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

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

Compliance Tests of the Envirotech Hooded Quench Car No. 104 Operated on the Number 20 Coke Battery Located at the United States Steel Clairton Works

File No. 50.50
2/12/85

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VOLUME I - Test Report

Clairton, PA 15025

Project No. 50.50

February 12, 1985

Prepared by:
Dr. R.G. Patterson

AIR POLLUTION
TECHNOLOGY INC.

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Compliance Tests of the Envirotech Hooded Quench Car No. 104 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. 104 (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 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 December 5, 6, 13 and 14, 1984. **Pre-compliance tests** completed on October 19, 21, 23 and 24 which were run under similar operating conditions are also presented in this report at the request of the BOAPC. 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. 104. Three **compliance tests** were conducted during normal coking conditions.

One **compliance test** was completed during upset coking conditions which resulted from an outage caused by a mechanical breakdown in the coke battery.

1. The average particulate mass emission rate was 0.015 lb/ton of coke for the three tests completed during normal coking conditions. 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.
3. The test completed on December 6, 1984 was conducted during upset coking conditions. The emission rate for this test was 0.032 lb/ton of coke pushed. The fugitive visible emission exceeded 20% during 18 of the 24 ovens pushed.

The following points summarize the results of the **pre-compliance tests** presented in this report:

1. The average particulate mass emission rate was 0.016 lb/ton of coke for these tests.
2. Visible emission observations were made on October 23, 1984 during which the opacity did not exceed 20% at any time during push or travel.
3. These tests were completed during normal coking conditions.

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, Project Engineer
- Mr. Bruce C. DaRos, Field Test Crew Leader
- Mr. Paul Jarman, Sampling Train Operator
- Mr. Sherman Smith, Pitot Tube Operator
- Mr. Cary Milburn, Pitot Tube Operator
- Ms. Linda Lancaster, Visible Emissions Observer

Allegheny County Board of Air Pollution Control Observers:
- Mr. K. Shankar N. Banninthaya, Air Pollution Engineer
- Mr. William J. Logan, Air Pollution Control Technician
- Mr. Thomas Kelly, Coke Oven Technician
- Mr. Clarence Carey, 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. Robert Brown, BCM 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. Frank Kress, Control Car Operations

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 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

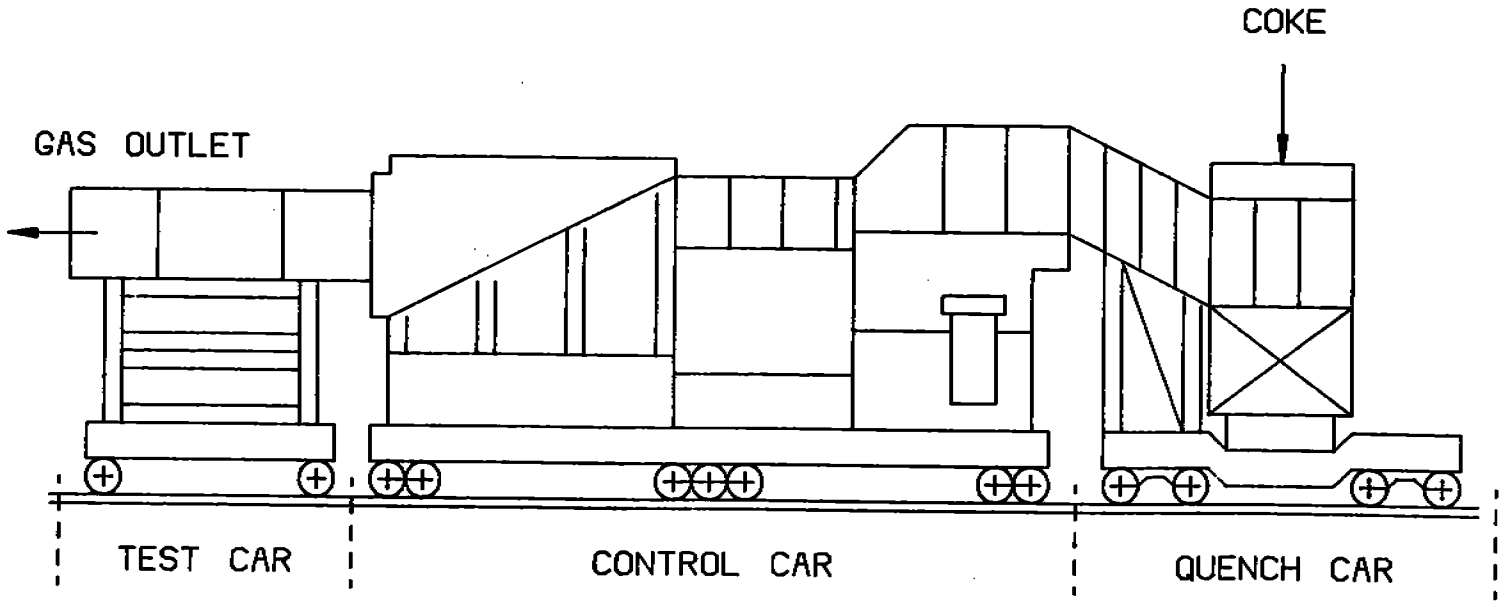

Figure 1. Envirotech Hooded Coke Quench Car System.

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 follow:

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. Tables 1 and 2 show the average data for the HQC system for each of the **compliance** and **pre-compliance** tests. During both of these test series the average production rate for coke battery number 20 was 14.5 tons of coke per oven.

TESTS RESULTS

A number of pre-compliance tests were run with the HQC System under different operating conditions and combinations of modifications. The results from the pre-compliance tests run on the HQC System as described on page 1, as well as the compliance tests are presented in this section:

Test Number	Date	Test Type	Coking Conditions
3.1	10/19/84	Pre-comp.	Normal
3.2	10/21/84	"	"
3.3	10/23/84	"	"
3.4	10/24/84	"	"
7.1	12/5/84	Compliance	"
7.2	12/6/84	"	Upset
7.4	12/13/84	"	Normal
7.5	12/14/84	"	"

Test number 7.2 was completed during upset operating conditions on the number 20 battery. The pusher machine was out for fourteen hours during the previous night's turn, which upset the normal pushing schedule. Test number 7.3 was started on December 7, 1984, but was aborted because of the low ambient

TABLE 1. AVERAGE HQC SYSTEM PROCESS CONDITION DATA
COMPLIANCE TESTS

Test Number	7.1		7.2		7.4		7.5	
	Push	Travel	Push	Travel	Push	Travel	Push	Travel
Nozzle Water Flowrate, gpm	351	115	350	115	365	115	361	119
Water Temp, deg F*	429	429	429	429	414	414	414	414
Water Press, psig	294	287	295	287	295	286	294	286
Annubar Vel Head, in. WC	3.0	1.0	3.0	1.0	3.1	1.5	3.1	1.4
Scrubber Temp In, deg F**	145	132	145	131	200	174	197	171
Scrubber Temp Out, deg F	156	158	161	164	160	161	158	159
Pre-spray H_2O Flowrate, gpm***	400	0	400	0	400	0	400	0

* Water temperature reported here was the tank temperature.

** The inlet scrubber gas temperature thermocouple was recalibrated prior to test number 7.4.

***The quench water flowrate was assumed to be 400 gpm from the pump specifications.

TABLE 2. AVERAGE HQC SYSTEM PROCESS CONDITION DATA
PRE-COMPLIANCE TESTS

Test Number	3.1		3.2		3.3		3.4	
	Push	Travel	Push	Travel	Push	Travel	Push	Travel
Nozzle Water Flowrate, gpm	401	110	397	110	382	110	373	110
Water Temp, deg F	419	418	425	423	417	417	424	424
Water Press, psig	299	288	305	296	297	287	295	286
Annubar Vel Head, in. WC	2.0	0.9	2.9	1.3	0.0	0.0	2.6	1.3
Scrubber Temp In, deg F***	142	166	142	144	148	142	165	147
Scrubber Temp Out, deg F	154	158	156	159	155	159	155	161
Pre-spray H_2O Flowrate, gpm*	400	0	400	0	400	0	400	0

* The quench water flowrate was assumed to be 400 gpm from the pump specifications.

** See notes regarding thermocouple calibration on Table 1.

mperature. The ambient temperature was approximately 10°F and the impinger outlet temperature was 15°F which indicated that the impinger water could have frozen during the test.

Tables 3 and 4 are summaries of the test conditions for each of the tests. Tables 5 through 7 and 8 through 10 show the particulate emission results for the compliance and the pre-compliance tests. Tables 5 and 8 compare the particulate emission rate in lb/ton of coke pushed to the EAER emission standard for each of the tests. The results of the visible emission observations are summarized in Table 11.

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 November 21, 1984 showed an average cyclonic flow angle of 1.8 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 3. SUMMARY OF COMPLIANCE TEST CONDITIONS

Test Number	7.1		7.2		7.4		7.5	
	Push	Travel	Push	Travel	Push	Travel	Push	Travel
Avg Gas Vel, fps	67.4	34.3	66.5	34.6	69.2	38.9	66.2	36.2
Avg Gas Flow rate, acfm	129968	66069	128130	66652	133306	75021	127571	69697
Avg Gas Flow rate, dscfm	76222	38653	68609	35520	74808	42034	73539	40124
Exit Gas, deg F	156	158	161	164	160	161	158	159
Exit Press, in. Hg	29.41	29.41	28.99	28.99	29.23	29.23	29.49	29.49
Samp. Vol., dscf (corr.)	22.26	11.14	19.92	11.31	21.12	13.51	20.26	12.99
% Isokinetic	109	105	103	105	101	112	101	102

	Total	Total	Total	Total
Samp. Vol., dscf (corr.)	33.40	31.24	34.64	33.25
Dry Gas Comp.				
CO2 (vol %)	2.0	2.2	2.1	2.1
O2 (vol %)	18.2	17.3	18.3	18.3
CO (vol %)	0.2	0.3	0.0	0.0
N2 (vol %)	79.6	80.2	79.7	79.7
Moisture, vol%				
M-5	30.38	37.47	32.60	33.85
Sat. at T out	30.44	35.04	33.02	31.54
Mol Wt,				
Dry	29.05	29.04	29.06	29.06
Wet	25.69	25.17	25.45	25.57
Front-half Part., mg	34.77	79.77	45.73	30.08
Back-half Part., mg	1.40	2.09	1.69	1.46
Total DER Part, mg	36.17	81.86	47.42	31.54

TABLE 4. SUMMARY OF PRE-COMPLIANCE TEST CONDITIONS

Test Number	3.1		3.2		3..3		3.4	
	Push	Travel	Push	Travel	Push	Travel	Push	Travel
Avg Gas Vel, fps	74.6	41.5	68.9	40.2	66.4	35.3	62.9	36.5
Avg Gas Flow rate, acfm	143837	79949	132752	77491	127908	68038	121298	70390
Avg Gas Flow rate, dscfm	89946	49714	80884	46960	80079	42308	78584	45212
Exit Gas, deg F	154	158	156	159	155	159	155	161
Exit Gas, in. Hg	30.486	30.486	30.373	30.373	30.763	30.763	30.753	30.753
Samp. Vol., dscf (corr.)	24.33	15.36	12.72	6.60	23.40	13.92	24.57	11.46
% Isokinetic	90	107	98	99	99	112	107	91
		Total		Total		Total		Total
Samp. Vol., dscf (corr.)		39.69		19.32		37.32		36.04
Dry Gas Comp.								
CO2 (vol %)		1.8		2.7		2.0		2.2
O2 (vol %)		18.5		17.3		18.0		18.3
CO (vol %)		0.0		0.2		0.2		0.3
N2 (vol %)		79.7		79.8		79.8		79.2
Moisture, vol%								
M-5		38.94		35.79		31.62		26.53
Sat. at T out		28.61		29.97		29.09		29.87
Mol Wt,								
Dry		29.03		29.13		29.04		29.09
Wet		25.87		25.79		25.83		26.14
Front-half Part., mg		36.97		15.30		26.87		37.98
Back-half Part., mg		1.08		1.41		1.35		2.31
Total DER Part, mg		38.05		16.71		28.22		40.29

TABLE 5. TOTAL PENNSYLVANIA DER PARTICULATES*
COMPLIANCE TESTS

Run Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke	Allowable, lb/ton coke
7.1	24	0.0167	0.76	0.0144	0.0400
7.2	24	0.0404	2.24	0.0324	0.0400
7.4	24	0.0211	1.26	0.0185	0.0400
7.5	24	0.0146	0.82	0.0128	0.0400
Avg		0.023	1.27	0.020	0.040
Avg w/o No. 7.2		0.017	0.95	0.015	0.040

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

TABLE 6. FRONT-HALF PARTICULATES*
COMPLIANCE TESTS

Run Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke
7.1	24	0.0161	0.73	0.0138
7.2	24	0.0394	2.18	0.0316
7.4	24	0.0204	1.22	0.0178
7.5	24	0.0140	0.78	0.0122
Avg		0.022	1.23	0.019
Avg w/o No. 7.2		0.017	0.91	0.015

* Includes filter and front-half acetone and water washes

TABLE 7. BACK-HALF PARTICULATES*
COMPLIANCE TESTS

Run Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke
7.1	24	0.00065	0.029	0.00056
7.2	24	0.00103	0.057	0.00083
7.4	24	0.00075	0.045	0.00066
7.5	24	0.00068	0.038	0.00059
Avg		0.00078	0.042	0.00066
Avg w/o No. 7.2		0.00069	0.037	0.00060

* Includes 0.22 micron filter catch of impinger solution

TABLE 8. TOTAL PENNSYLVANIA DER PARTICULATES*
PRE-COMPLIANCE TESTS

Run Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke	Allowable, lb/ton coke
3.1	24	0.0148	1.00	0.0163	0.0400
3.2	12	0.0133	0.81	0.0140	0.0400
3.3	24	0.0117	0.54	0.0112	0.0400
3.4	24	0.0251	1.48	0.0228	0.0400
Avg		0.016	0.96	0.016	0.040

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

TABLE 9. FRONT-HALF PARTICULATES*
PRE-COMPLIANCE TESTS

Run Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke
3.1	24	0.0144	0.97	0.0158
3.2	12	0.0122	0.74	0.0128
3.3	24	0.0111	0.52	0.0106
3.4	24	0.0236	1.39	0.0215
Avg		0.015	0.90	0.015

* Includes filter and front-half acetone and water washes

TABLE 10. BACK-HALF PARTICULATES*
PRE-COMPLIANCE TESTS

Run Number	Number of Pushes	Part. Conc. gr/dscf	Part. Rate, lbs/hr	Part. Rate, lb/ton coke
3.1	24	0.00042	0.028	0.00046
3.2	12	0.00113	0.068	0.00118
3.3	24	0.00056	0.026	0.00053
3.4	24	0.00144	0.085	0.00131
Avg		0.00089	0.052	0.00087

* Includes 0.22 micron filter catch of impinger solution

TABLE 11. SUMMARY OF VISIBLE EMISSION OBSERVATIONS

Test No.	12-5-84 7.1		12-6-84 7.2		12-13-84 7.4		12-14-84 7.5		10-23-84 3.3	
Point No.	Opac >20%	Sec >20%	Opac >20%	Sec >20%	Opac >20%	Sec >20%	Opac >20%	Sec >20%	Opac >20%	Sec >20%
1.6 PT	65%	10s								
1.5 PT	20	1	70%	3s						
1.4 PT			65	5						
1.3 PT	65	4								
1.2 PT			55	8	25%	1s				
1.1 PT					25	1				
2.6 PT	20	0.9					65%	1s		
2.5 PT			30	1						
2.4 PT			80	10						
2.3 PT	25	2								
2.2 PT			90	9						
2.1 PT			65	8						
3.6 PT			40	3						
3.5 PT			30	2						
3.4 PT			80	10			60	3		
3.3 PT			85	7						
3.2 PT	30	1								
3.1 PT			100	21	25	1				
4.6 PT			30	2						
4.5 PT			35	2	45	5				
4.4 PT			95	16						
4.3 PT			100	27						
4.2 PT			100	8						
4.1 PT			30	1						
No./test	6		18		4		2		0	
Sec/test		18.9		143		8		4		0

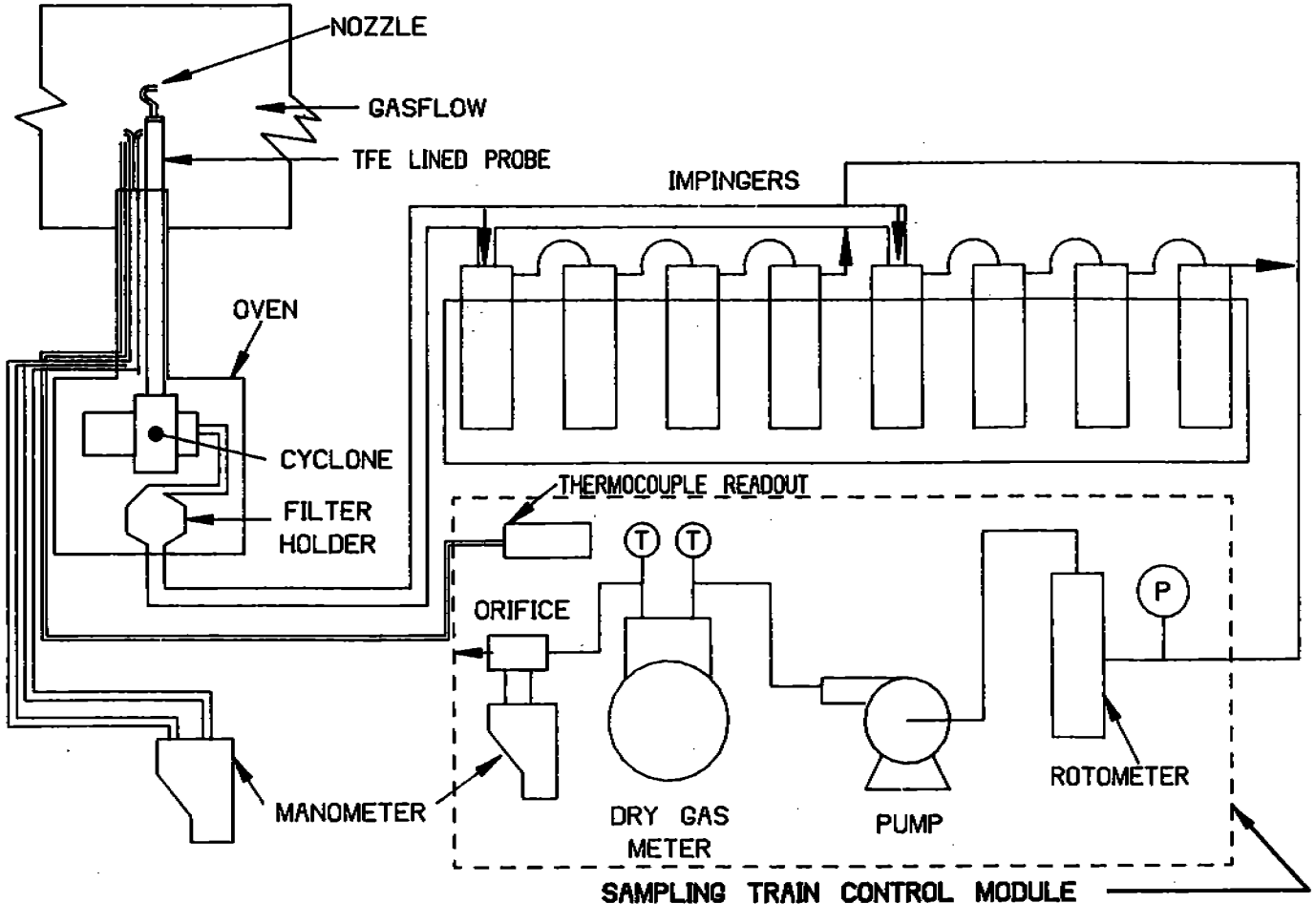

Figure 2. Method 5 Sampling Apparatus.

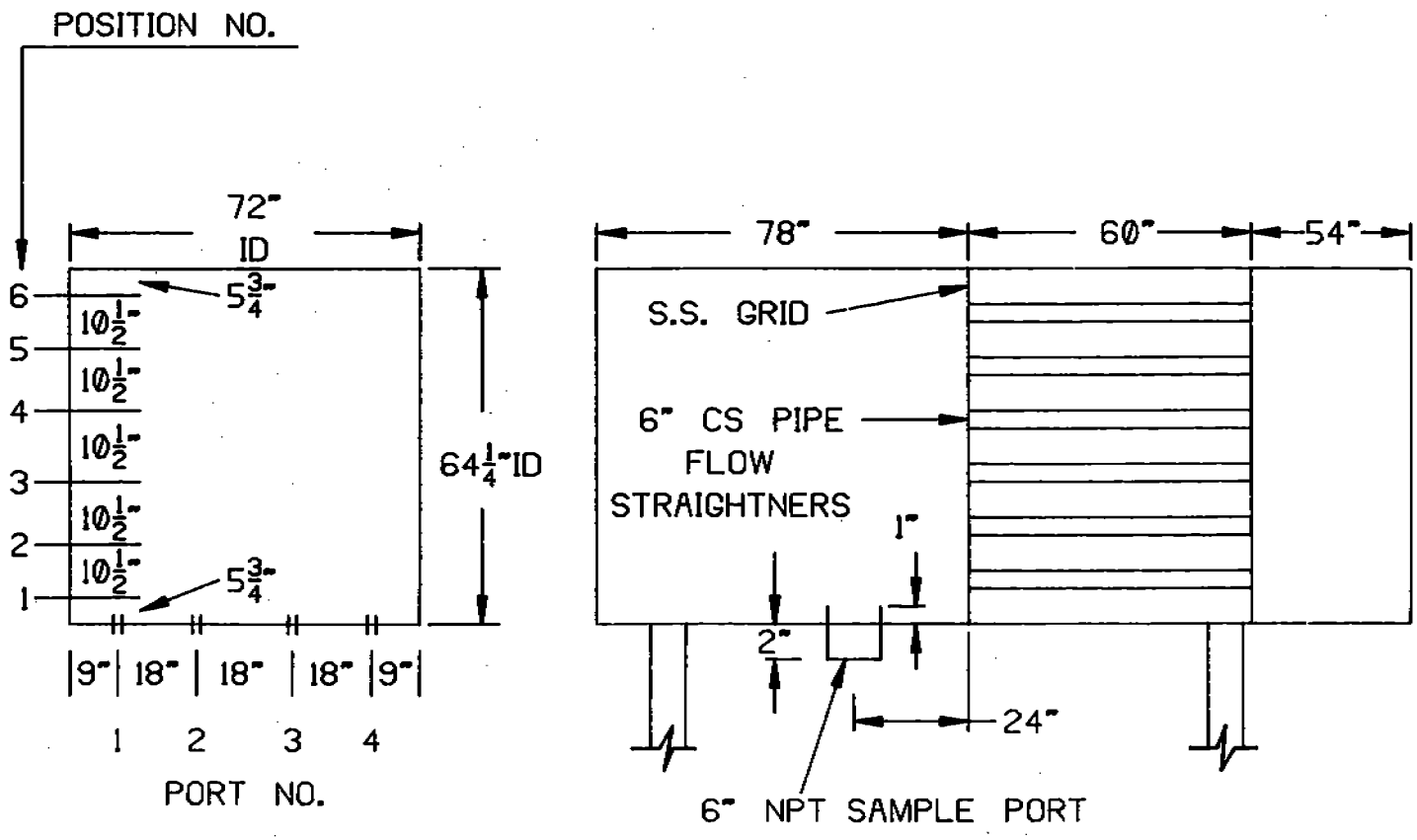

Figure 3. Test Car Duct Sampling Arrangement.

File No. 50.50
2/12/85

Compliance Tests of the Envirotech Hooded Quench Car No. 104 Operated on the Number 20 Coke Battery Located at the United States Steel Clairton Works

VOLUME II - Appendices

Clairton, PA 15025

Project No. 50.50

February 12, 1985

Prepared by:
Dr. R.G. Patterson

APPENDIX A

SCRUBBER OPERATING DATA

DATE : 12-5-84
CAR. # : 4
BAT. # : 20

TEST DESCRIPTION : CAR #4 - TEST 7.1 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	C-26	A-28	B-28	A-1	B-1	C-1	A-3	B-3	C-3	A-5	B-5	C-5	A-7	B-7	C-7	A-1
	TIME AT START OF PUSH	10:28	10:45	11:06	11:55	12:16	12:29	12:59	1:12	1:29	1:42	1:55	2:09	2:22	2:38	2:51	3:05
	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	72%	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	429°	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)	11			10.5			10.5			10.5			11.5			
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	355	"	"	"	"	350			"	"	"	"	"	"	"	"
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	255	"	"	"	"	"	"	292	"	"	"	"	295	"	"	"
FULL	TR 524 TEMP. TO JETS (0-600°F) R	TRANSMITTER NOT WORKING PROPERLY															
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	140°	133°	140°	154°	147°	147°	147°	140°	133°	147°	140°	147°	147°	[illegible]	[illegible]	140°
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	115	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
TRAVEL	PR 522 PRESS. TO JETS	287	"	"	"	"	"	"	285	"	"	"	"	287	"	"	"
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER NOT WORKING PROPERLY															
TRAVEL	TR 531 COKE GAS TEMP.	133°	126°	133°	140°	126°	133°	133°	126°	119°	126°	126°	133°	133°	133°	133°	126°
	ANNUBAR MANO. FULL		2.9		1.95			2			2			2			
	ANNUBAR MANO. TRAVEL	1			1.05			.75			1			.75			
	COKE GAS TEMP. AT TWR.	189°	161°	161°	145°	161°	168°	[illegible]	168°	161°	154°	168°	145°	165°	175°	168°	161°

DATE: 12-5-84
CAR #: 4
BAT. #: 20

TEST DESCRIPTION: CAR #4 - TEST 7.1 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	B-9	C-9	A-11	B-11	C-11	A-13	B-13	C-13								
	TIME AT START OF PUSH	3 18	3 31	3 43	3 52	4 09	4 21	4 34	4 47								
	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%) R	72%	"	"	"	"	"	"	"								
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	429°	"	"	"	"	"	"	"								
	SEPARATOR INLET PRESSURE (IN. W.C.)	10.5			10.5			10.5									
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	350	"	"	"	"	"	"	"								
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	295	"	"	"	"	"	"	"								
FULL	TR 524 TEMP. TO JETS (0-600°F) R	TRANSMITTER NOT WORKING															
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	147°	154°	147°	140°	154°	154°	147°	147°								
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	115	"	"	"	"	"	"	"								
TRAVEL	PR 522 PRESS. TO JETS	287	"	"	"	"	"	"	"								
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER NOT WORKING															
TRAVEL	TR 531 COKE GAS TEMP.	133°	133°	133°	133°	133°	140°	133°	133°								
	ANNUBAR MANO. FULL	3			2.95			2.95									
	ANNUBAR MANO. TRAVEL	1			1			1									
	COKE GAS TEMP. AT TWR.	168°	175°	168°	161°	175°	168°	168°	168°								

DATE: 12-6-84
CAR #: 4
BAT #: 20

TEST DESCRIPTION: CAR #4 - TEST 7.2 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	B-19	C-19	A-21	B-21	C-21	A-23	B-23	C-23								
	TIME AT START OF PUSH	1 02	1 15	1 29	1 42	1 54	2 06	2 18	2 31								
	OVEN SCRUBBED (Y OR N)	Y	Y	Y	Y	Y	Y	Y	Y								
	COKING TIME (HRS.)																
	I.R 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%) R	74%	"	"	"	"	"	"	"								
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	429°	"	"	"	"	"	"	"								
	SEPARATOR INLET PRESSURE (IN. W.C.)	10.5			10.5			10.5									
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	350	"	"	"	"	"	"	"								
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	295	"	290	295	"	"	"	"								
FULL	TR 524 TEMP. TO JETS (0-600°F) R	TRANSMITTER									INOPERABLE						
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	147°	147°	133°	140°	154°	147°	140°	147°								
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	115	"	"	"	"	"	"	"								
TRAVEL	PR 522 PRESS. TO JETS	287	285	282	285	287	"	"	"								
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER									INOPERABLE						
TRAVEL	TR 531 COKE GAS TEMP.	126°	133°	119°	140°	140°	133°	133°	126°								
AVERAGE MAX. FULL		3.05			3.05			3.05									
AVERAGE MAX. TRAVEL		.95			.95			.95									
COKE GAS TEMP. AVG.		168°	157°	161°	175°	210°	210°	168°									

