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Carpenter Technology Corporation
Reading, Pennsylvania
ESED No. 79/9
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by

PEDCo Environmental, Inc.
11499 Chester Road
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Mr. William Terry of Midwest Research Institute, the New Source Performance Standards contractor, monitored the process operation during the test series, assisted in the coordination of tests with process conditions, and provided the information contained in Section 2 and Appendix D of this report. Messrs. Larry Geiser and George Michael of Carpenter Technology Corporation helped to coordinate plant activities.

SECTION 1

INTRODUCTION

During the week of April 28, 1981, PEDCo Environmental personnel conducted an emission sampling program at the steel melt shop operated by Carpenter Technology Corporation (Cartech) in Reading, Pennsylvania. The purpose of this test program was to provide data for assessing the need for revising current New Source Performance Standards (NSPS) for electric arc furnaces (EAF) to include argon-oxygen decarburization (AOD) furnaces.

The No. 2 AOD at Cartech was selected for source testing for the following reasons:

1) It utilizes best available control technology.

2) The emissions capture and control equipment is representative of the industry.

3) Emissions from a single AOD are controlled separately from those of other furnaces.

4) Emission data could be obtained by standard sampling techniques at the desired locations.

Particulate matter concentrations and mass emission rates were measured at one inlet and one outlet site according to U.S. Environmental Protection Agency (EPA) Reference Method 5.* Inlet and outlet tests for particulate matter were performed simultaneously so that control efficiency as well as values for

*40 CFR 60, Appendix A, July 1980.

controlled and uncontrolled emissions could be determined. Flue gas flow rates, temperature, and composition were measured in conjunction with these tests. In addition, particle size distribution samples were collected simultaneously at the inlet and outlet sites. Method 9* procedures were used to evaluate visible emissions (VE) from the melt shop and fabric filter outlet throughout the test series. Fugitive emissions (FE) from the fabric filter dust handling system were determined visually according to the proposed Method 22.** Samples of dust collected by the fabric filter were obtained for analysis of particle size distribution and trace element composition. Tests took place simultaneously at all sites, including visible and fugitive emission sites. A representative from the NSPS contractor assisted in coordinating the tests with process operations. Two filterable particulate samples taken at the outlet and two fabric filter dust samples were subsequently analyzed for concentrations of fluoride, chromium, lead, and nickel.

This report documents the activities and results of the test program. Section 2 describes the process that was tested and the operating conditions during the sampling period. Section 3 presents and discusses the results. Section 4 describes the sampling sites and general test procedures. Section 5 briefly outlines quality assurance measures and audit results. Section 6 gives details of the sampling and analytical procedures for

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*40 CFR 60, Appendix A, July 1980.

**Federal Register, Vol. 45, No. 224, November 19, 1980.

determining particulate matter concentrations and particle size distribution. The appendices contain computer output and example calculations (Appendix A), field data (Appendix B), sample recovery and analytical data (Appendix C), the Midwest Research Institute (MRI) process summary (Appendix D), calibration procedures and results (Appendix E), a quality assurance summary (Appendix F), and a list of project participants (Appendix G).

SECTION 2

PROCESS OPERATION

Cartech's Reading plant has five EAF's and two AOD's. The plant is capable of producing about 400 different grades of steel for use in numerous industries (e.g., electronics, automotive, appliance, aerospace, and industrial equipment). Each of the five EAF's has a rated capacity of 13.6 megagrams (Mg) (15 tons) and produces an average heat of 15.4 Mg (17 tons). The No. 1 AOD has a rated capacity of 15.4 Mg (17 tons). The No. 2 AOD has a rated capacity of 18.1 Mg (20 tons), but typically refines a 15.4-Mg (17-ton) charge of molten metal. During the test series the facility was operating at normal capacity (three shifts per day, 5 days per week).

The No. 2 AOD vessel normally operates continuously, with only a 5- to 10-minute delay between a tap and a subsequent charge of molten metal. The molten metal charge comes from one of two EAF's (designated as "C" and "E"). The time lapse between tap and charge is short because no refractory gunning is performed on the AOD. Longer delays occur periodically, when maintenance is performed on the AOD vessel or when vessel charging is delayed because a crane is not available. Delays

in tapping could occur if the continuous caster were still casting the metal from the No. 1 AOD or if the continuous caster were broken down.

Each heat in the No. 2 AOD vessel consists of three general stages. The first stage begins with the charging of molten metal from either of two EAF's (C or E), which is followed by the addition of the fluxing agent (lime). The vessel blow begins almost immediately after the charge, with an oxygen-to-argon ratio of 3:1 [930 normal cubic meters per hour (Nm^3/h) of oxygen to 310 Nm^3/h of argon, or 33,000 standard cubic feet per hour (scfh) to 11,000 scfh]. Some of the heats also use nitrogen in a ratio of 3:1:1 (oxygen:argon:nitrogen) for the first phase of the heat. After a gas blow of 15 to 30 minutes, the vessel is turned down for a temperature check. If the temperature is close to 1923 K (3182°F), alloys are added. The type and weight of the alloy additions depend on final product specifications.

During the next stage of the heat (approximately 1 hour), the orientation of the vessel alternates between an upright position (for blowing or stirring the molten metal with oxygen, argon, or nitrogen gas) and a turned-down position (for temperature measurement, sample acquisition, and alloy and flux addition). The oxygen-to-argon ratio for blowing during this stage is 1:3. The AOD vessel operators make the necessary alloy and flux additions, which are determined by mathematical calculations based on the gross weight of the heat. Near the end of the heat,

the slag is poured off into a slag pot to remove the lime and impurities that are chemically bound in the slag.

Final chemical additions are made at the end of the heat, after the final sample results are available. After the alloys are melted into the bath by stirring with argon or nitrogen gas, the molten metal is tapped into a ladle for transfer to the continuous caster area. The AOD shop and the continuous caster building are separated by a sheet metal wall suspended from the ceiling to a level of about 6.1 meters (m) [20 feet (ft)] above the floor. The molten metal ladle from the AOD must pass under this wall to the ladle-stirring area before it is delivered to the single-strand continuous caster.

Figure 2-1 is a schematic of the process and control system. The process emissions generated during the heat are captured by a canopy hood built into the roof trusses approximately 13 m (42.7 ft) above the mouth of the vessel. The fumes are directed to the canopy hood by a movable diverter hood located 1.5 m (5 ft) above the mouth of the AOD vessel. The diverter hood swings out of the way during charging and tapping operations. The shop roof above the No. 2 AOD is closed, and any fugitive emissions not captured by the canopy hood remain inside the building and are drawn into two openings in a scavenger duct located in the peak of the roof between the AOD canopy and the continuous caster area. The scavenger duct openings are not hooded.

The canopy hood and scavenger ducts are combined to form a main inlet duct, which is then split into two ducts. Each duct

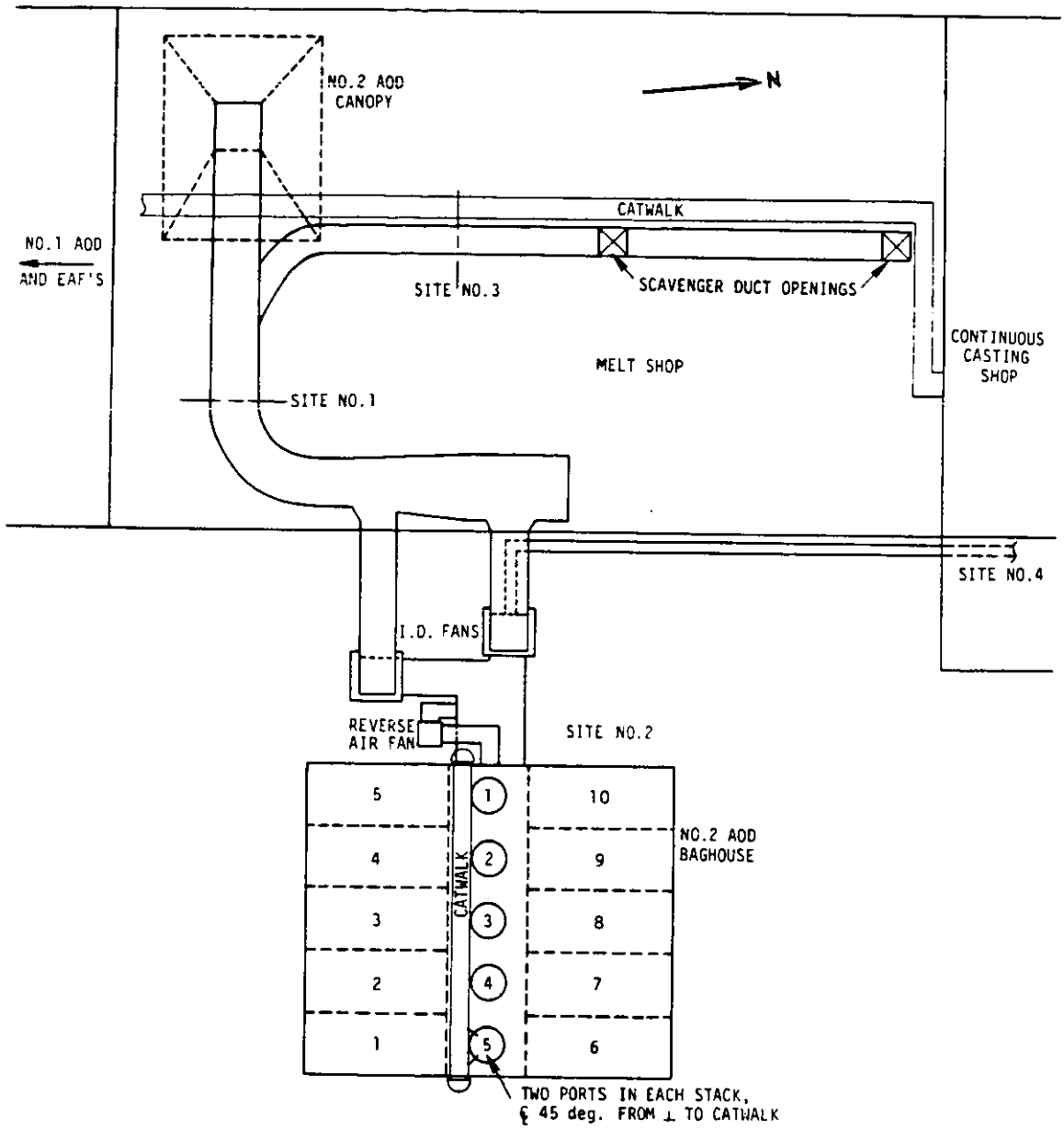

Figure 2-1. Process and control system schematic at Cartech.

has a 522-kilowatt (700-horsepower) fan that routes the emissions to the inlet plenum of the fabric filter. The emissions from the continuous-caster cutting torch are normally routed to the fabric filter by a small duct and booster fan. The EPA requested that this duct be closed off during the source test, however, to prevent emissions from the cutting torch and the AOD from mixing.

The AOD gases are treated in a positive-pressure Carborundum fabric filter to remove the particulate matter. The cleaned exhaust gases exit via five short stacks on the fabric filter. Table 2 in Appendix D presents technical data on the No. 2 AOD and the associated control device.

William Terry of MRI monitored the operation of the vessel and the fabric filter. The AOD vessel operated normally during the source tests, with only a few short delays. Table 2-1 presents a summary of production data for the test series. Tap-to-tap times ranged from 1.4 to 2.3 hours, and the weight of metal produced per heat ranged from 14.9 to 18.8 Mg (16.4 to 20.7 tons). The average production rate during the tests was 9.2 Mg per hour (10.1 tons per hour), not including process delay times. The average time between heats was less than 5 minutes, and testing continued during these periods unless maintenance was to be performed or the AOD operators indicated there would be a delay. The testing was stopped on April 28, 1981, when emissions from a fire at the No. 1 AOD drifted over to the No. 2 AOD.

TABLE 2-1. NO. 2 AOD PRODUCTION SUMMARY[a]

PEDCo Run No.	Date (1981)	Complete heats sampled, Heat No.	Tap-to-tap time, minutes	Metal produced[b]		Process weight[c] rate	
				Mg	tons	Mg/h	tons/h
1	4/28	1	86[d]	16.4	18.1	11.4	12.6
		2	108	17.7	19.5	9.8	10.8
		3	100	15.7	17.3	9.4	10.4
		4	104[e]	15.3	16.9	8.9	9.8
		5	105	15.1	16.6	8.6	9.5
		Average	101	16.1	17.7	9.5	10.5
2	4/29	1	121	15.5	17.1	7.7	8.5
		2	94	15.9	17.5	10.2	11.2
		3	137[f]	16.1	17.7	7.1	7.8
		4	95	17.2	19.0	10.9	12.0
		Average	112	16.1	17.8	8.6	9.5
3	4/30	1	115	15.4	17.0	8.1	8.9
		2	115	18.8	20.7	9.8	10.8
		3	97	15.1	16.6	9.3	10.3
		4	102	16.1	17.8	9.5	10.5
		5	87[g]	14.9	16.4	10.3	11.3
		Average	103	16.1	17.7	9.3	10.3

[a]Compiled from data in Appendix D (Table 4 and Attachment 1).

[b]Final billet weights, reported in megagrams and tons.

[c]Process weight rates were calculated by dividing the weight of metal produced by the tap-to-tap time. Averages are based on average metal produced and heat time to yield a weighted average.

[d]These are actually charge-to-charge times because one tap time was unavailable.

[e]Seven minutes was subtracted from the actual time to reflect a delay resulting from the unavailability of a crane.

[f]Thirteen minutes was subtracted from the actual time to reflect a delay caused by slag pot removal. The long heat time resulted from problems in attaining metal specifications.

[g]Five minutes was subtracted from the actual time to reflect a delay caused by pulling a collar.

The fabric filter was observed approximately once an hour and was found to be operating normally. Indicator dials in the fabric filter control room showed which compartment was closed for cleaning, the amperage on each of the two fans, the inlet gas temperature, and the amperage of the reverse-air fan. The amperage of the reverse-side fan was typically 100 to 105 when the fan was in the cleaning operation and 60 when it was not in the cleaning mode. The other indicator dial readings are included in Attachment 1 of Appendix D.

The test conditions were representative of normal operations and should provide useful data on controlled and uncontrolled emissions from an individually controlled AOD vessel. Emissions were most significant during the blowing operation, and the flow to the fabric filter appeared to be adequate to capture almost all of the emissions in the canopy hood. The emissions that were not captured by the canopy drifted northward toward the continuous caster area, where they were captured by the scavenger ducts. Charging and tapping emissions were minimal, and most were captured by the canopy hood.

SECTION 3

SUMMARY OF RESULTS

Particulate matter and particle size distribution tests were conducted simultaneously at the inlet and outlet of the fabric filter. Visible emissions from the melt shop and fabric filter outlet were evaluated concurrently with particulate tests. Fugitive emissions from the fabric filter dust-handling system were evaluated periodically. Fabric filter dust samples were collected and analyzed for trace elements and particle size distribution. Table 3-1 summarizes the type and number of samples that were collected.

In brief, uncontrolled particulate matter concentrations averaged 167 mg/dNm^3 (0.073 gr/dscf). At the fabric filter outlet, particulate concentrations averaged 0.66 mg/dNm^3 (0.00029 gr/dscf) which indicates a 99.6 percent control efficiency. Both concentration levels were in the range of expected values based on reported data on EAF's.[1,2] Outlet emissions, however, were significantly lower than results of previous tests at this site.[3]

The opacity of melt shop visible emissions averaged zero percent over the test series; in fact, no emissions were visually detected at any time. These results attested to the efficient capture of emissions during charging, tapping, and other process

TABLE 3-1. SAMPLES COLLECTED AT CARTECH

Sampling site	Sample type	Sampling method	Number of samples[a]	Time for each sample	Additional analysis		
					Type	No.	Method
No. 1 - Inlet	Particulate	EPA 5	3	~7-1/2 h	Organic and inorganic condensibles	3	Back half E/C extract
	Particle size	High capacity impactor	3	~5 h			
		Impactor	3	5-15 minutes			
No. 2 - Outlet	Particulate	EPA 5	3	~8 h			
	Particle size	Impactor	3	7-1/2 - 9 h			
	VE	EPA 9	3	~1-5 h			
No. 3 - Scavenger duct	Velocity	EPA 2 - Average point	3	~7-1/2 h			
No. 4 - Torch cutter	Velocity	EPA 2	1	10 minutes			
Melt shop	VE	EPA 9	3	~1-5 h			
Fabric filter dust handling system	FE	EPA 22	3	20 minutes	Trace metals, particle size	3	SSMS,[c] Coulter
	Dust	Grab	3[b]	1 per day			

[a]Does not include preliminary, blank, or duplicate runs.

[b]Two samples were analyzed later for fluoride (by EPA Method 13B) and for chromium, lead, and nickel (by Atomic Absorption Spectrophotometry).

[c]Spark source mass spectroscopy.

operations. The opacity of visible emissions from the fabric filter outlet averaged zero percent, which is indicative of efficient control of particulate matter in terms of opacity.

These and other results are presented and discussed in detail according to emission type.

3.1 PARTICULATE MATTER

The fabric filter inlet duct (Site 1) and the fabric filter outlet (Site 2) were tested simultaneously for particulate matter. Site 1 represented uncontrolled process and fugitive emissions from the No. 2 AOD; Site 2 represented controlled emissions from the same source.

The fugitive portion of uncontrolled emissions was represented by Site 3, the scavenger duct. The velocity in this duct was monitored for the duration of the particulate tests to detect any changes in flow rate and corresponding emission capture efficiency. Uncontrolled emissions from the torch cutter operation (represented by Site 4) were not sampled. After initial gas flow measurements had been made at Site 4, the torch cutter duct was blocked (at EPA's request) to prevent those emissions from entering the control system. This accomplished two things: 1) only emissions related to the AOD were tested, and 2) the gas flow measurements at Site 1 represented the total net gas flow to the fabric filter (not counting gas recirculated by the reverse-air cleaning system).

Particulate tests at Sites 1 and 2 were conducted over approximately five AOD heats. Because the large number of heats covered by the sampling period reduced the significance of testing for integral heats (i.e., charging through tapping), tests were commenced at any convenient time during a heat. Testing started at both sites simultaneously and continued until the respective traverses were completed, (about 7.5 to 8 hours). This procedure made possible the calculation of control efficiencies and average emission factors. Fabric filter cleaning cycles were sampled as they occurred.

The NSPS contractor representative, who was on site to monitor process operations, helped to coordinate the tests with process conditions. Based on his observations, tests were interrupted whenever the AOD experienced an operational delay or conditions were unrepresentative.

Particulate matter was sampled and analyzed according to procedures described in EPA Methods 1, 2, 3, and 5 of the Federal Register.* Each outlet test consisted of traversing all five stacks. Site 1 did not meet minimum Method 1 criteria, but previous velocity profiles obtained by Cartech personnel indicated the site was acceptable. At Sites 3 and 4 velocity was measured according to procedures described in EPA Method 2. Three particulate tests were conducted at Sites 1 and 2. Three velocity determinations were made at Site 3, and one was made at

*40 CFR 60, Appendix A, July 1980.

Site 4. Integrated gas samples were collected once at Sites 1 and 2 (according to Method 3) to verify that the gas streams were essentially air. Additional molecular weight determinations were not made.

3.1.1. Gas Conditions and Particulate Emissions

Summaries of the measured stack gas and particulate emission data are presented in Tables 3-2 through 3-5. Volumetric flow rates are expressed in actual cubic meters per second (m^3/s) and actual cubic feet per minute (acfm) at stack conditions. Flow rates corrected to zero percent moisture and standard conditions [20°C and 101 kPa (68°F and 29.92 in.Hg)] are expressed as dry normal cubic meters per second (dNm^3/s) and dry standard cubic feet per minute (dscfm). Average stack gas velocities are expressed in actual meters per second (m/s) and actual feet per second (ft/s) at stack conditions. Particulate concentrations are reported in milligrams per dry normal cubic meter and grains per dry standard cubic foot. Emission rates are expressed in kilograms per hour and pounds per hour. The product of the concentration and the volumetric flow rate is the mass emission rate. The filterable particulate data represent material collected in the sample probe and on the filter, both of which were heated to approximately 121°C (250°F). The condensible organic and inorganic fractions represent material that passed through the filter and was collected by the impinger section of the sampling train at approximately 20°C (68°F). The isokinetic rate

TABLE 3-2. SUMMARY OF GAS STREAM CHARACTERISTICS AT SITES 1 AND 2[a]

Run No.	Date (1981)	Flow rate[b]		Temperature		Moisture, %	Velocity[c]		Flow rate[d]	
		dNm^3/s	dscfm	°C	°F		m/s	ft/s	m^3/s	acfm
C1P-1	4/28	130.6	276,800	57	135	1.1	21.5	70.5	150.0	317,800
C1P-2	4/29	138.7	293,800	51	124	1.7	22.7	74.3	158.1	335,000
C1P-3	4/30	133.3	282,400	50	122	0.9	21.5	70.5	149.9	317,600
Average		134.2	284,300	53	127	1.2	21.9	71.8	152.7	323,500
C2P-1	4/28	59.0	125,100	55	130	0.3	6.0	19.8	66.5	141,000
C2P-2	4/29	63.0	133,400	55	131	1.4	6.5	21.4	72.0	152,800
C2P-3	4/30	68.5	142,200	49	119	0.5	6.9	22.6	76.1	161,300
Average		63.5	134,600	53	127	0.7	6.5	21.3	71.5	151,700

[a]Average $CO_2 \leq 0.6\%$, $O_2 = 19.4\%$. Sites 1 and 2 are the inlet and outlet, respectively.

[b]Dry normal cubic meters per second at 20°C and 101 kPa and dry standard cubic feet per minute at 68°F and 29.92 in.Hg.

[c]Velocity at stack conditions.

[d]Flow rate at stack conditions.

Note: Outlet flowrates are values measured in the five stack exhausts. The difference between reported inlet and outlet flowrates is the net gas flow that escapes by means other than the stacks; that is, through the partially open grating at the bottom level of the bags and through other small openings on the clean side of the exhaust. These losses are a result of the back pressure on the exhaust system caused by the small stack outlet area.

TABLE 3-3. SUMMARY OF GAS STREAM CHARACTERISTICS AT SITES 3 AND 4[a]

Run No.	Date (1981)	Flow rate[b]		Temperature		Moisture, %[c]	Velocity[d]		Flow rate[e]	
		dNm^3/s	dscfm	°C	°F		m/s	ft/s	m^3/s	acfm
C3-1	4/28	34.0	72,030	53.4	128	1.5	15.9	52.2	34.5	73,130
C3-2	4/29	34.0	72,060	52.8	127	1.5	15.9	52.2	34.5	73,160
C3-3	4/30	34.5	73,030	47.8	118	1.5	16.1	52.9	35.0	74,140
Average		34.2	72,370	51.3	124	1.5	16.0	52.4	34.7	73,480
C4V-1	4/27	6.5	13,830	33.4	92	1.5	32.7	107.3	6.6	14,040

[a]Average CO_2 and O_2 estimated at 0.6 percent and 19.4 percent, respectively. Site 3 is the scavenger duct, and Site 4 is the torch cutter.

[b]Dry normal cubic meters per second at 20°C and 101 kPa and dry standard cubic feet per minute at 68°F and 29.92 in.Hg.

[c]Estimated.

[d]Velocity at stack conditions.

[e]Flow rate at stack conditions.

Note: Scavenger duct flowrates are included in inlet values reported in Table 3-2. The flow through the torch cutter duct was blocked during the test series, but the reported data were obtained prior to testing.

TABLE 3-4. SUMMARY OF FILTERABLE PARTICULATE EMISSIONS DATA AT THE INLET, SITE NO. 1

Run No.	Date (1981)	Concentration[a]		Mass emission rate		Isokinetic rate, %
		mg/dNm^3	gr/dscf	kg/h	lb/h	
C1P-1	4/28	149.9	0.0655	70.5	155.4	108
C1P-2	4/29	141.1	0.0617	70.5	155.3	107
C1P-3	4/30	210.9	0.0921	101.2	223.0	101
Average		167.3	0.0731	80.7	177.9	

[a]Milligrams per dry normal cubic meter at 20°C and 101 kPa and grains per dry standard cubic foot at 68°F and 29.92 in.Hg.

TABLE 3-5. SUMMARY OF PARTICULATE EMISSIONS DATA AT THE OUTLET, SITE NO. 2

Run No.	Date (1981)	Concentration[a]						Mass emission rate[b]						Iso-kinetic rate, %
		Filterable		Condensible				Filterable		Condensible				
				Organic		Inorganic				Organic		Inorganic		
		mg/dNm^3	gr/dscf	mg/dNm^3	gr/dscf	mg/dNm^3	gr/dscf	kg/h	lb/h	kg/h	lb/h	kg/h	lb/h	
C2P-1	4/28	0.827	0.000365	0	0	0.372	0.000162	0.390	0.859	0	0	0.175	0.385	98.0
C2P-2	4/29	0.493	0.000217	0.069	0.000030	0.259	0.000113	0.246	0.542	0.035	0.077	0.130	0.286	98.7
C2P-3	4/30	0.650	0.000284	0.289	0.000126	0.449	0.000196	0.312	0.687	0.138	0.305	0.216	0.475	97.9
Average		0.657	0.000289	0.119	0.000052	0.360	0.000157	0.316	0.696	0.058	0.127	0.174	0.382	

[a]Milligrams per dry normal cubic meter at 20°C and 101 kPa and grains per dry standard cubic foot at 68°F and 29.92 in.Hg.

[b]Outlet mass emission rates are based on measured outlet concentrations and total inlet standard flow rates.

is the ratio of the velocity of the sample gas stream entering the nozzle to the local stack gas velocity, expressed as a percentage.

The volumetric flow rate at the combined inlet (Site 1) averaged 134 dNm^3/s (284,000 dscfm). The outlet flow rate averaged 64 dNm^3/s (135,000 dscfm), which was significantly lower than it should have been. This discrepancy is believed to be a result of the excessive back pressure on the exhaust system, which was caused by the small cross sectional area of the outlet stacks. Because of this back pressure, a large volume of cleaned exhaust gas exited the fabric filter through various openings in the structure as well as through the stacks. These flow measurements are discussed in more detail later in this section.

The actual flow rate at inlet Site 1 averaged 153 m^3/s (324,000 acfm) at 53°C (127°F) and approximately 1 percent moisture, and was equivalent to a gas velocity of 22 m/s (72 ft/s). The actual flow rate measured at outlet Site 2 averaged 72 m^3/s (152,000 acfm) at 53°C (127°F) and less than 1 percent moisture, which represented a gas velocity of 6.5 m/s (21 ft/s).

For calculation purposes, the stack gases were essentially air. During one run at each site, the carbon dioxide (CO_2) concentration averaged less than 0.6 percent, and the oxygen concentration was 19.4 percent by volume.

Table 3-3 presents the results of velocity and flow measurements at the scavenger duct (Site 3) and the torch cutter duct (Site 4). For calculation purposes, gas composition data were

estimated from results of the particulate tests at Sites 1 and 2. The flow rate measured in the scavenger duct averaged 34 dNm^3/s (72,000 dscfm), which is included in the total flow reported for Site 1. At a stack temperature of 51°C (124°F), the actual flow rate averaged 35 m^3/s (73,000 acfm) and represented a gas velocity of 16 m/s (52 ft/s). Measurements of the normal flow rate in the torch cutter duct made before the duct was blocked off showed that the actual flow rate was 6.6 m^3/s (14,000 acfm) at 33°C (92°F), which represented a gas velocity of 33 m/s (107 ft/s). This flow was equivalent to 6.5 dNm^3/s (13,800 dscfm).

Tables 3-4 and 3-5 present particulate emission results. At Site 1 the average filterable particulate concentration was 167 mg/dNm^3 (0.0731 gr/dscf), with a corresponding uncontrolled mass emission rate of 80.7 kg/h (178 lb/h). Condensible fractions were not determined at this site so as to avoid biases that could be caused by the long sample line used between the filter and first impinger.

At the outlet, the filterable particulate concentration averaged 0.66 mg/dNm^3 (0.00029 gr/dscf). The organic and inorganic condensible concentrations averaged 0.12 mg/dNm^3 (0.00005 gr/dscf) and 0.36 mg/dNm^3 (0.00016 gr/dscf), respectively. The reported mass emission rates are based on the total flow rates measured at inlet Site 1 rather than on the flow rates measured at the outlet, which were biased low. Thus, they provide a realistic estimate of the total particulate matter exiting the fabric filter. The filterable, organic condensible, and

inorganic condensible emission rates averaged 0.32, 0.06, and 0.17 kg/h (0.70, 0.13, and 0.38 lb/h), respectively.

Isokinetic sampling rates ranged between 101 and 108 percent at the inlet and were either 98 or 99 percent at the outlet.

3.1.2 Control Efficiencies and Emission Factors

Control efficiencies were calculated by dividing the difference between the outlet and inlet particulate concentrations by the inlet value. Table 3-6 presents a summary of filterable particulate concentrations and indicates the fabric filter collection efficiency for each run. Control efficiencies were 99.4, 99.6, and 99.7 percent on the three test days.

Table 3-7 presents filterable particulate emission factors for uncontrolled and controlled emissions in terms of emission rate per unit of furnace metal capacity. Factors were calculated by dividing the appropriate hourly mass emission rate by the furnace capacity of 18.1 Mg (20 tons). Results are reported in kilograms per hour per megagram of furnace capacity (kg/h per Mg) and in pounds per hour per ton (lb/h per ton). The emission factor for uncontrolled emissions averaged 4.5 kg/h per Mg, or 8.9 lb/h per ton. The average controlled emission factor was 0.018 kg/h per Mg (0.035 lb/h per ton).

The emission factors shown in Table 3-8 are based on actual production data. Results were calculated by dividing the filterable mass emission rate by the corresponding average production rate. Emission factors are reported in kilograms per

TABLE 3-6. FILTERABLE PARTICULATE COLLECTION EFFICIENCY

Run	Inlet concentration		Outlet concentration		% efficiency[c]
	mg/dNm^3[a]	gr/dscf[b]	mg/dNm^3	gr/dscf	
1	150	0.0655	0.827	0.000365	99.4
2	141	0.0617	0.493	0.000217	99.6
3	211	0.0921	0.650	0.000284	99.7
Average	167	0.0731	0.657	0.000289	99.6

[a]Milligrams per dry normal cubic meter at 20°C and 191 kPa.

[b]Grains per dry standard cubic foot at 68°F and 29.92 in.Hg.

[c]Percent efficiency = $\frac{C_{inlet} - C_{outlet}}{C_{inlet}} \times 100.$

TABLE 3-7. PARTICULATE EMISSION FACTORS BASED ON FURNACE CAPACITY[a]

Run No.	Uncontrolled		Controlled	
	kg/h per Mg	lb/h per ton	kg/h per Mg	lb/h per ton
1	3.90	7.77	0.022	0.043
2	3.90	7.76	0.014	0.027
3	5.59	11.2	0.017	0.034
Average	4.46	8.91	0.018	0.035

[a]Factors are based on emissions per unit of furnace metal capacity in kilograms per hour per megagram (pounds per hour per ton). The furnace capacity is 18.1 Mg (20 tons).

TABLE 3-8. PARTICULATE EMISSION FACTORS BASED ON PRODUCTION[a]

Run No.	Metal production rate[b]		Emission factor[c]			
			Uncontrolled		Controlled	
	Mg/h	tons/h	kg/Mg	lb/ton	kg/Mg	lb/ton
1	9.5	10.5	7.42	14.8	0.041	0.082
2	8.6	9.5	8.20	16.3	0.029	0.057
3	9.3	10.3	10.9	21.6	0.034	0.067
Average	9.1	10.1	8.84	17.6	0.035	0.069

[a]Calculated by dividing the filterable mass emission rate by the corresponding average metal production rate.

[b]From Table 2-1.

[c]Kilograms per megagram (pounds per ton) of metal produced.

megagram (pounds per ton) of metal produced. The average uncontrolled emission factor was 8.8 kg/Mg (18 lb/ton), based on a production rate of 9.1 Mg/h (10.1 ton/h). At the same production rate, controlled emissions averaged 0.035 kg/Mg (0.069 lb/ton).

3.1.3 Discussion

In general, the particulate tests were conducted according to schedule. Only minor problems were encountered with the sampling equipment and the process operation. The report does not include the results of preliminary tests that were conducted at Sites 1 and 2 to compare particulate loadings with estimated sampling times and to eliminate any problems associated with test coordination or physical sampling maneuvers. This section discusses validity of results, the discrepancy between inlet and outlet flow rates, and effects of process operations.

The primary purpose of the long sampling time was twofold: (1) to collect approximately 25 to 50 mg in the front half of the outlet sampling train so as to minimize handling and weighing errors; and (2) to satisfy NSPS minimum requirements for sample time and volume. The actual filterable catch weights, which ranged between 5.7 and 8.9 mg, were considerably lower than desired. The actual minimum sampling time and volume were 8 hours and 10.8 dNm^3 (380 dscf), which met the minimum criteria of 4 hours and 4.5 dNm^3 (160 dscf) set forth for EAF's in Subpart AA of the Federal Register.*

*40 CFR 60, Subpart AA, July 1980.

The analyses of filterable particulate matter should provide results within the expected limits of accuracy for Method 5. Several factors support this conclusion: 1) all repeat weighings of filters and acetone rinses were within 0.2 mg, which is closer than the 0.5 mg allowed by the method; 2) the acetone used was within method specifications (impurities were 0.006 mg/g versus a tolerance of 0.01 mg/g); 3) the analysis of the particulate filter blank agreed within 0.4 mg of the original tare weight (Method 5 gives no criterion for this); and 4) a glass-lined probe was used to minimize possible sample biases. The maximum possible margin for error associated with net acetone blank adjustments, filter blanks, and repeat weighings was estimated to be about 30 percent. Actual error was probably much lower on the average; therefore, results were considered to be acceptable.

Condensible concentrations measured at the outlet compared favorably with expected values based on previously reported tests at EAF's and AOD's. Test results indicated that a significant portion (30 to 50 percent) of total emissions was being collected in the impinger section of the sampling train.

Sampling equipment problems were minor. Although the probe heat failed during Run 1 at the inlet site, it was heating properly during about 30 percent of the test, and a comparison of Run 1 results with those of the other two runs indicated that particulate concentrations had not been significantly affected. Sampling at the outlet during Run 3 was delayed for a short period while the filter holder heating system was being repaired. This delay did not affect the results.

Inlet flow rates measured at Site 1 agreed very well with the system design flow rate of 142 m^3/s (300,000 acfm); all runs were within 12 percent of this value. This satisfactory agreement supported the decision to sample at Site 1 despite its failure to meet minimum Method 1 criteria.

All flow rates measured at the scavenger duct were within 2.5 percent of the design flow of 35 m^3/s (75,000 acfm). Comparison of the combined inlet and scavenger duct flow rates indicated that approximately 25 percent of the control system's capacity was used to capture fugitive emissions and 75 percent to capture primary process emissions.

Although the system for the capture of torch cutter emissions represented only 5 percent of the total volumetric capacity of the entire No. 2 AOD control system, the EPA requested that it be disconnected for the duration of the test series so that only AOD emissions could be determined. Based on visual observations, particulate loading at the torch cutter operation was much lower in magnitude than the AOD process emissions. Therefore, the impact of this source on total fabric filter emissions under normal operating conditions is probably insignificant.

Measured outlet flow rates were approximately half of those expected. Actual velocity measurements are considered to be representative of conditions at the time of the tests and accurate within the limits of EPA Method 2. This conclusion is supported by the following: 1) the site met minimum Method 1

criteria, 2) all procedures of Method 2 were followed properly, 3) checks for cyclonic flow were negative during both the test series and the pretest survey, 4) all five stacks were traversed during each test, 5) Cartech's previous measurements at this site indicated similar low flow rates,[3] and 6) inlet flow rates were validated.

The difference between measured inlet and outlet flow rates is believed to have resulted from an excessive back pressure on the exhaust system. Because the cross-sectional area provided by the five stacks is so small, some exhaust gases must exit through other available openings. Among the possible exit points were the interior walkway gratings at the bottom level of the bags. Even though Cartech personnel had covered these openings with Masonite panels prior to the test series, the low stack flow rates indicated that some gases still managed to escape. It was also evident that, contrary to conditions at similar installations, these gratings were not sources of air inleakage at this facility. Other possible gas exit points included the seams between the compartment walls, roof, and access doors. All possible exit points were considered to be on the clean side of the fabric filter because there was no visually detected leakage of particulate-laden gases. Because the measured stack flow rates were biased low and the measured outlet particulate concentrations were considered to be representative, the total inlet flow rate was used to calculate a more realistic estimate of the

outlet mass emission rate. The gas flow of the reverse-air cleaning system was not added to the inlet flow because the reverse-air system recirculated cleaned exhaust gas and did not represent an increase in net flow out of the fabric filter. Also, based on the agreement between the measured and design inlet flows, air inleakage at the induced draft (I.D.) fans was probably negligible. Although comparison of inlet and outlet moisture contents seemed to indicate some dilution, accuracy limitations of moisture determinations at the 1 to 2 percent level are probably greater than the reported differences. The close agreement between average inlet and outlet gas temperatures indicated that any entry of dilution air was less than 10 percent. There was an apparent discrepancy between the inlet and outlet gas temperatures measured during Run 2, but it was not significant because the difference was within the 1.5 percent criterion specified in Method 2. Because the flow rate measured at Site 1 was considered representative of the net system flow, the outlet mass emission rates reported in the text and tables reflect this flow rate. Calculations used to adjust the computer output are shown in Appendix A. These calculations did not affect any other parameters.

The concentration of particulate matter measured at the stack outlets was considered to be representative of the gases escaping through openings other than the stacks. Although the measured outlet particle size distributions indicated that the number of large particles present was greater than expected,

these distributions were thought to be biased by a combination of factors (which are discussed later in this section): 1) increased collection efficiency of upper impactor stages, 2) weighing errors, and 3) particle agglomeration. A similar type of particle size distribution (i.e., greater than expected number of large particles) also was shown by a separate test series at an EAF/AOD installation that did not show a loss of gas flow between inlet and outlet test sites. This comparison tends to support the conclusion that an apparent high number of large particles does not necessarily indicate a biased particulate concentration. In addition, observations of the fabric filter structure and stack outlets did not reveal any visually detectable differences in opacity of the gases exiting the stacks and the gases escaping via other means. Therefore, the particulate concentrations measured at the stack outlets are considered to be representative.

Evaluation of the process data furnished by MRI seemed to indicate that the No. 2 AOD system was operating normally during the test series. The several short process-related delays in testing did not seem to affect emission results. The increase in uncontrolled emissions indicated by Run 3 was substantiated by the results of the particle size test during the same period; however, the increase could not be related to specific process activities. Overall, process operations were relatively consistent. The average production rates for each test were within 10 percent of each other and compared favorably with normal

values. Emission results were therefore considered to be representative of normal operations.

