AP-42 Section 12.2
Reference
Report Sect. 4
Reference 103

File No. 50.74

Compliance Tests of the Envirotech Hooded Quench Car No. 107 Operated on the Number 20 Coke Battery Located at the United States Steel Clairton Works

Clairton, PA 15025

Project No. 50.74

October 2, 1985

Prepared by:

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APT AIR POLLUTION TECHNOLOGY, INC.

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AIR POLLUTION TECHNOLOGY, INC.

File 50.74

Compliance Tests of the Envirotech Hooded Quench Car No. 107 Operated on the Number 20 Coke Battery Located at the United States Steel Clairton Works

INTRODUCTION

This report covers test work performed by Air Pollution Technology, Inc. (APT) in cooperation with United States Steel Corporation (USSC) and Envirotech Corporation (EVT) on the Envirotech Hooded Quench Car No. 107 (HQC) operating on the No. 20 coke batteries located at the USSC's Clairton Cokeworks. The purposes of these tests were to measure the particulate and visible emissions from the HQC.

The EVT HQC system is designed to capture and remove particulates from the hot gases during coke-pushing operations. The basic HQC System consists of three major components.

1. A self propelled Control Car, which houses all induced draft and gas cleaning equipment. This car carries the Aeronetics Hot Water Scrubber that provides both the draft required to capture the gases at the system inlet and the fine water drops required to collect particulates in the gas stream during the scrubbing process.
2. A One-Spot Hooded Quench Car, which consists of a tilting coke box covered by a fixed hood to contain the gases so that they can be drawn into and through the control car for cleaning. The hood encloses the quench car on three sides and the top, with the side facing the ovens open to receive the coke pushed.
3. Minor modifications, as required, to the existing coke quide to prevent gases from escaping to the atmosphere during the coke push. Wings are added to the face of the coke quide on both sides of the coke discharge opening. The wings align with the open face of the quench car hood when the car is positioned for the push.

The Aeronetics hot water scrubber, considered the "heart" of the system, incorporates a two-phase adjustible jet nozzle in which water is ejected to perform the dual functions of gas

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movement and gas scrubbing. The water/vapor combination in the scrubber is referred to as a two-phase phenomenon.

The Aeronetics scrubber directs pressurized hot water to provide the energy for moving large quantities of gas through the scrubbing system. The nozzle's jet ejector effect transfers momentum from the liquid to the gas. Additionally, the jet nozzle atomizes the liquid and accelerates it to velocities of more than 1,000 feet per second, thereby creating a large velocity differential between the drops and the suspended particles in the gas stream. This relative velocity causes inertial impaction between the drops and the particles. As inertial impaction occurs, the particles are deposited on the drops, which are then removed from the gas stream by means of an entrainment separator. The cleaned gas exits into the atmosphere and the particulated liquid flows into a drain.

Recently, EVT made several modifications to the basic HQC system to improve the particle collection efficiency. They are as follows:

1. The effectiveness of the quench car hood was increased by extending the transition duct into the hood so as to cause more symmetrical gas flow within the hood. This increases the efficiency of fugitive emissions capture.
2. The collection efficiency was increased by pre-conditioning the gas prior to entering the Aronetics scrubbers by spraying water into the gas stream. This increases the liquid to gas (L/G) ratio in the scrubber throat.

The particle mass concentration was measured at the outlet of the HQC with an EPA Method 5 sampling train. The visible emissions observations were done simultaneously with the particulate mass concentration measurements at the request of the Allegheny County Health Department Bureau of Air Pollution Control (BOAPC). The compliance test results presented in this report are for tests completed on August 19, 20 and 21, 1985. All tests were completed while the car was receiving and transporting coke from the Number 20 coke battery.

SUMMARY

The following points summarize the results of the compliance tests completed on the EVT Hooded Quench Car No. 107. Three compliance tests were conducted during normal coking conditions.

1. The average particulate mass emission rate was 0.017 lb/ton of coke for the three compliance tests. This coke battery is subject to the LAER Standard which is 0.040 lb/ton of coke.

2. As requested, (Appendix G) visible emission readings were observed simultaneous during the particulate mass emission compliance testing with the test car attached to the HQC system. The test car added additional pressure drop to the system which decreases the gas flow rate and the ability of the HQC system to capture fugitive emissions.

The approved testing protocol, Appendix F, provides for opacity observation to be made with disconnection of the test car. Such test car disconnection will improve the visible emission performance.

The visible emission results, based on the above conditions, meets the intent of the Consent Degree visible emission requirements.

OBJECTIVES

The compliance tests reported here were completed under the joint USSC/EVT Compliance Test Program and were observed by the BOAPC. The test work was authorized by United States Steel Corporation and had the following objectives:

1. Measure the particulate mass emissions from the HQC according to the Compliance Test Protocol presented in Appendix F.

2. Observe the visible emissions from the HQC according to the Compliance Test Protocol presented in Appendix F.

3. Compliance test protocol presented in Appendix F complies with the USSC consent decree, as modified, for coke pushing emissions and has been approved by the Allegheny County Health Department, Bureau of Air Pollution Control, Pennsylvania Department of Environmental Resources and the Environmental Protection Agency.

Battery 20 is considered a new source and is subject to the Lowest Achieviable Emission Rate (LAER) standard. Pursuant to the Consent Decree, as modified, the applicable LAER emissions standards for particulates, and as discussed with the regulatory agencies, are as follow:

1. Particulate mass emission less than or equal to 0.04 pounds per ton of coke pushed.

2. Visible emissions during push and travel less than 20 percent.

3. USSC has been informed by BOAPC, as shown in Appendix G, that opacity standards during travel should be less than 20% since USSC uses pushing emission control devices.

APPROACH

1. Carry out particulate mass and visible emission measurements on the HQC system. This involved the following:

   a. Two of the test personnel were on the test car to operate the particulate mass emission sampling apparatus. One of the personnel operated the sampling train control module. The other person measured the gas velocity head and converted that number into a sample train flowrate for the sample train operator. This helped the sample train operator maintain isokinetic sampling conditions. The second person also signaled the start, stop and change from push to travel modes for the sample train operator.

   b. One test person was assigned to measure the visible emissions from the HQC system during the push and travel cycles.

   c. One test person was assigned to ride in the cab of the HQC control car to record the car operating parameters.

   d. All process operating data were supplied by the Clairton Cokeworks Operations personnel.

2. Analyze all samples in a field lab set up in a construction trailer at the test site. The analyses were completed by the sample crew leader.

3. Reduce and analyze the test data.

4. Determine the particulate and visible emission performance of the HQC and compare these results with the LAER emission standards.

TEST PERSONNEL AND OBSERVERS

Following is a list of test personnel and observers:

Field Test Personnel:

- Dr. Ronald G. Patterson, Testing Manager
- Mr. Bruce C. DaRos, Field Test Crew Leader
- Mr. Sherman Smith, Sampling Train Operator
- Mr. Cary Milburn, Sampling Train Operator
- Mr. Dan Petrovay, Visible Emissions Observer

Allegheny County Board of Air Pollution Control Observers:
- Mr. William J. Logan, Air Pollution Control Technician
- Mr. Thomas Kelly, Coke Oven Technician
- Mr. Clarence Carey, Coke Oven Technician
- Mr. Dan Nadzan, Coke Oven Technician

USSC Personnel:
- Mr. Joseph Connelly, Project Engineer
- Mr. Larry Gainer, Division Superintendent, Gas & Coke
- Mr. Roy Weiskircher, Senior Environmental Engineer
- Mr. Randy York, Environmental Consultant
- Mr. Michael J. McKelvey, Field Construction Manager
- Mr. James E. McKoy, BEC Visible Emissions Observer

EVT Personnel:
- Mr. Patrick J. Reilly, Vice President and Project Manager
- Mr. Ned H. Ford, Field Construction Manager
- Mr. Ira Lapof, Field Construction Superintendent
- Mr. Lee Trexler, Control Car Operator

Consultants to EVT:
- Dr. Seymour Calvert, Environmental Engineering and Testing Consultant
- Mr. Frank Lauer, Coking Consultant

TEST SITE AND OPERATING CONDITIONS

Metallurgical grade coke is produced by USSC at the Clairton Works by heating coal in an inert atmosphere at approximately 2,600°F for a period of 18 to 21 hours to drive off volatile compounds and impurities, such as sulfur.

Each coke battery consists of a number of ovens which are charged from the top with a coal mixture. The coal mixture is heated by circulating hot gas through flues which form the walls of the ovens. At the end of the heating cycle the coke is pushed from the oven into a coke quench car which transports the incandescent coke to the quench tower. After quenching, the coke is then transported to a wharf which acts as a surge bin for holding the coke and continously loading it onto a belt for conveyance to the coke storage system.

The EVT HQC system is designed to capture and remove particulates from the hot gases during coke-pushing operations. The basic HQC System consists of three major components as shown in Figure 1.

1. A self propelled Control Car, which houses all induced draft and gas cleaning equipment. This car carries the Aeronetics Hot Water Scrubber that provides both the draft required to capture the gases at the system

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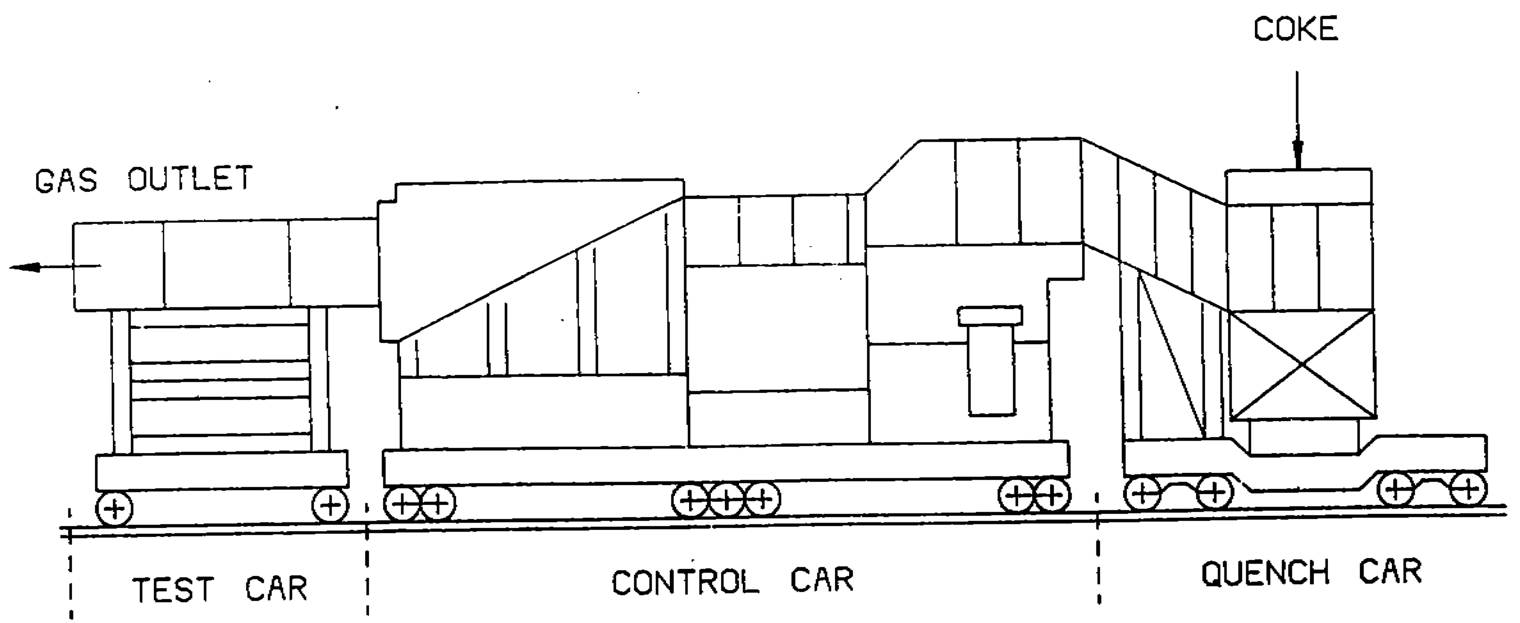

Figure 1. Envirotech Hooded Coke Quench Car System.

inlet and the fine water drops required to collect particulates in the gas stream during the scrubbing process.

2. A One-Spot Hooded Quench Car, which consists of a tilting coke box covered by a fixed hood to contain the gases so that they can be drawn into and through the control car for cleaning. The hood encloses the quench car on three sides and the top, with the side facing the ovens open to receive the coke pushed.
3. Minor modifications, as required, to the existing coke guide to prevent gases from escaping to the atmosphere during the coke push. Wings are added to the face of the coke quide on both sides of the coke discharge opening. The wings align with the open face of the quench car hood when the car is positioned for the push.

The Aeronetics hot water scrubber, considered the "heart" of the system, incorporates a two-phase adjustible jet nozzle in which water is ejected to perform the dual functions of gas movement and gas scrubbing. The flow of the water/vapor combination in the scrubber is referred to as a two-phase phenomenon.

The Aeronetics scrubber directs pressurized hot water to provide the energy for moving large quantities of gas through the scrubbing system. The nozzle's jet ejector effect transfers momentum from the liquid to the gas. Additionally, the jet nozzle atomizes the liquid and accelerates it to velocities of more than 1,000 feet per second, thereby creating a large velocity differential between the drops and the suspended particles in the gas stream. This relative velocity causes inertial impaction between the drops and the particles. As inertial impaction occurs, the particles are deposited on the drops, which are then removed from the gas stream by means of an entrainment separator. The cleaned gas exits into the atmosphere and the particulated liquid flows into a drain.

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1. The effectiveness of the quench car hood was increased by extending the transition duct into the hood so as to cause more symmetrical gas flow within the hood. This increases the efficiency of fugitive emissions capture.
2. The collection efficiency was increased by pre-conditioning the gas prior to entering the Aronetics scrubbers by spraying water into the gas stream. This increases the liquid to gas (L/G) ratio in the scrubber throat.

Process condition data for the HQC System were recorded for each traverse point as shown in Appendix A. Table 1 shows the average data for the HQC system for each of the compliance tests. During this test series the average production rate for coke battery number 20 was 14.5 tons of coke per oven.

TESTS RESULTS

The results from the compliance tests run on the HQC System as described on page 1 are presented in this section:

Test Number	Date	Test Type	Coking Conditions
903	8/19/85	Compliance	Normal
904	8/20/85	"	"
906	8/21/85	"	"

Table 2 summarizes the test conditions for each of the tests. Tables 3 through 5 show the particulate emission results for the compliance tests. Table 5 compares the particulate emission rate in lb/ton of coke pushed to the LAER emission standard for each of the tests. The results of the visible emission observations are summarized in Table 6.

TEST METHODS

The tests results presented in this report were completed according to the Compliance Test Protocol shown in Appendix F. The particulate emission tests were completed with the Method 5 particulate emission sampling system modified as approved for these tests, as shown in Figure 2. The probe, cyclone and filter holder were Teflon lined or coated. Two impinger trains were used in parallel to acommodate the high sample flowrate required to collect a sample volume greater than 30 dscf.

The 24 sampling locations are shown in Figure 3. A cyclonic flow test completed on July 23, 1985 showed an average cyclonic flow angle of 0.2 degrees for all points during push and travel. The results of the cyclonic flow test are shown in Appendix I. All sample analysis was completed in a field laboratory set up in a construction trailer near the test site.

All fugitive visible emission observations were completed simultaneously with the particulate emission tests. The test car was attached during the visible emission observations. This increased the pressure drop that the Aeronetics nozzle had to overcome, which decreased the gas flowrate and the ability of the HQC System to capture fugitive emissions during these tests.

TABLE 1. AVERAGE HQC SYSTEM PROCESS CONDITION DATA

Test Number	903		904		906	
	Push	Travel	Push	Travel	Push	Travel
Nozzle Water Flowrate, gpm	430	144	430	140	447	149
Water Temp, deg F	441	441	443	442	420	420
Water Press, psig	322	315	328	320	278	268
Annubar Vel Head, in. WC	0.0	0.0	0.0	0.0	0.0	0.0
Scrubber Temp In, deg F	0	0	0	0	0	0
Scrubber Temp Out, deg F	162	155	171	164	162	156
Quench H2O Flowrate, gpm*	400	0	400	0	400	0

* The quench water flowrate was assumed to be 400 gpm from the pump specifications, since there is no flowmeter on this system.

TABLE 2. SUMMARY OF COMPLIANCE TEST CONDITIONS

Test Number	903		904		906	
	Push	Travel	Push	Travel	Push	Travel
Avg Gas Vel, fps	64.4	45.1	50.9	40.9	67.5	43.7
Avg Gas Flow rate, acfm	124170	86874	98197	78859	130080	84250
Avg Gas Flow rate, dscfm	70158	49636	51053	41480	85823	56095
Gas Temp, deg F	162	155	171	164	162	156
Gas Press, in. Hg	29.21	29.21	29.34	29.34	29.35	29.35
Samp. Vol., dscf (corr.)	23.72	14.46	20.10	12.47	23.24	16.45
% Isokinetic	94	102	107	105	83	93

	903 Total	904 Total	906 Total
Samp. Vol., dscf (corr.)	38.18	32.57	39.69
Dry Gas Comp.			
CO_2 (vol %)	0.7	0.7	0.7
O_2 (vol %)	20.0	20.0	20.0
CO (vol %)	0.0	0.0	0.0
N_2 (vol %)	79.3	79.3	79.3
Moisture, vol%			
M-5	32.01	36.65	20.83
Sat.	31.86	39.41	31.87
Mol Wt,			
Dry	28.91	28.91	28.91
Wet	25.44	24.91	26.64
Front-half Part., mg	58.25	33.98	37.91
Back-half Part., mg	0.30	2.00	0.90
Total DER Part, mg	58.55	35.98	38.81

TABLE 3. TOTAL PENNSYLVANIA DER PARTICULATES*

Test Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke	Allowable, lb/ton coke
903	24	0.0237	1.24	0.0224	0.0400
904	24	0.0170	0.93	0.0126	0.0400
906	24	0.0151	1.01	0.0166	0.0400
Avg		0.019	1.06	0.017	0.040

* Includes total front-half, plus insoluble back-half

TABLE 4. FRONT-HALF PARTICULATES*

Test Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke
903	24	0.0235	1.23	0.0223
904	24	0.0161	0.88	0.0119
906	24	0.0147	0.99	0.0163
Avg		0.018	1.03	0.017

* Includes filter and front-half acetone and water washes

TABLE 5. BACK-HALF PARTICULATES*

Test Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke
903	24	0.00012	0.006	0.00011
904	24	0.00095	0.052	0.00070
906	24	0.00035	0.023	0.00039
Avg		0.00047	0.027	0.00040

* Includes 0.22 micron filter catch of impinger solution

TABLE 6. SUMMARY OF VISISBLE EMISSION OBSERVATIONS

Test No.		903		904		906	
Point No.		Opac >20%	Sec >20%	Opac >20%	Sec >20%	Opac >20%	Sec >20%
1.6	P			20	2.1		
	T						
1.5	P	30	1.8	100	16.9	55	5.2
	T			20	5.0		
1.4	P					30	4.8
	T						
1.3	P	45	5.0	20	1.6		
	T						
1.2	P			20	5.1		
	T						
1.1	P			100	20.1	100	7.6
	T						
2.6	P			25	4.6		
	T						
2.5	P			30	3.9	60	8.1
	T						
2.4	P			100	15.8		
	T						
2.3	P						
	T						
2.2	P			100	13.8	25	2
	T			20	1.6		
2.1	P			100	12.6	75	5.7
	T						
3.6	P						
	T						
3.5	P						
	T						
3.4	P			20	2.6	80	5.9
	T						
3.3	P						
	T						
3.2	P						
	T						
3.1	P	100	17.2				
	T						
4.6	P			100	13.0		
	T						
4.5	P					35	1.1
	T						
4.4	P	20	2.2				
	T						
4.3	P						
	T						
4.2	P			100	17.1	40	5.3
	T						
4.1	P						
	T						
No./test		4		15		9	
Sec/test			26.2		135.6		45.7

