER NO. 1324

TEST CREW RAC 74

STATIC PRESSURE -1.20

PITOT CORRECTION 0.84 STACK DIA. 18.0"

BAROMETRIC PRESSURE 29.60

PORT DIRECTION North West

CONTROL BOX NO. 52 PORT SIZE 4.0"

Traverse Point (inches)	Time	Dry Gas Meter Reading (scf)	Pitot ΔP (in. H ₂ O)	Required (in. H ₂ O)	Actual (in. H ₂ O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°F)	Hot Box Temp. (°F)	Comments
16.2	10:51	470.000	0.04	1.21	1.21	84	82	2.0	486	486	486	486	5 min./point
46.5			0.04	1.21	1.21	100	83	2.0	490				
33.0			0.02	.60	.60	105	84	1.5	495				
22.0			0.05	1.57	1.57	108	85	3.5	499				
12.5			0.02	0.60	0.60	112	87	1.5	492				
4.0	11:21	480.958	0.02	0.60	0.60	110	88	1.5	478				
66.2	11:24	480.958	0.05	1.57	1.57	100	90	3.5	488				
46.5			0.05	1.57	1.57	102	93	3.5	499				
33.0			0.03	0.91	0.91	117	94	0.5	470				
22.0			0.05	1.57	1.57	118	93	3.5	479				
12.5			0.03	0.91	0.91	119	94	3.5	464				
4.0	11:54	503.050	0.03	0.91	0.91	118	94	2.5	476				

Estimates:
MW = 27.9
%H₂O = 12%

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	Leak Rate (cfm)
Before	5.0	<0.010
After	5.0	0.009

PITOT LEAK CHECK

	Positive	Negative
Before	0.1530	0.1530
After	0.1530	0.1530

	CO ₂	CO	N ₂
Before	4.0	4.0	4.0
After	4.0	4.0	4.0

Impinger

No. Contents

Final

Initial

Difference

1.	100% AT 4.0	100%	100%	100%
2.	100% AT 4.0	100%	100%	100%
3.	100% AT 4.0	100%	100%	100%
4.	100% AT 4.0	100%	100%	100%
5.	100% AT 4.0	100%	100%	100%
6.	100% AT 4.0	100%	100%	100%
7.	100% AT 4.0	100%	100%	100%
8.	100% AT 4.0	100%	100%	100%

ATS

204.59

STACK SAMPLING DATA SHEET

Page 2 of 2

CLIENT USS - CLARKSON

TEST DATE 08-24-94 (Wed)

ORIFICE CORRECTION (A110) 1.837 HOT/COLD BOX NO. 2

TEST UNIT # 19 801008 Stack

TEST NO. 035-CLK-8579-2

METER CORRECTION (V) 1.0173 PROBE NO. 10-2

PROJECT NO. ITA-8244

NOZZLE (SIZE, #) 0.490

CALIBRATION DATE 06-20-94 FILTER NO. 1524

TEST CREW RAC 74

STATIC PRESSURE -1.20

PITOT CORRECTION 0.84 STACK DIA. 186"

DAROMETRIC PRESSURE 29.6

PORT DIRECTION Southeast

CONTROL BOX NO. 26 PORT SIZE 4.0"

Traverse Point (Inches)	Time	Dry Gas Meter Reading (dsc)	Pilot A/P (in. H2O)	Required (in. H2O)	Actual (in. H2O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°F)	Hot Box Temp. (°F)	Comments
166.2	11:57	523.050	0.03	0.91	0.91	100	94	5.0	499	~250°	~138°	~250°	5 min./point
46.5			0.04	1.21	1.21	119	95	3.5	501				
33.0			0.04	1.21	1.21	120	96	3.5	500				
22.0			0.03	0.91	0.91	120	96	2.5	492				
12.5			0.02	0.60	0.60	120	97	1.5	464				
4.0	12:27	519.673	0.02	0.60	0.60	120	97	1.5	476				
66.3	12:30	519.673	0.03	0.91	0.91	108	98	2.5	494				
46.5			0.02	0.60	0.60	120	99	1.5	488				
33.0			0.04	1.21	1.21	120	98	3.0	500				
22.0			0.02	0.60	0.60	121	91	1.5	505				
12.5			0.02	0.60	0.60	121	99	1.5	477				
4.0	13:00	534.663	0.02	0.60	0.60	121	99	1.5	480				
Test	A=120	A=	(A)M=	A(H)=									Estimates:
Test	mw		0.03	0.96									MW= 279
													%H2O= 12%

SYSTEM LEAK CHECK dcf

PITOT LEAK CHECK

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

	Positive	Negative
Before		
After		

	1	2
CO2		
O2		
CO		
N2		

Impinger

Impinger

Final

Initial

Difference

No.	Contents	Final	Initial	Difference
1.	100m AT 14.0			
2.	100m AT 12.0			
3.	EMPTY			
4.	Sliver gel			
5.				
6.				
7.				
8.				

ATS

STACK SAMPLING DATA SHEET

Page 1 of 2

CLIENT US-CLIMATE WORKS TEST DATE 08-24-94 (week) OFFICE CORRECTION (Δ H₂O) 1.837 HOT/COLD BOX NO. 7
 TEST UNIT #19 Borel smk TEST NO. 185-cuc-85*18-3 METER CORRECTION (Y) 1.072 PROBE NO. 10-2
 PROJECT NO. TM-0294 NOZZLE (SIZE, #) 0.490 CALIBRATION DATE 06-20-94 FILTER NO. 1325
 TEST CREW RC, TM STATIC PRESSURE -1.2 PITOT CORRECTION 0.84 STACK DIA. 18"
 BAROMETRIC PRESSURE 29.10 PORT DIRECTION EAST CONTROL BOX NO. 571 PORT SIZE 4.0"

Traverse Point (inches)	Time	Dry Gas Meter Reading (det)	Pitot Δ P (in. H ₂ O)	Required (in. H ₂ O)	Actual (in. H ₂ O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°F)	Hot Box Temp. (°F)	Comments
66.2	13:35	535.015	0.05	1.54	1.54	92	92	4.0	499	~250°	<68°	~230°	5 min./point
46.5			0.04	1.23	1.03	107	92	3.5	509				
33.0			0.02	0.61	0.61	113	94	1.5	515				
22.0			0.02	0.61	0.61	113	94	1.5	511				
13.5			0.03	0.92	0.92	116	95	2.5	495				
4.0	14:05	551.000	0.02	0.61	0.61	118	97	1.5	484				
66.2	14:08	551.000	0.05	1.54	1.54	109	98	4.0	496				
46.5			0.03	0.92	0.92	119	99	3.0	495				
33.0			0.03	0.92	0.92	122	100	3.0	489				
23.0			0.05	1.54	1.54	123	100	4.5	470				
12.5			0.04	1.23	1.23	125	102	4.0	482				
4.0	14:38	569.742	0.05	1.54	1.54	125	102	4.5	507				

Estimates:

MW = 279

%H₂O = 1285

SYSTEM LEAK CHECK

	Vacuum (in. Hg)	DNM Rate (cfm)
Before	5.0	0.0076
After	5.0	0.0106

PITOT LEAK CHECK

	Positive	Negative
Before	0.4/5.4	0.4/5.4
After	0.4/5.4	0.4/5.4

Impinger

Impinger Contents

Final

Initial

Difference

No.	Impinger	Final	Initial	Difference
1.	100ml AF-H ₂ O	739.9	551.1	188.8
2.	100ml AF-H ₂ O	573.9	552.6	21.3
3.	empty	444.8	441.4	3.4
4.	50ml gas	673.5	658.6	14.9
5.				
6.				
7.				
8.				