3.2 PARTICLE SIZE

Tests for particle size distribution were conducted at Site 1 to represent uncontrolled emissions, and at Site 2 to represent controlled emissions. These tests were performed in conjunction with particulate matter tests.

Inlet particle size tests were conducted over three entire heat cycles to represent average emissions, and during shorter intervals to provide supplemental data. Tests during integral heats were initiated at the beginning of a charge, continued for three heats, and concluded at the end of tapping operations. This yielded a sampling time of approximately 5 hours, which was necessary to collect an adequate sample in the impactor that was used. The shorter particle size runs were performed at various times during the particulate test. The sampling times for these shorter tests were approximately 5 to 15 minutes, adjusted as necessary to obtain proper loadings.

Particle size distribution samples were collected at the outlet simultaneously with each particulate test, which yielded a sampling time of between 7.5 and 9 hours for each run. All five stacks were sampled during each run in a manner that minimized interferences with the coinciding particulate tests. Fabric filter cleaning cycles were sampled as they occurred.

The NSPS contractor's representative assisted in the coordination of the integral heat runs at the inlet with process operations. Tests were interrupted when he considered it necessary to avoid sampling during unrepresentative conditions.

Andersen Mark III Cascade Impactors were used to collect the shorter inlet samples and all of the outlet samples, and an Andersen Heavy Grain Loading Impactor was used to obtain integral heat samples. All inlet samples were collected at an average velocity point in the combined inlet duct (Site 1). Outlet samples were run in duplicate, with the impactors positioned at average velocity points in each of the five stacks. The sample time for each run was divided equally among the five stacks. Velocity data were obtained periodically during each run by the use of Method 2 equipment. The report presents the results of three runs for each type of sample.

3.2.1 Particle Size Distributions and Fractional Efficiencies

Cumulative distribution curves represent the total weight percent of particulate matter smaller than the indicated aerodynamic particle diameter in micrometers. Each distribution curve represents the best-fit average curve through test data points. Each data point was plotted manually and indicates both the 50 percent effective cut-size of each impactor stage and the cumulative weight percent of material collected in subsequent stages.

The three cut-points for each Andersen Heavy Grain Loading Impactor test at Site 1 were determined graphically from information supplied by the manufacturer. Cut-points for the eight Mark

III Impactor stages were calculated by computer programs contained in "A Computer-Based Cascade Impactor Data Reduction System" (CIDRS), developed for EPA by Southern Research Institute (SRI).[4] All particle size results are based on a particle density of one gram per cubic centimeter. Data reduction and intermediate result calculations for both types of impactors were performed by the CIDRS programs with moisture contents obtained from simultaneous particulate tests. All calculations and results are included in Appendix A.

Figure 3-1 shows the average cumulative distribution curve for uncontrolled emissions. Results of the integral heat tests and shorter interval tests agreed very well with each other and were plotted on the same graph. The average distribution indicated that 50 percent by weight of uncontrolled particulate emissions consisted of particles with aerodynamic diameters of 1.2 μm or less. Approximately 81 percent by weight had diameters of 10 μm or less.

Figure 3-2 shows the average distribution curve for the outlet samples. Results indicated that approximately 50 percent of the mass emissions consisted of particles having aerodynamic diameters of 10 μm or less. Only 20 percent by weight had diameters of 3.0 μm or less.

Table 3-9 presents the fractional collection efficiencies for various size ranges. Weight percents in each size range were determined from the average inlet and outlet cumulative distribution curves plotted in Figures 3-1 and 3-2. Controlled and

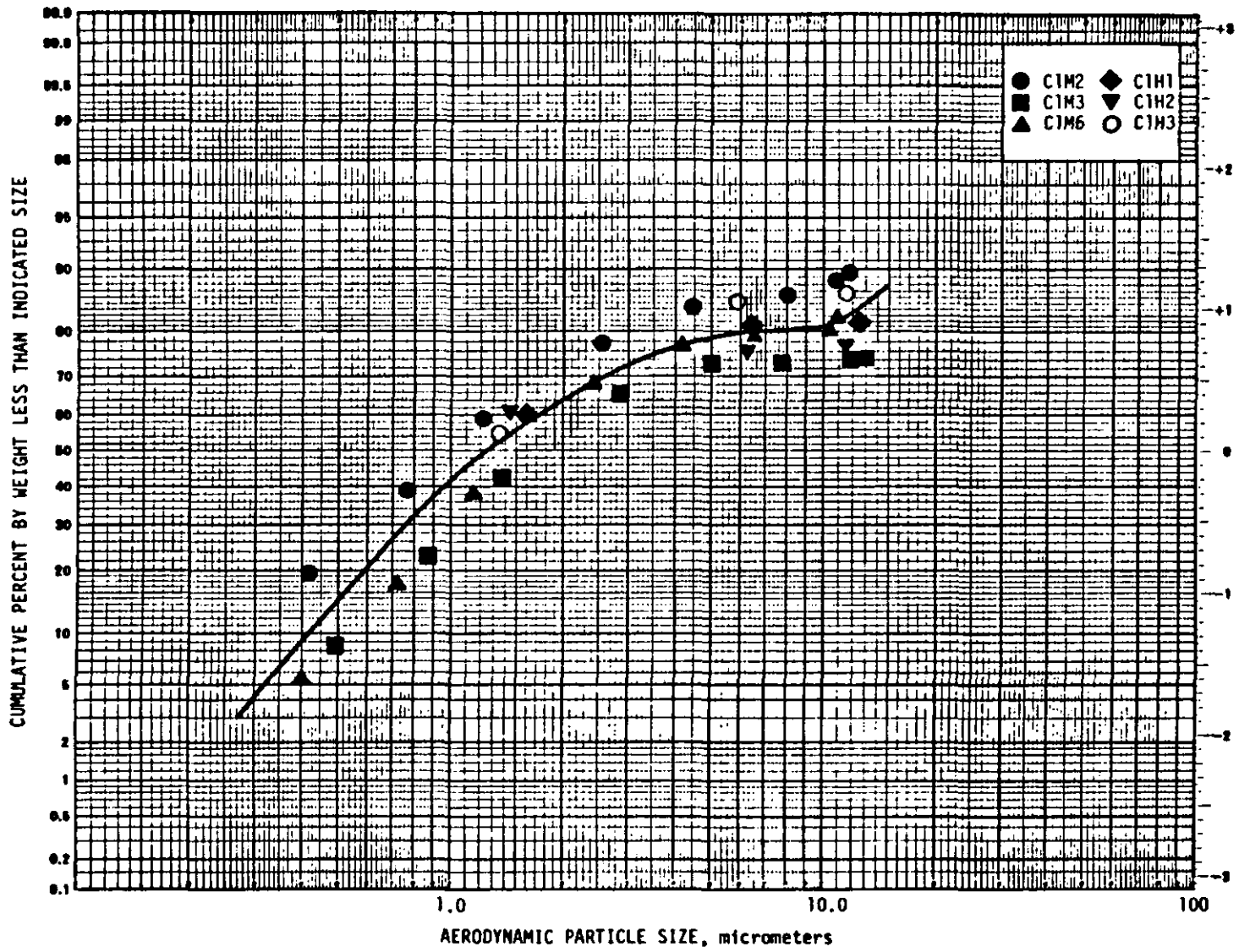

Figure 3-1. Average particle size results for uncontrolled emissions, Site 1.

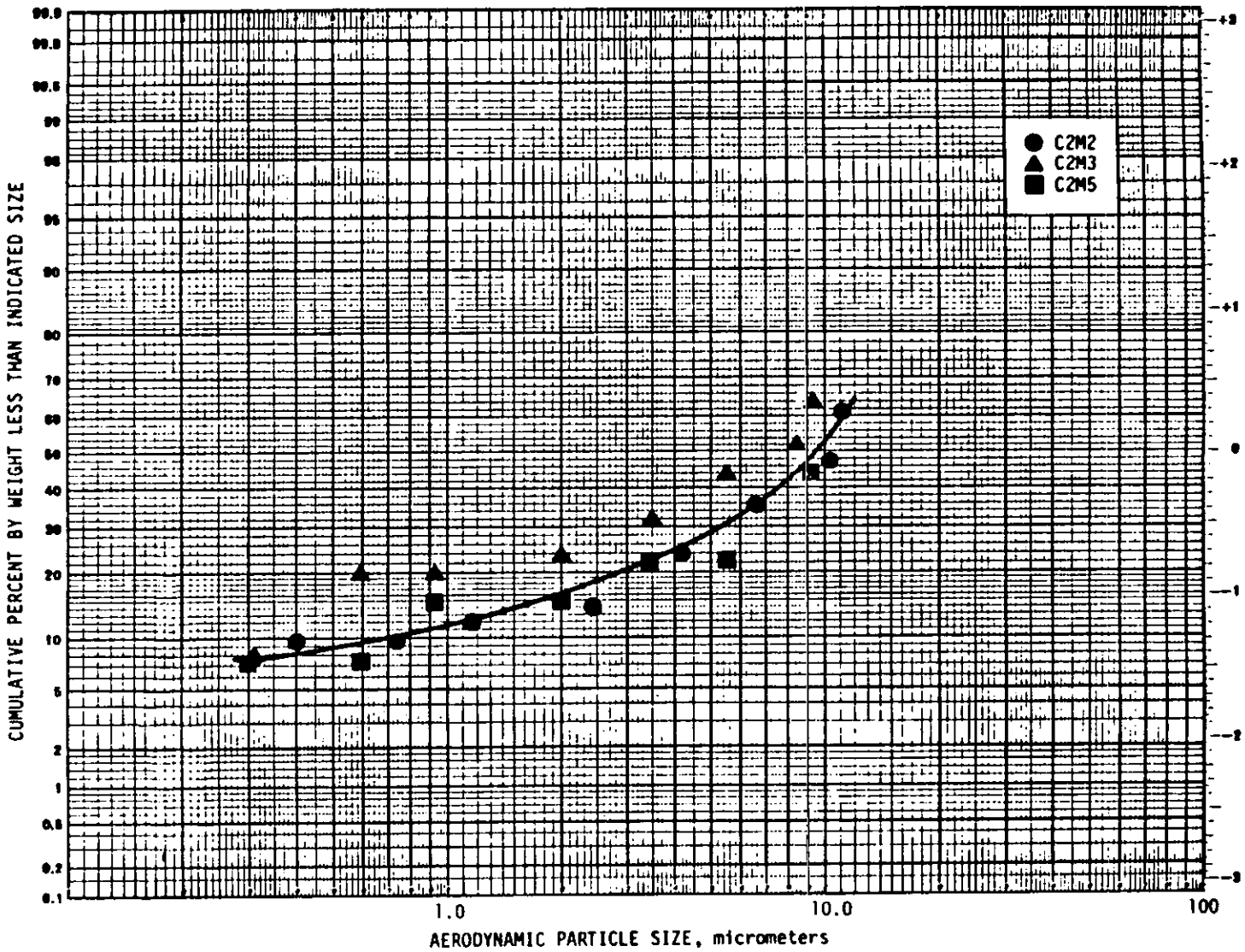

Figure 3-2. Average particle size results for controlled emissions, Site 2.

TABLE 3-9. SUMMARY OF PARTICLE SIZE DISTRIBUTION AND FRACTIONAL EFFICIENCY

		Aerodynamic particle size range, micrometers						
		D<0.5	0.5<D<1.0	1.0<D<2.5	2.5<D<5	5<D<10	D>10 μm	Total
Cumulative weight percent less than larger stated size[a]	Inlet	15	15-42	42-70	70-78	78-82	-	100
	Outlet	9	9-12	12-18	18-28	28-53	-	100
Weight percent in stated size range	Inlet	15	27	28	8	4	18	100
	Outlet	9	3	6	10	25	47	100
Particulate concentration in stated size range,[b] mg/dNm^3	Inlet	25.0	45.1	46.8	13.4	6.7	30.1	167
	Outlet	0.059	0.020	0.039	0.066	0.164	0.309	0.657
(gr/dscf)	Inlet	0.0110	0.0197	0.0205	0.0058	0.0029	0.0132	0.0731
	Outlet	0.000026	0.000009	0.000017	0.000029	0.000072	0.000135	0.000289
Fractional collection efficiency in stated size range[c]		99.8	>99.9	99.9	99.5	97.6	99.0	99.6

[a]Weight percents are taken from plots of average distributions.

[b]Filterable particulate concentration = total emissions x weight percent in stated size range; concentrations given in terms of milligrams per dry normal cubic meter at 20°C and 101 kPa and grains per dry standard cubic foot at 68°F and 29.92 in.Hg. Total concentrations were taken from Method 5 test results.

[c]Collection efficiency = $\frac{\text{Inlet concentration - outlet concentration}}{\text{inlet concentration}} \times 100.$

uncontrolled mass loadings in the respective size ranges were calculated by multiplying these weight percentages by the average inlet and outlet particulate concentrations shown in Table 3-6. Fractional efficiencies were calculated for each size range by dividing the difference between inlet and outlet concentrations by the inlet values. The overall efficiency was 99.6 percent; the range was from a high of 99.9+ percent for particles between 0.5 and 1.0 μm in diameter to a minimum of 97.6 percent for particles between 5 and 10 μm in diameter.

3.2.2 Discussion of Results

All test run results are not reported. Some runs were not included because of poor isokinetics, undesirable stage loadings, or problems related to impactor assembly.

When evaluating these results, one should keep in mind that particle sizes are in terms of aerodynamic diameters based on a particle density of 1 g/cm^3. Cumulative distribution curves based on physical diameters and actual density would be shifted to the left toward smaller sizes if the actual density were greater, and vice versa. A quick approximation of the physical diameter can be obtained by dividing the reported aerodynamic diameter by the square root of the actual particle density. For example, the specific gravity of the fabric filter dust samples was about 3.8 g/cm^3. Using this particle density would increase the amount of controlled emissions of particles smaller than 5 μm from roughly 30 to 50 cumulative weight percent.

As expected, results of the Mark III blank run at the outlet indicated that stack gases did not react with the glass fiber filter media to create false weight changes.

Results representing average uncontrolled emissions over an entire heat cycle compared very well with results of the shorter tests conducted during the 3:1 oxygen-to-argon blow phase of operation. Because of this agreement, both sets of data were plotted on the same graph. The resultant distribution generally agreed with expected results based on previous EAF/AOD data. Except for the first set of runs, the particulate concentrations indicated by the integral heat and shorter particle size tests compared favorably with the results of particulate tests conducted over similar time frames. The differences between the first set of runs may be related to the variation in emissions over the short term.

The isokinetic sampling rates for five of the six reported inlet tests were between 91 and 101 percent. The isokinetic sampling rate for one of the shorter Mark III runs was 67 percent, but the distribution results agreed with the other runs. The sampling flow rates were all within limits suggested by the manufacturer, and results are believed to be within generally expected limits of accuracy.

Particle size distributions at the outlet showed a higher number of large particles than expected; 80 to 90 cumulative weight percent of the particles were expected to have aerodynamic diameters of about 2.5 μm or less. One of several plausible

explanations for the apparent discrepancy is the possibility of bias as a result of increased efficiency in the upper impactor stages when glass fiber filters are used.[5] Although examination of analytical results indicated that this may have occurred, it could not be verified. Adjusting outlet results for this type of bias would not completely account for the difference between actual and expected results, however.

A partial explanation of the results could be related to the very low sample weights. Despite the long sampling times (7.5 to 9 hours) and large sample volumes [5.6 to 9.8 dNm^3 (198 to 347 dscf)], the total catch weights were low (between 2.5 and 4.2 mg). Approximately 30 to 55 percent of the catch weights were collected in the acetone rinse of the nozzle and inlet chamber. Because each total catch represents 10 separate analyses (9 filters and 1 rinse), weighing errors could have contributed to the discrepancy between actual and expected results, but would not completely account for the difference. The particle size distributions indicated by the three runs were in relative agreement, and the particulate concentrations indicated by two of the runs were within 65 to 90 percent of the results from simultaneous particulate tests (which is good agreement for the two different methods).

Another explanation could be related to particle agglomeration caused by electrostatic charge. Although the existence of such a charge was not verified at this site, it has occurred before at an EAF/AOD installation. This agglomeration could

account for the discrepancy between expected and actual distribution results.

Sampling procedures probably had no effect on results. All the isokinetic sampling rates averaged between 99 and 102 percent, and all sampling flow rates were within the limits suggested by the manufacturer.

The results probably were affected by a combination of the following: 1) increased collection efficiency of the upper stages, 2) weighing errors, and 3) particle agglomeration. Therefore, the reported distributions for outlet emissions are believed to be biased, and describing them by mean particle size and geometric standard deviation would be misleading.

3.3 VISIBLE AND FUGITIVE EMISSIONS

Evaluation of visible emissions from the melt shop roof and five fabric filter stacks took place simultaneously with particulate concentration tests. Emissions were observed in 6-minute sets, and individual opacity readings were recorded at 15-second intervals according to Method 9* procedures. Fugitive emissions from the fabric filter dust-handling system were evaluated periodically according to procedures outlined in the proposed Method 22.** Fugitive emissions were recorded as the cumulative minutes of any emissions visually detectable during 20-minute observation periods.

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*40 CFR 60, Appendix A, July 1, 1980.

**Federal Register, Vol. 45, No. 224, November 18, 1980.

3.3.1 Results

Table 3-10 summarizes the results of all visible and fugitive emission observations. No emissions were visually detectable at any time during normal operations. Most of the data were collected during Run 1 because adverse weather conditions prevented additional observations during Runs 2 and 3. A total of 69 six-minute observations were made at the melt shop during 13 hours of process operation covering all modes of furnace operation. A total of 68 six-minutes sets of opacity data were collected at the fabric filter outlet. The fabric filter dust-handling system was observed for a total of 60 minutes.

3.3.2 Discussion

Capture of melt shop emissions during charging, tapping, and other process operations was efficient. It is important to note that only the area of the melt shop surrounding the No. 2 AOD was observed; the continuous casting shop and the No. 1 AOD were not. Several of the 6-minute set times did not coincide exactly with actual charging and tapping times. Because emission points were casually monitored during break periods, and readings were to be resumed if emissions greater than zero percent opacity were noticed, the average opacity for these charging and tapping periods was considered to be zero percent. During the 13 hours of operation, a total of seven charges and seven taps were observed. The emissions caused by a fire at the No. 1 AOD during Run 1 were recorded but not included in the summary.

TABLE 3-10. SUMMARY OF VISIBLE AND FUGITIVE EMISSIONS[a]

Melt shop[b]					
Date (1981)	Run No.	Point of emissions	Number of sets	Range of readings, % opacity	Range of set averages, % opacity
4/28	1	Roof	48	0	0
4/29	2	Roof	8	0	0
4/30	3	Roof	13	0	0

Fabric filter outlet		
Number of of sets	Range of readings, % opacity	Range of set averages, % opacity
68	0	0

Fugitive emissions from fabric filter dust handling system		
Accumulated observation period, minutes	Accumulated emission time	
	minutes	% of observation period
60	0	0

[a]Data were collected during 9.5 hours of process operation on April 28, 1.5 hours on April 29, and 2 hours of April 30. Unfavorable weather conditions prevented additional readings on April 29 and 30.

[b]On April 28 an abnormal situation at the No. 1 AOD, which occurred between 4:38 and 4:43 p.m., caused visible emissions at the No. 2 AOD. The average opacity for that period was 6 percent.

The lack of visible emissions from the fabric filter outlet indicated efficient control of particulate matter in terms of opacity. No emissions were detected at any time, even after compartment cleaning cycles, and these results were supported by the low particulate concentration results.

Fugitive emission data for the fabric filter dust-handling system may be misleading in that the system probably was not in operation during most of the observation period.

3.4 FABRIC FILTER DUST SAMPLES

Samples of dust collected by the fabric filter were obtained daily from the waste container into which the hopper screw conveyors emptied. Samples were collected in a manner that did not interfere with other ongoing tests. The laboratory split each sample into two fractions for separate analyses of trace elements by spark source mass spectroscopy (SSMS) and for particle size distribution by Coulter Counter.

3.4.1 Trace Elements

Table 3-11 summarizes the results of SSMS analyses on the three dust samples. Concentrations are given in micrograms of element per gram of sample. Less-than (<) and greater-than (>) marks are used to denote concentrations outside the quantification limits for the particular element and sample analysis. The minimum detection limit for most of the elements was 0.1 μg/g, although it was as high as 0.8 μg/g in some cases. Major constituents are listed as >1000 μg/g. Results for several elements

TABLE 3-11. SUMMARY OF TRACE ELEMENT ANALYSES ON FABRIC FILTER DUST SAMPLES

Element	Concentration, μg/g (ppm weight)		
	Sample 1	Sample 2	Sample 3
Aluminum	> 90	> 130	> 96
Antimony	7	10	8
Arsenic	19	27	20
Barium	430	140	260
Beryllium	< 0.1	< 0.1	< 0.1
Bismuth	70	45	33
Boron	2	5	2
Bromine	8	11	8
Cadmium	27	10	7
Calcium	>1000	>1000	>1000
Carbon	NR[a]	NR	NR
Cerium	2	6	2
Cesium	1	2	1
Chlorine	510	740	540
Chromium	>1000	>1000	>1000
Cobalt	>1000	>1000	>1000
Copper	>1000	>1000	>1000
Dysprosium	< 0.1	< 0.1	< 0.1
Erbium	< 0.1	< 0.1	< 0.1
Europium	< 0.1	0.3	0.2
Fluorine	>1000	>1000	>1000
Gadolinium	< 0.1	< 0.1	< 0.1
Gallium	75	110	80
Germanium	9	13	10
Gold	< 0.1	< 0.1	< 0.1
Hafnium	< 0.1	≤ 0.8	< 0.1
Holmium	< 0.1	< 0.1	< 0.1
Hydrogen	NR	NR	NR
Indium	STD[b]	STD	STD
Iodine	0.4	0.6	0.5
Iridium	< 0.1	< 0.1	< 0.1
Iron	>1000	>1000	>1000
Lanthanum	0.9	5	2
Lead	>1000	>1000	>1000
Lithium	3	8	6
Lutetium	< 0.1	< 0.1	< 0.1
Magnesium	>1000	>1000	>1000
Manganese	> 920	>1000	>1000
Mercury	NR	NR	NR
Molybdenum	>1000	>1000	>1000
Neodymium	≤ 0.4	0.6	0.5

(continued)

TABLE 3-11 (continued)

Element	Sample 1	Concentration, µg/g (ppm weight)	
		Sample 2	Sample 3
Nickel	>1000	>1000	>1000
Niobium	21	17	12
Nitrogen	NR	NR	NR
Osmium	< 0.1	< 0.1	< 0.1
Oyxgen	NR	NR	NR
Palladium	< 0.1	< 0.1	< 0.1
Phosphorus	390	560	170
Platinum	< 0.1	< 0.1	< 0.1
Potassium	>1000	>1000	>1000
Praseodymium	0.2	0.9	0.4
Rhenium	< 0.1	< 0.1	< 0.1
Rhodium	< 0.1	< 0.1	< 0.1
Rubidium	16	51	21
Ruthenium	< 0.1	< 0.1	< 0.1
Samarium	< 0.1	1	0.5
Scandium	< 0.1	< 0.1	< 0.1
Selenium	280	640	290
Silicon	>1000	>1000	>1000
Silver	84	140	40
Sodium	> 230	> 330	< 250
Strontium	65	53	31
Sulfur	> 560	> 810	> 600
Tantalum	< 0.3	< 0.1	< 0.1
Tellurium	0.7	2	0.7
Terbium	< 0.1	< 0.1	< 0.1
Thallium	2	6	5
Thorium	< 0.8	2	< 0.8
Thulium	< 0.1	< 0.1	< 0.1
Tin	16	26	19
Titanium	>1000	680	150
Tungsten	89	73	85
Uranium	< 0.6	0.9	0.7
Vanadium	270	99	180
Ytterbium	< 0.1	< 0.1	< 0.1
Yttrium	0.7	1	0.7
Zinc	>1000	>1000	>1000
Zirconium	3	4	6

[a]Not reported.

[b]Internal standard.

are not reported, and indium was added to each sample as an internal standard. Elements are listed alphabetically for convenience. The analytical results included in Appendix C are listed in order of decreasing atomic number.

3.4.2 Particle Size Distribution

Figure 3-3 shows the best-fit cumulative distribution curve for the three dust samples. This curve represents the weight percent of particulate matter smaller than the indicated physical particle diameter (in micrometers). Each data point was plotted manually from differential distribution data reported by the laboratory. The average curve indicated that 50 percent by weight of collected dust consisted of particles with physical diameters of 1.6 μm or less. Ninety-eight percent by weight had diameters of less than 10 μm.

3.4.3 Discussion

Concentrations of several trace elements seem to vary considerably. Such variation could be related to the different specifications of the metal in the furnaces. It should be remembered, however, that the SSMS analytical technique is more qualitative than quantitative. The results of the audit samples shown in Tables 5-5 and 5-6 bear this out in that they indicate that reported element concentrations are only accurate within a factor of ± 3.

When evaluating the particle size results, one should note that the cumulative distribution curves are based on physical diameters rather than aerodynamic diameters as reported for

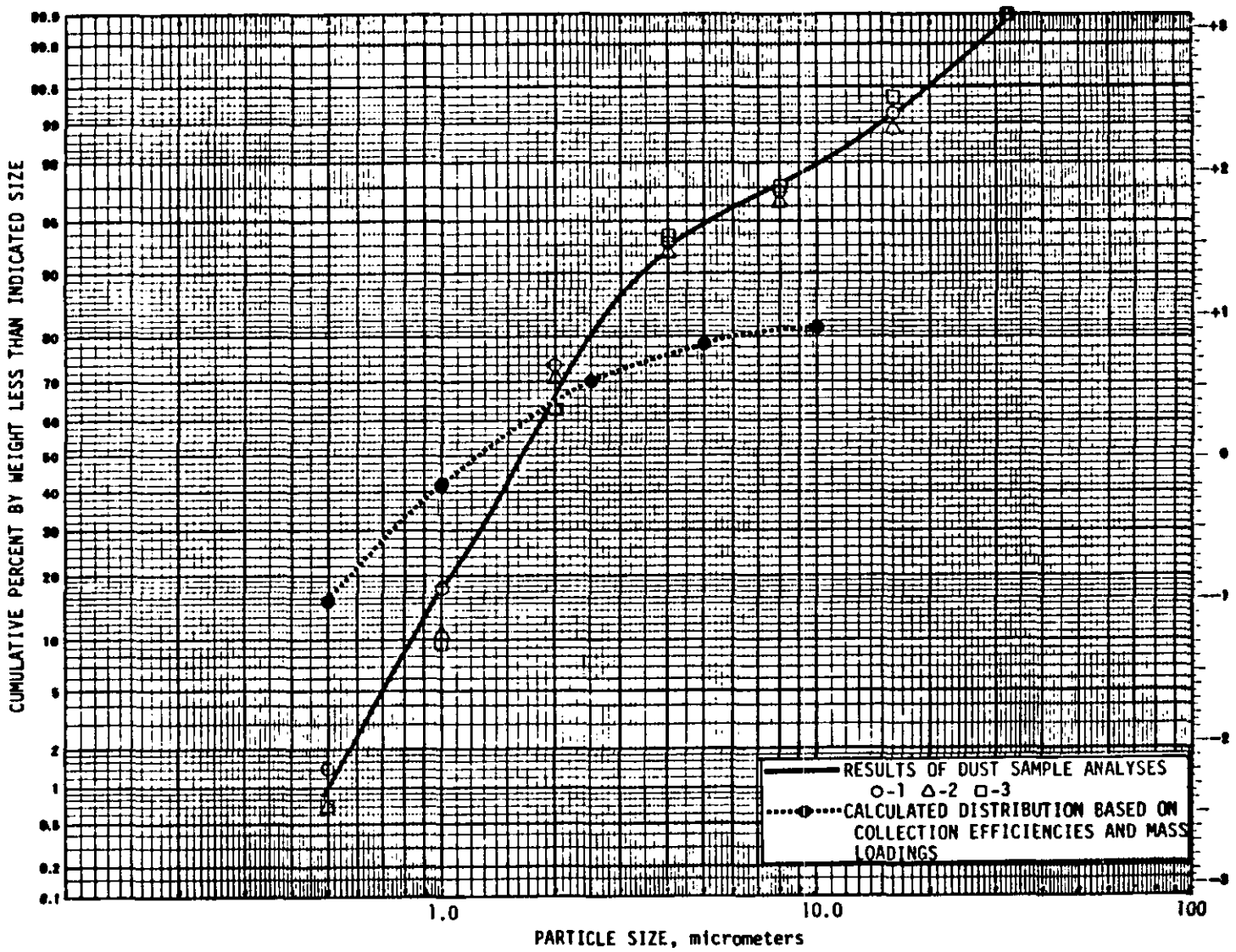


Figure 3-3. Average particle size distribution of fabric filter dust samples.

emission tests. An approximation of the aerodynamic diameters can be made by multiplying the reported physical diameters by the square root of the actual particle density. Using the specific gravity analysis results of 3.8 g/cm^3 would decrease the amount of dust smaller than 5 μm from approximately 95 to 80 cumulative weight percent.

The reported cumulative weight distributions also assume that all particles have the same density. This assumption was necessary to convert particle volume data measured by the Coulter Counter to a weight basis.

The Coulter Counter results were compared with a theoretical size distribution based on emission test results at the inlet and outlet sites. This theoretical cumulative weight curve was estimated from the average size distributions, fractional efficiencies, and mass loadings listed in Table 3-9. The Coulter Counter and theoretical curves both indicated that 65 cumulative weight percent of the collected dust consisted of particles with aerodynamic diameters of approximately 2.0 μm or less. The curves differed considerably at other sizes, but this may be related to the different test methods.

3.5 SUPPLEMENTAL ANALYSES FOR FLUORIDE, CHROMIUM, LEAD, AND NICKEL

Several outlet samples and fabric filter dust samples were analyzed for particulate fluoride content by procedures described in EPA Method 13B*, and for chromium, lead, and nickel content

*40 CFR 60, Appendix A, July 1980.

by Atomic Absorption Spectrophotometry. These analyses were performed subsequent to the completion of originally scheduled laboratory work for better quantification of emission levels that SSMA analyses on the fabric filter dust samples had indicated as being greater than 1000 μg/g.

Separate fluoride analyses were performed on two acetone rinses and one filter from the outlet filterable particulate samples, two of the fabric filter dust samples, and appropriate blanks. Metal analyses were performed on two outlet filterable particulate samples (acetone rinse and filter combined), two dust samples, and appropriate blanks. The fourth outlet sample was obtained from the shorter preliminary test run.

Laboratory results of fluoride and metal analyses on the outlet samples were reported as milligrams of pollutant. The species concentration (in micrograms per gram) was calculated by dividing the mass of pollutant by the mass of particulate matter reported in earlier gravimetric analyses. The laboratory results for dust samples were reported in concentrations of milligrams per gram, which were easily converted to micrograms per gram. The two concentration results of each species and sample type were averaged. Average concentrations were multiplied by average filterable particulate emission results to determine pollutant gas stream concentrations, mass emission rates, and emission factors. For this purpose, results of dust sample analyses were assumed to be representative of uncontrolled emissions. Results are summarizes in Table 3-12.

TABLE 3-12. SUMMARY OF SUPPLEMENTAL ANALYSES FOR FLUORIDE, CHROMIUM, LEAD, AND NICKEL

Pollutant species	Concentration			Emission rate		Emission factors			
	μg/g of solid	mg/dNm^3	gr/dscf	kg/h	lb/h	kg/h/Mg	lb/h/ton	kg/Mg	lb/ton
Uncontrolled emissions[a]									
Fluoride	15,200	2.5	0.0011	1.2	2.7	0.068	0.14	0.13	0.27
Chromium	49,200	8.2	0.0036	4.0	8.8	0.22	0.44	0.43	0.87
Lead	2,200	0.37	0.0002	0.18	0.39	0.0098	0.020	0.019	0.039
Nickel	21,500	3.6	0.0016	1.7	3.8	0.096	0.19	0.19	0.38
Controlled emissions[b]									
Fluoride[c]	10,300	0.0068	0.000003	0.0033	0.0072	0.0002	0.0004	0.0004	0.0007
Chromium	7,600	0.0050	0.000002	0.0024	0.0053	0.0001	0.0003	0.0003	0.0005
Lead[d]	<2,300	<0.0015	$<7 \times 10^{-7}$	<0.0007	<0.0016	<0.00004	<0.00008	<0.00008	<0.0002
Nickel	6,800	0.0045	0.000002	0.0021	0.0047	0.0001	0.0002	0.0002	0.0005

[a]Based on average uncontrolled particulate emissions and the average of analyses on two dust samples, assuming that the concentration in the uncontrolled gas stream is the same as in the collected dust.

[b]Based on average controlled particulate emissions and the average of analyses on two outlet samples.

[c]Based on analyses of acetone rinses only; the glass fiber filter analysis had a high blank weight of fluoride and was not used.

[d]Lead concentrations were below the analytical detection limits for these samples; numerical values for emissions are based on the minimum detectable mass of lead.

The outlet fluoride results are based on acetone rinse analyses only because the filter analysis had a high blank value of fluoride. This was caused by the filter material, which was glass fiber instead of paper as specified by Method 13B. The total filter blank value was two times larger than the net fluoride on the filter, which increased the possibility of error in the results. Because the amount of fluoride in the acetone rinse was much smaller than that indicated by the filter analysis, a small error in the filter results would have a significant impact on total fluoride. For these reasons, and because the filter result indicated a much higher concentration of fluoride than did the acetone rinse results, the filter analysis was disregarded. Should the filter result be correct, the outlet fluoride concentration would be 40,700 μg/g instead of the 10,300 μg/g indicated in the table. This would not compare favorably with the 15,200 μg/g of fluoride measured in the dust samples because it would contradict the trend of the other results, which indicate lower pollutant concentrations in the outlet samples than in the dust samples.

The mass of lead in each outlet sample was less than the minimum detection limit. The concentration of lead (in micrograms per gram) was therefore calculated by dividing the minimum detectable mass of lead by the particulate sample weight. A less-than mark (<) is used in the table to indicate that emissions are based on the equivalent minimum detection limit.

SECTION 4

SAMPLING SITES AND TEST METHODS

This section describes the sampling sites and outlines the various test methods that were used to characterize particulate matter emissions, particle size distributions, visible and fugitive emissions, and fabric filter dust samples. An overall schematic of the No. 2 AOD process and control system was shown earlier in Figure 2-1.

4.1 SITE 1--INLET

Uncontrolled process and fugitive emissions from the No. 2 AOD were sampled at Site 1 for particulate matter and particle size distribution. As shown in Figure 4-1, this site was in the 264-cm (104-in.) square main inlet duct downstream of the junction of the canopy and scavenger ducts, and upstream of the point where the duct is split by the two I.D. fans. Seven new sampling ports in the side of the duct were located 1.1 equivalent diameters downstream of the scavenger duct inlet and 0.4 diameter upstream of a 90-degree bend, as shown in Figure 4-2. Although the site did not meet minimum Method 1 criteria, analysis of velocity traverse data indicated an acceptable flow distribution without cyclonic characteristics. Figure 4-3 shows the location of the 49 sampling points used to traverse the duct cross-

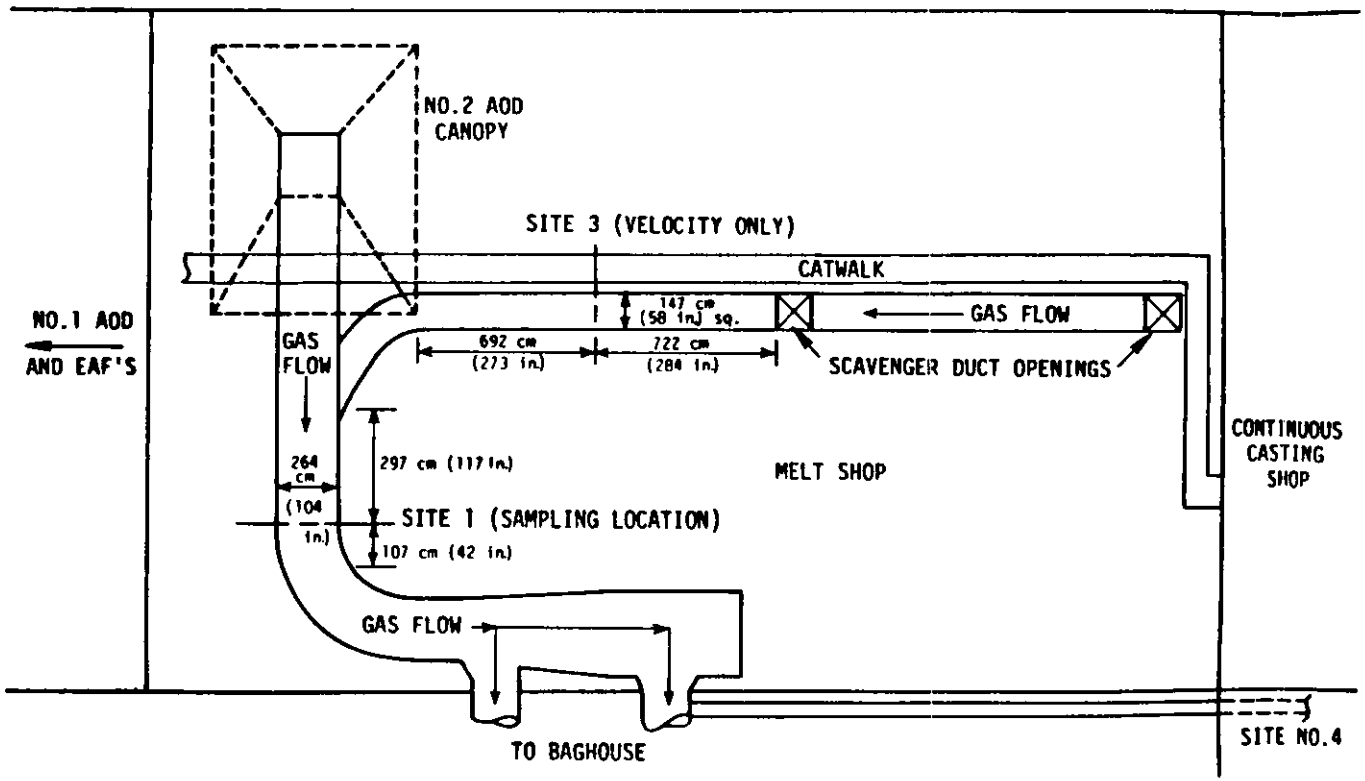


Figure 4-1. Sampling sites for uncontrolled emissions.