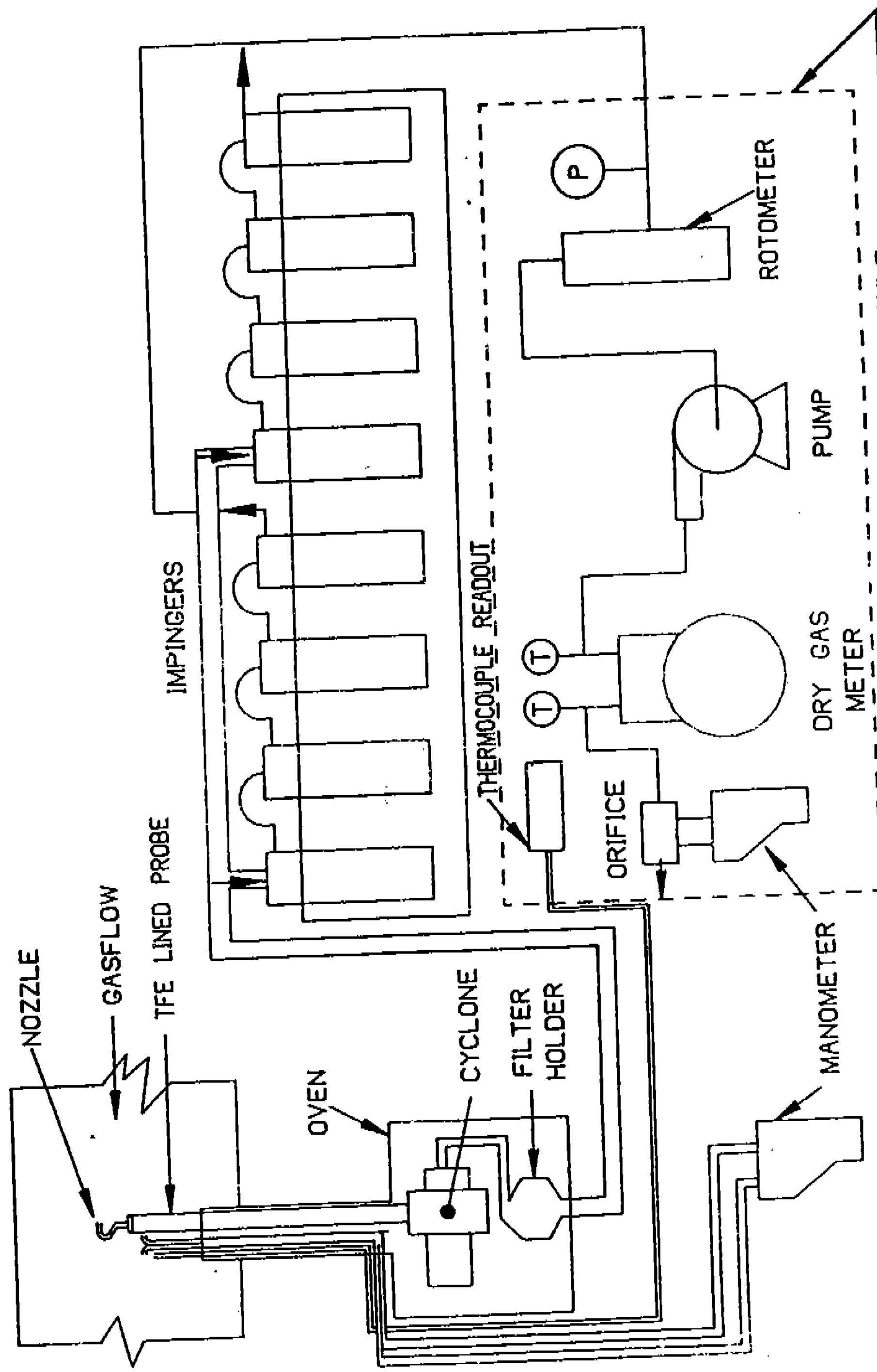

Figure 2. Method 5 Sampling Apparatus.

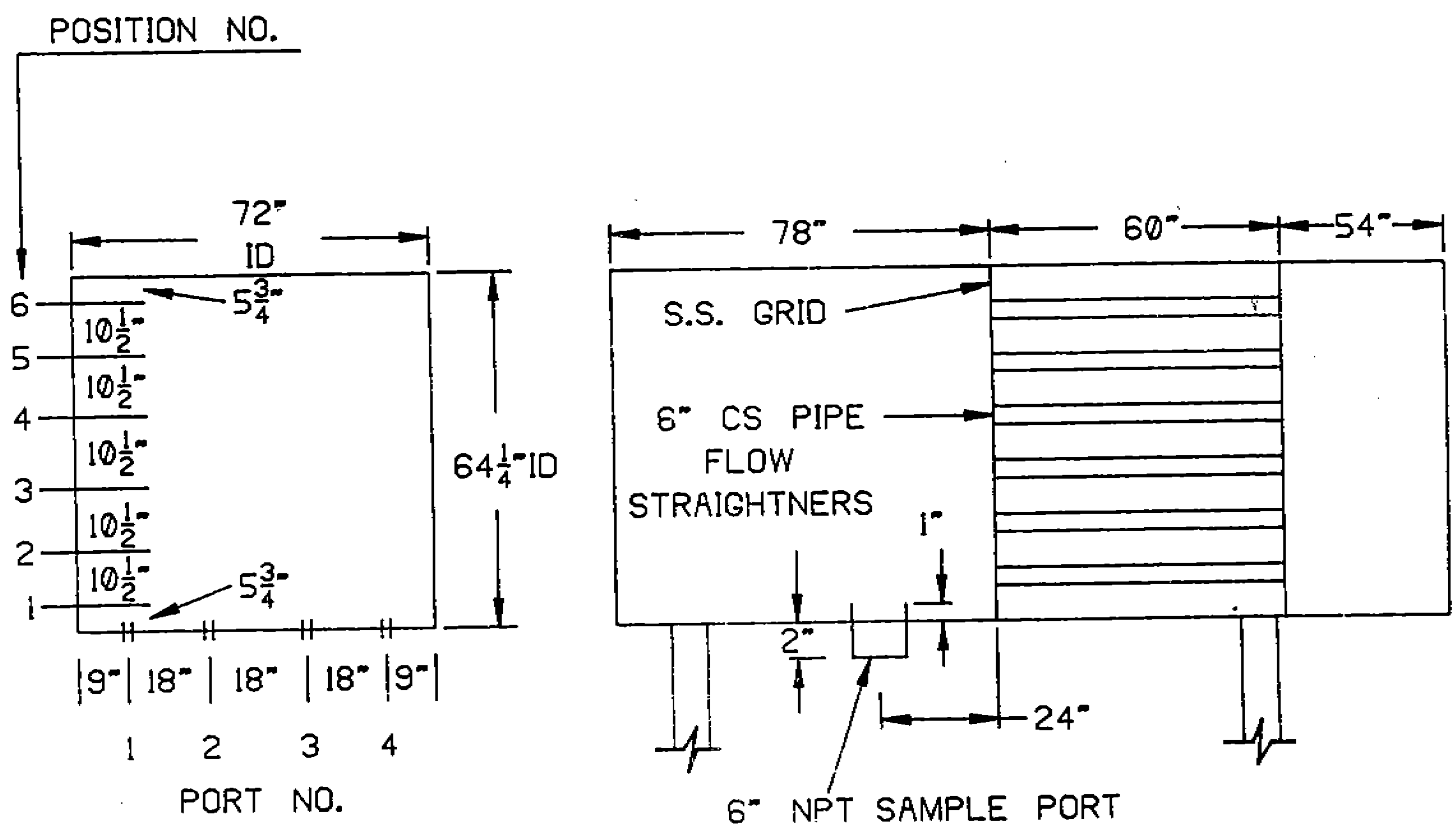

Figure 3. Test Car Duct Sampling Arrangement.

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APPENDIX A

SCRUBBER OPERATING DATA

DATE : 2-?-85
CAR # : H-3-7
BAT. # : 20

TEST DESC : H-3-7 ... Compliance Test

		1.6	1.5	1.4	1.3	1.2	1.1	2.6	2.5	2.4	2.3	2.2	2.1	3.6	3.5	3.4	3.3
		130	220	20	120	20	620	20	20	920	1020	20	1220	1320	1420	1520	1620
OVEN NUMBER		A/16	B/16	[illegible]	A/18	B/[illegible]	C/18	A/20	[illegible]/20	A/28	B/28	C/28	A/1	B/1	[illegible]/1	A/31	B/31
TIME AT START OF PUSH		9 33/A	9 44/A	9 [illegible]/A	10 1/A	10 [illegible]/A	10 35/A	11 14/A	12 [illegible]	1 47/P	1 54/P	2 06/P	2 15/P	2 32/P	2 44/P	2 58/P	3 10/P
OVEN SCRUBBED (Y or N)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COKING TIME (HRS)																	
LR 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%)		82%	82%	[illegible]%	82%	[illegible]%	82%	80%	82%	82%	83%	82%	82%	82%	82%	82%	82%
TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F)		444°	444°	[illegible]	444°	444°	444°	444°	432°	444°	444°	444°	444°	444°	444°	444°	444°
SEPARATOR INLET PRESSURE (IN. W.C.)																	
FUEL — FR 521 FLOW TO JETS (0-600 GPM)	B	430	430	430	430	430	430	430	420	430	430	430	430	430	430	430	430
FUEL — PR 522 PRESS TO JETS (0-500 PSIG)	G	320	320	[illegible]	330	330	330	3[illegible]	[illegible]	320	[illegible]	320	320	3[illegible]0	320	320	320
FUEL — TR 524 TEMP TO JETS (0-600°F)	R	432°	430°	[illegible]	444°	444°	444°	420°	420°	444°	444°	444°	444°	444°	444°	444°	444°
FUEL — TR 531 COKE GAS TEMP (0-700°F)	P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
INTERMEDIATE — FR 521 FLOW TO JETS																	
INTERMEDIATE — PR 522 PRESS TO JETS																	
INTERMEDIATE — TR 524 TEMP TO JETS																	
INTERMEDIATE — TR 531 COKE GAS TEMP																	
TAR — FR 521 FLOW TO JETS	B	190	150	140	150	150	150	150	140	140	140	140	140	140	140	140	140
TAR — PR 522 PRESS TO JETS	G	310	320	[illegible]	320	[illegible]	320	31[illegible]	[illegible]	[illegible]	310	310	310	310	310	310	310
TAR — TR 524 TEMP TO JETS	R	432°	432°	444°	444°	444°	444°	420°	420°	444°	444°	444°	444°	444°	444°	444°	444°
TAR — TR 531 COKE GAS TEMP	P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

DATE: [illegible]9-85
CAR #: H-3-7
BAT. #: 20

TEST DESCRIPTION: H-3 [illegible] CAR [illegible] [illegible] NO. 20
Compliance [illegible]

		17 1:20	18 2:20	19 3:20	20 4:20	21 5:20	22 6:20	23 7:20	24 8:20	9	10	11	12	13	14	15	16
	OVEN NUMBER	C/3	A/5	B/5	C/5	A/7	B/17	C/7	B/7								
	TIME AT START OF PUSH	3:22 P	3:35 P	3:47 P	4:00 P	4:15 P	4:27 P	4:4[illegible] P	4:52 P								
	OVEN SCRUBBED (Y or N)	Y	Y	Y	Y	Y	Y	Y	Y								
	COKING TIME (HRS)																
LR 505	HOT WATER TANK LEVEL BEFORE PUSH (0-100%)	82%	82%	82%	82%	82%	82%	82%	82%								
TR 509	HOT WATER TANK TEMP BEFORE PUSH (0-600°F)	444°	444°	444°	444°	444°	444°	444°	444°								
	SEPARATOR INLET [illegible]																
FR 521	FLOW TO JETS (0-[illegible]) B	430	430	430	430	430	430	430	430								
PR 522	PRESS TO JETS (0-500 PSIG) G	320	320	320	320		330	330	320								
TR 524	TEMP TO JETS (0-600°F) R	444°	444°	444°	444°	444°	444°	444°	444°								
TR 531	COKE GAS TEMP (0-[illegible]) P	—	—	—	—	—	—	—	—								
INTERMEDIATE FR 521	FLOW TO JETS																
PR 522	PRESS TO JETS																
TR 524	TEMP TO JETS																
TR 531	COKE GAS TEMP																
TRAVEL FR 521	FLOW TO JETS B	140	140	140	140	140	140	140	140								
PR 522	PRESS TO JETS G	320	320	320	320	320	320	320	320								
TR 524	TEMP TO JETS R	444°	444°	444°	444°	444°	444°	444°	444°								
TR 531	COKE GAS TEMP P	—	—	—	—	—	—	—	—								

DATE : 8-30-85
CAR # : 4-B-7
BAT. # : 20

TEST DESCRIPTION : [illegible]
COMPLIANCE [illegible]

	1.6 120	1.5 220	1.4 320	1.3 420	1.2 520	1.1 620	2.6 720	2.5 820	2.4 920	2.3 1020	2.2 1120	2.1 1220	3.6 1320	3.5 1420	3.4 1520	3.3 1620
OVEN NUMBER	B/3	A/5	B/5	C/5	A/7	B/7	C/7	[illegible]	B/9	C/9	A/11	B/11	C/11	A/13	B/13	C/13
TIME AT START OF PUSH	10 02 A	10 16 A	10 22 A	10 29 A	10 36 A	10 48 A	11 02 A	11 [illegible]	11 35 P	11 50 A	12 04 P	12 16 P	12 29 P	12 43 P	12 56 P	1 11 P
OVEN SCRUBBED (Y or N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COKING TIME (HRS)																
LR 505 Hot Water Tank Level Before Push (0-100%) R	61%	82%	64%	82%	64%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%
TR 509 Hot Water Tank Temp Before Push (0-600°F) G	432°	432°	432°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°
SEPARATOR INLET PRESSURE (IN. WC)																
FULL — FR 521 Flow to Jets (0-600 GPM) B	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
FULL — PR 522 Press. to Jets (0-500 PSIG) G	300	320	320	330	320	330	330	330	330	330	330	330	330	330	330	320
FULL — TR 524 Temp. to Jets (0-600°F) R	432°	432°	432°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°	444°
FULL — TR 531 Coke Gas Temp. (0-700°F) P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
INTERMEDIATE — FR 521 Flow to Jets																
INTERMEDIATE — PR 522 Press. to Jets																
INTERMEDIATE — TR 524 Temp. to Jets																
INTERMEDIATE — TR 531 Coke Gas Temp.																
TRAVEL — FR 521 Flow to Jets B	140	140	140	140	140	140	[illegible]	140	140	140	140	140	140	140	140	140
TRAVEL — PR 522 Press. to Jets G	300	320	320	320	[illegible]	[illegible]	[illegible]	[illegible]	330	330	320	[illegible]	330	320	330	320
TRAVEL — TR 524 Temp. to Jets R	[illegible]	432°	432°	444°	[illegible]	[illegible]	[illegible]	[illegible]	444°	444°	444°	444°	444°	432°	444°	444°
TRAVEL — TR 531 Coke Gas Temp. P	—	—												—	—	—

DATE: 8-20-85
CAR #: H-3-7
BAT. #: 20

TEST DESCRIPTION: H-3-7 CHK. [illegible]

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		3.2 17 220	3.1 18 220	4.6 19 220	4.5 20 A 20	4.9 21 220	4.7 22 [illegible]	4.2 [illegible]	4.4 [illegible]								
OVEN NUMBER		A/15	B/15	C/15	A/17	B/17	C/17	A/19	A/25								
TIME AT START OF PUSH		124 P	140 P	151 P	204 P	216 P	228 P	240 P	2[illegible]								
OVEN SCRUBBED (Y OR N)		Y	Y	Y	Y	Y	Y	Y	✓								
COKING TIME (HRS)																	
LR 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%)	R	82%	82%	82%	82%	82%	82%	82%	65%								
TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F)	G	444°	444°	444°	444°	444°	444°	444°	444°								
SEPARATOR INLET PRESSURE (IN. W.C.)																	
FULL: FR 521 FLOW TO JETS (0-600 GPM)	B	430	430	430	430	430	430	430	430								
FULL: PR 522 PRESS. TO JETS (0-500 PSIG)	G	330	330	330	330	330	330	330	330								
FULL: TR 524 TEMP. TO JETS (0-600°F)	R	444°	444°	444°	444°	444°	444°	444°	444°								
FULL: TR 531 COKE GAS TEMP. (0-700°F)	P	—	—	—	—	—	—	—	—								
INTERMEDIATE: FR 521 FLOW TO JETS																	
INTERMEDIATE: PR 522 PRESS. TO JETS																	
INTERMEDIATE: TR 524 TEMP. TO JETS																	
INTERMEDIATE: TR 531 COKE GAS TEMP.																	
TRAVEL: FR 521 FLOW TO JETS	B	140	140	140	140	140	140	140	140								
TRAVEL: PR 522 PRESS. TO JETS	G	320	320	[illegible]	320	320	320	320	320								
TRAVEL: TR 524 TEMP. TO JETS	R	444°	444°	444°	440°	444°	444°	444°	444°								
TRAVEL: TR 531 COKE GAS TEMP.	P																

DATE: 6-21-85
CAR #: H-3-7
BAT. #: 20

TEST DESCRIPTION: H-3-7 CAR BATTERY NO. 20
COMPLIANCE TEST

		1.6 1:20	1.5 2:20	1.4 :20	1.3 4:20	1.2 :20	1.1 6:20	2.6	2.5 :20	2.4 9:20	2.3 10:20	2.2 11:20	2.1 12:20	3.6 13:20	3.5 14:20	3.4 15:20	3.3 16:20
	OVEN NUMBER	C/4	A/6	B/6	C/6	A/8	B/8	C/8	A/10	B/10	C/10	A/12	B/12	C/12	A/14	B/14	C/14
	TIME AT START OF PUSH	2 05/P	2 41/P	2 47/P	2 55/P	3 24/P	3 45/P	[illegible]	[illegible]	4 14/P	4 27/P	4 41/P	4 56/P	5 09/P	5 22/P	5 36/P	5 50/P
	OVEN SCRUBBED (Y or N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	COKING TIME (HRS.)																
	LR 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%)	82%	82%	62%	82%	82%	82%	62%	82%	82%	82%	82%	82%	82%	82%	82%	82%
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F)	420	432°	432°	432°	432°	432°	432°	432°	432°	432°	432°	432°	432°	432°	432°	432°
	SEPARATOR INLET PRESSURE (IN. W.C.)																
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	430	430	430	450	450	450	450	450	450	450	450	450	450	450	450	450
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	280	280	260	270	280	280	270	270	280	280	280	280	280	280	280	280
FULL	TR 524 TEMP. TO JETS (0-600°F) R	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°	420°
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
INTERMEDIATE	FR 521 FLOW TO JETS																
INTERMEDIATE	PR 522 PRESS. TO JETS																
INTERMEDIATE	TR 524 TEMP TO JETS																
INTERMEDIATE	TR 531 COKE GAS TEMP.																
TRAVEL	FR 521 FLOW TO JETS B	140	140	140	150	150	150	150	150	150	150	150	150	150	150	150	150
TRAVEL	PR 522 PRESS. TO JETS G	270	270	[illegible]	260	270	270	260	260	270	270	270	270	270	270	270	270
TRAVEL	TR 524 TEMP TO JETS R	420°	420°	420°	420°	420°	420°	420°	420°	430°	420°	420°	420°	420°	420°	420°	420°
TRAVEL	TR 531 COKE GAS TEMP. P	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