DATE : 12-6-84
CAR # : 4
BAT. # : 20

TEST DESCRIPTION : CAR #4 - TEST 7.2 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	A-9	B-9	C-9	A-11	B-11	C-11	A-13	B-13	C-13	A-15	B-15	C-15	A-17	B-17	C-17	A-19
	TIME AT START OF PUSH	9 41	9 53	10 06	10 18	10 30	10 42	10 55	11 07	11 19	11 35	11 48	12 01	12 13	12 25	12 38	12 50
	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	74%	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	429°	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)		10.5			10.5			10.5			10.5			10.5		
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	380	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	212	295	"	297	"	295	"	"	"	"	"	"	"	"	"	"
FULL	TR 524 TEMP. TO JETS (0-600°F) R		TRANSMITTER								INOPERABLE						
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	147°	154°	147°	147°	147°	147°	147°	154°	147°	147°	140°	140°	140°	147°	140°	140°
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	115	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
TRAVEL	PR 522 PRESS. TO JETS	285	287	"	290	"	"	"	287	"	"	"	"	"	"	"	"
TRAVEL	TR 524 TEMP. TO JETS		TRANSMITTER								INOPERABLE						
TRAVEL	TR 531 COKE GAS TEMP	133°	140°	140°	133°	133°	133°	133°	126°	133°	126°	126°	126°	126°	126°	133°	126°
	ANNUBAR MANO. FULL		3			3			3			3			3		
	ANNUBAR MANO. TRAVEL			1		1			.95			.95			.95		
	COKE GAS TEMP. FULL	163°	182°	210°	168°	182°	176°	175°	132°	175°	161°	168°	182°	161°	161°	196°	161°

DATE : 12-13-84
CAR # : 4
BAT. # : 20

TEST DESCRIPTION : CAR #4 - TEST 1.4 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	B-1	C-1	A-3	B-3	C-3	A-5	B-5	C-5	A-7	B-7	C-7	A-9	B-9	C-9	A-11	B-11
	TIME AT START OF PUSH	9:30	9:42	9:57	10:09	10:21	10:35	10:47	10:59	11:11	11:21	11:36	11:49	12:02	12:17	12:29	12:41
	OVEN SCRUBBED (Y OR N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	COKING TIME (HRS)																
	I.R. 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%)	74%	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F)	414°	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)		"			"			"			"			"		
FULL	FR 521 FLOW TO JETS (0-600 GPM)	365	"	"	"	360	"	"	365	"	"	"	"	370	365	"	"
FULL	PR 522 PRESS. TO JETS (0-500 PSIG)	295	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FULL	TR 524 TEMP. TO JETS (0-600°F)	TRANSMITTER INOPERABLE															
FULL	TR 531 COKE GAS TEMP. (0-700°F)	203°	210°	189°	189°	196°	203°	203°	196°	189°	189°	210°	196°	203°	203°	196°	203°
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	115	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
TRAVEL	PR 522 PRESS. TO JETS	287	"	"	285	"	"	"	"	287	"	"	"	"	"	"	285
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER INOPERABLE															
TRAVEL	TR 531 COKE GAS TEMP.	175°	189°	175°	175°	163°	175°	163°	175°	168°	168°	189°	168°	175°	175°	168°	175°
	HINDEAR MAND FULL		3.1			3.1			3.05			3.05			3.05		
	HINDEAR MAND. TRAVEL								1.5			1.45			1.45		
	[illegible] TEMP [illegible]	[illegible]	[illegible]	[illegible]	189°	[illegible]	189°	196°	203°	196°	203°	[illegible]	210°	210°	[illegible]	203°	203°

DATE : 12-13-84
CAR # : 4
BAT. # : 20

TEST DESCRIPTION : CAR #4 - TEST 7.4 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	C-11	A-12	B-13	C-13	A-15	B-15	C-15	A-17								
	TIME AT START OF PUSH	12 53	1 09	1 21	1 33	1 45	1 58	2 10	2 23								
	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%) R	74%	"	"	"	"	"	"	"								
	TR 509 HOT WATER TANK TEMP. BEFORE PUSH (0-600°F) G	414°	"	"	"	"	"	"	"								
	SEPARATOR INLET PRESSURE (IN. W.C.)	11			11												
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	365	"	"	"	"	"	"	"								
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	295	"	"	"	"	"	"	"								
FULL	TR 524 TEMP. TO JETS (0-600°F) R	TRANSMITTER INOPERABLE															
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	203°	203°	203°	203°	196°	196°	196°	203°								
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	115	"	"	"	"	"	"	"								
TRAVEL	PR 522 PRESS. TO JETS	231	"	"	"	"	"	"	"								
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER INOPERABLE															
TRAVEL	TR 531 COKE GAS TEMP.	175°	175°	175°	175°	175°	175°	175°	175°								
	PUSHER MAN. FULL	3.05			3.05												
	PUSHER MAN. TRAVEL	1.5			1.5												
	MOTOR TEMP. TUP	217°	196°	196°	217°	[illegible]	[illegible]	[illegible]	196°								

PUSHING SCHEDULE FOR BATTERIES 19/20

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATES
1	A26/19	A24/19		7:53	8: 0	8:14
2	A26/20	A24/20		7:59	8: 6	8:20
3	B26/19	B24/19		8: 5	8:12	8:26
4	B26/20	B24/20		8:11	8:18	8:32
5	C26/19	C24/19		8:18	8:25	8:39
6	[illegible]	C24/20		8:24	8:31	8:45
7	[illegible]	A26/19		8:30	8:37	8:51
8	[illegible]	A26/20		8:37	8:44	8:58
9	[illegible]	B26/19		8:43	8:50	9: 4
10	[illegible]	B26/20		8:49	8:56	9:10
11	[illegible]	C26/19		8:56	9: 3	9:17
12	[illegible]	C26/20		9: 2	9: 9	9:23
13	[illegible]	A28/19		9: 8	9:15	9:2[illegible]
14	[illegible]	A28/20		9:15	9:22	9:3[illegible]
15	[illegible]	B28/19		9:21	9:28	9:4[illegible]
16	[illegible]	B28/20		9:27	9:34	9:40
17	[illegible]	C28/19		9:34	9:41	9:5[illegible]
18	[illegible]	C28/20		9:40	9:47	10: [illegible]
19	[illegible]	A 1/19		9:46	9:53	10: [illegible]
20	[illegible]	A 1/20		9:52	9:59	10:14
21	[illegible]	B 1/19		9:59	10: 6	10:20
22	[illegible]	B 1/20		10: 5	10:12	10:28
23	[illegible]	C 1/19		10:11	10:18	10:32
24	[illegible]	C 1/20		10:18	10:25	10:39
25	[illegible]	A 3/19		10:24	10:31	10:45
26	[illegible]	A 3/20		10:30	10:37	10:51
27	[illegible]	B 3/19		10:37	10:44	10:58
28	[illegible]	B 3/20		10:43	10:50	11: 4
29	[illegible]	C 3/19		10:49	10:56	11:10
30	[illegible]	C 3/20		10:56	11: 3	11:17
31	[illegible]	A 5/19		11: 2	11: 9	11:2[illegible]
32	[illegible]	A 5/20		11: 8	11:15	11:2[illegible]
33	[illegible]	B 5/19		11:15	11:22	11:3[illegible]
34	[illegible]	B 5/20		11:21	11:28	11:4[illegible]
35	[illegible]	C 5/19		11:27	11:34	11:4[illegible]
36	[illegible]	C 5/20		11:34	11:41	11:55
37	[illegible]	A 7/19		11:40	11:47	12: [illegible]
38	[illegible]	A 7/20		11:46	11:53	12: [illegible]
39	[illegible]	B 7/19		11:52	11:59	12: 1[illegible]
40	[illegible]	B 7/20		11:59	12: 6	12:20
41	[illegible]	C 7/19		12: 5	12:12	12:2[illegible]
42	[illegible]	C 7/20		12:11	12:18	12:3[illegible]
43	[illegible]	A 9/19		12:18	12:25	12:3[illegible]
44	[illegible]	A 9/20		12:24	12:31	12:45
45	[illegible]	B 9/19		12:30	12:37	12:5[illegible]
46	[illegible]	B 9/20		12:37	12:44	12:5[illegible]
47	[illegible]	C 9/19		12:43	12:50	1: [illegible]
48	[illegible]	C 9/20		12:49	12:56	1:10
49	[illegible]	A11/19		12:56	1: 3	1:1[illegible]
50	[illegible]	A11/20		1: 2	1: 9	1:2[illegible]
51	[illegible]	B11/19		1: 8	1:15	1:2[illegible]
52	[illegible]	B11/20		1:15	1:22	1:3[illegible]
53	[illegible]	C11/19		1:21	1:28	1:4[illegible]
54	[illegible]	C11/20		1:27	1:34	1:4[illegible]
55	[illegible]	A13/19		1:34	1:41	1:5[illegible]
56	[illegible]	A13/20		1:40	1:47	2: [illegible]
57	[illegible]	B13/19		1:46	1:53	2: [illegible]
58	[illegible]	B13/20		1:52	1:59	2:1[illegible]
59	[illegible]	C13/19		1:59	2: 6	2:2[illegible]
60	[illegible]	C13/20		2: 5	2:12	2:2[illegible]
61	[illegible]	A15/19		2:11	2:18	2:3[illegible]
62	[illegible]	A15/20		2:18	2:25	2:3[illegible]
63	[illegible]	B15/19		2:24	2:31	2:4[illegible]
64	[illegible]	B15/20		2:30	2:37	2:51
65	[illegible]	C15/19		2:37	2:44	2:5[illegible]
66	[illegible]	C15/20		2:43	2:50	3: [illegible]
67	[illegible]	A17/19		2:49	2:56	3:1[illegible]
68	[illegible]	A17/20		2:56	3: 3	3:1[illegible]
69	[illegible]	B17/19		3: 2	3: 9	3:2[illegible]
70	B19/20	B17/20		3: 8	3:15	3:2[illegible]
71	C19/19	C17/19		3:15	3:22	3:3[illegible]
72	C19/20	C17/20		3:21	3:28	3:4[illegible]
73	A21/19	A19/19		3:27	3:34	3:4[illegible]
74	A21/20	A19/20		3:34	3:41	3:5[illegible]
75	B21/19	B19/19		3:40	3:47	4: [illegible]
76	B21/20	B19/20		3:46	3:53	4: [illegible]

A-5-#19 Batt
A-28-20 Batt > EMPTY Patchers

THR DEC 13 1984 8X 4 TURN

DATE : 12-14-84
CAR # :
BAT. # : 26

TEST DESCRIPTION : CAR #4 - TEST 7.5 - OFFICIAL E.P.A. TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	OVEN NUMBER	C-15	A-17	B-17	C-17	A-19	B-19	C-19	A-21	B-21	C-21	A-23	B-23	C-23	A-25	B-25	C-25
	TIME AT START OF PUSH	8 56	9 09	9 23	9 36	9 48	10 01	10 13	10 26	10 38	10 51	11 03	11 17	11 29	11 41	11 56	12 10
	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	74%	"	"	"	"	"	"	"	"	"	"	"	"	70%	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	414°	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)		11			11			11			11			11		
FULL	FR 521 FLOW TO JETS (0-600 GPM) G	360	365	360	365	"	"	360	"	"	"	365	"	"	"	360	"
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	295	295	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FULL	TR 524 TEMP. TO JETS (0-600°F) R	TRANSMITTER									INOPERABLE						
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	203°	210°	203°	203°	203°	203°	203°	203°	203°	203°	203°	196°	203°	189°	189°	175°
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	120	"	"	"	"	115	"	120	"	"	"	"	"	"	"	115
TRAVEL	PR 522 PRESS. TO JETS	285	285	"	281	"	"	"	"	"	"	"	"	"	"	"	"
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER									INOPERABLE						
TRAVEL	TR 531 COKE GAS TEMP	175°	182°	175°	175°	175°	175°	182°	175°	175°	175°	175°	175°	175°	175°	161°	161°
	ANNUBAR MANO. FULL		3.1			3.05			3.05			3.05			3.05		
	ANNUBAR MANO TRAVEL		1.35			1.35									1.35		
	[illegible]	224°	224°	217°	217°	217°	217°	231°	217°	224°	224°	217°	217°	231°	203°	203°	210°

DATE : 12-14-80
CAR # : 4
BAT. # : 20

TEST DESCRIPTION : CAR #4 - TEST 75 - OFFICIAL EPA TEST

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	A-27	B-27	C-27	A-29	B-29	A-2	B-2	C-2	A-4							
	TIME AT START OF PUSH	12 23	12 36	12 48	1 01	1 14	1 40	1 58	2 11	2 24							
	OVEN SCRUBBED (Y OR N)	Y	Y	Y	Y	Y	Y	Y	Y	Y							
	COKING TIME (HRS.)																
TR 505	HOT WATER TANK LEVEL BEFORE PUSH (0-100%)	72%	"	"	"	"	"	64%	72%	"							
TR 509	HOT WATER TANK TEMP. BEFORE PUSH (0-600°F)	414°	"	"	"	"	"	"	"	"							
	SEPARATOR INLET PRESSURE (IN. W.C.)	11			11				11								
FULL	FR 521 FLOW TO JETS (0-600 GPM)	360	"	"	"	"	355	345	360	"							
FULL	PR 522 PRESS. TO JETS (0-500 PSIG)	275	"	"	"	"	"	275	295	"							
FULL	TR 524 TEMP. TO JETS (0-600°F)	TRANSMITTER INOPERABLE															
FULL	TR 531 COKE GAS TEMP. (0-700°F)	203°	196°	196°	203°	203°	196°	154°	196°	182°							
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	120	"	"	"	"	"	115	120	"							
TRAVEL	PR 522 PRESS. TO JETS	237	"	"	"	"	"	210	287	"							
TRAVEL	TR 524 TEMP. TO JETS	TRANSMITTER INOPERABLE															
TRAVEL	TR 531 COKE GAS TEMP.	[illegible]	168°	168°	176°	175°	168°	170°	161°	161°							
	ANNULUS PRESS. COLD	3.05			3.05				3.05								
	ANNULUS PRESS. TRAVEL	1.4			1.35												
	[illegible] GAS TEMP.	217°	217°	210°	219°	[illegible]	[illegible]	139°	224°								

DATE: [illegible] 84 TEST DESCRIPTION: CAR [illegible] SATURATION SPRAY TEST [illegible]
CAR #: 4
BAT. #: 20

Test 3-1

		1	2	3	~~4~~	4 ~~5~~	5 ~~6~~	6 ~~7~~	7 ~~8~~	8 ~~9~~	9 ~~10~~	10 ~~11~~	11 ~~12~~	12 ~~13~~	13 ~~14~~	14 ~~15~~	15 ~~16~~
	OVEN NUMBER	C-21	A-23	B-23	C-23	A-25	B-25	C-25	A-27	B-27	C-27	A-29	B-29	C-29	A-2	B-2	C-2
	TIME AT START OF PUSH	11:36	11:50	12:03	12:17	12:30	12:43	1:24	1:17	1:32	1:45	2:00	2:16	2:31	2:46	3:02	3:13
	OVEN SCRUBBED (Y OR N)	Y	Y	Y	N	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	78%	78%	73%	78%	73%	73%	73%	73%	78%	78%	78%	78%	78	"	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	420°	420°	426°	426°	432°	43[illegible]	432°	432°	432	432	432	432	432	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)		12					15	11	10	10.5			11			
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	400	400	400		408	403		408	400	400	400	400	400	"	"	
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	290	290	295	295	270	295	310	305	300	300	300	300	300	"	"	"
FULL	TR 524 TEMP. TO JETS (0-600°F) R	420°	420°	420°	420°	430°	42[illegible]°	426°	426°	420	426	420	420	420	"	"	414
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	154°	154°	147°		140°	[illegible]	147°	133°	140	140	140	140	154	140	140	"
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	110	110	110		110	[illegible]	[illegible]	110	110	110	110	110	110	110	"	
TRAVEL	PR 522 PRESS. TO JETS	275	280	285		280	285	295	290	280	280	280	280	290	298	290	"
TRAVEL	TR 524 TEMP. TO JETS	420°	420°	420°		420°	42[illegible]°	[illegible]°	426°	420	420	414	414	420	414	"	"
TRAVEL	TR 531 COKE GAS TEMP.	147°	168°	[illegible]°		[illegible]°	[illegible]	[illegible]	147°	196	154	168	154	168	210	154	168
	ANNUBAR MAND. FULL		4.0					4.2	2.6	2.6	2.5			2.5			
	ANNUBAR MAND. TRAVEL		1.6						1.2		1.2			1.2			
	COKE GAS TEMP AT TWR.	175°	273°	25[illegible]°		[illegible]°	420°	[illegible]°	182°	280	182	182	174	196	244	152	224

SPRAY SYSTEM
STRAINER PLUGGED

DATE: [illegible] 7-84
CAR #: 4
BAT. #: 20

TEST DESCRIPTION: CAR #4 [illegible]TURATION SPRAY TEST #1 (CO[illegible]

Test 3-1

		16 1	17 2	18 3	19 4	20 5	21 6	22 7	23 8	24 9	10	11	12	13	14	15	16
	OVEN NUMBER	A-4	B-4	C-4	A-6	B-6	C-6	A-8	B-8	A-10							
	TIME AT START OF PUSH	3 26	3 39	3 52	4 03	4 14	4 26	4 38	4 49	5 16							
	OVEN SCRUBBED (Y OR N)	Y	Y	Y	Y	Y	Y	Y	Y	Y							
	COKING TIME (HRS.)																
	LR 505 HOT WATER TANK LEVEL BEFORE PUSH (0-100%) R	78	"	"	"	"	"	"	"	"							
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	426	"	"	"	"	"	"	"	"							
	SEPARATOR INLET PRESSURE (IN. W.C.)	10	[illegible]				15	"	12	12							
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	400	"	"	"	"	"	"	"	"							
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	300	"	"	"	"	"	"	"	"							
FULL	TR 524 TEMP. TO JETS (0-600°F) R	414	"	"	"	"	"	408°	420°	"							
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	126	140	147	140	140	133	140°	133°	140°							
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	110	"	"	"	"	"	"	"	"							
TRAVEL	PR 522 PRESS. TO JETS	290	"	"	"	"	"	"	"	"							
TRAVEL	TR 524 TEMP. TO JETS	414	"	"	"	"	"	408°	420°	"							
TRAVEL	TR 531 COKE GAS TEMP.	154	154	168	154	154	154	140°	140°	154°							
	ANNUBAR MANO. FULL	OUT OF ORDER															
	ANNUBAR MANO. TRAVEL																
	COKE GAS TEMP. AT TWR.	175	196	224	175	196	217	180°	154°	161°							

DATE: 1 21-84 TEST DESCRIPTION: CAR #1 SATURATION SPRAY TEST #2 Test 3-2
CAR #: 1
BAT. #: 20

10-21-84

		1	2	3	4	5	6	7	8	9	10	11	12		
OVEN NUMBER		A-24	B-24	C-24	A-26	B-26	C-26	A-28	B-28	C-28	A-1	B-1	A-3	B-3	A-5
TIME AT START OF PUSH		1 12	1 24	1 38	1 51	2 03	2 15	2 27	2 47	2 58	3 11	3 29	3 53	4 04	4 28
OVEN SCRUBBED (Y OR N)		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	118%	"	"	"	"	"	"	"	"	"	"	"		
TR 509	HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	432°	"	"	"	"	"	"	"	"	"	"	"		
SEPARATOR INLET PRESSURE (IN. W.C.)		12	12			12		12		12			12		
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	400	"	"	"			"	400		"	360	400		
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	305	"	"	"			"	310	"	"	335	305		
FULL	TR 524 TEMP. TO JETS (0-600°F) R	420°	"	426°	432°			414°	420°	426°	"	"	420°		
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	140°	140°	133°	140°		133°		147°	140°	168°	140°	147°		
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	110	"	"	"	"	"	"	"	"	"	"	"	"	
TRAVEL	PR 522 PRESS. TO JETS	275	"	"	"	"	"	"	300	"	"	275	300	325	
TRAVEL	TR 524 TEMP. TO JETS	420°	"	426°	432°	"	410°	414°	420°	426°	"	"	"	420	
TRAVEL	TR 531 COKE GAS TEMP.	147°	140°	140°	140°	147°	140°	147°	147°	147°	147°	147°	147°	140°	
AMMONIA MAND. FULL		2.7	2.85			2.8		2.15		3.0			2.8		
AMMONIA MAND. TRAVEL					1.1	1.4				1.25					
COKE GAS TEMP. AT TWR.		182°	175°	192°	161°	182°	182°	189°	154°	182°	161°	161°	163°		

DATE : [illegible] 23-84
CAR # : 4
BAT. # : 20

TEST DESCRIPTION : CAR [illegible] [illegible]URATION SPRAY TEST #3

Test 3-3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	A-17	B-17	C-17	A-19	B-19	C-19	A-21	B-21	C-21	A-23	B-23	C-23	A-25	B-25	C-25	A-29
	TIME AT START OF PUSH	12 36	12 50	1 03	1 20	1 33	1 46	2 02	2 16	2 36	2 53	3 06	3 18	3 32	3 46	3 59	4 48
	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	77%	"	"	74%	77%	"	"	"	75%	74%	77%	75%	77%	"	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	432°	"	"	"	"	"	"	"	429°	"	"	"	"	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)		12			12			12			12			12		
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	408		400	396		396	"	315	375	360	375	"	"	"	"	"
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	305	"	310	[illegible]	310	[illegible]	"	300	285	285	295	"	"	"	"	"
FULL	TR 524 TEMP. TO JETS (0-600°F) R	408°	426°	408°	414°	"	[illegible]	414°	420°	426°	"	423°	420°	"	426°	420°	"
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	147°	140°	140°	126°	140°	147°	[illegible]	133°	126°	133°	140°	154°	154°	147°	161°	168°
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	110	110	110	"	"	"	"	"	"	"	"	"	"	"	"	"
TRAVEL	PR 522 PRESS. TO JETS	295	"	300	285	[illegible]	[illegible]	"	290	275	275	285	"	"	"	"	"
TRAVEL	TR 524 TEMP. TO JETS	414°	[illegible]	[illegible]	[illegible]	"	[illegible]	[illegible]	420°	426°	423°	"	420°	"	426°	420°	"
TRAVEL	TR 531 COKE GAS TEMP.	140°	140°	140°	133°	140°	[illegible]	147°	133°	133°	133°	147°	140°	147°	147°	147°	147°
	ANNUBAR MAND. FULL		INOPERABLE														
	ANNUBAR MAND. TRAVEL																
	COKE GAS TEMP. [illegible] TWR.	154°	175°	182°	[illegible]	175°	[illegible]	168°	168°	168°	147°	168°	175°	161°	168°	182°	168°

DATE : / 13-84
CAR # : 7
BAT. # : 20

TEST DESCRIPTION : CAR #4 [illegible] SPRAY TEST #3 (Con[illegible])

Test 3-3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	B-29	C-29	A-2	B-2	C-2	A-4	B-4	C-4								
	TIME AT START OF PUSH	5 00	5 13	5 25	5 37	5 50	6 02	6 15	6 27								
	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%) R	77%	"	"	"	"	"	76%	"								
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	429°	"	"	"	"	"	"	"								
	SEPARATOR INLET PRESSURE (IN. W.C.)	12			12			12									
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	375	"	"	"	"	"	"	"								
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	295	"	"	"	"	"	"	"								
FULL	TR 524 TEMP. TO JETS (0-600°F) R	420°	"	410°	"	402°	[illegible]0°	410°	"								
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	161°	154°	163°	154°	154°	154°	147°	154°								
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	110	"	"	"	"	"	"	"								
TRAVEL	PR 522 PRESS. TO JETS	18[illegible]	"	"	"	"	"	"	"								
TRAVEL	TR 524 TEMP. TO JETS	420°	"	410°	"	402°	410°	"	"								
TRAVEL	TR 531 COKE GAS TEMP.	[illegible]°	140°	147°	147°	140°	147°	140°	140°								
	ANNULAR MANO. FULL																
	ANNULAR MANO. TRAVEL																
	COKE GAS TEMP. AT TWR.	163°	189°	161°	[illegible]3°	175°	[illegible]	163°	192°								

DATE : 10 1-84
CAR # : 4
BAT. # : 20

TEST DESCRIPTION : CAR #4 SATURATION SPRAY TEST #4

10-24-84

Test #3-4

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	OVEN NUMBER	C-25	A-27	B-27	C-27	A-29	B29	C-29	A-2	B-2	C-2	A-4	B-4	C-4	A-6	B-6	C-6
	TIME AT START OF PUSH	9 57	10 11	10 23	10 35	10 49	11 02	11 28	11 43	11 57	12 09	12 22	12 34	12 47	12 59	1 11	1 24
	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	76%	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	TR 509 HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	426°	429°	"	"	"	"	426	429°	"	"	"	"	"	"	"	"
	SEPARATOR INLET PRESSURE (IN. W.C.)	11			11.5			10.5			11.5			11			
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	375	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	287	290	295	297	295	"	300	295	"	"	297	"	300	297	"	292
FULL	TR 524 TEMP. TO JETS (0-600°F) R	408	414°	417°	420°	423°	426°	426	429°	420°	426°	429°	426°	429°	426°	[illegible]	426
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	147°	147°	147°	161°	161°	161°	.	182°	175°	161°	168°	182°	175°	182°	[illegible]	154°
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	110	"	"	"	"	"	110	"	"	"	"	"	"	"	"	"
TRAVEL	PR 522 PRESS. TO JETS	280	"	285	287	285	"	295	285	"	"	"	287	290	290	287	285
TRAVEL	TR 524 TEMP. TO JETS	408°	414°	417°	[illegible]	[illegible]	[illegible]	420	[illegible]	420°	426°	[illegible]	[illegible]	429°	426°	[illegible]	426
TRAVEL	TR 531 COKE GAS TEMP.	[illegible]	140°	140°	154°	147°	[illegible]	140	[illegible]	154°	147°	154°	154°	147°	147°	154°	147
	ANNULAR MANO. FULL	2.6			2.7			2.6			2.7			2.65			
	ANNULAR MANO. TRAVEL		1.25			1.2			1.4			1.3			1.3		
	COKE GAS TEMP. AT TWR.	196°	182°	182°	210°	168°	182°	210	168°	168°	175°	161°	168°	182°	[illegible]	[illegible]	[illegible]

DATE : 10 4-84
CAR # :
BAT. # : 20

TEST DESCRIPTION : CAR #4 [illegible] SPRAY TEST #4 (Con

10-24-84

Test # 3-4

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
OVEN NUMBER		A-8	B-8	C-8	A-10	B-10	C-10	A-12	B-12								
TIME AT START OF PUSH		1 31	1 49	2 03	2 15	2 29	2 41	[illegible] 53	3 06								
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%) R	76%	"	"	"	"	"	"	"								
TR 509	HOT WATER TANK TEMP BEFORE PUSH (0-600°F) G	429°	"	"	"	"	"	"	"								
SEPARATOR INLET PRESSURE (IN. W.C.)		11				11											
FULL	FR 521 FLOW TO JETS (0-600 GPM) B	375	"	360	370	"	"	"	"								
FULL	PR 522 PRESS. TO JETS (0-500 PSIG) G	295	"	292	297	297	"	"	"								
FULL	TR 524 TEMP. TO JETS (0-600°F) R	429°	"	426°	"	"	"	"	"								
FULL	TR 531 COKE GAS TEMP. (0-700°F) P	175°	154°	175°	161°	161°	175°	163°	168°								
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	110	"	"	"	"	"	"	"								
TRAVEL	PR 522 PRESS. TO JETS	290	287	282	287	289	"	"	"								
TRAVEL	TR 524 TEMP. TO JETS	429°	"	426	"	"	"	"	"								
TRAVEL	TR 531 COKE GAS TEMP.	140°	147°	147°	147°	154°	140°	147°	140°								
ANNUAL MAND. FULL		2.6				2.1											
ANNUAL MAND. TRAVEL			1.3				1.25										
COKE GAS TEMP. TWR.		161°	182°	175°	175°	175°	182°	161°	168°								

APPENDIX B

SAMPLE TRAIN DATA SHEETS

FIL DATA

Plant USS-CLAIRTON, PA
Date 12-5-84
Sample Location HCRC-TEST CAR
Sample Type M-5
Run Number 7.1
Operator JARMMO/SMITH
Ambient Temperature ~ 29°F
Barometric Pressure 29.42 @ 4:00P
Static Pressure, (H_2O)
Filter Number(s) RA1026-045

Leak Check: Initial at 16" Hg, .004 CFM
Final at 15" Hg, .004 CFM
Pitot Leak Check: OK

	Impinger Volumes Initial	Final	Net Gain
TRAIN A	100	356.0	256.0
	100	140.0	40.0
	M/T	1.0	1.0
TRAIN B	100	101.0	1.0
	100	100.0	Ø
	M/T	0.0	Ø

Silica Gel		
687.3	691.4	
736.0	743.5	

SASS Condensate N/A
Total Volume

Probe Length and Type 5' TFE LINED
Nozzel Size & I.D. ~~.287~~ .293 (302)
Pitot Coefficient & I.D. .84
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12 LG
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

P.H. — 3.5
RANGE - 4.17 → 15.00

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 288.474														
1-6	:44	289.21	.80		18.7	164	271	37	38		270	37	37	NA		NA
	:55	289.737	.25		9.8	158	272	35	35		273	38	37	1		.09
1-5	:45	290.31	.50		14.5	154	264	38	38		266	39	38	2		.28
	:43	290.607	.20		.11ΔH	157	269	38	39		271	39	38	1		.11
1-4	:44	291.15	.45		13.7	156	266	38	38		267	40	39	2		.25
	:49	291.508	.20		.11ΔH	158	269	38	39		267	41	39	1		.11
1-3	:45	292.30	.80		18.7	157	266	40	40		266	43	43	4		.42
	:38	292.638	.20		.11	161	269	40	40		267	44	42	1		.11
AVG.																