1213.59

ATS

STACK SAMPLING DATA SHEET

CLIENT USS - CANTON WORK TEST DATE 08-24-94 (406) OFFICE CORRECTION (ΔH) 1.837 HOT/COLD BOX NO. 7
 TEST UNIT # A PATWAY STOCK TEST NO. USS-CLC-65#19-3 METER CORRECTION (V) 1.0173 PROBE NO. 10-2
 PROJECT NO. 744-0204 NOZZLE (SIZE, #) 0.490 CALIBRATION DATE 06-20-94 FILTER NO. 1326
 TEST CREW RPE TM STATIC PRESSURE -1.2 PITOT CORRECTION 0.04 STACK DIA. 186"
 BAROMETRIC PRESSURE 29.60 PORT DIRECTION WEST CONTROL BOX NO. 517 PORT SIZE 4.0"

Traverse Point (inches)	Time	Dry Gas Meter Reading (scf)	Pitot ΔP (in. H ₂ O)	Required (in. H ₂ O)	Actual (in. H ₂ O)	Meter Temperature In (°F)	Meter Temperature Out (°F)	Vacuum (in. Hg)	Stack Temp. (°F)	Probe Temp. (°F)	Impinger Temp. (°F)	Hot Box Temp. (°F)	Comments
46.2	14:48	569.742	0.05	1.54	1.52	115	103	4.5	486	~250°F	<68°F	~250°F	5 min./point
46.5			0.05	1.54	1.54	124	102	4.5	500				
33.0			0.03	0.92	0.92	125	103	2.5	500				
22.0			0.03	0.92	0.92	125	104	2.5	467				
12.5			0.03	0.61	0.61	125	104	1.5	469				
4.0	15:12	587.79	0.02	0.61	0.61	124	104	1.5	472				
66.8	15:16	587.179	0.03	0.92	0.92	105	102	2.5	490				
46.5			0.02	0.61	0.61	120	103	2.0	496				
35.0			0.02	0.61	0.61	121	103	2.0	479				
22.0			0.03	0.92	0.92	123	103	3.5	480				
12.5			0.04	1.23	1.23	124	103	4.5	490				
4.0	15:46	602.962	0.04	0.92	0.92	124	103	3.5	470				
Est	$\Delta = 10$	$A =$	$(10)_{H_2O} =$	$(10)_{H_2O} =$	$(10)_{H_2O} =$								
Notes	67.947	2.03	1.02	109.45	487.79	2							

SYSTEM LEAK CHECK

Vacuum (in. Hg)	DIAG Note
Before	
After	

PITOT LEAK CHECK

Positive	Negative
Before	
After	

QAS	1	2
CO2	4.0	4.0
O2	12.0	12.0
CO	0	0
N2	84.0	84.0

Impinger

No.	Impinger	Conc.	Final	Initial	Difference
1.	100 ml AT 420				
2.	100 ml AT 420				
3.	EMPTY				
4.	500 ml GEL				
5.					
6.					
7.					
8.					

ATS

VISIBLE EMISSIONS OBSERVATIONS FORM

19 STACK TEST

OBSERVER: Joe Dumb

DATE: 8.24-94

FACILITY: USX-CLINTON

OBSERVATION START TIME: 8:10

END TIME: 9:10

OBSERVATION POINT:

TRAILER AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: CALM

DIRECTION: CALM

TEMPERATURE: 56°F

SKY CONDITION: HIGH clouds

BACKGROUND: SKY

READING CONDITIONS: GOOD

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McNATT

COMMENTS: _____

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	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

19 STACK TEST

OBSERVER: Sam Aubrey

DATE: 8-24-94

FACILITY: USX-CLAYTON

OBSERVATION: START TIME: 9:10

END TIME: 10:10

OBSERVATION POINT:

TRAILER AREA

SOURCE:

DISTANCE: 400

DIRECTION FROM: SOUTH

HEIGHT: 200

WIND:

SPEED: CALM

DIRECTION: CALM

TEMPERATURE: 58°F

SKY CONDITION: HIGH LIGHT clouds

BACKGROUND: SKY

READING CONDITIONS: GOOD

COLOR OF EMISSION: -

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McNATT

COMMENTS: _____

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	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

19 STACK TEST

OBSERVER: [Signature]

DATE: 8-29-94

FACILITY: USK - clinton

OBSERVATION: START TIME: 10:10

END TIME: 10:20

OBSERVATION POINT:

TRAILER AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 6 MPH

DIRECTION: EAST

TEMPERATURE: 69°F

SKY CONDITION: CLEAR

BACKGROUND: SKY

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 40

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McHATT

COMMENTS: _____

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

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

VISIBLE EMISSIONS OBSERVATIONS FORM

19 STACK TEST

OBSERVER: Sam Dunning

DATE: 8.24.94

FACILITY: USX CLINTON

OBSERVATION: START TIME: 10:47

END TIME: 11:47

OBSERVATION POINT:

TILALEIZ AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 7 MPH

DIRECTION: S-E

TEMPERATURE: 67°

SKY CONDITION: CLEAR

BACKGROUND: SKY

READING CONDITIONS: GOOD

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McNATT

COMMENTS: _____

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	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

19 STACK TEST

OBSERVER: Paul Drury

DATE: 8.24.94

FACILITY: USX-CLINTON

OBSERVATION: START TIME: 11:47

END TIME: 12:47

OBSERVATION POINT:

TRAILER AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 5 MPH

DIRECTION: WEST

TEMPERATURE: 71°F

SKY CONDITION: HIGH LIGHT CLOUDS

BACKGROUND: SKY

READING CONDITIONS: GOOD

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 24

No. READINGS $\geq 20\%$ 0

No. READINGS $\geq 60\%$ 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McNATT

COMMENTS:

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	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

19 STACK TEST

OBSERVER: James D. Dwyer

DATE: 8.24.94

FACILITY: USX-CLAYTON

OBSERVATION: START TIME: 12:47

END TIME: 13:00

OBSERVATION POINT:

TRAILER AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 7 MPH

DIRECTION: WEST

TEMPERATURE: 75°

SKY CONDITION: HIGH LIGHT CLOUDS

BACKGROUND: SKY

READING CONDITIONS: GOOD

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 52

No. READINGS ≥ 202 0

No. READINGS ≥ 602 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McHATT

COMMENTS: —

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

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

VISIBLE EMISSIONS OBSERVATIONS FORM

19 STACK TEST

OBSERVER: James Dumbly

DATE: 8-24-94

FACILITY: USX - CLAIRTON

OBSERVATION: START TIME: 13:35
END TIME: 14:35

OBSERVATION POINT:
TRAILER AREA

SOURCE:

DISTANCE: 400

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 8 MPH

DIRECTION: S-W

TEMPERATURE: 78°F

SKY CONDITION: HIGH LIGHT CLOUDS

BACKGROUND: SKY

READING CONDITIONS: Good

COLOR OF EMISSION: -

TOTAL No. OF READINGS: 240

No. READINGS $\geq 20\%$ 0

No. READINGS $\geq 60\%$ 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McNATT

COMMENTS:

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	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

19 STACK TEST

OBSERVER: Sam Durling

DATE: 8.24.94

FACILITY: USX - clinton

OBSERVATION: START TIME: 14:35
END TIME: 15:35

OBSERVATION POINT: TRAILER AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 8 MPH

DIRECTION: S-W

TEMPERATURE: 79°F

SKY CONDITION: HIGH LIGHT CLOUDS

BACKGROUND: 5124

READING CONDITIONS: Good

COLOR OF EMISSION: -

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: H. McVATT

COMMENTS: _____

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	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

19 STACK TEST

OBSERVER: [Signature]

DATE: 8.24.94

FACILITY: USX - CLINTON

OBSERVATION: START TIME: 15:35
END TIME: 15:46

OBSERVATION POINT:
TRAILER AREA

SOURCE:

DISTANCE: 400'

DIRECTION FROM: SOUTH

HEIGHT: 200'

WIND:

SPEED: 8 MPH

DIRECTION: S-W

TEMPERATURE: 77°F

SKY CONDITION: HIGH LIGHT CLOUDS

BACKGROUND: SKY

READING CONDITIONS: Good

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 44

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 10%

CREW: C FOREMAN: H.M. NATT

COMMENTS: _____

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

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

THREE POINT CALIBRATION

BOX # 6
DATE 06-20-94
BP 28.95
OPERATOR RPC
in. Hg

	WET TEST METER				DRY TEST METER						METER COEFFICIENT Y	ORIFICE COEFFICIENT Δ H@
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD			
START HALF STOP	12.75	81.0	0.000 5.000	28.95	98.0	89.0	93.5	0.50	350.100 355.151			
CALCULATION	12.75	541.0	5.013	28.95			553.5	28.99	5.051	1.0140	1.873	
START HALF STOP	8.95	81.0	0.000 5.000	28.95	105.0	90.0	97.5	1.00	355.600 360.700			
CALCULATION	8.95	541.0	5.013	28.95			557.5	29.02	5.100	1.0103	1.833	
START HALF STOP	6.30	81.0	0.000 5.000	28.95	110.0	92.0	101.0	2.00	361.200 366.234			
CALCULATION	6.30	541.0	5.013	28.95			561.0	29.10	5.034	1.0273	1.805	
AVERAGE										1.0172	1.837	

POST TEST

BOX # 6 BP 28.95 In. Hg
DATE 09-06-94 OPERATOR RPC

	WET TEST METER				DRY TEST METER							METER COEFFICIENT Y	ORIFICE COEFFICIENT Δ H@
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD				
START HALF STOP	8.73	72.0	0.000 5.000	28.95	104.0	85.0	94.5	1.10	802.200 807.200				
CALCULATION	8.73	532.0	5.013	28.95		554.5	29.03	5.000		1.0420	1.865		
START HALF STOP	8.68	72.0	0.000 5.000	28.95	105.0	85.0	95.0	1.10	807.500 812.500				
CALCULATION	8.68	532.0	5.013	28.95		555.0	29.03	5.000		1.0429	1.842		
START HALF STOP	8.68	72.0	0.000 5.000	28.95	108.0	87.0	97.5	1.10	812.800 817.842				
CALCULATION	8.68	532.0	5.013	28.95		557.5	29.03	5.042		1.0389	1.834		
AVERAGE										1.0413	1.847		
DIFFERENCE										-2.3%	-0.5%		

PRE-TEST MAGNEHELIC CALIBRATION

BOX# 6
DATE 06-09-94
OPERATOR RPC

0 to 3.0" H2O RANGE

MAGNEHELIC	ΔP	MANOMETER
	0.50	0.50
	1.00	1.00
	2.00	2.00
	3.00	3.00

0 to 0.50" H2O RANGE
SLANT TUBE

PRIMARY STANDARD

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

PRE-TEST LEAK CHECK

DATE 06-20-94
OPERATOR RPC

	START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
DRY	394.400	394.618	0.219	10.000	0.000
WET	0.000	0.222	0.222		

PYROMETER CALIBRATION

DATE 04-28-88
OPERATOR AGL

VOLTAGE INPUT (mV)	ARGE TEMP (°F)	TEMP READING (°F)
0.18	40	40.0
0.40	50	50.0
0.84	70	70.0
1.29	90	90.0
1.74	110	110.0
2.66	150	150.0
3.82	200	200.0
6.09	300	301.0
8.31	400	400.0
10.57	500	500.0

PRE-TEST PYROMETER CHECK

DATE 06-09-94
OPERATOR RPC

VOLTAGE INPUT (mV)	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	402.0
10.57	500	502.0

POST-TEST MAGNEHELIC CALIBRATION

BOX# 6
DATE 09-06-94
OPERATOR RPC

0 to 3.0" H2O RANGE

MAGNEHELIC	ΔP	MANOMETER
	0.50	0.50
	1.00	1.00
	2.00	2.00
	3.00	3.00

0 to 0.50" H2O RANGE
SLANT TUBE

PRIMARY STANDARD

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 09-06-94
OPERATOR RPC

	START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
DRY	801.400	801.658	0.258	10.000	0.0002
WET	0.000	0.260	0.260		

PYROMETER CALIBRATION

DATE 04-28-88
OPERATOR AGL

VOLTAGE INPUT (mV)	ARGE 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 09-06-94
OPERATOR RPC

VOLTAGE INPUT (mV)	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	502.0

QA ORIFICE AUDIT

ORIFICE BAPC-3 DATE 06-09-94 B.P. 29.00
 OPERATOR RPC BOX # 6

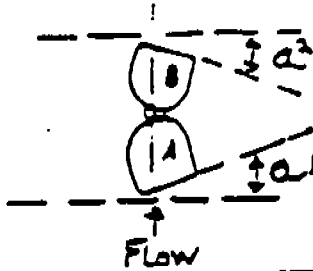
RUN	1		2		3	
INITIAL CF	110.300		118.300		126.300	
FINAL CF	117.825		125.828		133.810	
DIFFERENCE	7.525		7.528		7.510	
TEMP INITIAL	IN 105	OUT 100	IN 102	OUT 98	IN 102	OUT 97
TEMP 5 MIN	102	99	101	97	102	97
TEMP 10 MIN	102	98	102	97	103	98
TEMP 15 MIN	102	98	102	97	103	98
TEMP AVG	100.75	TEMP R 560.75	89.5	TEMP R 559.5	100	TEMP R 560
TIME (MIN.)	15.00		15.00		15.00	
ORIFICE	N WATE 0.75	IN HG 0.06	IN WATER 0.75	IN HG 0.06	IN WATER 0.75	IN HG 0.06
METER PRESSURE		29.06		29.06		29.06
AMBIENT TEMP.	°F 78.0	°C 25.6	°F 78.0	°C 25.6	°F 78.0	°C 25.6
VACUUM IN HG	21.0		21.0		21.0	
DGM CAL Y	1.0128		1.0128		1.0128	
STD CF	6.995		7.014		6.991	
STD CUBIC METERS	0.1981		0.1986		0.1980	

GEOMETRIC PITOT CALIBRATION

Caliper # X6F-59
 Precheck _____
 Post Check _____

Probe #: 10.2
 Date: 6-10-94
 Initials: RPC

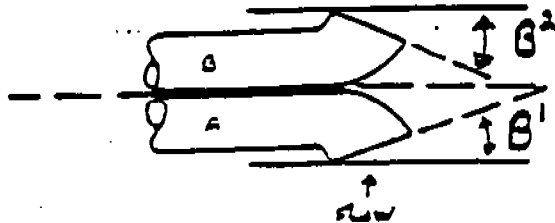
①



$a^1 = 3"$
 $a^2 = 0"$
 $B^1 = 0"$
 $B^2 = 1"$
 $F = 93"$

$a^1, a^2 = < 10^\circ$
 $B^1, B^2 = < 5^\circ$

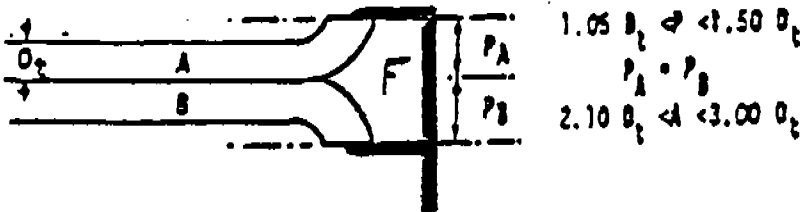
②



$\mu = 16$
 $V = 0$
 $W = 194$

$\mu \leq 0.1250^\circ (\mu = F \tan \delta)$
 $V \leq 0.03125^\circ (V = F \tan \epsilon)$
 $W \geq 0"$