DATE : 8-31-85
CAR # : H-3-7
BAT. # : 20

TEST DESCRIPTION : H-3-7 CAR, BATTERY NO. 20.
COMPLIANCE TEST

		17	18	19	20	21	22	23	24	9	10	11	12	13	14	15	16
	OVEN NUMBER	A/16	B/16	C/16	A/18	B/18	C/18	A/20	B/20								
	TIME AT START OF PUSH	6 04/P	6 19/P	6 32/P	6 47/P	7 01/P	7 15/P	7 30/P	7 46/P								
	OVEN SCRUBBED (Y or N)	Y	Y	Y	Y	Y	Y	Y	Y								
	COKING TIME (HRS.)																
	LR 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%)	82%	82%	82%	82%	82%	82%	82%	82%								
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F)	432°	432°	432°	432°	[illegible]	432°	432°	432°								
	SEPARATOR INLET PRESSURE (IN. W.C.)																
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	450	450	450	450	450	450	450	450								
FULL	PR 522 PRESS TO JETS (0-500 PSIG) G	280	280	280	280	280	280	280	280								
FULL	TR 524 TEMP. TO JETS (0-600°F) R	420°	420°	420°	420	[illegible]	420°	420°	420°								
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	—	—	—	—	—	—	—	—								
INTERMEDIATE	FR 521 FLOW TO JETS																
INTERMEDIATE	PR 522 PRESS. TO JETS																
INTERMEDIATE	TR 524 TEMP. TO JETS																
INTERMEDIATE	TR 531 COKE GAS TEMP																
TRAVEL	FR 521 FLOW TO JETS B	150	150	150	150	150	150	150	150								
TRAVEL	PR 522 PRESS TO JETS G	270	270	270	[illegible]	[illegible]	270	270	270								
TRAVEL	TR 524 TEMP TO JETS R	420°	420°	420°	420	420°	420°	420°	420°								
TRAVEL	TR 531 COKE GAS TEMP P	—	—	—	—	—	—	—	—								

APPENDIX B

SAMPLE TRAIN DATA SHEETS

FIELD DATA

Plant US STEEL-CLAIRTON PA
Date 8-19-85
Sample Location HCQC-TEST CAR
Sample Type M-5
Run Number 9.3
Operator Smith & Milburn
Ambient Temperature 73°
Barometric Pressure 29.27 @ 3PM
Static Pressure, (H_2O) -.85
Filter Number(s) RA026-066
N/A

	Impinger Volumes Initial	Final	Net Gain
TRAIN A	100	355	255
	100	105	5
	M/T	2	2
TRAIN B	100	201	105
	100	105	5
	M/T	0	ø 572
	Silica Gel		
A	622.0	622.6	
B	686.6	692.7	

SASS Condensate ______
Total Volume ______

Probe Length and Type 5 ft TFE
Nozzel Size & I.D. .317
Pitot Coefficient & I.D. .825 (1-BGT)
Assumed Moisture ______
Molecular Weight, Dry, (M_d) ______
Meter Box Number APT 14 LG (MOD)
Meter Coefficient ______
α Factor ______
K = ______
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Leak Check: Initial at 15" Hg. .005 CFM
Final at 10" Hg. .010 CFM
Pitot Leak Check: ok

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Probe	Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
			Init. 709.520												
1.6	:44	934	710.350	.80		20.0	164	270	64°	.53	225	73	73	3.5	
	1:26	:42	710.840	.40		13.7	157	272	64°	.24	227	73	73	2.0	
1.5	:41	946	711.520	.90	1	14.6/26	164	272	64°	.54	244	75	74	2.0	
	1:30	:49	712.025	.30		11.6	156	273	64°	.08	246	75	74	1.0	
1.4	:50	959	712.970	.65		17.9	160	269	64°	.38	254	76	75	3.0	
	1:44	:54	713.315	.25		10.4	155	273	64°	.14	255	76	75	1.0	
1.3	:54	1011	714.235	.80		20.	163	271	64°	.49	256	77	77	3.5	
	1:28	:34	714.650	.40		13.7	157	271	64°	.23	256	77	77	2.0	
AVG.															

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft³ Init.	Velocity Head (ΔP_s), in. H₂O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Probe	Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
1.2	:52	1024	715.630	~~.2~~ 1.0		22.5	159	267	60°	.59	258	78	78	4.0	
	1:38	:46	716.290	.50		15.4	155	272	60°	.25	258	79	78	2.0	
1.1	:53	1036	717.500	1.8		~~2~~ 30.7	158	271	56°	1.05	259	79	78	7.0	
	1:58	:65	718.620	.8		20.0	154	270	56°	.54	259	79	78	4.0	
2.6	:52	1115	719.520	.90		21.3	156	269	60°	.54	267	81	81	3.5	
	1:31	:29	720.130	.60		17.9	150	273	60°	.36	267	81	81	3.0	
2.5	:52	130	72~~1~~0.040	.90		21.3	158	271	66°	.51	267	87	88	4.0	
	1:42	:50	721.775	.65		17.1	153	272	66°	.36	268	89	88	3.0	
2.4	:58	143	722.880	.90		21.3	159	269	68°	.60	267	89	89	6.0	
	1:30	:32	723.335	.65		17.9	155	273	68°	.45	267	90	89	3.0	
2.3	:56	155	724.565	1.5		25.9/28.1	162	270	66°	.87	267	90	89	6.0	
	1:33	:39	725.190	.65		17.9	155	273	66°	.37	267	90	89	3.0	
2.2	:56	207	726.425	1.5		28.0	161	271	64°	.91	266	91	90	6.0	
	1:44	:49	727.235	.75		19.3	154	271	64°	.47	267	91	90	3.0	
2.1	:53	220	728.360	1.3		25.9	164	269	66°	.82	266	91	90	6.0	
	1:23	:30	728.845	.60		17.1	156	272	66°	.37	266	91	90	2.0	
AVG.															

REV 2-7-85

Run No. 9.3

Date 8-19-85

Sampling Location HCQC - TEST CAR

US STEEL - CLAIRTON, PA

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft Init.	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F Stack	Probe	Impinger	ORIFICE ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg
4.4	:49	417	741.365	1.0		22.5	162	271		.57	266	96	95	4.5
	1:24	:35	741.845	.50		15.4	156	274		.37	266	96	95	2
4.3	:53	428	742.960	1.3		25.9	161	270		.78	266	96	95	5.5
	1:33	:40	743.560	.60		17.1	155	273		.32	266	96	96	3
4.2	:54	442	744.565	1.0		22.5	160	271		.60	266	96	96	4.5
	1:39	:45	745.170	.50		15.4	152	269		.28	266	96	96	3
4.1	:55	452	746.185	1.0		22.5	162	270		.63	266	96	96	[illegible]
	1:27	:32	746.635	.50		15.4	154	271		.35	267	97	96	[illegible]
Avg.														

Recovered by [illegible]

REV'D

Run No. 9.3

Date 8-20-85

Sampling Location HCDC - TEST LAB

US STEEL - CLAIRTON, PA

Comments:

FIELD DATA

Plant US STEEL-CLAIRTON, PA
Date 8-20-85
Sample Location HCOC-TEST CAR H-3-7
Sample Type M-5
Run Number 9.4
Operator SMITH & MILBURN
Ambient Temperature 70°
Barometric Pressure 29.58 @ 2PM
Static Pressure, (H_2O) -.5
Filter Number(s) RA1026-067

Leak Check: Initial at 15 " Hg, .010 CFM
Final at 10 " Hg, .020 CFM
Pitot Leak Check: ok

	Impinger Volumes Initial	Final	Net Gain
TRAIN A	100	410	310
	100	130	30
	M/T	Ø	Ø
TRAIN B	100	143	43
	100	103	3
	M/T		Ø
	Silica Gel		
A	668.0	674.5	
B	693.2	701.Ø	
SASS Condensate			
Total Volume			

Probe Length and Type 5 ft TFE
Nozzel Size & I.D. .317
Pitot Coefficient & I.D. .825 (1-BEAT)
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number APT 14 2G (MOD)
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Probe	Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. Vac
			Init. 756.660												
1.6	:56	1004	757.355	.35		12.7	168	270	64°	.23	272	73	72	2"	
	1:30	:34	757.665	.25		10.4	164	274	62°	.16	272	73	72	2"	
1.5	:57	1017	758.390	.40		~~12.7~~/14.0	183	274	64°	.22/.40	270	73	72	3"	
	1:23	:26	758.655	.30		11.6	165	275	58°	.18	267	73	72	2"	
1.4	:42	1023	759.300	.30		11.6	170	271	58°	.20	267	73	72	2"	
	1:27	:45	759.580	.20		12	165	273	58°	.12	267	73	72	1.5"	
1.3	:51	1030	760.245	.45		14.6	167	271	58°	.29	267	73	72	3	
	1:46	:55	760.840	.30		11.6	162	272	58°	.21	261	73	72	2"	
AVG.															

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr)	Meter Reading (V_m), ft^3 Init.	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Probe	Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum In. Hg	
1.2	:57	1037	761.645	.50		15.4	166	270	58°	.32	261	73	72	3"	
	1:26	:29	761.960	.35		12.7	162	273	58°	.26	261	74	72	2"	
1.1	:52	1050	762.820	.80		20.0	175	271	58°	.52	269	74	73	4"	
	1:32	:40	763.310	.40		13.7	164	271	58°	.24	278	74	73	3"	
2.6	:54	1103	764.275	.90		20.0	170	272	60°	.54	279	74	73	4.5	
	1:39	:45	764.910	.55		16.3	162	270	60°	.30	278	74	73	3	
2.5	:58	1115	765.840	.70		18.6	169	270	60°	.42	275	75	74	4	
	1:28	:30	766.210	.45		14.6	162	274	60°	.33	275	75	73	3	
2.4	:53	1137	767.155	1.0		22.5	178	272	56°	.58	274	76	75	5.5	
	1:36	:43	767.815	.65		18.6	166	270	56°	.42	274	76	75	3.5	
2.3	:57	1152	768.850	1.0		20.9 22.5	167	270	56°	.57	275	77	76	5.0	
	1:43	:46	769.535	.60		17.9	162	273	56°	.28	275	77	76	3.0	
2.2	:56	1204	770.450	.75		17.1	181	270	56°	.39	275	77	76	3.0	
	1:28	:32	770.900	.50		15.4	167	273	56°	.30	275	77	77	2.0	
2.1	:53	1217	771.835	.80		20.0	174	271	56°	.47	275	77	77	5.0	
	1:34	:41	772.415	.50		15.4	168	269	56°	.32	274	78	77	3.0	
AVG.															

REV 2

Run No. 9.4

Date 8-20-85

Sampling Location HCQC - TEST CAR

US STEEL - CLAIRTON, PA

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft³ Init.	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F Stack	Temperature °F Probe	Temperature °F Impinger	ORIFICE ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
3.6	:48	1230	773.185	.80		20.0	170	272	60°	.47	275	78	77	4.5"	
	2:30	1:42	774.585	.45		14.6	164	269	60°	.25	275	78	77	3.0	
3.5	:58	1244	775.435	.55		16.3	170	271	60°	.34	275	78	77	3.0	
	1:27	:29	775.775	.40		13.7	162	271	60°	.24	275	78	77	2.0	
3.4	:50	1257	776.430	.40		13.7	169	270	62°	.24	275	78	77	2.0	
	1:32	:42	776.835	.21		10.4	164	273	62°	.13	275	78	77	1.5	
3.3	:56	112	777.500	.35		12.7	166	269	64°	.22	275	78	78	[illegible]	
	1:41	:45	777.950	.25		10.4	161	272	64°	.12	275	77	78	[illegible]	
3.2	:56	125	778.680	.45		14.6	168	270	64°	.22	275	79	78	3.0	
	1:25	:29	778.885	.30		11.6	164	273	64°	.18	274	79	78	1.0	
3.1	:52	141	779.710	.55		16.3	167	272	64°	.31	274	79	78	3.0	
	1:34	:42	780.160	.35		12.7	161	272	64°	.14	274	79	78	1.0	
4.6	:51	153	781.025	.80		20.7	175	272	64°	.53	276	80	79	5.0	
	1:44	:53	781.665	.35		12.7	165	270	64°	.18	276	80	79	[illegible]	
4.5	:49	205	782.380	.65		17.9	169	270	66°	.37	275	80	79	3.5	
	1:28	:39	782.795	.30		~~13.7~~	163	273	66°	.16	275	80	80	[illegible]	
AVG.						11.6									

Run No. 9.4

Date 8-20-85

Sampling Location HCOC - TEST BAY

US STEEL - CLAIRTON, PA

Comments

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft^3 Init.	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Probe	Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum In. Hg
4.4	:53	217	783.635	.70		19.3	168	270	60°	.44	275	80	80	4.0
	1:35	:42	784.165	.45		14.6	163	271	60°	.18	275	80	80	2.5
4.3	:52	229	785.060	.85		20.0	168	270	58°	.52	274	81	80	[illegible]
	1:52	1:00	785.900	.55		15.4/16.3	164	272	58°	.37	274	81	80	3.0
4.2	:54	242	786.640	.55		16.3	178	270	60°	.32	274	81	80	3.0
	1:32	:38	787.085	.40		13.7	165	273	60°	.18	274	81	80	2.5
4.1	1:14	249	787.990	.40		13.7	168	269	64°	.23	274	81	80	2.5
	1:33	:19	~~787.990~~ 788.225	.40		13.7	162	271	64°	.26	274	81	80	2.5
AVG.														

REV

Run No. 9.4

Date 8-20-85

Sampling Location HCQC - TEST CAR

US STEEL - CLAIRTON, PA

Comments:

FIELD DATA

Plant US STEEL - CLAIRTON, PA
Date 8-21-85
Sample Location HCQC - TEST CAR
Sample Type M-5
Run Number 9.6
Operator SMITH & MILBURN
Ambient Temperature ~70°F
Barometric Pressure 29.39 @ 1PM
Static Pressure, (H_2O) -0.5
Filter Number(s) BA02G-069

Leak Check: Initial at 17" Hg, .015 CFM
Final at 15" Hg, .015 CFM
Pitot Leak Check: ok

	Impinger Volumes Initial	Final	Net Gain
TRAIN A	100	225	125
	100	100	∅
	M/T	M/T	∅
TRAIN B	100	125	25
	100	105	5
	M/T	M/T	∅
	Silica Gel		
A	653.5	660.3	
B	210.5	720.6	
SASS Condensate			
Total Volume			

Probe Length and Type 5 ft TFE
Nozzel Size & I.D. .317
Pitot Coefficient & I.D. .325 (LARGE T)
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number APT 14 LG (MDA)
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Stack	Probe	Impinger	ORIFICE ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
			Init. 809.970												
1.6	:49	207	810.765	.80		20.0	167	270	70°	.50	283	79	78	3"	
	1:26	:47	811.275	.30		11.6	157	274	70°	.14	282	79	79	2"	
1.5	:5[illegible]	242	811.855	.40		11.6/13.7	165	270	70°	.18/.23	259	79	79	2"	
	1:25	:33	812.175	.30		11.6	156	273	70°	.19	258	79	79	2"	
1.4	:47	248	812.880	.55		15.4/16.3	163	272	70°	.38	261	79	79	3"	
	1:35	:48	813.385	.15		—	159	271	70°	.09	262	79	79	2"	
1.3	:49	255	814.250	1.0		[illegible]/20	160	272	70°	.60	264	80	79	4"	
	1:41	:52	814.840	.30		~~13.7~~ 11.6	156	271	70°	.15	264	80	79	2"	
AVG.															

Comments:

Delta replaced S. Smith @ 3:00 PM

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft 3 Init.	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F Stack	Probe	Impinger	ORIFICE ΔH	Oven	Gas Meter In	Gas Meter Out	[illegible]
1.2	:48	3:25	815.800	1.3		25.9	159	271	65	.76	264	81	81	[illegible]
	1:27		816.590	.6		17.1	154	272	65	.41	264	81	81	[illegible]
1.1	:50	3:43	817.600	1.5		28.0	164	270	65	.76	265	82	81	[illegible]
	1:53		818.310	.6		17.1	156	271	65	.39	265	81	81	[illegible]
2.6	:51	3:48	819.400	~~2.6~~ 1.3		25.9	161	269	69	.85	267	81	81	[illegible]
	1:40		820.130	.5		16.3	157	271	69	.35	266	81	81	[illegible]
2.5	:49	3:57	~~820.090~~ 821	1.3		25.9	161	272	65		272	81	81	[illegible]
	1:31		821.725	~~.32~~ .325		15.4	153	269	65	.32	272	81	81	[illegible]
2.4	:50	—	822.900	1.5		28.0	161	270	65	.90	262	81	81	[illegible]
	1:37		823.635	.7		18.6	157	270	65	.38	264	81	81	[illegible]
2.3	:40	4:26	824.600	2.0		32.6	161	272	65	1.2	268	81	81	[illegible]
	1:39		825.375	.7		18.6	157	269	65	.40	264	81	81	[illegible]
2.2	:49	4:40	826.400	1.5		~~24~~ 28.0	163	269	65	.92	260	81	81	7
	1:26		827.000	.5		15.4	158	260	65	.32	260	81	81	3
2.1	:49		828.070	1.5		28.0	165	271	65	.90	263	81	81	7
	1:39		828.805	.65		17.9	157	268	65	.37	264	81	81	3
AVG.														

Run No. 9-6

Date 8-21-85

Sampling Location HCOC - TEST CAR

US STEEL - CLAIRTON, PA

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr Clock)	Gas Meter Reading (V_m), ft³ Init.	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Probe	Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
3.6	:49	5:07	829.990	1.7		29.9	162	271	68	9.9	265	82	81		6
	1:41		830.775	.65		17.9	156	270	68	.41	266	82	81		3
3.5	:38	—	831.570	[illegible]		22.5	161	271	68	.52	264	82	81		5
	1:15		832.100	.55		15.4	155	272	68	.30	265	82	81		3
3.4	:44	5:35	833.050	1.0		22.5	162	269	68	.62	264	81	81		5
	1:35		833.770	.5		15.4	157	273	68	.32	264	81	81		3
3.3	:46	—	834.706	1.25		25.0	160	270	68	.75	262	82	81		5
	1:39		835.540	.50		15.4	156	272	68	.32	264	82	81		3
3.2	:49	6:01	836.300	.70		18.6	162	269	68	—	263	81	81		[illegible]
	1:30		836.780	.40		13.7	156	272	68	.26	263	81	81		2
3.1	:47	6:16	837.690	.90		21.3	159	270	68	.54	263	81	80		[illegible]
	1:34		838.195	.40		13.7	153	269	68	.18	263	81	80		[illegible]
4.6	:50	6:31	839.30	1.50		28.0	161	270	65	.93	263	80	80		[illegible]
	1:49		840.190	.55		16.3	156	271	65	.32	264	80	80		2
4.5	:49	6:46	841.050	.85		20.7	164	271	65	.54	263	80	80		4
	1:31		841.505	.35		12.7	158	272	65	.22	263	80	80		2
AVG.															

REV 2 7-85

Run No. 9.6 Date 8-21-85 Sampling Location: HCGC- TEST CAR

US STEEL - CLAIRTON, PA

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V_m), ft^3 Init.	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Stack	Temperature °F Probe	Temperature °F Impinger	Orifice ΔH	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg
4.4	:50		842.400	1.0		22.5	156	271	65	.62	263	79	79	[illegible]
	11:38		843.040	.45		14.6	156	270	65	.25	263	79	79	[illegible]
4.3	:48	7:13	844.090	1.5		28.0	162	269	65	.93	265	79	77	[illegible]
	11:40		844.940	.7		18.6	156	272	65	.40	265	79	77	[illegible]
4.2	:46		846.100	1.5		28.0	163	269	65	.91	265	77	79	7.0
	11:37		846.715	.60		17.1	157	270	65	.38	265	77	79	[illegible]
4.1	:49		847.500	1.0		22.5	155	269	65	.60	265	[illegible]	77	[illegible]
	11:38		848.385	.45		14.6	149	269	65	.28	[illegible]	79	79	[illegible]
			PURGE TO:											
			880.900											
AVG.														