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 292.638														
1-2	:45	~~292.638~~ 151	1.0		21.1	156	265	40	40		267	44	43	4		.58
	:47	393.45	.25		9.8	156	269	39	39		265	45	43	1		.13
1-1	1) :47	394.92	1.7	28.6	27.0	159	265	40	40		266	45	44	6		.81
	:46	395.530	.40		12.8	162	263	40	40		267	45	43	2		.21
2-6	:44	397.65/ 2)	1.3		24.0	155	268	40	40		265	45	44	5		.70
	:32	398.035	.35		11.9	169	270	39	40		268	46	44	1		NA
2-5	:46	298.92	1.2		23.2	155	268	40	40		263	45	45	5		.65
	:46	299.468	.30		10.9	158	270	40	40		266	46	44	1		.19
2-4	3) :47	300.43	1.4		25.2	152	268	40	40		260	46	45	5.5		.74
	:51	301.063	.40		12.8	160	270	39	39		262	46	44	1		.26
2-3	:47	302.00	1.3		24.2	154	267	40	40		262	46	45	5		.70
	:37	302.425	.35		11.9	159	268	39	39		269	46	44	1		.20
2-2	4) :46	303.41	1.4		25.2	156	266	40	40		270	46	45	6		.75
	:48	304.05	.50		14.5	159	268	40	40		270	46	45	2		.30
2-1	:46	305.04		~~27.0~~ 27.9	27.0	156	266	40	40		270	46	46	6		.80
	:53	305.717			12.8	158	267	40	40		268	47	45	2		.28
AVG.																

Run No. 7.1 Date 12-5-84 Sampling Location HCQC - TEST SAR

Comments: 1) Could not pull my desired rate 4) ORSAT Back on
2) Orsat off for repair
3) Initial Gas meter reading for this point was 397.017 (397.65 was end of push reading
[illegible] No reading taken

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger A	Impinger B	FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 305.717														
3-6	~~3:00~~ :46	306.72	1.6		27.0	154	270	40	40		266	47	46	6		.83
	:38	307.159	.35		11.9	157	271	40	40		266	47	45	1		.21
3-5	:45	308.17	1.6		27.0	154	268	41	40		262	47	46	6		.85
	:45	308.720	.30		10.9	155	271	40	40		268	48	46	1		.23
3-4	:46	309.54	.95		20.5	154	268	40	40		270	48	46	NA		.54
	:59	310.051	.25		9.8	157	271	40	40		270	48	46	1		.13
3-3	:46	310.84	.80		18.7	156	267	40	40		263	48	47	3		.46
	:41	311.123	.20		.11	158	271	40	40		267	48	47	1		.11
3-2	:44	311.93	.95		20.5	155	267	40	40		267	48	47	4		.55
	:45	312.331	.25		9.8	157	270	40	40		270	48	47	1		.14
3-1	:46	313.19	1.1		22.2	159 ~~267~~	266	40	40		270	48	47	NA		.62
	1) :54	313.674	.25		9.8	159	269	40	40		269	48	47	1		.14
4-6	:43	314.37	.80		18.7	154	265	40	40		266	48	47	3		.45
	:45	314.776	.25		9.8	156	270	40	40		253	49	47	1		.13
4-5	:45	315.42	.55		15.3	157	268	41	41		270	49	48	2		.33
	:45	315.670	.15		.080H	155	271	41	41		273	49	47	≈ 1		.08
AVG.																

Run No. 7.1 Date 12-5-84 Sampling Location HCQC - TEST CAR

Comments: 1) Static taken ~~port~~ port #3 Push = .10
travel = .03

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 315.670														
4-4	:43	316.40	.80		18.7	157	268	41	41		269	49	48	4		.47
	:57	316.907	.25		9.8	157	271	41	41		269	49	48	1		.15
4-3	:46	317.89	1.5		26.2	158	267	41	41		268	49	48	6		.82
	:38	318.344	.30		10.9	156	272	41	41		270	50	48	1		.22
4-2	:45	319.27	1.5		26.2	157	266	41	41		267	50	48	6		.77
	:47	319.782	.30		10.1	156	270	41	41		267	50	48	1		.19
4-1	[1]		1.2		23.2	162	266	41	41		265	50	49	5		.67
		321.203	.25		9.8	157	264	41	41		260	50	48	1		.16
AVG.																

Run No. 7.1 Date 12-5-84 Sampling Location HCDC - TEST CAR

Comments: [1] H_2O in Pitot Line - no gas meter reading taken at end of push
no time for push taken

DATE - 12-5-84

RUN # - 7.1

PLANT - USS - CLAIRTON

TRAVERSE POINT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6	C-26	.80	.80 / .25	18.7 / 9.8	1:41	
1.5	A-28	.60	.50 / .20	14.5 / .11ΔH	1:28	
1.4	B-28		.45 / .20	13.7 / .11ΔH	1:33	
1.3	A-1		.80 / .20	18.7 / .11ΔH	1:23	
1.2	B-1		1.0 / .25	21.1 / 9.8	1:32	
1.1	C-1		1.7 / .40	28.6 / 12.8	1:33	
2.6	A-3		1.3 / .35	24.2 / 11.9	1:18	
2.5	B-3		1.2 / .30	23.2 / 10.9	1:32	
2.4	C-3		1.4 / .40	25.2 / 12.8	1:38	
2.3	A-5		1.3 / .35	24.2 / 11.9	1:24	
2.2	B-5		1.4 / .50	25.2 / 14.5	1:34	
2.1	C-5		1.7 / .40	27.9 / 12.8	1:39	
3.6	A-7		1.6 / .35	27.0 / 11.9	1:24	
3.5	B-7		1.6 / .30	27.0 / 10.9	1:30	
3.4	C-7		.95 / .25	20.5 / 9.8	1:45	
3.3	A-9		.80 / .20	18.7 / .11ΔH	1:27	
3.2	B-9		.95 / .25	20.5 / 9.8	1:31	
3.1	C-9		1.1 / .25	22.2 / 9.8	1:40	
4.6	A-11		.80 / .25	18.7 / 9.8	1:28	
4.5	B-11		.55 / .15	15.3 / .08ΔH	1:31	
4.4	C-11		.80 / .25	18.7 / 9.8	1:40	
4.3	A-13		1.5 / .30	26.2 / 10.9	1:24	
4.2	B-13		1.5 / .30	26.2 / 10.9	1:32	
4.1	C-13		1.2 / .25	23.2 / 9.8	1:39	
AVG.					TOTAL TIME	

[illegible]	[illegible]	Rotometer Reading
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.12	[illegible]	8.6
0.25	0.14	9.8
0.30	0.15	10.9
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.50	0.26	14.5
0.55	0.31	15.2
0.60	0.34	16.3
0.65	0.37	16.7
[illegible]	0.40	17.1
0.75	0.42	18.0
0.80	0.45	18.7
0.85	0.46	19.3
0.90	0.52	20.2
0.95	0.54	20.5
[illegible]	0.57	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	22.6
[illegible]	0.69	23.2
[illegible]	0.72	23.7
1.30	0.75	24.2
1.35	0.78	24.7
1.40	0.81	25.2
1.45	0.85	25.7
1.50	0.88	26.2
1.55	0.90	26.6
1.60	0.93	27.0
1.65	0.97	27.5
1.70	1.00	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
2.30	1.36	32.7
2.35	1.39	33.0
2.40	1.42	33.4

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON
DATE 12-5-84 TEST No 7.1
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HSQC - TEST CAR
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 25°C
OPERATOR R. DeRoy

COMMENTS:

RUN / GAS	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	44/100	0.88
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.2	18.2	20.2	18.2	20.2	18.2	18.2	32/100	5.824
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.4	0.2	20.4	0.2	20.4	0.2	0.2	28/100	0.056
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100	79.6		79.6		79.6	79.6	28/100	22.288
								TOTAL	29.048

EPA (Dur) 230
4.72

FIL DATA

Plant U.S.S. Clairton
Date 12-6-84
Sample Location HCQC-TEST CAR
Sample Type M-5
Run Number 7.2
Operator JARMAN/Smith
Ambient Temperature ~ 30°F
Barometric Pressure 29.01 @ 12:25P
Static Pressure, (H_2O) ___
Filter Number(s) RA 1036-046

Leak Check: Initial at 17 " Hg, .002 CFM
Final at 16 " Hg, .002 CFM
Pilot Leak Check: OK

Impinger Volumes

	Initial	Final	Net Gain
A	100.0	338.0	238
	100.0	238.0	138
	~~0~~	~~0~~	~~0~~
B	100.0	108.0	8
	100.0	100.0	~~0~~
	~~0~~	~~0~~	~~0~~

Silica Gel

691.4	696.4	___
243.5	252.2	___

SASS Condensate N/A

Total Volume ___

Probe Length and Type 5' TFL
Nozzel Size & I.D. .301 "
Pitot Coefficient & I.D. .84
Assumed Moisture ___
Molecular Weight, Dry, (M_d) ___
Meter Box Number APT 12
Meter Coefficient ___
α Factor ___
K = ___
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Purge - 8.7 to 18.7
PH - 2.5

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 321.875														
1-6	1 :43	322.55	.60	18.7	16.0	162	271	40	40		266	41	41		3	.37
	:41	322.840	.20	9.8	.11ΔH	162	269	40	40		269	42	41		1	.11
1-5	:46	323.44	.45	14.5	13.7	156	270	40	40		265	42	42		2	.30
	:46	323.718	.15	.11ΔH	.08ΔH	163	269	40	40		262	42	41		1	.08
1-4	:48	324.35	.50	13.7	14.5	157	266	40	40		264	43	42		3	.30
	:58	324.60	.15	.11ΔH	.08ΔH	163	269	40	40		265	44	42		1	.08
1-3	:45	325.37		18.7	16.7	157	265	40	40		266	44	43		3	.39
	:41	325.674		.11ΔH	.11ΔH	165	269	40	40		264	44	43		1	.11
AVG.																

Comments: 1 Desired Roto readings are used as a reference used for todays test.

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Probe Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 325.694														
1-2	:46	326.55	.95	21.1	20.5	165	264	40	40		266	45	44	5		.53
	:49	326.969	.25	9.8	9.8	166	268	40	40		266	45	43	1		.16
1-1	:47 ‖	328.03	1.9	29.6	27.0	166	265	40	40		268	46	44	7		.75
	:57	328.877 PCB #77	.40	12.8	12.8	164	266	40	40		267	46	44	2		.27
2-6	:45	329.63	1.4	24.2	25.2	165	267	40	40		268	46	45	7		.75
	:41	330.145	.35	11.9	11.9	163	268	40	40		265	47	45	NA		.22
2-5	:45	331.05	1.2	23.2	23.0	159	266	40	40		260	47	46	5		.65
	:49	331.592	.30	10.9	10.9	164	267	40	40		263	47	46	1		.22
2-4	:46	332.48	1.0	25.2	21.1	155	265	40	40		263	48	46	6		.50
	:55	333.145	.40	12.8	12.8	162	265	40	40		263	48	46	1		.25
2-3	:45	334.10	1.6	24.2	27.0	163	265	40	40		260	48	47	7		.78
	:40	334.628	.45	11.9	13.7	162	265	40	40		260	48	47	NA		.28
2-2	:46	335.61	1.6	25.2	27.0	158	264	40	40		264	48	47	7		.77
	:49	336.317	.40	14.5	12.8	162	264	40	40		267	49	47	2		.26
2-1	:46	337.27	1.3	27.9	24.2	169	264	40	40		264	48	47	6.5		.73
	:56	338.054	.55	12.8	15.3	166	270	40	40		265	49	47	3		.35
AVG.																

Run No. T.T 7.2 Date 12-6-84 Sampling Location HCQC Test car

Comments: ‖ Could not pull desired rate of 29.6

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger A	Impinger B	FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 338.054														
3-6	:47	339.05	1.6	27.0	1.6	158	270	40	40		267	49	48	7		.76
	:37	339.510	.35	11.9	.35	160	269	40	40		269	47	47	NA		.25
3-5	:44	340.42	1.1	27.0	22.2	158	268	40	40		262	49	48	5		.64
	:49	340.958	.35	10.9	11.9	161	270	40	40		261	49	48	2		.24
3-4	:46	341.74	.95	20.5	20.5	172	265	40	40		262	50	48	NA		.48
	:57	342.193	.25	9.8	9.8	167	266	40	40		265	50	48	1		.13
3-3	:46	342.95	.80	18.7	18.7	159	265	40	40		266	49	48	4		.45
	:45	343.28	.25	.11ΔH	9.8	160	268	40	40		269	50	48	1		.12
3-2	:44	344.06	.95	20.5	20.5	157	265	40	40		266	50	48	5		.55
	:49	344.480	.25	9.8	9.8	163	266	40	40		265	50	48	1		.15
3-1	:47	345.37	1.2	22.2	23.2	156	261	40	40		267	50	48	7		.57
	:57	346.030	.30	9.8	10.9	172	267	40	40		270	50	48	2		.20
4-6	:46	346.69	.55	18.7	15.3	154	268	40	40		269	50	49	4		.35
	:42	346.865	.15	9.8	.08	159	270	40	40		268	50	49	1		.08
4-5	:47	347.44	.40	15.3	12.8	154	266	40	40		263	50	49	3		.24
	:45	347.580	.10	.08ΔH	.08ΔH	159	269	40	40		263	50	49	1		.05
AVG.																

Run No. 7.2 Date 12-6-84 Sampling Location HCQC test car

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 347.580														
4-4	:45	348.2	.65	18.7	16.7	157	265	40	40		261	50	48	5		.33
	:58	348.520	.15	9.8	.08	164	270	40	40		260	50	48	1		.08
4-3	:46 [1]	349.36	1.3	26.2	24.2	169	265	40	40		264	50	48	9		.70
	:41	349.867	.30	10.9	10.9	168	269	40	40		264	50	48	NA		.23
4-2	:45	350.800	1.4	26.2	25.2	168	264	40	40		265	50	49	8		.65
	:57	351.473	.30	10.9	10.9	165	266	40	40		265	50	48	3		.17
4-1	:45	352.37	1.3	25.2	24.2	163	263	40	40		266	49	48	8		.61
	1:01	352.925	.25	9.8	9.8	164	263	40	40		266	50	48	2		.13
	[2]															
AVG.																

Run No. 7.2 Date 12-6-84 Sampling Location HCQC test car

Comments: [1] High vaccum due to H_2O in 1st imp. train A impinger is getting full, carrys over

[2] Static. Push travel -.25 None rubber shutoff

DATE - 12-6-84

RUN # - 7-2

PLANT-USS-CLAIRTON

RAVERSE POINT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6	A-9	.80 / .25	.60 / .20	16.0 / .11ΔH	1:24	
1.5	B-9	.50 / .20	.50(.45) / .15	14.5(13.7) / .08ΔH	1:32	
1.4	C-9	.45 / .20	.50 / .15	14.5 / .08ΔH	1:46	
1.3	A-11	.80 / .20	.75(.65) / .20	18.0(16.7) / .11ΔH	1:26	
1.2	B-11	1.0 / .25	.95 / .25	20.5 / 9.8	1:35	
1.1	C-11	1.7 / .40	1.9 / .40	29.6 / 12.8	1:44	
2.6	A-13	1.3 / .35	1.4 / .35	25.2 / 11.9	1:26	
2.5	B-13	1.2 / .30	1.2 / .30	23.2 / 10.9	1:34	
2.4	C-13	1.4 / .40	1.0 / .40	21.1 / 12.8	1:41	
2.3	A-15	1.3 / .35	1.6 / .45	27.0 / 13.7	1:25	
2.2	B-15	1.4 / .50	1.6 / .40	27.0 / 12.8	1:35	
2.1	C-15	1.7 / .40	1.3 / .55	24.2 / 15.3	1:42	
3.6	A-17	1.6 / .35	1.6 / .35	27.0 / 13.7	1:26	
3.5	B-17	1.6 / .30	1.1 / .35	22.2 / 11.9	1:33	
3.4	C-17	.95 / .25	.95 / .25	20.5 / 9.8	1:43	
3.3	A-19	.80 / .20	.80 / .25	18.7 / 9.8	1:31	
3.2	B-19	.95 / .25	.95 / .25	20.5 / 9.8	1:33	
3.1	C-19	1.1 / .25	1.2 / .30	23.2 / 10.9	1:44	
4.6	A-21	.80 / .25	.55 / .15	15.3 / .08ΔH	1:28	
4.5	B-21	.55 / .15	.40 / .10	12.8 / .05ΔH	1:32	
4.4	C-21	.80 / .25	.65 / .15	16.7 / .08ΔH	1:43	
4.3	A-23	1.5 / .30	1.3 / .30	24.2 / 10.9	1:27	
4.2	B-23	1.5 / .30	1.4 / .30	25.2 / 10.9	1:42	
4.1	C-23	1.2 / .25	1.3 / .25	24.2 / 9.8	1:44	
Avg.					TOTAL TIME	

[illegible] Vel. Head in H2O	Office [illegible] in W.C.	Rotometer Reading
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.25	0.14	9.8
0.30	0.16	10.9
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.50	[illegible]	14.5
0.55	[illegible]	15.3
0.60	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.80	0.45	18.7
[illegible]	0.49	19.3
[illegible]	[illegible]	20.0
[illegible]	[illegible]	20.5
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	22.6
[illegible]	[illegible]	23.2
[illegible]	[illegible]	23.7
[illegible]	0.76	24.2
1.35	0.78	24.7
1.40	0.81	25.2
1.45	0.85	25.7
[illegible]	0.88	[illegible]
1.55	0.90	26.6
1.60	0.93	27.0
1.65	0.97	27.5
1.70	1.00	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
2.30	1.36	32.7
2.35	.39	33.0
2.40	1.42	33.[illegible]

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON
DATE 12-6-84 TEST 7.2
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HSQC - TEST CAR
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 23°C ~3:30P
OPERATOR B. DeRoy

COMMENTS:

RUN / GAS	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	44/100	0.968
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.6	17.4	19.4	17.2	19.4	17.2	17.266	32/100	5.525
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.8	0.2	19.8	0.4	19.8	0.4	0.33	28/100	0.093
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100	80.2	100	80.2	100	80.2	80.20	28/100	22.456
								TOTAL	29.042

EPA (Dur) 230
4.72

F DATA

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Plant USS-CLAIRTON, PA
Date 12-13-84
Sample Location HCQC-TESTCAR
Sample Type M-5
Run Number 7.3 (Blank)
Operator TARMAN/MILBURN
Ambient Temperature
Barometric Pressure
Static Pressure, (H_2O)
Filter Number(s) RA1026-047

Leak Check: Initial at 20 " Hg, 0.000 CFM
Final at 15 " Hg, 0.000 CFM
Pitot Leak Check: OK

Impinger Volumes

	Initial	Final	Net Gain
TRAIN A	100	100.0	
	100	100.0	
	M/T	Ø	
TRAIN B	100	100.0	
	100	100.0	
	M/T	Ø	
Silica Gel	666.0	673.4	7.4
	659.6	662.0	2.4

SASS Condensate N/A

Total Volume

Probe Length and Type 5' TFE
Nozzel Size & I.D. 0.302 (302)
Pitot Coefficient & I.D.
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12 16
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Purge 5.80 to 15.8
P.H. 5.0

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 354.233														
1-6																
1-5																
1-4																
1-3																
AVG.																

Comments:

Plant USS Clairton PA
Date 12-13-84
Sample Location HCGC test gas
Sample Type M-5
Run Number 7.4
Operator JARMAN/Milburn
Ambient Temperature 60° F
Barometric Pressure 29.24 @ 12:25P
Static Pressure, (H_2O)
Filter Number(s) RA 1026-048

Leak Check: Initial at 16" Hg, .006 CFM
Final at 16" Hg, .007 CFM
Pitot Leak Check: OK

Impinger Volumes

	Initial	Final	Net Gain
A	100.0	398.0	298
	100.0	101.0	1
	M/T	1.0	1
B	100.0	138.0	38
	100.0	102.0	2
	M/T	1.0	1
Silica Gel	673.4	678.6	
	662.0	671.8	
SASS Condensate			
Total Volume			NA

Probe Length and Type 5' TFE
Nozzel Size & I.D. 0.302 #302
Pitot Coefficient & I.D. .84
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{T_m}{T_s}\right)$ (P)

Purge 72.1 to 82.1 CFM
PH 3.0

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Probe Stack Travel	Probe	Impinger	Impinger	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 355.297														
1-6	:45	356.07	1.0	18.7	21.1	NA	265	67	67		268	66	65	NA		.50
	:44	356.675	.40	~~14.5~~ 9.8	12.8	160	270	65	65		269	66	64	NA		.23
1-5	:47	357.29	.60	14.5	16.0	158	265	67	67		268	67	65	NA		NA
	:56	357.716	.15	.11ΔH	.08ΔH	161	268	62	62		268	68	66	1		.08
1-4	:46	358.32	.65	13.7	16.7	159	263	68	68		267	68	67	3		.33
	:32	358.620	.20	.11ΔH	.11ΔH	161	266	66	66		269	69	67	1		.11
1-3	:43	359.35	.95	18.7	20.5	159	264	68	68		267	69	68	3		.50
	:43	359.765	.35	.11ΔH	11.9	161	268	64	63		264	68	68	1		.16
AVG.																

Comments: ‖ Desired Rotometer reading is used as a reference

30.4

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotameter Desired	Rotameter Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 359.765														
1-2	:45	360.55	~~.95~~ 1.0	21.1	22.2	158	263	66	66		253	70	69	3.5		.56
	:51	361.057	~~.35~~ .35	9.8	11.8	162	266	61	61		250	71	69	1		.20
1-1	1 :47	362.15	2.0	~~28.6~~ 30.4	26.0	157	262	66	66		256	71	70	6		.75
	:38	362.660	.65	12.8	16.7	155	264	58	58		258	72	70	2		.34
2-6	:46	363.56	1.4	24.2	25.7	157	262	65	65		263	72	70	6		.61
	:43	364.098	.50	11.9	14.5	159	267	60	58		258	72	70	2		.29
2-5	:45	364.80	.65	23.2	16.7	158	265	65	65		256	72	71	5		.37
	:57	365.172	.20	10.9	.11 ΔH	160	266	60	60		256	72	70	2		.11
2-4	:48	365.80	.60	25.2	16.0	161	264	65	65		261	72	71	3		.32
	:38	366.144	.40	12.8	12.8	160	264	60	60		259	72	70	2		NA
2-3	:44	367.09	1.89 ~~.65~~	~~24.2~~ 28.6	28.6	161	263	65	65		260	72	71	6		.77
	:42	367.739	.65	11.9	16.7	162	262	59	59		260	72	72	3		.36
2-2	:45	368.73	1.5	25.2	26.2	157	262	65	65		261	72	71	6		.78
	:55	369.482	.55	14.5	15.3	165	265	59	59		262	72	71	2		.37
2-1	2 :46	370.47	2.1	27.9	25.0	159	262	65	65		265	73	71	6		.75
	:37	371.065	.70	12.8	17.4	160	261	59	58		265	73	71	2		NA
AVG.																

Run No. ~~7.3~~ PB 7.4

Date ~~12-12-84~~ PB 12-13-84

Sampling Location HCRC - TEST CAR

Comments: 1 actual desired rotometer reading was 30.4, only able to pull 28.6
2 " " " " " 31.1 " " " " 25.0

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 371.065														
3-6	:46	372.04	1.2	27.0	23.2	163	263	65	65		269	73	71	5		.64
	:46	372.587	.40	11.9	12.8	163	267	59	59		268	73	71	1		.20
3-5	:44	373.47	1.1	27.0	22.2	161	264	66	66		261	73	72	5		.60
	:55	374.126	.35	11.9	11.8	160	267	60	60		262	73	72	1		.20
3-4	:44	374.95	1.0	20.5	21.1	158	263	67	66		260	73	72	3.5		.54
	:38	375.365	.30	9.8	10.9	157	269	60	60		262	73	71	1		.16
3-3	:44	376.23	.90	18.7	20.0	164	263	67	67		260	74	73	NA		.65
	:49	376.262	.27	.11ΔH	10.5	161	267	60	60		259	74	72	1		.26
3-2	:44	377.74	1.0	20.5	21.1	162	263	67	67		262	74	73	4		.65
	:56	378.486	.35	9.8	11.9	162	264	60	60		263	74	73	2		.26
3-1	:44	379.47	1.45	22.2	25.7	158	262	67	67		266	74	73	5		.78
	:41	380.157	.45	9.8	13.7	160	266	60	60		268	75	73	2		.35
4-6	:43	381.05	.75	18.7	18.0	158	265	66	66		269	74	73	4		.61
	:47	381.679	.25	9.8	9.8	160	269	59	59		269	74	73	1		.21
4-5	:44	382.46	.50	16.3	14.6	171	264	67	67		264	74	73	3		.42
	:58	383.140	.15	.08ΔH	.08ΔH	163	265	61	61		263	75	73	1		.08
AVG.																

Run No. ~~7.5~~ PB 7.4

Date ~~12-12-84~~ PB 12-13-84

Sampling Location HCRC - DEST CAR

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³ Init. 383.140	Velocity Head (ΔP_s), in. H_2O	Rotameter Desired	Rotameter Actual	Temperature °F Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	Δ H
4-4	:46	1/ 384.040	.95	18.7	20.5	159	264	68	68		254	74	73	4		.59
	:38	384.482	.25	9.8	9.8	159	267	60	60		258	75	73	1		NA
4-3	:45	385.50	1.5	26.2	26.2	156	261	68	68		254	75	74	6		.78
	:53	386.383	.45	10.9	13.7	160	264	60	60		257	75	74	2.5		.40
4-2	:46	387.45	1.95	~~26.8~~ 30.0	26.0	160	261	68	68		258	75	74	6		.77
	:56	388.301	.40	10.9	12.8	161	263	60	60		259	75	74	2		.35
4-1	:45	389.30	1.5	23.2	26.2	157	264	68	68		264	75	74	6		.79
	:40	389.45	.35	9.8	11.9	160	260	60	60		263	75	74	1		.32
AVG.																