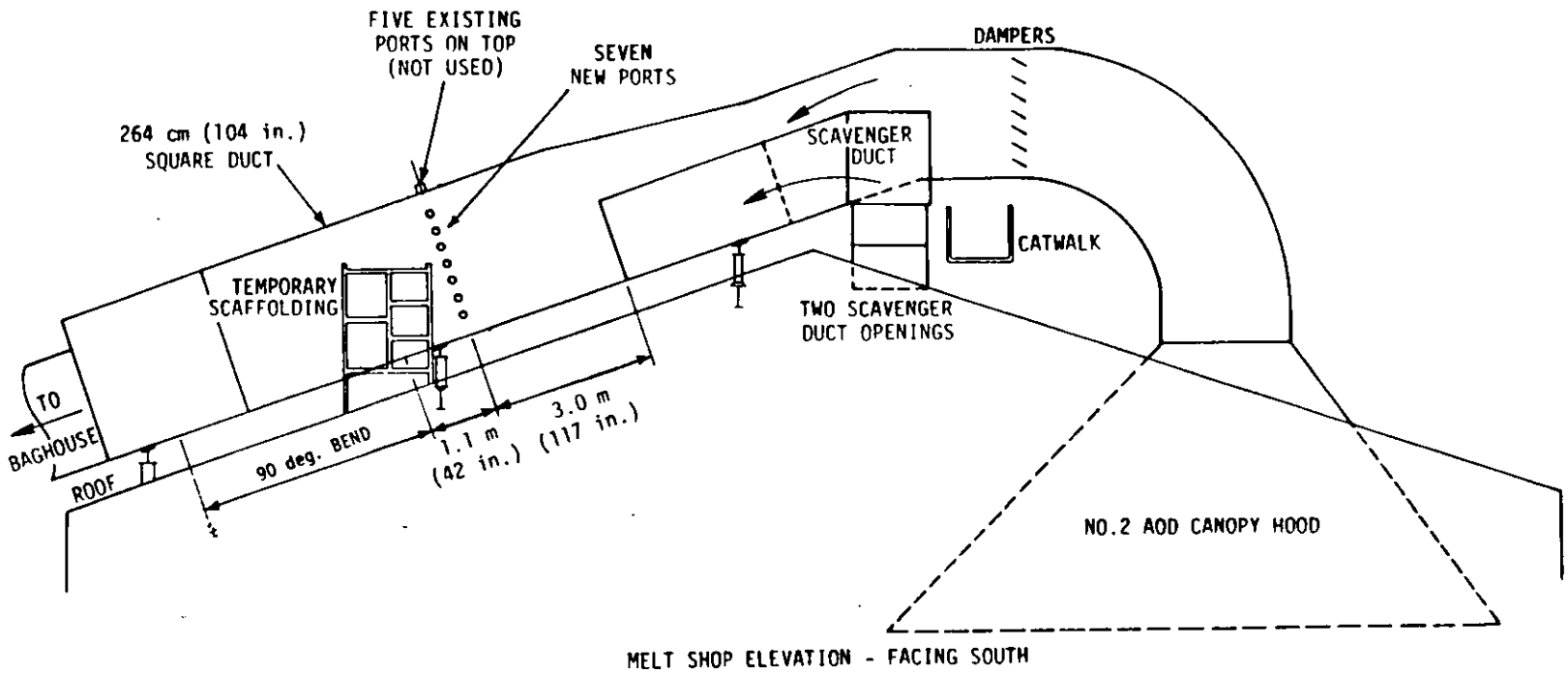


Figure 4-2. Sampling location for uncontrolled AOD emissions, Site 1.

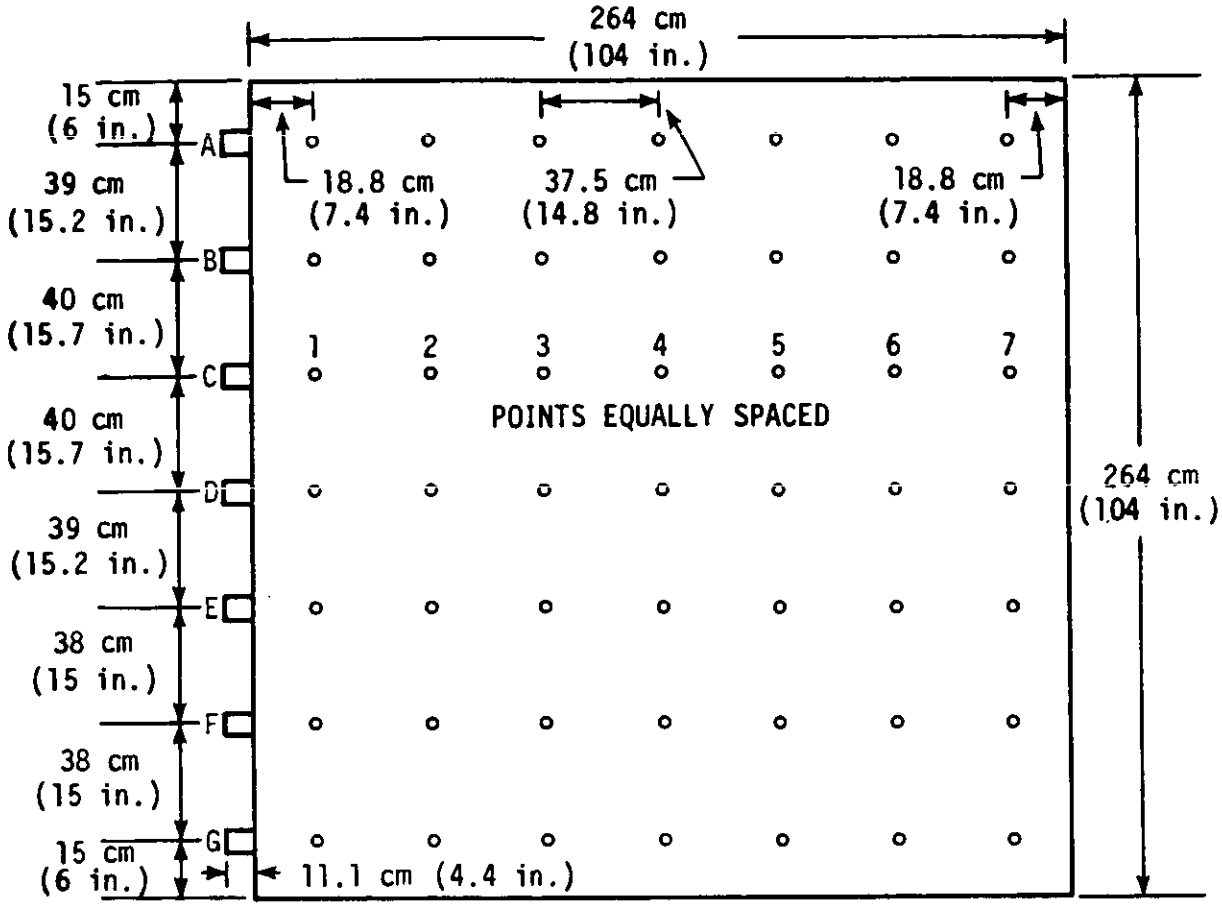


Figure 4-3. Location of sampling points at Site 1.

sectional area for the particulate matter tests. During one complete traverse each point in the equal matrix was sampled for 9 minutes, which yielded a total sampling time of 441 minutes per run. Tests were initiated sometime during a heat and continued until the traverse was completed. Sampling was interrupted during process delays or unrepresentative operating conditions, but not for the short intervals (~5 minutes) between heats.

Particle size distribution samples were collected at a point of average velocity near the centroid of the duct. A separate port was used to minimize interferences with the particulate matter tests. Sampling times ranged from 5 minutes for the Andersen Mark III samples to 310 minutes for the Andersen Heavy Grain Loading Impactor samples, which covered three integral heats. These integral heat runs were inititated at the beginning of a charge and continued through the end of the third subsequent tap.

4.2 SITE 2--FABRIC FILTER OUTLET

Controlled emissions from the No. 2 AOD fabric filter were sampled at Site 2 for particulate matter and particle size distribution. This site consisted of five 168-cm (66-in.) diameter stub stacks aligned down the center of the baghouse roof. As shown in Figures 4-4 and 4-5, each stack exhausted cleaned gases from 2 of the 10 compartments. Two sampling ports in each stack were located 2.0 duct diameters downstream of the gas entry point and 0.4 diameter upstream of the stack exit. At

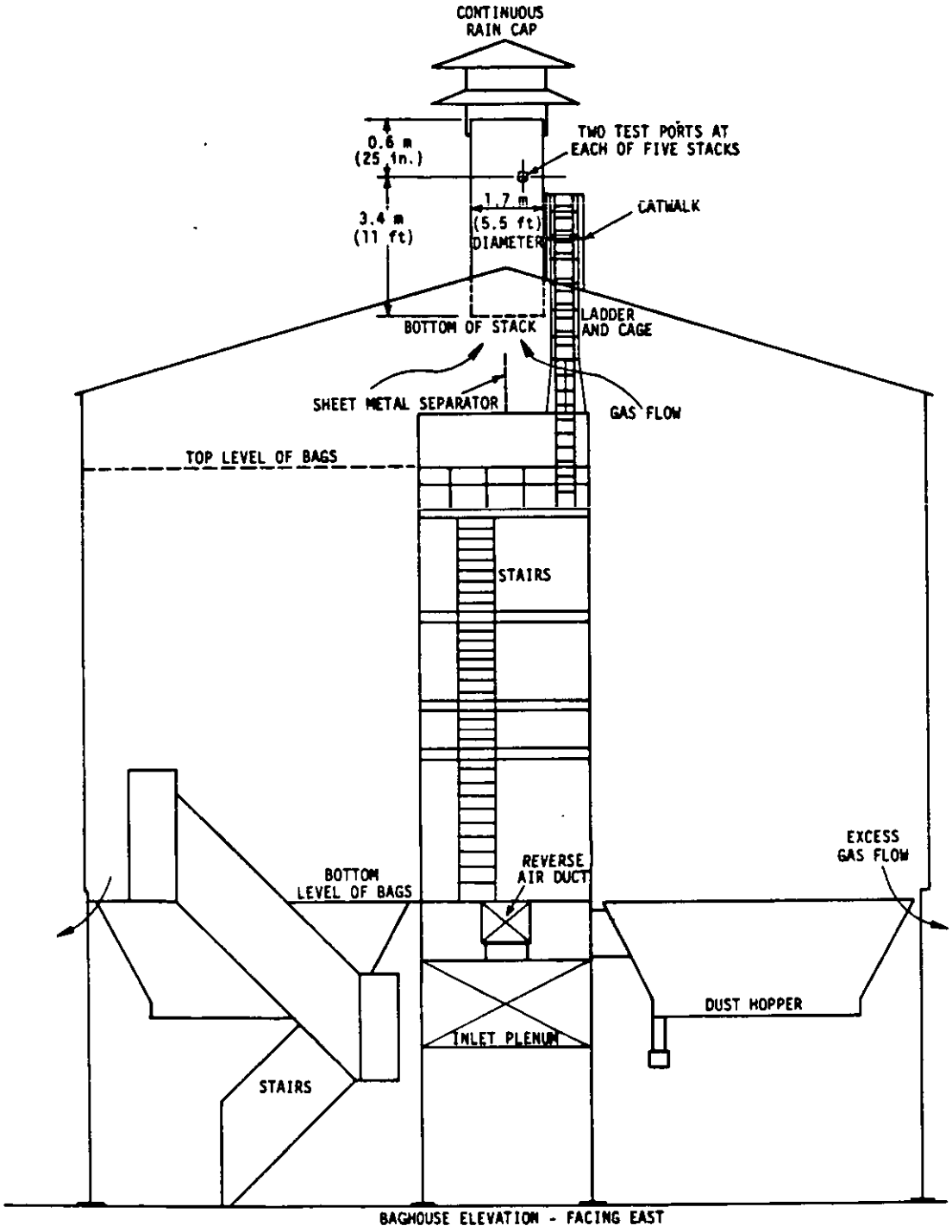
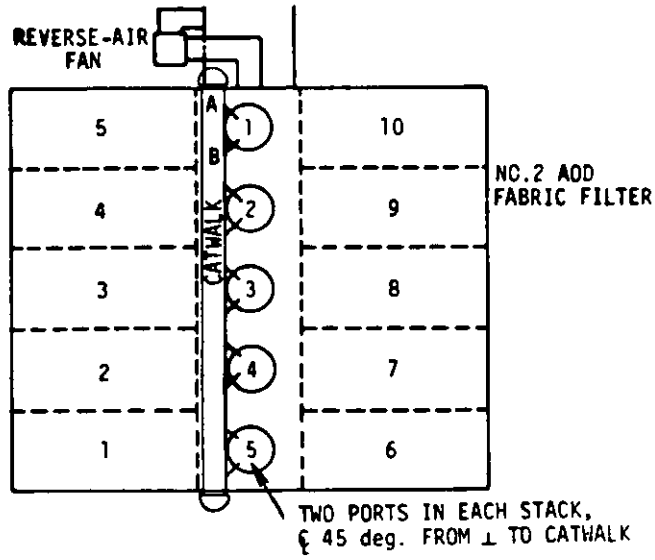
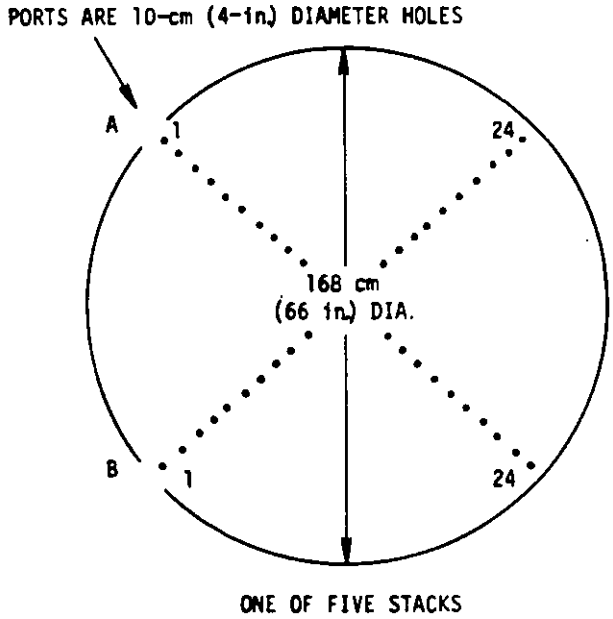


Figure 4-4. Fabric filter, Site 2.





POINT NUMBER	LOCATION
1	2.5 cm (1 in.)
2	5.4 cm (2.1 in.)
3	9.2 cm (3.6 in.)
4	13.3 cm (5.2 in.)
5	17.8 cm (7.0 in.)
6	22.2 cm (8.7 in.)
7	27.0 cm (10.6 in.)
8	32.7 cm (12.9 in.)
9	38.4 cm (15.1 in.)
10	45.7 cm (18.0 in)
11	54.3 cm (21.4 in.)
12	67.3 cm (26.5 in.)
13	101.0 cm (38.7 in.)
14	113.3 cm (44.6 in.)
15	121.9 cm (48 in.)
16	129.2 cm (50.9 in.)
17	135.2 cm (53.2 in.)
18	140.6 cm (55.4 in.)
19	145.4 cm (57.2 in.)
20	149.9 cm (59 in.)
21	154.3 cm (60.7 in.)
22	158.4 cm (62.4 in.)
23	162.2 cm (63.9 in.)
24	165.1 cm (65 in.)

Figure 4-5. Location of sampling points at the fabric filter outlet, Site 2.

these distances Method 1 criteria required 48 particulate sampling points. Figure 4-5 shows the location of sampling points and the orientation of traverse diameters. Each particulate test consisted of traversing all five stacks. Each point was sampled for 2 minutes, which yielded a total sampling time of 480 minutes. The tests began at the same time as the inlet tests and continued until all stacks had been traversed. Cleaning cycles were sampled as they occurred, and tests were interrupted during process delays and unrepresentative operating conditions.

Each particle size distribution sample was collected for an equal amount of time at one sampling point in each of the five stacks. During Runs 1 and 2, each stack was sampled for 90 minutes, which yielded a total run time of 450 minutes. Because the sample catch weights for these runs were low, each stack was sampled for 108 minutes during Run 3, which yielded a total sampling time of 540 minutes. All particle size sampling occurred simultaneously with particulate matter tests, but all probes were not in the same stack at the same time.

Sometime before the test series, Cartech personnel had covered all of the gratings at the bottom level of the fabric filter with Masonite panels to minimize the loss of exhaust gas flow through these gratings.

4.3 SITE 3--SCAVENGER DUCT

The velocity in the scavenger duct was monitored at Site 3 during each test. As shown in Figure 4-1, the site was located 4.9 equivalent duct diameters downstream of the last fugitive

emission capture point and 4.7 duct diameters upstream of a 60-degree bend. Figure 4-6 shows the 21 traverse points used to obtain initial velocity data. An average velocity point was selected and monitored for the duration of each test at Site 1.

4.4 SITE 4--CONTINUOUS CASTING TORCH CUTTER

Emissions from this source are normally controlled by the fabric filter. The EPA requested that flow through this duct be prevented during the test series so that tests would be representative of AOD emissions only. The normal flow through the torch cutter duct was measured prior to the tests to determine its impact on the control system. (Figure 4-1 shows the approximate location of Site 4.) As shown in Figure 4-7, two sampling ports, 90 degrees apart, were located 1.5 duct diameters downstream and 0.5 duct diameter upstream of 45-degree bends. Twenty points were used to traverse the duct cross section.

4.5 VELOCITY AND GAS TEMPERATURE

A type S pitot tube and an inclined draft gauge manometer were used to measure the gas velocity pressures at each site. Velocity pressures were measured at each sampling point across the duct to determine an average value. Measurements were taken in accordance with procedures outlined in Method 2 of the Federal Register.* The temperature at each sampling point was measured with a thermocouple and digital readout.

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*40 CFR 60, Appendix A, July 1980.

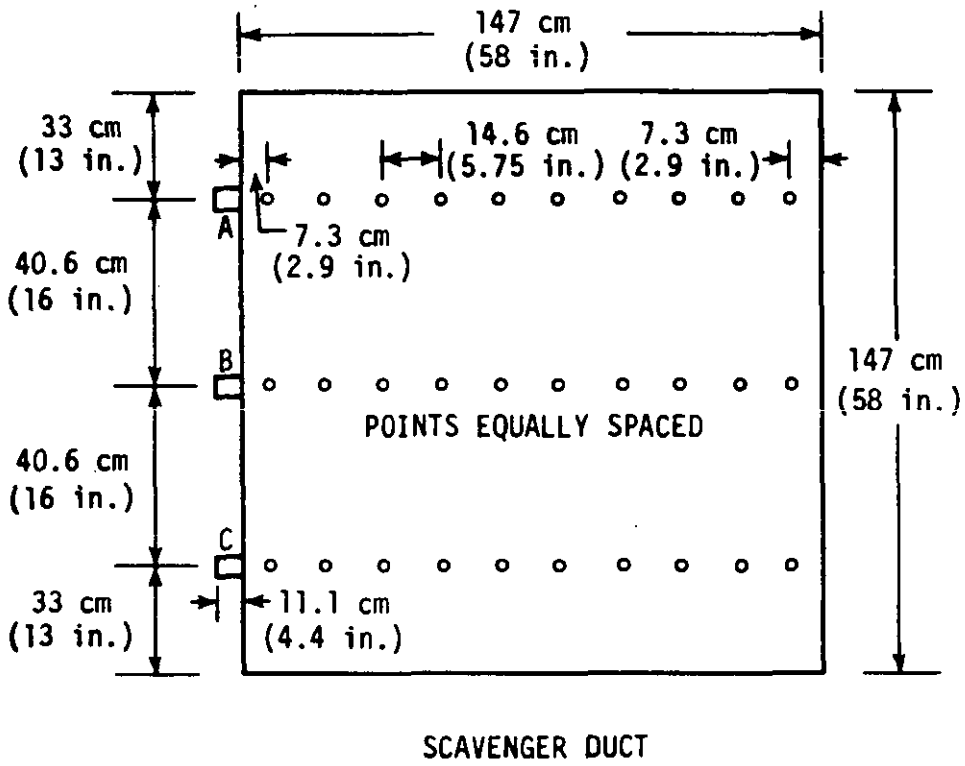
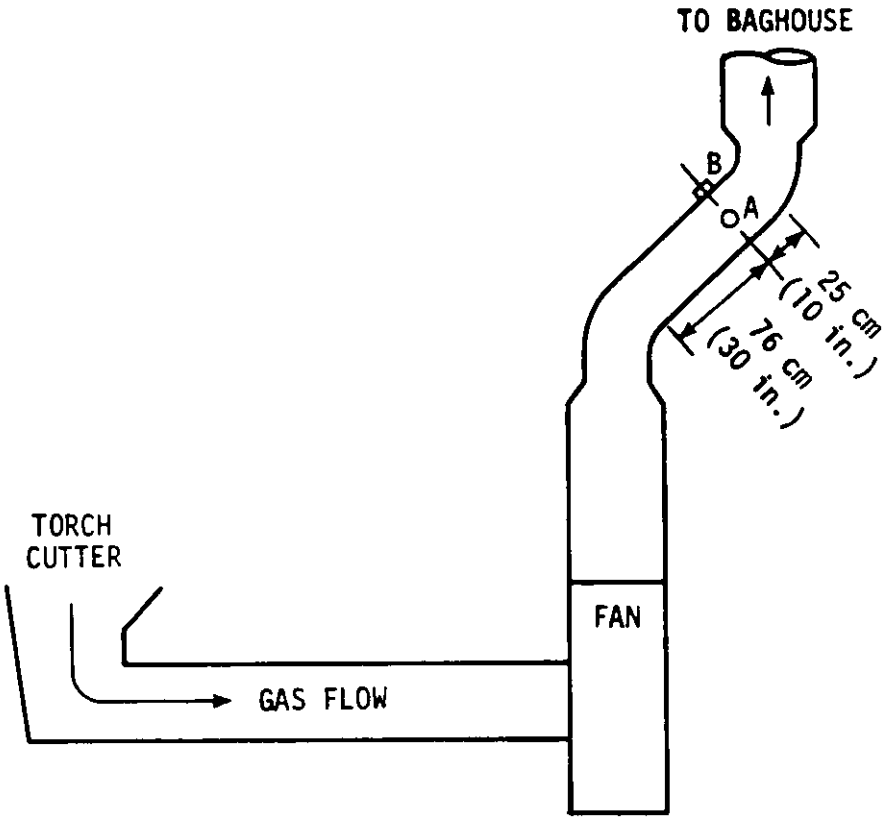
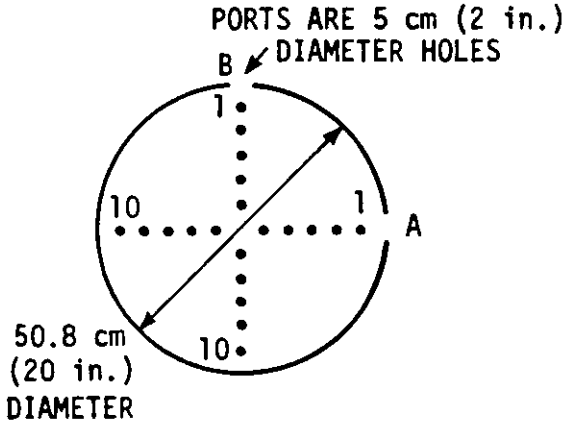


Figure 4-6. Location of velocity traverse points at Site 3.





POINT NUMBER	LOCATION
1	2.5 cm (1 in.)
2	4.1 cm (1.6 in.)
3	7.6 cm (3.0 in.)
4	11.4 cm (4.5 in.)
5	17.5 cm (6.8 in.)
6	33.4 cm (13.2 in.)
7	39.3 cm (15.5 in.)
8	43.4 cm (17.1 in.)
9	46.6 cm (18.4 in.)
10	48.3 cm (19.0 in.)

Figure 4-7. Location of traverse points at Site 4.

4.6 MOLECULAR WEIGHT

Flue gas composition was determined in accordance with procedures described in Method 3.* An integrated bag sample was collected at Sites 1 and 2 during the preliminary runs on Monday, and an Orsat Gas Analyzer was used to analyze the bag contents for oxygen and carbon dioxide. Since these results verified that the gas streams were essentially air, additional samples were not collected.

4.7 PARTICULATE MATTER

Method 5* was used to measure particulate concentrations at Sites 1 and 2. All tests were conducted isokinetically by traversing the cross sectional area of the stack and regulating the sample flow rate relative to the gas velocity in the duct as measured by the pitot tube and thermocouple attached to the sample probe. The outlet sampling train consisted of a heated, glass-lined probe, a heated 87-mm (3-in.) diameter glass fiber filter (Gelman Type AE), and a series of Greenburg-Smith impingers followed by an umbilical line and metering equipment. The inlet sampling train was similar except that the probe was lined with 316 stainless steel, and a Teflon sample line was used between the filter and first impinger. At the end of each test, the nozzle, probe, and filter holder portions of the sample train were acetone-rinsed. The acetone rinse and filter media were dried at room temperature, desiccated to a constant weight, and

*40 CFR 60, Appendix A, July 1980.

weighed on an analytical balance. Total filterable particulate matter was determined by adding the net weights of the two sample fractions. The amount of water collected in the impinger section of the sampling train was measured (any condensate in the sample line used at the inlet was first drained into the impingers). On the outlet train, the impinger contents were recovered and analyzed for organic and inorganic condensible matter by ether-chloroform extraction.

Sampling times and volumes for particulate tests at the outlet exceeded the respective minimum requirements of 4 hours and 4.5 dNm^3 (160 dscf) specified for EAF's in Subpart AA of the Federal Register.*

4.8 PARTICLE SIZE DISTRIBUTION

Particle size samples at the inlet site were collected with an Andersen Mark III Cascade Impactor and an Andersen Heavy Grain Loading Impactor (HGLI). The Mark III is an in-stack, multistage cascade impactor that yields a total of eight particle cut-sizes ranging, nominally, from 0.5 to 15 μm. Substrates for this impactor were 64-mm diameter glass fiber filters. The Mark III was used to collect samples over time intervals of approximately 5 to 15 minutes. The HGLI is an in-stack multistage impactor designed specifically to allow longer sampling times at high grain loadings. The three nominal cut-points are 2, 5, and 10 μm. The only filter in the HGLI is a glass fiber thimble used as

*40 CFR 60, Subpart AA, July 1980.

the backup stage. This impactor was used to collect samples over an interval that included three entire AOD heats (approximately 5 hours).

A cyclone precutter was attached to the front of each type of impactor to remove larger particles and to avoid the need to use buttonhook nozzles. Because the sampling rate could not be adjusted to obtain the 15-μm cut-point of the cyclone precutter, the weight of particulate collected by the cyclone was added to the weight in the first stage of the respective impactor.

All inlet samples were collected at a point of average velocity near the centroid of the duct. The isokinetic sampling rate was based on initial measurements of velocity pressure and temperature. Constant cut-point characteristics were maintained during sampling, but velocity pressures and temperatures were measured periodically at the sampling point to evaluate the actual variation in isokinetic rate. Nozzles were selected to keep sampling rates in the recommended range of 8.5 to 21 liters per minute (0.3 to 0.75 acfm). Each filter was recovered, desiccated, and weighed on an analytical balance. Acetone rinses of appropriate stages were evaporated, desiccated, and weighed.

Particle size samples at the outlet were collected by a Mark III impactor fitted with a straight nozzle. Each sample was collected for an equal amount of time at an average velocity point in each of the five stacks. The isokinetic sampling rate was based on initial measurements of velocity pressure and gas temperature. Constant cut-point characteristics were maintained

throughout each test, but gas temperatures and velocity pressures were measured periodically at the sampling points to evaluate the actual variation in isokinetic sampling rate. Each filter was recovered, desiccated, and weighed on an analytical balance. The inlet chamber and nozzle were brushed and rinsed with acetone, and the rinse was evaporated, desiccated, and weighed.

4.9 VISIBLE AND FUGITIVE EMISSIONS

Certified observers recorded visible emissions from the melt shop roof and fabric filter stacks in accordance with procedures described in EPA Method 9.* Data were taken in 6-minute sets (simultaneously with particulate tests), and individual readings were recorded in percent opacity at 15-second intervals. Intermittent rest periods were taken to prevent eye fatigue; however, as long as emissions were visually detectable, readings were continued until a break was absolutely necessary. The emission points were casually monitored during break periods, and readings were resumed immediately if any opacity was noted.

Fugitive emissions from the fabric filter dust-handling system were observed according to the proposed Method 22.** Emissions were recorded as the cumulative amount of time that any fugitive emissions were visually detectable during a 20-minute observation period. Several observation periods were recorded during the test series.

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*40 CFR 60, Appendix A, July 1980.

**Federal Register, Vol. 45, No. 224, November 18, 1980.

Observers were positioned near the parking lots, approximately 60 meters (200 feet) southeast of the fabric filter. Adverse weather conditions reduced the amount of time available for visual emission observations during the second and third tests.

4.10 FABRIC FILTER DUST SAMPLES

Samples from the dust-handling system were obtained from the waste container into which all the hoppers were emptied. Because the hoppers were emptied only once a day, a single grab sample was taken on each test day. For each sample, approximately 1 liter of dust was collected in a glass jar that had been rinsed with dilute nitric acid in the laboratory. Upon return to the laboratory, each sample was split into two fractions: one for analysis of trace elements and one for analysis of particle size distribution.

The Spark Source Mass Spectroscopy technique was used for qualitative examination of approximately 70 elements. A known concentration on indium was added to each sample before it was ionizied. All elements were ionized with approximately equal sensitivity. A photographic plate used to record the mass spectra was examined, and the response of each element was related to that of indium. Relative sensitivity factors based on previous analyses of standards were used to compensate for the variation in response of the photoplate for different elements.

The Coulter Counter technique was used to determine particle size distributions. Particles in each sample were suspended in a

sodium chloride electrolytic solution, and electrical current passed from one immersed electrode to another electrode through a small aperture. As a particle passed through the aperture, it displaced a volume of electrolyte and changed the electrical current by an amount proportional to the size of the particle. The volume and number of particles were used to establish a differential distribution by volume. Assuming all particles were of equal density, the volume distribution also represented a weight distribution.

SECTION 5

QUALITY ASSURANCE

Quality assurance (QA) is one of the main facets of stack sampling because the end product of testing is to produce representative emission results. Quality assurance guidelines provide detailed procedures and actions necessary for defining and producing acceptable data. The four guideline documents used in this test program were a source-specific test plan prepared by PEDCo and reviewed by the Emissions Measurement Branch; the EPA Quality Assurance Handbook Volume III, EPA-600/4-77-027b; a draft of the PEDCo Environmental Emission Test Quality Assurance Plan; and the PEDCo Environmental Laboratory Quality Assurance Plan. The last two quality assurance plans are PEDCo's general guideline manuals, which define the standard operating procedures followed by the company's emission testing and laboratory groups.

Appendix F provides more detail on the Quality Assurance procedures, including the QA objective; data reduction; quality control checks; performance and system audits; preventive maintenance; precision, accuracy, and completeness; corrective action; and quality assurance reports to management.

With regard to this specific test program, the following were steps taken to ensure that quality data were obtained by the testing and analytical procedures.

- Calibration of field sampling equipment. (Calibration guidelines are described in more detail in Appendix E.)
- Train configuration and calculation checks.
- Onsite quality assurance checks, such as leak checks on the sample train, pitot tube, and Orsat line.
- Use of designated analytical equipment and sampling reagents.

Table 5-1 lists the sampling equipment used to conduct particulate loading and particle size tests, along with calibration guidelines and limits. In addition to the pre- and post-test calibration, a field audit was performed on the dry gas meters by the use of critical orifices calibrated and supplied by the EPA. The audit results in Table 5-2 show that all dry gas meters used for this test series were within limitations stipulated in EPA Method 5. Dry gas meter performance test procedures and field audit sheets are shown in Figures 5-1 through 5-5.

Between runs, onsite preliminary calculation checks were performed to verify isokinetic sampling rates and to compare moisture contents, flow rates, and other parameters with expected values. These checks were used to ensure that the tests were conducted properly.

As a check of the reliability of the method used to analyze the particulate matter and particle size filters, sets of blank filters that had been preweighed in the laboratory were resubmitted for replicate analysis. Table 5-3 summarizes the results

TABLE 5-1. FIELD EQUIPMENT CALIBRATION

Equipment	I.D. No.	Calibrated against	Allowable deviation	Actual deviation	Within allowable limits	Comments
Meter box	FB-2	Wet test meter	ΔY pre[a] ± 0.020	+0.005	✓	$\bar{Y}$ pre = 1.007
			ΔH@ ± 0.15	-0.08	✓	
			ΔY post[b] ± 0.05	-0.011	✓	$\bar{Y}$ post = 0.996
Meter box	FB-3			-0.005	✓	$\bar{Y}$ pre = 1.008
				-0.09	✓	
				+0.027	✓	$\bar{Y}$ post = 1.035
Meter box	FB-4			+0.002	✓	$\bar{Y}$ pre = 1.050
				-0.07	✓	
				-0.019	✓	$\bar{Y}$ post = 1.031
Meter box	FB-6			+0.001	✓	$\bar{Y}$ pre = 0.973
				-0.06	✓	
				-0.000	✓	$\bar{Y}$ post = 0.973
Meter box	FB-8			-0.010	✓	$\bar{Y}$ pre = 0.982
				+0.06	✓	
				+0.014	✓	$\bar{Y}$ post = 0.996
Pitot tube	179	Standard pitot tube	Δ Cp ± 0.01	0.01	✓	Cp = 0.82
Pitot tube	180			0.00	✓	Cp = 0.81
Pitot tube	185			0.00	✓	Cp = 0.84
Pitot tube	187			0.00	✓	Cp = 0.83
Pitot tube	189			0.00	✓	Cp = 0.82
Pitot tube	192			0.00	✓	Cp = 0.84

TABLE 5-1 (continued)

Equipment	I.D. No.	Calibrated against	Allowable deviation	Actual deviation	Within allowable limits	Comments
Thermocouple	129	ASTM reference thermometer	± 1.5%	+0.70	✓	OK in range of use
Thermocouple	164			-1.4	✓	OK in range of use
Thermocouple	256			-0.2	✓	
Thermocouple	259			-0.3	✓	
Digital indicator	124 125 219	Millivolt signals	0.5%	Avg. 0.13% Avg. 0.22% Avg. -0.10%	✓ ✓ ✓	
Orsat analyzer	232	Standard gas	±0.5%	0.1%	✓	O_2 and CO_2 are the higher deviation
Trip balance	198	Type S weights	±0.5 g	0.0 g	✓	
Barometer	225	NBS traceable barometer	0.20 in. Hg post-test	0.02 in. Hg	✓	

(continued)

TABLE 5-1 (continued)

Equipment	I.D. No.	Calibrated against	Allowable deviation	Actual deviation	Within allowable limits	Comments
Dry gas thermometer	FB-2	Reference thermometer type ASTM 2F or 3F	±5°F	I 1.2°F O 1.4°F	✓ ✓	I = inlet thermometer O = outlet thermometer
	FB-3			I 1.1°F O 2.0°F	✓ ✓	
	FB-4			I 1.1°F O 1.0°F	✓ ✓	
	FB-6			I 0.8°F O 1.4°F	✓ ✓	
	FB-8			I 1.0°F O 2.1°F	✓ ✓	
Probe nozzle	CIM-3	Caliper	Dn ± 0.004 in.	0.002	✓	Nozzles for particle-size tests were labeled according to run numbers
	6XXX			0.000	✓	
	C2M-4			0.000	✓	
	C2M-2			0.001	✓	
	C2M-P			0.001	✓	
	2-103			0.002	✓	
	CIH-3			0.002	✓	

[a]Allowable deviation ΔY pretest = $\pm 0.02\ \bar{Y}$ pretest.

[b]Allowable deviation ΔY post-test = $\pm 0.05\ \bar{Y}$ pretest.

TABLE 5-2. DRY GAS METER AUDIT RESULTS

Meter box No.	Calibrated against	Deviation, %[a]
FB-2	Critical orifice No. 6	- 2.5
FB-3	Critical orifice No. 7	- 0.71
FB-4	Critical orifice No. 9	- 1.78
FB-6	Critical orifice No. 10	+ 0.99
FB-8	Critical orifice No. 8	- 1.72

[a]Expected deviation < ±5%.

AUDIT REPORT SAMPLE METER BOX

Date 4/27/81

Barometeric pressure (P_{bar}, in Hg) 29.825

Orifice number # 6

Orifice K factor 4.995×10^{-4}

Client EPA

Meter box number FB-2

Pretest Y 1.007

Auditor R. Campbell

Orifice manometer reading ΔH in H_2O	Dry gas meter reading V_i/V_f ft^3	Dry gas meter volume V_m ft^3	Temperatures: Ambient T_{a_i}/T_{a_f} °F	Average T_a °F	Inlet T_{mi} °F	Outlet T_{mo} °F	Average T_m °F	Sampling time θ min	$V_{m_{std}}$ ft^3	$V_{m_{act}}$ ft^3	Percent error
1.76	901.434	11.656	93	93	100	88	96.5	0 ↕ 15	10.948	11.225	-2.47%
	913.090		93		107	91					

$V_{m_{std}} = (17.647)(V_m)(Y)(P_{bar} + \Delta H/13.6)/(T_m + 460) = 10.948$ (11.656, 1.607, 29.285, 1.76, 96.5)

$V_{m_{act}} = (1203)(\theta)(K)(P_{bar})/(T_m + 460)^{\frac{1}{2}} = 2.3004$ (15, 4.995×10^{-4}, 29.285, 93)

$V_{m_{std}} = (17.647)(\quad)(\quad)(\quad)/(\quad) = 10.948$

$V_{m_{act}} = (1203)(15)(4.995 \times 10^{-4})(29.285)/(553)^{\frac{1}{2}} = 11.225$

$error = (V_{m_{std}} - V_{m_{act}})(100)/(V_{m_{act}}) = (0.277)(100)/(11.225) = 2.47$

Figure 5-1. Dry gas meter audit.

AUDIT REPORT SAMPLE METER BOX

Date 4-27-81

Barometeric pressure (P_{bar}, in Hg) 29.74

Orifice number #7

Orifice K factor 5.036×10^{-4}

Client USEPA

Meter box number FB#3

Pretest Y 1.008

Auditor DAN FITZGERALD

Orifice manometer reading ΔH in H_2O	Dry gas meter reading V_i/V_f ft^3	Dry gas meter volume V_m ft^3	Temperatures: Ambient T_{a_i}/T_{a_f} °F	Average T_a °F	Inlet T_{mi} °F	Outlet T_{mo} °F	Average T_m °F	Sampling time θ min	$V_{m_{std}}$ ft^3	$V_{m_{act}}$ ft^3	Percent error
2.2	643.000	12.000	91	91	95	85	91	15.2	11.584	11.667	–
	655.000		91		97	87					0.71 %

$V_{m_{std}} = (17.647)(V_m)(Y)(P_{bar} + \Delta H/13.6)/(T_m + 460)$

$V_{m_{act}} = (1203)(\theta)(K)(P_{bar})/(T_a + 460)$

655.000 ft³ 241

$V_{m_{std}} = (17.647)(12.00)(1.008)(29.74 + 2.2/13.6)/(91+460) = 11.584\ ft^3$

$V_{m_{act}} = (1203)(15.2)(5.036 \times 10^{-4})(29.74)/(91+460) = 11.667\ ft^3$

$error = (V_{m_{std}} - V_{m_{act}})(100)/(V_{m_{act}}) = (11.667 - 11.584)(100)/(11.667) = 0.7116\ \%$

Figure 5-2. Dry gas meter audit.