REV 2

Run No. 9.6 Date 8-21-85 Sampling Location HCQC - TEST CAR

US STEEL - CLAIRTON, PA

Comments:

APPENDIX C

VISIBLE EMISSION DATA SHEETS

SOURCE NAME: U.S.S. CLAIRTON WORKS

ADDRESS: 135 STATE STREET

STATE: PA | ZIP: 15025 | TELEPHONE:

SOURCE ID NUMBER: BATTERY # 20

OBSERVATION DATE: 8-19-85

PROCESS: Coke Pushing Emissions

OPERATING MODE:

CONTROL EQUIPMENT: EnviRoTech Chemico Quench car

OPERATING MODE: 18-24 HR. Coke

DESCRIBE EMISSION POINT: ABOVE GAS MAIN

OBSERVER'S NAME (PRINT): DANIEL PETROVAY

ORGANIZATION: Hemeon ASSOCIATES INC.

CERTIFIED BY: E.T.A

DATE: 4-3-85

AT WHAT POINT WAS OPACITY DETERMINED: TOP OF GAS MAIN

DESCRIBE BACKGROUND:

BACKGROUND COLOR: Blue sky

SKY CONDITIONS: Blue sky

WIND SPEED: 6MPH Am TO 7MPH pm

WIND DIRECTION: N-6 Am TO NW PM

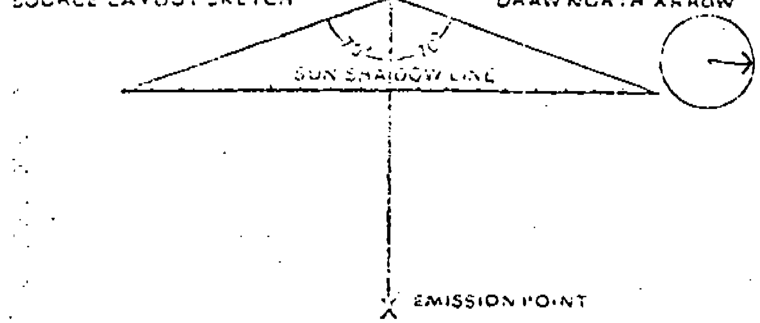
AMBIENT TEMPERATURE: AM. 65° Pm 80°

RELATIVE HUMIDITY: Am. 72% Pm 46% 30.055-Pm 30.03R-Am

BATTERY - OVEN	/	/	/	/	/	/	/
TIME DOOR REMOVED							
TIME OF PUSH							
DURATION OF SMOKE ≥ 20%							
MAXIMUM OPACITY	%	%	%	%	%	%	%
TIME OF HOOD DROP							
DURATION OF SMOKE > 10%							
MAXIMUM OPACITY	%	%	%	%	%	%	%
TIME OF QUENCH							
EXCEEDS STANDARDS							
COMMENTS							

SOURCE LAYOUT SKETCH

DRAW NORTH ARROW



HEIGHT ABOVE GROUND LEVEL: 60 FT.

HEIGHT RELATIVE TO OBSERVER: 50 FT.

DISTANCE FROM OBSERVER: 70 YARDS

DIRECTION FROM OBSERVER: EAST

DESCRIBE EMISSIONS: GRAY + BLACK SMOKE

EMISSION COLOR:

PLUME TYPE: CONTINUOUS ☐ FUGITIVE ■ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ■ YES ☐

IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐

OBSERVER'S SIGNATURE: Daniel Petrovay

DATE: 8-19-85

VERIFIED BY:

EVT Coke Quench Car Tests RGP06.27.85 Sheet 1 of 2 Date: 8-19-85

Test No. 9.3 Car No. 4-3-7 Battery No. 20 Observer DAN PETROVAY

	Oven No.	Start Time	Opacity > 20%	Seconds > 20%	Comments
Push	A-16	9:33:45	10%	0	MAX. OPACITY 10%
Travel	A-16	9:34:35	5%	0	5% ON TRAVEL 1
Push	B-16	9:46:10	30%	1.79	30% MAX. OPACITY COLD SPOT #2 CHARGE PORT
Travel	B-16	9:47:05	0%	0	0% ON TRAVEL 2
Push	C-16	9:58:10	5%	0	5% MAX. OPACITY
Travel	C-16	9:59:00	0%	0	0% ON TRAVEL 3
Push	A-18	10:11:50	45%	4.47	45% MAX. OPACITY COLD SPOT #6 FLUE
Travel	A-18	10:12:35	0%	0	0% ON TRAVEL 4
Push	B-18	10:24:30	5%	0	5% MAX. OPACITY
Travel	B-18	10:25:20	0%	0	0% ON TRAVEL 5
Push	C-18	10:42:00	5%	0	5% MAX. OPACITY
Travel	C-18	10:43:10	0%	0	0% ON TRAVEL 6
Push	A-20	11:16:10	10%	0	10% MAX. OPACITY
Travel	A-20	11:17:00	0%	0	0% ON TRAVEL 7
Push	C-26	13:36:10	10%	0	10% MAX. OPACITY
Travel	C-26	13:37:00	5%	0	5% ON TRAVEL 8
Push	A-28	13:44:10	10%	0	10% MAX OPACITY
Travel	A-28	13:44:55	0%	0	0% ON TRAVEL 9
Push	B-28	13:55:55	5%	0	5% MAX. OPACITY
Travel	B-28	13:56:50	0%	0	0% ON TRAVEL 10
Push	C-28	14:08:20	10%	0	10% MAX. OPACITY
Travel	C-28	14:09:10	0%	0	0% ON TRAVEL 11
Push	A-1	14:20:50	15%	0	15% MAX. OPACITY
Travel	A-1	14:21:40	0%	0	0% ON TRAVEL 12
Push	B-1	14:33:50	15%	0	15% MAX. OPACITY
Travel	B-1	14:34:50	0%	0	0% ON TRAVEL 13

EVT Coke Quench Car Tests RGP06.27.85 Sheet 2 of 2 Date: 8-19-85

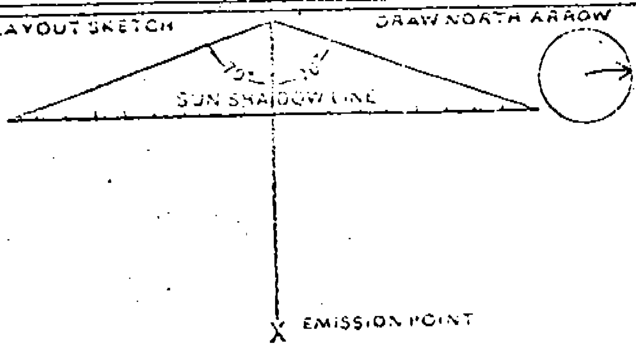
Test No. 9.3 Car No. H-3-7 Battery No. 20 Observer DAN PETROVAY

	Oven No.	Start Time	Opacity > 20%	Seconds > 20%	Comments SUN IN EYES
Push	C-1	14:46:10	10%	0	10% MAX. OPACITY
Travel	C-1	14:47:00	0%	0	0% ON TRAVEL (14)
Push	A-3	15:00:05	10%	0	10% MAX. OPACITY
Travel	A-3	15:00:55	0%	0	0% ON TRAVEL (15)
Push	B-3	15:11:50	15%	0	15% MAX. OPACITY
Travel	B-3	15:12:40	0%	0	0% ON TRAVEL (16)
Push	C-3	15:23:40	5%	0	5% MAX. OPACITY
Travel	C-3	15:24:30	0	0	0% ON TRAVEL (17)
Push	A-5	15:36:40	100%	17.22	100% MAX. OPACITY COLD SPOT #6 FLUE
Travel	A-5	15:37:30	15%	0	15% ON TRAVEL (18)
Push	B-5	15:47:20	15%	0	15% MAX. OPACITY
Travel	B-5	15:48:20	0%	0	0% ON TRAVEL (19)
Push	C-5	16:02:00	10%	0	10% MAX. OPACITY
Travel	C-5	16:02:50	0%	0	0% ON TRAVEL (20)
Push	A-7	16:17:10	20%	2.19	20% MAX. OPACITY
Travel	A-7	16:18:05	5%	0	5% ON TRAVEL (21)
Push	B-7	16:29:15	10%	0	10% MAX. OPACITY
Travel	B-7	16:30:05	0%	0	0% ON TRAVEL (22)
Push	C-7	16:42:50	5%	0	5% MAX. OPACITY
Travel	C-7	16:43:45	0%	0	0% ON TRAVEL
Push	A-9	16:56:40	10%	0	10% MAX. OPACITY
Travel	A-9	16:57:30	0%	0	0% ON TRAVEL
Push					
Travel					
Push					
Travel					

SOURCE NAME: U.S.S. CLAIRTON WORKS	OBSERVER'S NAME (PRINT): DANIEL R. PETROVAY
	ORGANIZATION: HEMEON ASSOCIATES INC.
ADDRESS: 135 STATE STREET CLAIRTON	CERTIFIED BY: E.T.A. — DATE: 4-3-85
STATE: PA — ZIP: 15025 — TELEPHONE:	AT WHAT POINT WAS OPACITY DETERMINED: TOP OF GAS MAIN
SOURCE ID NUMBER: # 20 COKE OVEN BATTERY — OBSERVATION DATE: 8-20-85	DESCRIBE BACKGROUND: GRAY+WHITE CLOUD COVER
PROCESS: PUSHING OF COKE TO QUENCH CAR — OPERATING MODE: WHILE PUSHING COKE	BACKGROUND COLOR: GRAY + WHITE CLOUDS — SKY CONDITIONS: 100% CLOUD COVER
CONTROL EQUIPMENT: H-3-7 ENVIROTECH CHEMICO QUENCH CAR — OPERATING MODE: 18.24 HR. COKE	WIND SPEED: 5 TO 7 — WIND DIRECTION: S.W.
DESCRIBE EMISSION POINT: TOP OF GAS MAIN	AMBIENT TEMPERATURE: A.M. 62° PM 67° 30.14 F. PM 30.14 R AM — RELATIVE HUMIDITY: A.M. 75% 67% PM

BATTERY - OVEN							
TIME DOOR REMOVED							
TIME OF PUSH							
DURATION OF SMOKE ≥ 20%							
MAXIMUM OPACITY	%	%	%	%	%	%	%
TIME OF HOOD DROP							
DURATION OF SMOKE > 10%							
MAXIMUM OPACITY	%	%	%	%	%	%	%
TIME OF QUENCH							
EXCEEDS STANDARDS							
COMMENTS							

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



HEIGHT ABOVE GROUND LEVEL: 60 FT	HEIGHT RELATIVE TO OBSERVER: 30 FT
DISTANCE FROM OBSERVER: 40 YARDS	DIRECTION FROM OBSERVER: EAST
DESCRIBE EMISSIONS: BLACK SMOKE ON TOP OF GAS MAIN DURING PUSH	
EMISSION COLOR: GRAY + BLACK	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☒ INTERMITTENT ☐
WATER DROPLETS PRESENT: NO ☒ YES ☐	IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐
OBSERVER'S SIGNATURE: Daniel R. Petrovay — DATE: 8-20-85	VERIFIED BY:

EVT Coke Quench Car Tests RGP06.27.85 Sheet 1 of 2 Date: 8-20-85

Test No. 9.4 Car No. H-3-7 Battery No. 20 Observer DAN PETROVAY

	Oven No.	Start Time	Opacity > 20%	Seconds > 20%	Comments
Push	B-3	10:04:10	20%	2.06	20% MAX. OPACITY
Travel	B-3	10:05:00	5%	0	5% ON TRAVEL ① COLD SPOT
Push	A-5	10:18:30	100%	16.91	100% MAX. OPACITY #6 FLUE PLUGED
Travel	A-5	10:19:20	20%	5.02	20% ON TRAVEL ②
Push	B-5	10:24:10	10%	0	10% MAX. OPACITY
Travel	B-5	10:25:00	0%	0	0% ON TRAVEL ③
Push	C-5	10:30:30	20%	1.59	20% MAX. OPACITY
Travel	C-5	10:31:30	0%	0	0% ON TRAVEL ④
Push	A-7	10:38:15	20%	5.09	20% MAX. OPACITY
Travel	A-7	10:39:05	0%	0	0% ON TRAVEL ⑤ TWO COLD
Push	B-7	10:50:30	100%	20.05	100% MAX. OPACITY SPOTS
Travel	B-7	10:51:20	15%	0	15% ON TRAVEL ⑥
Push	C-7	11:04:05	25%	4.63	25% MAX. OPACITY
Travel	C-7	11:04:55	10%	0	10% ON TRAVEL ⑦
Push	A-9	11:16:05	30%	3.89	30% MAX. OPACITY
Travel	A-9	11:16:55	10%	0	10% MAX. OPACITY ⑧ COLD SPOT
Push	B-9	11:37:25	100%	15.75	100% MAX. OPACITY #6 FLUE
Travel	B-9	11:38:15	15%	0	15% ON TRAVEL ⑨
Push	C-9	11:52:45	15%	0	15% MAX. OPACITY
Travel	C-9	11:53:35	0%	0	0% ON TRAVEL ⑩ COLD SPOT
Push	A-11	12:05:45	100%	13.75	100% MAX. OPACITY #6 FLUE
Travel	A-11	12:06:35	20%	1.63	20% MAX. OPACITY ⑪ COLD SPOT
Push	B-11	12:18:10	100%	12.60	100% MAX. OPACITY #6 FLUE
Travel	B-11	12:19:05	10%	0	10% ON TRAVEL ⑫
Push	C-11	12:30:30	15%	0	15% MAX. OPACITY
Travel	C-11	12:31:20	0%	0	0% ON TRAVEL ⑬

EVT Coke Quench Car Tests RGP06.27.85 Sheet 2 of 2 Date: 8-20-85

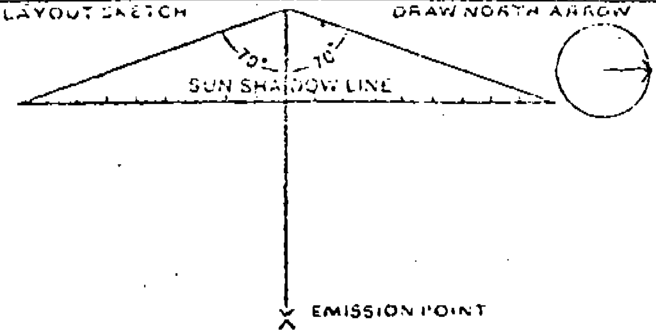
Test No. 9.4 Car No. H-3-7 Battery No. 20 Observer DAN PETROVAY

	Oven No.	Start Time	Opacity > 20%	Seconds > 20%	Comments
Push	A-13	12:44:45	10%	0	10% MAX. OPACITY
Travel	A-13	12:45:35	5%	0	5% ON TRAVEL 13
Push	B-13	12:58:00	20%	2.61	20% MAX. OPACITY
Travel	B-13	12:58:50	5%	0	5% ON TRAVEL 15
Push	C-13	13:12:45	15%	0	15% MAX. OPACITY
Travel	C-13	13:13:35	0%	0	0% ON TRAVEL 16
Push	A-15	13:25:35	10%	0	10% MAX. OPACITY
Travel	A-15	13:26:25	0%	0	0% ON TRAVEL 17
Push	B-15	13:41:30	10%	0	10% MAX. OPACITY
Travel	B-15	13:42:40	0%	0	0% ON TRAVEL 18
Push	C-15	13:53:40	100%	13.02	100% MAX. OPACITY
Travel	C-15	13:54:30	10%	0	10% ON TRAVEL 19
Push	A-17	14:05:40	15%	0	15% MAX. OPACITY
Travel	A-17	14:06:30	0%	0	0% ON TRAVEL 20
Push	B-17	14:17:40	10%	0	10% MAX. OPACITY
Travel	B-17	14:18:30	0%	0	0% ON TRAVEL 21
Push	C-17	14:29:45	10%	0	10% MAX. OPACITY
Travel	C-17	14:30:40	0%	0	0% ON TRAVEL 22 DOOR REPLACED
Push	A-19	14:42:30	100%	17.05	100% MAX. OPACITY COULD NOT SEE OVEN.
Travel	A-19	14:43:20	10%	0	10% MAX. OPACITY TRAVEL 23
Push	A-25	14:50:20	10%	0	10% MAX. OPACITY
Travel	A-25	14:51:10	0%	0	0% ON TRAVEL 24
Push					
Travel					
Push					
Travel					

SOURCE NAME U.S.S. CLAIRTON WORKS	OBSERVER'S NAME (PRINT) DANIEL R. PETROVAY
ADDRESS 135 STATE STREET CLAIRTON	ORGANIZATION HEMEON ASSOCIATES INC.
STATE: PA. · ZIP: 15025 · TELEPHONE:	CERTIFIED BY: E.T.A. · DATE: 4-3-85
SOURCE ID NUMBER: #20 COKE OVEN BATTERY · OBSERVATION DATE: 8-21-85	AT WHAT POINT WAS OPACITY DETERMINED TOP OF GAS MAIN
PROCESS: PUSHING OF COKE TO QUENCH-CAR · OPERATING MODE:	DESCRIBE BACKGROUND
CONTROL EQUIPMENT: ENVIROTECH CHEMICO QUENCH-CAR H3-7 · OPERATING MODE: 18.24 HR. COKE	BACKGROUND COLOR: GRAY + WHITE CLOUDS · SKY CONDITIONS: 100% OVERCAST
DESCRIBE EMISSION POINT TOP OF GAS MAIN	WIND SPEED: 6 MPH AM · WIND DIRECTION: N AM
	AMBIENT TEMPERATURE: 59° AM · RELATIVE HUMIDITY: 72° AM 30.14R

BATTERY - OVEN							
TIME DOOR REMOVED							
TIME OF PUSH							
DURATION OF SMOKE ≥ 20%							
MAXIMUM OPACITY	%	%	%	%	%	%	%
TIME OF HOOD DROP							
DURATION OF SMOKE > 10%							
MAXIMUM OPACITY	%	%	%	%	%	%	%
TIME OF QUENCH							
EXCEEDS STANDARDS							
COMMENTS							

SOURCE LAYOUT SKETCH · DRAW NORTH ARROW



HEIGHT ABOVE GROUND LEVEL: 60 FT.	HEIGHT RELATIVE TO OBSERVER: 60 FT.
DISTANCE FROM OBSERVER: 40 YARDS	DIRECTION FROM OBSERVER: EAST
DESCRIBE EMISSIONS: BLACK SMOKE ON TOP OF GAS MAIN	
EMISSION COLOR: GRAY + BLACK	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ■ INTERMITTENT ☐
WATER DROPLETS PRESENT: NO ■ YES ☐	IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐
OBSERVER'S SIGNATURE: Daniel R. Petrovay · DATE: 8-21-85	VERIFIED BY