Run No. ~~7.3~~ PJ 7.4

Date ~~12-12-84~~ PJ 12-13-84

Sampling Location HCQC - TEST CHR

Comments: 1/ mis-read meter reading

Push - .07

Static travel - .05

DATE - [illegible]

RUN # - 7.4

PLANT-USS-CLAIRTON

TRAVERSE POINT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6	B-1		.60 / .40	21.1 / 12.8	1:29	
1.5	C-1		.60 / .17	16.0 / .08ΔH	1:43	
1.4	A-3		.65 / .20	16.7 / .11ΔH	1:18	
1.3	B-3		.95 / .35	20.5 / 9.8	1:26	
1.2	C-3		1.0 / .35	22.2 / 11.8	1:36	
1.1	A-5		2.0 / .65	30.4 / 16.7	1:25	
2.6	B-5		1.45 / .50	25.7 / 14.5	1:29	
2.5	C-5		.65 / .20	16.7 / .11ΔH	1:42	
2.4	A-7		.60 / .40	16.0 / 12.8	1:26	
2.3	B-7		1.80 / .65	28.6 / 16.7	1:28	
2.2	C-7		1.5 / .55	26.2 / 15.3	1:40	
2.1	A-9		2.10 / .70	31.1 / 17.4	1:23	
3.6	B-9		1.2 / .40	23.2 / 12.8	1:32	
3.5	C-9		1.10 / .35	22.2 / 11.8	1:41	
3.4	A-11		1.0 / .30	21.1 / 10.9	1:22	
3.3	B-11		.90 / .27	20.0 / 10.5	1:33	
3.2	C-11		1.0 / .35	21.1 / 11.9	1:40	
3.1	A-13		1.45 / .45	25.7 / 13.7	1:25	
4.6	B-13		.75 / .25	18.0 / 9.8	1:30	
4.5	C-13		.50 / .15	14.6 / .08ΔH	1:42	
4.4	A-15		.95 / .25	20.5 / 9.8	1:24	
4.3	B-15		1.5 / .45	26.2 / 13.7	1:38	
4.2	C-15		1.95 / .40	30.0 / 17.8	1:42	
4.1	A-17		.50 / .35	26.2 / 14.5	1:25	
				TOTAL TIME		

0.05	[illegible]	[illegible]
[illegible]	[illegible]	5.1
[illegible]	0.24	7.3
[illegible]	[illegible]	8.5
0.25	0.14	8.4
0.30	0.16	10.6
0.35	0.18	[illegible]
0.40	[illegible]	[illegible]
0.45	[illegible]	[illegible]
0.50	0.26	14.6
0.55	0.31	15.3
0.60	0.34	16.0
0.65	0.37	16.7
0.70	0.40	17.4
0.75	0.42	18.0
0.80	0.45	18.7
0.85	0.49	19.3
0.90	0.52	20.0
0.95	0.54	20.5
1.00	0.57	21.1
1.05	0.61	[illegible]
1.10	0.61	22.2
1.15	0.66	22.6
1.20	0.69	23.2
1.25	0.72	23.7
1.30	0.75	24.2
1.35	0.78	24.7
1.40	0.81	25.2
1.45	0.85	25.7
1.50	0.88	26.2
1.55	0.90	26.6
1.60	0.93	27.0
1.65	0.97	27.5
1.70	1.00	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
2.30	1.36	32.7
2.35	1.39	33.0
2.40	1.42	33.4

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON
DATE 12-13-84
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HSQC - TEST CAR
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 25°C
OPERATOR R. DeRoy

COMMENTS:

RUN / GAS	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	1.8		2.2		2.2			44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.2		20.4		20.4			32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.2		20.4		20.4			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100		100		100			28/100	
								TOTAL	

EPA (Dur) 230
4.72

F DATA

Plant USS - CLAIRTON, PA
Date 12-14-84
Sample Location HCQC - TEST CAR
Sample Type M-5
Run Number 7.5
Operator JARMAN / MILBURN
Ambient Temperature ~55°F
Barometric Pressure 29.50 (11:25AM)
Static Pressure, (H_2O)
Filter Number(s) RA102G-049

Leak Check: Initial at 18 " Hg, .001 CFM
Final at 19 " Hg, .001 CFM
Pitot Leak Check: ok

Impinger Volumes

	Initial	Final	Net Gain
TRAIN A	100	412	312
	100	114	14
	M/T	M/T	~~0~~
TRAIN B	100	120	20
	100	100	~~0~~
	M/T	M/T	~~0~~

Silica Gel

A	641.0g	646.5g	5.5g
	654.0g	664.0g	10.0g

SASS Condensate N/A

Total Volume

Probe Length and Type 5' TFE LINED
Nozzel Size & I.D. .302 (302)
Pitot Coefficient & I.D. .84
Assumed Moisture
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12 LG
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Purge - 82.5 - 92.5 CFM
pH = ~5.5

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotameter Desired	Rotameter Actual	Temperature °F: Pos H Stack Travel	Probe	Impinger A	Impinger B	Actual ~~Meter~~ ~~Temp~~ Roto	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 393.111														
1-6	~~1:01~~ :45	393.97	.90	~~90~~	20.5	157	259	54	55	20.5	267	53	52	NA		.57
	1:01	394.674	.35	~~25~~	11.9	160	263	50	50	11.9	268	54	52	1		.25
1-5	:44	395.36	.60	16.0	~~16.0~~	163	261	55	55	16.0	260	54	54	NA		.42
	:44	395.564	.20	.08ΔH	~~.08ΔH~~	163	265	51	51	.11ΔH	261	55	53	1		.11
1-4	:46	396.37	.70	16.7	~~16.7~~	157	260	55	55	17.4	261	56	54	4		.54
	:53	396.800	.15	.11ΔH	~~.11ΔH~~	162	263	50	50	.08ΔH	261	56	54	1		.08
1-3	:45	397.64	.90	20.5	~~20.5~~	157	261	56	55	20.0	263	56	55	4		.55
	:59	398.216	.25	11.9	~~11.9~~	162	263	50	50	9.8	259	57	55	1		.17
AVG.																

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 398.216														
1-2	:44	399.02	1.2	22.2	23.2	159	260	55	54		259	57	56	5		.70
	:44	399.610	.40	11.8	12.8	162	263	50	50		259	58	56	1		.27
1-1	:46	400.61	2.10	31.1	27.0	160	260	57	57		259	58	57	7		.82
	:48	401.403	.55	16.7	15.3	161	261	50	50		264	59	57	2		.34
2-6	:46	402.36	1.25	25.7	23.7	173	264	56	56		263	59	58	6		.69
	:57	403.112	.40	14.5	12.8	167	265	50	50		260	60	58	2		.29
2-5	:46	404.03	1.10	16.7	22.2	157	262	56	56		259	59	59	5		.69
	:38	404.495	.40	11ΔH	12.8	158	261	50	50		259	60	60	2		.22
2-4	:46	405.42	1.25	16.0	23.7	159	262	57	56		256	60	59	5		.73
	:53	406.158	.50	12.8	14.5	159	261	50	50		257	60	59	3		.36
2-3	:45	406.900	.60		16.0	159	261	57	57		260	61	60	NA		.38
	:56	407.410	.15	16.7	.08ΔH	160	260	50	50		259	61	60	1		.08
2-2	:44	408.37	1.6	28.6	27.0	160	260	57	57		258	62	60	6.5		.81
	:53	409.079	.40	15.3	12.8	157	260	51	51		262	62	60	2		.24
2-1	:43	409.96	.90		20.0	160	259	58	58		267	63	61	3		.51
	:57	410.657	.35	17.4	11.9	160	259	50	50		258	63	61	1		.21
AVG.																

Run No. 7.5 Date 12-14-84 Sampling Location HCQC - TEST CAR

Comments: ↓ could not pull actual desired rate of 31.1

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 410.657														
3-6	11 :45	411.55	1.40	23.2	25.2	155	264	58	58		268	63	62	5		.79
	:45	412.047	.40	12.8	12.8	152	265	50	50		267	64	62	1		.22
3-5	:43	412.90	1.3	22.2	24.2	163	263	58	58		259	64	62	5		.74
	:56	413.625	.45	11.8	13.7	157	265	50	50		262	64	62	2		.26
3-4	:44	414.43	.95	21.1	20.5	156	262	59	59		259	64	63	4		.53
	1:00	415.043	.30	10.9	10.9	155	264	58	58		260	64	63	1		.20
3-3	:44	415.80	.80	20.0	18.7	157	261	59	59		259	65	64	NA		.51
	:50	416.300	.25	10.5	9.8	162	264	51	51		259	65	64	1		.17
3-2	:44	417.05	.96	21.1	20.5	152	261	60	60		256	65	64	4		.55
	:50	417.653	.13	10.9	10.9	158	262	52	52		257	66	64	1		.22
3-1	:43	418.49	1.3		24.2	157	260	60	60		262	65	66	5		.73
	:59	419.232	.39		~~11.8~~ 12.6	158	261	52	52		263	66	65	2		.24
4-6	:45	419.99	.75	18.0	18.0	152	264	61	61		266	66	65	3		.49
	:46	420.369	.25	9.8	9.8	156	266	54	54		268	67	66	1		.15
4-5	.44	420.97	.40	14.6	12.8	150	262	61	61		258	67	66	2		.27
	:56	421.325	.15	.08ΔH	.08ΔH	155	263	54	54		261	67	66	1		.08
AVG.																

Run No. 7.5 Date 12-14-84 Sampling Location HCQC - TEST CAR

Comments: 11 Lower stuck temp than ~~[illegible]~~ normal

DATE - [illegible]

RUN # - 7.5

PLANT-USS-CLAIRTON

TRAVERSE POINT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6			.90 / .33	20.8 / 11.9	1:46	
1.5	A-17		.60 / .20	16.0 / .11 ΔH	1:28	
1.4	B-17		.70 / .15	17.4 / .08 ΔH	1:34	
1.3	C-17		.90 / .25	20.0 / 9.8	1:44	
1.2	A-19		1.2 / .40	23.2 / 12.8	1:28	
1.1	B-19		2.10 / .55	31.1 / 15.3	1:34	
2.6	C-19		1.25 / .40	23.7 / 12.8	1:43	
2.5	A-21		~~1.10~~ / .40	22.2 / 12.8	1:24	
2.4	B-21		1.25 / .50	23.7 / 14.5	1:39	
2.3	C-21		.60 / .15	16.0 / .08 ΔH	1:41	
2.2	Missed A-23		1.60 / .40	27.0 / 12.5	1:37	Water in pitot A-23 ①
2.1	C-23		.90 / .35	20.0 / 11.9	1:40	
3.6	A-25		1.4 / .40	25.2 / 12.8	1:30	
3.5	B-25		1.3 / .45	24.2 / 13.7	1:39	
3.4	C-25		.95 / .30	20.5 / 10.9	1:46	
3.3	A-27		.80 / .25	18.7 / 9.8	1:34	
3.2	B-27		.95 / .13	20.5 / 10.9	1:40	
3.1	C-27		1.30 / .39	24.2 / 12.6	1:42	
4.6	A-29		.75 / .25	18.0 / 9.8	1:31	
4.5	B-29		.40 / .15	12.8 / .08 ΔH	1:40	
4.4	A-2		.95 / .30	20.5 / 10.9	1:24	
4.3	B-2		1.1 / .30	23.2 / 10.9	1:32	
4.2	C-2		1.45 / .35	25.7 / 11.9	1:39	
4.1			1.4 / .45	25.2 / 13.7	1:27	
NO.					TOTAL TIME	

[illegible]	[illegible]	[illegible]meter Reading
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.25	[illegible]	[illegible]
[illegible]	[illegible]	10.6
[illegible]	[illegible]	11.9
[illegible]	[illegible]	12.6
[illegible]	[illegible]	13.7
0.50	0.29	14.5
0.55	[illegible]	15.3
0.60	[illegible]	16.0
0.65	[illegible]	16.7
0.70	[illegible]	17.4
0.75	0.42	18.0
0.80	0.45	18.7
0.85	0.49	19.3
0.90	0.52	20.0
0.95	0.54	20.5
1.00	0.57	21.1
1.05	[illegible]	21.7
[illegible]	[illegible]	22.2
[illegible]	0.66	22.6
1.20	0.69	23.2
1.25	0.72	23.7
1.30	0.75	24.2
1.35	0.79	24.7
1.40	0.81	25.2
1.45	0.85	25.7
1.50	0.88	26.2
1.55	0.90	26.6
1.60	[illegible]	27.0
[illegible]	[illegible]	27.5
[illegible]	[illegible]	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
2.30	1.36	32.7
2.35	1.39	33.0
2.40	1.42	33.4

① No reading taken on A-23

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger A	Impinger B	FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 421.325														
4-4	:42	422.06	.95	20.5	20.5	158	262	62	62		259	68	67	4		.52
	:40	422.238	.30	9.8	10.9 ~~[illegible]~~	157	266	54	54		260	68	67	1		NA
4-3	:43	422.98	1.1	26.2	23.2	154	261	62	62		257	68	67	6		.79
	:49	423.280	.30	13.7	10.9	154	265	60	60		262	68	67	2		.16
4-2	:44	424.[illegible]11	1.45	30.7	25.2	159	260	62	62		264	69	68	6		.76
	:54	424.470	.35	12.8	11.9	159	261	60	60		264	69	68	1		.18
4-1	:44	425.31	1.4	25.2	25.2	160	262	62	62		263	69	68	6		NA
	:43	425.610	.45	11.9	13.7	159	263	60	60		264	69	68	2		.25
AVG.																

Run No. 7.5 Date 12-14-84 Sampling Location HCQC - TEST CAR

Comments:

static taken point 3-1
push (-.08)
travel (-.05)

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 421.325														
4-4	:42	422.06	.95	20.5	20.5	158	262	62	62		259	68	67	4		.52
	:40	422.238	.30	9.8	10.9 ~~11.0~~	157	266	54	54		260	68	67	1		NA
4-3	:43	422.98	1.1	26.2	23.2	154	261	62	62		257	68	67	6		.79
	:49	423.280	.30	13.7	10.9	154	265	60	60		262	68	67	2		.16
4-2	:44	424.811	1.45	30.7	25.2	159	260	62	62		264	69	68	6		.76
	:54	424.470	.35	12.8	11.9	159	261	60	60		264	69	68	1		.18
4-1	:44	425.31	1.4	25.2	25.2	160	262	62	62		263	69	68	6		NA
	:43	425.610	.45	11.9	13.7	159	263	60	60		264	69	68	2		.25
AVG.																

Run No. 7.5 Date 12-14-84 Sampling Location HCQC - TEST CAR

Comments:

Static taken Point 3-1
push (-.08)
travel (-.05)

DATE - [illegible]

RUN # - 2.5

PLANT-USS-CLAIRTON

TRAVERSE POINT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6			.69 / .33	20.8 / 11.9	1:46	
1.5	A17		.60 / .20	16.0 / .11ΔH	1:28	
1.4	B-17		.70 / .15	17.4 / .08ΔH	1:34	
1.3	C-17		.90 / .23	20.0 / 9.8	1:44	
1.2	A-19		1.2 / .40	23.2 / 12.8	1:28	
1.1	B-19		2.10 / .55	31.1 / 15.3	1:34	
2.6	C-19		1.25 / .40	23.7 / 12.8	1:43	
2.5	A21		1.10 / .40	22.2 / 12.8	1:24	
2.4	B-21		1.25 / .50	23.7 / 14.5	1:39	
2.3	C-21		.60 / .15	16.0 / .08ΔH	1:41	
2.2	missed A-23		1.60 / .40	27.0 / 12.5	1:37	water in pitot A-23 ①
2.1	C23		.90 / .35	20.0 / 11.9	1:40	
3.6	A-25		1.4 / .46	25.2 / 12.8	1:36	
3.5	B-25		1.3 / .45	24.2 / 13.7	1:39	
3.4	C-25		.95 / .30	20.5 / 10.9	1:46	
3.3	A-27		.80 / .25	18.7 / 9.8	1:34	
3.2	B-27		.95 / .3	20.5 / 10.9	1:40	
3.1	C-27		1.30 / .50	24.2 / 12.6	1:42	
4.6	A-29		.75 / .25	18.0 / 9.8	1:31	
4.5	B-29		.40 / .15	12.4 / .08ΔH	1:40	
4.4	A-2		.95 / .30	20.5 / 10.9	1:24	
4.3	B-2		1.1 / .30	23.2 / 10.9	1:32	
4	C-2		1.45 / .35	25.7 / 11.4	1:39	
4.1			1.4 / .45	25.2 / 13.7	1:27	
NO.					TOTAL TIME	

[illegible]	[illegible]	Rotometer Reading
[illegible]	[illegible]	[illegible]
0.25	[illegible]	[illegible]
0.30	[illegible]	[illegible]
0.35	[illegible]	11.9
0.40	[illegible]	12.6
0.45	[illegible]	13.7
0.50	0.28	14.5
0.55	[illegible]	15.3
0.60	[illegible]	16.0
0.65	[illegible]	16.7
0.70	[illegible]	17.4
0.75	0.43	18.0
0.80	0.45	18.7
0.85	0.49	19.3
0.90	0.52	20.0
0.95	0.54	20.5
1.00	0.57	21.1
1.05	0.61	21.7
1.10	[illegible]	22.2
1.15	0.66	22.6
1.20	0.69	23.2
1.25	0.72	23.7
1.30	0.75	24.2
1.35	0.79	24.7
1.40	0.81	25.2
1.45	0.85	25.7
1.50	0.88	26.2
1.55	0.90	26.6
1.60	0.93	27.0
1.65	[illegible]	27.5
1.70	1.00	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
2.30	1.36	32.7
2.35	1.39	33.0
2.40	1.42	33.4

① No reading taken on A-23

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON
DATE 12-14-84
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HSRC - TEST CAR
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 25°C
OPERATOR R. DeRoy

COMMENTS:

RUN / GAS	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	2.0	2.0	2.0	2.0	2.0	2.0		44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.0	18.0	20.0	18.0	20.0	18.0		32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.0	0	20.0	0	20.0	0		28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100	80.0	100	80.0	100	80.0		28/100	
								TOTAL	

EPA (Dur) 230
4.72

FIE _ DATA

Plant USS - CLAIRTON, PA
Date 10-15-84
Sample Location HCQC - TEST CAR
Sample Type M-5
Run Number 3, i
Operator JARMON / SMITH
Ambient Temperature 78°F
Barometric Pressure 30.45 1145 hrs
Static Pressure, (H_2O) P- -.75 T- -.20
Filter Number(s) RA102G-017
RA102G-022

Leak Check: Initial at 16 " Hg, .000 CFM
Final at 15 " Hg, .001 CFM
Pitot Leak Check: OK

Impinger Volumes

	Initial	Final	Net Gain
Imp A1	100	284.0	184.0
2	100	300	200.0
3	0	0	0
Imp B1	100	236.0	136.0
2	100	102.2	2.2
3	0	0	0

Silica Gel

658.7	666.5	7.8
659.2	666.9	7.7

SASS Condensate N/A
Total Volume 537.7

Probe Length and Type 5' TFE LINED
Nozzel Size & I.D. .302 in
Pitot Coefficient & I.D. .84
Assumed Moisture ~ 31%
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12 LG MOD
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

pH - 3.5

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 752.570														
1-6	:49	753.36	.83		19.3	157	276	~~80~~ 80	~~68~~ 78	297	244	72	72	3		.43
	1:02	753.929	.20		.11ΔH	163	275	68	66	290	248	72	71	1		.11
1-5	:52	754.61			14.5	155	274	80	78	298	245	75	73	2		.30
	:48	754.879			.08ΔH	159	273	66	64	296	256	75	73	1	.084	~~NA~~
1-4	:51	755.58		~~15.3~~	15.3	153	274	80	80	305	249	77	75	NA		.32
	.49	755.923		~~14.5~~	.08ΔH	157	276	68	66	299	258	78	76	NA		.08ΔH
1-3	:49	756.74	.95		20.5	155	273	80	80	303	246	77	77	NA		NA
	.43	757.171	.25		9.8	158	276	68	66	299	253	81	80	1		NA
AVG.																

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger		Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 757.171														
1-2	:52	758.05	1.01		23.2	156	273	82	80	309	252	83	82	5		NA
	:52	758.719	.35		11.9	159	274	64	62	292	252	85	82	2		.25
1-1	:50	759.900	2.2		31.9	150	272	84	82	308	254	86	87	[illegible]		1.1
	:56	760.810	.65		16.7	157	272	60	60	293	257	87	84	2		NA
2-6	:49	761.850	1.7		27.9	157	274	84	82	310	258	87	85	NA		.86
	:35	762.403	.60		16.0	156	272	62	60	293	261	88	85	NA		.39
2-5	:50	763.41	1.4		25.2	158	274	84	82	311	256	88	86	5		.73
	:51	764.108	.45		13.7	158	274	64	62	289	254	88	86	3		.27
2-4	:50	765.10	1.4		25.2	153	274	84	82	311	254	89	87	5		.71
	1:06	766.996*	.55		15.3	160	270	62	62	287	287	89	87	3		.34
2-3	:49	767.08	1.7		27.9	162	273	83	81	308	253	90	88	7		.88
	:49	767.848	.60		16.0	159	270	62	61	285	252	91	88	3		.38
2-2	:50	769.00	1.8		28.6	157	273	84	82	308	252	91	90	7		.95
	:54	769.840	.60		16.0	159	272	62	61	286	252	91	89	3		.39
2-1	:50	771.10	2.4		33.4	156	273	84	82	310	253	91	90	9.5		1.1
	1:00	772.095	.75		18.0	159	269	61	60	284	252	92	89	NA		.40
AVG.																

Run No. 2.1 Date 10-19-84 Sampling Location NCQC - test car

Comments: * Assumed vol reading was 765.996

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger	FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 772.095													
3-6	:47	773.16	1.9		29.6	151	274	84	82	308	252	91	90	7	.97
	:34	773.640	.55		15.3	157	274	62	60	284	260	92	90	2.5	.35
3-5	:48	774.69	1.7		27.9	151	274	84	82	308	252	92	90	7	.91
	:44	775.363	.55		15.3	154	274	64	62	287	256	92	90	2.5	.37
3-4	:48	776.33	1.4		25.2	150	273	84	82	311	234	92	91	5	.15
	:48	776.945	.40		12.8	154	274	64	64	289	259	92	90	2	.26
3-3	:48	777.82	1.0		21.1	153	273	84	82	311	255	92	91	4.5	.57
	:34	778.253	.33		11.9	157	273	66	64	290	253	92	90	2	.23
3-2	:48	779.12	1.2		23.2	152	273	84	82	309	254	93	91	4.5	.60
	:42	779.609	.31		10.7	157	274	64	62	292	253	92	90	NA	.21
3-1	:50	780.68	1.8		28.6	154	273	84	82	310	254	92	92	6.5	.87
	:53	781.475	5.0		14.5	157	272	62	60	292	259	92	90	2.5	.30
4-6	:44	782.43	1.6		27.0	153	273	84	82	312	253	92	91	6	.85
	:37	782.935	.50		14.5	156	270	64	62	296	254	95	95	NA	.29
4-5	:44	783.54	~~.43~~ .60		16.0	155	274	~~82~~	80	311	254	92	91	NA	NA
	:48	783.928	~~.12~~ .15		.08ΔH	154	271	62	60	308	256	93	91	NA	.08
AVG.															

Run No. 3.1 Date 10-15-84 Sampling Location MCQC test car

Comments:

	17		20 4-5
Static	-.50	P	-.75
	-.20	t	-.20

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger A	Impinger B	FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 783.928														
4-4	:49	784.80	1.3		24.2	154	273	82	80	310	254	93	92	5		.67
	:51	785.490	.40		12.8	155	273	62	60	294	253	93	91	2		.24
4-3	:47	786.53	1.9		29.6	153	272	78	78	310	255	92	91	7		NA
	:33	787.046	.50		14.5	158	270	60	60	273	257	92	90	2		.33
4-2	:49	788.15	2.0		30.4	156	272	78	76	310	253	92	90	7		.97
	:42	788.725	.50		14.5	158	273	60	58	292	258	91	90	3		.30
4-1	:49	* ~~790.151~~ NA	1.7		27.7	157	269	80	78	306	248	90	89	7		.13
	:37	790.151	.75		18.0	159	268	60	58	~~30~~ 295	~~8~~ 251	89	98	NA		NA
Push		23.031														
travel		14.550														
Purge train 396.00		to 406.44														
AVG.																

Run No. 2.1 Date 10-19-84 Sampling Location 4CQC test car

Comments: * Assumed vol reading was 789.701 (calculated from previous readings)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS-CLAIRTON
DATE 10-19-84
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HSQC - TEST CAR 3.1
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE
OPERATOR B.C. DaRos

COMMENTS:

RUN / GAS	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	1.8		1.8		1.8			44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.6		21.0		20.4 ~~18.8~~			32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	19.6		21.0		20.4 ~~18.8~~			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100		100		100			28/100	
								TOTAL	

EPA (Dur) 230
4.72

[illegible] 10-11-07

RUN # – 3.1

PLANT – USS-CLAIRTON

AVERSE POINT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6	C-21	.75 / .20	.83 / .20	19.3 / SEE COMMENT	1:51	.11ΔH
1.5	A-23	.52 / .15	.50 (.40) / .15	14.5 (12.8) / SEE COMMENT	1:35	.08ΔH
1.4	B-23	.53 / .15	.55 (.50) / .15	15.3 (14.5) / SEE COMMENT	1:40	.08ΔH
1.3	A-25 ~~C-23~~	1.2 / .25	.95 / .25	20.5 / 9.8	1:32	
1.2	B-25	1.6 / .35	1.1 (1.2) / .35	22.2 (23.2) / 11.9	1:44	
1.1	C-25	2.6 / .60	2.2 / .65	31.9 / 16.7	1:46	
2.6	A-27	1.2 / .40	1.7 / .60	27.9 / 16.0	1:24	
2.5	B-27	1.2 / .35	1.4 / .45	25.2 / 13.7	1:41	
2.4	C-27	1.7 / .60	1.4 / .55	25.2 / 15.3	1:51	
2.3	A-29	2.2 / .60	1.7 / .60	27.9 / 16.0	1:38	
2.2	B-29	2.1 / .50	1.8 / .60	28.6 / 16.0	1:44	
2.1	C-29	2.8 / .65	~~2.3~~ 2.4 / .75	~~32.7~~ 33.4 / 18.0	1:50	
3.6	A-2	1.7 / .35	1.9 / .55	29.6 / 15.3	1:21	
3.5	B-2	1.7 / .40	1.7 / .55	27.9 / 15.3	1:32	
3.4	C-2	1.1 / .30	1.4 / .40	25.2 / 12.8	1:36	
3.3	A-4	1.5 / .35	1.0 / .33	21.1 / 11.9	1:22	
3.2	B-4	1.2 / .30	1.2 / .31	23.2 / 10.9	1:30	
3.1	C-4	1.5 / .35	1.8 / .50	28.6 / 14.5	1:43	
4.6	A-6	1.1 / .25	1.6 / .50	27.0 / 14.5	1:21	
4.5	B-6	.43 / .12	.60 / .15	16.0 / SEE COMMENT	1:31	.08ΔH
4.4	C-6	1.1 / .30	1.3 / .40	24.2 / 12.8	1:40	
4.3	A-8	1.7 / .40	1.9 / .50	29.6 / 14.5	1:22	
[illegible]	B-8	2.1 / .40	2.0 / .50	30.4 / 14.5	1:31	
4.1	~~C-8~~ A-10	1.8 / .45	1.7 / .75	27.9 / 18.0	1:26	
Avg.					TOTAL TIME	

[illegible]	[illegible]	[illegible]meter [illegible]
[illegible]	[illegible]	5.6
[illegible]	[illegible]	6.7
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	8.6
0.25	[illegible]	9.8
[illegible]	0.15	10.9
[illegible]	[illegible]	11.9
0.40	[illegible]	12.8
0.45	0.25	13.7
0.50	0.28	14.5
0.55	0.31	15.3
0.60	0.34	16.0
0.65	0.37	16.7
0.70	0.40	17.4
0.75	0.42	18.0
0.80	0.45	18.7
0.85	0.49	19.3
0.90	0.52	20.0
0.95	0.54	20.5
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	21.7
[illegible]	[illegible]	[illegible]
[illegible]	0.66	22.6
1.20	0.69	23.2
1.25	0.72	23.7
1.30	0.75	24.2
1.35	0.78	24.7
1.40	0.81	25.2
1.45	0.85	25.7
1.50	0.88	26.2
1.55	0.90	26.6
1.60	0.93	27.0
1.65	0.97	27.5
1.70	1.00	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
2.30	1.36	32.7
2.35	1.39	33.0
2.40	1.42	33.4

FIL DATA

Page ___ of ~~1~~ 2

Plant USS - Clairton
Date ~~10-20-84~~ 10-21-84
Sample Location HCGC - test car
Sample Type M-5
Run Number 3.2
Operator JARMAN / Smith
Ambient Temperature ~ 50°F
Barometric Pressure 30.41
Static Pressure, (H_2O) ____
Filter Number(s) RA102G-021
RA102G-020

Leak Check: Initial at 15 " Hg, .006 CFM
Final at 15 " Hg, .010 CFM
Pitot Leak Check: OK

Impinger Volumes

		Initial	Final	Net Gain
A	1	100.0	284.0	184
	2	100.0	96.0	<-4>
	3	~~0~~	~~0~~	0
B	1	100.0	128.0	38
	2	100.0	101.0	1
	3	~~0~~	~~0~~	Ø =
Silica Gel		666.9	671.8	4.9
		666.5	671.4	4.9

SASS Condensate NA
Total Volume ____

Probe Length and Type 5' TFE
Nozzel Size & I.D. .302"
Pitot Coefficient & I.D. .84
Assumed Moisture 31%
Molecular Weight, Dry, (M_d) ____
Meter Box Number APT 12
Meter Coefficient ____
α Factor ____
K = ____
$K(Nd)^4$ = ____ x (____)^4 = ____
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right) (P)$

PH 3.5

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	Δ H
		Init. 814.388														
1-6	:49	815.15	.64	19.3	16.7	156	273	75	72	304	252	75	74	2		.38
	:41	815.344	.20	.11ΔH	.11ΔH	158	274	62	62	304	265	75	74	NA		.11
1-5	:53	816.04	.40	14.5	14.5	153	271	75	74	316	250	76	75	2		.30
	:45	816.283	.15	.08ΔH	.08ΔH	159	272	64	64	299	271	76	75	1		.08
1-4	:50	816.92	.50	15.3	~~14.5~~ 13.9	151	269	76	75	323	267	77	76	2		.25
	:55	~~816~~ 817.194	.15	.08ΔH	.08ΔH	159	275	65	64	315	269	77	76	1		.08
1-3	:49	817.98	.75	20.5	18.0	152	271	76	76	324	262	77	76	3.5		.43
	:40	818.375	.27	9.8	9.8	157	274	64	63	306	270	78	77	1		.15
AVG.																