AUDIT REPORT SAMPLE METER BOX

Date 4/27/81

Barometeric pressure (P_{bar}, in Hg) 29.825

Orifice number #9

Orifice K factor 4.796 X 10^{-4}

Client EPA Carpenter Technology

Meter box number FB-4

Pretest Y 1.050

Auditor R. Campbell

Orifice manometer reading ΔH in H_2O	Dry gas meter reading V_i/V_f ft^3	Dry gas meter volume V_m ft^3	Temperatures: Ambient T_{a_i}/T_{a_f} °F	Average T_a °F	Inlet T_{mi} °F	Outlet T_{mo} °F	Average T_m °F	Sampling time θ min	$V_{m_{std}}$ ft^3	$V_{m_{act}}$ ft^3	Percent error
1.79	558.114	10.876	91	91	101	92	99	0	10.800	10.996	1.78%
	568.990		90		108	95		15			

10.876 1.050 29.825 1.79 99

$V_{m_{std}} = (17.647)(V_m)(Y)(P_{bar} + \Delta H/13.6)/(T_m + 460)$

$V_{m_{act}} = (1203)(\theta)(K)(P_{bar})/(T_a + 460)^{\frac{1}{2}}$

$V_{m_{std}} = (17.647)(10.876)(1.050)(29.825 + 1.79/13.6)/(99+460) = 10.800$

$V_{m_{act}} = (1203)(15.0)(4.796 \times 10^{-4})(29.825)/(91+460)^{\frac{1}{2}} = 10.996$

$error = (V_{m_{std}} - V_{m_{act}})(100)/(V_{m_{act}}) = (-.196)(100)/(10.996)$

Figure 5-3. Dry gas meter audit.

AUDIT REPORT SAMPLE METER BOX

Date 04/30/81

Barometeric pressure (P_{bar}, in Hg) 29.70

Orifice number #10

Orifice K factor 4.798×10^{-4}

Client (CARPENTER TECH) USEPA

Meter box number EB-6

Pretest Y .973

Auditor Z. ANTOSZEWSKI

Orifice manometer reading ΔH in H_2O	Dry gas meter reading V_i/V_f ft^3	Dry gas meter volume V_m ft^3	Temperatures: Ambient T_{a_i}/T_{a_f} °F	Average T_a °F	Inlet T_{mi} °F	Outlet T_{mo} °F	Average T_m °F	Sampling time θ min	$V_{m_{std}}$ ft^3	$V_{m_{act}}$ ft^3	Percent error
1.50	723.700	12.10	75	75	94	91	91.5	15.0	11.23	11.12	+0.99
	735.800		75		90	90					

$V_{m_{std}} = (17.647)(V_m)(Y)(P_{bar} + \Delta H/13.6)/(T_m + 460)$

$V_{m_{act}} = (1203)(\theta)(K)(P_{bar})/(T_a + 460)^{\frac{1}{2}}$

$V_{m_{std}} = (17.647)(12.10)(.973)(29.81)/(535.5) = 11.23$

$V_{m_{act}} = (1203)(15.0)(4.798 \times 10^{-4})(29.70)/(535)^{\frac{1}{2}} = 11.12$

error $= (V_{m_{std}} - V_{m_{act}})(100)/(V_{m_{act}}) = (.11)(100)/(11.12) = .99$

Figure 5-4. Dry gas meter audit.

AUDIT REPORT SAMPLE METER BOX

Date 4/29/81

Barometeric pressure (P_{bar}, in Hg) 29.68

Orifice number # 8

Orifice K factor 4.784×10^{-4}

Client CARPENTER TECH. READING, PA

Meter box number FB-8

Pretest Y 0.982

Auditor ANTIEBBERGER

Orifice manometer reading ΔH in H_2O	Dry gas meter reading V_i/V_f ft^3	Dry gas meter volume V_m ft^3	Temperatures: Ambient T_{a_i}/T_{a_f} °F	Average T_a °F	Inlet T_{mi} °F	Outlet T_{mo} °F	Average T_m °F	Sampling time θ min	$V_{m_{std}}$ ft^3	$V_{m_{act}}$ ft^3	Percent error
1.85	622.300	11.3	75	75	76	74	15.0 min		10.86	11.05	-1.72
1.85	633.600		75		79	76					

$V_{m_{std}} = (17.647)(V_m)(Y)(P_{bar} + \Delta H/13.6)/(T_m + 460)$ (11.3, 0.982, 29.6, 1.85, 76.25)

$V_{m_{act}} = (1203)(\theta)(K)(P_{bar})/(T_a + 460)^{\frac{1}{2}}$ (15, 4.784×10^{-4}, 29.6, 75)

$V_{m_{std}} = (17.647)(11.3)(0.982)(29.736)/(536.25)$

$V_{m_{act}} = (1203)(15)(29.6)(4.784 \times 10^{-4})(29.6)/(535)^{\frac{1}{2}}$

error = $(V_{m_{std}} - V_{m_{act}})(100)/(V_{m_{act}}) = (.19)(100)/(11.05)$

Figure 5-5. Dry gas meter audit.

TABLE 5-3. FILTER BLANK ANAYLSIS

Type of filter	Filter No.	Tare weight, mg	Blank weight, mg	Net weight, mg	Comments
Particulate: 87-mm Gelman A/E[a]	0002029	363.0	363.4	0.4	
Andersen Mark III Impactor[b]	W-39	148.7	149.2	0.5	
	W-42	136.7	136.2	-0.3	
	X39	149.2	149.6	0.4	
	W38	136.6	136.8	0.2	
	W35	147.2	147.3	0.1	
	W34	137.8	138.0	0.2	
	W31	147.6	148.8	1.2	c
	W32	135.8	136.0	0.2	
	B217	188.1	188.0	-0.1	
Andersen Mark III Impactor Blank test run[b]	W07	149.0	148.8	-0.2	
	W08	139.2	139.1	-0.1	
	W05	150.2	149.6	-0.6	
	W06	139.4	138.8	-0.6	
	W03	149.0	149.2	0.2	
	W04	138.6	138.8	0.2	
	W01	149.0	149.0	0.0	
	W02	138.0	137.8	-0.2	
	B407	198.3	198.8	0.5	
Andersen Heavy Grain Loading Impactor (HGLI) Thimble[d]	4-BU658	1878.1	1880.6	2.5	
	5-BU659	2120.2	2122.6	2.4	
	6-BU660	2329.2	2330.0	2.8	

[a]Expected deviation, ±0.5 mg.

[b]Expected deviation, ±0.3 mg.

[c]Both initial tare weighings agreed within ±0.2 mg, as did both blank weighings.

[d]Expected deviation, ±5.0 mg.

of these blank filter analyses. Except for one particle size filter, these results show good data reproducibility from an analytical standpoint.

A blank run was performed at the fabric filter outlet to determine whether stack gases reacted with the filter media to produce erroneous results. This was accomplished by placing a backup filter in front of a normally prepared impactor and then sampling in the usual manner. Table 5-3 lists results of the blank run. These results show that stack gases did not significantly affect filter media.

Blanks also were taken to check the quality of reagents used to recover and analyze particulate and particle size samples. Table 5-4 summarizes the results of these blank analyses. These results show that all reagents met designated specifications for quality.

A trace element audit sample was analyzed along with the fabric filter dust samples to check the accuracy of the SSMS analytical procedures. The audit sample was taken from Standard Reference Material (SRM) No. 1633, "Trace Elements in Coal Fly Ash," which was obtained from the National Bureau of Standards (NBS). The results (shown in Table 5-5) indicate that, except for manganese, the analyses were within a factor of three of true values, which is the expected limit of SSMS accuracy. The laboratory performed its own internal audit by analyzing a sample taken from SRM No. 1632, "Trace Elements in Coal," which was also obtained from the NBS. The results (shown in Table 5-6) indicate

TABLE 5-4. REAGENT BLANK ANALYSIS

Type of blank	Container No.	Volume of blank, ml	Weight after evaporation and desiccation, mg/g[a]	Comments
Particulate blanks:				
Acetone	1228A	537	+0.0061	
Water	1229A	500	+0.0052	
Particle size blanks:				
Acetone	3823A	221	+0.0074	
Analytical blanks:				
Ether/chloroform	BU630	150	0.004	

[a]Tolerance: ±0.01 mg/g.

TABLE 5-5. TRACE ELEMENT AUDIT RESULTS

Element	Concentration, μg/g		Percent difference[b]
	NBS certified[a]	Measured	
Arsenic	61 ± 6	31	- 50
Cadmium	1.45 ± 0.06	0.5	- 70
Chromium	131 ± 2	170	+ 30
Copper	128 ± 5	49	- 60
Lead	70 ± 4	59	- 20
Manganese	493 ± 7	74	- 80
Nickel	98 ± 3	27	- 70
Selenium	9.4 ± 0.5	4	- 60
Uranium	11.6 ± 0.2	13	+ 10
Vanadium	214 ± 8	110	- 50
Zinc	210 ± 20	96	- 50

[a]SRM No. 1633, "Trace Elements in Coal Fly Ash."

[b]Percent difference = $\frac{\text{measured - actual}}{\text{actual}}$ x 100, to the nearest 10%. Expected deviation is +200%, -70% (± factor of 3).

TABLE 5-6. TRACE ELEMENT AUDIT RESULTS

Element	Concentration, μg/g		Percent difference[b]
	NBS certified[a]	Measured	
Arsenic	5.9 ± 0.6	5	- 20
Cadmium	0.19 ± 0.03	0.7	+270
Chromium	20.2 ± 0.5	10	- 50
Copper	18 ± 2	12	- 30
Lead	30 ± 9	4	- 90
Manganese	40 ± 3	46	+ 10
Nickel	15 ± 1	9	- 40
Selenium	2.9 ± 0.3	2	- 30
Thallium	0.59 ± 0.03	<0.1	>- 80
Uranium	1.4 ± 0.01	1	- 30
Vanadium	35 ± 3	17	- 50
Zinc	37 ± 4	15	- 60

[a]SRM No. 1632, "Trace Elements in Coal."

[b]Percent difference = $\frac{\text{measured - actual}}{\text{actual}}$ x 100, to the nearest 10%. Expected deviation is +200%, -70% (± factor of 3).

that, except for cadmium, lead, and thallium, the analyses were within the range of expected accuracy.

Sampling equipment, reagents, and analytical procedures for this test series followed and met all necessary guidelines set forth for accurate test results in Volume III of the Quality Assurance Handbook.[6] Therefore, test results reported in this document should be within the expected accuracies of the method used.

SECTION 6

STANDARD SAMPLING AND ANALYTICAL PROCEDURES

This section describes the test methods, sampling equipment, and analytical techniques that were used for determination of particulate matter and particle size distribution.

6.1 DETERMINATION OF PARTICUALTE EMISSIONS

The sampling and analytical procedures used to determine particulate emissions were those described in Method 5 of the Federal Register.*

6.1.1 Sampling Apparatus

The particulate sampling train used in these tests met design specifications established by the EPA. The sampling apparatus, which was assembled by PEDCo personnel, consisted of the following:

Nozzle - Stainless steel (316) with sharp, tapered leading edge and accurately measured round opening.

Probe - Stainless steel (316) with a heating system capable of maintaining a minimum gas temperature of 121°C (250°F) at the exit end during sampling. (A glass-lined probe was used at Site 2.)

Pitot Tube - A type S pitot tube that met all geometric standards was attached to a probe to monitor stack gas velocity pressure.

*40 CFR 60, Appendix A, July 1980.

Temperature Gauge - A Chromel/Alumel type-K thermocouple (or equivalent) was attached to the pitot tube, in an interference-free arrangement, to monitor stack gas temperature within 1.5°C (5°F) by the use of a digital readout.

Filter Holder - The filter holder was made of Pyrex glass and had a heating system capable of maintaining a filter temperature of approximately 121°C (250°F).

Filter - An 87-mm (3-in.) diameter, glass fiber filter (Gelman A/E) was used.

Draft Gauge - The draft was measured with an inclined Dwyer manometer with a readability of 0.25 mm (0.01 in.) H_2O in the 0 to 25 mm (0 to 1 in.) H_2O range.

Impingers - Four Greenburg-Smith design impingers were connected in series with glass ball joints. The first, third, and fourth impingers were modified by removing the tip and extending the tube to within 1.3 cm (0.5 in.) of the bottom of the flask.

Metering System - The metering system consisting of a vacuum gauge, a leak-free pump, thermometers capable of measuring temperature to within 1.5°C (5°F), a calibrated dry gas meter, and related equipment was used to maintain an isokinetic sampling rate and to determine sample volume. The dry gas meter was made by Rockwell, and the fiber vane pump was made by Gast.

Barometer - An aneroid type barometer was used to measure atmospheric pressures to 0.3 kPa (±0.1 in.Hg).

6.1.2 Sampling Procedure

After the sampling site and minimum number of traverse points were selected, the stack pressure, temperature, moisture, and range of velocity head were measured according to procedures described in the Federal Register.*

Approximately 400 grams of silica gel were weighed and placed in a sealed impinger prior to each test. Glass fiber filters were desiccated for at least 24 hours to a constant

*40 CFR 60, Appendix A, Methods 1, 2, 3, or 4, July 1980.

weight and weighed to the nearest 0.1 mg on an analytical balance. One hundred milliliters of distilled water was placed in each of the first two impingers, the third impinger was initially empty, and the impinger containing the silica gel was placed next in series. The train was set up as shown in Figure 6-1 or Figure 6-2. Before each test run the sampling train was leak-checked at the sampling site by plugging the inlet to the nozzle and pulling a 50-kPa (15-in.Hg) vacuum and at the conclusion of the test, by plugging the inlet to the nozzle and pulling a vacuum equal to the highest vacuum reached during the test run.

The pitot tube and lines were leak-checked at the test site before and after each test run. The check was made by blowing into the impact opening of the pitot tube until the manometer indicated 7.6 cm (3 in.) or more of water and then capping the impact opening and holding it for 15 seconds to assure it was leak-free. The same procedure was used to leak-check the static pressure side of the pitot tube, except suction was used to obtain the 7.6-cm (3-in.) H_2O manometer reading. Crushed ice was placed around the impingers to keep the temperature of the gases leaving the last impinger at 20°C (68°F) or less.

During sampling, stack gas and sampling train data were recorded at each sampling point and whenever significant changes in stack flow conditions occurred. Isokinetic sampling rates were set throughout the sampling period with the aid of a nomograph or calculator. All sampling data were recorded on the Emission Testing Field Data Sheet.

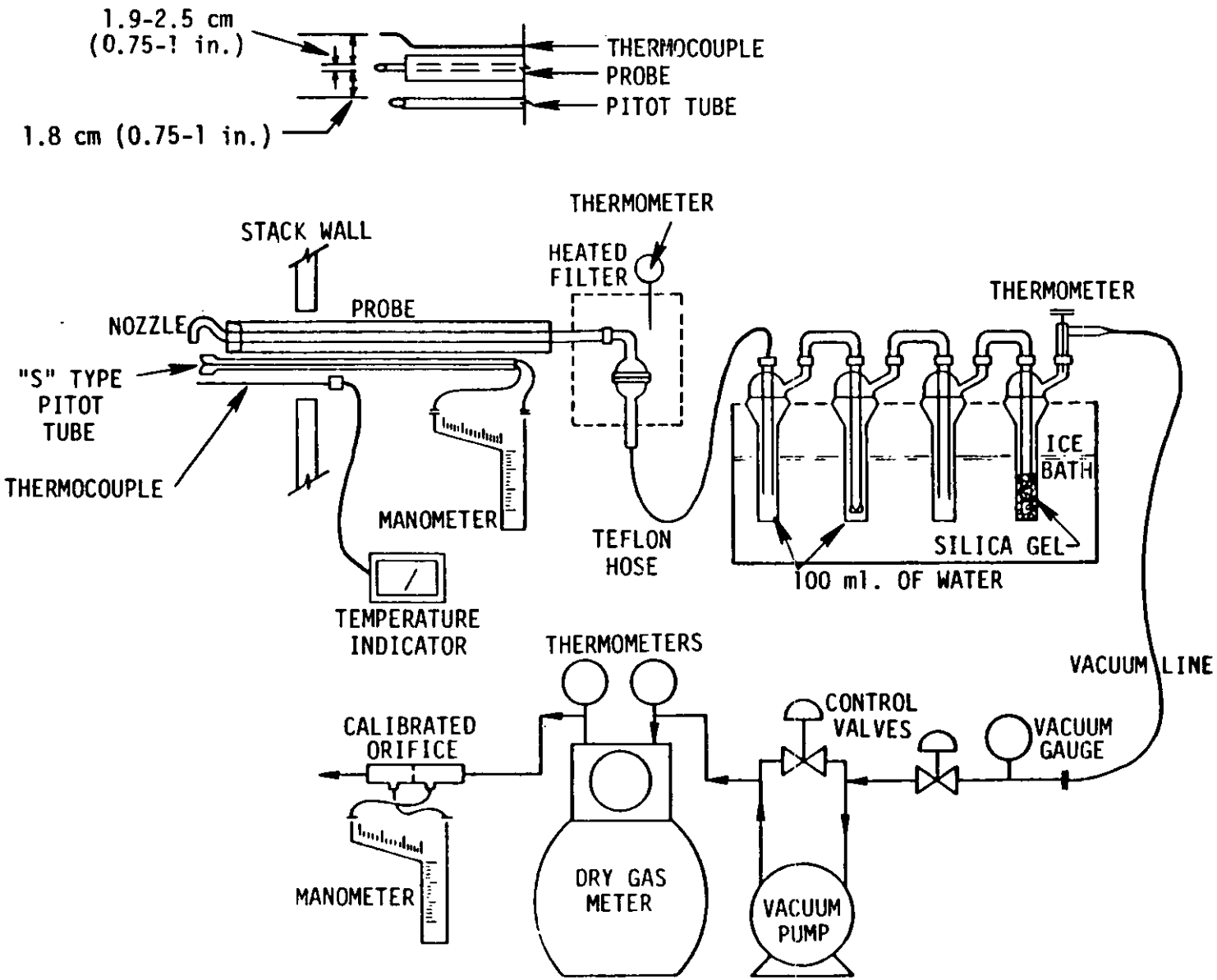

Figure 6-1. Particulate sampling train used at Site 1.

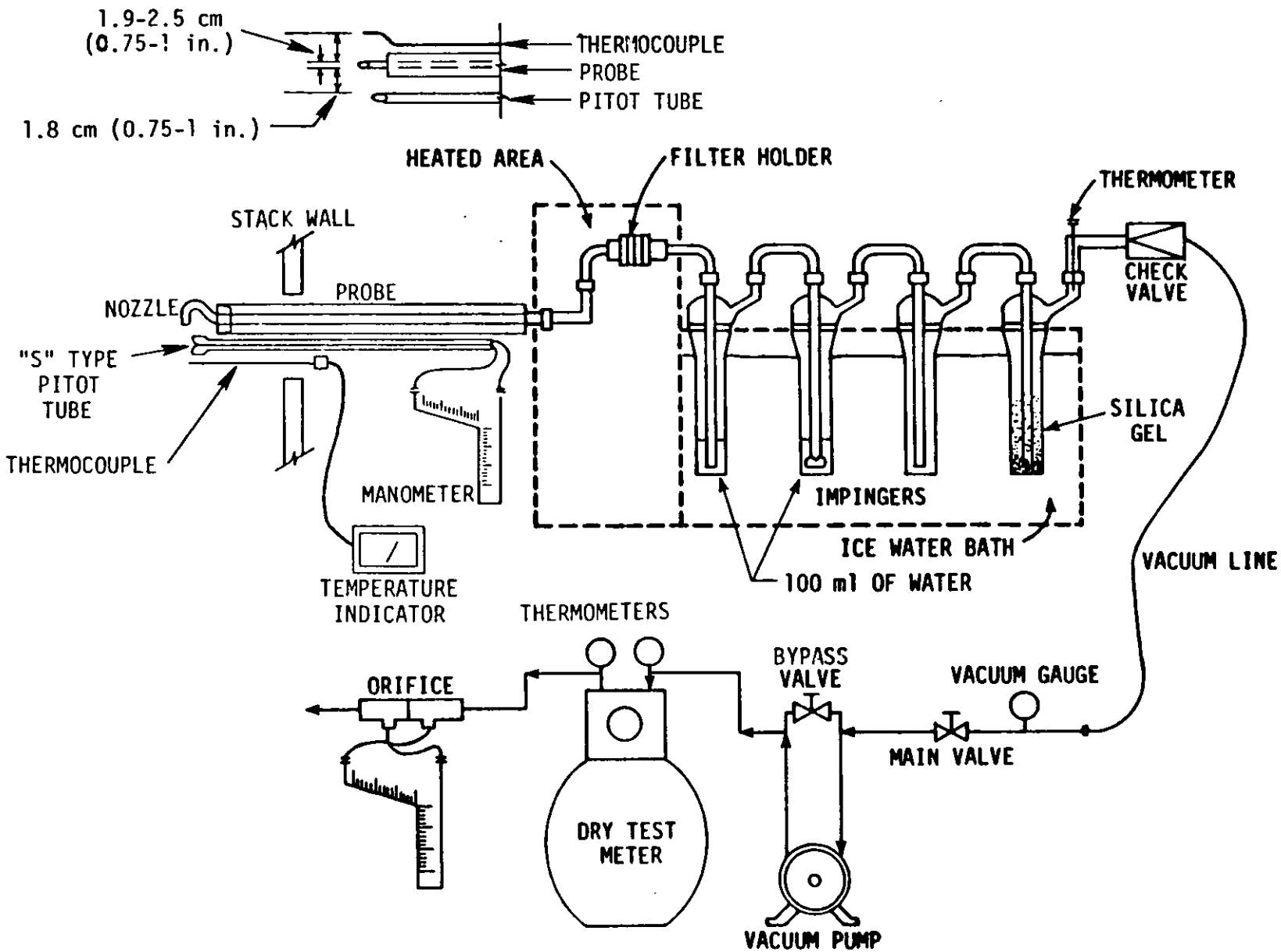

Figure 6-2. Particulate sampling train used at Site 2.

6.1.3 Sample Recovery Procedure

The sampling train was moved carefully from the test site to the cleanup area. The volume of water from the first three impingers was measured, and the silica gel from the fourth impinger was weighed to the nearest 0.1 gram. Sample fractions were recovered as follows:

Container No. 1 - The filter was removed from its holder, placed in a petri dish, and sealed.

Container No. 2 - Loose particulate and acetone washings from all sample-exposed surfaces prior to the filter were placed in a polyethylene jar, sealed, and labeled. Particulate was removed from the probe with the aid of a brush and acetone rinsing. The liquid level was marked after the container was sealed.

Container No. 3 - A minimum of 200 ml of acetone was taken for the blank analysis. The blank was obtained and treated in a similar manner as the acetone washing.

Container No. 4 - After being measured, distilled water in the impinger section of the sampling train was placed in a polyethylene container. The impingers and connecting glassware were rinsed with distilled H_2O, and this rinse was added to the container for shipment to the laboratory.

Container No. 5 - A minimum of 200 ml of distilled water was taken for the blank analysis. The blank was obtained and treated in a similar manner as the water rinse.

Container No. 6 - An unused glass fiber filter was taken for blank analysis.

6.1.4 Analytical Procedures

The analytical procedures used were those described in the Federal Register.*

Container No. 1 - The filter and any loose particulate matter were desiccated in the petri dish for 24 hours to a constant weight and then weighed to the nearest 0.1 mg.

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*40 CFR 60, Appendix A, July 1980.

Container No. 2 - The volume of acetone washings was measured and transferred to a tared beaker. The sample was evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 3 - The volume of acetone blank was measured and transferred to a tared beaker. The blank was evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 4 - For tests at Site 1, the content of this container was stored for future reference. For tests at Site 2, the volume of distilled water and water rinse was measured and transferred to a separatory funnel. The sample was extracted three times with diethyl ether, and each time the water was drained back into the original sample container and the ether into a clean, tared beaker. The sample was then extracted three times with chloroform, and each time the chloroform was drained into the beaker with the ether. After the final extraction, the water portion was drained into a separate tared beaker, evaporated to dryness at 105°C, desiccated, and weighed to a constant weight to obtain the condensible inorganic content. The ether/chloroform portion was evaporated to dryness at ambient temperature, desiccated, and weighed to a constant weight to obtain the condensible organic content.

Container No. 5 - For tests at Site 1, the content of this container was stored for future reference. For tests at Site 2 the distilled water blank was treated in an identical manner as Container No. 4. The aqueous fraction was used as a water blank, and the organic fraction was used as an ether/chloroform blank.

Container No. 6 - The blank filter was treated in an identical manner as the filter in Container No. 1.

The term "constant weight" means a difference of no more than 0.5 mg or 1 percent of total weight less tare weight, whichever is greater between two consecutive readings, with no less than 6 hours of desiccation between weighings. All analytical data were recorded on the Analytical Particulate Data Sheet. Acetone and water blank data were recorded on respective blank data sheets.

6.2 DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Three different configurations of in-stack cascade impactors were used to collect samples for particle size distribution measurements. The following sampling and analytical procedures were used.

6.2.1 Sampling Apparatus

The source sampling train used in these tests met design specifications established by the EPA. Assembled by PEDCo personnel, it consisted of the following:

Nozzle - Stainless steel (316) with sharp tapered leading edge and accurately measured round opening.

Temperature gauge - A Chromel/Alumel type-K thermocouple (or equivalent) was attached to the probe to monitor stack gas (impactor) temperature to within 1.5°C (5°F) by the use of a digital readout.

Metering system - The metering system consisting of a vacuum gauge, a leak-free pump, thermometers capable of measuring temperature to within 1.5°C (5°F), a dry gas meter with 2 percent accuracy, and related equipment was used to maintain an isokinetic sampling rate and to determine sample volume. The dry gas meter was made by Rockwell, and the fiber vane pump was made by Gast.

Condenser - The condenser consisted of a moisture-removal device capable of maintaining a temperature of less than 20°C (68°F), and an attached thermometer to monitor temperature.

Impactor - An Andersen Mark III with eight stages and a backup filter was used at Sites 1 and 2. An Andersen Heavy Grain Loading Impactor with three stages and a backup filter was used at Site 1. A cyclone precutter was attached to the front of each impactor used at Site 1.

Barometer - An aneroid type barometer was used to measure atmospheric pressures to 0.3 kPa (±0.1 in.Hg).

6.2.2 Sampling Procedure

The stack pressure, temperature, moisture, and velocity pressure of the selected sampling site were measured with Method 5 equipment in accordance with procedures described in the Federal Register.* One or more points representing average velocity were selected as sampling points.

Each type of impactor was assembled appropriately. Assembly of the Andersen Mark III (Mark III) involved alternating the stage plates, collection media, flat crossbars, and Inconel spacer rings so as to provide eight cut-sizes. The collection substrates were Reeve Angel 934 AH glass fiber filters that had been heated in a 204°C (400°F) oven for 1 to 2 hours, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg on an analytical balance.

Assembly of the Andersen Heavy Grain Loading Impactor (HGLI) involved inserting a glass fiber thimble in the backup stage and threading together the various parts of the third-stage cyclone and first- and second-stage jet-impaction chambers. The glass fiber thimble had been desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg on an analytical balance.

It used, the cyclone precutter was threaded together and attached to the front of the impactor.

The sampling train was assembled as shown in Figure 6-3 or Figure 6-4. It was leak-checked at the sampling site prior to each test run by plugging the inlet to the impactor (or cyclone

*40 CFR 60, Appendix A, Methods 2, 3, or 4, July 1980.

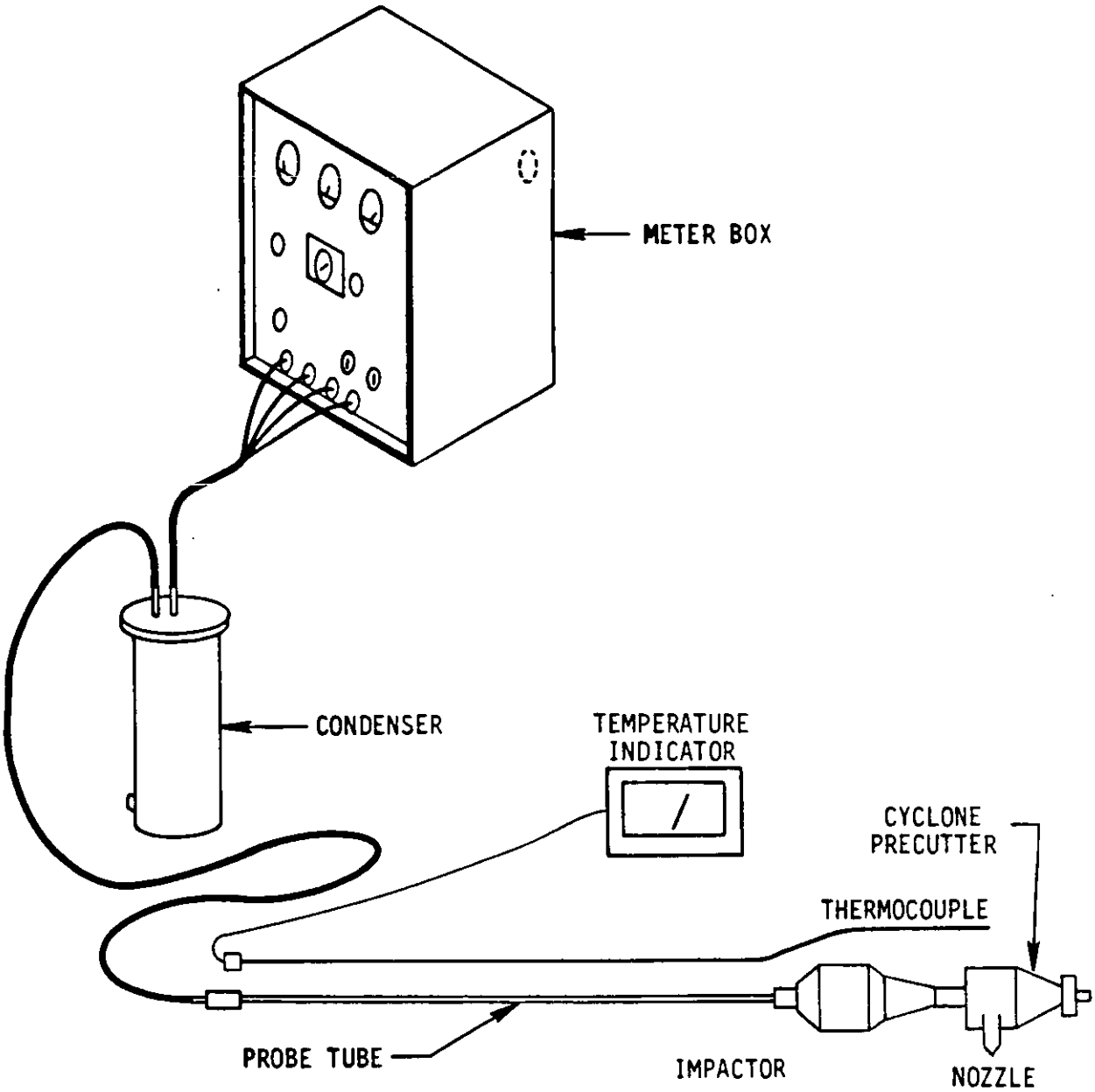

Figure 6-3. Particle size distribution sampling train used at Site 1.

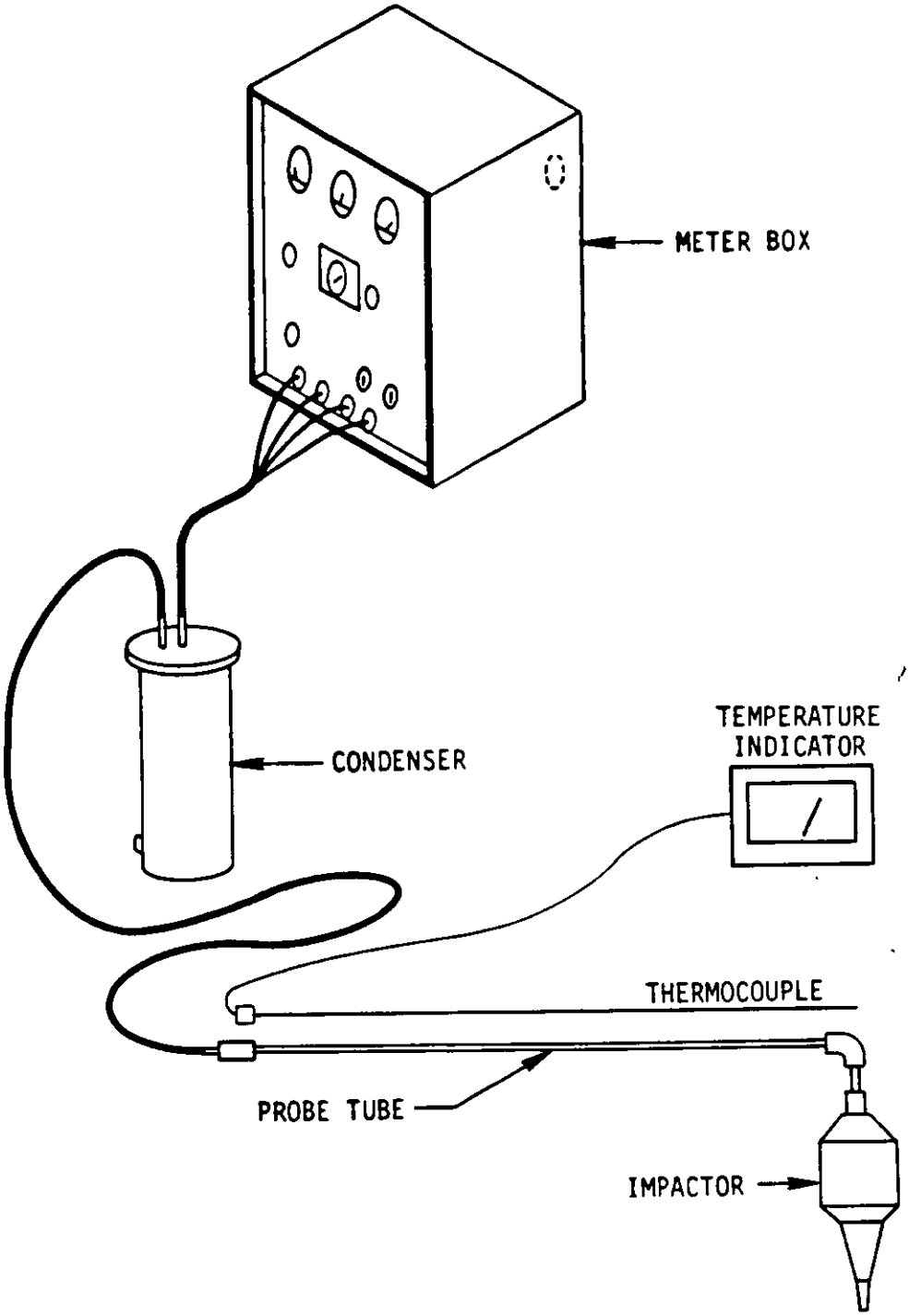

Figure 6-4. Particle size distribution sampling train used at Site 2.

precutter, if used) and pulling a 50-kPa (15-in.Hg) vacuum. Once the desired vacuum was reached, the leakage rate was checked at the dry gas meter for 1 minute. If the leak rate was less than 0.6 liter/min (0.02 cfm), the train was considered ready for sampling. Any excessive leaks were corrected before the train was used. The impactor was then placed at the selected sampling point and allowed to preheat for several minutes before sampling began. While the impactor was preheating, the nozzle was capped or pointed away from the gas flow. A leak-check was capped or pointed away from the gas flow. A leak-check was not performed after the test run so as to avoid the possibility of dislodging the particles on individual stages.

During sampling, stack gas and sampling train data were recorded at regular intervals based on the length of the run. Velocity pressure data were obtained periodically using separate Method 5 equipment. The isokinetic sampling rate was set initially, and constant cut-point characteristics were maintained throughout the sampling period. Preliminary impactor runs were made at each site to determine the Mark III sampling times required to allow uniform loading on the backup filter and to prevent loadings of greater than 10 mg on any one stage. All sampling data were recorded on the Impactor Testing Field Data Sheet.

6.2.3 Sample Recovery Procedure

When the test was over, the impactor was removed from the probe and carefully moved to the designated cleanup are while

still in an upright position. The impactors were recovered as follows:

Mark III:

Container No. 1 - Particulate in the nozzle and inlet chamber was removed by brushing and rinsing with acetone into a polyethylene container, which was sealed and labeled.

Containers No. 2 through 10 - Each filter was removed from its stage and carefully placed in a petri dish. Loose particulate from the bottom side of the previous stage plates, the Inconel spacer, the flat crossbar, and the top side of the plate directly under the filter were brushed into the same petri dish as the respective filter. Each petri dish was sealed and labeled.

Container No. 11 - If the cyclone precutter was used, particulate from all sample-exposed surfaces except the interior of the cyclone exit tube was brushed and acetone-rinsed into a polyethylene container, which was sealed and labeled. Particulate from the interior of the cyclone exit tube was added to Container No. 1.

Heavy Grain Loading Impactor With Cyclone Precutter:

Containers No. 1 through 5 - Particulate from all sample-exposed surfaces after the cut-point of the preceding stage and prior to the cut-point of a given stage was brushed and rinsed with acetone into a polyethylene container. After the container was sealed and labeled, the liquid level was marked.

Container No. 6 - The glass fiber thimble was carefully removed from the holder and placed in a glass jar. The jar was then sealed and labeled.

All pertinent data were recorded on Sample Recovery and Integrity Data Sheets.

6.2.4 Analytical Procedures

Filters - Each glass fiber filter or thimble and any loose particulate matter were desiccated in respective sample containers for 24 hours to a constant weight and weighed to the nearest 0.1 mg on an analytical balance.

Acetone Rinses - The volume of each acetone washing was measured and transferred to a tared beaker. The sample was evaporated to dryness at ambient temperature and pressure,

desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

The term "constant weight" means a difference of no more than 0.5 mg or 1 percent of total weight less tare weight, whichever is greater between two consecutive weighings, with no less than 6 hours of desiccation between weighings. All analytical data were recorded on Andersen Impactor or HGLI Particulate Analytical Data Sheets.