EVT Coke Quench Car Tests RGP06.27.85 Sheet 1 of 2 Date: 8-21-85

Test No. 9.6 Car No. H-3-7 Battery No. 20 Observer DAN PETROVAY

	Oven No.	Start Time	Opacity > 20%	Seconds > 20%	Comments 14:07 START 19:49 STOP	
Push	C-4	14:07:30	0%	0	0% MAX. OPACITY	#18 DOOR MACHINE BROKEN
Travel	C-4	14:08:25	0%	0	0% ON TRAVEL	
Push	A-6	14:43:05	55%	5.19	55% MAX. OPACITY	COLD SPOT #6 FLUE
Travel	A-6	14:44:00	0%	0	0% ON TRAVEL	
Push	B-6	14:49:00	30%	4.84	30% MAX. OPACITY	
Travel	B-6	14:49:50	0%	0	0% ON TRAVEL	
Push	C-6	14:56:30	10%	0	10% MAX. OPACITY	
Travel	C-6	14:57:20	0%	0	0% ON TRAVEL	
Push	A-8	15:26:10	0%	0	0% MAX OPACITY	#17 DOOR MACHINE COKE GUIDE STUCK
Travel	A-8	15:27:00	0%	0	0% ON TRAVEL	
Push	B-8	15:46:25	100%	7.55	100% MAX. OPACITY	NO# 16 DOOR MACHINE HOLE IN HOOD
Travel	B-8	15:47:10	0%	0	0% ON TRAVEL	
Push	C-8	15:52:25	5%	0	5% MAX. OPACITY	
Travel	C-8	15:53:15	0%	0	0% ON TRAVEL	
Push	A-10	16:01:50	60%	8.09	60% ON MAX OPACITY.	
Travel	A-10	16:02:40	0%	0	0% ON TRAVEL	
Push	B-10	16:16:45	5%	0	5% MAX. OPACITY	#17 DOOR MACHINE BACK ON LINE
Travel	B-10	16:17:35	0%	0	0% ON TRAVEL	
Push	C-10	16:29:30	5%	0	5% MAX OPACITY	
Travel	C-10	16:30:20	0%	0	0% ON TRAVEL	
Push	A-12	16:43:15	25%	2.03	25% MAX. OPACITY	
Travel	A-12	16:44:05	0%	0	0% ON TRAVEL	
Push	B-12	16:56:55	75%	5.72	75% MAX OPACITY	
Travel	B-12	16:57:45	0%	0	0% MAX. OPACITY	
Push	C-12	17:11:00	5%	0	5% MAX. OPACITY	
Travel	C-12	17:11:50	0%	0	0% ON TRAVEL	

EVT Coke Quench Car Tests RGP06.27.85 Sheet 2 of 2 Date: 8-21-85

Test No. 9.6 Car No. H-3-7 Battery No. 20 Observer DAN PETROVAY

	Oven No.	Start Time	Opacity > 20%	Seconds > 20%	Comments
Push	A-14	17:24:30	0%	0	0% MAX. OPACITY CLOSED DOOR ON COKE GUIDE
Travel	A-14	17:25:30	0%	0	0% ON TRAVEL
Push	B-14	17:38:00	80%	5.89	80% MAX. OPACITY COLD SPOTS #2-3-4 HOLES
Travel	B-14	17:38:50	5%	0	5% ON TRAVEL
Push	C-14	17:51:45	0%	0	0% MAX. OPACITY
Travel	C-14	17:52:35	0%	0	0% ON TRAVEL
Push	A-16	18:05:35	0%	0	0% MAX. OPACITY CLOSE DOOR ON COKE GUIDE
Travel	A-16	18:06:25	0%	0	0% ON TRAVEL
Push	B-16	18:20:30	0%	0	0% MAX. OPACITY CLOSED DOOR ON COKE GUIDE
Travel	B-16	18:21:20	0%	0	0% ON TRAVEL
Push	C-16	18:34:40	0%	0	0% MAX. OPACITY
Travel	C-16	18:35:35	0%	0	0% ON TRAVEL
Push	A-18	18:49:15	35%	1.09	35% MAX. OPACITY COLD SPOT #6 FLUE
Travel	A-18	18:50:05	0%	0	0% ON TRAVEL
Push	B-18	19:03:00	5%	0	5% MAX. OPACITY
Travel	B-18	19:05:50	0%	0	0% ON TRAVEL
Push	C-18	19:17:05	15%	0	15% MAX. OPACITY
Travel	C-18	19:17:55	0%	0	0% ON TRAVEL
Push	A-20	19:30:55	40%	5.33	40% MAX. OPACITY COLD SPOTS ON TOP
Travel	A-20	19:31:45	5%	0	5% ON TRAVEL
Push	B-20	19:48:15	0%	0	0% MAX. OPACITY
Travel	B-20	19:49:05	0%	0	0% ON TRAVEL
Push					
Travel					
Push					
Travel					

APPENDIX D

LABORATORY DATA

ANALYTICAL REPORT

PLANT US STEEL - CLAIRTON, PA PROJECT NO. ______

TEST NO. 5.3 TEST DATE 8-19-85

FRONT HALF ANALYTICAL

		FINAL WT		TARE WT		NET WT
FRONT FILTER / DRY CATCH	RA1026-066 FILTER ID	0.5079	-	0.4887	=	0.0192
BACK-UP FILTER	N/A FILTER ID		-		=	

H_2O WASH VOL 113 ML ACETONE WASH VOL 90 ML

FILTER H_2O WASH W .22µM MEMBRANE FILTER

			FINAL WT		TARE WT		NET WT.
PRECIPITATE FINE DRK BLK/BRN PARTICULATE		GA47-2-073 FILTER ID	1.4134	-	1.4000	=	~~1.0~~ 0.0134
FILTRATE	THRU RESIDUE	T-158 TIN ID	1.3821	-	1.35945	=	0.02265

0.02265g - [113cc x 0.0000345g/cc] = 0.01875

FILTRATE VOL 113 ML (BEFORE EVAPORATION)

ACETONE WASH

		FINAL WT		TARE WT		NET WT
RESIDUE	T-157 TIN ID	1.35615	-	1.34905	=	0.0071

0.0071 - (90ml x 0.0000022g/cc) = 0.0069

TEST No. 9.3
8-19-85

BACK HALF ANALYTICAL

INITIAL IMPINGER VOL 400 ML
IMPINGER VOL AFTER SAMPLING 400+372 ML (INITIAL+CONDENSATE)
IMPINGER VOL AFTER RECOVERY 950 ML (INIT.+COND.+RINSE)
ACETONE RINSE VOL 60 ML

ACETONE WASH:

	TIN ID	FINAL WT		TARE WT		NET WT
RESIDUE CLEAR RESIDUE	T-167	1.3565	-	~~1.3575~~ 1.35535	=	~~(0.0010)~~ 0.00115

0.00115 - (60cc x 0.0000022g/cc) = 0.00102

[illegible] IMPINGER CONTENTS AND WASH w/ .22μm MEMBRANE FILTER:

	ID	FINAL WT		TARE WT		NET WT
PRECIPITATE VERY LITTLE DISCOLORATION	QA47-2-094 (FILTER ID)	1.4002	-	1.3999	=	0.00030
FILTRATE BROWN/BLACK VISCOUS RESIDUE pH=0	BK-10 (TIN ID)	64.0530	-	63.9965	=	0.0565

0.0565 - [(950-372) 0.0000345 g/cc] = 0.0366

FILTRATE pH 3.2

[illegible]

ANALYTICAL REPORT

PLANT US STEEL - CLARITON, PA   PROJECT NO. ______

TEST NO. 9.4   TEST DATE 8-20-85

FRONT HALF ANALYTICAL

		FINAL WT		TARE WT		NET WT
FRONT FILTER / DRY CATCH VERY FINE DULL BLK PARTIC. W/ SOME DRY CATCH (SHINY BLK)	RA1026-067 FILTER ID	0.50960	-	0.49415	=	0.01545
BACK-UP FILTER	N/A FILTER ID	______	-	______	=	______

H_2O WASH VOL 80 ML   ACETONE WASH VOL 94 ML

FILTER H_2O WASH W/ .22 μm MEMBRANE FILTER:

		FINAL WT		TARE WT		NET WT
PRECIPITATE VERY FINE BLK PARTICULATE (GREY APPEARANCE ON FILTER)	GA47-2-04 FILTER ID	1.3772	-	1.3716	=	0.0056
FILTRATE LIGHT TAN DISCOLORATION OF TIN	T-178 TIN ID	1.3392	-	1.3291	=	0.0101

0.0101 g − (80 cc × 0.0000345 g/cc) = 0.00734

FILTRATE VOL 80 ML (BEFORE EVAPORATION)

ACETONE WASH:

		FINAL WT		TARE WT		NET WT
RESIDUE	T-179 TIN ID	1.32325	-	1.3174	=	0.0058

0.0058 g − (0.0000022 g/cc × 94 cc) = 0.00559

BACK HALF ANALYTICAL

INITIAL IMPINGER VOL 700 ML
IMPINGER VOL AFTER SAMPLING 786 ML (INITIAL + CONDENSATE)
IMPINGER VOL AFTER RECOVERY 900 ML (INIT. + COND. + RINSE)
ACETONE RINSE VOL 96 ML

ACETONE WASH:

		FINAL WT	TARE WT	NET WT
RESIDUE	T-180 (TIN ID)	1.3249	1.3209	0.0040

0.0040 − (96cc x 0.0000022 g/cc) = 0.00378

FILTER IMPINGER CONTENTS AND WASH W .22 μm MEMBRANE FILTER:

		FINAL WT	TARE WT	NET WT 1/
PRECIPITATE	PALE YELLOW → GA47-2-106 LIGHT YELLOW → GA47-2-105 (FILTER ID)	1.3750	1.3594 1.3750	0.0
FILTRATE BRN/BLK VISCOUS RESIDUE pH = 0	BK-011 (TIN ID)	64.3534	64.1180	0.2354

0.2354 − [(900 − 386) 0.0000345] = 0.2177

FILTRATE pH 3.0

NOTES:

1/ VERY DIFFICULT TO FILTER − REQUIRED 2 − (GA47-2) FILTERS

ANALYTICAL REPORT

PLANT US STEEL - CLAIRTON, PA

PROJECT NO. ______

TEST NO. 9.6

TEST DATE 8-21-85

FRONT HALF ANALYTICAL

		FINAL WT		TARE WT		NET WT
FRONT FILTER / DRY CATCH STAINED BLK - VERY FINE DRY CATCH	RA1026-069 FILTER ID	0.5045	-	0.4884	=	0.0161
BACK-UP FILTER	N/A FILTER ID	______	-	______	=	______

H_2O WASH VOL 75 ML   ACETONE WASH VOL 69 ML

FILTER H_2O WASH w/ .22 μm MEMBRANE FILTER

		FINAL WT		TARE WT		NET WT.
PRECIPITATE BURNT BROWN COLORATION	GA47-2-98 FILTER ID	1.3913	-	1.3852	=	0.0061
FILTRATE	T-161 TIN ID	1.36265	-	1.3524	=	0.01025

0.01025 - [0.0000345 g/cc × 75cc] = 0.00766

FILTRATE VOL 75 ML (BEFORE EVAPORATION)

ACETONE WASH

		FINAL WT		TARE WT		NET WT
RESIDUE	T-170 TIN ID	1.37095	-	1.36275	=	0.0082

0.0082 - [0.0000022 g/cc × 69cc] = 0.00805

TEST NO. 9.6
8-21-85

BACK HALF ANALYTICAL

INITIAL IMPINGER VOL 400 ML
IMPINGER VOL AFTER SAMPLING 605 ML (INITIAL + CONDENSATE)
IMPINGER VOL AFTER RECOVERY 735 ML (INIT. + COND. + RINSE)
ACETONE RINSE VOL 82 ML

ACETONE WASH:

	TIN ID	FINAL WT		TARE WT		NET WT
RESIDUE	T-181	1.33915	−	1.3323	=	0.00685

0.00685 − (82 ml × 0.0000022 g/cc) = 0.00669

FILTER IMPINGER CONTENTS AND WASH $\overline{W}$ .22 μm MEMBRANE FILTER:

	ID	FINAL WT		TARE WT		NET WT
PRECIPITATE VERY PALE YEL	GA47-2-102 (FILTER ID)	1.4045	−	1.4036	=	0.00090
FILTRATE GRN/BLK VISCOUS RESIDUE pH = 0	BK-012 (TIN ID)	64.5172	−	64.41315	=	0.10405

0.10405 − [(735 − 205) 0.0000345 g/cc] = 0.0858

FILTRATE pH 3.5

NOTES:

6

Temp of cyclonic

#	acn#	Point	Push/Travel	Temp of Push/Travel	cyclonic
	A-22	(1.6)	Push 1.4 / .48 Travel		(10%)
20	B-22	(1.5)	.5/.13		(0%)
	C-22	(1.4)	.4/.15		(0%)
	~~C-22~~	~~(1.3)~~			
1	B-24	(1.3)	.63/.2	157/154	(0%)
	C-22	(1.2)	1.1/.38	162/158	(0%)
70	A-24	(1.1)	1.7/.58	153/149	(0%)
	B-24	(2.6)	1.5/.53	160/159	(0%)
	B-24	(2.5)	1.5/.5	160/157	(0%)
	C-24	(2.4)	1.5/.5	161/160	(0%)
26	C-24	(2.3)	1.3/.48	160/158	(0%)
1	A-26	(2.2)	1.1/.45	[illegible]/157	(0%)
	A-26	(2.1)	2.0/.75	158/151	(0%)
	B-26	(3.6)	.7/.45	161/159	(0%)
	B-26	(3.5)	.85/.38	161/158	(0%)
9	C-26	(3.4)	1.1/~~4~~ .45	158/161	(0%)
	C-26	(3.3)	1.0/.4	161/158	(0%)
9	A-28	(3.2)	.69/.27	159/157	(0%)
	A-28	(3.1)	1.0/.4	158/152	(0%)
9	B-28	(4.6)	.65/.4	160/158	(0%)
	B-28	(4.5)	.45/.25	160/159	(0%)
	C-28	(4.4)	.80/.4	154/155	(0%)
	C-28	(4.3)	1.5/.65	159/158	(0%)
	A-1	(4.2)	1.05/.52	157/157	(0%)
	A-1	(4.1)	.46/.4	158/156	(0%)

No Data From 19 B-22(1.5) Flow only .5 on Push

1-25-83

PLANT - USS CLAIRTON

RUN # - 8.0

Smith & Milburn

Point	Oven Number	Battery # ~~ΔP Expected~~	ΔP Actual	Temp °F ~~Rotometer Desired~~	Cyclone ~~Point~~ Eflout ~~Sample time~~	Comment
6	A-22	20	1.4 / .48	157 / —	0° F	
5	B-22	20	.5 / .13	— / —	0	
4	C-22	19	.4 / .15	— / —	0	
3	B-24	19	.63 / .2	157 / 154	0	
2	C-22	20	1.1 / .38	162 / 158	0	
1	A-24	20	1.7 / .58	152 / 149	0	
2.6	B-24	19	1.5 / .53	160 / 159	0	
5	B-24	20	1.5 / .5	160 / 157	0	
[illegible]	C-24	19	1.5 / .5	161 / 160	0	
2 3	C-24	20	1.3 / .48	160 / 158	0	
[illegible]	A-26	19	1.1 / .45	161 / 157	0	
1	A-26	20	2.0 / .75	158 / 151	0	
3 6	B-26	19	.7 / .45	161 / 159	0	
5	B-26	20	.85 / .38	161 / 158	0	
4	C-26	19	1.1 / .45	158 / 161	0	
3.3	C-26	20	1.0 / .4	161 / 158	0	
2	A-28	19	.69 / .27	159 / 157	0	
1	A-28	20	1.0 / .4	158 / 152	0	
4 6	B-28	19	.65 / .4	160 / 158	-10°	
4 5	B-28	20	.45 / .25	160 / 159	0	
4	C-28	19	.86 / .4	154 / 158	0	
4 3	C-28	20	1.5 / .65	159 / 158	0	
1.2	A-1	19	1.5 / .52	157 / 157	0	
1	A-1	20	.96 / .4	158 / 158	0	
				Total		

TEMP = PUSH run TRAVEL

Recopied by:

RG 2-25-83

DRY MOLECULAR WEIGHT DETERMINATION

PLANT US Steel Clairton

DATE 8-19-85

SAMPLING TIME (24-hr CLOCK) 1700

SAMPLING LOCATION HCQC .437 Test # 9.3

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Integrated bag

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 80° F

OPERATOR C. Milburn

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	.7		.7		.7			44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.7		20.7		20.7			32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.7		20.7		20.7			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT U.S. Steel-Clairton, PA

DATE 8-20-85

SAMPLING TIME (24-hr CLOCK) 1600

SAMPLING LOCATION #CQC TEST # 9.4

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) integrated bag

ANALYTICAL METHOD orsat

AMBIENT TEMPERATURE 80°F

OPERATOR C. Micuri

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.7		0.7		0.7			44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.7		20.7		20.7			32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.7		20.7		20.7			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4.72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT U.S. Steel Clairton
DATE 8-21-85 H2-7
SAMPLING TIME (24-hr CLOCK) 20:00
SAMPLING LOCATION HCGC 9.6
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) Integrated bag
ANALYTICAL METHOD orsat
AMBIENT TEMPERATURE 75°F
OPERATOR Milburn

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.7		0.7		0.7			44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.7		20.7		20.7			32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.7		20.7		20.7			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

APPENDIX E

DATA REDUCTION

FIELD DATA

Plant	USS - Clairton, PA
Date	8-19-85
Car No.	H-3-7
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	9.3
Operator	Smith & Milburn
No. of Ovens Tested	24
No. of Ovens Tested/hr	3.8
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	73
Barometric Pressure, in Hg	29.27
Static Pressure, in H2O	-0.85
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-066
Bottom Filter Number	N/A
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.317
Pitot Coefficient	0.825
Meter Box Number	APT 14 LG Mod
DGM Coeff's A1	0.0025
A2	1.0253
A3	0.0079
Orfice Coeff's B	0.4754
A	0.3949
Cal Press, in Hg	30

		in Hg	CFM
Leak Check	Initial	15	0.005
	Final	10	0.010

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	355	255
Imp A2	100	105	5
Imp A3	.0	0	0
Sil Gel A	622	627.6	5.6
Imp B1	100	205	105
Imp B2	100	105	5
Imp B3	0	0	0
Sil Gel B	686.6	692.9	6.3
Total Volume			381.9

Combined Impinger pH 3.2

	Point No.	Oven No.	Start Time	Sample Time sec Total	Sample Time sec DGM Start	Gas Metr ft3	Rotometer	Orifice del P in. WC
						709.520		
P	1.6	A-16	9:34	86	44	710.350	20.0	0.53
T					42	710.840	13.7	0.24
P	1.5	B-16	9:46	90	41	711.520	21.0	0.54
T					49	712.025	11.6	0.08
P	1.4	C-16	9:59	104	50	712.770	17.9	0.38
T					54	713.315	10.4	0.14
P	1.3	A-18	10:11	88	54	714.235	20.0	0.49
T					34	714.650	13.7	0.23
P	1.2	B-18	10:24	98	52	715.630	22.5	0.59
T					46	716.290	15.4	0.25
P	1.1	C-18	10:38	118	53	717.500	30.7	1.05
T					65	718.620	20.0	0.54
P	2.6	A-20	11:15	91	52	719.520	21.3	0.54
T					39	720.130	17.9	0.36
P	2.5	C-26	1:30	102	52	721.040	21.3	0.51
T					50	721.775	17.1	0.36
P	2.4	A-28	1:43	90	58	722.880	21.3	0.60
T					32	723.335	17.9	0.45
P	2.3	B-28	1:55	95	56	724.565	28.0	0.87
T					39	725.190	17.9	0.37
P	2.2	C-28	2:07	104	56	726.425	28.0	0.91
T					48	727.235	19.3	0.47
P	2.1	A-1	2:20	83	53	728.360	25.9	0.82
T					30	728.845	17.1	0.37
P	3.6	B-1	2:33	104	56	729.755	22.5	0.60
T					48	730.460	17.1	0.39
P	3.5	C-1	2:45	99	54	731.475	22.5	0.63
T					45	732.055	13.7	0.15
P	3.4	A-3	2:59	90	56	733.030	20.7	0.52
T					34	733.470	14.6	0.33
P	3.3	B-3	3:11	97	52	734.345	19.3	0.45
T					45	734.915	14.6	0.31
P	3.2	C-3	3:23	98	53	735.795	17.9	0.45
T					45	736.280	11.6	0.11
P	3.1	A-5	3:35	85	52	737.225	22.5	0.59
T					33	737.680	17.1	0.45
P	4.6	B-5	3:47	84	51	738.400	25.9	0.73
T					33	739.205	15.4	0.26
P	4.5	C-5	4:02	100	57	740.085	15.4	0.30
T					43	740.525	11.6	0.16
P	4.4	A-7	4:17	84	49	741.365	22.5	0.57
T					35	741.845	15.4	0.37
P	4.3	B-7	4:28	93	53	742.960	25.9	0.78
T					40	743.560	17.1	0.32
P	4.2	C-7	4:42	99	54	744.565	22.5	0.60
T					45	745.170	15.4	0.28
P	4.1	A-9	4:53	87	55	746.185	22.5	0.63
T					32	746.635	15.4	0.35