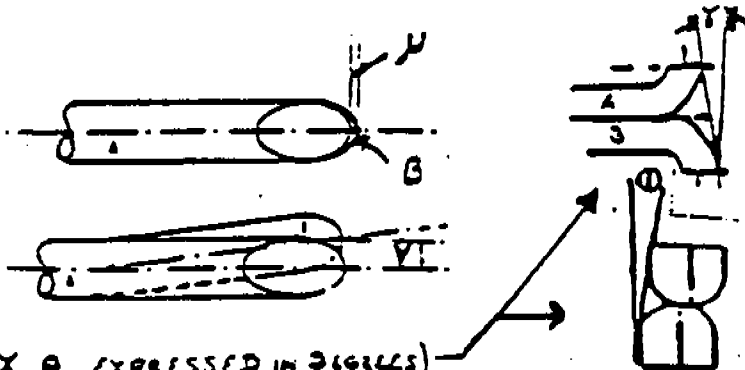
③



$X = 0.97$
 $Y = 5.6$
 $Z = 3.6$
 $D_t = 375$

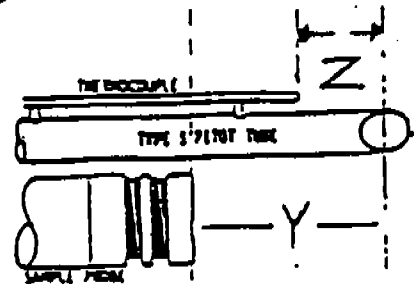
$X \geq 0.750"$
 $(3/4" \text{ using } 1/2" \text{ nozzle})$
 $Y \geq 3.0"$
 $Z \geq 2.0"$
 $D_t \geq .1875"$

④

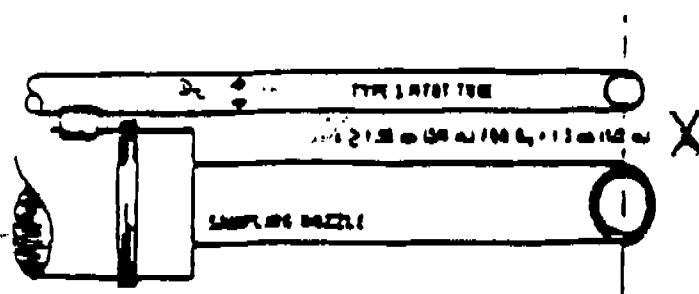


(δ, ϵ EXPRESSED IN DEGREES)

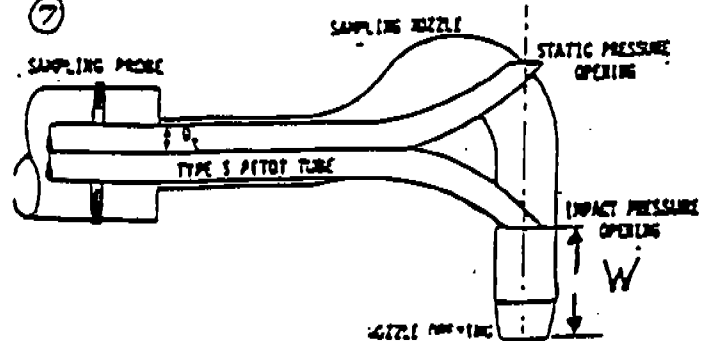
⑤



⑥



⑦

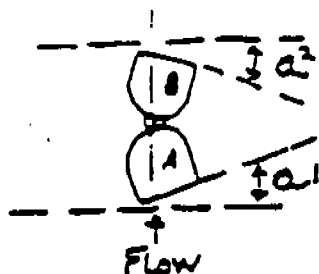


GEOMETRIC PITOT CALIBRATION

Caliper # XEF-59
 Precheck _____
 Post Check _____

Probe #: 10-2
 Date: 10-10-94
 Initials: R/C

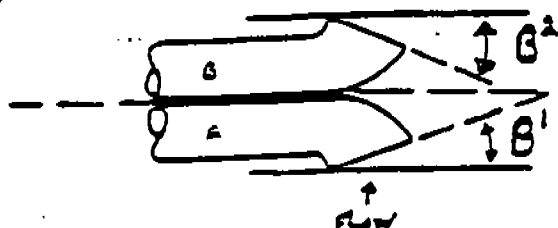
①



$a^1 = 3^\circ$
 $a^2 = 0^\circ$
 $B^1 = 0$
 $B^2 = 1$
 $F = 94$

$a^1, a^2 = < 10^\circ$
 $B^1, B^2 = < 5^\circ$

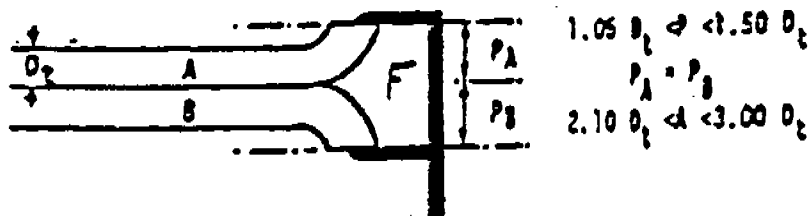
②



$\mu = .16$
 $V = 0$
 $W = .200$

$\mu \leq 0.1250^\circ (\mu = F \tan \delta)$
 $V \leq 0.03125^\circ (V = F \tan \epsilon)$
 $W \geq 0^\circ$

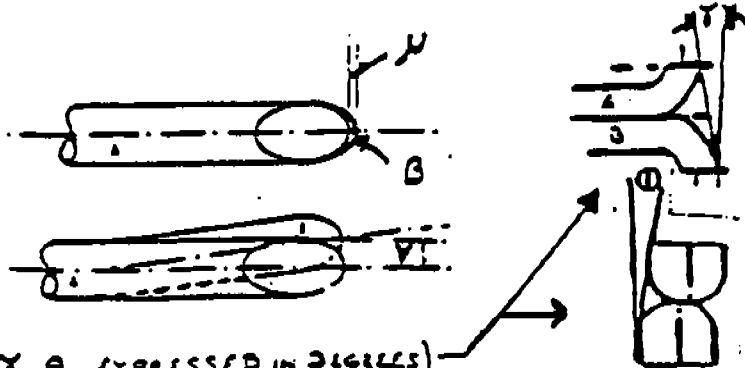
③



$X = .97$
 $Y = 5.6$
 $Z = 3.8$
 $D_t = 376$

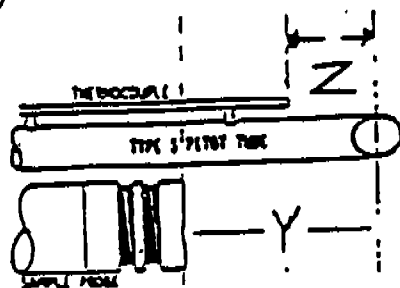
$X \geq 0.750$
 $(3/4"$ using $1/2"$ nozzle)
 $Y \geq 3.0$
 $Z \geq 2.0$
 $D_t > .1875$

④

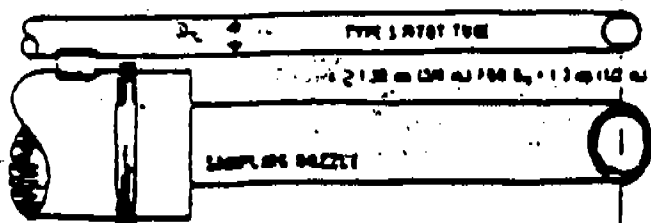


(δ, θ EXPRESSED IN DEGREES)