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 818.375														
1-2	:49	819.30	1.2	23.2	23.2	170	270	78	78	317	259	78	77	NA		.61
	:54	819.963	.40	11.9	12.8	160	274	60	60	303	268	79	78	2		.26
1-1	:51	821.27	2.1	31.9	31.1	154	269	78	78	324	266	79	78	NA		1.0
	:53	821.991	.60	16.7	16.0	159	272	60	58	299	271	79	77	NA		.36
2-6	:47 [1]	822.419/823.36	1.2	27.9	23.2	153	271	78	78	319	270	80	79	5		.65
	:51	824.075	.50	16.0	14.5	154	273	60	60	302	273	81	80	2		.31
2-5	:48	824.91	.80	25.2	~~21.1~~ 18.7	157	272	78	78	325	269	81	80	4		.41
	:60	825.602	.40	13.7	12.8	165	271	60	60	299	268	82	80	2		.22
2-4	[4] :25 / :50	[2] 826.182 / 827.16	1.4	25.2	23.2	15[illegible]	269	78	78	320	266	82	81	5		.67
	:42	827.75	.55	13.7	13.7	158	270	60	60	299	267	82	80	2		.28
2-3	:50	828.80	1.7	27.9	~~15~~ 27.9	157	267	78	78	315	263	82	81	6		.83
	:32	829.297	.55	~~27~~ 16.0	15.3	162	270	60	60	294	269	81	80	NA		NA
2-2	:49	830.41	1.8	28.6	28.6	157	267	78	76	315	263	82	81	7		.89
	:47	831.149	.58	16.0	16.0	159	270	60	58	292	262	82	81	3		.37
2-1	:51 [3]	832.17	2.4	33.4	26.0	165	266	78	78	316	259	82	81	NA		N.A
	:33	832.705	.85	18.0	17.3	163	269	62	60	298	266	82	81	NA		.48
AVG.																

Purge 407.900 to 417.900

Run No. 3-2 Date 10-21-84 Sampling Location HCRC test car

Comments: 1 Generator died @ 822.419 Repeat Point 2-6
2 Run 29 to 826.182 Repeat point 2-4
3 Could only pull 26.0 due to power problems

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON, PA
DATE 10-22-84
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HCQC - TEST CAR
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE
OPERATOR B.C. DaRos

COMMENTS:

RUN / GAS	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	2.75	2.75	2.7	2.7	2.7	2.7	2.716	44/100	1.195
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.0	17.25	20.0	17.3	20.0	17.3	17.28	32/100	5.529
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.2	0.2	20.2	0.2	20.1	0.1	0.166	28/100	0.046
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100	79.8	100	79.8	100	79.9	79.833	28/100	22.353
								TOTAL	29.12

EPA (Dur) 230
4.72

RUN # - 3.2

PLANT-USS-CLAIRTON

AVERSE [illegible]	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
1.6	A-24	.83 / .20	.64 / .20	16.7 / SEE COMMENT	1:30	.11ΔH
1.5	B-24	.40 / .15	.60 (.50) / .15	(14.5) / SEE COMMENT	1:38	.08ΔH
1.4	C-24	.50 / .15	(.45) .50 / .15	(13.7) 14.5	1:45	.08ΔH
1.3	A-26	.95 / .25	.85 (.75) / .27	19.3 (18.0) / 9.8	1:29	
1.2	B-26	1.2 / .35	1.2 / .40	23.2 / 12.8	1:43	
1.1	C-26	2.2 / .65	2.1 / .60	31.1 / 16.0	1:44	
2.6	B-28 ~~A-28~~	1.7 / .60	1.2 / .50	23.2 / 14.5	1:38	
2.5	C-28	1.4 / .45	1.0 (.80) / .40	21.1 (18.7) / 12.8	1:48	
2.4	B-1	1.4 / .55	~~1.4~~ 1.2 / .45	23.2 / 13.7	1:32	
2.3	A-3	1.7 / .60	1.7 / .55	27.9 / 15.3	1:22	
2.2	B-3	1.8 / .60	1.8 / .58	28.6 / 16.0	1:36	
2.1		2.4 / .75	2.4 / .85	33.4 (26.0) / 19.3	1:24	26.0 BEST
3.6		1.9 / .55				
3.5		1.7 / .55				
3.4		1.4 / .40				
3.3		1.0 / .33				
3.2		1.2 / .31				
3.1		1.8 / .50				
4.6		1.6 / .50				
4.5		.60 / .15				
4.4		1.3 / .40				
4.3		1.9 / .50				
[illegible]		2.0 / .50				
4.1		1.7 / .75				
Avg.					TOTAL TIME	

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
0.25	0.11	9.8
0.30	0.16	10.9
[illegible]	[illegible]	11.9
[illegible]	[illegible]	12.8
0.45	0.25	13.7
0.50	0.28	14.5
0.55	0.31	15.3
0.60	0.34	16.0
0.65	0.37	16.7
0.70	0.40	17.4
0.75	0.42	18.0
0.80	0.45	18.7
0.85	0.49	19.3
0.90	0.52	20.0
0.95	0.54	20.5
1.00	0.57	21.1
1.05	0.61	21.7
[illegible]	0.64	22.2
1.15	0.66	22.6
1.20	0.69	23.2
1.25	0.72	23.7
1.30	0.75	24.2
1.35	0.78	24.7
1.40	0.81	25.2
1.45	0.85	25.7
1.50	0.88	26.2
1.55	0.90	26.6
1.60	0.93	27.0
1.65	0.97	27.5
1.70	1.00	27.9
1.75	1.02	28.2
1.80	1.05	28.6
1.85	1.08	29.1
1.90	1.11	29.6
1.95	1.15	30.0
2.00	1.18	30.4
2.05	1.20	30.7
2.10	1.23	31.1
2.15	1.27	31.5
2.20	1.30	31.9
2.25	1.33	32.3
[illegible]	1.36	32.7
[illegible]	1.39	33.0
[illegible]	1.42	33.4

FIL DATA

Plant VSS - Clairton
Date 10-23-84
Sample Location HCQC - test car
Sample Type M-5
Run Number 3•3
Operator JARMAN/Smith
Ambient Temperature 50°F
Barometric Pressure 30.80 @ 1:40P
Static Pressure, (H_2O)
Filter Number(s) RA1026-025
RA1026-026

P.H. : 3.0

Leak Check: Initial at 16 " Hg, .004 CFM
Final at 10 " Hg, .005 CFM
Pitot Leak Check: OK

Impinger Volumes

	Initial	Final	Net Gain
A	100.0	399.0	299
	100.0	100.0	∅
	~~0~~	~~0~~	∅
B	100.0	152.0	52
	100.0	101.0	1
	~~0~~	~~0~~	∅

Silica Gel

A	670.6	676.4	5.8
B	~~668~~ 658.5	663.3	4.8

SASS Condensate NA
Total Volume

Probe Length and Type 5' TFE
Nozzel Size & I.D. .302"
Pitot Coefficient & I.D. .84
Assumed Moisture 31%
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Purge - 96.900 to 106.900

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 834.663														
1-6	:50	835.43	.65	19.3	16.7	153	271	60	60	331	256	63	62	3		.38
	:35	835.711	.20	.11ΔH	.11ΔH	160	274	56	56	326	257	63	61	1		.11
1-5	:48	836.35	.55	14.5	15.3	157	270	60	60	333	259	63	62	NA		.31
1	:47	836.720	.10	.08ΔH	.05ΔH	162	273	56	56	321	259	63	62	0		.05
1-4	:49	837.44	.55	15.3	15.3	159	271	60	60	331	258	63	62	3		.36
	:57	837.896	.15	.08ΔH	.08ΔH	165	272	56	56	321	259	63	62	0		.11
1-3 ~~2~~	:47	838.69	.75	20.5	18.0	154	270	60	60	331	259	64	63	3.5		.42
2	:46	839.112	.25	9.8	9.8	163	274	56	56	318	257	65	63	NA		NA
AVG.																

OK ~~2 Static reading taken on Battery 19, Point 1-3 Push = / Travel =~~ Acq Push: -.26 Travel: -0.8

Comments: 1 We noticed 2 differences from 3·2 & 3·1; Scrubber H_2O is a rusty color now compared to clear before and scrubber H_2O is luke warm compared to very hot before.
2) Static pressure inaccurate, nozzel interference on Point 1-3

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Probe	Temperature °F: Impinger A	Temperature °F: Impinger B	Temperature °F: Filter Temp	Temperature °F: Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 839.112													
1-2	:46	839.97	1.2	23.2	23.2	270	60	60	330	261	64	63	4.5		.65
	:52	840.610	.35	11.9	11.9	271	55	55	319	259	65	63	1		.19
1-1	:48	841.70	1.8	31.9	28.6	270	60	60	329	258	65	64	7		.92
	:55	842.448	.52	16.7	14.5	272	54	52	314	260	65	64	2.5		.31
2-6	:49	843.40	.90	27.9	20.0	270	60	60	331	259	65	64	4		.56
	:38 [1]	843.863	.35	16.0	11.9	272	54	54	318	260	65	63	NA		.23
2-5	:48 [2]	844.80	1.8	25.0	22.2	271	60	60	~~257~~ 270	263	65	64	4.5		.62
	:50	845.415	.35	13.7	11.9	272	54	54	262	264	65	63	1		.23
2-4	:47	846.30	1.1	25.2	22.2	270	60	60	~~250~~ 280	262	65	64	4		.62
	:53	846.995	.35	13.7	12.9	272	54	54	291	261	66	65	2		.26
2-3	:46	847.97	1.4	25.2	25.2	271	62	60	300	262	66	65	5		.78
	[3] :42	848.535	.45	15.3	13.7	274	55	55	297	260	66	64	2		.24
2-2	:47	849.54	1.5	28.6	26.2	271	62	60	247	260	67	65	6		.80
	:49	850.176	.45	16.0	13.7	272	54	54	261	261	67	65	NA		.26
2-1	:48	851.37	2.3	33.4	32.7	269	62	60	291	259	67	65	7		1.1
	:57	852.258	.55	18.0	15.3	272	54	52	289	260	67	65	3		.35
AVG.															

Run No. 3.3 Date 10-23-84 Sampling Location HCQC test car

Comments: [1] Temp. of scrubber H_2O has now gotten back to temp. of previous tests. Color is still Rusty. [2] Unexplainable why filter temp drop – oven temp stayed the same.
[3] Static Taken Point 2-3, Battery 19; Push -.84 travel -.27

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Push Stack Travel	Probe	Impinger	Impinger	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 852.258														
3-6	:48	853.29	1.3	29.6	24.2	153	271	60	60	239	255	67	66	NA		.74
	:39	853.837	.38	15.3	12.8	157	273	54	52	238	254	67	65	2		.29
3-5	:48	854.90	1.5	27.9	26.2	155	270	60	60	228	250	67	66	NA		.81
	:49	855.522	.35	15.3	11.9	158	272	54	52	240	248	67	65	2		.24
3-4	:49	856.33	~~1.1~~ 1.0	25.2	19.3	159	269	60	60	241	240	67	66	4		.48
	:56	856.871	.20 ~~.11~~	12.8	.11 ΔH	158	272	54	54	247	238	67	66	0		.11
3-3	:49	857.70	~~.85~~ .90	21.1	20.0	152	272	60	60	224	261	67	65	3.5		.52
	2] :44 [1]	858.228	.28	11.9	10.9	159	273	54	54	246	266	66	65	NA		.22
3-2	:47	859.03	.85	23.2	19.3	154	273	60	60	262	216	67	65	3.5		.48
	3] :47	859.485	.26	10.9	9.8	158	273	56	56	262	209	67	65	1		.15
3-1	:46	860.47	1.3	28.6	24.2	154	272	60	60	296	213	66	66	5		.78
	1:01	861.221	.35	14.5	11.9	158	273	52	50	290	222	67	65	2		.23
4-6	:47	862.12	.96	27.0	20.5	157	273	60	60	297	234	67	65	NA		.53
	:37	862.482	.27	14.5	9.8	155	274	54	52	308	242	67	65	1		.16
4-5	:45 [4]	863.15	.50	16.0	14.5	154	272	60	60	358	254	67	66	3		.30
	:47	863.355	.15	.08 ΔH	.08 ΔH	157	272	56	54	353	255	67	65	0		
AVG.																

Run No. 3-3 Date 10-23-84 Sampling Location HCOC test car

Comments:
1] Replaced 1 or 2 Heat tapes on Filter - heating ok
2] Static measured at Point 3-3; 19 battery; Push -.48 Travel -.13
3] H_2O inside oven during maintenance of heater; should dry out and give accurate temp
4] Oven temp back to normal reading

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 863.355														
4-4	:48	864.24	1.0	24.2	21.1	153	271	60	60	368	262	67	66	4		.56
	:49	864.829	.29	12.8	10.9	156	272	52	52	340	261	67	65	2		.25
4-3	1 :47	865.84	1.4	29.6	23.2	155	271	58	58	364	261	66	65	6		.80
	:33	866.253	.35	14.5	11.9	157	271	56	54	332	265 ~~332~~	66	65	2		.22
4-2	:50	867.37	1.6	30.4	27.0	154	270	58	58	353	269 ~~353~~	66	65	7		.84
	:42	867.903	.35	14.5	11.9	158	271	50	50	329	260	66	64	NA		.21
4-1	:47	868.88	1.3	27.9	24.2	154	270	58	58	354	269	66	64	6		.73
	:54	869.595	.35	18.0	11.9	157	269	50	48	320	270	66	64	2		.25
AVG.																

Run No. 3-3 Date 10-23-84 Sampling Location HCQC Test co.

1 Static taken point 4-3, battery 19 Push -.75 travel -.20

Comments:

RUN # – 3.3

PLANT – USS-CLAIRTON

VERSE NT	OVEN NUMBER	ΔP EXPECTED	ΔP ACTUAL	ROTOMETER DESIRED	POINT SAMPLE TIME	COMMENT
.6	A-17	.83 / .20	.75(.65) / .20	18.0(16.7) / SEE COMMENT	1:25	.11ΔH
.5	B-17	.40 / .15	.55 / .10	15.3 / SEE COMMENT	1:35	.05ΔH
.4	C-17	.50 / .15	.55 / .15	15.3	1:46	.11ΔH
.3	A-19	.95 / .25	.85(.75) / .25	19.3(18.0) / 9.8	1:33	
1.2	B-19	1.2 / .35	1.2 / .35	23.2 / 11.9	1:38	
1.1	C-19	2.2 / .65	1.8 / .52	28.6 / 14.5	1:43	
2.6	A-21	1.7 / .60	1.0(.90) / .35	21.1(20.0) / 11.9	1:27	
2.5	B-21	1.4 / .45	1.1 / .35	22.2 / 11.9	1:38	
2.4	C-21	1.4 / .55	1.1 / .35	22.2 / 11.9	1:40	
2.3	A-23	1.7 / .60	1.4 / .45	25.2 / 13.7	1:28	
2.2	B-23	1.8 / .60	1.5 / .45	26.2 / 13.7	1:36	
2.1	C-23	2.4 / .75	23. / .55	32.7 / 15.3	1:45	
3.6	A-25	1.9 / .55	1.3 / .38	24.2 / 12.8	1:27	
3.5	B-25	1.7 / .55	1.5 / .35	26.2 / 11.9	1:37	
3.4	C-25	1.4 / .40	1.0(.85) / .20	21.1(19.3)	1:45	.11ΔH
3.3	A-29	1.0 / .33	.90 / .28	20.0 / 10.9	1:33	
3.2	B-29	1.2 / .31	.85 / .26	19.3 / 9.8	1:34	
3.1	C-29	1.8 / .50	1.3 / .35	24.2 / 11.9	1:47	
4.6	A-2	1.6 / .50	.96 / .27	20.5 / 9.8	1:24	
4.5	B-2	.60 / .15	.65(.50) / .15	16.7(14.5) / SEE COMMENT	1:32	.08ΔH
4.4	C-2	1.3 / .40	1.0 / .29	21.1 / 10.9	1:37	
4.3	A-4	1.9 / .50	1.4 / .35	25.2 / 11.9	1:20	
4.2	B-4	2.0 / .50	1.6 / .35	27.0 / 11.9	1:32	
4.1	C-4	1.7 / .75	1.3 / .35	24.2 / 11.9	1:41	
AVG.					TOTAL TIME	

			Rotometer Reading
STATIC			3.5
			5.7
			7.3
			8.5
			9.3
.26		0.15	10.9
.08			11.4
			12.8
			13.7
	0.50	0.26	14.5
	0.55	0.31	15.3
	0.60	0.34	16.0
	0.65	0.37	16.7
	0.70	0.40	17.4
	0.75	0.42	18.0
	0.80	0.45	18.7
	0.85	0.49	19.3
	0.90	0.52	20.0
	0.95	0.54	20.5
.84			21.1
.27			21.7
			22.2
		0.66	22.6
		0.69	23.2
		0.72	23.7
	1.30	0.75	24.2
	1.35	0.78	24.7
	1.40	0.81	25.2
	1.45	0.85	25.7
	1.50	0.88	26.2
	1.55	0.90	26.6
	1.60	0.93	27.0
	1.65	0.97	27.5
0.5*	1.70	1.00	27.9
.23	1.75	1.02	28.2
	1.80	1.05	28.6
	1.85	1.08	29.1
	1.90	1.11	29.6
	1.95	1.15	30.0
	2.00	1.18	30.4
	2.05	1.20	30.7
	2.10	1.23	31.1
	2.15	1.27	31.5
	2.20	1.30	31.9
	2.25	1.33	32.3
	2.30	1.36	32.7
.75	2.35	1.39	33.0
.20	2.40	1.42	33.4

water from duct rusty looking & cooler

* = #20 Battery

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON, PA
DATE 10-23-84
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HCQC - TEST CAR 3.3
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE
OPERATOR R.C. DeRos

COMMENTS:

4

GAS \ RUN	1 ACTUAL READING	1 NET	2 ACTUAL READING	2 NET	3 ACTUAL READING	3 NET	AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
2.0 / 2.0 CO_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	44/100	0.88
20.0 / 18.0 O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.0	19.0	20.0	18.0	20.0	18.0	18.0	32/100	5.76
20.2 / 0.2 CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	21.0	0	20.2	0.2	20.2	0.2	0.2	28/100	0.056
100 / 79.8 N_2 (NET IS 100 MINUS ACTUAL CO READING)	100	79	100	79.8	100	79.8	79.8	28/100	22.344
								TOTAL	29.04

EPA (Dur) 230
4.72

FIELD DATA

Plant USS Clairton
Date 10-24-84
Sample Location HCAC test car
Sample Type M-5
Run Number 3-4
Operator JARMAN / Smith
Ambient Temperature
Barometric Pressure 30.79 @ 2:00P
Static Pressure, (H_2O)
Filter Number(s) RA1026-030
RA1026-031

Leak Check: Initial at 17 " Hg, .006 CFM
Final at 15 " Hg, 000 CFM
Pitot Leak Check: OK

Impinger Volumes

	Initial	Final	Net Gain
A	100.0	381.0	281
	100.0	102.0	2
	Ø	Ø	Ø
B	100.0	178.0	78
	100.0	101.0	1
	Ø	Ø	Ø

Silica Gel

676.4	682.0	5.6
663.3	672.2	8.9

SASS Condensate NA
Total Volume 376.5

Probe Length and Type 5' TFE
Nozzel Size & I.D. .302"
Pitot Coefficient & I.D. .84
Assumed Moisture 3%
Molecular Weight, Dry, (M_d)
Meter Box Number APT 12
Meter Coefficient
α Factor
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Purge – 419.00 to 429.00 CFM
P.H. – 3.0

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temp °F Push Stack Travel	Probe	Impinger A	Impinger B	Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	Δ H
		Init. 881.240			16.7											
1-6	:47	882.09	.65	16.7	~~[illegible]~~	154	271	60	58	321	241	56	55	3		NA
	:57	882.548	.25	.11ΔH	9.8	162	272	50	50	276	247	56	55	NA		.16
1-5	:49	883.12	.52	15.3	14.5	157	269	60	58	262	250	57	56	2		.29
	:39	883.431	.15	.05ΔH	.08ΔH	161	272	56	54	258	249	57	56	NA		.08
1-4	:50	884.08	.50	15.3	14.5	157	271	60	58	231	245	58	57	2		.27
	:45	884.458	.20	.08ΔH	.11ΔH	161	273	55	54	240	249	58	58	1		.11
1-3	:47	885.23	.75	18.0	18.0	156	270	60	60	290	252	59	58	4		.39
	1:01	885.781	.25	13.7	9.8	170	271	50	50	277	254	60	58	1		.13
AVG.																

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft³	Velocity Head (ΔP_s), in. H_2O	Rotometer Desired	Rotometer Actual	Temperature °F: Push Stack Travel	Probe	Impinger		Filter Temp	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 885.781														
1-2	:49	886.69	1.0	23.2	21.1	157	269	60	60	332	254	61	59	4.5		.57
⊔	:38	887.154	.30	11.9	10.9	161	271	56	54	282	251	61	59	NA		.22
1-1	:48	888.28	.20	28.6	30.4	154	270	60	60	343	252	61	60	7		.97
	:53	889.043	.50	14.5	14.5	161	269	54	52	282	252	62	60	NA		.31
2-6	:47	889.87	1.2	20.0	21.1	155	272	62	62	269	261	63	62	5		.55
	1:02	890.633	.35	14.5	11.9	162	276	54	52	267	260	64	62	2		.24
2-5	:47	891.52	1.1	22.2	22.2	155	270	63	60	267	256	64	63	5		.61
	:32	891.949	.40	16.0	12.8	163	271	56	56	244	258	65	63	NA		.25
2-4	:47	892.88	1.3		22.2	157	270	64	62	333	260	65	64	6		.66
	:41	893.492	.50		11.9	163	270	58	56	274	258	66	64	NA		.31
2-3	:48	894.50	1.5		25.2	157	268	65	63	246	253	66	65	NA		.77
	:48	895.153	.45		13.7	160	269	58	56	235	250	67	65	2		.27
2-2	:48	896.17	1.5		26.2	155	269	65	63	250	254	67	66	6		.78
	:33	896.625	.45		13.7	160	269	58	56	244	253	68	65	2		.28
2-1	:47	897.73	2.0		32.7	158	269	65	63	300	257	68	66	8		1.0
	:41	898.372	.70		15.3	162	268	58	56	266	254	69	67	3.5		.42
AVG.																

Run No. 3.4 Date 10-24-84 Sampling Location HCRC-TESTCAR

⊔ Changed filter heater controller

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger		FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 898.372														
3-6	:48	899.32	1.2	24.2	23.2	153	268	65	63	250	255	68	67	5		.66
	:53	899.953	.40	11.9	12.8	160	268	59	57	258	255	69	67	NA		.23
3-5	:48	900.99	1.6	26.2	27.0	155	271	65	63	320	255	69	68	6.5		.82
	:35	901.467	.45	11.9	13.7	158	270	59	58	253	256	69	67	2		.29
3-4	:47	902.29	.95	19.3	20.5	156	270	64	62	262	264	70	68	4		.55
	:44	902.720	.25	8.6	9.8	160	270	58	58	243	261	70	67	NA		.15
3-3	:48	903.55	.90	20.0	20.0	157	271	65	63	241	270	71	69	4		.50
	:56	904.158	.30	10.9	10.9	158	271	60	58	230	265	70	69	1		.20
3-2	:46	904.92	.85	19.3	19.3	154	270	65	63	278	260	71	69	4		.48
	:36	905.298	.30	9.8	10.9	160	270	60	58	269	258	71	69	NA		NA
3-1	:47	906.19	1.1	24.2	22.2	157	268	65	63	308	252	71	70	5		.62
	:43	906.733	.40	11.9	12.8	160	270	58	57	279	247	71	70	NA		NA
4-6	:49	907.48	.65	20.5	16.7	154	269	65	63	320	252	72	70	3		.38
	:52	907.940	.25	9.8	9.8	156	272	58	56	303	254	71	70	1		.13
4-5	:46 ⊥	908.59	.60	14.5	16.0	156	270	65	63	320	260	72	70	3		.35
	:38	908.766	.15	.08ΔH	.08ΔH	159	272	60	58	308	262	71	70	NA		.07
AVG.																

Run No. 3.4 Date 10-24-84 Sampling Location HCQC-TEST CAR

⊥ Scrubber H_2O is cleaner compared to test 3.4

Comments:

Traverse Point Number	Sampling Time, min (MIN:SEC)	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	ROTOMETER Desired	ROTOMETER Actual	Temperature °F: PUSH STACK TRAVEL	Probe	Impinger A	Impinger B	FILTER TEMP	Oven	Gas Meter In	Gas Meter Out	Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$	ΔH
		Init. 908.766														
4-4	:44	909.55	1.0	21.1	21.1	155	270	65	63	318	260	72	71	4.5		.55
	:45	910.050	.30	10.9	10.9	160	272	58	56	272	260	72	70	2		.21
4-3	:46	910.98	1.3	25.2	24.2	153	270	65	63	325	261	72	71	6		NA
	:49	911.565	.35	11.9	11.9	159	272	60	57	275	260	72	71	2		.24
4-2	:47	912.59	1.6	27.0	27.0	154	268	65	63	330	255	72	71	7		.85
	:36	913.062	.40	11.9	12.8	160	271	60	58	287	253	72	70	NA		.25
4-1	:45	914.98	1.3	24.2	24.2	154	268	65	63	327	249	72	71	6		.73
	:46	914.575	.32	11.9	10.9	159	268	58	56	287	249	72	71	NA		.22
AVG.																

Run No. 3.4 Date 10-24-84 Sampling Location HCQC - TEST CAR.