6.2.5 Blanks

Several unused glass fiber thimbles and a complete set of unused Mark III filters were returned to the laboratory in their respective containers. Approximately 200 ml of the acetone used for sample recovery was taken as a blank. In addition, a blank test run was conducted with the Mark III impactor to determine if stack gases had reacted with the filter media to cause false weight changes. In the blank run a backup filter was placed in front of a normally assembled impactor to filter out all particulate matter so that only the stack gases would contact the filter media.

All blanks were recovered and analyzed in the same manner as the actual samples. Data were recorded on the respective blank data sheets.

REFERENCES

1. U.S. Environmental Protection Agency. A Review of Standards of Performance for Electric Arc Furnaces in the Steel Industry. EPA 450/3-70-033, October 1979.

2. U.S. Environmental Protection Agency. Background Information for Standards of Performance: Electric Arc Furnaces in the Steel Industry. EPA 450/2-74-017b, October 1974.

3. Carpenter Technology Corporation. Reports of Emissions Testing Performed August 22, 1978, on Carborundum Baghouse - No. 2 AOD. September 1978.

4. Southern Research Institute. A Computer-Based Cascade Impactor Data Reduction System. Prepared for U.S. Environmental Protection Agency under Contract No. 68022131, March 1978.

5. University of Florida. Use and Limitations of In-Stack Impactors. Prepared by the Department of Environmental Sciences for U.S. Environmental Protection Agency under Grant No. R803692-02, February 1980.

6. U.S. Environmental Protection Agency. Quality Assurance Handbook for Air Pollution Measurement Systems. Vol. III. EPA-600/4-77-027b, August 1977.

APPENDIX A

COMPUTER PRINTOUTS AND EXAMPLE CALCULATIONS

PARTICULATE

Site No. 1
Site No. 2

VELOCITY

Site No. 3
Site No. 4

PARTICLE SIZE

Site No. 1 - Andersen Mark III
Site No. 2 - Andersen Mark III
Site No. 1 - High Capacity

EXAMPLE CALCULATIONS

The following calculations were used to adjust mass emission rates measured at the outlet to conditions representative of the total inlet flow rate.

$$\text{Adjusted emission rate} = \text{emission rate indicated in computer output} \times \frac{\text{inlet flow rate}}{\text{measured outlet flow rate}}$$

Example: For Run 1,

Indicated outlet emission rate = 0.388 lb/h

Inlet flow rate = 16,608,860 scfh

Measured outlet flow rate = 7,506,190 scfh

$$\text{Adjusted emission rate} = 0.388 \times \frac{16{,}608{,}860}{7{,}506{,}190} = 0.859 \text{ lb/h}$$

This was then converted to metric units.

FIELD DATA

PLANT	CARPENTER TECH READING, PA	DATE	04/28/81
SAMPLING LOCATION	#1 STTE INLET	RUN NUMBER	C1P-1
SAMPLE TYPE	PARTICULATE	PROBE LENGTH & TYPE	10 FT STAINLESS
OPERATOR	R ANTESBERGER	NOZZLE 2-1021 I.D.	.128
AMBIENT TEMP.(DEG.F)	70.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.80	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	FB6
FILTER NUMBER(S)	0002150	METER HEAD DIFF.	1.53
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	250.
THERM. NO.	259	HEATER BOX SETTING	250.
LEAKAGE	.000 CFM @ 5.0 IN.HG		
METER CALIB. FACTOR	.973	K FACTOR	124.9
READ & RECORD DATA EVERY	9.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	1015	213.955									
A-01	9.0	1024	217.800	1.900	.40	.40	120.	73.	72.	2.0	240.	55.
A-02	18.0	1033	221.630	1.800	.39	.39	115.	76.	73.	2.0	250.	55.
A-03	27.0	1042	225.740	2.100	.45	.45	115.	80.	74.	2.0	250.	56.
A-04	36.0	1051	229.800	2.000	.43	.43	116.	83.	75.	2.0	250.	56.
A-05	45.0	1100	233.600	1.700	.36	.36	116.	86.	78.	2.0	250.	57.
A-06	54.0	1109	237.050	1.600	.31	.31	164.	88.	79.	2.0	255.	56.
A-07	63.0	1118	240.530	1.600	.32	.32	159.	88.	80.	2.0	250.	56.
B-01	72.0	1129	244.400	1.800	.38	.38	129.	89.	82.	2.0	250.	57.
B-02	81.0	1138	248.050	1.700	.35	.35	132.	90.	82.	2.0	250.	57.
B-03	90.0	1147	251.900	1.800	.38	.38	126.	92.	84.	2.0	250.	57.
B-04	99.0	1156	256.100	2.100	.44	.44	125.	94.	86.	2.0	250.	58.
B-05	108.0	1205	259.830	1.700	.36	.36	121.	96.	86.	2.0	250.	58.
B-06	117.0	1214	263.550	1.600	.34	.34	123.	96.	86.	2.0	250.	58.
B-07	126.0	1223	267.170	1.600	.34	.34	124.	96.	88.	2.0	250.	59.
C-01	135.0	1240	271.550	2.000	.42	.42	124.	94.	88.	2.0	250.	60.
C-02	144.0	1249	275.200	1.900	.40	.40	125.	94.	90.	2.0	250.	60.
C-03	153.0	1258	278.770	1.600	.32	.32	158.	94.	90.	2.0	250.	60.
C-04	162.0	1307	282.050	1.400	.26	.26	189.	94.	90.	2.0	250.	61.
C-05	171.0	1316	285.600	1.600	.32	.32	148.	94.	90.	2.0	250.	61.
C-06	180.0	1325	289.100	1.300	.26	.26	143.	94.	90.	2.0	250.	61.
C-07	189.0	1334	292.325	1.400	.29	.29	133.	92.	88.	2.0	250.	61.
D-01	198.0	1349	295.950	1.600	.33	.33	129.	90.	88.	2.0	250.	53.
D-02	207.0	1358	300.000	2.000	.42	.42	130.	89.	88.	2.5	250.	53.
D-03	216.0	1407	303.700	1.600	.34	.34	127.	89.	87.	2.5	250.	52.
D-04	225.0	1416	307.550	1.800	.38	.38	122.	90.	87.	2.5	250.	52.
D-05	234.0	1425	311.320	1.700	.36	.36	120.	90.	87.	2.5	250.	52.
D-06	243.0	1434	314.200	1.500	.29	.29	171.	92.	88.	2.5	250.	53.
D-07	252.0	1443	317.905	1.200	.25	.25	129.	93.	88.	2.5	250.	50.
E-01	261.0	1450	321.280	1.400	.29	.29	126.	92.	88.	2.5	250.	50.
E-02	270.0	1459	324.710	1.400	.29	.29	127.	93.	88.	2.5	250.	51.

PLANT CARPENTER TECH READING, PA
SAMPLING LOCATION #1 STTF INLET
DATE 04/28/81
RUN NUMBER C1P-1

READ & RECORD DATA EVERY 9.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
E-03	279.0	1508	328.500	1.700	.36	.36	127.	93.	88.	2.5	250.	51.
E-04	288.0	1517	332.100	1.500	.32	.32	124.	93.	88.	2.5	255.	50.
E-05	297.0	1526	335.770	1.600	.34	.34	125.	94.	88.	2.5	255.	50.
E-06	306.0	1535	339.100	1.300	.27	.27	124.	94.	88.	2.5	250.	50.
E-07	315.0	1544	342.180	1.100	.23	.23	128.	94.	88.	2.5	250.	49.
F-01	324.0	1609	345.150	1.000	.21	.21	129.	94.	90.	2.5	250.	49.
F-02	333.0	1618	348.000	.900	.18	.18	136.	94.	90.	2.5	250.	49.
F-03	342.0	1627	351.200	1.200	.25	.25	142.	96.	90.	2.5	250.	50.
F-04	351.0	1654	354.550	1.400	.27	.27	187.	98.	91.	2.5	250.	50.
F-05	360.0	1703	357.800	1.200	.24	.24	144.	98.	93.	2.5	270.	50.
F-06	369.0	1712	360.450	.800	.16	.16	138.	99.	94.	2.5	270.	51.
F-07	378.0	1721	363.120	.750	.15	.15	136.	100.	94.	2.5	265.	51.
G-01	387.0	1730	365.750	.650	.13	.13	132.	100.	96.	2.0	265.	53.
G-02	396.0	1743	368.340	.800	.16	.16	137.	100.	96.	2.0	260.	55.
G-03	405.0	1752	371.800	1.400	.29	.29	138.	100.	96.	2.0	250.	54.
G-04	414.0	1801	375.250	1.400	.29	.29	134.	100.	96.	2.0	250.	54.
G-05	423.0	1810	378.200	.950	.19	.19	142.	102.	96.	2.0	250.	55.
G-06	432.0	1819	380.400	.500	.10	.10	166.	102.	96.	2.0	250.	55.
G-07	441.0	1828	382.600	.600	.10	.10	154.	102.	96.	2.0	250.	56.
TOTALS	441.0		168.645									
AVERAGE					.30	.30	135.	93.	88.	2.2	252.	54.

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT- NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH READING, PA — R ANTESBERGER

TEST C1P-1 #1 SITE INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/28/81	04/28/81
TB	TIME-START	1015	1015
TF	TIME-FINISH	1828	1828
TT	NET TIME OF TEST, MIN.	441.0	441.0
NP	NET SAMPLING POINTS	49	49
Y	METER CALIBRATION FACTOR	.973	.973
DN	SAMPLING NOZZLE DIAMETER	.128 IN	3.3 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.30 IN-H2O	7.6 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	168.645 CU-FT	4.775 CU-M
TM	AVERAGE GAS METER TEMP	90.3 F	32.4 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	156.930 SCF	4.444 SCM
VLC	TOTAL H2O COLLECTED IN IMPINGERS AND SILICA GEL,ML.	36.4	36.4
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	1.713 SCF	.049 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.08	1.08
FMD	MOLE FRACTION DRY GAS	.989	.989
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.75	28.75

PB	BAROMETRIC PRESSURE	29.80	IN-HG	756.92	MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30	IN-H2O	-33.02	MM-H2O
PS	STACK PRES, ABS.	29.70	IN-HG	754.49	MM-HG
TS	AVERAGE STACK TEMP	135.	F	57.	C
VS	AVG STACK GAS VELOCITY	70.5	FPS	21.5	MPS
AS	STACK AREA	10816.	SQ-IN	6.978	SQ-M
QSSTD	STACK FLOW RATE, DRY*	16608860.	SCFH	470313.	SCMH
QS	ACTUAL STACK FLOW RATE	19067308.	ACFH	539929.	ACMH
ISO	PERCENT ISOKINETIC	108.1		108.1	
MN	PARTICULATE MG. EPA 5	665.9		665.9	
CS	PARTICULATE	.0655	GR/DSCF*	149.864	MG/DSCM
PMR	PARTICULATE EMISSION RATE	155.371	LB/HR	70.48	KG/HR

* 68 DEG F, 29.92 IN.HG.

EXAMPLE PARTICULATE CALCULATIONS TEST NO. C1P-1

#1 STTE INLET

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

VMSTD = (17.647 * VM * Y * (PB + PM / 13.6)) / (TM + 460.)

$$VMSTD = \frac{17.647 * 168.645 * .973 * (29.80 + .300 / 13.6)}{(90. + 460.)} = 156.930 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

VWC = .04707 * VLC

VWC = .04707 * 36. = 1.71 SCF

PERCENT MOISTURE IN STACK GAS

BWO = (100. * VWC) / (VMSTD + VWC)

$$BWO = \frac{100. * 1.71}{156.930 + 1.71} = 1.08 \text{ PERCENT}$$

A-9

MOLE FRACTION OF DRY STACK GAS

FMD = (100. - BWO) / 100.

$$FMD = \frac{100. - 1.1}{100.} = .989$$

AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

MD = (PCO2 * .44) + (PO2 * .32) + (PN2 + PCO) * .28

MD = (.60*44/100) + (19.4*32/100) + ((80.0+ .0) * 28/100 = 28.87

MOLECULAR WEIGHT OF STACK GAS

MWS = MD * (1. - (BWO/100)) + 18. * (BWO/100)

MWS = 28.87* (1. -(1.08/100)) + 18. * (1.08/100) = 28.75

STACK GAS VELOCITY AT STACK CONDITIONS

DELP = SUM. OF THE SQRT(VH * (TS + 460.))

VS = 85.49 * CP * DELP / (SQRT(MWS * PS) * PNTS)

VS = 85.49 * .83 * 1423.146 / (SQRT(28.75 * 29.70) * 49. = 70.52 FPS

STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

QS = VS * AS * 3600/144

QS = 70.52 * 10816. 3600/144 = 19067308. ACFH

STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS

QSSTD = 17.647 * QS * PS * (1. - (BWO/100)) / (TS + 460.)

```
          17.647 *   19067308. *  29.70 * (1. - ( 1.08/100))
QSSTD = ------------------------------------------------- = 16608860. SCFH
                    ( 135. + 460.)
```

PERCENT ISOKINETIC

ISO = (305.58*(TS+460.))*((0.002669*VLC)+(VM*Y*(PB+(PM/13.6))/(TM+460.)))/(TT*VS*PS*DN*DN)

```
        (305.58*( 135.+460.))*((0.002669*   36.)+(  168.645* .973*( 29.80+(    .300/13.6))/(  90.+460.)))
ISO = ------------------------------------------------------------------------------------------------------ * 108.05 PERCENT
                                441. *     70.52 *   29.70 *  .128 *  .128
```

PARTICULATE LOADING -- EPA METHOD 5 (AT STANDARD CONDITIONS)

CS = 0.001 * MN * 15.43 / VMSTD

CS = 0.001 * 665.9 * 15.43 / 156.930 = .065 GR/DSCF

PARTICULATE LBS/HR -- EPA METHOD 5

PMR = CS * QSSTD / (15.43 * 453.6)

PMR = .065 * 16608860. / (15.43 * 453.6) = 155.37

FIELD DATA

PLANT	CARPENTER TECH READING, PA	DATE	04/29/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	CIP-2
SAMPLE TYPE	PARTICULATE	PROBE LENGTH & TYPE	10 FT STAINLESS
OPERATOR	R ANTESBERGER	NOZZLE 2-102: I.D.	.128
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.60	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	FB6
FILTER NUMBER(S)	0002182	METER HEAD DIFF.	1.53
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	250.
THERM. NO.	259	HEATER BOX SETTING	250.
LEAKAGE	.000 CFM @ 15.0 IN.HG		
METER CALIB. FACTOR	.973	K FACTOR	121.1
READ & RECORD DATA EVERY	9.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	924	382.910									
A-01	9.0	933	387.000	1.700	.36	.36	114.	70.	69.	1.0	235.	47.
A-02	18.0	942	391.250	2.200	.46	.46	117.	73.	70.	2.0	240.	47.
A-03	27.0	951	394.780	1.800	.37	.37	119.	78.	72.	2.0	250.	48.
A-04	36.0	1000	398.500	1.800	.37	.37	121.	80.	73.	2.0	250.	50.
A-05	45.0	1009	402.150	1.700	.35	.35	120.	84.	76.	2.0	250.	50.
A-06	54.0	1018	404.530	1.500	.31	.31	120.	86.	76.	2.0	250.	50.
A-07	63.0	1027	408.375	1.000	.20	.20	122.	87.	79.	2.0	250.	50.
B-01	72.0	1045	412.000	1.700	.35	.35	122.	88.	82.	2.0	250.	51.
B-02	81.0	1054	416.000	2.000	.41	.41	126.	89.	82.	2.0	250.	50.
B-03	90.0	1103	420.130	2.200	.45	.45	125.	91.	83.	2.0	250.	50.
B-04	99.0	1112	424.300	2.200	.45	.45	127.	92.	84.	2.0	250.	51.
B-05	108.0	1121	428.500	2.200	.45	.45	124.	93.	84.	2.0	255.	50.
B-06	117.0	1130	432.850	2.300	.48	.48	123.	94.	84.	2.0	250.	50.
B-07	126.0	1139	437.000	2.200	.45	.45	124.	94.	84.	2.0	250.	50.
D-01	135.0	1150	440.820	1.700	.35	.35	124.	93.	86.	2.0	250.	50.
D-02	144.0	1159	445.000	2.200	.45	.45	124.	93.	86.	2.0	250.	52.
D-03	153.0	1200	449.100	2.000	.41	.41	123.	93.	87.	2.0	250.	55.
D-04	162.0	1209	453.250	2.100	.43	.43	123.	93.	87.	2.0	255.	56.
D-05	171.0	1218	457.550	2.300	.47	.47	124.	94.	87.	2.0	260.	56.
D-06	180.0	1227	461.900	1.900	.39	.39	122.	96.	87.	2.0	260.	56.
D-07	189.0	1236	465.345	2.200	.45	.45	123.	96.	88.	2.0	260.	57.
E-01	198.0	1259	469.650	2.200	.45	.45	128.	93.	88.	2.5	240.	53.
E-02	207.0	1224	473.640	2.000	.41	.41	127.	93.	88.	2.5	245.	51.
E-03	216.0	1333	477.630	1.900	.39	.39	125.	91.	88.	2.5	250.	51.
E-04	225.0	1342	481.500	1.800	.37	.37	129.	91.	88.	2.5	250.	53.
E-05	234.0	1351	485.750	2.000	.41	.41	128.	93.	88.	2.5	250.	53.
E-06	243.0	1400	489.250	1.700	.35	.35	129.	96.	88.	2.5	250.	53.
E-07	252.0	1409	492.930	1.600	.33	.33	130.	96.	89.	2.5	250.	54.
F-01	261.0	1419	496.030	1.100	.22	.22	129.	96.	90.	2.5	250.	54.
F-02	270.0	1428	498.800	.850	.17	.17	129.	96.	90.	2.5	250.	55.

PLANT CARPENTER TECH READING, PA DATE 04/29/81
SAMPLING LOCATION SITE #1 INLET RUN NUMBER C1P-2

READ & RECORD DATA EVERY 9.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
F-03	279.0	1437	502.150	1.400	.28	.28	130.	96.	90.	2.5	250.	55.
F-04	288.0	1446	505.950	1.700	.35	.35	131.	96.	91.	2.5	250.	57.
F-05	297.0	1455	509.500	1.400	.29	.29	130.	96.	91.	2.5	250.	57.
F-06	306.0	1504	512.470	1.000	.20	.20	130.	98.	91.	2.5	250.	58.
F-07	315.0	1513	515.270	.930	.19	.19	134.	98.	91.	2.0	250.	60.
G-01	324.0	1522	517.890	.740	.15	.15	128.	96.	91.	1.8	250.	64.
G-02	333.0	1531	520.380	.670	.14	.14	128.	96.	92.	1.6	250.	66.
G-03	342.0	1540	522.250	1.300	.27	.27	134.	96.	92.	2.2	250.	66.
G-04	351.0	1549	526.800	1.100	.22	.22	152.	97.	92.	2.0	250.	66.
G-05	360.0	1558	529.500	.800	.16	.16	150.	98.	92.	2.0	250.	65.
G-06	369.0	1607	532.050	.700	.14	.14	142.	98.	93.	2.0	250.	64.
G-07	378.0	1616	534.500	.650	.13	.13	129.	99.	93.	2.0	250.	65.
C-01	387.0	1638	538.050	1.500	.31	.31	130.	98.	94.	2.0	250.	65.
C-02	396.0	1647	542.170	2.000	.43	.43	98.	98.	94.	2.5	250.	64.
C-03	405.0	1656	546.300	1.900	.41	.41	102.	98.	94.	2.5	250.	64.
C-04	414.0	1705	550.300	1.800	.39	.39	101.	100.	94.	2.5	250.	66.
C-05	423.0	1714	554.400	2.000	.43	.43	102.	102.	94.	3.0	250.	66.
C-06	432.0	1723	558.000	1.400	.30	.30	98.	104.	94.	3.0	250.	66.
C-07	441.0	1732	561.310	1.200	.26	.26	97.	104.	94.	3.0	250.	68.
TOTALS	441.0		178.400									
AVERAGE					.34	.34	124.	93.	87.	2.2	250.	56.

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT- NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH READING, PA — R ANTESBERGER

TEST C1P-2 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/29/81	04/29/81
TB	TIME-START	924	924
TF	TIME-FINISH	1732	1732
TT	NET TIME OF TEST, MIN.	441.0	441.0
NP	NET SAMPLING POINTS	49	49
Y	METER CALIBRATION FACTOR	.973	.973
DN	SAMPLING NOZZLE DIAMETER	.128 IN	3.3 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.34 IN-H2O	8.6 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	178.400 CU-FT	5.052 CU-M
TM	AVERAGE GAS METER TEMP	90.1 F	32.3 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	164.965 SCF	4.671 SCM
VLC	TOTAL H2O COLLECTED IN IMPINGERS AND SILICA GEL,ML.	59.7	59.7
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	2.810 SCF	.080 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.67	1.67
FMD	MOLE FRACTION DRY GAS	.983	.983
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.69	28.69

PB	BAROMETRIC PRESSURE	29.60	IN-HG	751.84	MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30	IN-H2O	-33.02	MM-H2O
PS	STACK PRES, ABS.	29.50	IN-HG	749.41	MM-HG
TS	AVERAGE STACK TEMP	124.	F	51.	C
VS	AVG STACK GAS VELOCITY	74.3	FPS	22.7	MPS
AS	STACK AREA	10816.	SQ-IN	6.978	SQ-M
QSSTD	STACK FLOW RATE, DRY*	17627876.	SCFH	499169.	SCMH
QS	ACTUAL STACK FLOW RATE	20102684.	ACFH	569248.	ACMH
ISO	PERCENT ISOKINETIC	107.0		107.0	
MN	PARTICULATE MG. EPA 5	659.3		659.3	
CS	PARTICULATE	.0617	GR/DSCF*	141.152	MG/DSCM
PMR	PARTICULATE EMISSION RATE	155.317	LB/HR	70.45	KG/HR

* 68 DEG F, 29.92 IN.HG.

EXAMPLE PARTICULATE CALCULATIONS TEST NO. C1P-2

SITE #1 INLET

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

VMSTD = (17.647 * VM * Y * (PB + PM / 13.6)) / (TM + 460.)

$$VMSTD = \frac{17.647 * 178.400 * .973 * (29.60 + .338 / 13.6)}{(90. + 460.)} = 164.965 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

VWC = .04707 * VLC

VWC = .04707 * 60. = 2.81 SCF

PERCENT MOISTURE IN STACK GAS

BWO = (100. * VWC) / (VMSTD + VWC)

$$BWO = \frac{100. * 2.81}{164.965 + 2.81} = 1.67 \text{ PERCENT}$$

MOLE FRACTION OF DRY STACK GAS

FMD = (100. - BWO) / 100.

$$FMD = \frac{100. - 1.7}{100.} = .983$$

AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

MD = (PCO2 * .44) + (PO2 * .32) + (PN2 + PCO) * .28

MD = (.60*44/100) + (19.4*32/100) + ((80.0+ .0) * 28/100 = 28.87

MOLECULAR WEIGHT OF STACK GAS

MWS = MD * (1. - (BWO/100)) + 18. * (BWO/100)

MWS = 28.87* (1. -(1.67/100)) + 18. * (1.67/100) = 28.69

STACK GAS VELOCITY AT STACK CONDITIONS

DELP = SUM. OF THE SQRT(VH * (TS + 460.))

VS = 85.49 * CP * DELP / (SQRT(MWS * PS) * PNTS)

VS = 85.49 * .83 * 1493.681 / (SQRT(28.69 * 29.50) * 49. = 74.34 FPS

STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

QS = VS * AS * 3600/144

QS = 74.34 * 10816. 3600/144 = 20102684. ACFH

STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS

QSSTD = 17.647 * QS * PS * (1. - (BWO/100)) / (TS + 460.)

$$QSSTD = \frac{17.647 * 20102684. * 29.50 * (1. - (1.67/100))}{(124. + 460.)} = 17627876. \text{ SCFH}$$

PERCENT ISOKINETIC

ISO = (305.58*(TS+460.))*((0.002669*VLC)+(VM*Y*(PB+(PM/13.6))/(TM+460.)))/(TT*VS*PS*DN*DN)

$$ISO = \frac{(305.58*(124.+460.))*((0.002669* 60.)+(178.400* .973*(29.60+(.338/13.6))/(90.+460.)))}{441. * 74.34 * 29.50 * .128 * .128} = 107.02 \text{ PERCENT}$$

PARTICULATE LOADING -- EPA METHOD 5 (AT STANDARD CONDITIONS)

CS = 0.001 * MN * 15.43 / VMSTD

CS = 0.001 * 659.3 * 15.43 / 164.965 = .062 GR/DSCF

PARTICULATE LBS/HR -- EPA METHOD 5

PMR = CS * QSSTD / (15.43 * 453.6)

PMR = .062 * 17627876. / (15.43 * 453.6) = 155.32

FIELD DATA

PLANT	CARPENTER TECH CO READING, PA	DATE	04/30/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	CIP-3
SAMPLE TYPE	PARTICULATE	PROBE LENGTH & TYPE	10 FT STAINLESS
OPERATOR	R ANTESBERGER	NOZZLE 2-102: I.D.	.128
AMBIENT TEMP.(DEG.F)	75.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.70	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	FB6
FILTER NUMBER(S)	0002087	METER HEAD DIFF.	1.53
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	250.
THERM. NO.	259	HEATER BOX SETTING	250.
LEAKAGE	.000 CFM @ 5.0 IN.HG		
METER CALIB. FACTOR	.973	K FACTOR	120.9
READ & RECORD DATA EVERY	9.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	935	561.680									
A-01	9.0	944	565.440	2.000	.39	.39	154.	62.	62.	2.0	240.	49.
A-02	18.0	953	569.145	2.000	.38	.38	171.	64.	62.	2.0	250.	49.
A-03	27.0	1022	573.300	2.100	.45	.45	106.	66.	64.	2.0	250.	47.
A-04	36.0	1031	577.050	1.800	.38	.38	116.	68.	64.	2.0	250.	47.
A-05	45.0	1040	580.150	1.700	.37	.37	99.	71.	65.	2.0	260.	48.
A-06	54.0	1049	584.000	1.700	.37	.37	99.	74.	66.	2.0	255.	48.
A-07	63.0	1058	588.130	1.500	.32	.32	100.	76.	68.	2.0	250.	48.
B-01	72.0	1110	591.750	1.900	.36	.36	99.	76.	70.	2.0	250.	49.
B-02	81.0	1119	595.050	2.000	.37	.37	116.	77.	70.	2.0	250.	49.
B-03	90.0	1128	598.850	1.700	.29	.29	175.	79.	71.	2.0	255.	50.
B-04	99.0	1137	602.150	1.600	.30	.30	112.	80.	72.	2.0	250.	50.
B-05	108.0	1146	605.800	1.900	.35	.35	125.	80.	72.	2.0	250.	50.
B-06	117.0	1155	609.100	1.600	.30	.30	110.	81.	73.	2.0	250.	51.
B-07	126.0	1204	612.450	1.600	.30	.30	109.	82.	74.	2.0	250.	51.
D-01	135.0	1220	615.900	1.700	.32	.32	112.	81.	76.	2.0	250.	54.
D-02	144.0	1229	619.420	1.700	.32	.32	113.	81.	76.	2.0	250.	54.
D-03	153.0	1238	623.300	2.100	.39	.39	111.	82.	76.	2.0	250.	55.
D-04	162.0	1247	626.900	1.800	.34	.34	108.	84.	77.	2.0	250.	55.
D-05	171.0	1256	630.700	1.900	.36	.36	106.	85.	78.	2.0	250.	55.
D-06	180.0	1305	634.200	1.800	.34	.34	106.	86.	79.	2.0	250.	53.
D-07	189.0	1314	637.620	1.600	.30	.30	115.	88.	80.	2.0	250.	52.
E-01	198.0	1329	640.850	1.400	.26	.26	121.	86.	81.	2.0	250.	51.
E-02	207.0	1338	644.050	1.400	.26	.26	118.	86.	81.	2.0	250.	52.
E-03	216.0	1347	647.700	1.900	.35	.35	115.	86.	81.	2.0	250.	52.
E-04	225.0	1356	651.300	1.800	.34	.34	112.	86.	81.	2.0	250.	54.
E-05	234.0	1405	654.830	1.700	.32	.32	114.	87.	81.	2.0	250.	54.
E-06	243.0	1414	658.250	1.600	.30	.30	110.	88.	81.	2.0	250.	55.
E-07	252.0	1423	661.220	1.100	.21	.21	106.	88.	81.	2.0	250.	54.
F-01	261.0	1440	664.320	1.300	.24	.24	114.	86.	80.	2.0	250.	55.
F-02	270.0	1449	666.900	.850	.16	.16	114.	86.	80.	2.0	250.	56.

PLANT CARPENTER TECH CO READING, PA DATE 04/30/81

SAMPLING LOCATION SITE #1 INLET RUN NUMBER CIP-3

READ & RECORD DATA EVERY 9.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
F-03	279.0	1458	670.000	1.400	.26	.26	115.	86.	80.	2.0	250.	56.
F-04	288.0	1507	673.300	1.500	.27	.27	132.	87.	81.	2.0	250.	58.
F-05	297.0	1516	676.200	1.200	.21	.21	142.	87.	81.	2.0	250.	58.
F-06	306.0	1525	678.650	.800	.14	.14	131.	88.	82.	2.0	250.	58.
F-07	315.0	1534	681.350	.950	.17	.17	124.	88.	83.	2.0	250.	58.
G-01	324.0	1543	683.700	.700	.13	.13	130.	89.	84.	2.0	250.	58.
G-02	333.0	1552	686.600	1.000	.18	.18	129.	90.	85.	2.0	250.	59.
G-03	342.0	1601	689.750	1.400	.25	.25	132.	92.	86.	2.0	250.	59.
G-04	351.0	1610	692.900	1.300	.23	.23	135.	93.	88.	2.0	250.	59.
G-05	360.0	1619	695.200	.950	.17	.17	141.	95.	88.	2.0	250.	59.
G-06	369.0	1628	698.200	.650	.11	.11	140.	98.	90.	2.0	250.	60.
G-07	378.0	1637	700.300	.700	.12	.12	135.	99.	90.	2.0	250.	60.
C-01	387.0	1654	703.600	1.500	.27	.27	134.	95.	91.	2.0	250.	60.
C-02	396.0	1703	706.800	1.600	.28	.28	144.	96.	92.	2.0	250.	60.
C-03	405.0	1712	709.625	1.100	.20	.20	135.	97.	92.	2.0	250.	61.
C-04	414.0	1721	712.550	1.200	.22	.22	130.	98.	92.	2.0	250.	61.
C-05	423.0	1730	715.600	1.300	.24	.24	129.	98.	92.	2.0	250.	61.
C-06	432.0	1739	718.500	1.100	.20	.20	128.	98.	92.	2.0	250.	62.
C-07	441.0	1748	721.170	1.100	.20	.20	128.	98.	92.	2.0	250.	62.
TOTALS	441.0		159.490									
AVERAGE					.28	.28	122.	85.	79.	2.0	250.	55.

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT- NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH CO READING, PA — R ANTESBERGER

TEST C1P-3 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/30/81	04/30/81
TB	TIME-START	935	935
TF	TIME-FINISH	1748	1748
TT	NET TIME OF TEST, MIN.	441.0	441.0
NP	NET SAMPLING POINTS	49	49
Y	METER CALIBRATION FACTOR	.973	.973
DN	SAMPLING NOZZLE DIAMETER	.128 IN	3.3 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.28 IN-H2O	7.0 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	159.490 CU-FT	4.516 CU-M
TM	AVERAGE GAS METER TEMP	82.2 F	27.9 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	150.107 SCF	4.251 SCM
VLC	TOTAL H2O COLLECTED IN IMPINGERS AND SILICA GEL,ML.	28.0	28.0
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	1.318 SCF	.037 SCM
BWO	PERCENT MOISTURE BY VOLUME	.87	.87
FMD	MOLE FRACTION DRY GAS	.991	.991
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY.	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.78	28.78

PB	BAROMETRIC PRESSURE	29.70	IN-HG	754.38	MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30	IN-H2O	-33.02	MM-H2O
PS	STACK PRES, ABS.	29.60	IN-HG	751.95	MM-HG
TS	AVERAGE STACK TEMP	122.	F	50.	C
VS	AVG STACK GAS VELOCITY	70.5	FPS	21.5	MPS
AS	STACK AREA	10816.	SQ-IN	6.978	SQ-M
QSSTD	STACK FLOW RATE, DRY*	16943076.	SCFH	479777.	SCMH
QS	ACTUAL STACK FLOW RATE	19055452.	ACFH	539593.	ACMH
ISO	PERCENT ISOKINETIC	101.3		101.3	
MN	PARTICULATE MG. EPA 5	896.2		896.2	
CS	PARTICULATE	.0921	GR/DSCF*	210.862	MG/DSCM
PMR	PARTICULATE EMISSION RATE	223.009	LB/HR	101.16	KG/HR

* 68 DEG F, 29.92 IN.HG.

EXAMPLE PARTICULATE CALCULATIONS TEST NO. C1P-3

SITE #1 INLET

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

VMSTD = (17.647 * VM * Y * (PB + PM / 13.6)) / (TM + 460.)

$$VMSTD = \frac{17.647 * 159.490 * .973 * (29.70 + .277 / 13.6)}{(82. + 460.)} = 150.107 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

VWC = .04707 * VLC

VWC = .04707 * 28. = 1.32 SCF

PERCENT MOISTURE IN STACK GAS

BWO = (100. * VWC) / (VMSTD + VWC)

$$BWO = \frac{100. * 1.32}{150.107 + 1.32} = .87 \text{ PERCENT}$$

MOLE FRACTION OF DRY STACK GAS

FMD = (100. - BWO) / 100.

$$FMD = \frac{100. - .9}{100.} = .991$$

AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

MD = (PCO2 * .44) + (PO2 * .32) + (PN2 + PCO) * .28

MD = (.60*44/100) + (19.4*32/100) + ((80.0+ .0) * 28/100 = 28.87

MOLECULAR WEIGHT OF STACK GAS

MWS = MD * (1. - (BWO/100)) + 18. * (BWO/100)

MWS = 28.87* (1. -(.87/100)) + 18. * (.87/100) = 28.78

STACK GAS VELOCITY AT STACK CONDITIONS

DELP = SUM. OF THE SQRT(VH * (TS + 460.))

VS = 85.49 * CP * DELP / (SQRT(MWS * PS) * PNTS)

VS = 85.49 * .83 * 1420.427 / (SQRT(28.78 * 29.60) * 49. = 70.47 FPS

STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

QS = VS * AS * 3600/144

QS = 70.47 * 10816. 3600/144 = 19055452. ACFH

STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS

QSSTD = 17.647 * QS * PS * (1. - (BWO/100)) / (TS + 460.)

```
          17.647 *   19055452. *  29.60 * (1. - (  .87/100))
QSSTD = ------------------------------------------------------ =  16943076. SCFH
                     ( 122. + 460.)
```

PERCENT ISOKINETIC

ISO = (305.58*(TS+460.))*((0.002669*VLC)*(VM*Y*(PB+(PM/13.6))/(TM+460.)))/(TT*VS*PS*DN*DN)

```
        (305.58*( 122.+460.))*((0.002669*   28.)+(  159.490* .973*( 29.70+(    .277/13.6))/(  82.+460.)))
ISO = ------------------------------------------------------------------------------------------------------ = 101.32 PERCENT
                                  441. *     70.47 *   29.60 *  .128 *  .128
```

PARTICULATE LOADING -- EPA METHOD 5 (AT STANDARD CONDITIONS)

CS = 0.001 * MN * 15.43 / VMSTD

CS = 0.001 * 896.2 * 15.43 / 150.107 = .092 GR/DSCF

PARTICULATE LBS/HR -- EPA METHOD 5

PMR = CS * QSSTD / (15.43 * 453.6)

PMR = .092 * 16943076. / (15.43 * 453.6) = 223.01

FIELD DATA

PLANT	CARTECH CORP READING, PA	DATE	04/28/81
SAMPLING LOCATION	#2A0D BAGHOUSE OUTLET	RUN NUMBER	C2P-1
SAMPLE TYPE	PARTICULATE	PROBE LENGTH & TYPE	6 FT GLASS
OPERATOR	R CAMPBELL P REINERMA	NOZZLE 6 : I.D.	.375
AMBIENT TEMP.(DEG.F)	70.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.77	SAMPLE BOX NUMBER	113
STATIC PRESS.(IN.H2O)	.10	METER BOX NUMBER	FB4
FILTER NUMBER(S)	0002089	METER HEAD DIFF.	1.79
STACK INSIDE DIM.(IN)	147.58 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	250.
THERM. NO.	164	HEATER BOX SETTING	250.
LEAKAGE	.000 CFM @ 10.0 IN.HG		
METER CALIB. FACTOR	1.050	K FACTOR	11220.8
READ & RECORD DATA EVERY	2.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	925	736.737									
1B01	2.0	0	738.081	.080	1.58	1.58	108.	75.	70.	2.0	250.	67.
1B02	4.0	0	739.525	.090	1.76	1.76	114.	75.	70.	2.0	250.	67.
1B03	6.0	0	740.875	.070	1.34	1.34	126.	75.	70.	2.0	250.	64.
1B04	8.0	0	742.220	.090	1.71	1.71	130.	76.	70.	2.0	250.	64.
1B05	10.0	0	743.590	.100	1.88	1.88	135.	76.	70.	2.0	250.	64.
1B06	12.0	0	745.060	.110	2.06	2.06	139.	78.	70.	2.5	250.	62.
1B07	14.0	0	746.530	.120	2.24	2.24	142.	79.	70.	3.0	250.	60.
1B08	16.0	0	748.040	.130	2.41	2.41	144.	80.	70.	3.0	250.	58.
1B09	18.0	0	749.550	.130	2.41	2.41	145.	82.	70.	3.0	250.	58.
1B10	20.0	0	751.160	.110	2.06	2.06	140.	83.	72.	3.0	250.	58.
1B11	22.0	0	753.060	.190	3.57	3.57	137.	83.	72.	3.0	250.	58.
1B12	24.0	0	755.150	.210	3.95	3.95	136.	84.	72.	4.0	250.	58.
1B13	26.0	0	757.170	.180	3.39	3.39	135.	86.	74.	4.0	255.	60.
1B14	28.0	0	759.130	.180	3.40	3.40	133.	86.	74.	4.0	230.	55.
1B15	30.0	0	761.150	.190	3.61	3.61	130.	87.	74.	4.0	235.	53.
1B16	32.0	0	763.110	.160	3.05	3.05	128.	87.	75.	4.0	245.	50.
1B17	34.0	0	764.610	.080	1.52	1.52	129.	88.	75.	4.0	250.	50.
1B18	36.0	0	766.185	.120	2.29	2.29	127.	88.	76.	2.5	250.	50.
1B19	38.0	0	767.820	.110	2.11	2.11	125.	88.	76.	2.5	255.	52.
1B20	40.0	0	769.430	.090	1.73	1.73	124.	88.	76.	2.5	255.	52.
1B21	42.0	0	770.940	.080	1.54	1.54	123.	88.	76.	2.5	255.	54.
1B22	44.0	0	772.310	.090	1.73	1.73	122.	88.	76.	2.0	255.	54.
1B23	46.0	0	773.815	.100	1.93	1.93	121.	89.	77.	2.0	255.	54.
1B24	48.0	1013	775.422	.120	2.32	2.32	121.	89.	77.	2.0	255.	54.
1A01	50.0	0	776.310	.040	.77	.77	120.	88.	79.	1.0	250.	54.
1A02	52.0	0	777.480	.060	1.16	1.16	118.	89.	79.	1.0	250.	56.
1A03	54.0	0	778.780	.080	1.55	1.55	119.	89.	79.	1.5	255.	56.
1A04	56.0	0	780.380	.090	1.74	1.74	120.	90.	80.	1.5	250.	56.
1A05	58.0	0	781.650	.100	1.93	1.93	122.	90.	80.	1.5	250.	56.
1A06	60.0	0	783.110	.090	1.73	1.73	122.	90.	80.	2.0	250.	58.