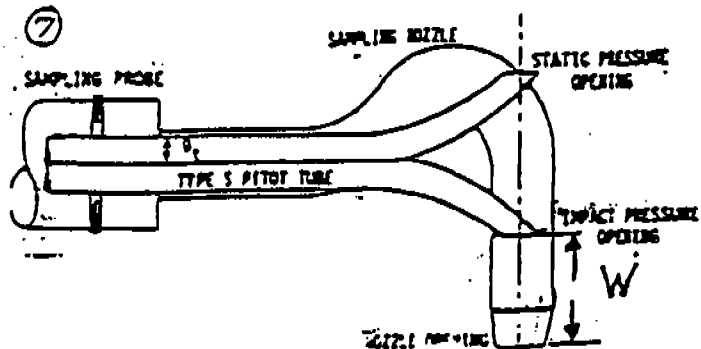
⑤



⑥



⑦



**COMPLIANCE DEMONSTRATION
NO. 19 BATTERY COMBUSTION STACK**

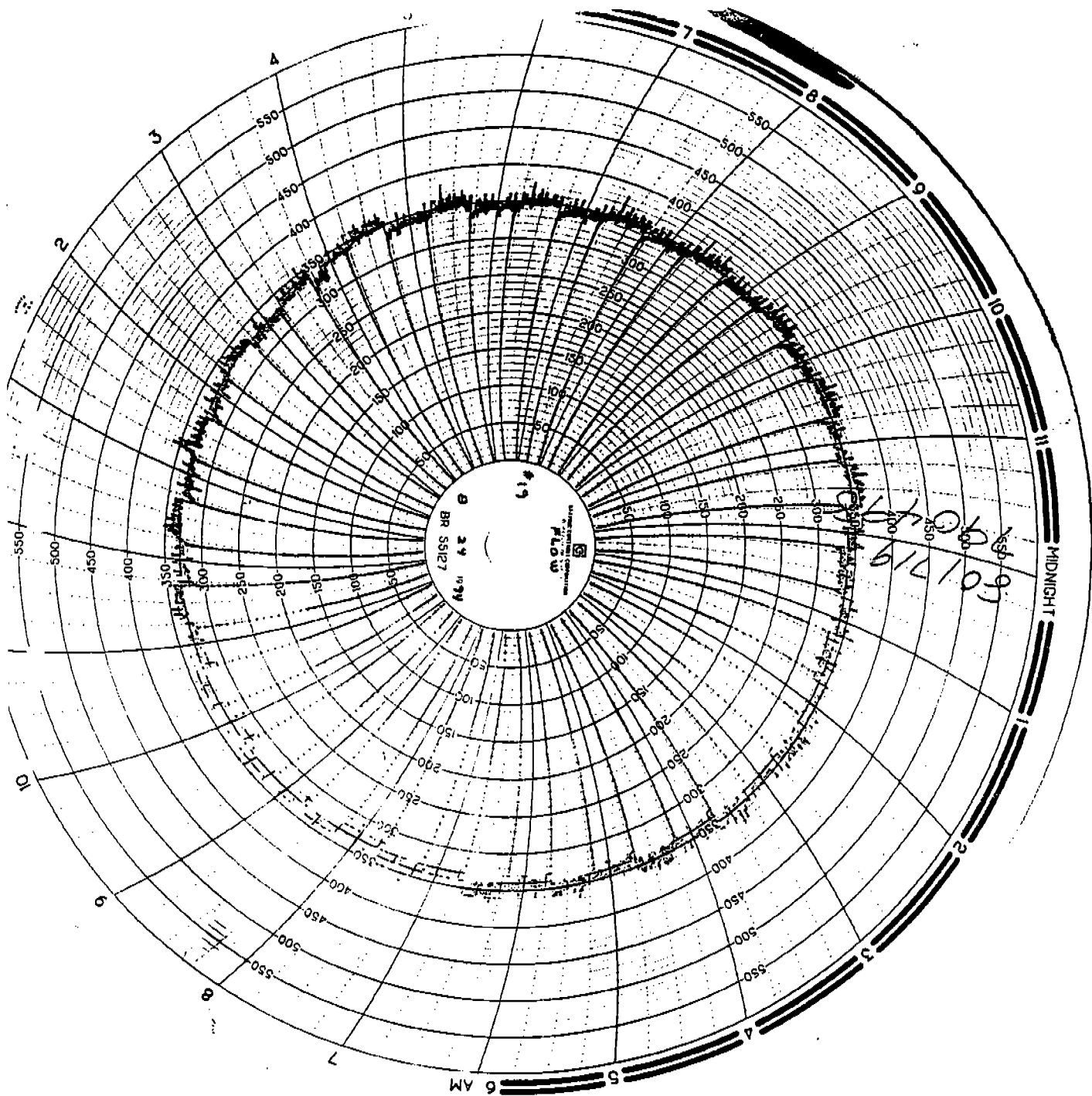
**USS CLAIRTON WORKS
A DIVISION OF USX CORPORATION
CLAIRTON, PENNSYLVANIA**

APPENDIX B

PLANT OPERATIONAL DATA

ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.



CG-10285 REV. 1181
03.001.0020

UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 7

12 Hrs. Beginning 12:00 A M

Date 8-24-94

BATTERY NO. <u>A19</u>				BATTERY NO. <u>B19</u>				BATTERY NO. <u>C19</u>			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1	12 11	12 41		1				1	9 20	9 42	
3				3				3	9 40	10 03	
5	12 21	12 55		5				5	10 -	10 20	
7	3 33	4 02		7				7	10 18	10 37	
9	3 45	4 11		9				9	10 35	10 48	
11	3 56	4 21		11				11	10 46		
13	4 07	4 36		13				13			
15	4 16	4 46		15		11 10		15			
17	4 26	5 00		17		11 32		17			
19	4 40	5 15		19		11 31		19			
21	4 51	5 23		21	11 14	11 41		21			
23	5 03	5 37		23	11 35	11 54		23			
25	5 17	5 50		25	11 36	12 09		25			
27	5 27	6 09		27	11 46	12 19		27			
29	5 40	6 21		29	11 59	12 30		29			
31				31				31			
2				2	5 57	6 32		2	12 35	1 08	
4				4	6 12	6 37		4	12 47	1 20	
6				6	6 28	6 45		6	12 59	1 32	
8				8	6 40	6 45		8	1 12	1 43	
10				10	7 18	7 38		10	1 24	1 56	
12				12	7 36	7 53		12	1 38	2 16	
14				14	7 50	8 02		14	1 49	2 22	
16				16	8 -	8 15		16		2 09	
18				18	8 12	8 27		18	1 59	2 31	
20				20	8 25	8 40		20	2 12	2 46	
22				22	8 38	8 46		22	2 24	3 10	
24				24	8 48	8 56		24	2 38	3 30	
26				26	8 58	9 11		26	2 53	3 40	
28				28	9 13	9 13		28	3 15	3 51	
30				30				30			
1				1				1			
2				2				2			

REMARKS:

14/14

19/22

19/19

Condition of Signals

Condition of Pusher

HOURLY REPORT OF OPERATION

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	
1-1	5	5		5-5	5	5		
1-2	5	5		7-6	3	6		Total Ovens Pushed <u>52</u>
2-3	5	5		8-3	3	2		Total Ovens Charged <u>55</u>
3-4	4	5		9-8	6	6		
4-5	4	4		10-9	3	3		Pusherman
5-6	5	5		11-10	4	4		Battery Foreman <u>P. M. H. W.</u>
	28	29			24	26		