Comments:

DRY MOLECULAR WEIGHT DETERMINATION

PLANT USS - CLAIRTON, PA
DATE 10-24-84
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION HCQS - TEST CAR 3,4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS GRAB) INTEGRATED BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE
OPERATOR B.C. DaRos

COMMENTS:

RUN / GAS	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	44/100	0.968
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.6	18.4	20.4	18.2	20.6	18.4	18.33	32/100	5.8656
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.9	0.3	20.6	0.4	20.9	0.3	0.333	28/100	0.093
N_2 (NET IS 100 MINUS ACTUAL CO READING)	100	79.1	100	79.4	100	79.1	79.200	28/100	22.176
								TOTAL	29.10

EPA (Dur) 230
4.72

APPENDIX E

DATA REDUCTION

FIELD DATA

Plant	USS - Clairton, PA
Date	12/5/84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	7.1
Operator	Smith/Jarman
No. of Ovens Tested	24
No. of Ovens Tested/hr	3.6
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	29
Barometric Pressure, in Hg	29.42
Static Pressure, in H2O	-0.1
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-045
Bottom Filter Number	None
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.296
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	16	0.004
	Final	15	0.004

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	356	256
Imp A2	100	140	40
Imp A3	0	1	1
Sil Gel A	687.3	691.4	4.1
Imp B1	100	101	1
Imp B2	100	100	0
Imp B3	0	0	0
Sil Gel B	736	743.5	7.5
Total Volume			309.6

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
						288.474		
P	1.6	C-26	10:28	99	44	289.210	18.7	
T					55	289.737	9.8	0.09
P	1.5	A-28	10:45	88	45	290.310	14.5	0.28
T					43	290.607		0.11
P	1.4	B-28	11:06	93	44	291.150	13.7	0.25
T					49	291.508		0.11
P	1.3	A-1	11:55	83	45	292.300	18.7	0.42
T					38	292.638		0.11
P	1.2	B-1	12:16	92	45	293.313	21.1	0.58
T					47	293.450	9.8	0.13
P	1.1	C-1	12:29	93	47	294.920	29	0.81
T					46	295.530	12.8	0.21
P	2.6	A-3	12:59	76	44	297.651	24	0.70
T					32	298.035	11.9	
P	2.5	B-3	13:12	92	46	298.920	23.2	0.65
T					46	299.468	10.9	0.19
P	2.4	C-3	13:23	98	47	300.430	25.2	0.74
T					51	301.063	12.8	0.26
P	2.3	A-5	13:42	84	47	302.000	24.2	0.70
T					37	302.425	11.9	0.20
P	2.2	B-5	13:55	94	46	303.410	25.2	0.75
T					48	304.050	14.5	0.30
P	2.1	C-5	14:09	99	46	305.040	27	0.80
T					53	305.717	12.8	0.28
P	3.6	A-7	14:22	84	46	306.720	27	0.83
T					38	307.159	11.9	0.21
P	3.5	B-7	14:38	90	45	308.170	27	0.85
T					45	308.720	10.9	0.23
P	3.4	C-7	14:51	105	46	309.540	20.5	0.54
T					59	310.051	9.8	0.13
P	3.3	A-9	15:05	87	46	310.840	18.7	0.46
T					41	311.123		0.11
P	3.2	B-9	15:18	89	44	311.930	20.5	0.55
T					45	312.331	9.8	0.14
P	3.1	C-9	15:31	100	46	313.190	22.2	0.62
T					54	313.674	9.8	0.14
P	4.6	A-11	15:43	88	43	314.370	18.7	0.45
T					45	314.776	9.8	0.13
P	4.5	B-11	15:56	90	45	315.420	15.3	0.33
T					45	315.670		0.08
P	4.4	C-11	16:09	100	43	316.400	18.7	0.47
T					57	316.907	9.8	0.15
P	4.3	A-13	16:21	84	46	317.890	26.2	0.82
T					38	318.344	10.9	0.22
P	4.2	B-13	16:34	92	45	319.270	26.2	0.77
T					47	319.782	10.9	0.19
P	4.1	C-13	16:47	99	45	320.645	23.2	0.67
T					54	321.203	9.8	0.15

Total (Time in minutes)	36.65	32.729	
Push	18.10	21.800	File: DAT 701
Travel	18.55	10.929	Page 2 of 8

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	164	271	270	37	38	37	37
T		158	272	273	35	35	38	37
P	1.5	154	266	266	38	38	39	38
T		157	269	271	38	39	39	38
P	1.4	156	266	267	38	38	40	39
T		158	269	267	38	39	41	39
P	1.3	157	266	266	40	40	43	43
T		161	269	267	40	40	44	42
P	1.2	156	265	267	40	40	44	43
T		156	269	265	39	39	45	43
P	1.1	159	265	266	40	40	45	44
T		162	263	268	40	40	45	43
P	2.6	155	268	265	40	40	45	44
T		159	270	268	39	40	46	44
P	2.5	155	268	263	40	40	45	45
T		158	270	266	40	40	46	44
P	2.4	152	268	260	40	40	46	45
T		160	270	262	39	39	46	44
P	2.3	154	267	262	40	40	46	45
T		159	268	269	39	39	46	44
P	2.2	156	266	270	40	40	46	45
T		159	268	270	40	40	46	45
P	2.1	156	266	270	40	40	46	46
T		158	267	268	40	40	47	45
P	3.6	154	270	266	40	40	47	46
T		157	271	266	40	40	47	45
P	3.5	154	268	262	41	40	47	46
T		155	271	268	40	40	48	46
P	3.4	154	268	270	40	40	48	46
T		157	271	270	40	40	48	46
P	3.3	156	167	263	40	40	48	47
T		158	271	267	40	40	48	47
P	3.2	155	267	267	40	40	48	47
T		157	270	270	40	40	48	47
P	3.1	159	266	270	40	40	48	47
T		159	269	269	40	40	48	47
P	4.6	154	265	266	40	40	48	47
T		156	270	253	40	40	49	47
P	4.5	157	268	270	41	41	49	48
T		155	271	273	41	41	49	47
P	4.4	157	268	269	41	41	49	48
T		157	271	269	41	41	49	48
P	4.3	156	267	268	41	41	49	48
T		156	272	270	41	41	50	48
P	4.2	157	266	267	41	41	50	48
T		156	270	267	41	41	50	48
P	4.1	162	266	265	41	41	50	49
T		157	264	260	41	41	50	48

P TW Avg	156
T TW Avg	158

	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		0.80	0.89	58.09		65	10
T		1	0.25	0.50	32.32			
P	1.5	2	0.50	0.71	45.55		20	1
T		1	0.20	0.45	28.88			
P	1.4	2	0.45	0.67	43.29			
T		1	0.20	0.45	28.90			
P	1.3	4	0.80	0.89	57.76		65	4
T		1	0.20	0.45	28.97			
P	1.2	4	1.00	1.00	64.53			
T		1	0.25	0.50	32.26			
P	1.1	6	1.70	1.30	84.34			
T		2	0.40	0.63	41.01			
P	2.6	5	1.30	1.14	73.51		20	0.9
T		1	0.35	0.59	38.27			
P	2.5	5	1.20	1.10	70.63			
T		1	0.30	0.55	35.40			
P	2.4	5.5	1.40	1.18	76.10			
T		1	0.40	0.63	40.94			
P	2.3	5	1.30	1.14	73.45		25	2
T		1	0.35	0.59	38.27			
P	2.2	6	1.40	1.18	76.35			
T		2	0.50	0.71	45.74			
P	2.1	6	1.70	1.30	84.13			
T		2	0.40	0.63	40.88			
P	3.6	6	1.60	1.26	81.49			
T		1	0.35	0.59	38.21			
P	3.5	6	1.60	1.26	81.49			
T		1	0.30	0.55	35.31			
P	3.4		0.95	0.97	62.79			
T		1	0.25	0.50	32.29			
P	3.3	3	0.80	0.89	57.72			
T		1	0.20	0.45	28.90			
P	3.2	4	0.95	0.97	62.84		30	1
T		1	0.25	0.50	32.29			
P	3.1		1.10	1.05	67.84			
T		1	0.25	0.50	32.34			
P	4.6	3	0.80	0.89	57.62			
T		1	0.25	0.50	32.26			
P	4.5	2	0.55	0.74	47.89			
T		1	0.15	0.39	24.97			
P	4.4	4	0.80	0.89	57.76			
T		1	0.25	0.50	32.29			
P	4.3	6	1.50	1.22	79.03			
T		1	0.30	0.55	35.34			
P	4.2	6	1.50	1.22	79.09			
T		1	0.30	0.55	35.34			
P	4.1	5	1.20	1.10	71.03			
T		1	0.25	0.50	32.29			
P TW Avg				1.04				
T TW Avg				0.53				

	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	11	2.9	429	355	295		140
T			1	429	115	287		133
P	1.5		2.9	429	355	295		133
T			1	429	115	287		126
P	1.4		2.9	429	355	295		140
T			1	429	115	287		153
P	1.3	10.5	2.95	429	355	295		154
T			1.05	429	115	287		140
P	1.2		2.95	429	355	295		147
T			1.05	429	115	287		126
P	1.1		2.95	429	350	295		147
T			1.05	429	115	287		133
P	2.6	10.5	3	429	350	295		147
T			0.95	429	115	287		133
P	2.5		3	429	350	292		140
T			0.95	429	115	285		126
P	2.4		3	429	350	292		133
T			0.95	429	115	285		119
P	2.3	10.5	3	429	350	292		147
T			1	429	115	285		126
P	2.2		3	429	350	292		140
T			1	429	115	285		126
P	2.1		3	429	350	292		147
T			1	429	115	285		133
P	3.6	10.5	3	429	350	295		147
T			0.95	429	115	287		133
P	3.5		3	429	350	295		140
T			0.95	429	115	287		133
P	3.4		3	429	350	295		147
T			0.95	429	115	287		126
P	3.3		3	429	350	295		140
T			0.95	429	115	287		126
P	3.2	10.5	3	429	350	295		147
T			1	429	115	287		133
P	3.1		3	429	350	295		154
T			1	429	115	287		133
P	4.6		3	429	350	295		147
T			1	429	115	287		133
P	4.5	10.5	2.95	429	350	295		140
T			1	429	115	287		133
P	4.4		2.95	429	350	295		154
T			1	429	115	287		133
P	4.3		2.95	429	350	295		154
T			1	429	115	287		140
P	4.2	10.5	2.95	429	350	295		147
T			1	429	115	287		133
P	4.1		2.95	429	350	295		147
T			1	429	115	287		133
P	TW Avg		2.97	429	351	294	0	145
T	TW Avg		0.99		115	287	0	132
							File: DAT	701

LABORATORY DATA

Orsat Analysis
Operator

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
O2	20.2	18.2	20.2	18.2	20.2	18.2	18.2
CO	20.4	0.2	20.4	0.2	20.4	0.2	0.2
N2		79.6		79.6		79.6	79.6
Molecular Weight, Dry			29.05				

Particulate Analysis

Front-half Filter Dry Catch, mg	8.99
Blank Filter Catch, mg	None Used
Front-half Aqueous Wash, mg	
Filterable	9.07
Non-filterable	13.69
Front-half Acetone Wash, mg	3.02
Impinger Catch, mg	
Filterable	1.40
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	7.90
Total Front-half Filterable, mg	18.06
Total Front-half Nonfilterable, mg	16.71
Total Front-half, mg	34.77
Total Back-half Filterable, mg	1.40
Total Pennsylvania DER Mass, mg	36.17

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	29.42
Stack Press, in Hg	29.41
Vol of H2O Std, dscf	14.573
M-5 Stack Moist. Content, %	30.38
Sat Stack Moist. Content, %	30.44
Stack Moist. Cont. Used, %	30.38
Molecular Weight, Dry	29.05
Molecular Weight, Wet	25.69
Nozzle Dia, in	0.296
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	156	158	157
Meter Volume Corr, ft3	22.292	11.162	33.454
Meter Volume Std, dscf	22.256	11.144	33.401
Vol of H2O Std, dscf	9.711	4.862	14.573
Sample Time, min	18.10	18.55	36.65
Stack Vel, fps	67.43	34.28	
Percent Isokinetic, %	109	105	
Stack Gas Vol, acfm	129968	66069	
Stack Gas Vol, dscfm	76222	38653	
Stack Gas Density, lb/ft3	0.0562	0.0561	
DER Part. Emission Conc., gr/dscf		0.0167	
DER Part. Emission Rate, lb/ton coke		0.0144	
DER Part. Emission Rate, lb/hr		0.76	
Front-half Part. Conc., gr/dscf		0.0161	
Front-half Part. Rate, lb/ton coke		0.0138	
Front-half Part. Rate, lb/hr		0.73	
Back-half Filt. Conc., gr/dscf		0.0006	
Back-half Filt. Rate, lb/ton coke		0.0006	
Back-half Filt. Rate, lb/hr		0.03	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	58	74	81	58
5	46	71	81	48
4	43	76	63	58
3	58	73	58	79
2	65	76	63	79
1	84	84	68	71

Position

Travel

Position	1	2	3	4
6	32	38	38	32
5	29	35	35	25
4	29	41	32	32
3	29	38	29	35
2	32	46	32	35
1	41	41	32	32

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	12/06/84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	7.2
Operator	Smith/Jarman
No. of Ovens Tested	24
No. of Ovens Tested/hr	4.8
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	30
Barometric Pressure, in Hg	29.01
Static Pressure, in H2O	-0.25
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-046
Bottom Filter Number	None
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.301
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	17	0.002
	Final	16	0.002

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	338	238
Imp A2	100	238	138
Imp A3	0	0	0
Sil Gel A	691.4	696.4	5
Imp B1	100	108	8
Imp B2	100	100	0
Imp B3	0	0	0
Sil Gel B	743.5	752.2	8.7
Total Volume			397.7

Combined Impinger pH 2.5

	Point No.	Oven No.	Start Time	Sample Time sec Total	DGM Start	Gas Metr ft3	Rotometer	Orifice del P in. WC
						321.875		
P	1.6	A-9	9:41	84	43	322.550	16	0.37
T					41	322.840		0.11
P	1.5	B-9	9:53	92	46	323.440	13.7	0.30
T					46	323.718		0.08
P	1.4	C-9	10:06	106	48	324.350	14.5	0.30
T					58	324.600		0.08
P	1.3	A-11	10:18	86	45	325.370	16.7	0.39
T					41	325.674		0.11
P	1.2	B-11	10:30	95	46	326.550	20.5	0.53
T					49	326.969	9.8	0.16
P	1.1	C-11	10:42	104	47	328.030	27	0.75
T					57	328.770	12.8	0.27
P	2.6	A-13	10:55	86	45	329.630	25.2	0.75
T					41	330.145	11.9	0.22
P	2.5	B-13	11:07	94	45	331.050	23	0.65
T					49	331.592	10.9	0.22
P	2.4	C-13	11:19	101	46	332.480	21.1	0.50
T					55	333.145	12.8	0.25
P	2.3	A-15	11:35	85	45	334.100	27	0.78
T					40	334.628	13.7	0.28
P	2.2	B-15	11:48	95	46	335.610	27	0.77
T					49	336.317	12.8	0.26
P	2.1	C-15	12:01	102	46	337.270	24.2	0.73
T					56	338.054	15.3	0.35
P	3.6	A-17	12:13	86	47	339.050		0.76
T					39	339.510		0.25
P	3.5	B-17	12:25	93	44	340.420	22.2	0.64
T					49	340.958	11.9	0.24
P	3.4	C-17	12:38	103	46	341.740	20.5	0.48
T					57	342.193	9.8	0.13
P	3.3	A-19	12:50	91	46	342.950	18.7	0.45
T					45	343.280	9.8	0.12
P	3.2	B-19	13:02	93	44	344.060	20.5	0.55
T					49	344.480	9.8	0.15
P	3.1	C-19	13:15	104	47	345.370	23.2	0.57
T					57	346.030	10.9	0.20
P	4.6	A-21	13:29	88	46	346.690	15.2	0.35
T					42	346.865		0.08
P	4.5	B-21	13:42	92	47	347.440	12.8	0.24
T					45	347.580		0.05
P	4.4	C-21	13:54	103	45	348.200	16.7	0.33
T					58	348.520		0.08
P	4.3	A-23	14:06	87	46	349.360	24.2	0.70
T					41	349.867	10.9	0.23
P	4.2	B-23	14:18	102	45	350.800	25.2	0.65
T					57	351.473	10.9	0.17
P	4.1	C-23	14:31	106	45	352.370	24.2	0.61
T					61	352.925	9.8	0.13

Total (Time in minutes)	37.97	31.05	
Push	18.27	19.797	File: DAT 702
Travel	19.70	11.253	Page 2 of 8

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	162	271	266	40	40	41	41
T		162	269	269	40	40	42	41
P	1.5	156	270	265	40	40	42	42
T		163	269	262	40	40	42	41
P	1.4	157	266	264	40	40	43	42
T		163	269	265	40	40	44	42
P	1.3	157	265	266	40	40	44	43
T		165	269	264	40	40	44	43
P	1.2	165	264	266	40	40	45	44
T		166	268	266	40	40	45	43
P	1.1	166	265	268	40	40	46	44
T		164	266	267	40	40	46	44
P	2.6	165	267	268	40	40	46	45
T		163	268	265	40	40	47	45
P	2.5	159	266	260	40	40	47	46
T		164	267	263	40	40	47	46
P	2.4	155	265	263	40	40	48	46
T		162	265	263	40	40	48	46
P	2.3	163	265	260	40	40	48	47
T		162	265	260	40	40	48	47
P	2.2	158	264	264	40	40	48	47
T		162	264	267	40	40	49	47
P	2.1	169	264	264	40	40	48	47
T		166	270	265	40	40	49	47
P	3.6	158	270	267	40	40	49	48
T		160	269	269	40	40	49	47
P	3.5	158	268	262	40	40	49	48
T		161	270	261	40	40	49	48
P	3.4	172	265	262	40	40	50	48
T		167	266	265	40	40	50	48
P	3.3	159	265	266	40	40	49	48
T		160	268	269	40	40	50	48
P	3.2	157	265	266	40	40	50	48
T		163	266	265	40	40	50	48
P	3.1	156	264	269	40	40	50	48
T		172	267	270	40	40	50	48
P	4.6	154	268	269	40	40	50	49
T		159	270	268	40	40	50	49
P	4.5	154	266	263	40	40	50	49
T		159	269	263	40	40	50	49
P	4.4	157	265	261	40	40	50	48
T		164	270	260	40	40	50	48
P	4.3	169	265	264	40	40	50	48
T		168	269	264	40	40	50	48
P	4.2	168	264	265	40	40	50	49
T		165	266	265	40	40	50	48
P	4.1	163	263	266	40	40	49	48
T		164	263	266	40	40	50	48

P TW Avg 161
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	3	0.60	0.77	51.11			
T		1	0.20	0.45	29.51			
P	1.5	2	0.48	0.69	45.25		70	3
T		1	0.15	0.39	25.57			
P	1.4	3	0.50	0.71	46.47		65	5
T		1	0.15	0.39	25.57			
P	1.3	3	0.70	0.84	54.98			
T		1	0.20	0.45	29.58			
P	1.2	5	0.95	0.97	64.46		55	8
T		1	0.25	0.50	33.10			
P	1.1	7	1.90	1.38	91.24			
T		2	0.40	0.63	41.80			
P	2.6	7	1.40	1.18	78.26			
T			0.35	0.59	39.07			
P	2.5	5	1.20	1.10	72.10		30	1
T		1	0.30	0.55	36.20			
P	2.4	6	1.00	1.00	65.61		80	10
T		1	0.40	0.63	41.73			
P	2.3	7	1.60	1.26	83.52			
T			0.45	0.67	44.26			
P	2.2	7	1.60	1.26	83.19		90	9
T		2	0.40	0.63	41.73			
P	2.1	6.5	1.30	1.14	75.65		65	8
T		3	0.55	0.74	49.09			
P	3.6	7	1.60	1.26	83.19		40	3
T			0.35	0.59	38.97			
P	3.5	5	1.10	1.05	68.98		30	2
T		2	0.35	0.59	39.00			
P	3.4		0.95	0.97	64.82		80	10
T		1	0.25	0.50	33.12			
P	3.3	4	0.80	0.89	58.87		85	7
T		1	0.25	0.50	32.94			
P	3.2	5	0.95	0.97	64.05			
T		1	0.25	0.50	33.02			
P	3.1	7	1.20	1.10	71.93		100	21
T		2	0.30	0.55	36.43			
P	4.6	4	0.55	0.74	48.62		30	2
T		1	0.15	0.39	25.49			
P	4.5	3	0.40	0.63	41.46		35	2
T		1	0.10	0.32	20.81			
P	4.4	5	0.65	0.81	52.98		95	16
T		1	0.15	0.39	25.59			
P	4.3	9	1.30	1.14	75.65		100	27
T			0.30	0.55	36.31			
P	4.2	8	1.40	1.18	78.44		100	8
T		3	0.30	0.55	36.23			
P	4.1	8	1.30	1.14	75.29		30	1
T		2	0.25	0.50	33.04			
P TW Avg				1.01				
T TW Avg				0.52				

	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		3	429	350	292		147
T			1	429	115	285		133
P	1.5	10.5	3	429	350	295		154
T			1	429	115	287		140
P	1.4		3	429	350	295		147
T			1	429	115	287		140
P	1.3		3	429	350	297		147
T			1	429	115	290		133
P	1.2	10.5	3	429	350	297		147
T			1	429	115	290		133
P	1.1		3	429	350	295		147
T			1	429	115	290		133
P	2.6		3	429	350	295		147
T			1	429	115	290		133
P	2.5	10.5	3	429	350	295		154
T			0.95	429	115	287		126
P	2.4		3	429	350	295		147
T			0.95	429	115	287		133
P	2.3		3	429	350	295		147
T			0.95	429	115	287		126
P	2.2	10.5	3	429	350	295		140
T			0.95	429	115	287		126
P	2.1		3	429	350	295		140
T			0.95	429	115	287		126
P	3.6		3	429	350	295		140
T			0.95	429	115	287		126
P	3.5	10.5	3	429	350	295		147
T			0.95	429	115	287		126
P	3.4		3	429	350	295		140
T			0.95	429	115	287		133
P	3.3		3	429	350	295		140
T			0.95	429	115	287		126
P	3.2	10.5	3.05	429	350	295		147
T			0.95	429	115	287		126
P	3.1		3.05	429	350	295		147
T			0.95	429	115	285		133
P	4.6		3.05	429	350	290		133
T			0.95	429	115	282		119
P	4.5	10.5	3.05	429	350	295		140
T			0.95	429	115	285		140
P	4.4		3.05	429	350	295		154
T			0.95	429	115	287		140
P	4.3		3.05	429	350	295		147
T			0.95	429	115	287		133
P	4.2	10.5	3.05	429	350	295		140
T			0.95	429	115	287		133
P	4.1		3.05	429	350	295		147
T			0.95	429	115	287		126
P	TW Avg		3.02	429	350	295	0	145
T	TW Avg		0.96		115	287	0	131
							File: DAT	702

LABORATORY DATA

Orsat Analysis
Operator

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
O2	19.6	17.4	19.4	17.2	19.4	17.2	17.3
CO	19.8	0.2	19.8	0.4	19.8	0.4	0.3
N2		80.2		80.2		80.2	80.2
Molecular Weight, Dry			29.04				

Particulate Analysis

Front-half Filter Dry Catch, mg	43.67
Blank Filter Catch, mg	None used
Front-half Aqueous Wash, mg	
Filterable	9.67
Non-filterable	22.44
Front-half Acetone Wash, mg	3.99
Impinger Catch, mg	
Filterable	2.09
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	5.97
Total Front-half Filterable, mg	53.34
Total Front-half Nonfilterable, mg	26.43
Total Front-half, mg	79.77
Total Back-half Filterable, mg	2.09
Total Pennsylvania DER Mass, mg	81.86

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	29.01
Stack Press, in Hg	28.99
Vol of H2O Std, dscf	18.720
M-5 Stack Moist. Content, %	37.47
Sat Stack Moist. Content, %	35.04
Stack Moist. Cont. Used, %	35.04
Molecular Weight, Dry	29.04
Molecular Weight, Wet	25.17
Nozzle Dia, in	0.301
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	161	164	162
Meter Volume Corr, ft3	20.237	11.493	31.730
Meter Volume Std, dscf	19.923	11.315	31.238
Vol of H2O Std, dscf	10.745	6.102	16.848
Sample Time, min	18.27	19.70	37.97
Stack Vel, fps	66.47	34.58	
Percent Isokinetic, %	103	105	
Stack Gas Vol, acfm	128130	66652	
Stack Gas Vol, dscfm	68609	35520	
Stack Gas Density, lb/ft3	0.0539	0.0536	
DER Part. Emission Conc., gr/dscf		0.0404	
DER Part. Emission Rate, lb/ton coke		0.0324	
DER Part. Emission Rate, lb/hr		2.24	
Front-half Part. Conc., gr/dscf		0.0394	
Front-half Part. Rate, lb/ton coke		0.0316	
Front-half Part. Rate, lb/hr		2.18	
Back-half Filt. Conc., gr/dscf		0.0010	
Back-half Filt. Rate, lb/ton coke		0.0008	
Back-half Filt. Rate, lb/hr		0.06	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	51	78	83	49
5	45	72	69	41
4	46	66	65	53
3	55	84	59	76
2	64	83	64	78
1	91	76	72	75

Position

Travel

Position	1	2	3	4
6	30	39	39	25
5	26	36	39	21
4	26	42	33	26
3	30	44	33	36
2	33	42	33	36
1	42	49	36	33

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	12/13/84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	7.4
Operator	Jarman/Milburn
No. of Ovens Tested	24
No. of Ovens Tested/hr	4.7
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	60
Barometric Pressure, in Hg	29.24
Static Pressure, in H2O	-0.07
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-048
Bottom Filter Number	None
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.302
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	16	0.006
	Final	16	0.007

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	398	298
Imp A2	100	101	1
Imp A3	0	1	1
Sil Gel A	673.4	678.6	5.2
Imp B1	100	138	38
Imp B2	100	102	2
Imp B3	0	1	1
Sil Gel B	662	671.8	9.8
Total Volume			356

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
						355.297		
P	1.6	B-1	9:30	89	45	356.070	21.1	0.50
T					44	356.675	12.8	0.23
P	1.5	C-1	9:42	103	47	357.290	16	
T					56	357.716		0.08
P	1.4	A-3	9:57	78	46	358.320	16.7	0.33
T					32	358.620		0.11
P	1.3	B-3	10:09	86	43	359.350	20.5	0.50
T					43	359.765	11.9	0.16
P	1.2	C-3	10:21	96	45	360.550	22.2	0.56
T					51	361.057	11.8	0.20
P	1.1	A-5	10:35	85	47	362.150	26	0.75
T					38	362.660	16.7	0.34
P	2.6	B-5	10:47	89	46	363.560	25.7	0.61
T					43	364.098	14.5	0.29
P	2.5	C-5	10:59	102	45	364.800	16.7	0.37
T					57	365.172		0.11
P	2.4	A-7	11:11	86	48	365.800	16	0.32
T					38	366.144	12.8	
P	2.3	B-7	11:24	86	44	367.090	28.6	0.77
T					42	367.739	16.7	0.36
P	2.2	C-7	11:36	100	45	368.730	26.2	0.78
T					55	369.482	15.3	0.37
P	2.1	A-9	11:49	83	46	370.470	25	0.75
T					37	371.065	17.4	
P	3.6	B-9	12:02	92	46	372.040	23.2	0.64
T					46	372.587	12.8	0.20
P	3.5	C-9	12:17	99	44	373.470	22.2	0.60
T					55	374.126	11.8	0.20
P	3.4	A-11	12:29	82	44	374.950	21.1	0.54
T					38	375.365	10.9	0.16
P	3.3	B-11	12:41	93	44	376.230	20	0.65
T					49	376.862	10.5	0.26
P	3.2	C-11	12:53	100	44	377.740	21.1	0.65
T					56	378.486	11.9	0.26
P	3.1	A-13	13:09	85	44	379.470	25.7	0.78
T					41	380.157	13.7	0.35
P	4.6	B-13	13:21	90	43	381.050	18	0.61
T					47	381.679	9.8	0.21
P	4.5	C-13	13:33	102	44	382.460	14.6	0.42
T					58	383.140		0.08
P	4.4	A-15	13:45	84	46	384.040	20.5	0.59
T					38	384.482	9.8	
P	4.3	B-15	13:58	98	45	385.500	26.2	0.78
T					53	386.383	13.7	0.40
P	4.2	C-15	14:10	102	46	387.450	26	0.77
T					56	388.301	12.8	0.35
P	4.1	A-17	14:23	85	45	389.300	26.2	0.79
T					40	389.450	11.9	0.32

Total (Time in minutes)	36.58	34.153	
Push	18.03	20.822	File: DAT 704
Travel	18.55	13.331	Page 2 of 8

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6		265	268	67	67	66	65
T		160	270	269	65	65	66	64
P	1.5	158	265	268	67	67	67	65
T		161	268	268	62	62	68	66
P	1.4	159	263	267	68	68	68	67
T		161	266	269	66	66	69	67
P	1.3	159	264	267	68	68	69	68
T		161	268	264	64	63	68	68
P	1.2	158	263	253	66	66	70	69
T		162	266	250	61	61	71	69
P	1.1	157	262	256	66	66	71	70
T		155	264	258	58	58	72	70
P	2.6	157	262	263	65	65	72	70
T		159	267	258	60	58	72	70
P	2.5	158	265	256	65	65	72	71
T		160	266	256	60	60	72	70
P	2.4	161	264	261	65	65	72	71
T		160	264	259	60	60	72	70
P	2.3	161	263	260	65	65	72	71
T		162	262	260	59	59	72	72
P	2.2	157	262	261	65	65	72	71
T		163	265	262	59	59	72	71
P	2.1	159	262	265	65	65	73	71
T		160	261	265	59	58	73	71
P	3.6	163	263	269	65	65	73	71
T		163	267	268	69	59	73	71
P	3.5	161	264	261	66	66	73	72
T		160	267	262	60	60	73	72
P	3.4	158	263	260	67	66	73	72
T		157	269	262	60	60	73	71
P	3.3	164	263	260	67	67	74	73
T		161	267	259	60	60	74	72
P	3.2	162	263	262	67	67	74	73
T		162	264	263	60	60	74	73
P	3.1	158	262	266	67	67	74	73
T		160	266	268	60	60	75	73
P	4.6	158	265	269	66	66	74	73
T		160	269	269	59	59	74	73
P	4.5	171	264	264	67	67	74	73
T		163	265	263	61	61	75	73
P	4.4	159	264	254	68	68	74	73
T		159	267	258	60	60	75	73
P	4.3	156	261	254	68	68	75	74
T		160	264	257	60	60	75	74
P	4.2	160	261	258	68	68	75	74
T		161	263	259	60	60	75	74
P	4.1	157	264	264	68	68	75	74
T		160	260	263	60	60	75	74
P TW Avg		160						
T TW Avg		161						