PLANT CARTECH CORP READING, PA DATE 04/28/81
SAMPLING LOCATION #2AOD BAGHOUSE OUTLET RUN NUMBER C2P-1

READ & RECORD DATA EVERY 2.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
1A07	62.0	0	784.620	.100	1.93	1.93	121.	92.	80.	2.0	255.	60.
1A08	64.0	0	786.390	.130	2.51	2.51	120.	92.	80.	3.0	260.	60.
1A09	66.0	0	788.085	.130	2.51	2.51	120.	94.	81.	3.0	265.	60.
1A10	68.0	0	789.850	.140	2.71	2.71	119.	94.	81.	3.0	260.	60.
1A11	70.0	0	791.580	.140	2.71	2.71	119.	97.	84.	3.5	260.	60.
1A12	72.0	0	793.515	.170	3.29	3.29	119.	97.	83.	4.0	250.	62.
1A13	74.0	0	795.565	.190	3.68	3.68	119.	97.	83.	4.0	250.	62.
1A14	76.0	0	797.550	.180	3.49	3.49	119.	98.	84.	4.5	250.	62.
1A15	78.0	0	799.570	.180	3.49	3.49	119.	99.	84.	4.5	255.	62.
1A16	80.0	0	801.325	.120	2.32	2.32	120.	100.	85.	3.5	255.	64.
1A17	82.0	0	802.880	.090	1.74	1.74	120.	101.	85.	3.0	255.	66.
1A18	84.0	0	804.415	.110	2.13	2.13	120.	101.	86.	2.0	250.	60.
1A19	86.0	0	806.080	.120	2.32	2.32	120.	102.	87.	2.5	250.	60.
1A20	88.0	0	807.750	.120	2.31	2.31	122.	102.	88.	2.5	250.	60.
1A21	90.0	0	809.360	.110	2.10	2.10	127.	103.	88.	2.5	255.	58.
1A22	92.0	0	811.020	.110	2.08	2.08	132.	103.	89.	2.0	255.	58.
1A23	94.0	0	812.570	.080	1.50	1.50	137.	103.	89.	1.0	255.	56.
1A24	96.0	1106	813.757	.080	1.50	1.50	137.	103.	89.	1.0	255.	56.
2B01	98.0	1112	814.885	.060	1.14	1.14	131.	103.	93.	.0	250.	66.
2B02	100.0	1114	816.080	.060	1.13	1.13	138.	104.	93.	.0	250.	66.
2B03	102.0	1116	817.297	.060	1.12	1.12	139.	105.	93.	.5	260.	64.
2B04	104.0	1118	818.550	.070	1.31	1.31	139.	106.	94.	.5	240.	64.
2B05	106.0	1120	819.873	.080	1.51	1.51	136.	107.	95.	.5	260.	64.
2B06	108.0	1122	821.280	.090	1.70	1.70	135.	108.	95.	.5	260.	62.
2B07	110.0	1124	822.892	.120	2.27	2.27	133.	109.	96.	1.5	270.	62.
2B08	112.0	1126	824.545	.120	2.27	2.27	133.	110.	96.	1.5	275.	60.
2B09	114.0	1128	826.389	.160	3.03	3.03	132.	110.	96.	3.5	270.	60.
2B10	116.0	1130	828.026	.110	2.09	2.09	131.	111.	98.	1.0	260.	62.
2B11	118.0	1132	829.638	.110	2.09	2.09	130.	111.	99.	1.0	250.	62.
2B12	120.0	1134	831.405	.150	2.86	2.86	129.	112.	100.	3.5	245.	62.
2B13	122.0	1136	833.465	.200	3.81	3.81	129.	112.	100.	5.0	250.	64.
2B14	124.0	1138	835.420	.160	3.05	3.05	129.	112.	100.	4.0	250.	64.
2B15	126.0	1140	837.131	.120	2.29	2.29	129.	112.	100.	2.5	260.	64.
2B16	128.0	1142	838.918	.140	2.67	2.67	128.	112.	100.	3.0	255.	64.
2B17	130.0	1144	840.599	.120	2.29	2.29	128.	112.	100.	2.5	265.	62.
2B18	132.0	1146	842.236	.110	2.10	2.10	128.	112.	100.	2.0	270.	62.
2B19	134.0	1148	843.774	.100	1.91	1.91	128.	112.	100.	2.0	255.	62.
2B20	136.0	1150	845.494	.130	2.48	2.48	128.	112.	102.	2.5	240.	63.
2B21	138.0	1152	847.030	.090	1.72	1.72	128.	112.	103.	1.5	250.	63.
2B22	140.0	1154	848.547	.100	1.91	1.91	127.	112.	103.	1.5	260.	64.
2B23	142.0	1156	849.999	.100	1.91	1.91	126.	112.	103.	2.0	260.	64.
2B24	144.0	1158	851.678	.120	2.30	2.30	126.	112.	103.	2.5	260.	66.
2A01	146.0	1204	852.750	.050	.96	.96	122.	112.	103.	.0	250.	66.
2A02	148.0	1206	853.939	.060	1.15	1.15	123.	112.	103.	.0	260.	66.
2A03	150.0	1208	855.222	.070	1.34	1.34	127.	112.	103.	.0	260.	66.
2A04	152.0	1210	856.609	.080	1.53	1.53	128.	113.	104.	.5	260.	66.
2A05	154.0	1212	858.029	.090	1.72	1.72	128.	113.	104.	1.0	250.	64.

2A06	156.0	1214	859.486	.090	1.72	1.72	128.	114.	104.	1.0	250.	63.
2A07	158.0	1216	861.190	.130	2.48	2.48	128.	114.	104.	3.0	270.	64.
2A08	160.0	1218	862.933	.130	2.48	2.48	129.	115.	104.	3.0	260.	64.
2A09	162.0	1220	864.626	.130	2.48	2.48	128.	115.	104.	3.0	270.	64.
2A10	164.0	1222	866.489	.150	2.86	2.86	128.	115.	104.	3.0	250.	66.
2A11	166.0	1224	868.309	.140	2.67	2.67	128.	116.	105.	3.0	260.	66.
2A12	168.0	1226	870.293	.190	3.62	3.62	128.	116.	105.	4.5	260.	64.
2A13	170.0	1228	872.180	.140	2.67	2.67	128.	116.	105.	3.0	250.	60.
2A14	172.0	1230	874.060	.160	3.06	3.06	127.	114.	105.	3.5	260.	60.
2A15	174.0	1232	876.111	.180	3.45	3.45	126.	114.	105.	4.0	260.	58.
2A16	176.0	1234	878.000	.140	2.68	2.68	127.	114.	105.	3.0	240.	56.
2A17	178.0	1236	879.181	.040	.77	.77	125.	111.	102.	.0	250.	56.
2A18	180.0	1238	880.370	.060	1.15	1.15	125.	110.	101.	.0	255.	56.
2A19	182.0	1240	881.834	.100	1.92	1.92	125.	108.	100.	2.0	260.	56.
2A20	184.0	1242	883.266	.080	1.53	1.53	126.	107.	100.	1.5	260.	58.
2A21	186.0	1244	884.748	.100	1.91	1.91	126.	106.	100.	2.0	270.	58.
2A22	188.0	1246	886.278	.100	1.92	1.92	125.	106.	100.	2.0	260.	60.
2A23	190.0	1248	887.750	.090	1.73	1.73	125.	105.	99.	2.0	250.	60.
2A24	192.0	1250	889.453	.130	2.48	2.48	129.	105.	98.	3.0	255.	60.
3B01	194.0	0	890.620	.060	1.11	1.11	145.	103.	97.	1.5	250.	58.
3B02	196.0	0	891.820	.060	1.10	1.10	150.	103.	97.	1.5	255.	58.
3B03	198.0	0	893.110	.080	1.46	1.46	155.	102.	96.	1.5	260.	60.
3B04	200.0	0	894.620	.110	2.01	2.01	155.	101.	95.	2.0	260.	60.
3B05	202.0	0	896.020	.080	1.47	1.47	151.	101.	95.	2.0	260.	60.
3B06	204.0	0	897.510	.110	2.01	2.01	154.	100.	95.	2.0	260.	60.
3B07	206.0	0	899.110	.110	2.02	2.02	151.	100.	94.	2.0	255.	58.
3B09	210.0	0	902.415	.140	2.59	2.59	147.	100.	93.	3.0	255.	58.
3B10	212.0	0	904.140	.130	2.41	2.41	144.	100.	93.	3.0	255.	58.
3B11	214.0	0	905.940	.150	2.79	2.79	143.	99.	92.	3.0	255.	58.
3B08	208.0	0	906.690	.120	2.22	2.22	145.	100.	93.	2.5	255.	58.
3B12	216.0	0	908.010	.200	3.74	3.74	140.	98.	91.	3.2	255.	58.
3B13	218.0	0	910.040	.170	3.21	3.21	134.	98.	90.	4.5	255.	58.
3B14	220.0	0	911.930	.160	3.02	3.02	134.	97.	90.	4.0	255.	58.
3B15	222.0	0	913.770	.150	2.83	2.83	134.	97.	90.	4.0	255.	58.
3B16	224.0	0	915.630	.160	3.03	3.03	133.	97.	90.	3.5	250.	60.
3B17	226.0	0	917.450	.140	2.65	2.65	133.	96.	89.	3.5	250.	60.
3B18	228.0	0	919.280	.150	2.85	2.85	130.	96.	89.	3.5	245.	60.
3B19	23.0	0	921.120	.140	2.67	2.67	128.	95.	88.	3.0	250.	60.
3B20	232.0	0	922.850	.130	2.48	2.48	128.	95.	88.	2.5	255.	60.
3B21	234.0	0	924.550	.120	2.29	2.29	127.	94.	88.	2.5	255.	60.
3B22	236.0	0	926.210	.120	2.29	2.29	127.	93.	87.	2.5	255.	60.
3B23	238.0	0	927.810	.110	2.10	2.10	127.	93.	85.	2.5	255.	60.
3B24	240.0	1343	929.371	.090	1.72	1.72	127.	93.	85.	2.5	255.	60.
3A01	242.0	0	930.580	.070	1.36	1.36	119.	91.	85.	1.0	250.	62.
3A02	244.0	0	931.831	.090	1.73	1.73	124.	91.	85.	1.0	250.	62.
3A03	246.0	0	933.230	.090	1.73	1.73	124.	91.	85.	1.5	250.	62.
3A04	248.0	0	934.620	.080	1.53	1.53	126.	90.	84.	1.5	250.	60.
3A05	250.0	0	936.030	.100	1.92	1.92	125.	90.	83.	1.5	250.	60.
3A06	252.0	0	937.510	.100	1.92	1.92	125.	90.	83.	2.0	250.	60.
3A07	254.0	0	939.010	.120	2.30	2.30	125.	90.	83.	2.0	250.	60.
3A08	256.0	0	940.485	.120	2.28	2.28	130.	90.	83.	2.5	250.	60.
3A09	258.0	0	942.180	.140	2.68	2.68	127.	91.	83.	3.0	250.	60.
3A10	260.0	0	944.000	.150	2.88	2.88	124.	92.	84.	3.0	250.	58.
3A11	262.0	0	945.830	.150	2.88	2.88	124.	94.	84.	3.0	250.	58.
3A12	264.0	0	947.610	.110	2.12	2.12	123.	95.	85.	3.5	250.	58.
3A13	266.0	0	949.650	.180	3.46	3.46	123.	96.	85.	4.0	250.	58.
3A14	268.0	0	951.620	.170	3.27	3.27	122.	96.	85.	4.0	255.	58.
3A15	270.0	0	953.410	.140	2.69	2.69	123.	97.	86.	3.5	250.	60.
3A16	272.0	0	954.760	.060	1.15	1.15	124.	97.	86.	1.5	250.	64.
3A17	274.0	0	956.180	.100	1.90	1.90	129.	98.	87.	2.0	250.	64.

3A18	276.0	0	957.510	.070	1.32	1.32	135.	98.	87.	1.0	250.	60.
3A19	278.0	0	958.870	.080	1.50	1.50	138.	98.	87.	1.0	250.	60.
3A20	280.0	0	960.150	.070	1.31	1.31	140.	98.	87.	1.0	250.	60.
3A21	282.0	0	961.415	.090	1.67	1.67	143.	98.	87.	1.0	250.	60.
3A22	284.0	0	962.770	.090	1.68	1.68	139.	98.	87.	1.0	250.	60.
3A23	286.0	0	964.210	.090	1.68	1.68	139.	99.	88.	1.5	250.	62.
3A24	288.0	0	965.545	.080	1.49	1.49	143.	100.	88.	1.5	250.	64.
4B01	290.0	1447	966.485	.040	.76	.76	131.	100.	90.	.0	270.	68.
4B02	292.0	1449	967.670	.060	1.14	1.14	131.	102.	90.	.0	260.	66.
4B03	294.0	1451	968.935	.070	1.33	1.33	132.	100.	90.	.0	240.	55.
4B04	296.0	1453	970.430	.110	2.08	2.08	133.	100.	90.	2.0	250.	55.
4B05	298.0	1455	971.875	.100	1.90	1.90	131.	100.	90.	2.0	250.	55.
4B06	300.0	1457	973.422	.110	2.09	2.09	129.	100.	90.	2.0	250.	55.
4B07	302.0	1459	975.000	.110	2.09	2.09	128.	100.	90.	2.0	250.	54.
4B08	304.0	1501	976.593	.120	2.29	2.29	127.	100.	90.	2.0	250.	52.
4B09	306.0	1503	978.495	.150	2.86	2.86	128.	98.	87.	3.0	260.	52.
4B10	308.0	1505	979.985	.100	1.91	1.91	127.	96.	88.	2.0	250.	52.
4B11	310.0	1507	981.681	.130	2.48	2.48	127.	96.	88.	3.0	250.	52.
4B12	312.0	1509	983.695	.190	3.63	3.63	127.	96.	88.	4.5	255.	52.
4B13	314.0	1511	985.721	.180	3.45	3.45	125.	96.	88.	4.0	250.	52.
4B14	316.0	1513	987.765	.190	3.65	3.65	124.	96.	88.	5.0	260.	55.
4B15	318.0	1515	989.806	.180	3.46	3.46	124.	96.	88.	4.0	255.	55.
4B16	320.0	1517	991.686	.150	2.88	2.88	124.	98.	89.	3.0	255.	55.
4B17	322.0	1519	993.568	.160	3.07	3.07	125.	98.	90.	4.0	255.	56.
4B18	324.0	1521	995.385	.140	2.69	2.69	124.	100.	90.	3.0	255.	56.
4B19	326.0	1523	997.290	.140	2.69	2.69	124.	100.	90.	3.0	260.	58.
4B20	328.0	1525	998.925	.130	2.49	2.49	126.	101.	90.	3.0	270.	60.
4B21	330.0	1527	.600	.120	2.30	2.30	126.	101.	90.	3.5	260.	60.
4B22	332.0	1529	2.210	.110	2.11	2.11	125.	101.	90.	3.0	250.	60.
4B23	334.0	1531	3.922	.130	2.50	2.50	124.	101.	90.	3.0	255.	62.
4B24	336.0	1533	5.240	.070	1.34	1.34	124.	101.	90.	.0	255.	62.
4A01	338.0	1539	6.485	.070	1.35	1.35	123.	100.	90.	.0	250.	64.
4A02	340.0	1541	7.690	.060	1.15	1.15	125.	100.	90.	.0	250.	60.
4A03	342.0	1543	8.966	.070	1.34	1.34	126.	100.	90.	.0	260.	58.
4A04	344.0	1545	10.207	.060	1.15	1.15	126.	101.	90.	.0	260.	58.
4A05	346.0	1547	11.672	.100	1.91	1.91	126.	101.	90.	2.0	260.	58.
4A06	348.0	1549	13.178	.100	1.91	1.91	126.	101.	90.	2.0	250.	58.
4A07	350.0	1551	14.950	.140	2.68	2.68	126.	100.	90.	3.0	255.	58.
4A08	352.0	1553	16.766	.160	3.06	3.06	127.	100.	90.	4.0	255.	56.
4A09	354.0	0	18.672	.160	3.06	3.06	127.	100.	90.	4.0	260.	64.
4A10	356.0	0	20.240	.100	1.91	1.91	127.	100.	91.	2.0	260.	62.
4A11	358.0	0	22.300	.180	3.44	3.44	127.	101.	91.	4.0	260.	60.
4A12	360.0	0	24.325	.200	3.81	3.81	129.	101.	91.	5.0	260.	60.
4A13	362.0	0	26.440	.200	3.81	3.81	129.	101.	91.	5.0	250.	60.
4A14	364.0	0	28.499	.190	3.62	3.62	129.	101.	91.	5.0	250.	60.
4A15	366.0	0	30.000	.090	1.71	1.71	129.	101.	91.	2.0	255.	58.
4A16	368.0	0	31.840	.160	3.04	3.04	131.	101.	91.	3.5	255.	58.
4A17	370.0	0	33.400	.090	1.69	1.69	137.	101.	91.	1.5	270.	58.
4A18	372.0	0	34.538	.050	.93	.93	144.	101.	92.	.0	260.	60.
4A19	374.0	0	35.805	.070	1.28	1.28	151.	101.	92.	.0	260.	62.
4A20	376.0	0	37.280	.100	1.80	1.80	163.	102.	92.	1.5	250.	62.
4A21	378.0	0	38.600	.080	1.45	1.45	161.	102.	92.	1.0	240.	62.
4A22	380.0	0	39.992	.090	1.62	1.62	162.	102.	92.	1.0	245.	62.
4A23	382.0	1623	41.450	.060	1.13	1.13	136.	102.	92.	1.0	255.	62.
4A24	384.0	1625	42.672	.060	1.13	1.13	135.	102.	92.	1.0	260.	64.
5B01	386.0	0	43.720	.030	.58	.58	123.	92.	87.	1.0	250.	58.
5B02	388.0	0	44.725	.050	.95	.95	127.	92.	87.	1.5	250.	58.
5B03	390.0	0	45.760	.050	.95	.95	130.	92.	87.	1.5	255.	60.
5B04	392.0	0	47.025	.070	1.33	1.33	132.	92.	87.	1.5	255.	60.
5B05	394.0	0	48.330	.080	1.52	1.52	132.	93.	87.	2.0	260.	60.

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5B06	396.0	0	49.915	.120	2.27	2.27	133.	94.	87.	2.5	255.	60.
5B07	398.0	0	51.380	.090	1.71	1.71	130.	94.	88.	1.5	255.	58.
5B08	400.0	0	52.860	.100	1.90	1.90	131.	94.	88.	2.0	255.	58.
5B09	402.0	0	54.510	.130	2.47	2.47	131.	94.	87.	2.5	255.	58.
5B10	404.0	0	56.270	.140	2.66	2.66	131.	94.	86.	3.0	255.	60.
5B11	406.0	0	58.090	.150	2.85	2.85	131.	94.	86.	3.5	250.	60.
5B12	408.0	0	59.940	.120	2.28	2.28	131.	94.	86.	3.5	255.	62.
5B13	410.0	0	61.920	.180	3.42	3.42	130.	94.	87.	4.0	250.	62.
5B14	412.0	0	63.515	.100	1.90	1.90	130.	95.	86.	2.0	250.	62.
5B15	414.0	0	65.170	.140	2.66	2.66	131.	94.	86.	3.0	255.	60.
5B16	416.0	0	67.025	.160	3.04	3.04	130.	95.	87.	3.5	250.	60.
5B17	418.0	0	68.810	.130	2.47	2.47	131.	95.	87.	3.0	250.	60.
5B18	420.0	0	70.410	.110	2.09	2.09	130.	95.	87.	2.0	255.	62.
5B19	422.0	0	71.980	.110	2.09	2.09	129.	95.	87.	2.0	255.	62.
5B20	424.0	0	73.560	.110	2.09	2.09	130.	95.	87.	2.0	255.	62.
5B21	426.0	0	75.099	.100	1.90	1.90	129.	95.	87.	2.0	255.	62.
5B22	428.0	0	76.540	.090	1.71	1.71	130.	95.	87.	1.5	260.	60.
5B23	430.0	0	78.030	.100	1.89	1.89	133.	95.	87.	2.0	255.	60.
5B24	432.0	1803	79.455	.080	1.50	1.50	138.	95.	87.	2.0	255.	58.
5A01	434.0	0	80.650	.070	1.30	1.30	142.	94.	87.	1.0	250.	60.
5A02	436.0	0	81.910	.070	1.28	1.28	151.	94.	86.	1.0	250.	60.
5A03	438.0	0	83.120	.060	1.09	1.09	154.	93.	86.	1.0	250.	66.
5A04	440.0	0	84.520	.100	1.84	1.84	147.	93.	86.	1.0	250.	60.
5A05	442.0	0	85.980	.100	1.84	1.84	149.	93.	85.	1.5	255.	62.
5A06	444.0	0	87.580	.130	2.40	2.40	148.	93.	85.	1.5	250.	62.
5A07	446.0	0	88.970	.070	1.30	1.30	143.	93.	85.	1.0	250.	62.
5A08	448.0	0	90.880	.190	3.55	3.55	140.	93.	85.	4.0	250.	60.
5A09	450.0	0	92.740	.140	2.63	2.63	137.	93.	85.	3.0	250.	60.
5A10	452.0	0	94.520	.160	3.01	3.01	135.	93.	85.	3.5	250.	62.
5A11	454.0	0	96.535	.190	3.59	3.59	133.	94.	85.	4.0	255.	63.
5A12	456.0	0	98.630	.200	3.79	3.79	131.	94.	85.	5.0	255.	64.
5A13	458.0	0	100.745	.200	3.80	3.80	130.	94.	85.	5.0	255.	64.
5A14	460.0	0	102.150	.110	2.09	2.09	131.	95.	85.	2.5	255.	66.
5A15	462.0	0	103.910	.090	1.71	1.71	130.	95.	85.	1.5	250.	64.
5A16	464.0	0	105.320	.110	2.09	2.09	130.	95.	85.	1.5	250.	64.
5A17	466.0	0	106.805	.100	1.90	1.90	130.	95.	85.	1.5	250.	64.
5A18	468.0	0	108.295	.100	1.90	1.90	130.	94.	85.	1.5	250.	62.
5A19	470.0	0	109.825	.110	2.09	2.09	129.	94.	85.	2.0	250.	62.
5A20	472.0	0	111.245	.080	1.52	1.52	129.	94.	84.	1.0	250.	62.
5A21	474.0	0	112.420	.060	1.15	1.15	127.	94.	84.	1.0	250.	62.
5A22	476.0	0	113.610	.070	1.34	1.34	125.	94.	84.	1.0	250.	62.
5A23	478.0	0	114.880	.070	1.33	1.33	128.	94.	94.	1.0	250.	62.
5A24	480.0	1855	115.921	.050	.95	.95	128.	94.	94.	1.0	250.	62.
TOTALS	480.0		379.185									
AVERAGE					2.16	2.16	130.	98.	89.	2.3	254.	60.

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT- NAME AND ADDRESS — TEST TEAM LEADER

CARTECH CORP READING, PA — R CAMPBELL P REINERMA

TEST C2P-1 #2AOD BAGHOUSE OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/28/81	04/28/81
TB	TIME-START	925	925
TF	TIME-FINISH	1855	1855
TT	NET TIME OF TEST, MIN.	480.0	480.0
NP	NET SAMPLING POINTS	240	240
Y	METER CALIBRATION FACTOR	1.050	1.050
DN	SAMPLING NOZZLE DIAMETER	.375 IN	9.5 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	2.16 IN-H2O	55.0 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	379.185 CU-FT	10.737 CU-M
TM	AVERAGE GAS METER TEMP	93.4 F	34.1 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	379.953 SCF	10.759 SCM
VLC	TOTAL H2O COLLECTED IN IMPINGERS AND SILICA GEL,ML.	22.0	22.0
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	1.036 SCF	.029 SCM
BWO	PERCENT MOISTURE BY VOLUME	.27	.27
FMD	MOLE FRACTION DRY GAS	.997	.997
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.84	28.84

PB	BAROMETRIC PRESSURE	29.77	IN-HG	756.16	MM-HG
PSI	STATIC PRES OF STACK GAS	.10	IN-H2O	2.54	MM-H2O
PS	STACK PRES, ABS.	29.78	IN-HG	756.34	MM-HG
TS	AVERAGE STACK TEMP	130.	F	55.	C
VS	AVG STACK GAS VELOCITY	19.8	FPS	6.0	MPS
AS	STACK AREA	17105.	SQ-IN	11.035	SQ-M
QSSTD	STACK FLOW RATE, DRY*	7506190.	SCFH	212553.	SCMH
QS	ACTUAL STACK FLOW RATE	8457820.	ACFH	239500.	ACMH
ISO	PERCENT ISOKINETIC	98.0		98.0	
MN	ORGANIC MG. EPA 5	.0		.0	
CS	ORGANIC	.0000	GR/DSCF*	.000	MG/DSCM
PMR	ORGANIC EMISSION RATE	.000	LB/HR	.00	KG/HR
MN	INORGANIC MG. EPA 5	4.0		4.0	
CS	INORGANIC	.0002	GR/DSCF*	.372	MG/DSCM
PMR	INORGANIC EMISSION RATE	.174	LB/HR	.08	KG/HR
MN	PARTICULATE MG. EPA 5	8.9		8.9	
CS	PARTICULATE	.0004	GR/DSCF*	.827	MG/DSCM
PMR	PARTICULATE EMISSION RATE	.38A	LB/HR	.18	KG/HR

* 68 DEG F, 29.92 IN.HG.

EXAMPLE PARTICULATE CALCULATIONS TEST NO. C2P-1

#2AOD BAGHOUSE OUTLET

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

VMSTD = (17.647 * VM * Y * (PB + PM / 13.6)) / (TM + 460.)

$$VMSTD = \frac{17.647 * 379.185 * 1.050 * (29.77 + 2.164 / 13.6)}{(93. + 460.)} = 379.953 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

VWC = .04707 * VLC

VWC = .04707 * 22. = 1.04 SCF

PERCENT MOISTURE IN STACK GAS

BWO = (100. * VWC) / (VMSTD + VWC)

$$BWO = \frac{100. * 1.04}{379.953 + 1.04} = .27 \text{ PERCENT}$$

MOLE FRACTION OF DRY STACK GAS

FMD = (100. - BWO) / 100.

$$FMD = \frac{100. - .3}{100.} = .997$$

AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

MD = (PCO2 * .44) + (PO2 * .32) + (PN2 + PCO) * .28

MD = (.60*44/100) + (19.4*32/100) + ((80.0+ .0) * 28/100 = 28.87

MOLECULAR WEIGHT OF STACK GAS

MWS = MD * (1. - (BWO/100)) + 18. * (BWO/100)

MWS = 28.87* (1. -(.27/100)) + 18. * (.27/100) = 28.84

STACK GAS VELOCITY AT STACK CONDITIONS

DELP = SUM. OF THE SQRT(VH * (TS + 460.))

VS = 85.49 * CP * DELP / (SQRT(MWS * PS) * PNTS)

VS = 85.49 * .84 * 1937.194 / (SQRT(28.84 * 29.78) * 240. = 19.78 FPS

STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

QS = VS * AS * 3600/144

QS = 19.78 * 17105. 3600/144 = 8457820. ACFH

STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS

QSSTD = 17.647 * QS * PS * (1. - (BWO/100)) / (TS + 460.)

```
          17.647 *    8457820. *  29.78 * (1. - (  .27/100))
QSSTD = ------------------------------------------------- =    7506190. SCFH
                    ( 130. + 460.)
```

PERCENT ISOKINETIC

ISO = (305.58*(TS+460.))*((0.002669*VLC)+(VM*Y*(PB+(PM/13.6))/(TM+460.)))/(TT*VS*PS*DN*DN)

```
        (305.58*( 130.+460.))*((0.002669*   22.)+(  379.185*1.050*( 29.77+(   2.164/13.6))/(  93.+460.)))
ISO = ------------------------------------------------------------------------------------------------ =  97.99 PERCENT
                                    480. *     19.78 *   29.78 *  .375 *  .375
```

PARTICULATE LOADING -- EPA METHOD 5 (AT STANDARD CONDITIONS)

CS = 0.001 * MN * 15.43 / VMSTD

CS = 0.001 * .0 * 15.43 / 379.953 = .000 GR/DSCF

PARTICULATE LBS/HR -- EPA METHOD 5

PMR = CS * QSSTD / (15.43 * 453.6)

PMR = .000 * 7506190. / (15.43 * 453.6) = .00

FIELD DATA

PLANT	CARPENTER TECH READING, PA	DATE	04/29/81
SAMPLING LOCATION	SITE #2 OUTLET 1,2,3,4,5	RUN NUMBER	C2P-2
SAMPLE TYPE	PART M5	PROBE LENGTH & TYPE	6 FT GLASS
OPERATOR	P REINERMANN/CAMPBELL	NOZZLE : I.D.	.375
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.60	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	.10	METER BOX NUMBER	F84
FILTER NUMBER(S)	0001998	METER HEAD DIFF.	1.79
STACK INSIDE DIM.(IN)	147.58 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	250.
THERM. NO.		HEATER BOX SETTING	250.
LEAKAGE	.020 CFM @ 10.0 IN.HG		
METER CALIB. FACTOR	1.050	K FACTOR	11224.6
READ & RECORD DATA EVERY	2.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	918	116.313									
5A01	2.0	921	117.729	.090	1.77	1.77	112.	85.	81.	2.0	250.	66.
5A02	4.0	923	119.263	.110	2.16	2.16	112.	83.	80.	2.5	250.	64.
5A03	6.0	925	120.827	.110	2.15	2.15	113.	84.	80.	2.5	250.	58.
5A04	8.0	927	122.539	.130	2.53	2.53	116.	85.	80.	3.0	260.	56.
5A05	10.0	929	124.230	.130	2.50	2.50	124.	86.	80.	3.0	260.	56.
5A06	12.0	931	125.871	.120	2.29	2.29	129.	86.	80.	3.0	260.	56.
5A07	14.0	933	127.500	.130	2.47	2.47	131.	87.	81.	3.0	260.	56.
5A08	16.0	935	129.150	.130	2.45	2.45	134.	87.	81.	3.0	270.	54.
5A09	18.0	937	131.185	.210	3.95	3.95	137.	90.	81.	6.0	260.	54.
5A10	20.0	939	133.306	.210	3.94	3.94	139.	92.	81.	6.0	250.	50.
5A11	22.0	941	135.493	.230	4.30	4.30	140.	93.	81.	6.5	240.	50.
5A12	24.0	943	137.335	.150	2.80	2.80	142.	95.	82.	4.0	245.	50.
5A13	26.0	945	139.492	.240	4.50	4.50	142.	96.	83.	7.5	255.	50.
5A14	28.0	947	141.064	.100	1.88	1.88	136.	95.	82.	2.5	250.	52.
5A15	30.0	949	142.670	.120	2.27	2.27	133.	95.	82.	3.0	250.	52.
5A16	32.0	951	144.500	.170	3.22	3.22	133.	96.	83.	3.5	260.	54.
5A17	34.0	953	146.435	.170	3.22	3.22	133.	97.	83.	5.0	260.	54.
5A18	36.0	955	148.224	.140	2.65	2.65	132.	99.	85.	4.0	270.	56.
5A19	38.0	957	149.899	.120	2.28	2.28	130.	101.	86.	3.5	260.	60.
5A20	40.0	959	151.530	.120	2.28	2.28	132.	101.	86.	3.5	260.	60.
5A21	42.0	1001	153.290	.140	2.65	2.65	132.	102.	87.	3.0	260.	60.
5A22	44.0	1003	154.870	.110	2.09	2.09	132.	102.	88.	3.0	260.	62.
5A23	46.0	1005	156.300	.090	1.71	1.71	131.	103.	89.	3.0	250.	62.
5A24	48.0	1007	157.281	.110	2.10	2.10	129.	103.	90.	4.0	250.	62.
5B01	50.0	1018	158.980	.070	1.34	1.34	125.	103.	92.	1.0	285.	62.
5B02	52.0	1020	160.277	.070	1.34	1.34	125.	103.	92.	1.0	285.	62.
5B03	54.0	1022	161.637	.080	1.53	1.53	125.	103.	92.	1.0	285.	62.
5B04	56.0	1024	163.291	.110	2.11	2.11	124.	103.	92.	1.0	285.	62.
5B05	58.0	1026	164.785	.110	2.12	2.12	123.	103.	92.	1.0	285.	62.
5B06	60.0	1028	166.351	.100	1.93	1.93	123.	104.	92.	1.0	300.	60.

PLANT CARPENTER TECH READING, PA DATE 04/29/81
SAMPLING LOCATION SITE #2 OUTLET 1,2,3,4,5 RUN NUMBER C2P-2

READ & RECORD DATA EVERY 2.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
5B07	62.0	1030	168.050	.140	2.70	2.70	122.	104.	93.	1.0	260.	60.
5B08	64.0	1032	169.824	.140	2.70	2.70	123.	104.	93.	1.0	260.	60.
5B09	66.0	1034	171.650	.140	2.70	2.70	123.	105.	94.	1.0	260.	60.
5B10	68.0	1036	173.525	.170	3.27	3.27	123.	105.	94.	2.0	260.	60.
5B11	70.0	1038	175.700	.220	4.24	4.24	123.	106.	94.	2.5	260.	60.
5B12	72.0	1040	177.924	.220	4.23	4.23	124.	106.	94.	3.0	250.	60.
5B13	74.0	1042	179.936	.160	3.08	3.08	124.	106.	94.	2.0	250.	60.
5B14	76.0	1044	181.705	.120	2.31	2.31	123.	106.	94.	1.0	240.	60.
5B15	78.0	1046	183.520	.200	3.85	3.85	123.	106.	94.	2.0	240.	60.
5B16	80.0	1048	185.563	.150	2.89	2.89	123.	106.	95.	1.0	240.	60.
5B17	82.0	1050	187.300	.150	2.89	2.89	123.	106.	95.	1.0	240.	60.
5B18	84.0	1052	189.267	.150	2.89	2.89	123.	106.	95.	1.0	240.	60.
5B19	86.0	1054	191.010	.140	2.70	2.70	123.	106.	95.	1.0	230.	66.
5B20	88.0	1056	192.855	.130	2.50	2.50	123.	106.	95.	1.0	230.	66.
5B21	90.0	1058	194.550	.120	2.31	2.31	123.	107.	95.	1.0	230.	66.
5B22	92.0	1100	196.190	.110	2.12	2.12	123.	107.	95.	1.0	230.	66.
5B23	94.0	1102	197.840	.120	2.31	2.31	123.	107.	95.	1.0	240.	68.
5B24	96.0	1104	199.350	.100	1.93	1.93	123.	107.	95.	1.0	240.	68.
4A01	98.0	1108	200.030	.070	1.36	1.36	118.	105.	96.	.0	240.	68.
4A02	100.0	1110	202.073	.090	1.74	1.74	122.	105.	96.	.0	240.	68.
4A03	102.0	1112	203.730	.120	2.31	2.31	122.	105.	96.	.0	240.	68.
4A04	104.0	1114	205.384	.120	2.31	2.31	122.	105.	96.	.5	250.	66.
4A05	106.0	1116	207.136	.130	2.51	2.51	122.	105.	96.	2.0	250.	64.
4A06	108.0	1118	208.945	.140	2.70	2.70	121.	104.	95.	2.0	250.	62.
4A07	110.0	1120	210.780	.150	2.90	2.90	121.	104.	95.	2.5	260.	68.
4A08	112.0	1122	212.751	.170	3.29	3.29	120.	104.	96.	2.0	240.	62.
4A09	114.0	1124	214.438	.120	2.32	2.32	120.	104.	96.	1.5	240.	62.
4A10	116.0	1126	216.440	.180	3.48	3.48	120.	104.	95.	2.0	250.	63.
4A11	118.0	1128	218.631	.210	4.05	4.05	122.	104.	95.	3.0	240.	63.
4A12	120.0	1130	220.713	.190	3.66	3.66	122.	104.	95.	3.0	240.	64.
4A13	122.0	1132	222.989	.210	4.05	4.05	122.	105.	94.	3.0	240.	64.
4A14	124.0	1134	224.653	.120	2.26	2.26	135.	105.	96.	.0	250.	64.
4A15	126.0	1136	226.554	.170	3.18	3.18	141.	105.	96.	2.0	260.	64.
4A16	128.0	1138	228.233	.120	2.23	2.23	143.	105.	95.	.0	260.	64.
4A17	130.0	1140	229.807	.110	2.04	2.04	143.	105.	95.	.0	250.	62.
4A18	132.0	1142	231.666	.180	2.95	2.95	148.	105.	95.	2.0	240.	62.
4A19	134.0	1144	233.259	.110	2.03	2.03	148.	106.	96.	.0	240.	64.
4A20	136.0	1146	234.999	.110	2.03	2.03	147.	106.	96.	.0	250.	64.
4A21	138.0	1148	236.710	.160	2.96	2.96	146.	106.	96.	2.0	240.	63.
4A22	140.0	1150	238.234	.100	1.85	1.85	146.	106.	96.	.0	240.	63.
4A23	142.0	1152	239.925	.130	2.42	2.42	142.	106.	96.	1.5	250.	64.
4A24	144.0	1154	241.498	.110	2.05	2.05	141.	106.	96.	.0	250.	66.
4B01	146.0	0	242.750	.070	1.33	1.33	131.	106.	97.	1.0	240.	68.
4B02	148.0	0	244.015	.070	1.33	1.33	131.	106.	97.	1.0	240.	65.
4B03	150.0	0	245.440	.090	1.71	1.71	132.	106.	97.	1.0	245.	62.
4B04	152.0	0	246.900	.090	1.71	1.71	130.	106.	97.	1.0	250.	60.
4B05	154.0	0	248.410	.100	1.90	1.90	129.	106.	97.	1.0	250.	58.