CC-10285 REV. 1161
03.001.0020

UNITED STATES STEEL CORPORATION
CLAIRTON COKE AND COAL CHEMICAL WORKS

PUSHING AND CHARGING REPORT

UNIT NO. 7
12 Hrs. Beginning 12:00 P M
Date 8-24-54

BATTERY NO. <u>A-19</u>				BATTERY NO. <u>B-19</u>				BATTERY NO. <u>C-19</u>			
OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES	OVEN NO.	TIME PUSHED	TIME CHARGED	NOTES
1				1	3 48	4 04		1			
3				3	4 —	4 15		3			
5				5	4 11	4 27		5			
7	9 56			7	4 23	4 38		7			
9	10 07			9	4 35	4 49		9			
11	10 18			11	4 47	5 02		11		11 08	
13				13	4 58	5 16		13	11 05	11 23	
15				15	5 12	5 27		15	11 20	11 34	
17				17	5 24	5 39		17	11 31	11 46	
19				19	5 36	5 50		19	11 44	12 00	
21				21	5 47	5 58		21	11 55	12 30	
23				23	6 20	6 30		23	12 25	12 38	
25				25	6 32	6 47		25	12 35	12 48	
27				27	6 43	7 04		27	12 45	12 50	
29				29	6 54	7 11		29	12 55	1 25	
31				31				31			
2				2				2	7 06	7 21	
4				4				4	7 18	7 33	
6	1 20	1 36		6				6	7 29	7 45	
8	1 38	1 46		8				8	7 41	7 57	
10	1 49	1 55		10				10	7 53	8 08	
12	1 58	2 07		12				12	8 05	8 20	
14	2 10	2 18		14				14	8 17	8 31	
16	2 25	2 32		16				16	8 28	8 43	
18	2 30	2 53		18				18	8 40	8 56	
20	2 38	2 48		20				20	8 52	9 21	
22	2 45	2 55		22				22	9 18	9 32	
24	3 14	3 24		24				24	9 26	9 48	
26	3 26	3 40		26				26	9 38	9 48	
28	3 37	3 52		28				28	9 44	10 —	
30				30				30			
1				1				1			
2				2				2			

REMARKS:

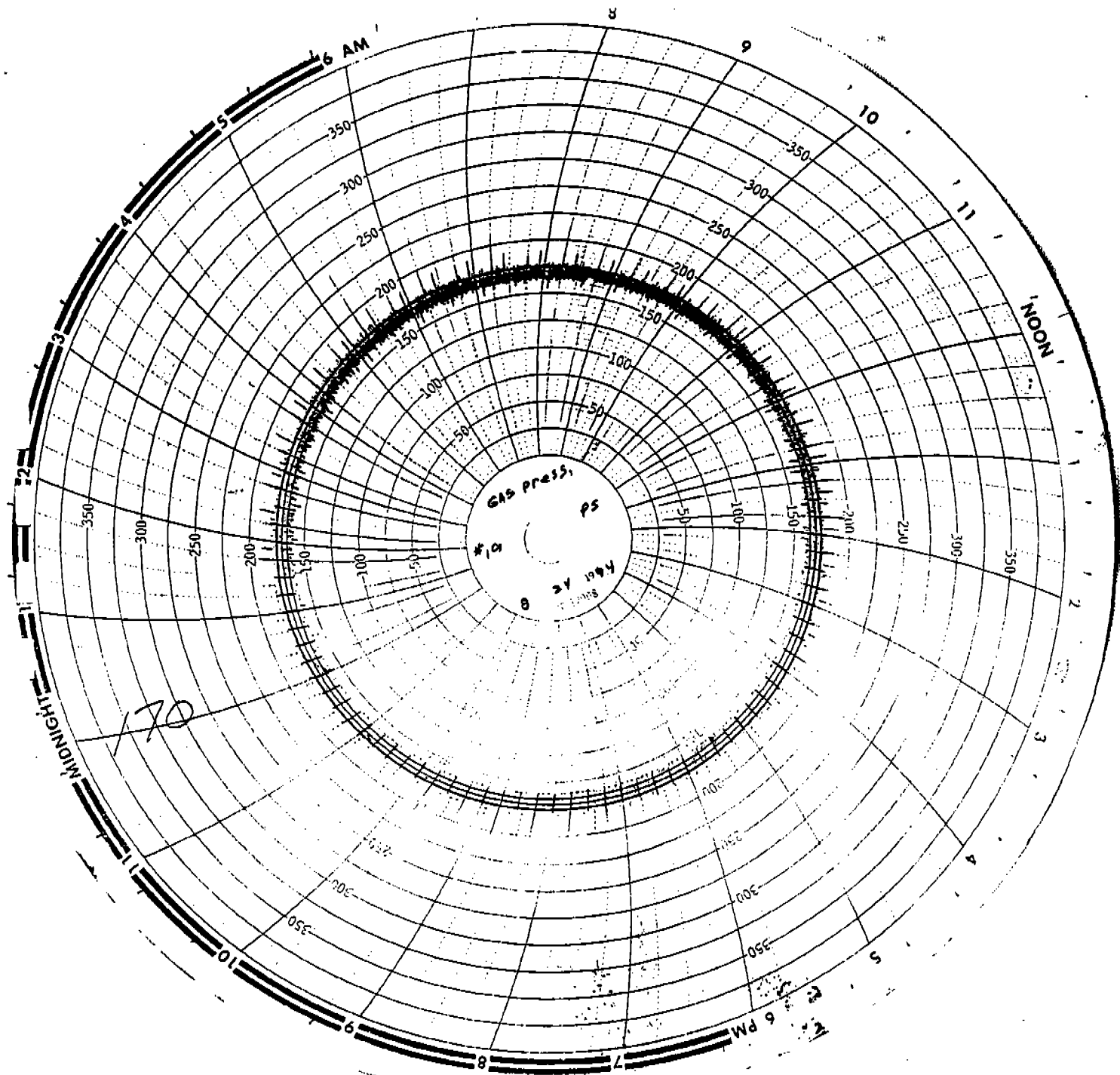
15/12 15/15 23/24

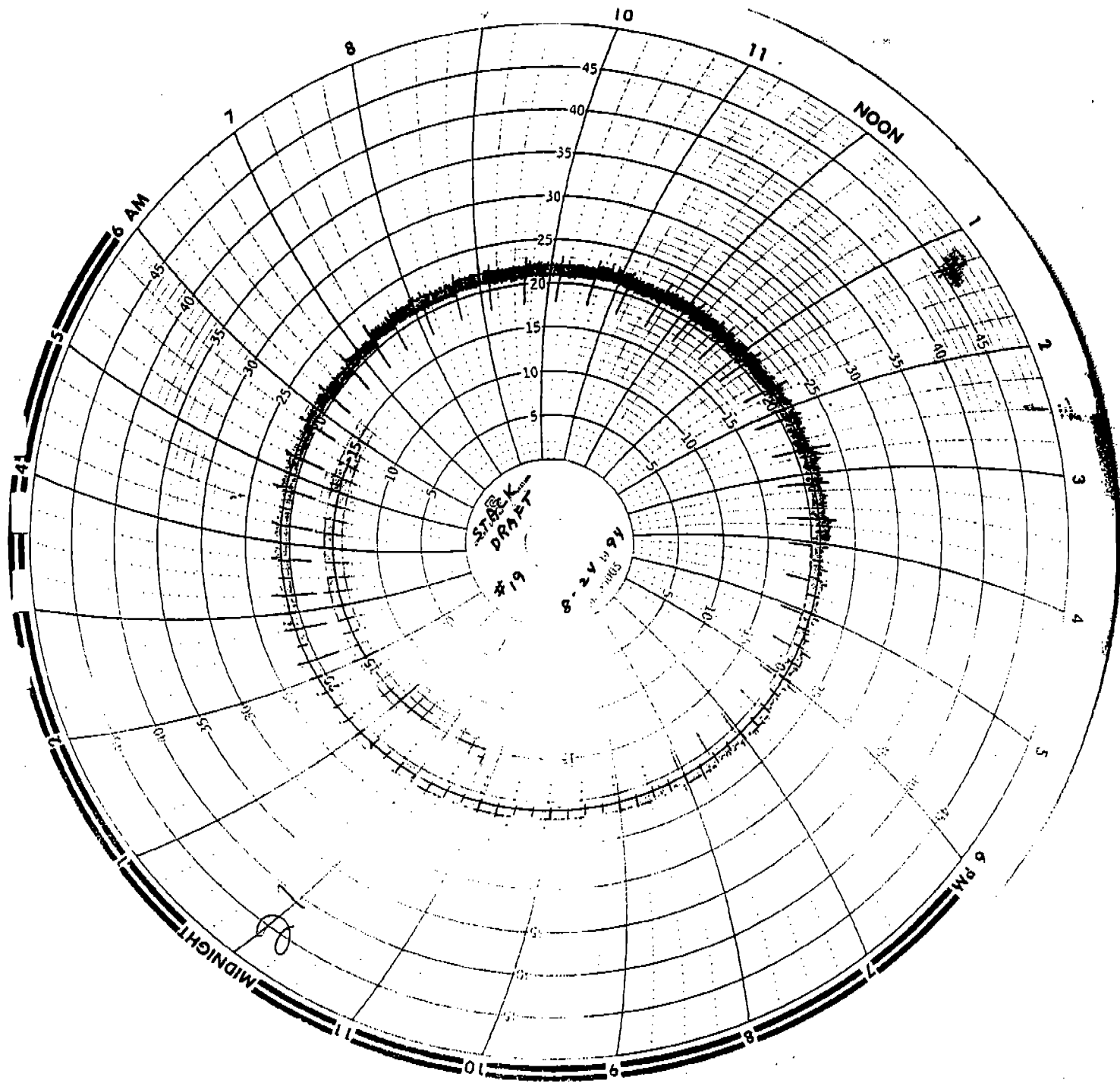
Condition of Signals

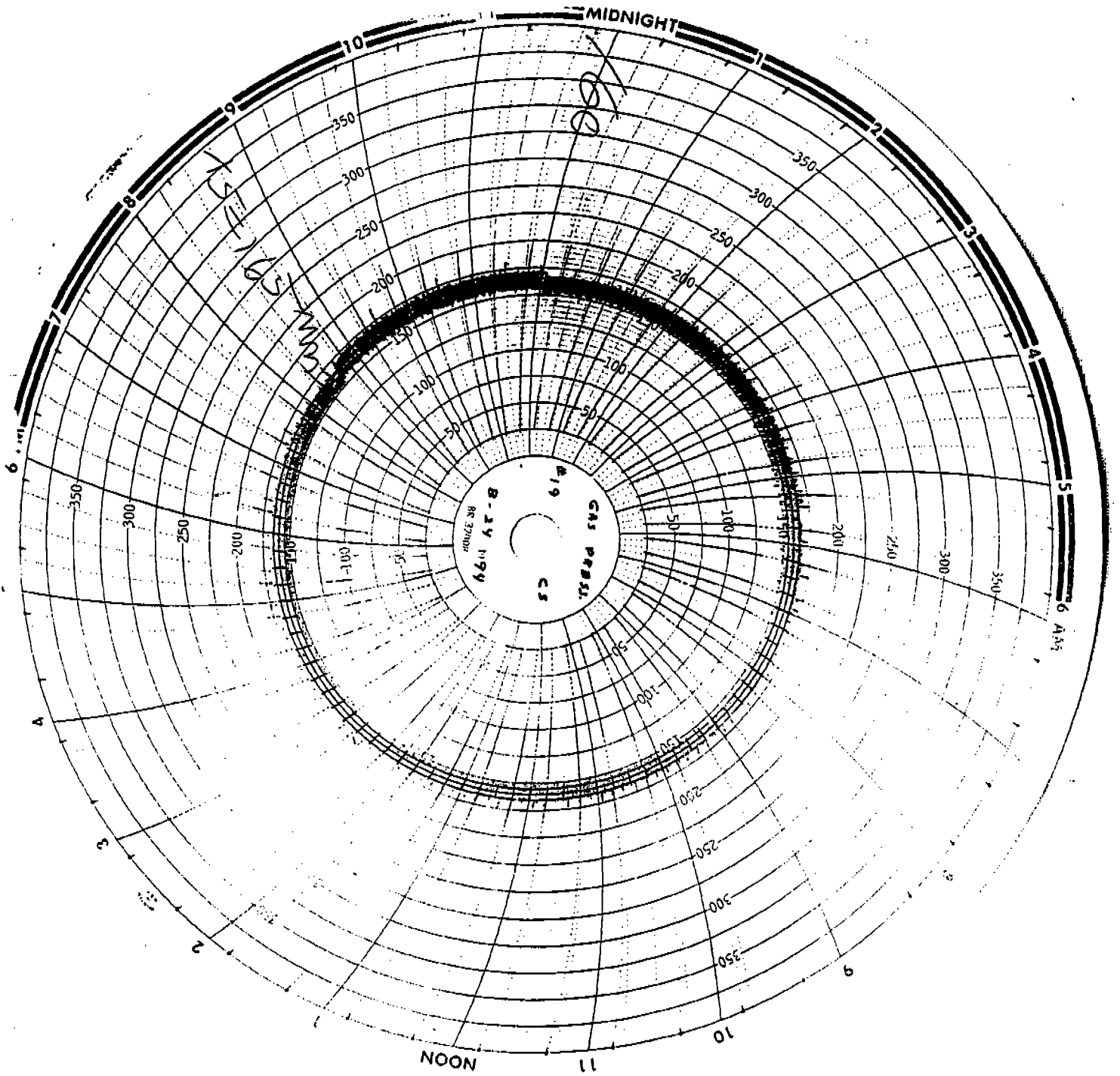
Condition of Pusher

HOURLY REPORT OF OPERATION

TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	TIME	OVENS PUSHED	OVENS CHARGED	OVENS SCHEDULED	
12/1	5	4		1/5	4	6		
1/2	4	5		1/6	4	2		Total Ovens Pushed 53
2/3	4	4		1/7	5	6		Total Ovens Charged 51
2/4	5	6		1/8	5	5		
3/5	4	3		1/9	5	4		Pusherman
4/6	10	5		1/10	2	1		Battery Foreman R M 1/10/50
	28	27			25	24		







**COMPLIANCE DEMONSTRATION
NO. 19 BATTERY COMBUSTION STACK**

**USS CLAIRTON WORKS
A DIVISION OF USX CORPORATION
CLAIRTON, PENNSYLVANIA**

**APPENDIX C
GRAVIMETRIC RESULTS, EMISSIONS CALCULATIONS**

ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.

ATS
AIR QUALITY ENGINEERING
ANALYTICAL REPORTING FORM

CLIENT	USS - CLARKSON STEEL	TEST DATE	8/24/94
PLANT LOCATION	CLARKSON, PA	DATE RECEIVED	8/24/94
PROJECT NUMBER	1 K10204	DATE ANALYZED	8/31/94
UNIT TESTED	BATTERY STACK #19	ANALYTICAL METHOD	GRAVIMETRIC METHOD

[illegible]

Analyst's Signature

Date _____

Comments

STACK SAMPLING CALCULATIONS

CLIENT: USS CLAIRTON WORKS
 TEST SITE #19 BATTERY COMBUSTION STACK

TEST DATE: 08-24-94
 TEST NUMBER: CLR-BS#19-1

A.	Barometric Pressure	29.60 in. Hg	
B.	Static Pressure	-1.2 in. H2O	
C.	Stack Pressure	29.51 in. Hg	[A+(B/13.6)]
D.	Average ΔH	1.01 in. H2O	
E.	Meter Pressure	29.67 in. Hg	[A+(D/13.6)]
F.	Average ΔP	0.03 in. H2O	
G.	Pitot Coefficient	0.84	
H.	Gas Meter Coefficient	1.0172	
I.	Stack Diameter	186 in.	
J.	Stack Area	188.69 ft²	(0.00545*I²)
K.	Nozzle Diameter	0.490 in.	
L.	Nozzle Area	1.31E-03 ft²	(0.00545*K²)
M.	Average Stack Temperature	482 °F	
N.	Average Stack Temperature	942 °R	(460+M)
O.	Average Meter Temperature	87 °F	
P.	Average Meter Temperature	547 °R	(460+O)
Q.	Condensate Volume	210.2 mL	
R.	Absorbed H2O	15.5 mL	
S.	Total H2O	225.7 mL	(Q+R)
T.	Filter Weight	0.0314 g	
U.	Probe Weight	0.0226 g	
V.	Impinger Weight	0.0000 g	
W.	Total Weight	0.0540 g	(T+U+V)
X.	Metered Gas Volume	64.282 dcf	
Y.	Corrected Metered Gas Volume	65.388 dcf	(X*H)
Z.	H2O Gas Volume	11.140 cf	(0.00267*S*P/A)
AA.	Total Sample Volume	76.527 cf	(Y+Z)
BB.	Percent H2O	14.6 %	(100*Z/AA)
CC.	Gas Volume Sampled	62.579 dscf	[Y*(528/P)*(E/29.92)]
DD.	Grain Loading	0.0133 gr/dscf	(15.43*W/CC)
EE.	Average Molecular Weight:		