Total	(Time in minutes)	37.82	37.115	
Push		21.05	23.045	File: DAT 903
Travel		16.77	14.070	Page 2 of 8

	Point No.	Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
		Temperature, deg F						
P	1.6	164	270	225	64	64	73	73
T		157	272	227	64	64	73	73
P	1.5	164	272	244	64	64	74	74
T		156	273	246	64	64	74	74
P	1.4	160	269	254	64	64	75	75
T		155	273	255	64	64	75	75
P	1.3	163	271	256	64	64	77	77
T		157	271	256	64	64	77	77
P	1.2	159	269	258	60	60	78	78
T		155	272	258	60	60	79	78
P	1.1	158	271	259	56	56	79	78
T		154	270	259	56	56	79	78
P	2.6	156	269	267	60	60	81	81
T		150	273	267	60	60	81	81
P	2.5	158	271	267	66	66	89	88
T		153	272	268	66	66	89	88
P	2.4	159	269	267	68	68	89	89
T		155	273	267	68	68	90	89
P	2.3	162	270	267	66	66	90	89
T		155	273	267	66	66	90	89
P	2.2	161	271	266	64	64	91	90
T		154	271	267	64	64	91	90
P	2.1	164	269	266	66	66	91	90
T		156	272	266	66	66	91	90
P	3.6	161	271	266	68	68	92	91
T		156	270	267	68	68	92	91
P	3.5	161	272	266	70	70	93	92
T		152	269	267	70	70	93	92
P	3.4	161	271	266	68	68	93	93
T		153	270	266	68	68	94	93
P	3.3	162	273	266	72	72	94	93
T		155	271	267	72	72	94	93
P	3.2	162	271	266	72	72	95	94
T		155	272	266	72	72	95	94
P	3.1	171	270	266	70	70	95	94
T		158	273	266	70	70	95	94
P	4.6	167	270	266	70	70	95	94
T		155	274	267	70	70	95	95
P	4.5	162	274	267	76	76	96	95
T		157	274	267	76	76	96	95
P	4.4	162	271	266			96	95
T		156	274	266			96	95
P	4.3	161	270	266			96	95
T		155	273	266			96	96
P	4.2	160	271	266			96	96
T		152	269	266			96	96
P	4.1	162	270	266			96	96
T		154	271	267			97	96
P TW Avg		162						
T TW Avg		155						

	Point No.	Pump Vac in Hg	Vel Head in H2O	Sqrt del P	Duct Vel fps	Sep P In in H2O	Opacity > 20%	Seconds > 20%
P	1.6	3.5	0.80	0.89	57.81		10	0.0
T		2.0	0.40	0.63	40.65		5	0.0
P	1.5	2.0	0.90	0.95	61.32		30	1.8
T		1.0	0.30	0.55	35.18		0	0.0
P	1.4	3.0	0.65	0.81	51.95		5	0.0
T		1.0	0.25	0.50	32.09		0	0.0
P	1.3	3.5	0.80	0.89	57.77		45	5.0
T		2.0	0.40	0.63	40.65		0	0.0
P	1.2	4.0	1.00	1.00	64.38		5	0.0
T		2.0	0.50	0.71	45.38		0	0.0
P	1.1	7.0	1.80	1.34	86.30		5	0.0
T		4.0	0.80	0.89	57.35		0	0.0
P	2.6	3.5	0.90	0.95	60.93		10	0.0
T		3.0	0.60	0.77	49.50		0	0.0
P	2.5	4.0	0.90	0.95	61.03		10	0.0
T		3.0	0.65	0.81	51.65		5	0.0
P	2.4	4.0	0.90	0.95	61.08		10	0.0
T		3.0	0.65	0.81	51.74		0	0.0
P	2.3	6.0	1.50	1.22	79.04		5	0.0
T		3.0	0.65	0.81	51.74		0	0.0
P	2.2	6.0	1.50	1.22	78.98		10	0.0
T		3.0	0.75	0.87	55.53		0	0.0
P	2.1	6.0	1.30	1.14	73.70		15	0.0
T		2.0	0.60	0.77	49.75		0	0.0
P	3.6	5.0	1.00	1.00	64.48		15	0.0
T		3.0	0.60	0.77	49.75		0	0.0
P	3.5	5.0	1.00	1.00	64.48		10	0.0
T		2.0	0.40	0.63	40.49		0	0.0
P	3.4	4.0	0.85	0.92	59.45		10	0.0
T		2.5	0.45	0.67	42.98		0	0.0
P	3.3	3.5	0.75	0.87	55.89		15	0.0
T		2.0	0.45	0.67	43.05		0	0.0
P	3.2	3.5	0.70	0.84	53.99		5	0.0
T		2.0	0.30	0.55	35.15		0	0.0
P	3.1	5.0	1.00	1.00	65.00		100	17.2
T		3.0	0.60	0.77	49.83		15	0.0
P	4.6	6.0	1.30	1.14	73.88		15	0.0
T		2.0	0.50	0.71	45.38		0	0.0
P	4.5	2.0	0.50	0.71	45.63		10	0.0
T		1.0	0.20	0.45	28.74		0	0.0
P	4.4	4.5	1.00	1.00	64.54		20	2.2
T		2.0	0.50	0.71	45.41		5	0.0
P	4.3	5.5	1.30	1.14	73.52		10	0.0
T		3.0	0.60	0.77	49.71		0	0.0
P	4.2	4.5	1.00	1.00	64.43		5	0.0
T		3.0	0.50	0.71	45.26		0	0.0
P	4.1	5.0	1.00	1.00	64.54		10	0.0
T		2.0	0.50	0.71	45.34		0	0.0
P TW Avg				1.00				
T TW Avg				0.70				

	Point No.	Separator P, in. WC	Annubar in. WC	Tank T deg F	Jet Flow gpm	Jet P psig	Jet Temp deg F	Gas T In deg F
P	1.6			444	430	320	432	
T				444	190	310	432	
P	1.5			444	430	320	432	
T				444	150	320	432	
P	1.4			444	430	320	444	
T				444	140	320	444	
P	1.3			444	430	330	444	
T				444	150	320	444	
P	1.2			444	430	330	444	
T				444	150	320	444	
P	1.1			444	430	330	444	
T				444	150	320	444	
P	2.6			444	430	310	420	
T				444	150	310	420	
P	2.5			432	420	310	420	
T				444	140	300	420	
P	2.4			444	430	320	444	
T				444	140	310	444	
P	2.3			444	430	320	444	
T				444	140	310	444	
P	2.2			444	430	320	444	
T				444	140	310	444	
P	2.1			444	430	320	444	
T				444	140	310	444	
P	3.6			444	430	320	444	
T				444	140	310	444	
P	3.5			444	430	320	444	
T				444	140	310	444	
P	3.4			444	430	320	444	
T				444	140	310	444	
P	3.3			444	430	320	444	
T				444	140	310	444	
P	3.2			444	430	320	444	
T				444	140	310	444	
P	3.1			444	430	320	444	
T				444	140	320	444	
P	4.6			444	430	320	444	
T				444	140	320	444	
P	4.5			444	430	320	444	
T				444	140	320	444	
P	4.4			444	430	320	444	
T				444	140	320	444	
P	4.3			444	430	330	444	
T				444	140	320	444	
P	4.2			444	430	330	444	
T				444	140	320	444	
P	4.1			444	430	330	444	
T				444	140	320	444	
P	TW Avg		0.00	444	430	322	441	0
T	TW Avg		0.00		144	315	441	0

LABORATORY DATA

Orsat Analysis
Operator - Milburn

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	0.7	0.7	0.7	0.7	0.7	0.7	0.7
O2	20.7	20.0	20.7	20.0	20.7	20.0	20.0
CO	20.7	0.0	20.7	0.0	20.7	0.0	0.0
N2	100.0	79.3	100.0	79.3	100.0	79.3	79.3
Molecular Weight, Dry			28.91				

Particulate Analysis

Front-half Filter Dry Catch, mg	19.20
Blank Filter Catch, mg	0.00
Front-half Aqueous Wash, mg	
Filterable	13.40
Non-filterable	18.75
Front-half Acetone Wash, mg	6.90
Impinger Catch, mg	
Filterable	0.30
Non-filterable	36.60
Back-half Acetone rinse, mg	1.02
Total Front-half Filterable, mg	32.60
Total Front-half Nonfilterable, mg	25.65
Total Front-half, mg	58.25
Total Back-half Filterable, mg	0.30
Total Pennsylvania DER Mass, mg	58.55
Total Back-half Solubles, mg	37.62

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	29.27
Stack Press, in Hg	29.21
Vol of H2O Std, dscf	17.976
M-5 Stack Moist. Content, %	32.01
Sat Stack Moist. Content, %	31.86
Stack Moist. Cont. Used, %	31.86
Molecular Weight, Dry	28.91
Molecular Weight, Wet	25.44
Nozzle Dia, in	0.317
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	162	155	159
Meter Volume Corr, ft3	23.880	14.561	38.441
Meter Volume Std, dscf	23.721	14.464	38.185
Vol of H2O Std, dscf	11.090	6.762	17.852
Sample Time, min	21.05	16.77	37.82
Stack Vel, fps	64.42	45.07	
Percent Isokinetic, %	94	102	
Stack Gas Vol, acfm	124170	86874	
Stack Gas Vol, dscfm	70158	49636	
Stack Gas Density, lb/ft3	0.0548	0.0554	
DER Part. Emission Conc., gr/dscf		0.0237	
DER Part. Emission Rate, lb/ton coke		0.0224	
DER Part. Emission Rate, lb/hr		1.24	
Front-half Part. Conc., gr/dscf		0.0235	
Front-half Part. Rate, lb/ton coke		0.0223	
Front-half Part. Rate, lb/hr		1.23	
Back-half Filt. Conc., gr/dscf		0.0001	
Back-half Filt. Rate, lb/ton coke		0.0001	
Back-half Filt. Rate, lb/hr		0.01	
Back-half Soluble Conc., gr/dscf		0.0152	
Back-half Soluble Rate, lb/ton coke		0.0144	
Back-half Soluble Rate, lb/hr		0.79	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	58	61	64	74
5	61	61	64	46
4	52	61	59	65
3	58	79	56	74
2	64	79	54	64
1	86	74	65	65

Position

Travel

Position	1	2	3	4
6	41	50	50	45
5	35	52	40	29
4	32	52	43	45
3	41	52	43	50
2	45	56	35	45
1	57	50	50	45

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	8-20-85
Car No.	H-3-7
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	9.4
Operator	Smith & Milburn
No. of Ovens Tested	24
No. of Ovens Tested/hr	5.1
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	70
Barometric Pressure, in Hg	29.38
Static Pressure, in H2O	-0.5
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-067
Bottom Filter Number	N/A
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.317
Pitot Coefficient	0.825
Meter Box Number	APT 14 LG Mod
DGM Coeff's A1	0.0025
A2	1.0253
A3	0.0079
Orfice Coeff's B	0.4754
A	0.3949
Cal Press, in Hg	30

	in Hg	CFM
Leak Check Initial	15	0.010
Final	10	0.020

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	410	310
Imp A2	100	130	30
Imp A3	0	0	0
Sil Gel A	668	674.5	6.5
Imp B1	100	143	43
Imp B2	100	103	3
Imp B3	0	0	0
Sil Gel B	693.2	701	7.8
Total Volume			400.3

Combined Impinger pH 3.0

	Point No.	Oven No.	Start Time	Sample Time sec Total	DGM Start	Gas Metr ft3	Rotometer	Orifice del P in. WC
						756.660		
P	1.6	B-3	10:04	90	56	757.355	12.7	0.23
T					34	757.665	10.4	0.16
P	1.5	A-5	10:17	83	57	758.390	14.0	0.40
T					26	758.655	11.6	0.18
P	1.4	B-5	10:23	87	42	759.300	11.6	0.20
T					45	759.580		0.12
P	1.3	C-5	10:30	106	51	760.245	14.6	0.29
T					55	760.840	11.6	0.21
P	1.2	A-7	10:37	86	57	761.645	15.4	0.32
T					29	761.960	12.7	0.26
P	1.1	B-7	10:50	92	52	762.820	20.0	0.52
T					40	763.310	13.7	0.24
P	2.6	C-7	11:03	99	54	764.275	20.0	0.54
T					45	764.910	16.3	0.30
P	2.5	A-9	11:15	88	58	765.840	18.6	0.42
T					30	766.210	14.6	0.33
P	2.4	B-9	11:37	96	53	767.155	22.5	0.58
T					43	767.815	18.6	0.42
P	2.3	C-9	11:52	103	57	768.850	22.5	0.57
T					46	769.535	17.9	0.28
P	2.2	A-11	12:04	88	56	770.450	17.1	0.39
T					32	770.900	15.4	0.30
P	2.1	B-11	12:17	94	53	771.835	20.0	0.47
T					41	772.415	15.4	0.32
P	3.6	C-11	12:30	150	48	773.185	20.0	0.47
T					102	774.585	14.6	0.25
P	3.5	A-13	12:44	87	58	775.435	16.3	0.34
T					29	775.775	13.7	0.24
P	3.4	B-13	12:57	92	50	776.430	13.7	0.24
T					42	776.835	10.4	0.13
P	3.3	C-13	1:12	101	56	777.500	12.7	0.22
T					45	777.950	10.4	0.12
P	3.2	A-15	1:25	85	56	778.680	14.6	0.27
T					29	778.985	11.6	0.18
P	3.1	B-15	1:41	94	52	779.710	16.3	0.31
T					42	780.160	12.7	0.14
P	4.6	C-15	1:53	104	51	781.025	20.7	0.53
T					53	781.665	12.7	0.18
P	4.5	A-17	2:05	88	49	782.380	17.9	0.37
T					39	782.795	11.6	0.16
P	4.4	B-17	2:17	95	53	783.635	19.3	0.44
T					42	784.165	14.6	0.18
P	4.3	C-17	2:29	112	52	785.060	20.0	0.52
T					60	785.900	16.3	0.37
P	4.2	A-19	2:42	92	54	786.640	16.3	0.32
T					38	787.085	13.7	0.19
P	4.1	A-25	2:49	93	74	787.990	13.7	0.23
T					19	788.225	13.7	0.26
Total	(Time in minutes)				38.42	31.565		
Push					21.65	19.475	File: DAT	904
Travel					16.77	12.090	Page 2 of 8	

	Point No.	Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
		Temperature, deg F						
P	1.6	168	270	272	64	64	73	72
T		164	274	272	62	62	73	72
P	1.5	183	274	270	64	64	73	72
T		165	275	267	58	58	73	72
P	1.4	170	271	267	58	58	73	72
T		165	273	267	58	58	73	72
P	1.3	167	271	267	58	58	73	72
T		162	272	267	58	58	73	72
P	1.2	166	270	261	58	58	73	72
T		162	273	261	58	58	74	72
P	1.1	175	271	269	58	58	74	73
T		164	271	278	58	58	74	73
P	2.6	170	272	279	60	60	74	73
T		162	270	278	60	60	74	73
P	2.5	169	270	275	60	60	75	74
T		162	274	275	60	60	75	73
P	2.4	178	272	274	56	56	76	75
T		166	270	274	56	56	76	75
P	2.3	167	270	275	56	56	77	76
T		162	273	275	56	56	77	76
P	2.2	181	270	275	56	56	77	76
T		167	273	275	56	56	77	77
P	2.1	174	271	275	56	56	77	77
T		168	269	274	56	56	78	77
P	3.6	170	272	275	60	60	78	77
T		164	269	275	60	60	78	77
P	3.5	170	271	275	60	60	78	77
T		162	271	275	60	60	78	77
P	3.4	169	270	275	62	62	78	77
T		164	273	275	62	62	78	77
P	3.3	166	269	275	64	64	78	78
T		161	272	275	64	64	79	78
P	3.2	168	270	275	64	64	79	78
T		164	273	274	64	64	79	78
P	3.1	167	272	274	64	64	79	78
T		161	272	274	64	64	79	78
P	4.6	175	272	276	64	64	80	79
T		165	270	276	64	64	80	79
P	4.5	169	270	275	66	66	80	79
T		163	273	275	66	66	80	80
P	4.4	168	270	275	60	60	80	80
T		163	271	275	60	60	80	80
P	4.3	168	270	274	58	58	81	80
T		164	272	274	58	58	81	80
P	4.2	178	270	274	60	60	81	80
T		165	273	274	60	60	81	80
P	4.1	168	269	274	64	64	81	80
T		162	271	274	64	64	81	80
P	TW Avg	171						
T	TW Avg	164						

	Point No.	Pump Vac in Hg	Vel Head in H2O	Sqrt del P	Duct Vel fps	Sep P In in H2O	Opacity > 20%	Seconds > 20%
P	1.6	2.0	0.35	0.59	38.67		20	2.1
T		2.0	0.25	0.50	32.58		5	0.0
P	1.5	3.0	0.40	0.63	41.83		100	16.9
T		2.0	0.30	0.55	35.72		20	5.0
P	1.4	2.0	0.30	0.55	35.86		10	0.0
T		1.5	0.20	0.45	29.16		0	0.0
P	1.3	3.0	0.45	0.67	43.82		20	1.6
T		2.0	0.30	0.55	35.63		0	0.0
P	1.2	3.0	0.50	0.71	46.15		20	5.1
T		2.0	0.35	0.59	38.49		0	0.0
P	1.1	4.0	0.80	0.89	58.79		100	20.1
T		3.0	0.40	0.63	41.21		15	0.0
P	2.6	4.5	0.90	0.95	62.11		25	4.6
T		3.0	0.55	0.74	48.25		10	0.0
P	2.5	4.0	0.70	0.84	54.74		30	3.9
T		3.0	0.45	0.67	43.64		10	0.0
P	2.4	5.5	1.00	1.00	65.89		100	15.8
T		3.5	0.65	0.81	52.62		15	0.0
P	2.3	5.0	1.00	1.00	65.32		15	0.0
T		3.0	0.60	0.77	50.39		0	0.0
P	2.2	3.0	0.75	0.87	57.20		100	13.8
T		2.0	0.50	0.71	46.19		20	1.6
P	2.1	5.0	0.80	0.89	58.75		100	12.6
T		3.0	0.50	0.71	46.22		10	0.0
P	3.6	4.5	0.80	0.89	58.56		15	0.0
T		3.0	0.45	0.67	43.71		0	0.0
P	3.5	3.0	0.55	0.74	48.56		10	0.0
T		2.0	0.40	0.63	41.15		5	0.0
P	3.4	2.0	0.40	0.63	41.38		20	2.6
T		1.5	0.25	0.50	32.58		5	0.0
P	3.3	2.0	0.35	0.59	38.61		15	0.0
T		0.5	0.25	0.50	32.50		0	0.0
P	3.2	3.0	0.45	0.67	43.85		10	0.0
T		1.0	0.30	0.55	35.69		0	0.0
P	3.1	3.0	0.55	0.74	48.44		10	0.0
T		1.0	0.35	0.59	38.46		0	0.0
P	4.6	5.0	0.80	0.89	58.79		100	13.0
T		2.5	0.35	0.59	38.58		10	0.0
P	4.5	3.5	0.65	0.81	52.75		15	0.0
T		2.0	0.30	0.55	35.66		0	0.0
P	4.4	4.0	0.70	0.84	54.69		10	0.0
T		2.5	0.45	0.67	43.68		0	0.0
P	4.3	5.0	0.85	0.92	60.27		10	0.0
T		3.0	0.55	0.74	48.33		0	0.0
P	4.2	3.0	0.55	0.74	48.86		100	17.1
T		2.5	0.40	0.63	41.25		10	0.0
P	4.1	2.5	0.40	0.63	41.34		10	0.0
T		2.5	0.40	0.63	41.15		0	0.0
P TW Avg				0.78				
T TW Avg				0.63				