4B06	156.0	0	249.985	.110	2.10	2.10	127.	107.	97.	1.0	255.	56.
4B07	158.0	0	251.620	.120	2.29	2.29	127.	107.	97.	1.5	255.	56.
4B08	160.0	0	253.180	.100	1.91	1.91	127.	107.	97.	1.5	250.	56.
4B09	162.0	0	254.930	.140	2.67	2.67	127.	107.	97.	1.5	250.	56.
4B10	164.0	0	256.620	.120	2.30	2.30	125.	108.	98.	2.0	250.	56.
4B11	166.0	0	258.500	.160	3.06	3.06	125.	108.	98.	2.0	250.	56.
4B12	168.0	0	260.610	.200	3.84	3.84	125.	108.	98.	3.0	250.	56.
4B13	170.0	0	262.720	.200	3.84	3.84	124.	108.	98.	3.0	250.	56.
4B14	172.0	0	264.820	.180	3.47	3.47	122.	108.	98.	2.5	250.	56.
4B15	174.0	0	266.710	.140	2.69	2.69	123.	108.	98.	2.5	255.	56.
4B16	176.0	0	268.670	.160	3.08	3.08	122.	107.	98.	2.5	250.	58.
4B17	178.0	0	270.570	.140	2.70	2.70	122.	107.	98.	2.0	250.	58.
4B18	180.0	0	272.210	.140	2.70	2.70	121.	106.	98.	2.0	250.	58.
4B19	182.0	0	274.050	.140	2.70	2.70	121.	106.	98.	2.0	250.	58.
4B20	184.0	0	275.710	.110	2.12	2.12	121.	106.	98.	1.0	250.	58.
4B21	186.0	0	277.370	.110	2.12	2.12	121.	106.	98.	1.0	250.	58.
4B22	188.0	0	278.925	.110	2.12	2.12	121.	105.	98.	1.0	250.	58.
4B23	190.0	0	280.560	.110	2.12	2.12	121.	104.	98.	1.0	250.	58.
4B24	192.0	1250	282.154	.120	2.31	2.31	122.	104.	98.	1.0	250.	58.
3A01	194.0	0	283.370	.070	1.36	1.36	116.	100.	93.	1.0	250.	62.
3A02	196.0	0	284.660	.070	1.36	1.36	118.	100.	93.	1.0	250.	62.
3A03	198.0	1300	286.077	.080	1.55	1.55	120.	97.	91.	1.0	250.	62.
3A04	200.0	1313	287.440	.100	1.94	1.94	118.	97.	91.	1.0	250.	62.
3A05	202.0	0	288.970	.100	1.93	1.93	121.	87.	84.	1.0	250.	62.
3A06	204.0	0	290.610	.120	2.28	2.28	130.	91.	86.	1.0	245.	60.
3A07	206.0	0	292.380	.150	2.84	2.84	133.	89.	86.	1.5	240.	60.
3A08	208.0	0	294.280	.160	2.98	2.98	143.	89.	84.	2.0	245.	60.
3A09	210.0	0	296.110	.160	2.96	2.96	147.	90.	84.	2.0	250.	60.
3A10	212.0	0	298.110	.190	3.48	3.48	153.	90.	84.	2.5	250.	60.
3A11	214.0	0	300.080	.190	3.48	3.48	153.	90.	84.	2.5	255.	60.
3A12	216.0	0	302.170	.210	3.83	3.83	155.	90.	84.	2.5	250.	62.
3A13	218.0	0	304.020	.150	2.80	2.80	142.	91.	84.	3.0	250.	62.
3A14	220.0	0	305.750	.130	2.44	2.44	137.	91.	83.	1.8	250.	62.
3A15	222.0	0	307.860	.200	3.79	3.79	132.	92.	83.	3.0	250.	62.
3A16	224.0	0	309.670	.120	2.63	2.63	137.	92.	83.	2.0	250.	62.
3A17	226.0	0	311.530	.170	3.17	3.17	141.	92.	83.	2.2	255.	62.
3A18	228.0	0	313.370	.150	2.79	2.79	143.	92.	83.	2.0	250.	64.
3A19	230.0	0	315.185	.150	2.78	2.78	146.	92.	83.	2.0	245.	64.
3A20	232.0	0	316.730	.110	2.06	2.06	140.	92.	83.	2.0	245.	64.
3A21	234.0	0	318.240	.100	1.86	1.86	143.	92.	83.	1.0	250.	64.
3A22	236.0	0	319.790	.090	1.67	1.67	145.	92.	83.	1.0	255.	64.
3A23	238.0	0	321.110	.090	1.68	1.68	141.	92.	83.	1.0	255.	64.
3A24	240.0	1355	322.498	.110	2.05	2.05	141.	92.	83.	1.0	255.	64.
3B01	242.0	1402	323.770	.080	1.52	1.52	131.	91.	83.	1.0	230.	67.
3B02	244.0	1404	325.130	.080	1.52	1.52	131.	91.	83.	1.0	230.	67.
3B03	246.0	1406	326.552	.090	1.70	1.70	134.	91.	83.	1.0	230.	67.
3B04	248.0	1408	328.110	.110	2.09	2.09	132.	91.	83.	1.0	230.	67.
3B05	250.0	1410	329.667	.110	2.09	2.09	132.	91.	83.	1.0	230.	67.
3B06	252.0	1412	331.442	.130	2.46	2.46	133.	91.	83.	1.0	230.	67.
3B07	254.0	1414	332.978	.110	2.08	2.08	133.	91.	83.	1.0	230.	67.
3B08	256.0	1416	334.705	.170	3.23	3.23	131.	90.	82.	2.0	280.	66.
3B09	258.0	1418	336.600	.150	2.86	2.86	129.	90.	82.	2.0	280.	66.
3B10	260.0	1420	338.610	.190	3.63	3.63	128.	90.	81.	2.5	280.	66.
3B11	262.0	1422	340.670	.190	3.63	3.63	128.	90.	81.	3.0	280.	66.
3B12	264.0	1424	342.815	.220	4.19	4.19	130.	89.	81.	3.5	230.	68.
3B13	266.0	1426	344.934	.190	3.62	3.62	129.	89.	81.	3.0	230.	68.
3B14	268.0	1428	346.750	.130	2.49	2.49	127.	89.	81.	2.0	230.	68.
3B15	270.0	1430	348.763	.200	3.83	3.83	126.	89.	81.	3.0	225.	68.
3B16	272.0	1432	350.627	.140	2.68	2.68	126.	89.	81.	2.0	225.	60.
3B17	274.0	1434	352.492	.160	3.06	3.06	126.	89.	81.	2.5	225.	60.

3B18	276.0	1436	354.374	.160	3.07	3.07	125.	89.	81.	2.5	225.	60.
3B19	278.0	1438	356.183	.140	2.69	2.69	125.	89.	80.	2.0	225.	60.
3B20	280.0	1440	357.910	.130	2.49	2.49	125.	89.	80.	1.0	225.	60.
3B21	282.0	1442	359.580	.120	2.30	2.30	126.	89.	81.	1.0	225.	60.
3B22	284.0	1444	361.207	.110	2.11	2.11	124.	89.	81.	1.0	225.	60.
3B23	286.0	1446	362.790	.110	2.11	2.11	124.	89.	81.	1.0	225.	60.
3B24	288.0	1448	364.251	.100	1.93	1.93	123.	89.	81.	1.0	225.	60.
2A01	290.0	1456	365.496	.070	1.35	1.35	120.	87.	80.	1.0	250.	62.
2A02	292.0	1458	366.853	.080	1.55	1.55	121.	87.	80.	1.0	250.	62.
2A03	294.0	1500	368.380	.110	2.11	2.11	124.	87.	80.	1.0	250.	62.
2A04	296.0	1502	370.100	.140	2.69	2.69	124.	87.	80.	1.0	250.	62.
2A05	298.0	1504	371.797	.120	2.30	2.30	125.	87.	79.	1.5	250.	62.
2A06	300.0	1506	373.390	.110	2.11	2.11	125.	87.	79.	1.0	250.	62.
2A07	302.0	1508	375.180	.150	2.87	2.87	126.	87.	79.	2.0	250.	62.
2A08	304.0	1510	376.870	.120	2.30	2.30	126.	87.	79.	1.5	250.	62.
2A09	306.0	1512	378.568	.130	2.49	2.49	126.	88.	80.	2.0	250.	62.
2A10	308.0	1514	380.599	.200	3.84	3.84	125.	88.	80.	3.5	250.	62.
2A11	310.0	1516	382.418	.130	2.49	2.49	127.	88.	80.	1.5	250.	62.
2A12	312.0	1518	384.290	.180	3.45	3.45	126.	89.	80.	2.5	250.	62.
2A13	314.0	1520	386.190	.160	3.06	3.06	126.	89.	80.	2.0	250.	62.
2A14	316.0	1522	388.257	.200	3.84	3.84	125.	89.	80.	3.5	250.	62.
2A15	318.0	1524	390.070	.190	3.65	3.65	125.	90.	80.	3.0	250.	62.
2A16	320.0	1526	392.098	.110	2.11	2.11	126.	90.	80.	1.0	250.	68.
2A17	322.0	1528	393.905	.160	3.07	3.07	125.	90.	80.	2.0	250.	68.
2A18	324.0	1530	395.780	.130	2.49	2.49	126.	90.	80.	1.5	250.	68.
2A19	326.0	1532	397.505	.150	2.87	2.87	126.	90.	80.	2.0	250.	68.
2A20	328.0	1534	399.390	.160	3.04	3.04	130.	90.	80.	2.5	250.	68.
2A21	330.0	1536	401.100	.110	2.04	2.04	145.	90.	80.	1.0	250.	68.
2A22	332.0	1538	402.605	.100	1.86	1.86	143.	90.	80.	1.0	250.	68.
2A23	334.0	1540	404.100	.100	1.85	1.85	146.	90.	80.	1.0	250.	68.
2A24	33.6	1542	405.450	.090	1.66	1.66	149.	90.	80.	1.0	250.	68.
4B01	338.0	1547	406.614	.060	1.10	1.10	152.	90.	82.	2.0	260.	60.
4B02	340.0	1549	407.963	.090	1.65	1.65	151.	90.	82.	3.0	250.	60.
4B03	342.0	1551	409.434	.100	1.83	1.83	154.	90.	82.	4.0	250.	60.
4B04	344.0	1553	410.970	.110	2.03	2.03	150.	90.	82.	4.0	250.	60.
4B05	346.0	1555	412.596	.120	2.21	2.21	148.	90.	82.	5.0	250.	60.
4B06	348.0	1557	414.500	.160	2.95	2.95	148.	90.	82.	6.0	260.	58.
4B07	350.0	1559	416.447	.180	3.31	3.31	149.	90.	82.	6.0	260.	58.
4B08	352.0	1601	418.253	.150	2.78	2.78	149.	90.	82.	5.0	245.	60.
4B09	354.0	1603	420.370	.210	3.90	3.90	145.	91.	82.	7.0	240.	60.
4B10	356.0	1604	422.476	.210	3.90	3.90	145.	91.	82.	7.0	250.	60.
4B11	358.0	1606	424.100	.110	2.06	2.06	138.	91.	82.	4.0	260.	62.
4B12	360.0	1608	425.992	.180	3.38	3.38	138.	91.	82.	5.5	270.	62.
4B13	362.0	1610	428.064	.200	3.76	3.76	137.	91.	82.	7.0	270.	62.
4B14	364.0	1612	430.000	.150	2.82	2.82	136.	91.	82.	5.0	250.	62.
4B15	366.0	1614	431.815	.150	2.82	2.82	136.	91.	82.	5.0	255.	60.
4B16	368.0	1616	433.634	.150	2.83	2.83	134.	91.	82.	5.0	255.	60.
4B17	370.0	1618	435.686	.190	3.60	3.60	132.	91.	82.	5.0	260.	60.
4B18	372.0	1620	437.425	.130	2.46	2.46	132.	91.	82.	4.0	250.	62.
4B19	374.0	1622	439.064	.120	2.29	2.29	131.	91.	82.	4.0	250.	62.
4B20	376.0	1624	440.815	.140	2.66	2.66	130.	91.	82.	4.0	260.	64.
4B21	378.0	1626	442.560	.140	2.67	2.67	129.	91.	82.	4.0	260.	64.
4B22	380.0	1628	444.173	.110	2.10	2.10	128.	90.	82.	4.0	250.	64.
4B23	382.0	1630	445.812	.120	2.29	2.29	128.	90.	82.	4.5	250.	64.
4B24	384.0	1632	447.425	.110	2.10	2.10	127.	90.	82.	4.5	250.	64.
5A01	386.0	1640	448.600	.070	1.34	1.34	124.	90.	82.	.0	250.	62.
5A02	388.0	0	449.860	.070	1.34	1.34	125.	90.	82.	.0	250.	62.
5A03	390.0	0	451.200	.070	1.34	1.34	127.	90.	82.	.0	260.	63.
5A04	392.0	0	452.341	.070	1.34	1.34	127.	90.	82.	.0	250.	63.
5A05	394.0	0	453.756	.090	1.72	1.72	127.	90.	82.	1.0	250.	63.

5A06	396.0	0	455.204	.090	1.72	1.72	127.	90.	82.	2.0	250.	63.
5A07	398.0	0	456.639	.090	1.72	1.72	127.	90.	82.	2.0	260.	64.
5A08	400.0	0	458.200	.110	2.10	2.10	127.	90.	82.	2.0	260.	64.
5A09	402.0	0	459.771	.110	2.10	2.10	127.	90.	82.	2.5	260.	64.
5A10	404.0	0	461.594	.150	2.86	2.86	128.	90.	82.	4.0	260.	64.
5A11	406.0	0	463.200	.110	2.10	2.10	128.	90.	82.	2.5	250.	66.
5A12	408.0	0	464.945	.130	2.49	2.49	127.	91.	82.	3.0	240.	66.
5A13	410.0	0	466.287	.060	1.14	1.14	127.	91.	83.	.0	240.	62.
5A14	412.0	0	468.000	.170	3.25	3.25	128.	91.	83.	4.0	250.	60.
5A15	414.0	0	469.833	.130	2.46	2.46	133.	91.	83.	3.0	260.	60.
5A16	416.0	0	471.565	.160	3.00	3.00	139.	91.	83.	2.0	260.	60.
5A17	418.0	0	473.500	.170	3.17	3.17	142.	91.	83.	2.0	260.	60.
5A18	420.0	0	475.182	.120	2.23	2.23	145.	91.	83.	2.0	240.	60.
5A19	422.0	0	476.610	.090	1.67	1.67	145.	91.	83.	.0	250.	60.
5A20	424.0	0	478.073	.100	1.85	1.85	148.	91.	83.	.0	255.	62.
5A21	426.0	0	479.685	.120	2.23	2.23	144.	91.	83.	.0	255.	62.
5A22	428.0	1718	481.316	.120	2.23	2.23	143.	91.	83.	.0	260.	64.
5A23	430.0	1720	482.887	.110	2.05	2.05	142.	91.	83.	.0	260.	64.
5A24	432.0	1722	484.564	.130	2.44	2.44	139.	91.	83.	.0	260.	64.
5B01	434.0	0	485.615	.050	.94	.94	135.	91.	83.	1.0	245.	62.
5B02	436.0	0	486.790	.050	.94	.94	135.	92.	83.	1.5	245.	62.
5B03	438.0	0	488.080	.100	1.89	1.89	134.	91.	84.	1.5	250.	64.
5B04	440.0	0	489.680	.110	2.08	2.08	133.	91.	84.	1.5	250.	64.
5B05	442.0	0	491.260	.090	1.70	1.70	134.	91.	84.	1.0	250.	64.
5B06	444.0	0	492.570	.090	1.70	1.70	134.	91.	84.	1.0	250.	62.
5B07	446.0	0	494.190	.120	2.28	2.28	131.	91.	84.	1.5	250.	62.
5B08	448.0	0	495.660	.090	1.71	1.71	130.	91.	83.	1.5	255.	62.
5B09	450.0	0	497.560	.160	3.04	3.04	130.	91.	83.	2.5	255.	60.
5B10	452.0	0	499.566	.130	2.47	2.47	130.	91.	82.	1.5	255.	60.
5B11	454.0	0	501.080	.140	2.66	2.66	130.	91.	83.	1.5	255.	60.
5B12	456.0	0	502.990	.170	3.23	3.23	131.	91.	83.	2.0	250.	60.
5B13	458.0	0	504.820	.150	2.86	2.86	128.	91.	83.	2.0	245.	60.
5B14	460.0	0	506.690	.150	2.87	2.87	127.	91.	83.	2.0	250.	58.
5B15	462.0	0	508.250	.110	2.10	2.10	127.	90.	82.	1.5	250.	58.
5B16	464.0	0	510.040	.130	2.49	2.49	125.	90.	82.	1.5	250.	58.
5B17	466.0	0	511.910	.160	3.06	3.06	125.	90.	82.	2.0	250.	58.
5B18	468.0	0	513.560	.130	2.50	2.50	124.	90.	82.	1.5	250.	58.
5B19	470.0	0	515.260	.110	2.31	2.31	124.	60.	82.	1.5	245.	58.
5B20	472.0	0	517.065	.150	2.88	2.88	124.	90.	82.	2.0	240.	60.
5B21	474.0	0	518.980	.100	1.92	1.92	124.	90.	82.	1.0	240.	60.
5B22	476.0	0	520.315	.100	1.92	1.92	124.	90.	82.	1.0	240.	60.
5B23	478.0	0	522.130	.160	3.07	3.07	124.	90.	82.	2.0	240.	62.
5B24	480.0	0	523.492	.070	1.35	1.35	122.	90.	82.	.0	240.	62.
TOTALS	480.0		407.179									
AVERAGE					2.49	2.49	131.	95.	86.	2.1	250.	62.

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT- NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH READING, PA — P REINERMANN/CAMPBELL

TEST C2P-2 SITE #2 OUTLET 1,2,3,4,5

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/29/81	04/29/81
TB	TIME-START	918	918
TF	TIME-FINISH	0	0
TT	NET TIME OF TEST, MIN.	480.0	480.0
NP	NET SAMPLING POINTS	240	240
Y	METER CALIBRATION FACTOR	1.050	1.050
DN	SAMPLING NOZZLE DIAMETER	.375 IN	9.5 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	2.49 IN-H2O	63.3 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	407.179 CU-FT	11.530 CU-M
TM	AVERAGE GAS METER TEMP	90.7 F	32.6 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	408.009 SCF	11.554 SCM
VLC	TOTAL H2O COLLECTED IN IMPINGERS AND SILICA GEL,ML.	118.8	118.8
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	5.592 SCF	.158 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.35	1.35
FMD	MOLE FRACTION DRY GAS	.986	.986
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.73	28.73

PB	BAROMETRIC PRESSURE	29.60	IN-HG	751.84	MM-HG
PSI	STATIC PRES OF STACK GAS	.10	IN-H2O	2.54	MM-H2O
PS	STACK PRES, ABS.	29.61	IN-HG	752.03	MM-HG
TS	AVERAGE STACK TEMP	131.	F	55.	C
VS	AVG STACK GAS VELOCITY	21.4	FPS	6.5	MPS
AS	STACK AREA	17105.	SQ-IN	11.035	SQ-M
QSSTD	STACK FLOW RATE, DRY*	8003059.	SCFH	226623.	SCMH
QS	ACTUAL STACK FLOW RATE	9169094.	ACFH	259641.	ACMH
ISO	PERCENT ISOKINETIC	98.7		98.7	
MN	ORGANIC MG. EPA 5	.8		.8	
CS	ORGANIC	.0000	GR/DSCF*	.049	MG/DSCM
PMR	ORGANIC EMISSION RATE	.035	LB/HR	.02	KG/HR
MN	INORGANIC MG. EPA 5	3.0		3.0	
CS	INORGANIC	.0001	GR/DSCF*	.260	MG/DSCM
PMR	INORGANIC EMISSION RATE	.130	LB/HR	.06	KG/HR
MN	PARTICULATE MG. EPA 5	5.7		5.7	
CS	PARTICULATE	.0002	GR/DSCF*	.493	MG/DSCM
PMR	PARTICULATE EMISSION RATE	.246	LB/HR	.11	KG/HR

* 68 DEG F, 29.92 IN.HG.

EXAMPLE PARTICULATE CALCULATIONS TEST NO. C2P-2

SITE #2 OUTLET 1,2,3,4,5

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

VMSTD = (17.647 * VM * Y * (PB + PM / 13.6)) / (TM + 460.)

$$VMSTD = \frac{17.647 * 407.179 * 1.050 * (29.60 + 2.494 / 13.6)}{(91. + 460.)} = 408.009 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

VWC = .04707 * VLC

VWC = .04707 * 119. = 5.59 SCF

PERCENT MOISTURE IN STACK GAS

BWO = (100. * VWC) / (VMSTD + VWC)

$$BWO = \frac{100. * 5.59}{408.009 + 5.59} = 1.35 \text{ PERCENT}$$

MOLE FRACTION OF DRY STACK GAS

FMD = (100. - BWO) / 100.

$$FMD = \frac{100. - 1.4}{100.} = .986$$

AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

MD = (PCO2 * .44) + (PO2 * .32) + (PN2 + PCO) * .28

MD = (.60*44/100) + (19.4*32/100) + ((80.0+ .0) * 28/100 = 28.87

MOLECULAR WEIGHT OF STACK GAS

MWS = MD * (1. - (BWO/100)) + 18. * (BWO/100)

MWS = 28.87* (1. -(1.35/100)) + 18. * (1.35/100) = 28.73

STACK GAS VELOCITY AT STACK CONDITIONS

DELP = SUM. OF THE SQRT(VH * (TS + 460.))

VS = 85.49 * CP * DELP / (SQRT(MWS * PS) * PNTS)

VS = 85.49 * .84 * 2089.834 / (SQRT(28.73 * 29.61) * 240. = 21.44 FPS

STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

QS = VS * AS * 3600/144

QS = 21.44 * 17105. 3600/144 = 9169094. ACFH

STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS

QSSTD = 17.647 * QS * PS * (1. - (BWO/100)) / (TS + 460.)

$$QSSTD = \frac{17.647 * 9169094. * 29.61 * (1. - (1.35/100))}{(131. + 460.)} = 8003059. \text{ SCFH}$$

PERCENT ISOKINETIC

ISO = (305.58*(TS+460.))*((0.002669*VLC)+(VM*Y*(PB+(PM/13.6))/(TM+460.)))/(TT*VS*PS*DN*DN)

$$ISO = \frac{(305.58*(131.+460.))*((0.002669* 119.)+(407.179*1.050*(29.60+(2.494/13.6))/(91.+460.)))}{480. * 21.44 * 29.61 * .375 * .375} = 98.70 \text{ PERCENT}$$

PARTICULATE LOADING -- EPA METHOD 5 (AT STANDARD CONDITIONS)

CS = 0.001 * MN * 15.43 / VMSTD

CS = 0.001 * .8 * 15.43 / 408.009 = .000 GR/DSCF

PARTICULATE LBS/HR -- EPA METHOD 5

PMR = CS * QSSTD / (15.43 * 453.6)

PMR = .000 * 8003059. / (15.43 * 453.6) = .03

FIELD DATA

PLANT	CARPENTER TECH READING, PA	DATE	04/30/81
SAMPLING LOCATION	SITE NO 2	RUN NUMBER	C2P-3
SAMPLE TYPE	M5 PARTICULATE	PROBE LENGTH & TYPE	6 FT GLASS
OPERATOR	P REINERMANN RC SH	NOZZLE : I.D.	.375
AMBIENT TEMP.(DEG.F)	75.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.70	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	.10	METER BOX NUMBER	FB4
FILTER NUMBER(S)	0001918	METER HEAD DIFF.	1.79
STACK INSIDE DIM.(IN)	147.58 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	250.
THERM. NO.	164	HEATER BOX SETTING	250.
LEAKAGE	.012 CFM @ 12.0 IN.HG		
METER CALIB. FACTOR	1.050	K FACTOR	11224.6
READ & RECORD DATA EVERY	2.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	1010	526.003									
1A01	2.0	1012	527.500	.100	1.96	1.96	113.	76.	71.	3.5	240.	66.
1A02	4.0	1014	529.125	.120	2.35	2.35	113.	81.	75.	5.0	270.	60.
1A03	6.0	1016	530.838	.130	2.56	2.56	111.	81.	75.	5.0	270.	60.
1A04	8.0	1018	532.666	.150	2.95	2.95	110.	82.	75.	6.0	260.	60.
1A05	10.0	1020	534.439	.140	2.76	2.76	110.	82.	75.	6.0	260.	60.
1A06	12.0	1022	536.064	.110	2.17	2.17	110.	82.	75.	4.0	260.	58.
1A07	14.0	1024	537.936	.170	3.35	3.35	109.	82.	75.	7.5	270.	56.
1A08	16.0	1026	539.984	.190	3.75	3.75	109.	83.	76.	9.0	260.	56.
1A09	18.0	1028	541.992	.180	3.56	3.56	108.	84.	76.	8.0	250.	56.
1A10	20.0	1030	544.108	.200	3.95	3.95	108.	84.	76.	9.5	255.	56.
1A11	22.0	1032	546.081	.170	3.37	3.37	106.	85.	77.	7.5	245.	50.
1A12	24.0	1034	548.290	.230	4.56	4.50	106.	85.	77.	10.5	260.	50.
1A13	26.0	1036	550.424	.200	3.97	3.97	105.	85.	77.	9.5	260.	50.
1A14	28.0	1038	552.617	.220	4.39	4.39	103.	86.	77.	10.5	245.	48.
1A15	30.0	1040	554.700	.190	3.79	3.79	103.	86.	78.	9.0	255.	48.
1A16	32.0	1042	556.814	.190	3.78	3.78	103.	87.	78.	9.0	255.	50.
1A17	34.0	1044	558.750	.170	3.38	3.38	103.	87.	78.	7.5	250.	50.
1A18	36.0	1046	560.712	.170	3.38	3.38	104.	87.	78.	7.5	260.	50.
1A19	38.0	1048	562.700	.160	3.18	3.18	104.	87.	79.	7.0	260.	50.
1A20	40.0	1050	564.369	.130	2.58	2.58	104.	88.	79.	5.0	260.	52.
1A21	42.0	1052	566.164	.140	2.79	2.79	104.	88.	79.	5.5	245.	52.
1A22	44.0	1054	567.831	.120	2.39	2.39	104.	89.	80.	5.0	250.	52.
1A23	46.0	1056	569.626	.110	2.19	2.19	104.	90.	81.	4.5	260.	52.
1A24	48.0	1058	570.961	.100	1.99	1.99	105.	90.	81.	4.0	260.	54.
1A01	50.0	1102	572.424	.100	1.99	1.99	103.	90.	80.	4.0	250.	54.
1A02	52.0	1104	574.788	.140	2.79	2.79	103.	90.	80.	4.5	250.	52.
1A03	54.0	1106	575.816	.110	2.18	2.18	105.	90.	80.	4.0	245.	52.
1A04	56.0	1108	577.500	.120	2.39	2.39	104.	90.	81.	5.0	245.	52.
1A05	58.0	1110	579.254	.140	2.79	2.79	104.	91.	81.	5.0	260.	52.
1A06	60.0	1112	581.110	.150	2.96	2.96	108.	90.	80.	6.0	240.	52.

PLANT CARPENTER TECH READING, PA DATE 04/30/81
SAMPLING LOCATION SITE NO 2 RUN NUMBER C2P-3

READ & RECORD DATA EVERY 2.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
1A07	62.0	1114	582.950	.150	2.95	2.95	111.	90.	80.	6.0	250.	52.
1A08	64.0	1116	584.839	.160	3.13	3.13	114.	90.	80.	7.0	250.	54.
1A09	66.0	1118	586.946	.210	4.06	4.06	120.	90.	81.	9.5	245.	55.
1A10	68.0	1120	588.985	.180	3.44	3.44	128.	91.	81.	8.0	240.	57.
1A11	70.0	1122	590.999	.200	3.80	3.80	131.	90.	81.	9.0	250.	56.
1A12	72.0	1124	593.086	.190	3.60	3.60	132.	90.	81.	8.5	255.	55.
1A13	74.0	1126	595.312	.250	4.74	4.40	132.	90.	81.	11.0	260.	54.
1A14	76.0	1128	597.479	.210	3.99	3.99	131.	90.	81.	10.0	270.	54.
1A15	78.0	1130	599.565	.190	3.65	3.65	125.	90.	81.	8.5	255.	54.
1A16	80.0	1132	601.640	.200	3.85	3.85	123.	89.	81.	9.0	245.	53.
1A17	82.0	1134	603.622	.180	3.45	3.45	125.	89.	81.	8.0	250.	53.
1A18	84.0	1136	605.436	.140	2.70	2.70	123.	90.	81.	6.0	255.	54.
1A19	86.0	1138	606.974	.100	1.93	1.93	123.	90.	81.	4.0	245.	55.
1A20	88.0	1140	608.732	.140	2.70	2.70	121.	89.	80.	5.5	240.	56.
1A21	90.0	1142	610.208	.090	1.74	1.74	120.	88.	80.	3.0	250.	56.
1A22	92.0	1144	611.780	.110	2.13	2.13	119.	88.	80.	4.0	250.	56.
1A23	94.0	1146	613.436	.120	2.33	2.33	118.	90.	80.	5.0	260.	58.
1A24	96.0	1148	615.079	.120	2.33	2.33	117.	90.	80.	5.0	260.	58.
2B01	98.0	1158	616.362	.080	1.58	1.58	110.	92.	82.	2.0	265.	63.
2B02	100.0	1200	617.740	.080	1.57	1.57	113.	93.	83.	2.0	265.	63.
2B03	102.0	1202	619.946	.100	1.96	1.96	114.	94.	83.	2.5	265.	63.
2B04	104.0	1204	621.564	.120	2.34	2.34	115.	95.	84.	4.0	270.	62.
2B05	106.0	1206	623.370	.140	2.74	2.74	114.	96.	84.	6.0	275.	60.
2B06	108.0	1208	625.110	.140	2.74	2.74	113.	96.	84.	6.0	275.	60.
2B07	110.0	1210	626.977	.160	3.14	3.14	112.	97.	85.	7.0	275.	60.
2B08	112.0	1212	629.000	.200	3.92	3.92	112.	97.	85.	9.0	275.	60.
2B09	114.0	1214	631.130	.190	3.72	3.72	113.	97.	86.	9.0	270.	60.
2B10	116.0	1216	633.285	.200	3.91	3.91	114.	98.	87.	9.5	270.	60.
2B11	118.0	1218	635.425	.200	3.92	3.92	112.	99.	88.	9.5	265.	60.
2B12	120.0	1220	637.650	.230	4.51	4.51	112.	99.	88.	9.5	260.	60.
2B13	122.0	1222	639.875	.210	4.12	4.12	112.	99.	88.	10.0	260.	60.
2B14	124.0	1224	642.050	.210	4.12	4.12	111.	99.	88.	10.0	255.	58.
2B15	126.0	1226	644.010	.150	2.95	2.95	111.	99.	88.	7.0	255.	58.
2B16	128.0	1228	645.920	.160	3.14	3.14	111.	100.	89.	6.5	255.	58.
2B17	130.0	1230	647.930	.190	3.74	3.74	110.	100.	89.	8.5	255.	58.
2B18	132.0	1232	649.990	.140	2.75	2.75	111.	100.	90.	6.0	255.	58.
2B19	134.0	1234	651.790	.150	2.94	2.94	112.	100.	90.	6.0	255.	58.
2B20	136.0	1236	653.430	.130	2.36	2.36	112.	100.	90.	5.0	250.	56.
2B21	138.0	1238	655.270	.150	2.95	2.95	111.	100.	90.	5.5	250.	58.
2B22	140.0	1240	657.020	.150	2.95	2.95	111.	100.	90.	5.5	250.	58.
2B23	142.0	1242	658.650	.110	2.16	2.16	111.	100.	90.	4.0	255.	58.
2B24	144.0	1244	660.250	.110	2.16	2.16	111.	100.	90.	4.0	250.	60.
2A01	146.0	0	661.330	.050	.99	.99	106.	101.	91.	1.5	250.	60.
2A02	148.0	0	662.570	.070	1.38	1.38	109.	101.	91.	2.0	250.	60.
2A03	150.0	0	664.050	.100	1.97	1.97	110.	101.	91.	2.0	250.	60.
2A04	152.0	0	665.730	.140	2.76	2.76	110.	101.	91.	5.0	250.	60.
2A05	154.0	0	667.450	.120	2.36	2.36	110.	101.	92.	5.0	250.	60.

2A06	156.0	0	669.210	.130	2.56	2.56	110.	101.	92.	5.0	250.	60.
2A07	158.0	0	671.050	.150	2.95	2.95	110.	101.	92.	6.0	250.	60.
2A08	160.0	0	673.020	.170	3.34	3.34	111.	101.	92.	7.0	250.	60.
2A09	162.0	0	674.990	.180	3.54	3.54	111.	101.	92.	7.5	255.	58.
2A10	164.0	0	677.110	.200	3.93	3.93	111.	101.	92.	8.5	255.	56.
2A11	166.0	0	679.140	.180	3.53	3.53	113.	101.	92.	8.0	255.	56.
2A12	168.0	0	681.120	.160	3.12	3.12	115.	101.	92.	7.0	255.	56.
2A13	170.0	0	683.210	.200	3.83	3.83	126.	100.	91.	9.0	255.	56.
2A14	172.0	0	685.440	.240	4.55	4.55	132.	99.	91.	10.0	255.	58.
2A15	174.0	0	687.580	.200	3.76	3.76	137.	98.	90.	9.0	255.	58.
2A16	176.0	0	689.810	.210	3.94	3.94	138.	98.	90.	9.0	255.	58.
2A17	178.0	0	691.850	.200	3.73	3.73	141.	97.	90.	9.0	255.	58.
2A18	180.0	0	693.810	.170	3.15	3.15	146.	97.	90.	6.5	255.	58.
2A19	182.0	0	695.630	.150	2.78	2.78	145.	97.	90.	6.0	255.	58.
2A20	184.0	0	697.380	.130	2.41	2.41	144.	96.	90.	5.5	255.	58.
2A21	186.0	0	699.060	.120	2.26	2.26	137.	96.	90.	5.0	250.	60.
2A22	188.0	0	700.550	.090	1.68	1.68	141.	96.	90.	3.5	250.	60.
2A23	190.0	0	702.110	.110	2.07	2.07	137.	96.	90.	4.0	250.	60.
2A24	192.0	1333	703.715	.130	2.63	2.63	137.	96.	90.	.0	250.	60.
3B01	194.0	1336	705.000	.080	1.55	1.55	119.	97.	90.	3.0	250.	63.
3B02	196.0	1338	706.448	.090	1.74	1.74	120.	98.	90.	3.0	250.	63.
3B03	198.0	1340	707.996	.100	1.94	1.94	120.	98.	90.	3.5	250.	64.
3B04	200.0	1342	709.424	.090	1.74	1.74	119.	98.	90.	3.0	250.	64.
3B05	202.0	1344	711.060	.120	2.32	2.32	120.	99.	90.	5.0	255.	65.
3B06	204.0	1346	712.719	.120	2.33	2.33	118.	99.	90.	5.0	255.	65.
3B07	206.0	1348	714.600	.160	3.11	3.11	117.	99.	91.	7.0	260.	65.
3B08	208.0	1350	716.679	.190	3.69	3.69	118.	100.	91.	8.5	250.	65.
3B09	210.0	1352	718.752	.190	3.70	3.70	116.	100.	90.	8.5	250.	65.
3B10	212.0	1354	720.677	.200	3.90	3.90	115.	101.	90.	9.0	255.	65.
3B11	214.0	1356	722.826	.160	3.12	3.12	115.	101.	90.	7.0	260.	65.
3B12	216.0	1358	725.063	.240	4.69	4.41	114.	101.	90.	11.0	260.	65.
3B13	218.0	1400	727.260	.200	3.91	3.91	114.	101.	90.	9.0	245.	65.
3B14	220.0	1402	729.329	.220	4.31	4.31	113.	100.	90.	10.5	240.	64.
3B15	222.0	1404	731.627	.210	4.11	4.11	113.	100.	90.	10.5	250.	64.
3B16	224.0	1406	733.826	.210	4.11	4.11	113.	100.	90.	10.5	260.	63.
3B17	226.0	1408	735.833	.170	3.34	3.34	112.	99.	90.	7.5	260.	62.
3B18	228.0	1410	737.710	.150	2.94	2.94	112.	99.	90.	6.0	260.	62.
3B19	230.0	1412	739.397	.120	2.35	2.35	112.	100.	90.	5.0	260.	62.
3B20	232.0	1414	741.136	.130	2.55	2.55	111.	100.	90.	5.0	250.	62.
3B21	234.0	1416	742.759	.110	2.17	2.17	110.	100.	90.	4.0	240.	60.
3B22	236.0	1418	744.374	.110	2.16	2.16	111.	100.	90.	4.0	265.	60.
3B23	238.0	1420	746.000	.110	2.16	2.16	111.	100.	90.	4.0	245.	62.
3B24	240.0	1422	747.769	.140	2.75	2.75	111.	100.	90.	5.0	260.	62.
3A01	242.0	1432	749.122	.090	1.77	1.77	110.	98.	90.	3.0	260.	60.
3A02	244.0	1434	750.750	.120	2.36	2.36	111.	98.	90.	4.5	260.	60.
3A03	246.0	1436	752.435	.120	2.36	2.36	111.	97.	89.	4.5	260.	58.
3A04	248.0	1438	754.111	.120	2.36	2.36	111.	97.	89.	4.5	260.	58.
3A05	250.0	1440	755.905	.150	2.95	2.95	111.	97.	89.	6.0	260.	58.
3A06	252.0	1442	757.810	.160	3.15	3.15	111.	96.	88.	6.5	260.	58.
3A07	254.0	1444	759.775	.170	3.35	3.35	110.	96.	88.	7.0	265.	65.
3A08	256.0	1446	761.680	.150	2.95	2.95	111.	96.	88.	6.0	265.	65.
3A09	258.0	1448	763.500	.140	2.75	2.75	112.	96.	88.	5.5	265.	62.
3A10	260.0	1450	765.480	.180	3.50	3.50	117.	96.	88.	8.0	265.	62.
3A11	262.0	1452	767.600	.200	3.84	3.84	124.	96.	88.	9.0	265.	62.
3A12	264.0	1454	769.700	.200	3.82	3.82	128.	96.	88.	9.0	275.	65.
3A13	266.0	1456	771.875	.220	4.20	4.20	128.	96.	88.	10.0	275.	65.
3A14	268.0	1458	774.190	.200	3.84	3.84	124.	96.	88.	9.5	275.	65.
3A15	270.0	1500	776.010	.140	2.70	2.70	123.	95.	87.	5.5	260.	62.
3A16	272.0	1502	777.937	.180	3.40	3.40	132.	95.	87.	7.5	260.	62.
3A17	274.0	1504	780.022	.210	4.00	4.00	129.	95.	87.	9.0	260.	62.