Component	% Volume +100	*(1-BB/100)	* Mol. Weight	= Weight/Mol
H2O	0.146		18	2.620
CO2	0.040	0.854	44	1.504
CO	0.000	0.854	28	0.000
O2	0.120	0.854	32	3.281
N2	0.840	0.854	28	20.096

Average Molecular Weight

27.50

lb./lb. mol

FF.	Average Stack Velocity	13.4 fps	{85.49*G*[(F*N)/(C*EE)]^0.5}
GG.	Average Flow Rate	151700 acfm	(60*FF*J)
HH.	Standard Flow Rate	83900 acfm	[GG*(528/N)*(C/29.92)]
II.	Sample Time	7200 sec	
JJ.	Percent Isokinetic	104.8 %	{[100*CC*60*J]/[HH*L*II*(1-BB/100)]}
KK.	Mass Flow Rate	8.18 lb/hr	[DD*HH*(1-BB/100)*60/7000]

STACK SAMPLING CALCULATIONS

CLIENT: USS CLAIRTON WORKS
TEST SITE #19 BATTERY COMBUSTION STACK

TEST DATE: 08-24-94
TEST NUMBER: CLR-BS#19-2

A.	Barometric Pressure	29.60 in. Hg	
B.	Static Pressure	-1.2 in. H ₂ O	
C.	Stack Pressure	29.51 in. Hg	[A+(B/13.6)]
D.	Average Δ H	0.96 in. H ₂ O	
E.	Meter Pressure	29.67 in. Hg	[A+(D/13.6)]
F.	Average Δ P	0.03 in. H ₂ O	
G.	Pitot Coefficient	0.84	
H.	Gas Meter Coefficient	1.0172	
I.	Stack Diameter	186 in.	
J.	Stack Area	188.69 ft ²	(0.00545*I ²)
K.	Nozzle Diameter	0.490 in.	
L.	Nozzle Area	1.31E-03 ft ²	(0.00545*K ²)
M.	Average Stack Temperature	487 °F	
N.	Average Stack Temperature	947 °R	(460+M)
O.	Average Meter Temperature	103 °F	
P.	Average Meter Temperature	563 °R	(460+O)
Q.	Condensate Volume	204.5 mL	
R.	Absorbed H ₂ O	14.6 mL	
S.	Total H ₂ O	219.1 mL	(Q+R)
T.	Filter Weight	0.0241 g	
U.	Probe Weight	0.0283 g	
V.	Impinger Weight	0.0000 g	
W.	Total Weight	0.0524 g	(T+U+V)
X.	Metered Gas Volume	64.662 dcf	
Y.	Corrected Metered Gas Volume	65.774 dcf	(X*H)
Z.	H ₂ O Gas Volume	11.123 cf	(0.00267*S*P/A)
AA.	Total Sample Volume	76.897 cf	(Y+Z)
BB.	Percent H ₂ O	14.5 %	(100*Z/AA)
CC.	Gas Volume Sampled	61.192 dscf	[Y*(528/P)*(E/29.92)]
DD.	Grain Loading	0.0132 gr/dscf	(15.43*W/CC)
EE.	Average Molecular Weight:		

Component	% Volume +100	*(1-BB/100)	* Mol. Weight	= Weight/Mol
H ₂ O	0.145		18	2.604
CO ₂	0.040	0.855	44	1.505
CO	0.000	0.855	28	0.000
O ₂	0.120	0.855	32	3.285
N ₂	0.840	0.855	28	20.118

Average Molecular Weight

27.51 lb./lb. mol

FF.	Average Stack Velocity	13.4 fps	{85.49*G*[(F*N)/(C*EE)]*0.5}
GG.	Average Flow Rate	152100 acfm	(60*FF*J)
HH.	Standard Flow Rate	83600 scfm	[GG*(528/N)*(C/29.92)]
II.	Sample Time	7200 sec	
JJ.	Percent Isokinetic	102.8 %	{[100*CC*60*J]/[HH*L*II*(1-BB/100)]}
KK.	Mass Flow Rate	8.10 lb/hr	[DD*HH*(1-BB/100)*60/7000]

STACK SAMPLING CALCULATIONS

CLIENT: USS CLAIRTON WORKS
TEST SITE #19 BATTERY COMBUSTION STACK

TEST DATE: 08-24-94
TEST NUMBER: CLR-BS#19-3

A.	Barometric Pressure	29.60 in. Hg	
B.	Static Pressure	-1.2 in. H2O	
C.	Stack Pressure	29.51 in. Hg	[A+(B/13.6)]
D.	Average Δ H	1.02 in. H2O	
E.	Meter Pressure	29.68 in. Hg	[A+(D/13.6)]
F.	Average Δ P	0.03 in. H2O	
G.	Pitot Coefficient	0.84	
H.	Gas Meter Coefficient	1.0172	
I.	Stack Diameter	186 in.	
J.	Stack Area	138.69 ft ²	(0.00545*I ²)
K.	Nozzle Diameter	0.490 in.	
L.	Nozzle Area	1.31E-03 ft ²	(0.00545*K ²)
M.	Average Stack Temperature	490 °F	
N.	Average Stack Temperature	950 °R	(460+M)
O.	Average Meter Temperature	109 °F	
P.	Average Meter Temperature	569 °R	(460+O)
Q.	Condensate Volume	213.5 mL	
R.	Absorbed H2O	14.9 mL	
S.	Total H2O	228.4 mL	(Q+R)
T.	Filter Weight	0.0357 g	
U.	Probe Weight	0.0324 g	
V.	Impinger Weight	0.0000 g	
W.	Total Weight	0.0681 g	(T+U+V)
X.	Metered Gas Volume	67.947 dcf	
Y.	Corrected Metered Gas Volume	69.116 dcf	(X*H)
Z.	H2O Gas Volume	11.726 cf	(0.00267*S*P/A)
AA.	Total Sample Volume	80.841 cf	(Y+Z)
BB.	Percent H2O	14.5 %	(100*Z/AA)
CC.	Gas Volume Sampled	63.594 dscf	[Y*(528/P)*(E/29.92)]
DD.	Grain Loading	0.0165 gr/dscf	(15.43*W/CC)
EE.	Average Molecular Weight:		

Component	% Volume +100	*(1-BB/100)	* Mol. Weight	= Weight/Mol
H2O	0.145		18	2.611
CO2	0.040	0.855	44	1.505
CO	0.000	0.855	28	0.000
O2	0.120	0.855	32	3.283
N2	0.840	0.855	28	20.108

Average Molecular Weight

27.51

lb./lb. mol

FF.	Average Stack Velocity	13.5 fps	{85.49*G*[(F*N)/(C*EE)] ^{0.5} }
GG.	Average Flow Rate	152300 acfm	(60*FF*I)
HH.	Standard Flow Rate	83500 scfm	[GG*(528/N)*(C/29.92)]
II.	Sample Time	7200 sec	
JJ.	Percent Isokinetic	107.0 %	{[100*CC*60*J]/[HH*L*II*(1-BB/100)]}
KK.	Mass Flow Rate	10.11 lb/hr	[DD*HH*(1-BB/100)*60/7000]