	Point No.	Separator P, in. WC	Annubar in. WC	Tank T deg F	Jet Flow gpm	Jet P psig	Jet Temp deg F	Gas T In deg F
P	1.6			432	430	300	432	
T				432	140	300	432	
P	1.5			432	430	320	432	
T				432	140	320	432	
P	1.4			432	430	320	432	
T				432	140	320	432	
P	1.3			444	430	330	444	
T				444	140	320	444	
P	1.2			444	430	320	444	
T				444	140	320	444	
P	1.1			444	430	330	444	
T				444	140	320	444	
P	2.6			444	430	330	444	
T				444	140	320	444	
P	2.5			444	430	330	444	
T				444	140	320	444	
P	2.4			444	430	330	444	
T				444	140	320	444	
P	2.3			444	430	330	444	
T				444	140	320	444	
P	2.2			444	430	330	444	
T				444	140	320	444	
P	2.1			444	430	330	444	
T				444	140	320	444	
P	3.6			444	430	330	444	
T				444	140	320	444	
P	3.5			444	430	330	444	
T				444	140	320	432	
P	3.4			444	430	330	444	
T				444	140	330	444	
P	3.3			444	430	330	444	
T				444	140	320	444	
P	3.2			444	430	330	444	
T				444	140	320	444	
P	3.1			444	430	330	444	
T				444	140	320	444	
P	4.6			444	430	330	444	
T				444	140	320	444	
P	4.5			444	430	330	444	
T				444	140	320	444	
P	4.4			444	430	330	444	
T				444	140	320	444	
P	4.3			444	430	330	444	
T				444	140	320	444	
P	4.2			444	430	330	444	
T				444	140	320	444	
P	4.1			444	430	330	444	
T				444	140	320	444	
P	TW Avg		0.00	443	430	328	443	0
T	TW Avg		0.00		140	320	442	0

LABORATORY DATA

Orsat Analysis
Operator - Milburn

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	0.7	0.7	0.7	0.7	0.7	0.7	0.7
O2	20.7	20.0	20.7	20.0	20.7	20.0	20.0
CO	20.7	0.0	20.7	0.0	20.7	0.0	0.0
N2	100.0	79.3	100.0	79.3	100.0	79.3	79.3
Molecular Weight, Dry			28.91				

Particulate Analysis

Front-half Filter Dry Catch, mg	15.45
Blank Filter Catch, mg	0.00
Front-half Aqueous Wash, mg	
Filterable	5.60
Non-filterable	7.34
Front-half Acetone Wash, mg	5.59
Impinger Catch, mg	
Filterable	2.00
Non-filterable	217.70
Back-half Acetone rinse, mg	3.78
Total Front-half Filterable, mg	21.05
Total Front-half Nonfilterable, mg	12.93

Total Front-half, mg	33.98
Total Back-half Filterable, mg	2.00

Total Pennsylvania DER Mass, mg	35.98
Total Back-half Solubles, mg	221.48

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	29.38
Stack Press, in Hg	29.34
Vol of H2O Std, dscf	18.842
M-5 Stack Moist. Content, %	36.65
Sat Stack Moist. Content, %	39.41
Stack Moist. Cont. Used, %	36.65
Molecular Weight, Dry	28.91
Molecular Weight, Wet	24.91
Nozzle Dia, in	0.317
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	171	164	168
Meter Volume Corr, ft3	20.160	12.507	32.667
Meter Volume Std, dscf	20.101	12.470	32.571
Vol of H2O Std, dscf	11.628	7.214	18.842
Sample Time, min	21.65	16.77	38.42
Stack Vel, fps	50.95	40.91	
Percent Isokinetic, %	107	105	
Stack Gas Vol, acfm	98197	78859	
Stack Gas Vol, dscfm	51053	41480	
Stack Gas Density, lb/ft3	0.0531	0.0537	
DER Part. Emission Conc., gr/dscf		0.0170	
DER Part. Emission Rate, lb/ton coke		0.0126	
DER Part. Emission Rate, lb/hr		0.93	
Front-half Part. Conc., gr/dscf		0.0161	
Front-half Part. Rate, lb/ton coke		0.0119	
Front-half Part. Rate, lb/hr		0.88	
Back-half Filt. Conc., gr/dscf		0.0009	
Back-half Filt. Rate, lb/ton coke		0.0007	
Back-half Filt. Rate, lb/hr		0.05	
Back-half Soluble Conc., gr/dscf		0.1049	
Back-half Soluble Rate, lb/ton coke		0.0776	
Back-half Soluble Rate, lb/hr		5.74	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	39	62	59	59
5	42	55	49	53
4	36	66	41	55
3	44	65	39	60
2	46	57	44	49
1	59	59	48	41

Position

Travel

Position	1	2	3	4
6	33	48	44	39
5	36	44	41	36
4	29	53	33	44
3	36	50	33	48
2	38	46	36	41
1	41	46	38	41

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	8-21-85
Car No.	H-3-7
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	9.6
Operator	Smith & Milburn
No. of Ovens Tested	24
No. of Ovens Tested/hr	4.2
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	82
Barometric Pressure, in Hg	29.39
Static Pressure, in H2O	-0.5
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-069
Bottom Filter Number	N/A
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.317
Pitot Coefficient	0.825
Meter Box Number	APT 14 LG Mod
DGM Coeff's A1	0.0025
A2	1.0253
A3	0.0079
Orfice Coeff's B	0.4754
A	0.3949
Cal Press, in Hg	30

	in Hg	CFM
Leak Check Initial	17	0.015
Final	15	0.015

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	225	125
Imp A2	100	100	0
Imp A3	.0	0	0
Sil Gel A	653.5	660.3	6.8
Imp B1	100	175	75
Imp B2	100	105	5
Imp B3	0	0	0
Sil Gel B	710.5	720.6	10.1
Total Volume			221.9

Combined Impinger pH 3.5

	Point No.	Oven No.	Start Time	Sample Time sec Total	DGM Start	Gas Metr ft3	Rotometer	Orifice del P in. WC
						809.970		
P	1.6	C-4	2:07	96	49	810.765	20.0	0.50
T					47	811.275	11.6	0.14
P	1.5	A-6	2:42	85	52	811.855	13.7	0.23
T					33	812.175	11.6	0.19
P	1.4	B-6	2:48	95	47	812.880	16.3	0.33
T					48	813.385		0.09
P	1.3	C-6	2:55	101	49	814.250	22.5	0.60
T					52	814.840	11.6	0.15
P	1.2	A-8	3:23	87	48	815.800	25.9	0.76
T					39	816.590	17.1	0.41
P	1.1	B-8	3:43	93	50	817.600	28.0	0.76
T					43	818.310	17.1	0.39
P	2.6	C-8	3:48	100	51	819.400	25.9	0.85
T					49	820.130	16.3	0.35
P	2.5	A-10	3:57	91	48	821.090	25.9	0.85
T					43	821.725	15.4	0.32
P	2.4	B-10		99	50	822.900	28.0	0.90
T					49	823.635	18.6	0.38
P	2.3	C-10	4:26	90	40	824.600	32.6	1.20
T					50	825.375	18.6	0.40
P	2.2	A-12	4:40	86	49	826.400	28.0	0.92
T					37	827.000	15.4	0.32
P	2.1	B-12		99	49	828.070	28.0	0.90
T					50	828.805	17.9	0.37
P	3.6	C-12	5:07	101	49	829.990	29.9	1.00
T					52	830.775	17.9	0.41
P	3.5	A-14		75	38	831.500	22.5	0.52
T					37	832.100	15.4	0.30
P	3.4	B-14	5:35	95	44	833.050	22.5	0.62
T					51	833.770	15.4	0.32
P	3.3	C-14		99	46	834.700	25.0	0.75
T					53	835.580	15.4	0.32
P	3.2	A-16	6:01	90	49	836.300	18.6	0.40
T					41	836.780	13.7	0.26
P	3.1	B-16	6:16	94	47	837.690	21.3	0.54
T					47	838.195	13.7	0.18
P	4.6	C-16	6:31	109	50	839.300	28.0	0.93
T					59	840.190	16.3	0.32
P	4.5	A-18	6:46	91	49	841.050	20.7	0.54
T					42	841.505	12.7	0.22
P	4.4	B-18		98	50	842.400	22.5	0.62
T					48	843.040	14.6	0.25
P	4.3	C-18	7:13	100	48	844.090	28.0	0.93
T					52	844.940	18.6	0.40
P	4.2	A-20		92	48	846.100	28.0	0.91
T					44	846.715	17.1	0.38
P	4.1	B-20		98	49	847.500	22.5	0.60
T					49	848.385	14.6	0.28

Total	(Time in minutes)	37.73	38.415	
Push		19.15	22.475	File: DAT 906
Travel		18.58	15.940	Page 2 of 8

	Point No.	Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
		Temperature, deg F						
P	1.6	167	270	283	70	70	79	78
T		157	274	282	70	70	79	79
P	1.5	165	270	259	70	70	79	79
T		156	273	258	70	70	79	79
P	1.4	163	272	261	70	70	79	79
T		159	271	262	70	70	79	79
P	1.3	160	272	264	70	70	80	79
T		156	271	264	70	70	80	79
P	1.2	159	271	264	65	65	81	81
T		154	272	264	65	65	81	81
P	1.1	164	270	265	65	65	82	81
T		156	271	265	65	65	82	81
P	2.6	161	269	267	69	69	81	81
T		157	271	266	69	69	81	81
P	2.5	161	272	272	65	65	81	81
T		153	269	277	65	65	81	81
P	2.4	161	270	262	65	65	81	81
T		157	270	261	65	65	81	81
P	2.3	161	272	269	65	65	81	81
T		157	269	268	65	65	81	81
P	2.2	163	269	260	65	65	81	81
T		158	260	260	65	65	81	81
P	2.1	165	271	263	65	65	81	81
T		157	268	264	65	65	81	81
P	3.6	162	271	265	68	68	82	81
T		156	270	266	68	68	82	81
P	3.5	161	271	264	68	68	82	81
T		155	272	265	68	68	82	81
P	3.4	162	269	264	68	68	81	81
T		157	273	264	68	68	81	81
P	3.3	160	270	262	68	68	82	81
T		156	272	264	68	68	82	81
P	3.2	162	269	263	68	68	81	81
T		156	272	263	68	68	81	81
P	3.1	159	270	263	68	68	81	80
T		153	269	263	68	68	81	80
P	4.6	161	270	263	65	65	80	80
T		156	271	264	65	65	80	80
P	4.5	164	271	263	65	65	80	80
T		158	272	263	65	65	80	80
P	4.4	156	271	263	65	65	79	79
T		156	270	263	65	65	79	79
P	4.3	162	269	265	65	65	79	79
T		156	272	265	65	65	79	79
P	4.2	163	269	263	65	65	79	79
T		157	270	263	65	65	79	79
P	4.1	155	269	264	65	65	79	79
T		149	269	264	65	65	79	79
P	TW Avg	162						
T	TW Avg	156						

File: DAT 906

	Point No.	Pump Vac in Hg	Vel Head in H2O	Sqrt del P	Duct Vel fps	Sep P In in H2O	Opacity > 20%	Seconds > 20%
P	1.6	3.0	0.80	0.89	56.49		0	0
T		2.0	0.30	0.55	34.32		0	0
P	1.5	2.0	0.40	0.63	39.88		55	5.2
T		2.0	0.30	0.55	34.29		0	0
P	1.4	3.0	0.55	0.74	46.69		30	4.8
T		2.0	0.15	0.39	24.30		0	0
P	1.3	4.0	1.00	1.00	62.80		10	0
T		2.0	0.30	0.55	34.29		0	0
P	1.2	3.0	1.30	1.14	71.55		0	0
T		2.0	0.60	0.77	48.41		0	0
P	1.1	3.0	1.50	1.22	77.17		100	7.6
T		2.0	0.60	0.77	48.49		0	0
P	2.6	3.5	1.30	1.14	71.66		5	0
T		2.5	0.50	0.71	44.30		0	0
P	2.5	3.0	1.30	1.14	71.66		60	8.1
T		2.0	0.50	0.71	44.16		0	0
P	2.4	6.0	1.50	1.22	76.98		5	0
T		3.0	0.70	0.84	52.42		0	0
P	2.3	8.0	2.00	1.41	88.89		5	0
T		3.0	0.70	0.84	52.42		0	0
P	2.2	7.0	1.50	1.22	77.10		25	2
T		3.0	0.50	0.71	44.34		0	0
P	2.1	7.0	1.50	1.22	77.23		75	5.7
T		3.0	0.65	0.81	50.51		0	0
P	3.6	6.0	1.70	1.30	82.02		5	0
T		3.0	0.65	0.81	50.47		0	0
P	3.5	5.0	1.00	1.00	62.85		0	0
T		3.0	0.55	0.74	46.39		0	0
P	3.4	5.0	1.00	1.00	62.90		80	5.9
T		3.0	0.50	0.71	44.30		5	0
P	3.3	5.0	1.25	1.12	70.22		0	0
T		3.0	0.50	0.71	44.26		0	0
P	3.2	4.0	0.70	0.84	52.63		0	0
T		2.0	0.40	0.63	39.59		0	0
P	3.1		0.90	0.95	59.53		0	0
T			0.40	0.63	39.50		0	0
P	4.6	4.0	1.50	1.22	76.98		0	0
T		2.0	0.55	0.74	46.43		0	0
P	4.5	4.0	0.85	0.92	58.09		35	1.1
T		2.0	0.35	0.59	37.09		0	0
P	4.4	4.5	1.00	1.00	62.60		5	0
T		2.0	0.45	0.67	41.99		0	0
P	4.3	4.0	1.50	1.22	77.04		15	0
T		3.0	0.70	0.84	52.37		0	0
P	4.2	7.0	1.50	1.22	77.10		40	5.3
T		2.5	0.60	0.77	48.53		5	0
P	4.1	5.0	1.00	1.00	62.55		0	0
T		2.0	0.45	0.67	41.75		0	0
P TW Avg				1.07				
T TW Avg				0.70				

	Point No.	Separator P, in. WC	Annubar in. WC	Tank T deg F	Jet Flow gpm	Jet P psig	Jet Temp deg F	Gas T In deg F
P	1.6			420	430	280	420	
T				432	140	270	420	
P	1.5			432	430	280	420	
T				432	140	270	420	
P	1.4			432	430	260	420	
T				432	140	250	420	
P	1.3			432	450	270	420	
T				432	150	260	420	
P	1.2			432	450	280	420	
T				432	150	270	420	
P	1.1			432	450	280	420	
T				432	150	270	420	
P	2.6			432	450	270	420	
T				432	150	260	420	
P	2.5			432	450	270	420	
T				432	150	260	420	
P	2.4			432	450	280	420	
T				432	150	270	420	
P	2.3			432	450	280	420	
T				432	150	270	420	
P	2.2			432	450	280	420	
T				432	150	270	420	
P	2.1			432	450	280	420	
T				432	150	270	420	
P	3.6			432	450	280	420	
T				432	150	270	420	
P	3.5			432	450	280	420	
T				432	150	270	420	
P	3.4			432	450	280	420	
T				432	150	270	420	
P	3.3			432	450	280	420	
T				432	150	270	420	
P	3.2			432	450	280	420	
T				432	150	270	420	
P	3.1			432	450	280	420	
T				432	150	270	420	
P	4.6			432	450	280	420	
T				432	150	270	420	
P	4.5			432	450	280	420	
T				432	150	270	420	
P	4.4			432	450	280	420	
T				432	150	270	420	
P	4.3			432	450	280	420	
T				432	150	270	420	
P	4.2			432	450	280	420	
T				432	150	270	420	
P	4.1			432	450	280	420	
T				432	150	270	420	
P	TW Avg		0.00	432	447	278	420	0
T	TW Avg		0.00		149	268	420	0

File: DAT 906

LABORATORY DATA

Orsat Analysis
Operator - Milburn

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	0.7	0.7	0.7	0.7	0.7	0.7	0.7
O2	20.7	20.0	20.7	20.0	20.7	20.0	20.0
CO	20.7	0.0	20.7	0.0	20.7	0.0	0.0
N2	100.0	79.3	100.0	79.3	100.0	79.3	79.3
Molecular Weight, Dry			28.91				

Particulate Analysis

Front-half Filter Dry Catch, mg	16.10
Blank Filter Catch, mg	0.00
Front-half Aqueous Wash, mg	
Filterable	6.10
Non-filterable	7.66
Front-half Acetone Wash, mg	8.05
Impinger Catch, mg	
Filterable	0.90
Non-filterable	85.80
Back-half Acetone rinse, mg	6.69
Total Front-half Filterable, mg	22.20
Total Front-half Nonfilterable, mg	15.71
Total Front-half, mg	37.91
Total Back-half Filterable, mg	0.90
Total Pennsylvania DER Mass, mg	38.81
Total Back-half Solubles, mg	92.49

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	29.39
Stack Press, in Hg	29.35
Vol of H2O Std, dscf	10.445
M-5 Stack Moist. Content, %	20.83
Sat Stack Moist. Content, %	31.87
Stack Moist. Cont. Used, %	20.83
Molecular Weight, Dry	28.91
Molecular Weight, Wet	26.64
Nozzle Dia, in	0.317
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	162	156	159
Meter Volume Corr, ft3	23.300	16.498	39.798
Meter Volume Std, dscf	23.239	16.455	39.694
Vol of H2O Std, dscf	6.115	4.330	10.445
Sample Time, min	19.15	18.58	37.73
Stack Vel, fps	67.49	43.71	
Percent Isokinetic, %	83	93	
Stack Gas Vol, acfm	130080	84250	
Stack Gas Vol, dscfm	85823	56095	
Stack Gas Density, lb/ft3	0.0577	0.0582	
DER Part. Emission Conc., gr/dscf		0.0151	
DER Part. Emission Rate, lb/ton coke		0.0166	
DER Part. Emission Rate, lb/hr		1.01	
Front-half Part. Conc., gr/dscf		0.0147	
Front-half Part. Rate, lb/ton coke		0.0163	
Front-half Part. Rate, lb/hr		0.99	
Back-half Filt. Conc., gr/dscf		0.0003	
Back-half Filt. Rate, lb/ton coke		0.0004	
Back-half Filt. Rate, lb/hr		0.02	
Back-half Soluble Conc., gr/dscf		0.0360	
Back-half Soluble Rate, lb/ton coke		0.0396	
Back-half Soluble Rate, lb/hr		2.41	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	56	72	82	77
5	40	72	63	58
4	47	77	63	63
3	63	89	70	77
2	72	77	53	77
1	77	77	60	63

Position

Travel

Position	1	2	3	4
6	34	44	50	46
5	34	44	46	37
4	24	52	44	42
3	34	52	44	52
2	48	44	40	49
1	48	51	39	42

Position

APPENDIX F

COMPLIANCE TEST PROTOCOL

ENVIROTECH 3000 Sand Hill Road
Menlo Park, California 94025
Telephone 415/854-2000
Cable ENVIROTECH, Telex 34-8360

September 7, 1984

RECEIVED
SEP 13 1984
TECHNOLOGY, INC.

United States Steel Corporation
1 Tech Center Drive
Monroeville, PA 15146

Attention: Mr. R. J. Weiskircher
Senior Environmental Engineer

Reference: United States Steel Corporation and Envirotech Corporation Settlement Agreement dated July 16, 1984 regarding Compliance Test Protocol for Clairton Coke Oven Operations

Subject: Confirmation of Agreement on Emission Testing Protocol between Allegheny County Bureau of Air Pollution Control (BATC), United States Steel Corporation (USSC) and Envirotech Corporation (EVT)

Gentlemen:

On September 7, 1984, Dr. R. G. Patterson, Air Pollution Technology Inc. (APT) and the writer visited Allegheny County BATC technical representatives, Messrs. Harilal L. Patel, Program and Administrator, Chief Air Quality Monitoring and K. S. N. Banninthaya, Air Pollution Engineer, and we reached the following agreement relating to the joint USSC/EVT emission testing protocol as outlined in the above referenced Settlement Agreement.