	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		1.00	1.00	56.19			
T			0.40	0.63	41.26			
P	1.5		0.60	0.77	50.45			
T		1	0.15	0.39	25.29			
P	1.4	3	0.65	0.81	52.55			
T		1	0.20	0.45	29.20			
P	1.3	3	0.95	0.97	63.53			
T		1	0.35	0.59	38.62		25	1
P	1.2	3.5	1.00	1.00	65.13			
T		1	0.35	0.59	38.66			
P	1.1	6	2.00	1.41	92.03		25	1
T		2	0.65	0.81	52.38			
P	2.6	6	1.40	1.18	77.00			
T		2	0.50	0.71	46.09			
P	2.5	5	0.65	0.81	52.51			
T		2	0.20	0.45	29.17			
P	2.4	3	0.60	0.77	50.57			
T		2	0.40	0.63	41.26			
P	2.3	6	1.80	1.34	87.59			
T		3	0.65	0.81	52.68			
P	2.2	6	1.50	1.22	79.70			
T		2	0.55	0.74	48.50			
P	2.1	6	2.10	1.45	94.46			
T		2	0.70	0.84	54.58			
P	3.6	5	1.20	1.10	71.63			
T		1	0.40	0.63	41.36			
P	3.5	5	1.10	1.05	68.47			
T		1	0.35	0.59	38.59			
P	3.4	3.5	1.00	1.00	65.13			
T		1	0.30	0.55	35.64			
P	3.3		0.90	0.95	62.09			
T		1	0.27	0.52	33.92			
P	3.2	4	1.00	1.00	65.34			
T		2	0.35	0.59	38.66			
P	3.1	5	1.45	1.20	78.43		25	1
T		2	0.45	0.67	43.76			
P	4.6	4	0.75	0.87	56.40			
T		1	0.25	0.50	32.62			
P	4.5	3	0.50	0.71	46.54		45	5
T		1	0.15	0.39	25.33			
P	4.4	4	0.95	0.97	63.53			
T		1	0.25	0.50	32.59			
P	4.3	6	1.50	1.22	79.64			
T		2.5	0.45	0.67	43.76			
P	4.2	6	1.95	1.40	91.10			
T		2	0.40	0.63	41.29			
P	4.1	6	1.50	1.22	79.70			
T		1	0.35	0.59	38.59			
P TW Avg				1.06				
T TW Avg				0.60				

	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		3.1	414	365	295		203
T			1.5	414	115	287		175
P	1.5		3.1	414	365	295		210
T			1.5	414	115	287		182
P	1.4		3.1	414	365	295		189
T			1.5	414	115	287		175
P	1.3		3.1	414	365	295		189
T			1.5	414	115	285		175
P	1.2		3.1	414	360	295		196
T			1.5	414	115	285		168
P	1.1		3.1	414	360	295		203
T			1.5	414	115	285		175
P	2.6		3.1	414	360	295		203
T			1.5	414	115	285		168
P	2.5		3.05	414	365	295		203
T			1.5	414	115	285		175
P	2.4		3.05	414	365	295		196
T			1.5	414	115	287		168
P	2.3		3.05	414	365	295		189
T			1.45	414	115	287		168
P	2.2		3.05	414	365	295		210
T			1.45	414	115	287		189
P	2.1		3.05	414	365	295		196
T			1.45	414	115	287		168
P	3.6		3.05	414	370	295		203
T			1.45	414	115	287		175
P	3.5		3.05	414	365	295		203
T			1.45	414	115	287		175
P	3.4		3.05	414	365	295		196
T			1.45	414	115	287		168
P	3.3		3.05	414	365	295		203
T			1.45	414	115	285		175
P	3.2		3.05	414	365	295		203
T			1.5	414	115	287		175
P	3.1		3.05	414	365	295		203
T			1.5	414	115	287		175
P	4.6		3.05	414	365	295		203
T			1.5	414	115	287		175
P	4.5		3.05	414	365	295		203
T			1.5	414	115	287		175
P	4.4		3.05	414	365	295		196
T			1.5	414	115	287		175
P	4.3		3.05	414	365	295		196
T			1.5	414	115	287		175
P	4.2		3.05	414	365	295		196
T			1.5	414	115	287		175
P	4.1		3.05	414	365	295		203
T			1.5	414	115	287		175
P	TW Avg		3.06	414	365	295	0	200
T	TW Avg		1.49		115	286	0	174
							File: DAT	704

LABORATORY DATA

Orsat Analysis
Operator

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	1.8	1.8	2.2	2.2	2.2	2.2	2.1
O2	20.2	18.4	20.4	18.2	20.4	18.2	18.3
CO	20.2	0.0	20.4	0.0	20.4	0.0	0.0
N2		79.8		79.6		79.6	79.7
Molecular Weight, Dry			29.06				

Particulate Analysis

Front-half Filter Dry Catch, mg	8.27
Blank Filter Catch, mg	None Used
Front-half Aqueous Wash, mg	
Filterable	5.57
Non-filterable	26.07
Front-half Acetone Wash, mg	5.82
Impinger Catch, mg	
Filterable	1.69
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	6.63
Total Front-half Filterable, mg	13.84
Total Front-half Nonfilterable, mg	31.89
Total Front-half, mg	45.73
Total Back-half Filterable, mg	1.69
Total Pennsylvania DER Mass, mg	47.42

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	29.24
Stack Press, in Hg	29.23
Vol of H2O Std, dscf	16.757
M-5 Stack Moist. Content, %	32.60
Sat Stack Moist. Content, %	33.02
Stack Moist. Cont. Used, %	32.60
Molecular Weight, Dry	29.06
Molecular Weight, Wet	25.45
Nozzle Dia, in	0.302
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	160	161	160
Meter Volume Corr, ft3	21.289	13.617	34.905
Meter Volume Std, dscf	21.125	13.512	34.637
Vol of H2O Std, dscf	10.220	6.537	16.757
Sample Time, min	18.03	18.55	36.58
Stack Vel, fps	69.16	38.92	
Percent Isokinetic, %	101	112	
Stack Gas Vol, acfm	133306	75021	
Stack Gas Vol, dscfm	74808	42034	
Stack Gas Density, lb/ft3	0.0551	0.0550	
DER Part. Emission Conc., gr/dscf		0.0211	
DER Part. Emission Rate, lb/ton coke		0.0185	
DER Part. Emission Rate, lb/hr		1.26	
Front-half Part. Conc., gr/dscf		0.0204	
Front-half Part. Rate, lb/ton coke		0.0178	
Front-half Part. Rate, lb/hr		1.22	
Back-half Filt. Conc., gr/dscf		0.0008	
Back-half Filt. Rate, lb/ton coke		0.0007	
Back-half Filt. Rate, lb/hr		0.04	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	56	77	72	56
5	50	53	68	47
4	53	51	65	64
3	64	88	62	80
2	65	80	65	91
1	92	94	78	80

Position

Travel

Position	1	2	3	4
6	41	46	41	33
5	25	29	39	25
4	29	41	36	33
3	39	53	34	44
2	39	48	39	41
1	52	55	44	39

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	12/14/84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	7.5
Operator	Jarman/Milburn
No. of Ovens Tested	24
No. of Ovens Tested/hr	4.4
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	60
Barometric Pressure, in Hg	29.5
Static Pressure, in H2O	-0.1
Stack Area, ft2	32.125
Filter Type	RA 934ah
Top Filter Number	RA102G-049
Bottom Filter Number	None
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.301
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	18	0.001
	Final	19	0.001

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	412	312
Imp A2	100	114	14
Imp A3	0	0	0
Sil Gel A	641	646.5	5.5
Imp B1	100	120	20
Imp B2	100	100	0
Imp B3	0	0	0
Sil Gel B	654	664	10
Total Volume			361.5

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
						393.111		
P	1.6	C-15	8:56	106	45	393.970	20.5	0.57
T					61	394.674	11.9	0.25
P	1.5	A-17	9:09	88	44	395.360	16	0.42
T					44	395.564		0.11
P	1.4	B-17	9:23	99	46	396.370	17.4	0.54
T					53	396.800		0.08
P	1.3	C-17	9:36	104	45	397.640	20	0.55
T					59	398.216	9.8	0.17
P	1.2	A-19	9:48	88	44	399.020	23.2	0.70
T					44	399.610	12.8	0.29
P	1.1	B-19	10:01	94	46	400.610	27	0.82
T					48	401.403	15.3	0.34
P	2.6	C-19	10:13	103	46	402.360	23.7	0.69
T					57	403.112	12.8	0.29
P	2.5	A-21	10:26	84	46	404.050	22.2	0.69
T					38	404.495	12.8	0.22
P	2.4	B-21	10:38	99	46	405.420	23.7	0.73
T					53	406.158	14.5	0.36
P	2.3	C-21	10:51	101	45	406.900	16	0.38
T					56	407.410		0.08
P	2.2	B-23	11:17	97	44	408.370	27	0.81
T					53	409.079	12.8	0.24
P	2.1	C-23	11:29	100	43	409.960	20	0.51
T					57	410.657	11.9	0.21
P	3.6	A-25	11:41	90	45	411.550	25.2	0.79
T					45	412.047	12.8	0.22
P	3.5	B-25	11:56	99	43	412.900	24.2	0.74
T					56	413.625	13.7	0.26
P	3.4	C-25	12:10	104	44	414.430	20.5	0.53
T					60	415.043	10.9	0.20
P	3.3	A-27	12:23	94	44	415.800	18.7	0.51
T					50	416.300	9.8	0.17
P	3.2	B-27	12:36	100	44	417.050	20.5	0.55
T					56	417.653	10.9	0.22
P	3.1	C-27	12:48	102	43	418.490	24.2	0.73
T					59	419.232	12.6	0.24
P	4.6	A-29	13:01	91	45	419.990	18	0.49
T					46	420.369	9.8	0.15
P	4.5	B-29	13:14	100	44	420.970	12.8	0.27
T					56	421.325		0.08
P	4.4	A-2	13:40	84	44	422.060	20.5	0.52
T					40	422.238	10.9	
P	4.3	B-2	13:58	92	43	422.980	23.2	0.79
T					49	423.280	10.9	0.16
P	4.2	C-2	14:11	98	44	424.110	25.7	0.76
T					54	424.470	11.9	0.18
P	4.1	A-4	14:24	87	44	425.310	25.2	
T					43	425.610	13.7	0.25

Total (Time in minutes)	38.40	32.499	
Push	17.78	19.799	File: DAT 705
Travel	20.62	12.700	Page 2 of 8

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	157	259	267	54	55	53	52
T		160	263	268	50	50	54	52
P	1.5	163	261	260	55	55	54	54
T		163	265	261	51	51	55	53
P	1.4	157	260	261	55	55	56	54
T		162	263	261	50	50	56	54
P	1.3	157	261	263	55	55	56	55
T		162	263	259	50	50	57	55
P	1.2	159	260	259	55	54	57	56
T		162	263	259	50	50	58	56
P	1.1	160	260	259	57	57	58	57
T		161	261	264	50	50	59	57
P	2.6	173	264	263	56	56	59	58
T		167	265	260	50	50	60	58
P	2.5	157	262	259	56	56	59	59
T		158	261	259	50	50	60	60
P	2.4	159	262	256	57	56	60	59
T		159	261	257	50	50	60	59
P	2.3	159	261	260	57	57	61	60
T		160	260	259	50	50	61	60
P	2.2	160	260	259	57	57	62	60
T		157	260	262	51	51	62	60
P	2.1	160	259	267	58	58	63	61
T		160	259	258	50	50	63	61
P	3.6	155	264	268	58	58	63	62
T		152	265	267	50	50	64	62
P	3.5	163	263	259	58	58	64	62
T		157	265	262	50	50	64	62
P	3.4	156	262	259	59	59	64	63
T		155	264	260	50	50	64	63
P	3.3	157	261	259	59	59	65	64
T		162	264	259	51	51	65	64
P	3.2	152	261	256	60	60	65	64
T		158	262	257	52	52	66	64
P	3.1	157	260	262	60	60	65	66
T		158	261	263	52	52	66	65
P	4.6	152	264	266	61	61	66	65
T		156	266	268	54	54	67	66
P	4.5	150	262	258	61	61	67	66
T		155	263	261	54	54	67	66
P	4.4	158	262	259	62	62	68	67
T		157	266	260	54	54	68	67
P	4.3	154	261	257	62	62	68	67
T		154	265	262	60	60	68	67
P	4.2	159	260	264	62	62	69	68
T		159	261	264	60	60	69	68
P	4.1	160	262	263	62	62	69	68
T		159	263	264	60	60	69	68
P	TW Avg	158						
T	TW Avg	159						

	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		0.90	0.95	61.33			
T		1	0.35	0.59	38.34			
P	1.5		0.60	0.77	50.31			
T		1	0.20	0.45	29.05			
P	1.4	4	0.70	0.84	54.08			
T		1	0.15	0.39	25.14			
P	1.3	4	0.90	0.95	61.33			
T		1	0.25	0.50	32.45			
P	1.2	5	1.20	1.10	70.93			
T		1	0.40	0.63	41.05			
P	1.1	7	2.10	1.45	93.90			
T		2	0.55	0.74	48.10			
P	2.6	6	1.25	1.12	73.20		65	1
T		2	0.40	0.63	41.21			
P	2.5	5	1.10	1.05	67.80			
T		2	0.40	0.63	40.92			
P	2.4	5	1.25	1.12	72.39			
T		3	0.50	0.71	45.78			
P	2.3		0.60	0.77	50.15			
T		1	0.15	0.39	25.10			
P	2.2	6.5	1.60	1.26	81.97			
T		2	0.40	0.63	40.88			
P	2.1	3	0.90	0.95	61.47			
T		1	0.35	0.59	38.34			
P	3.6	5	1.40	1.18	76.36			
T		1	0.40	0.63	40.72			
P	3.5	5	1.30	1.14	74.06			
T		2	0.45	0.67	43.36			
P	3.4	4	0.95	0.97	62.95		60	3
T		1	0.30	0.55	35.35			
P	3.3		0.80	0.89	57.82			
T		1	0.25	0.50	32.45			
P	3.2	4	0.95	0.97	62.75			
T		1	0.13	0.36	23.33			
P	3.1	5	1.30	1.14	73.70			
T		2	0.39	0.62	40.40			
P	4.6	3	0.75	0.87	55.75			
T		1	0.25	0.50	32.30			
P	4.5	2	0.40	0.63	40.65			
T		1	0.15	0.39	25.00			
P	4.4	4	0.95	0.97	63.06			
T		1	0.30	0.55	35.41			
P	4.3	6	1.10	1.05	67.63			
T		2	0.30	0.55	35.32			
P	4.2	6	1.45	1.20	77.97			
T		1	0.35	0.59	38.31			
P	4.1	6	1.40	1.18	76.67			
T		2	0.45	0.67	43.43			
P TW Avg				1.02				
T TW Avg				0.56				

	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		3.1	414	360	295		203
T			1.35	414	120	285		175
P	1.5	11	3.1	414	365	295		210
T			1.35	414	120	285		182
P	1.4		3.1	414	360	295		203
T			1.35	414	120	287		175
P	1.3		3.1	414	365	295		203
T			1.35	414	120	287		175
P	1.2	11	3.05	414	365	295		203
T			1.35	414	120	287		175
P	1.1		3.05	414	365	295		203
T			1.35	414	115	287		175
P	2.6		3.05	414	360	295		203
T			1.35	414	115	287		182
P	2.5	11	3.05	414	360	295		203
T			1.35	414	120	287		175
P	2.4		3.05	414	360	295		203
T			1.35	414	120	287		175
P	2.3		3.05	414	360	295		203
T			1.35	414	120	287		175
P	2.2		3.05	414	365	295		196
T			1.35	414	120	287		175
P	2.1		3.05	414	365	295		203
T			1.35	414	120	287		175
P	3.6	11	3.05	414	365	295		189
T			1.35	414	120	287		175
P	3.5		3.05	414	360	295		189
T			1.35	414	120	287		161
P	3.4		3.05	414	360	295		175
T			1.35	414	115	287		161
P	3.3	11	3.05	414	360	295		203
T			1.35	414	120	287		175
P	3.2		3.05	414	360	295		196
T			1.4	414	120	287		168
P	3.1		3.05	414	360	295		196
T			1.4	414	120	287		168
P	4.6	11	3.05	414	360	295		203
T			1.4	414	120	287		175
P	4.5		3.05	414	360	295		203
T			1.35	414	120	287		175
P	4.4		3.05	414	355	295		196
T			1.35	414	120	287		168
P	4.3		3.05	414	345	295		154
T			1.35	414	115	287		140
P	4.2	11	3.05	414	360	275		196
T			1.35	414	120	270		161
P	4.1		3.05	414	360	295		182
T			1.35	414	120	287		161
P TW Avg			3.06	414	361	294	0	197
T TW Avg			1.36		119	286	0	171
							File: DAT	705

LABORATORY DATA

Orsat Analysis
Operator

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	1.8	1.8	2.2	2.2	2.2	2.2	2.1
O2	20.2	18.4	20.4	18.2	20.4	18.2	18.3
CO	20.2	0.0	20.4	0.0	20.4	0.0	0.0
N2		79.8		79.6		79.6	79.7
Molecular Weight, Dry			29.06				

Particulate Analysis

Front-half Filter Dry Catch, mg	9.98
Blank Filter Catch, mg	None used
Front-half Aqueous Wash, mg	
Filterable	2.35
Non-filterable	15.58
Front-half Acetone Wash, mg	2.17
Impinger Catch, mg	
Filterable	1.46
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	3.55
Total Front-half Filterable, mg	12.33
Total Front-half Nonfilterable, mg	17.75
Total Front-half, mg	30.08
Total Back-half Filterable, mg	1.46
Total Pennsylvania DER Mass, mg	31.54

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	61	73	76	56
5	50	68	74	41
4	54	72	63	63
3	61	50	58	68
2	71	82	63	78
1	94	61	74	77

Position

Travel

Position	1	2	3	4
6	38	41	41	32
5	29	41	43	25
4	25	46	35	35
3	32	25	32	35
2	41	41	23	38
1	48	38	40	43

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	10/19/84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	3.1
Operator	Jarman/Smith
No. of Ovens Tested	24
No. of Ovens Tested/hr	4.2
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	78
Barometric Pressure, in Hg	30.45
Static Pressure, in H2O	0.5
Stack Area, ft2	32.125
Filter Type	RA 934 AH
Top Filter Number	RA102G-017
Bottom Filter Number	RA102G-022
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.302
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	16	0.000
	Final	15	0.001

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	284	184
Imp A2	100	300	200
Imp A3	0	0	0
Sil Gel A	658.7	666.5	7.8
Imp B1	100	236	136
Imp B2	100	102.2	2.2
Imp B3	0	0	0
Sil Gel B	659.2	666.9	7.7
Total Volume			537.7

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
						752.570		
P	1.6	C-21		111	49	753.360		0.43
T					62	753.929		0.11
P	1.5	A-23		95	52	754.610		0.30
T					43	754.879		0.08
P	1.4	B-23		100	51	755.580		0.32
T					49	755.923		0.08
P	1.3	A-25		92	49	756.740		
T					43	757.171		
P	1.2	B-25		104	52	758.050		
T					52	758.719		0.25
P	1.1	C-25		106	50	759.900		1.10
T					56	760.810		
P	2.6	A-27		84	49	761.850		0.86
T					35	762.403		0.39
P	2.5	B-27		101	50	763.410		0.73
T					51	764.108		0.27
P	2.4	C-27		111	50	765.100		0.71
T					61	765.996		0.34
P	2.3	A-29		98	49	767.080		0.88
T					49	767.848		0.38
P	2.2	B-29		104	50	769.000		0.95
T					54	769.840		0.39
P	2.1	C-29		110	50	771.100		1.10
T					60	772.095		0.40
P	3.6	A-2		81	47	773.160		0.97
T					34	773.640		0.35
P	3.5	B-2		92	48	774.690		0.91
T					44	775.363		0.37
P	3.4	C-2		96	48	776.330		0.75
T					48	776.945		0.26
P	3.3	A-4		82	48	777.820		0.57
T					34	778.253		0.23
P	3.2	B-4		90	48	779.120		0.60
T					42	779.609		0.21
P	3.1	C-4		103	50	780.680		0.87
T					53	781.475		0.30
P	4.6	A-6		81	44	782.430		0.85
T					37	782.935		0.28
P	4.5	B-6		92	44	783.540		
T					48	783.928		0.08
P	4.4	C-6		100	49	784.800		0.67
T					51	785.490		0.24
P	4.3	A-8		80	47	786.530		
T					33	787.046		0.33
P	4.2	B-8		91	49	788.150		0.97
T					42	788.725		0.30
P	4.1	A-10		86	49	789.701		0.83
T					37	790.151		
Total		(Time in minutes)			38.17	37.581		
Push					19.53	23.031	File: DAT	301
Travel					18.63	14.550	Page 2 of 8	

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	157	276	244	79		72	72
T		163	275	248	67		72	71
P	1.5	155	274	243	79		75	73
T		159	273	256	65		75	73
P	1.4	153	274	249	80		77	75
T		157	276	258	67		78	76
P	1.3	155	273	246	80		79	77
T		158	276	253	67		81	80
P	1.2	156	273	252	81		83	82
T		159	274	252	63		85	82
P	1.1	150	272	254	83		86	84
T		157	272	257	60		87	84
P	2.6	157	274	258	83		87	85
T		156	272	261	61		88	85
P	2.5	150	274	256	83		88	86
T		158	274	254	63		88	86
P	2.4	153	274	254	83		89	87
T		160	270	287	62		89	87
P	2.3	162	273	253	82		90	88
T		159	270	252	61.5		91	88
P	2.2	157	273	252	83		91	90
T		159	272	252	61.5		91	89
P	2.1	156	273	253	83		91	90
T		159	269	252	61.5		92	89
P	3.6	151	274	252	83		91	90
T		157	274	260	61		92	90
P	3.5	151	274	252	83		92	90
T		154	274	256	63		92	90
P	3.4	150	273	234	83		92	91
T		154	274	259	64		92	90
P	3.3	153	273	255	83		92	91
T		157	273	253	65		92	90
P	3.2	152	273	254	83		93	91
T		157	274	253	63		92	90
P	3.1	154	273	254	83		92	92
T		157	272	259	61		92	90
P	4.6	153	273	253	83		92	91
T		156	270	254	63		95	95
P	4.5	155	274	254	81		92	91
T		154	271	256	61		93	91
P	4.4	154	273	254	81		93	92
T		155	273	253	61		93	91
P	4.3	153	272	255	78		92	91
T		158	272	257	60		92	90
P	4.2	156	272	253	77		92	90
T		158	273	258	59		91	90
P	4.1	157	269	248	79		90	89
T		159	268	251	59		89	98

P TW Avg	154
T TW Avg	158

	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	0.83	0.91	57.86			
T		1	0.20	0.45	28.54			
P	1.5	2	0.45	0.67	42.54			
T		1	0.15	0.39	24.64			
P	1.4		0.53	0.72	45.87			
T			0.15	0.39	24.60			
P	1.3		0.95	0.97	61.80			
T		1	0.25	0.50	31.78			
P	1.2	5	1.15	1.07	68.05			
T		2	0.35	0.59	37.63			
P	1.1		2.20	1.48	93.67			
T		2	0.65	0.81	51.20			
P	2.6		1.70	1.30	82.81			
T			0.60	0.77	49.16			
P	2.5	5	1.40	1.18	74.72			
T		3	0.45	0.67	42.64			
P	2.4	5	1.40	1.18	74.90			
T		3	0.55	0.74	47.22			
P	2.3	7	1.70	1.30	83.14			
T		3	0.60	0.77	49.28			
P	2.2	7	1.80	1.34	85.21			
T		3	0.60	0.77	49.28			
P	2.1	9.5	2.40	1.55	98.31			
T			0.75	0.87	55.09			
P	3.6	7	1.90	1.38	87.12			
T		2.5	0.55	0.74	47.10			
P	3.5	7	1.70	1.30	82.41			
T		2.5	0.55	0.74	46.99			
P	3.4	5	1.40	1.18	74.72			
T		2	0.40	0.63	40.07			
P	3.3	4.5	1.00	1.00	63.31			
T		2	0.33	0.57	36.48			
P	3.2	4.5	1.20	1.10	69.29			
T			0.31	0.56	35.36			
P	3.1	6.5	1.80	1.34	85.00			
T		2.5	0.50	0.71	44.91			
P	4.6	6	1.60	1.26	80.08			
T			0.50	0.71	44.87			
P	4.5		0.60	0.77	49.12			
T			0.15	0.39	24.54			
P	4.4	5	1.30	1.14	72.24			
T		2	0.40	0.63	40.10			
P	4.3	7	1.90	1.38	87.26			
T		2	0.50	0.71	44.95			
P	4.2	7	2.00	1.41	89.75			
T		3	0.50	0.71	44.95			
P	4.1	7	1.70	1.30	82.81			
T			0.75	0.87	55.09			
P TW Avg				1.18				
T TW Avg				0.65				

	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		4	420	400	290	420	154
T			1.6	420	110	275	420	147
P	1.5		4	420	400	290	420	154
T			1.6	420	110	280	420	168
P	1.4		4	426	400	295	420	147
T			1.6	426	110	285	420	168
P	1.3		4	432	408	290	430	140
T			1.6	432	110	280	430	168
P	1.2		4	432	408	295	420	154
T			1.6	432	110	285	420	252
P	1.1		4.4	432	408	310	426	147
T			1.6	432	110	295	426	168
P	2.6		2.6	432	400	305	426	133
T			1.2	432	110	290	426	147
P	2.5		2.6	432	400	300	420	140
T			1.2	432	110	290	420	196
P	2.4		2.5	432	400	300	426	140
T			1.2	432	110	290	420	154
P	2.3		2.5	432	400	300	420	140
T			1.2	432	110	290	414	168
P	2.2		2.5	432	400	300	420	140
T			1.2	432	110	290	414	154
P	2.1		2.5	432	400	300	420	154
T			1.2	432	110	290	420	168
P	3.6		2.5	432	400	300	420	140
T			1.2	432	110	290	414	210
P	3.5		2.5	432	400	300	420	140
T			1.2	432	110	290	414	154
P	3.4		2.5	432	400	300	414	140
T			1.2	432	110	290	414	168
P	3.3			426	400	300	414	126
T				426	110	290	414	154
P	3.2			426	400	300	414	140
T				426	110	290	414	154
P	3.1			426	400	300	414	147
T				426	110	290	414	168
P	4.6			426	400	300	414	140
T				426	110	290	414	154
P	4.5			426	400	300	414	140
T				426	110	290	414	154
P	4.4			426	400	300	414	133
T				426	110	290	414	154
P	4.3			426	400	300	408	140
T				426	110	290	408	140
P	4.2			426	400	300	420	133
T				426	110	290	420	140
P	4.1			426	400	300	420	140
T				426	110	290	420	154
P TW Avg			2.00	429	401	299	419	142
T TW Avg			0.90		110	288	418	166
							File: DAT	301

LABORATORY DATA

Orsat Analysis
Operator - DaRos

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	1.8	1.8	1.8	1.8	1.8	1.8	1.8
O2	19.6	17.8	21.0	19.2	20.4	18.6	18.5
CO	19.6	0.0	21.0	0.0	20.4	0.0	0.0
N2		80.4		79.0		79.6	79.7
Molecular Weight, Dry			29.03				

Particulate Analysis

Front-half Filter Dry Catch, mg	11.81
Blank Filter Catch, mg	-0.33
Front-half Aqueous Wash, mg	
Filterable	5.19
Non-filterable	17.15
Front-half Acetone Wash, mg	3.15
Impinger Catch, mg	
Filterable	1.08
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	7.18
Total Front-half Filterable, mg	16.67
Total Front-half Nonfilterable, mg	20.30
Total Front-half, mg	36.97
Total Back-half Filterable, mg	1.08
Total Pennsylvania DER Mass, mg	38.05

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	30.45
Stack Press, in Hg	30.49
Vol of H2O Std, dscf	25.310
M-5 Stack Moist. Content, %	38.94
Sat Stack Moist. Content, %	28.61
Stack Moist. Cont. Used, %	28.61
Molecular Weight, Dry	29.03
Molecular Weight, Wet	25.87
Nozzle Dia, in	0.302
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	154	158	156
Meter Volume Corr, ft3	23.549	14.863	38.412
Meter Volume Std, dscf	24.335	15.359	39.694
Vol of H2O Std, dscf	9.753	6.156	15.909
Sample Time, min	19.53	18.63	38.17
Stack Vel, fps	74.62	41.48	
Percent Isokinetic, %	90	107	
Stack Gas Vol, acfm	143837	79949	
Stack Gas Vol, dscfm	89946	49714	
Stack Gas Density, lb/ft3	0.0589	0.0585	
DER Part. Emission Conc., gr/dscf		0.0148	
DER Part. Emission Rate, lb/ton coke		0.0163	
DER Part. Emission Rate, lb/hr		1.00	
Front-half Part. Conc., gr/dscf		0.0144	
Front-half Part. Rate, lb/ton coke		0.0158	
Front-half Part. Rate, lb/hr		0.97	
Back-half Filt. Conc., gr/dscf		0.0004	
Back-half Filt. Rate, lb/ton coke		0.0005	
Back-half Filt. Rate, lb/hr		0.03	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	58	83	87	80
5	43	75	82	49
4	46	75	75	72
3	62	83	63	87
2	68	85	69	90
1	94	98	85	83

Position

Travel

Position	1	2	3	4
6	29	49	47	45
5	25	43	47	25
4	25	47	40	40
3	32	49	36	45
2	38	49	35	45
1	51	55	45	55

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	10-21-84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	3.2
Operator	Jarman/Smith
No. of Ovens Tested	12
No. of Ovens Tested/hr	4.0
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	~50
Barometric Pressure, in Hg	30.41
Static Pressure, in H2O	-0.5
Stack Area, ft2	32.125
Filter Type	RA 934 AH
Top Filter Number	RA102G-021
Bottom Filter Number	RA102G-020
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.302
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	15	0.006
	Final	15	0.010