The points of agreement are:

- Use of cyclone separator is acceptable.
- Filter assembly temperature of 248°F ± 25°F.
- Minimum of 24 sampling points.
- Acceptance of sample volume, obtainable by using the maximum practicable nozzle size for isokinetic sampling on single train assembly.

All others items as outlined in the joint emission testing protocol, as reviewed by the regulatory agencies, have been approved.

A discussion was held with BATC regarding the necessary steps to have the State of California approved, APT opacity observers be re-certified by the local regulatory agencies. Mr. Patel believes re-certification would not be necessary but would look into the matter and advise us accordingly.

A brief explanation of USSC/EVT modification program was presented with an outline of the testing schedule for the initial base line and individual modification test sequence. It was agreed no submittal of such test results would be required until the official compliance test is undertaken. However, BATC was invited to visit the Clairton works for review of the testing apparatus and procedures.

We are taking the liberty of copying other interested Federal and State regulatory agencies so that all parties are aware of the above agreement.

Dr. Patterson and the writer wish to express our appreciation for the courtesy and understanding provided by all of the regulatory agencies in reviewing and approving the Clairton emission test protocol.

Very truly yours,

Patrick J. Reilly

Patrick J. Reilly*
Vice President, Project Management

PJR/jkl

cc: Ms. Jean Thompson, United States EPA
Mr. Richard St. Louis, Department of Environmental Resources
Mr. Harilal L. Patel, Allegheny County Health Dept.
Mr. K.S.N. Banninthaya, Allegheny County Health Dept.
Stephen K. Todd, Esq., United States Steel Corporation
Mr. Joseph Connelly, United States Steel Corporation

*Dictated but not read.

PROPOSED COMPLIANCE TEST PROTOCOL FOR DETERMINING THE PARTICULATE EMISSIONS FROM AN ENVIROTECH HOODED QUENCH CAR AT U.S.S.C. CLAIRTON PLANT

TABLE OF CONTENTS

File 5050/3

ENVIROTECH
3000 Sand Hill Road
Menlo Park, California 94025
Telephone 415/854-2000
Cable ENVIROTECH, Telex 34-8360

September 14, 1984

RECEIVED
SEP 17 1984
TECHNOLOGY INC.

United States Steel Corporation
1 Tech Center Drive
Monroeville, PA 15146

Attention: Mr. R. J. Weiskircher
Senior Environmental Engineer

Reference: United States Steel Corporation and and Envirotech Corporation Settlement Agreement dated July 16, 1984 regarding Compliance Test Protocol for Clairton Coke Oven Operations

Subject: Transmittal of Revised Emission Testing Protocol Based on Agreement between Allegheny County Bureau of Air Pollution Control (BAPC), United States Steel Corporation (USSC) and Envirotech Corporation (EVT)

Gentlemen:

On September 7, an agreement was reached between Allegheny County BAPC, USSC and EVT on the joint USSC/EVT Emission Testing Protocol for the USSC's coke pushing emission system at the Clairton Works, Clairton, PA. Please refer to EVT letter dated September 7, 1984.

Attached is the revised joint emission testing protocol reflecting the above referenced agreement.

For field expediting purposes, I am forwarding copies to Mr. Joseph Connelly, Mr. Thomas Nyisztor and Mr. Stephen Todd, all of USSC and to EVT field forces so that they have in their hands the latest revision of the testing protocol.

I would appreciate Mr. Weiskircher submitting copies to the Federal, state and local agencies for their files.

Again, Envirotech and the writer is greatly appreciative of the cooperation and courtesy received from Mr. Weiskircher and the USSC staff.

Very truly yours,

Pat Reilly

Patrick J. Reilly
Vice President, Project Management

8.0 REPORT

LIST OF FIGURES

1.0 INTRODUCTION

This test protocol defines the methodology, equipment, and quality assurance procedures to be used in determining the particulate emissions from a modified United States Steel Corp. (U.S.S.C.) Hooded Coke Quench Car (HQC) at the Clairton plant. The HQC is used to control the emissions during coke pushing operations.

1.1 Source of Methods

The proposed methods are consistent with the most recent versions of EPA Methods 1 through 5 as published in the Federal Register Volume 47, 28624, July 1, 1982. The analytical procedures are consistent with those specified by the Pennsylvania DER in its "Source Testing Manual" Rev. No. 1, January 1983.

1.2 Quality Assurance Procedures

The quality assurance procedures shall be those specified by EPA in the following publications:

1. EPA-600/9-76-005, "Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. I, Principles", March 1976.

2. EPA-600/9-76-027b, "Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. III, Stationary Source Specific Methods", August 1977.

2.0 SAMPLING METHODS

2.1 Velocity Traverse - EPA Method 1

EPA Method 1 shall be used to determine the traverse points. Gas velocity shall be determined with a type "S" pitot tube in accordance with EPA Method 2. A sketch of the test duct is shown in Figure 2.1-1. It is a 6'-0" x 5'-3.5" rectangular duct with 4 test ports located underneath. The test duct has straightening vanes installed to reduce the cyclonic action of the gas. According to EPA Method 1, 12 traverse points will be adequate for a duct with uniform gas flow for a duct length equal to 10 duct diameters. Since a 12 point traverse may not give enough gas sample volume, a 24 point traverse shall be used. The test duct shall be divided into 24 equal area rectangles. The sampling point shall be located at the center of each rectangle. A 24 point traverse will be used as long as USS coking schedules permit the sampling of 24 consecutive points on one battery in an 8 hour period.

2.2 Velocity and Volume Flow Rates - EPA Method 2

EPA Method 2 shall be used to determine velocity and volume flow rates.

2.3 Gas Composition - EPA Method 3

Gas composition shall be determined with an Orsat gas analyzer according to EPA Method 3. Each particulate test will be augmented by the collection of an integrated gas sample composed of a minimum of three individual grab samples. The integrated sample will undergo an Orsat analysis to determine its carbon dioxide, oxygen and carbon monoxide contents. The reported results of an Orsat analysis will be the average of the results of three repetitions of the analytical procedure.

2.4 Moisture - EPA Method 4

EPA Method 4 shall be used to determine the moisture content of the gas.

2.5 Particulate Concentration - Modified EPA Method 5

EPA Method 5, as modified by the procedures set forth herein, shall be used for determining the particulate concentration. All equipment selection and calibration shall be done according to Section 3.4 of the EPA Quality Assurance Handbook (Vol. III).

2.5.1 Sampling Equipment

The sampling equipment shall be as described EPA Method 5, with the following modifications:

2.5.1.1 Probe

The sampling probe shall be lined with Teflon (TFE) tubing to avoid chemical reactions involving sulfur compounds and the probe. Stainless steel or borosilicate glass lined probes shall not be used.

2.5.1.2 Cyclone

A "cyclone" shall be used to remove large particles and any entrained liquid before the gas sample enters the filter. The purpose of the cyclone is to reduce the extent of contact between sample gas and particles in order to minimuze chemical reactions involving sulfur compounds. Material collected in the cyclone shall be treated and measured in the same way as the filter. Acceptable cyclones are made of one of the following materials:

2.5.1.2.1 Teflon

2.5.1.2.2 Teflon lined stainless steel

2.5.1.2.3 Quartz glass

2.5.1.3 Filter

The filter shall be quartz fiber paper or Whatman #934AH (formerly Reeve Angel 934AH). The procedures for checking the filter for reactivity with gases are described in section (3.1.4).

2.5.1.4 Connecting Lines

All connecting lines which are in contact with the sample, starting from the probe exit to the end of the last impinger, shall be quartz or Teflon tubing rather than metal, borosilicate glass, polyethylene, or polypropylene.

2.5.1.5 Flow Control

Sampling rates will be controlled by adjusting the pressure drop across a calibrated orifice connected in series with the sampling train or, alternatively, by an automatic controller (such as the KURZ Model 275) to assure that isokentic sampling conditions are maintained.

3.0 SAMPLING PROCEDURES

3.1 Pretest

Presampling operation procedures include the following steps:

3.1.1 Laboratory and Field Calibration

All sampling apparatus and instruments shall be calibrated based on the procedures in EPA Quality Assurance Handbook, Volume III, Sections 3.4.2 and 3.4.3. All field calibrations must be within the specifications in the Pennsylvania DER Source Testing Manual.

3.1.2 Stack Parameter Measurements

3.1.2.1 Check cyclonic or nonparallel flow as described in EPA Method 1.

3.1.2.2 Measure the stack pressure, temperature, and velocity head at each travers point (EPA Method 2).

3.1.2.3 Determine the moisture content using EPA Method 4.

3.1.2.4 Determine the dry molecular weight of the stack gas (EPA Methods 2 or 3).

3.1.3 Setting Up Apparatus

All equipment set-up shall be consistant with that specified by EPA Method 5 and the EPA Quality Assurance Handbook. All sample lines shall be washed with distilled water before the commencement of a run to remove any dust deposited in the line.

The pre-test leak check shall be in accordance with the procedures in Section 3.4.4, EPA Quality Assurance Handbook, Vol. III. If the leakage rate is less than 0.00057 m^3/min (0.02 ft^3/min) or 4% of the expected average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the source of the leak must be found and corrected.

3.1.4 Blank Runs

Filter blanks shall be done during pre-test preparation to determine the spurious mass gain of the filter. The filter blank is used in series with the sampling filter used for EPA M5 testing (as modified herein).

3.2 Test Runs

3.2.1 Number of Runs

Three valid test runs shall be performed on each coke battery, following a practice run for the sampling crew.

3.2.2 Number of Pushes

Each test run shall consist of continuously sampling 24 pushes; each push shall be sampled at a separate traverse point.

3.2.3 Sampling Period

Each test run shall be completed within a 24 hour period without any interruption in the operation of the probe or filter heaters. Sampling shall begin when the coke mass starts to emerge from the oven and terminate when the coke quench car enters the quench tower.

3.2.4 Isokinetic Sampling

Isokinetic sampling shall be maintained throughout the entire sampling duration for each traverse point.

3.2.5 Probe and Filter Temperature

The probe and filter shall be maintained at 248°F ± 25°F.

3.2.6 Sample Flow Rate

The sample flow rate shall be about 1 cfm. Sample flow rate will be initially set at that calculated based upon the Method 1 velocity traverse. Once sampling starts, either the Sampling Train Operator or the control module will immediately re-set the rate to that appropriate for the measured velocity, pressure and gas temperature at the traverse point during sampling. Other parameters, such as percent moisture, gas composition, and pressure will be assumed constant for all pushes and will be determined independently by the methods previously described.

3.2.7 Minimum Sample Volume

A minimum gas volume of approximately 30 dscf (dry standard cubic feet) shall be sampled for each run. The minimum gas volume will be limited to the maximum sample volume possible with a sample train operating at a maximum of about 1 cfm. The total sample gas volume for the three compliance test runs shall be a minimum of 51 dscf.

3.2.8 Sampling Points

The sample duct shall be divided into 24 equal areas and the sampling nozzle shall be positioned at the center of each area.

3.2.9 Sampling Sequence

The test sequence shall be as follows:

3.2.9.1 Start the Aronetics scrubber 5 to 10 seconds prior to emergence of coke from the oven to bring the scrubber system up to prescribed operating conditions. (This is accomplished under the current procedure where the Aronetics scrubber is started by a signal from the ram when it starts the "Pushing Cycle". The initial ram movement and coke compression causes a 5 to 10 second delay in the emergence of coke from the oven).

3.2.9.2 Turn the sampling nozzle to face into the gas stream and start sampling as the coke mass begins to emerge from the oven.

3.2.9.3 Stop sampling and turn probe 180° when the quench car enters the quench tower.

3.2.9.4 Reset initial gas flow rate on the sampling train for the next traverse point.

3.2.9.5 Position the probe for the next traverse point.

6.2 Gas Composition
Computations will be made in accordance with EPA M3.

6.3 Moisture
Computations willbe made in accordance with EPA M4.

6.4 Particles

6.4.1 Front Half

6.4.1.1 Probe Catch
Computations will be made in accordance with EPA M5.

6.4.1.2 Filter Catch
Computations will be made in accordance with EPA M5.

6.4.2 Back Half Filterable (water insoluble)
Computations will be made in accordance with section 139.12(5) of the Pennsylvania DER Rules and Regulations.

7.0 VISIBLE OBSERVATIONS

7.1 Observations of visible emissions will be made after the completion of particulate testing and disconnection of the test car. The opacity of fugitive emissions will be observed at two distinctly different locations:

7.1.1 Above the coke side collector main, against a contrasting background.

7.1.2 At the point of maximum opacity below the collector main.

During the capture of a push, the observer will be positioned in close proximity to the single spot quench car such that he has an unobstructed view of all potential sources of visible emissions. The observer will not reposition himself as the car travels to the quench tower.

7.2 The following visible emission data will be collected:

7.2.1 The duration of fugitive emissions from and around the single spot quench car, coke guide, and transition duct greater than or equal to 20 percent opacity during the capture of each push.

7.2.2 The duration of fugitive emissions from the single spot quench car greater than 10 percent opacity during travel to the quench tower.

7.2.3 A maximum opacity will be recorded during each of the operations described above.

APPENDIX H

EQUATIONS FOR PARTICULATE, MOISTURE AND FLOW CALCULATIONS

EQUATIONS FOR PARTICULATE, MOISTURE AND FLOW CALCULATIONS

1. $P_S = P_{bar} + (P_{st}/13.6)$

2. $V_{w(std)} = 0.04707\ V_{wc}$

3. $V_{m(corr)} = A_1\theta + (A_2\ V_m) + (A_3(V_m{}^2/\theta)$

4. $V_{m(std)} = V_{mcorr}\ (T_{std} + 460)/(T_m + 460))\ ((P_{bar} + (\Delta H/13.6))/P_{std})$

   Note: The dry gas meter used for these tests was temperature compensated to $T_m = 60°F$.

5. $B_w = 100\ V_{w(std)}/(V_{m(std)} + V_{w(std)})$

6. $B_{w(sat)} = 100\ (\exp\ (15.361-(7196.5/(T_s + 389.52))))/P_s$

7. $B_{wo} = \text{minimum}\ (B_w, B_{w(sat)})$

8. $M_d = 0.44(\%CO_2) + 0.28(\%CO) + 0.32\ (\%O_2) + 0.28(\%N_2)$

9. $M_s = ((1-(0.01\ B_{wo}))\ M_d) + (0.18\ B_{wo})$

10. $V_s = 85.49\ C_p \quad \Delta P \quad (T_s + 460)/(P_s M_s)$

11. $\%I = 17.33\ ((T_s+460)(V_{w(std)} + V_{m(std)}))/(\theta V_s\ P_s\ D_n^2)$

12. $Q_s = 60\ V_s\ A_s$

13. $Q_{s(std)} = (1-(B_{wo}/100))\ (60\ V_s A_s\ (T_{std} + 460)P_s/((T_s + 460)(P_{std}))$

14. $\rho_s = 0.002597\ (T_{std} + 460)\ P_s M_s/((T_s+460)P_{std})$

15. $C_s = 0.015432\ M_p/V_{m(std)}$

16. $E_{rc} = 0.0001429\ C_s((Q_{sp(std)}\theta_p) + (Q_{st(std)}\ \theta_t))/(N_t C_r)$

17. $E_r = E_{rc}\ C_r\ N_o$

NOMENCLATURE

A_s = Stack cross-sectional area, ft²

A_1, A_2, A_3 = Dry gas meter constants, dimensionless

B_w = Moisture content of gas stream (calculated from V_{wc}), dimensionless

B_{wo} = Moisture content of gas stream (lower of B_w and $B_{w(sat)}$), dimensionless

$B_{w(sat)}$ = Moisture content of gas stream (saturated at T_s), dimensionless

%CO = Carbon monoxide content in dry gas stream, percent

$\%CO_2$ = Carbon dioxide content in dry gas stream, percent

C_p = Pitot correction factor, dimensionless

C_r = Coke production rate, tons/oven

C_s = Particulate mass emission concentration, gr/dscf

D_n = Nozzle diameter, in.

E_r = Particulate mass emission rate, lb/hr

E_{rc} = Particulate mass emission rate, lb/ton coke

%I = Isokinetic ratio, percent

M_d = Dry molecular weight of stack gas, lb/lb-mole

M_s = Molecular weight of stack gas, lb/lb-mole

N_o = Number of ovens tested/hr, hr^{-1}

N_t = Number of ovens tested, dimensionless

$\%N_2$ = Nitrogen content in dry gas stream, percent

$\%O_2$ = Oxygen content in dry gas stream, percent

P_{bar} = Barometric pressure, in. Hg.

P_s = Stack pressure (absolute), in. Hg.

P_{st} = Stack pressure (static), in. H_2O

P_{std} = Pressure (standard conditions), in. Hg.

Q_s = Stack gas flow, acfm

$Q_{sp(std)}$ = Stack gas flow during push, (dry standard conditions), dscfm

$Q_{s(std)}$ = Stack gas flow (dry standard conditions), dscfm

$Q_{st(std)}$ = Stack gas flow during travel, (dry standard conditions), dscfm

T_m = Average dry gas meter temperature, °F

Note: The dry gas meter used for these tests was temperature compensated to T_m = 60°F.

T_s = Time-weighted stack temperature, °F

T_{std} = Temperature (standard conditions), °F

V_m = Dry sample volume (meter conditions), ft^3

$V_{m(corr)}$ = Dry sample volume (corrected meter conditions), ft^3

$V_{m(std)}$ = Dry sample volume (standard conditions), ft^3

V_s = Stack gas velocity, fps

V_{wc} = Volume of liquid collected in impingers and silica gel, ml

$V_{w(std)}$ = Volume of liquid collected, dscf

ΔH = Orifice pressure drop, in H_2O

ΔP = Time-weighted average of the square roots of the pitot pressure differential, in H_2O

θ = Duration of test, min

θ_p = Duration of test during push, min.

θ_t = Duration of test during travel, min.

ρ_s = Stack gas density, lb/ft^3

APPENDIX I

SAMPLE TRAIN CALIBRATION DATA

EVT Coke Quench Car Tests RGP11.21.84 File: CYC 800

Cyclonic Flow Data

Plant	USS – Clairton, PA
Date	7-23-85
Car No.	H-3-3
Battery No.	19/20
Sample Location	HCQC – Test Car
Sample Type	M-5
Run Number	8.0
Operator	Smith/Milburn
Stack Area, ft2	32.125
Probe Length & Type	5 ft – TFE Lined

Average Cyclonic Flow Angle	deg
All points	0.2
Push	0.4
Travel	0.0

Note: Cyclonic flow angles were measured at the sampling plane according to EPA Method 1. The data were taken during [illegible] push and travel cycles on batteries [illegible] 19 and [illegible]

Point No.		Flow Angle deg
1.6	P	0
	T	0
1.5	P	0
	T	0
1.4	P	0
	T	0
1.3	P	0
	T	0
1.2	P	0
	T	0
1.1	P	0
	T	0
2.6	P	0
	T	0
2.5	P	0
	T	0
2.4	P	0
	T	0
2.3	P	0
	T	0
2.2	P	0
	T	0
2.1	P	0
	T	0
3.6	P	0
	T	0
3.5	P	0
	T	0
3.4	P	0
	T	0
3.3	P	0
	T	0
3.2	P	0
	T	0
3.1	P	0
	T	0
4.6	P	-10
	T	0
4.5	P	0
	T	0
4.4	P	0
	T	0
4.3	P	0
	T	0
4.2	P	0
	T	0
4.1	P	0
	T	0

CYCLONIC FLOW ANGLES