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	284	184
Imp A2	100	96	-4
Imp A3	0	0	0
Sil Gel A	666.9	671.8	4.9
Imp B1	100	138	38
Imp B2	100	101	1
Imp B3	0	0	0
Sil Gel B	666.5	671.4	4.9
Total Volume			228.8

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
						814.388		
P	1.6	A-24		90	49	815.150		0.38
T					41	815.344		0.11
P	1.5	B-24		98	53	816.040		0.30
T					45	816.283		0.08
P	1.4	C-24		105	50	816.920		0.25
T					55	817.194		0.08
P	1.3	A-26		89	49	817.980		0.43
T					40	818.375		0.15
P	1.2	B-26		103	49	819.300		0.61
T					54	819.964		0.26
P	1.1	C-26		104	51	821.270		1.00
T					53	821.991		0.36
P	2.6	B-28		98	47	823.360		0.65
T					51	824.075		0.31
P	2.5	C-28		108	48	824.910		0.41
T					60	825.602		0.22
P	2.4	B-1		121	79	827.160		0.67
T					42	827.750		0.28
P	2.3	A-3		82	50	828.800		0.83
T					32	829.297		
P	2.2	B-3		96	49	830.410		0.89
T					47	831.149		0.37
P	2.1	UNK		84	51	832.170		
T					33	832.705		0.48
P								
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P								
T								
Total	(Time in minutes)				19.63	18.317		
Push					10.42	12.058	File: DAT	302
Travel					9.22	6.259	Page 2 of 8	

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	156	273	252	73.5		75	74
T		158	274	265	62		75	74
P	1.5	153	271	250	74.5		76	75
T		159	272	271	64		76	75
P	1.4	151	269	267	75.5		77	76
T		159	275	269	64.5		77	76
P	1.3	152	271	262	76		77	76
T		157	274	270	63.5		78	77
P	1.2	170	270	259	78		78	77
T		160	274	268	60		79	78
P	1.1	154	269	265	78		79	78
T		159	272	271	59		79	77
P	2.6	153	271	270	78		80	79
T		154	273	273	60		81	80
P	2.5	157	272	269	78		81	80
T		165	271	268	60		82	80
P	2.4	151	269	266	78		82	81
T		158	270	267	60		82	80
P	2.3	157	267	263	78		82	81
T		162	270	269	60		81	80
P	2.2	157	267	263	77		82	81
T		159	270	262	59		82	81
P	2.1	165	266	259	78		82	81
T		163	269	266	61		82	81
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P TW Avg		156						
T TW Avg		159						

	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	0.64	0.80	50.94			
T			0.20	0.45	28.52			
P	1.5	2	0.40	0.63	40.18			
T		1	0.15	0.39	24.72			
P	1.4	2	0.50	0.71	44.85			
T		1	0.15	0.39	24.72			
P	1.3	3.5	0.75	0.87	54.97			
T		1	0.27	0.52	33.12			
P	1.2		1.20	1.10	70.55			
T		2	0.40	0.63	40.40			
P	1.1		2.10	1.45	92.13			
T			0.60	0.77	49.45			
P	2.6	5	1.20	1.10	69.59			
T		2	0.50	0.71	44.96			
P	2.5	4	0.80	0.89	57.00			
T		2	0.40	0.63	40.57			
P	2.4	5	1.40	1.18	75.04			
T		2	0.55	0.74	47.30			
P	2.3	6	1.70	1.30	83.10			
T			0.55	0.74	47.46			
P	2.2	7	1.80	1.34	85.50			
T		3	0.58	0.76	48.61			
P	2.1		2.40	1.55	99.37			
T			0.85	0.92	59.04			
P								
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T								
P TW Avg				1.08				
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		2.7	432	400	305	420	140
T			1.1	432	110	295	420	147
P	1.5		2.85	432	400	305	420	140
T			1.1	432	110	295	420	140
P	1.4		2.85	432	400	305	426	133
T			1.1	432	110	295	426	140
P	1.3		2.85	432	400	305	432	140
T			1.1	432	110	295	432	140
P	1.2		2.8	432	400	305	432	140
T			1.4	432	110	295	432	147
P	1.1		2.8	432	400	305	432	133
T			1.4	432	110	295	410	140
P	2.6		2.75	432	400	310	414	133
T			1.4	432	110	300	414	147
P	2.5		2.75	432	400	310	420	147
T			1.4	432	110	300	420	140
P	2.4		3	432	400	310	426	140
T			1.25	432	110	300	426	147
P	2.3		3	432	400	285	426	168
T			1.25	432	110	275	426	147
P	2.2		3	432	360	305	426	140
T			1.25	432	110	300	426	147
P	2.1		2.8	432	400	305	420	147
T			1.25	432	110	295	426	147
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T								
P TW Avg			2.85	432	397	305	425	142
T TW Avg			1.26		110	296	423	144

LABORATORY DATA

Orsat Analysis
Operator - DaRos

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	2.8	2.8	2.7	2.7	2.7	2.7	2.7
O2	20.0	17.3	20.0	17.3	20.0	17.3	17.3
CO	20.2	0.2	20.2	0.2	20.1	0.1	0.2
N2		79.8		79.8		79.9	79.8
Molecular Weight, Dry			29.13				

Particulate Analysis

Front-half Filter Dry Catch, mg	7.76
Blank Filter Catch, mg	-0.23
Front-half Aqueous Wash, mg	
Filterable	1.31
Non-filterable	3.66
Front-half Acetone Wash, mg	2.80
Impinger Catch, mg	
Filterable	1.41
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	5.85
Total Front-half Filterable, mg	8.84
Total Front-half Nonfilterable, mg	6.46
Total Front-half, mg	15.30
Total Back-half Filterable, mg	1.41
Total Pennsylvania DER Mass, mg	16.71

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	30.41
Stack Press, in Hg	30.37
Vol of H2O Std, dscf	10.770
M-5 Stack Moist. Content, %	35.79
Sat Stack Moist. Content, %	29.97
Stack Moist. Cont. Used, %	29.97
Molecular Weight, Dry	29.13
Molecular Weight, Wet	25.79
Nozzle Dia, in	0.302
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	156	159	158
Meter Volume Corr, ft3	12.328	6.393	18.721
Meter Volume Std, dscf	12.723	6.597	19.320
Vol of H2O Std, dscf	5.445	2.823	8.268
Sample Time, min	10.42	9.22	19.63
Stack Vel, fps	68.87	40.20	
Percent Isokinetic, %	98	99	
Stack Gas Vol, acfm	132752	77491	
Stack Gas Vol, dscfm	80884	46960	
Stack Gas Density, lb/ft3	0.0583	0.0580	
DER Part. Emission Conc., gr/dscf		0.0133	
DER Part. Emission Rate, lb/ton coke		0.0140	
DER Part. Emission Rate, lb/hr		0.81	
Front-half Part. Conc., gr/dscf		0.0122	
Front-half Part. Rate, lb/ton coke		0.0128	
Front-half Part. Rate, lb/hr		0.74	
Back-half Filt. Conc., gr/dscf		0.0011	
Back-half Filt. Rate, lb/ton coke		0.0012	
Back-half Filt. Rate, lb/hr		0.07	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	51	70	0	0
5	40	57	0	0
4	45	75	0	0
3	55	83	0	0
2	71	86	0	0
1	92	99	0	0

Position

Travel

Position	1	2	3	4
6	29	45	0	0
5	25	41	0	0
4	25	47	0	0
3	33	47	0	0
2	40	49	0	0
1	49	59	0	0

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	10-23-84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	3.3
Operator	Jarman/Smith
No. of Ovens Tested	24
No. of Ovens Tested/hr	3.4
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	50
Barometric Pressure, in Hg	30.8
Static Pressure, in H2O	-0.5
Stack Area, ft2	32.125
Filter Type	RA 934 AH
Top Filter Number	RA102G-025
Bottom Filter Number	RA102G-026
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.302
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	16	0.006
	Final	10	0.005

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	399	299
Imp A2	100	100	0
Imp A3	0	0	0
Sil Gel A	670.6	676.4	5.8
Imp B1	100	152	52
Imp B2	100	101	1
Imp B3	0	0	0
Sil Gel B	658.5	667.3	8.8
Total Volume			366.6

Combined Impinger pH 3.0

	Point No.	Oven No.	Start Time	Sample Time sec Total	Sample Time sec DGM Start	Gas Metr ft3	Rotometer	Orifice del P in. WC
						834.663		
P	1.6	A-17		85	50	835.430		0.38
T					35	835.711		0.11
P	1.5	B-17		95	48	836.350		0.31
T					47	836.720		0.05
P	1.4	C-17		106	49	837.440		0.36
T					57	837.896		0.11
P	1.3	A-19		93	47	838.690		0.42
T					46	839.112		
P	1.2	B-19		98	46	839.970		0.65
T					52	840.610		0.19
P	1.1	C-19		103	48	841.700		0.92
T					55	842.448		0.31
P	2.6	A-21		87	49	843.400		0.56
T					38	843.863		0.23
P	2.5	B-21		98	48	844.800		0.62
T					50	845.415		0.23
P	2.4	C-21		100	47	846.300		0.62
T					53	846.995		0.26
P	2.3	A-23		88	46	847.970		0.78
T					42	848.535		0.24
P	2.2	B-23		96	47	849.540		0.80
T					49	850.176		0.20
P	2.1	C-23		105	48	851.370		1.10
T					57	852.258		0.35
P	3.6	A-25		87	48	853.290		0.74
T					39	853.837		0.29
P	3.5	B-25		97	48	854.900		0.81
T					49	855.522		0.24
P	3.4	C-25		105	49	856.330		0.48
T					56	856.871		0.11
P	3.3	A-29		93	49	857.700		0.52
T					44	858.228		0.22
P	3.2	B-29		94	47	859.030		0.48
T					47	859.485		0.15
P	3.1	C-29		107	46	860.470		0.78
T					61	861.221		0.23
P	4.6	A-2		84	47	862.120		0.53
T					37	862.482		0.16
P	4.5	B-2		92	45	863.150		0.30
T					47	863.355		
P	4.4	C-2		97	48	864.240		0.56
T					49	864.829		0.23
P	4.3	A-4		80	47	865.840		0.80
T					33	866.253		0.22
P	4.2	B-4		92	50	867.370		0.84
T					42	867.903		0.21
P	4.1	C-4		101	47	868.880		0.73
T					54	869.595		0.25
Total	(Time in minutes)				38.05	34.932		
Push					19.07	21.892	File: DAT	303
Travel					18.98	13.040	Page 2 of 8	

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	153	271					
T		160	274					
P	1.5	157	270					
T		162	273					
P	1.4	159	271					
T		165	272					
P	1.3	154	270					
T		163	274					
P	1.2	152	270					
T		160	271					
P	1.1	160	270					
T		164	272					
P	2.6	155	270					
T		163	272					
P	2.5	152	271					
T		157	272					
P	2.4	151	270					
T		157	272					
P	2.3	151	271					
T		157	274					
P	2.2	159	271					
T		160	272					
P	2.1	159	269					
T		159	272					
P	3.6	153	271					
T		157	273					
P	3.5	155	270					
T		158	272					
P	3.4	159	269					
T		158	272					
P	3.3	152	272					
T		159	273					
P	3.2	154	273					
T		158	273					
P	3.1	154	272					
T		158	273					
P	4.6	157	273					
T		155	274					
P	4.5	154	272					
T		157	272					
P	4.4	153	271					
T		156	272					
P	4.3	155	271					
T		157	271					
P	4.2	154	270					
T		158	271					
P	4.1	154	270					
T		157	269					
P TW Avg		155						
T TW Avg		159						

	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	0.65	0.81	50.85			
T		1	0.20	0.45	28.37			
P	1.5		0.55	0.74	46.93			
T		0	0.10	0.32	20.09			
P	1.4	3	0.55	0.74	47.01			
T		0	0.15	0.39	24.67			
P	1.3	3.5	0.75	0.87	54.67			
T			0.25	0.50	31.79			
P	1.2	4.5	1.20	1.10	69.04			
T		1	0.35	0.59	37.53			
P	1.1	7	1.80	1.34	85.11			
T		2.5	0.52	0.72	45.89			
P	2.6	4	0.90	0.95	59.94			
T			0.35	0.59	37.62			
P	2.5	4.5	1.10	1.05	66.10			
T		1	0.35	0.59	37.44			
P	2.4	4	1.10	1.05	66.05			
T		2	0.35	0.59	37.44			
P	2.3	5	1.40	1.18	74.51			
T		2	0.45	0.67	42.45			
P	2.2	6	1.50	1.22	77.63			
T			0.45	0.67	42.55			
P	2.1	7	2.30	1.52	96.13			
T		3	0.55	0.74	47.01			
P	3.6		1.30	1.14	71.92			
T		2	0.38	0.62	39.01			
P	3.5		1.50	1.22	77.38			
T		2	0.35	0.59	37.47			
P	3.4	4	1.00	1.00	63.38			
T		0	0.20	0.45	28.32			
P	3.3	3.5	0.90	0.95	59.79			
T			0.28	0.53	33.54			
P	3.2	3.5	0.85	0.92	58.20			
T		1	0.26	0.51	32.29			
P	3.1	5	1.30	1.14	71.98			
T		2	0.35	0.59	37.47			
P	4.6		0.96	0.98	62.00			
T		1	0.27	0.52	32.83			
P	4.5	3	0.50	0.71	44.64			
T		0	0.15	0.39	24.51			
P	4.4	4	1.00	1.00	63.08			
T		2	0.29	0.54	34.05			
P	4.3	6	1.40	1.18	74.75			
T		2	0.35	0.59	37.44			
P	4.2	7	1.60	1.26	79.85			
T			0.35	0.59	37.47			
P	4.1	6	1.30	1.14	71.98			
T		2	0.35	0.59	37.44			
P TW Avg				1.05				
T TW Avg				0.56				

	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	408	305	408	147
T				432	110	295	414	140
P	1.5			432	408	305	426	140
T				432	110	295	426	140
P	1.4			432	400	310	408	140
T				432	110	300	408	140
P	1.3			432	396	295	414	126
T				432	110	285	414	133
P	1.2			432	396	310	414	140
T				432	110	300	414	140
P	1.1			432	396	305	426	147
T				432	110	295	426	147
P	2.6			432	396	305	414	147
T				432	110	295	414	147
P	2.5			432	375	300	420	133
T				432	110	290	420	133
P	2.4			429	375	285	426	126
T				429	110	275	426	133
P	2.3			429	360	285	426	133
T				429	110	275	423	133
P	2.2			429	375	295	423	140
T				429	110	285	423	147
P	2.1			429	375	295	420	154
T				429	110	285	420	140
P	3.6			429	375	295	420	154
T				429	110	285	420	147
P	3.5			429	375	295	426	147
T				429	110	285	426	147
P	3.4			429	375	295	420	161
T				429	110	285	420	147
P	3.3			429	375	295	420	168
T				429	110	285	420	147
P	3.2			429	375	295	420	161
T				429	110	285	420	140
P	3.1			429	375	295	420	154
T				429	110	285	420	140
P	4.6			429	375	295	410	168
T				429	110	285	410	147
P	4.5			429	375	295	410	154
T				429	110	285	410	147
P	4.4			429	375	295	402	154
T				429	110	285	402	140
P	4.3			429	375	295	410	154
T				429	110	285	410	147
P	4.2			429	375	295	410	147
T				429	110	285	410	140
P	4.1			429	375	295	410	154
T				429	110	285	410	140
P	TW Avg		0.00	430	382	297	417	148
T	TW Avg		0.00		110	287	417	142
							File: DAT	303

LABORATORY DATA

Orsat Analysis
Operator - DaRos

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
O2	20.0	18.0	20.0	18.0	20.0	18.0	18.0
CO	20.2	0.2	20.2	0.2	20.2	0.2	0.2
N2		79.8		79.8		79.8	79.8
Molecular Weight, Dry			29.04				

Particulate Analysis

Front-half Filter Dry Catch, mg	4.97
Blank Filter Catch, mg	0.10
Front-half Aqueous Wash, mg	
Filterable	3.70
Non-filterable	12.94
Front-half Acetone Wash, mg	5.16
Impinger Catch, mg	
Filterable	1.35
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	7.55
Total Front-half Filterable, mg	8.77
Total Front-half Nonfilterable, mg	18.10
Total Front-half, mg	26.87
Total Back-half Filterable, mg	1.35
Total Pennsylvania DER Mass, mg	28.22

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	30.80
Stack Press, in Hg	30.76
Vol of H2O Std, dscf	17.256
M-5 Stack Moist. Content, %	31.62
Sat Stack Moist. Content, %	29.09
Stack Moist. Cont. Used, %	29.09
Molecular Weight, Dry	29.04
Molecular Weight, Wet	25.83
Nozzle Dia, in	0.302
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	155	159	157
Meter Volume Corr, ft3	22.382	13.319	35.701
Meter Volume Std, dscf	23.395	13.922	37.317
Vol of H2O Std, dscf	9.599	5.712	15.311
Sample Time, min	19.07	18.98	38.05
Stack Vel, fps	66.36	35.30	
Percent Isokinetic, %	99	112	
Stack Gas Vol, acfm	127908	68038	
Stack Gas Vol, dscfm	80079	42308	
Stack Gas Density, lb/ft3	0.0592	0.0588	
DER Part. Emission Conc., gr/dscf		0.0117	
DER Part. Emission Rate, lb/ton coke		0.0112	
DER Part. Emission Rate, lb/hr		0.54	
Front-half Part. Conc., gr/dscf		0.0111	
Front-half Part. Rate, lb/ton coke		0.0106	
Front-half Part. Rate, lb/hr		0.52	
Back-half Filt. Conc., gr/dscf		0.0006	
Back-half Filt. Rate, lb/ton coke		0.0005	
Back-half Filt. Rate, lb/hr		0.03	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	51	60	72	62
5	47	66	77	45
4	47	66	63	63
3	55	75	60	75
2	69	78	58	80
1	85	96	72	72

Position

Travel

Position	1	2	3	4
6	28	38	39	33
5	20	37	37	25
4	25	37	28	34
3	32	42	34	37
2	38	43	32	37
1	46	47	37	37

Position

FIELD DATA

Plant	USS - Clairton, PA
Date	10-24-84
Car No.	104
Battery No.	20
Sample Location	HCQC - Test Car
Sample Type	M-5
Run Number	3.4
Operator	Jarman/Smith
No. of Ovens Tested	24
No. of Ovens Tested/hr	4.5
Coke Prd'n Rate, tons/oven	14.5
Ambient Temp, deg F	~60
Barometric Pressure, in Hg	30.79
Static Pressure, in H2O	-0.5
Stack Area, ft2	32.125
Filter Type	RA 934 AH
Top Filter Number	RA102G-030
Bottom Filter Number	RA102G-031
Probe Length & Type	5 ft - TFE Lined
Nozzle Size	0.302
Pitot Coefficient	0.84
Meter Box Number	APT 12 LG Mod
DGM Coeff's A1	0.0012
A2	1.0171
A3	0.0037
Orfice Coeff's B	0.4821
A	0.391
Cal Press, in Hg	29.65

		in Hg	CFM
Leak Check	Initial	17	0.006
	Final	15	0.000

Water Volume:

Location	Initial	Final	Net Gain
Imp A1	100	381	281
Imp A2	100	102	2
Imp A3	0	0	0
Sil Gel A	676.4	682	5.6
Imp B1	100	78	-22
Imp B2	100	101	1
Imp B3	0	0	0
Sil Gel B	663.3	672.2	8.9
Total Volume			276.5

Combined Impinger pH 3.0

	Point No.	Temperature, deg F Stack	Probe	Oven	Imping A	Imping B	GM In	GM Out
P	1.6	154	271	241	59			
T		162	272	247	50			
P	1.5	157	269	250	59			
T		161	272	249	55			
P	1.4	157	271	245	59			
T		161	273	249	54.5			
P	1.3	156	270	252	60			
T		170	271	254	50			
P	1.2	157	269	254	60			
T		161	271	251	55			
P	1.1	154	270		60			
T		161	269	252	53			
P	2.6	155	272	261	62			
T		162	276	260	53			
P	2.5	155	270	256	62			
T		163	271	258	56			
P	2.4	157	270	260	63			
T		163	270	258	57			
P	2.3	157	268	253	64			
T		160	269	250	57			
P	2.2	155	269	254	64			
T		160	269	253	57			
P	2.1	158	269	257	64			
T		162	268	254	57			
P	3.6	153	268	255	64			
T		160	268	255	58			
P	3.5	155	271	255	64			
T		158	270	256	58.5			
P	3.4	156	270	264	63			
T		160	270	267	58			
P	3.3	157	271	270	64			
T		158	271	265	59			
P	3.2	154	270	260	64			
T		160	270	258	59			
P	3.1	157	268	252	64			
T		160	270	247	57.5			
P	4.6	154	269	252	64			
T		156	272	254	57			
P	4.5	156	270	260	64			
T		159	272	262	59			
P	4.4	155	270	260	64			
T		160	272	260	57			
P	4.3	153	270	261	64			
T		159	272	260	58.5			
P	4.2	154	268	255	64			
T		160	271	253	59			
P	4.1	154	268	249	64			
T		159	268	249	57			
P TW Avg		155						
T TW Avg		161						

	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	0.65	0.81	50.96			
T			0.25	0.50	31.81			
P	1.5	2	0.52	0.72	45.69			
T			0.15	0.39	24.62			
P	1.4	2	0.50	0.71	44.80			
T		1	0.20	0.45	28.43			
P	1.3	4	0.75	0.87	54.83			
T		1	0.25	0.50	32.01			
P	1.2	4.5	1.00	1.00	63.36			
T			0.30	0.55	34.81			
P	1.1	7	0.20	0.45	28.27			
T			0.50	0.71	44.95			
P	2.6	5	1.20	1.10	69.29			
T		2	0.35	0.59	37.63			
P	2.5	5	1.10	1.05	66.34			
T			0.40	0.63	40.27			
P	2.4	6	1.30	1.14	72.24			
T			0.50	0.71	45.02			
P	2.3		1.50	1.22	77.60			
T		2	0.45	0.67	42.60			
P	2.2	6	1.50	1.22	77.47			
T		2	0.45	0.67	42.60			
P	2.1	8	2.00	1.41	89.67			
T		3.5	0.70	0.84	53.22			
P	3.6	5	1.20	1.10	69.18			
T			0.40	0.63	40.17			
P	3.5	6.5	1.60	1.26	80.01			
T		2	0.45	0.67	42.54			
P	3.4	4	0.95	0.97	61.70			
T			0.25	0.50	31.76			
P	3.3	4	0.90	0.95	60.11			
T		1	0.30	0.55	34.73			
P	3.2	4	0.85	0.92	58.27			
T			0.30	0.55	34.79			
P	3.1	5	1.10	1.05	66.45			
T			0.40	0.63	40.17			
P	4.6	3	0.65	0.81	50.96			
T		1	0.25	0.50	31.65			
P	4.5	3	0.60	0.77	49.04			
T			0.15	0.39	24.58			
P	4.4	4.5	1.00	1.00	63.26			
T		2	0.30	0.55	34.79			
P	4.3	6	1.30	1.14	72.00			
T		2	0.35	0.59	37.54			
P	4.2	7	1.60	1.26	79.95			
T			0.40	0.63	40.17			
P	4.1	6	1.30	1.14	72.06			
T			0.32	0.57	35.90			
P TW Avg				1.00				
T TW Avg				0.58				

	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		2.6	426	375	287	408	147
T			1.25	426	110	280	408	154
P	1.5		2.6	429	375	290	414	147
T			1.25	429	110	280	414	140
P	1.4		2.6	429	375	295	417	147
T			1.25	429	110	285	417	140
P	1.3		2.7	429	375	297	420	161
T			1.25	429	110	287	420	154
P	1.2		2.7	429	375	295	423	161
T			1.2	429	110	285	423	147
P	1.1		2.7	429	375	295	426	161
T			1.2	429	110	285	426	147
P	2.6		2.6	426	375	300	426	161
T			1.2	426	110	295	420	140
P	2.5		2.6	429	375	295	429	182
T			1.4	429	110	285	429	161
P	2.4		2.6	429	375	295	420	175
T			1.4	429	110	285	420	154
P	2.3		2.7	429	375	295	426	161
T			1.4	429	110	285	426	147
P	2.2		2.7	429	375	297	429	168
T			1.3	429	110	285	429	154
P	2.1		2.7	429	375	297	426	182
T			1.3	429	110	287	426	147
P	3.6		2.65	429	375	300	429	182
T			1.3	429	110	290	429	147
P	3.5		2.65	429	375	297	426	168
T			1.3	429	110	290	426	154
P	3.4		2.65	429	375	297	429	154
T			1.3	429	110	287	429	147
P	3.3		2.65	429	375	292	426	175
T			1.3	429	110	285	426	140
P	3.2		2.6	429	375	295	429	154
T			1.3	429	110	290	429	147
P	3.1		2.6	429	375	295	429	175
T			1.3	429	110	287	429	147
P	4.6		2.6	429	360	292	426	161
T			1.3	429	110	282	426	147
P	4.5		2.6	429	370	297	426	161
T			1.3	429	110	287	426	154
P	4.4		2.7	429	370	297	426	175
T			1.3	429	110	287	426	140
P	4.3		2.7	429	370	297	426	168
T			1.25	429	110	287	426	147
P	4.2		2.7	429	370	297	426	168
T			1.25	429	110	287	426	140
P	4.1		2.7	429	370	297	426	168
T			1.25	429	110	287	426	140
P	TW Avg		2.65	429	373	295	424	165
T	TW Avg		1.28		110	286	424	147
								304

LABORATORY DATA

Orsat Analysis
Operator - DaRos

Run	1		2		3		Avg
Gas	Act %	Net %	Act %	Net %	Act %	Net %	Net %
CO2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
O2	20.6	18.4	20.4	18.2	20.6	18.4	18.3
CO	20.9	0.3	20.6	0.2	20.9	0.3	0.3
N2		79.1		79.4		79.1	79.2
Molecular Weight, Dry			29.09				

Particulate Analysis

Front-half Filter Dry Catch, mg	14.00
Blank Filter Catch, mg	-0.05
Front-half Aqueous Wash, mg	
Filterable	4.00
Non-filterable	19.56
Front-half Acetone Wash, mg	0.47
Impinger Catch, mg	
Filterable	2.31
Non-filterable	Not Applicable
Back-half Acetone rinse, mg	5.24
Total Front-half Filterable, mg	17.95
Total Front-half Nonfilterable, mg	20.03
Total Front-half, mg	37.98
Total Back-half Filterable, mg	2.31
Total Pennsylvania DER Mass, mg	40.29

CALCULATIONS

Standard Temp, deg F	68
Standard Press, in Hg	29.92
Barometric Press, in Hg	30.79
Stack Press, in Hg	30.75
Vol of H2O Std, dscf	13.015
M-5 Stack Moist. Content, %	34.43
Sat Stack Moist. Content, %	29.87
Stack Moist. Cont. Used, %	29.87
Molecular Weight, Dry	29.09
Molecular Weight, Wet	25.77
Nozzle Dia, in	0.302
X-Area of Stack, ft2	32.125

	Push	Travel	Total
Time-avg Stack Temp, deg F	155	161	158
Meter Volume Corr, ft3	23.696	0.022	23.718
Meter Volume Std, dscf	24.760	0.023	24.783
Vol of H2O Std, dscf	10.546	0.010	10.556
Sample Time, min	18.92	18.05	36.97
Stack Vel, fps	63.38	36.78	
Percent Isokinetic, %	112	0	
Stack Gas Vol, acfm	122166	70893	
Stack Gas Vol, dscfm	75550	43467	
Stack Gas Density, lb/ft3	0.0590	0.0585	
DER Part. Emission Conc., gr/dscf		0.0251	
DER Part. Emission Rate, lb/ton coke		0.0228	
DER Part. Emission Rate, lb/hr		1.48	
Front-half Part. Conc., gr/dscf		0.0236	
Front-half Part. Rate, lb/ton coke		0.0215	
Front-half Part. Rate, lb/hr		1.39	
Back-half Filt. Conc., gr/dscf		0.0014	
Back-half Filt. Rate, lb/ton coke		0.0013	
Back-half Filt. Rate, lb/hr		0.08	

DUCT VELOCITIES
AT SAMPLING PLANE

Push

Position	1	2	3	4
6	51	69	69	51
5	46	66	80	49
4	45	72	62	63
3	55	78	60	72
2	63	77	58	80
1	28	90	66	72

Position

Travel

Position	1	2	3	4
6	32	38	40	32
5	25	40	43	25
4	28	45	32	35
3	32	43	35	38
2	35	43	35	40
1	45	53	40	36

Position