3A18	276.0	1506	782.090	.180	3.42	3.42	130.	94.	87.	8.0	260.	62.
3A19	278.0	1508	784.042	.160	3.05	3.05	129.	94.	87.	7.0	260.	62.
3A20	280.0	1510	785.900	.140	2.70	2.70	123.	94.	87.	5.5	260.	63.
3A21	282.0	1512	787.634	.120	2.31	2.31	122.	93.	86.	4.5	260.	63.
3A22	284.0	1514	789.253	.110	2.12	2.12	122.	92.	86.	4.0	260.	63.
3A23	286.0	1516	790.812	.100	1.93	1.93	123.	91.	85.	3.5	260.	63.
3A24	288.0	1518	792.309	.100	1.93	1.93	121.	91.	85.	3.5	260.	63.
4A01	290.0	1523	793.618	.080	1.55	1.55	118.	90.	84.	3.0	280.	65.
4A02	292.0	1525	795.130	.110	2.13	2.13	120.	90.	84.	4.0	280.	65.
4A03	294.0	1527	796.713	.110	2.13	2.13	120.	90.	84.	4.0	280.	65.
4A04	296.0	1529	798.300	.110	2.13	2.13	119.	91.	84.	4.0	280.	65.
4A05	298.0	1531	800.000	.130	2.52	2.52	119.	92.	84.	5.0	280.	65.
4A06	300.0	1533	801.810	.160	3.10	3.10	120.	93.	84.	6.5	280.	65.
4A07	302.0	1535	803.643	.140	2.70	2.70	121.	94.	84.	6.0	275.	65.
4A08	304.0	1537	805.690	.200	3.86	3.86	121.	95.	84.	9.0	275.	65.
4A09	306.0	1539	807.852	.210	4.06	4.06	120.	96.	85.	10.0	275.	65.
4A10	308.0	1541	809.967	.190	3.69	3.69	118.	96.	85.	9.0	275.	65.
4A11	310.0	1543	812.000	.200	3.89	3.89	117.	96.	85.	8.0	275.	65.
4A12	312.0	1545	814.002	.230	4.47	4.47	117.	97.	86.	10.5	265.	66.
4A13	314.0	1547	816.200	.160	3.11	3.11	117.	97.	86.	7.0	265.	66.
4A14	316.0	1549	818.127	.160	3.12	3.12	116.	98.	86.	7.0	265.	66.
4A15	318.0	1551	820.620	.200	3.90	3.90	116.	98.	86.	8.5	265.	64.
4A16	320.0	1553	822.220	.160	3.12	3.12	115.	98.	86.	7.5	265.	64.
4A17	322.0	1555	824.010	.120	2.34	2.34	115.	97.	86.	5.0	265.	64.
4A18	324.0	1557	825.680	.120	2.34	2.34	115.	97.	86.	5.0	265.	64.
4A19	326.0	1559	827.370	.130	2.54	2.54	115.	97.	86.	5.0	265.	64.
4A20	328.0	1561	829.050	.110	2.14	2.14	115.	97.	86.	4.5	265.	64.
4A21	330.0	1563	830.615	.100	1.95	1.95	115.	97.	87.	4.0	265.	64.
4A22	332.0	1565	832.150	.100	1.95	1.95	114.	97.	87.	4.0	265.	64.
4A23	334.0	1567	833.790	.080	1.56	1.56	114.	97.	87.	4.0	265.	64.
4A24	336.0	1569	835.128	.090	1.76	1.76	114.	97.	87.	4.0	265.	64.
4B01	338.0	0	836.620	.100	1.96	1.96	115.	98.	88.	4.0	265.	60.
4B02	340.0	0	838.070	.080	1.56	1.56	115.	98.	88.	3.5	265.	60.
4B03	342.0	1617	839.385	.070	1.36	1.36	116.	99.	88.	3.5	265.	60.
4B04	344.0	1622	840.710	.090	1.75	1.75	116.	99.	89.	3.5	265.	60.
4B05	346.0	0	842.210	.100	1.95	1.95	115.	99.	89.	3.7	265.	60.
4B06	348.0	0	843.710	.100	1.95	1.95	115.	98.	88.	4.0	265.	60.
4B07	350.0	0	845.370	.130	2.53	2.53	116.	96.	88.	4.0	265.	60.
4B08	352.0	0	847.065	.120	2.33	2.33	117.	97.	88.	5.0	260.	60.
4B09	354.0	0	848.810	.140	2.70	2.70	122.	97.	88.	5.5	260.	60.
4B10	356.0	0	850.680	.180	3.42	3.42	131.	97.	88.	6.5	260.	60.
4B11	358.0	0	852.620	.170	3.20	3.20	136.	97.	88.	8.0	260.	60.
4B12	360.0	0	854.635	.200	3.73	3.73	141.	97.	88.	8.5	255.	60.
4B13	362.0	0	856.815	.230	4.27	4.27	144.	97.	88.	10.0	250.	60.
4B14	364.0	0	858.750	.150	2.78	2.78	145.	100.	88.	6.5	250.	60.
4B15	366.0	0	860.150	.150	2.81	2.81	140.	100.	88.	6.0	250.	60.
4B16	368.0	0	862.505	.170	3.20	3.20	137.	100.	88.	7.0	250.	60.
4B17	370.0	0	864.445	.180	3.37	3.37	140.	100.	88.	7.5	250.	60.
4B18	372.0	0	866.320	.150	2.82	2.82	137.	100.	88.	6.0	250.	62.
4B19	374.0	0	868.080	.130	2.45	2.45	135.	100.	88.	5.0	255.	62.
4B20	376.0	0	869.870	.130	2.45	2.45	136.	101.	90.	5.0	255.	64.
4B21	378.0	0	871.610	.140	2.65	2.65	133.	101.	90.	5.5	255.	64.
4B22	380.0	0	873.415	.120	2.29	2.29	128.	102.	90.	5.0	250.	64.
4B23	382.0	0	874.995	.100	1.91	1.91	128.	102.	90.	5.0	250.	64.
4B24	284.0	1701	876.484	.120	2.29	2.29	128.	102.	91.	4.8	250.	64.
5B01	386.0	1706	877.699	.070	1.36	1.36	117.	102.	92.	2.0	250.	68.
5B02	388.0	1708	879.124	.090	1.74	1.74	120.	102.	92.	3.0	260.	66.
5B03	390.0	1710	880.564	.090	1.74	1.74	120.	102.	92.	3.0	260.	62.
5B04	392.0	1712	882.170	.110	2.13	2.13	119.	102.	92.	4.0	260.	62.
5B05	394.0	1714	883.934	.140	2.71	2.71	119.	102.	92.	5.5	260.	62.

5B06	396.0	1716	885.730	.140	2.72	2.72	118.	102.	92.	5.5	270.	60.
5B07	398.0	1718	887.353	.110	2.14	2.14	118.	102.	92.	4.0	255.	60.
5B08	400.0	1720	889.246	.160	3.11	3.11	117.	102.	92.	7.0	250.	60.
5B09	402.0	1722	891.413	.210	4.08	4.08	117.	102.	92.	10.0	260.	62.
5B10	404.0	1724	893.584	.210	4.08	4.08	117.	101.	91.	10.0	260.	62.
5B11	406.0	1726	895.749	.200	3.89	3.89	117.	101.	91.	9.0	250.	60.
5B12	408.0	1728	897.892	.200	3.89	3.89	117.	101.	91.	9.0	250.	60.
5B13	410.0	1730	899.938	.180	3.50	3.50	117.	101.	91.	8.0	250.	60.
5B14	412.0	1732	902.000	.180	3.50	3.50	117.	101.	91.	8.0	250.	60.
5B15	414.0	1734	903.743	.130	2.53	2.53	117.	101.	91.	5.0	260.	62.
5B16	416.0	1736	905.740	.180	3.50	3.50	117.	100.	91.	7.5	255.	63.
5B17	418.0	1738	907.530	.130	2.52	2.52	118.	100.	91.	5.0	245.	61.
5B18	420.0	1740	909.329	.150	2.91	2.91	118.	100.	92.	6.0	250.	60.
5B19	422.0	1742	911.238	.160	3.10	3.10	119.	100.	92.	6.5	240.	60.
5B20	424.0	1744	913.134	.160	3.10	3.10	118.	100.	91.	6.5	255.	60.
5B21	426.0	1746	914.953	.140	2.72	2.72	118.	101.	91.	5.0	255.	62.
5B22	428.0	1748	916.800	.150	2.92	2.92	117.	100.	90.	6.0	260.	62.
5B23	430.0	1750	918.600	.130	2.53	2.53	117.	100.	90.	5.0	260.	62.
5B24	432.0	1752	920.252	.120	2.33	2.33	117.	100.	90.	5.0	250.	64.
5A01	434.0	1757	921.681	.090	1.76	1.76	114.	97.	89.	3.0	250.	63.
5A02	436.0	1759	923.164	.100	1.90	1.90	132.	96.	89.	3.5	250.	60.
5A03	438.0	1801	924.950	.150	2.82	2.82	138.	96.	89.	6.0	255.	60.
5A04	440.0	1803	926.776	.150	2.81	2.81	140.	96.	89.	6.0	255.	60.
5A05	442.0	1805	928.654	.160	2.98	2.98	143.	97.	89.	6.0	255.	60.
5A06	444.0	1807	930.843	.220	4.07	4.07	146.	97.	89.	9.5	260.	61.
5A07	446.0	1809	932.999	.220	4.09	4.09	144.	98.	89.	9.5	260.	61.
5A08	448.0	1811	935.246	.230	4.27	4.27	145.	98.	90.	10.0	265.	61.
5A09	450.0	1813	937.299	.190	3.52	3.52	146.	98.	90.	8.0	245.	61.
5A10	452.0	1815	939.348	.190	3.52	3.52	146.	99.	90.	8.0	250.	60.
5A11	454.0	1817	941.200	.150	2.79	2.79	143.	98.	88.	6.0	260.	61.
5A12	456.0	1819	943.235	.210	3.92	3.92	141.	97.	88.	7.5	260.	61.
5A13	458.0	1821	945.438	.240	4.48	4.41	141.	96.	88.	11.0	260.	61.
5A14	460.0	1823	947.686	.240	4.48	4.40	139.	96.	88.	11.0	260.	61.
5A15	462.0	1825	949.890	.220	4.15	4.15	136.	96.	88.	10.0	250.	61.
5A16	464.0	1827	951.590	.120	2.27	2.27	133.	95.	88.	4.5	270.	60.
5A17	466.0	1829	953.490	.170	3.23	3.23	131.	95.	89.	5.5	260.	62.
5A18	468.0	1831	955.230	.130	2.47	2.47	130.	95.	89.	5.0	260.	67.
5A19	470.0	1833	956.800	.100	1.90	1.90	131.	95.	89.	3.5	260.	62.
5A20	472.0	1835	958.317	.100	1.90	1.90	129.	96.	87.	3.5	260.	63.
5A21	474.0	1837	959.799	.090	1.72	1.72	127.	96.	87.	3.5	250.	63.
5A22	476.0	1839	961.091	.070	1.34	1.34	126.	96.	87.	2.0	250.	63.
5A23	478.0	1841	962.543	.090	1.73	1.73	125.	96.	87.	3.0	250.	64.
5A24	480.0	1843	963.942	.090	1.73	1.73	124.	96.	87.	3.0	250.	68.
TOTALS	480.0		437.939									
AVERAGE					2.90	2.90	119.	96.	87.	6.2	258.	60.

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT- NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH READING, PA — P REINERMANN RC SH

TEST C2P-3 SITE NO 2

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/30/81	04/30/81
TB	TIME-START	1010	1010
TF	TIME-FINISH	1843	1843
TT	NET TIME OF TEST, MIN.	480.0	480.0
NP	NET SAMPLING POINTS	240	240
Y	METER CALIBRATION FACTOR	1.050	1.050
DN	SAMPLING NOZZLE DIAMETER	.375 IN	9.5 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	2.90 IN-H2O	73.6 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	437.939 CU-FT	12.401 CU-M
TM	AVERAGE GAS METER TEMP	91.3 F	32.9 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	440.326 SCF	12.469 SCM
VLC	TOTAL H2O COLLECTED IN IMPINGERS AND SILICA GEL,ML.	49.5	49.5
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	2.330 SCF	.066 SCM
BWO	PERCENT MOISTURE BY VOLUME	.53	.53
FMD	MOLE FRACTION DRY GAS	.995	.995
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.81	28.81

PB	BAROMETRIC PRESSURE	29.70	IN-HG	754.38	MM-HG
PSI	STATIC PRES OF STACK GAS	.10	IN-H2O	2.54	MM-H2O
PS	STACK PRES, ABS.	29.71	IN-HG	754.57	MM-HG
TS	AVERAGE STACK TEMP	119.	F	49.	C
VS	AVG STACK GAS VELOCITY	22.6	FPS	6.9	MPS
AS	STACK AREA	17105.	SQ-IN	11.035	SQ-M
QSSTD	STACK FLOW RATE, DRY*	8710496.	SCFH	246655.	SCMH
QS	ACTUAL STACK FLOW RATE	9679092.	ACFH	274083.	ACMH
ISO	PERCENT ISOKINETIC	97.9		97.9	
MN	ORGANIC MG. EPA 5	3.6		3.6	
CS	ORGANIC	.0001	GR/DSCF*	.289	MG/DSCM
PMR	ORGANIC EMISSION RATE	.157	LB/HR	.07	KG/HR
MN	INORGANIC MG. EPA 5	5.6		5.6	
CS	INORGANIC	.0002	GR/DSCF*	.449	MG/DSCM
PMR	INORGANIC EMISSION RATE	.244	LB/HR	.11	KG/HR
MN	PARTICULATE MG. EPA 5	8.1		8.1	
CS	PARTICULATE	.0003	GR/DSCF*	.650	MG/DSCM
PMR	PARTICULATE EMISSION RATE	.353	LB/HR	.16	KG/HR

* 68 DEG F, 29.92 IN.HG.

EXAMPLE PARTICULATE CALCULATIONS TEST NO. C2P-3

SITE NO 2

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

VMSTD = (17.647 * VM * Y * (PB + PM / 13.6)) / (TM + 460.)

$$VMSTD = \frac{17.647 * 437.939 * 1.050 * (29.70 + 2.897 / 13.6)}{(91. + 460.)} = 440.326 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

VWC = .04707 * VLC

VWC = .04707 * 50. = 2.33 SCF

PERCENT MOISTURE IN STACK GAS

BWO = (100. * VWC) / (VMSTD + VWC)

$$BWO = \frac{100. * 2.33}{440.326 + 2.33} = .53 \text{ PERCENT}$$

MOLE FRACTION OF DRY STACK GAS

FMD = (100. - BWO) / 100.

$$FMD = \frac{100. - .5}{100.} = .995$$

AVERAGE MOLECULAR WEIGHT OF DRY STACK GAS

MD = (PCO2 * .44) + (PO2 * .32) + (PN2 + PCO) * .28

MD = (.60*44/100) + (19.4*32/100) + ((80.0+ .0) * 28/100 = 28.87

MOLECULAR WEIGHT OF STACK GAS

MWS = MD * (1. - (BWO/100)) + 18. * (BWO/100)

MWS = 28.87* (1. -(.53/100)) + 18. * (.53/100) = 28.81

STACK GAS VELOCITY AT STACK CONDITIONS

DELP = SUM. OF THE SQRT(VH * (TS + 460.))

VS = 85.49 * CP * DELP / (SQRT(MWS * PS) * PNTS)

VS = 85.49 * .84 * 2213.246 / (SQRT(28.81 * 29.71) * 240. = 22.63 FPS

STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS

QS = VS * AS * 3600/144

QS = 22.63 * 17105. 3600/144 = 9679092. ACFH

STACK GAS VOLUMETRIC FLOW AT STANDARD CONDITIONS

QSSTD = 17.647 * QS * PS * (1. - (BWO/100)) / (TS + 460.)

```
          17.647 *    9679092. *  29.71 * (1. - (  .53/100))
QSSTD = ------------------------------------------------- =    8710496. SCFH
                     ( 119. + 460.)
```

PERCENT ISOKINETIC

ISO = (305.58*(TS+460.))*((0.002669*VLC)+(VM*Y*(PB+(PM/13.6))/(TM+460.)))/(TT*VS*PS*DN*DN)

```
       (305.58*( 119.+460.))*((0.002669*   50.)+(  437.939*1.050*( 29.70+(   2.897/13.6))/(  91.+460.)))
ISO = ------------------------------------------------------------------------------------------------ =  97.86 PERCENT
                                  480. *     22.63 *   29.71 *  .375 *  .375
```

PARTICULATE LOADING -- EPA METHOD 5 (AT STANDARD CONDITIONS)

CS = 0.001 * MN * 15.43 / VMSTD

CS = 0.001 * 3.6 * 15.43 / 440.326 = .000 GR/DSCF

PARTICULATE LBS/HR -- EPA METHOD 5

PMR = CS * QSSTD / (15.43 * 453.6)

PMR = .000 * 8710496. / (15.43 * 453.6) = .16

STACK VELOCITY DATA

PLANT	CARPENTER TECH READING, PA
DATE	04/28/81
SAMPLING LOCATION	SITE #3 INLET SCAVENGER
RUN NUMBER	C3-1V
CLOCK TIME	0
OPERATOR	ANTESBERGER
AMBIENT TEMP. (DEG.F)	70.
BAR.PRESS.(IN HG)	29.85
STATIC PRESS.(IN H2O)	-1.30
MOLECULAR WEIGHT	28.90
STACK INSIDE DIM(IN)	58.000 X 58.000
PITOT TUBE COEFF.	.82
MOISTURE CONTENT(%)	1.50

TRAVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H2O)	STACK TEMP (DEG.F)
A-01	.0	.950	126.
A-02	.0	.900	127.
A-03	.0	.750	120.
A-04	.0	.800	121.
A-05	.0	.850	119.
A-06	.0	.780	118.
A-07	.0	.860	125.
B-01	.0	.840	124.
B-02	.0	.790	127.
B-03	.0	.750	124.
B-04	.0	.830	128.
B-05	.0	.850	131.
B-06	.0	.770	124.
B-07	.0	.790	125.
C-01	.0	.830	124.
C-02	.0	.700	121.
C-03	.0	.890	133.
C-04	.0	.800	130.
C-05	.0	.820	131.
C-06	.0	.710	131.
C-07	.0	.810	128.
D-01	.0	.870	129.
D-02	.0	.750	130.
D-03	.0	.850	129.
D-04	.0	.700	121.
D-05	.0	.750	128.
D-06	.0	.800	128.
D-07	.0	.750	130.
E-01	.0	.820	128.
E-02	.0	.710	126.
E-03	.0	.850	125.
E-04	.0	.810	121.
E-05	.0	.910	131.
E-06	.0	.700	127.
E-07	.0	.760	127.

F-01	.0	.850	128.
F-02	.0	.810	130.
F-03	.0	.900	128.
F-04	.0	.890	127.
F-05	.0	.810	127.
F-06	.0	.810	128.
G-01	.0	.850	130.
G-02	.0	.870	131.
G-03	.0	.890	140.
G-04	.0	.800	138.
G-05	.0	.710	139.
G-06	.0	.850	140.
AVERAGE		.811	128.

PLANT CARPENTER TECH READING, PA
DATE 04/28/81
SAMPLING LOCATION SITE #3 INLET SCAVENGER
RUN NUMBER C3-1V

STACK AREA, SQ. FT. 23.361
STACK ABS. PRES., IN HG. 29.75
STACK GAS TEMPERATURE, DEG.F 128.
SQRT(VEL HD X STACK TEMP ABS) 21.8

STACK GAS VELOCITY, ACT. FPS 52.2
STACK GAS VOLUME (WET), ACT. CFM. 73126.0
STACK GAS VOLUME (DRY), ACT. CFM. 72029.1
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :
(DRY) 64351.5
(WET) 65331.5

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT	PTC	PITOT TUBE COEFFICENT
BPRES	BAROMETRIC PRESSURE, IN HG	SPRES	STATIC PRESSURE, IN H2O
DELP	DELTA P	STEMP	STACK TEMPERATURE, DEG F
DIA	DIAMETER OF CIRCULAR STACK, IN	STPRES	STACK PRESSURE, IN HG
DIM1	LENGTH OF RECTANGULAR STACK, IN	STVEL	STACK VELOCITY, AFPM
DIM2	WIDTH OF RECTANGULAR STACK, IN	TEMP	TEMPERATURE, DEG F
MOIST	MOISTURE CONTENT	VH	VELOCITY HEAD, IN H2O
MW	MOLECULAR WEIGHT	SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
NP	NUMBER OF TRAVERSE POINTS	VOLFLW	VOLUMETRIC FLOW (WET), ACFM
BW	MOLE FRACTION WATER VAPOR	SVOLFLD	STANDARD VOLUMETRIC FLOW (DRY), DSCFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT[VH * TEMP]]}{NP} = \frac{1025.7}{47} = 21.8$$

$$STPRES = BPRES + (SPRES/13.6) = 29.85 + (-1.30/13.6) = 29.8 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{6003.}{47} = 128. \text{ DEG F}$$

$$AREA[RECTANGULAR\ STACK] = \frac{DIM1 * DIM2}{144} = \frac{58.000 * 58.000}{144} = 23.36 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .82 * 21.8}{SQRT[28.90 * 29.8]} = 52.2 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 52.2 * 23.361 = 73126.0 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{73126.0 * 29.8 * (460. + 68.)}{29.92 * (127.7 + 460.)} = 65331.5 \text{ ACFM}$$

$$SVOLFLD = SVOLFLW * (1 - BW) = 65331.5 * (1 - .02) = 64351.5 \text{ DSCFM}$$

STACK VELOCITY DATA

PLANT CARPENTER TECH READING, PA
DATE 04/29/81
SAMPLING LOCATION SITE #3 INLET SCAVENGER
RUN NUMBER C3-2

CLOCK TIME 0
OPERATOR R ANTESBERGER
AMBIENT TEMP. (DEG.F) 80.
BAR.PRESS.(IN HG) 29.60
STATIC PRESS.(IN H2O) -1.30
MOLECULAR WEIGHT 28.90
STACK INSIDE DIM(IN) 58.000 X 58.000
PITOT TUBE COEFF. .82
MOISTURE CONTENT(%) 1.50

TRAVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H2O)	STACK TEMP (DEG.F)
A-01	.0	.630	121.
A-02	.0	.740	121.
A-03	.0	.650	122.
A-04	.0	.720	121.
A-05	.0	.730	122.
A-06	.0	.810	121.
A-07	.0	.830	120.
B-01	.0	.750	125.
B-02	.0	.850	126.
B-03	.0	.750	125.
B-04	.0	.810	125.
B-05	.0	.870	124.
B-06	.0	.810	124.
B-07	.0	.800	124.
D-01	.0	.830	124.
D-02	.0	1.000	124.
D-03	.0	.850	125.
D-04	.0	.870	124.
D-05	.0	.900	122.
D-06	.0	.910	122.
D-07	.0	.900	121.
E-01	.0	.680	129.
E-02	.0	.600	128.
E-03	.0	.750	129.
E-04	.0	.790	129.
E-05	.0	.800	130.
E-06	.0	.830	129.
E-07	.0	.910	130.
F-01	.0	.950	130.
F-02	.0	.850	129.
F-03	.0	.700	131.
F-04	.0	.750	131.
F-05	.0	.730	130.
F-06	.0	.750	130.
F-07	.0	.880	127.

G-01	.0	.950	131.
G-02	.0	.920	131.
G-03	.0	.850	123.
G-04	.0	.900	132.
G-05	.0	.720	135.
G-06	.0	.800	135.
G-07	.0	.950	135.
C-01	.0	.850	130.
C-02	.0	.800	129.
C-03	.0	.700	129.
C-04	.0	.750	131.
AVERAGE		.808	127.

PLANT	CARPENTER TECH READING, PA
DATE	04/29/81
SAMPLING LOCATION	SITE #3 INLET SCAVENGER
RUN NUMBER	C3-2

STACK AREA, SQ. FT.	23.361
STACK ABS. PRES., IN HG.	29.50
STACK GAS TEMPERATURE, DEG.F	127.
SQRT(VEL HD X STACK TEMP ABS)	21.7
STACK GAS VELOCITY, ACT. FPS	52.2
STACK GAS VOLUME (WET), ACT. CFM.	73162.4
STACK GAS VOLUME (DRY), ACT. CFM.	72065.0
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :	
(DRY)	63935.5
(WET)	64909.1

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT	PTC	PITOT TUBE COEFFICENT
BPRES	BAROMETRIC PRESSURE, IN HG	SPRES	STATIC PRESSURE, IN H2O
DELP	DELTA P	STEMP	STACK TEMPERATURE, DEG F
DIA	DIAMETER OF CIRCULAR STACK, IN	STPRES	STACK PRESSURE, IN HG
DIM1	LENGTH OF RECTANGULAR STACK, IN	STVEL	STACK VELOCITY, AFPM
DIM2	WIDTH OF RECTANGULAR STACK, IN	TEMP	TEMPERATURE, DEG F
MOIST	MOISTURE CONTENT	VH	VELOCITY HEAD, IN H2O
MW	MOLECULAR WEIGHT	SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
NP	NUMBER OF TRAVERSE POINTS	VOLFLW	VOLUMETRIC FLOW (WET), ACFM
BW	MOLE FRACTION WATER VAPOR	SVOLFLD	STANDARD VOLUMETRIC FLOW (DRY), DSCFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT[VH * TEMP]]}{NP} = \frac{1000.1}{46} = 21.7$$

$$STPRES = BPRES + (SPRES/13.6) = 29.60 + (-1.30/13.6) = 29.5 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{5836.}{46} = 127. \text{ DEG F}$$

$$AREA[RECTANGULAR\ STACK] = \frac{DIM1 * DIM2}{144} = \frac{58.000 * 58.000}{144} = 23.36 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .82 * 21.7}{SQRT[28.90 * 29.5]} = 52.2 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 52.2 * 23.361 = 73162.4 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{73162.4 * 29.5 * (460. + 68.)}{29.92 * (126.9 + 460.)} = 64909.1 \text{ ACFM}$$

$$SVOLFLD = SVOLFLW * (1 - BW) = 64909.1 * (1 - .02) = 63935.5 \text{ DSCFM}$$

STACK VELOCITY DATA

PLANT CARPENTER TECH READING, PA
DATE 04/30/81
SAMPLING LOCATION SITE #3 INLET SCAVENGER
RUN NUMBER C3-3

CLOCK TIME 0
OPERATOR ANTESBERGER
AMBIENT TEMP. (DEG.F) 70.
BAR.PRESS.(IN HG) 29.70
STATIC PRESS.(IN H2O) -1.30
MOLECULAR WEIGHT 28.90
STACK INSIDE DIM(IN) 58.000 X 58.000
PITOT TUBE COEFF. .82
MOISTURE CONTENT(%) 1.50

TRAVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H2O)	STACK TEMP (DEG.F)
A-01	.0	1.000	100.
A-02	.0	.950	99.
A-03	.0	.680	106.
A-04	.0	.880	105.
A-05	.0	.870	105.
A-06	.0	.750	110.
A-07	.0	.800	109.
B-01	.0	.910	111.
B-02	.0	.850	113.
B-03	.0	.800	115.
B-04	.0	.710	113.
B-05	.0	.700	113.
B-06	.0	.710	112.
B-07	.0	.850	115.
D-01	.0	.900	117.
D-02	.0	.810	118.
D-03	.0	.800	117.
D-04	.0	.850	117.
D-05	.0	.800	115.
D-06	.0	.890	113.
D-07	.0	.950	112.
E-01	.0	.950	120.
E-02	.0	.900	121.
E-03	.0	.960	117.
E-04	.0	.700	116.
E-05	.0	.890	115.
E-06	.0	.780	114.
E-07	.0	.810	116.
F-01	.0	.850	118.
F-02	.0	.950	115.
F-03	.0	.800	113.
F-04	.0	.870	112.
F-05	.0	.900	115.
F-06	.0	.980	117.
F-07	.0	.850	120.

G-01	.0	.830	132.
G-02	.0	.900	133.
G-03	.0	.950	135.
G-04	.0	.810	123.
G-05	.0	.900	121.
G-06	.0	.900	118.
G-07	.0	.750	117.
C-01	.0	.780	136.
C-02	.0	.800	137.
C-03	.0	.830	131.
C-04	.0	.750	131.
C-05	.0	.850	133.
C-06	.0	.800	134.
C-07	.0	.900	131.
AVERAGE		.845	118.

PLANT	CARPENTER TECH READING, PA
DATE	04/30/81
SAMPLING LOCATION	SITE #3 INLET SCAVENGER
RUN NUMBER	C3-3

STACK AREA, SQ. FT.	23.361
STACK ABS. PRES., IN HG.	29.60
STACK GAS TEMPERATURE, DEG.F	118.
SQRT(VEL HD X STACK TEMP ABS)	22.1

STACK GAS VELOCITY, ACT. FPS	52.9
STACK GAS VOLUME (WET), ACT. CFM.	74142.9
STACK GAS VOLUME (DRY), ACT. CFM.	73030.7
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :	
(DRY)	66023.5
(WET)	67029.0

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT	PTC	PITOT TUBE COEFFICENT
BPRES	BAROMETRIC PRESSURE, IN HG	SPRES	STATIC PRESSURE, IN H2O
DELP	DELTA P	STEMP	STACK TEMPERATURE, DEG F
DIA	DIAMETER OF CIRCULAR STACK, IN	STPRES	STACK PRESSURE, IN HG
DIM1	LENGTH OF RECTANGULAR STACK, IN	STVEL	STACK VELOCITY, AFPM
DIM2	WIDTH OF RECTANGULAR STACK, IN	TEMP	TEMPERATURE, DEG F
MOIST	MOISTURE CONTENT	VH	VELOCITY HEAD, IN H2O
MW	MOLECULAR WEIGHT	SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
NP	NUMBER OF TRAVERSE POINTS	VOLFLW	VOLUMETRIC FLOW (WET), ACFM
BW	MOLE FRACTION WATER VAPOR	SVOLFLD	STANDARD VOLUMETRIC FLOW (DRY), DSCFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT(VH * TEMP)]}{NP} = \frac{1081.5}{49} = 22.1$$

$$STPRES = BPRES + (SPRES/13.6) = 29.70 + (-1.30/13.6) = 29.6 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{5776.}{49} = 118. \text{ DEG F}$$

$$AREA(RECTANGULAR\ STACK) = \frac{DIM1 * DIM2}{144} = \frac{58.000 * 58.000}{144} = 23.36 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .82 * 22.1}{SQRT[\ 28.90 * 29.6\ ]} = 52.9 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 52.9 * 23.361 = 74142.9 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{74142.9 * 29.6 * (460. + 68.)}{29.92 * (117.9 + 460.)} = 67029.0 \text{ ACFM}$$

$$SVOLFLD = SVOLFLW * (1 - BW) = 67029.0 * (1 - .02) = 66023.5 \text{ DSCFM}$$

STACK VELOCITY DATA

PLANT	CARTECH, READING, PA
DATE	04/27/81
SAMPLING LOCATION	SITE #4 TORCHCUTTER
RUN NUMBER	C4V-1
CLOCK TIME	1050
OPERATOR	PROHASKA/FITZGERALD
AMBIENT TEMP. (DEG.F)	65.
BAR.PRESS.(IN HG)	29.84
STATIC PRESS.(IN H2O)	-5.50
MOLECULAR WEIGHT	29.00
STACK INSIDE DIM(IN)	20.000
PITOT TUBE COEFF.	.81
MOISTURE CONTENT(%)	1.50

TRAVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H2O)	STACK TEMP (DEG.F)
01	.0	3.000	85.
02	.0	3.400	86.
03	.0	3.700	87.
04	.0	3.700	94.
05	.0	3.700	104.
06	.0	4.400	100.
07	.0	4.400	96.
08	.0	4.500	95.
09	.0	4.500	94.
10	.0	4.500	93.
11	.0	4.200	91.
12	.0	4.500	92.
13	.0	4.800	93.
14	.0	5.000	92.
15	.0	4.800	92.
16	.0	4.300	91.
17	.0	3.700	90.
18	.0	2.000	90.
19	.0	1.400	91.
20	.0	1.500	91.
AVERAGE		3.800	92.

PLANT CARTECH, READING, PA
DATE 04/27/81
SAMPLING LOCATION SITE #4 TORCHCUTTER
RUN NUMBER C8V-1

STACK AREA, SQ. FT. 2.182
STACK ABS. PRES., IN HG. 29.40
STACK GAS TEMPERATURE, DEG.F 92.
SQRT(VEL HD X STACK TEMP ABS) 45.3

STACK GAS VELOCITY, ACT. FPS 107.3
STACK GAS VOLUME (WET), ACT. CFM. 14043.3
STACK GAS VOLUME (DRY), ACT. CFM. 13832.7
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :
(DRY) 13008.8
(WET) 13206.9

SAMPLE CALCULATIONS

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT	PTC	PITOT TUBE COEFFICENT
BPRES	BAROMETRIC PRESSURE, IN HG	SPRES	STATIC PRESSURE, IN H20
DELP	DELTA P	STEMP	STACK TEMPERATURE, DEG F
DIA	DIAMETER OF CIRCULAR STACK, IN	STPRES	STACK PRESSURE, IN HG
DIM1	LENGTH OF RECTANGULAR STACK, IN	STVEL	STACK VELOCITY, AFPM
DIM2	WIDTH OF RECTANGULAR STACK, IN	TEMP	TEMPERATURE, DEG F
MOIST	MOISTURE CONTENT	VH	VELOCITY HEAD, IN H20
MW	MOLECULAR WEIGHT	SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
NP	NUMBER OF TRAVERSE POINTS	VOLFLW	VOLUMETRIC FLOW (WET), ACFM
BW	MOLE FRACTION WATER VAPOR	SVOLFLD	STANDARD VOLUMETRIC FLOW (DRY), DSCFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT[VH * TEMP]]}{NP} = \frac{905.3}{20} = 45.3$$

$$STPRES = BPRES + (SPRES/13.6) = 29.84 + (-5.50/13.6) = 29.4 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{1847.}{20} = 92. \text{ DEG F}$$

$$AREA(CIRCULAR\ STACK) = \frac{3.1416 * (DIA/2)**2}{144} = \frac{3.1416 * (20.000/2)**2}{144} = 2.182 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .81 * 45.3}{SQRT[29.00 * 29.4]} = 107.3 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 107.3 * 2.182 = 14043.3 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{14043.3 * 29.4 * (460. + 68.)}{29.92 * (92.4 + 460.)} = 13206.9 \text{ ACFM}$$

$$SVOLFLD = SVOLFLW * (1 - BW) = 13206.9 * (1 - .02) = 13008.8 \text{ DSCFM}$$

FIELD DATA

PLANT	CARPENTER TECH, READING, PA	DATE	04/28/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	CIM-2
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	9 FT PIPE
OPERATOR	ANTESBERGER	NOZZLE : I.D.	.140
AMBIENT TEMP.(DEG.F)	75.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.85	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	FB8
FILTER NUMBER(S)	MARK III	METER HEAD DIFF.	1.91
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	0.
THERM. NO.	129	HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ 15.0 IN.HG		
METER CALIB. FACTOR	.982		
READ & RECORD DATA EVERY	5.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	1800	603.830									
C-04	5.0	1805	605.930	1.400	.51	.51	160.	92.	92.	.0	160.	53.
C-04	10.0	1810	607.990	1.400	.51	.51	166.	92.	92.	.0	166.	54.
C-04	15.0	1815	610.070	1.400	.51	.51	156.	92.	92.	.0	156.	54.
TOTALS	15.0		6.240									
AVERAGE					.51	.51	161.	92.	92.	.0	161.	54.

PERCENT ISOKINETIC 102.0

PLANT & CITY	CARPENTER TECH, READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.468
SAMPLING LOCATION	SITE #1 INLET	IMPACTOR TEMP.	160.7F 71.5C
DATE	04/28/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C1M-2	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	160.7F 71.5C	CO	.00
BAR.PRESS.(IN. HG)	29.85	N2	78.80
STACK PRESS.(IN. HG)	29.75	O2	19.11
NOZZLE:I.D.(IN.)	.140	H2O	1.50
METER HEAD DIFF.	.510	SAMPLING DURATION(MIN.)	15.00

CALC. MASS LOADING = 1.4189E-01 GR/ACF 1.7030E-01 GR/DSCF 3.2469E+02 MG/ACM 3.8971E+02 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	11.62	10.75	6.95	4.44	2.55	1.22	.76	.42	
MASS (MILLIGRAMS)	6.80	.50	1.00	1.90	4.10	12.60	12.50	12.90	12.30
MG/DSCM/STAGE	4.09E+01	3.01E+00	6.01E+00	1.14E+01	2.46E+01	7.58E+01	7.52E+01	7.76E+01	7.39E+01
CUM. PERCENT OF MASS SMALLER THAN D50	89.47	88.70	87.15	84.21	77.86	58.36	39.01	19.04	
CUM. (MG/ACM) SMALLER THAN D50	2.91E+02	2.88E+02	2.83E+02	2.73E+02	2.53E+02	1.89E+02	1.27E+02	6.18E+01	
CUM. (MG/DSCM) SMALLER THAN D50	3.49E+02	3.46E+02	3.40E+02	3.28E+02	3.03E+02	2.27E+02	1.52E+02	7.42E+01	
CUM. (GR/ACF) SMALLER THAN D50	1.27E-01	1.26E-01	1.24E-01	1.19E-01	1.10E-01	8.28E-02	5.53E-02	2.70E-02	
CUM. (GR/DSCF) SMALLER THAN D50	1.52E-01	1.51E-01	1.48E-01	1.43E-01	1.33E-01	9.94E-02	6.64E-02	3.24E-02	
GEO. MEAN DIA. (MICROMETERS)	2.41E+01	1.12E+01	8.64E+00	5.55E+00	3.37E+00	1.76E+00	9.65E-01	5.68E-01	2.98E-01
DM/DLOGD (MG/DSCM)	6.45E+01	8.91E+01	3.17E+01	5.88E+01	1.03E+02	2.35E+02	3.72E+02	2.99E+02	2.46E+02
DN/DLOGD (NO. PARTICLES/DSCM)	8.80E+06	1.22E+08	9.37E+07	6.56E+08	5.14E+09	8.20E+10	7.91E+11	3.13E+12	1.77E+13

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

PLANT & CITY	CARPENTER TECH, READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.468
SAMPLING LOCATION	STTE #1 INLET	IMPACTOR TEMP.	160.7F 71.5C
DATE	04/28/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	CIM-2	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	160.7F 71.5C	CO	.00
BAR.PRESS.(IN. HG)	29.85	N2	78.80
STACK PRESS.(IN. HG)	29.75	O2	19.11
NOZZLE:I.D.(IN.)	.140	H2O	1.50
METER HEAD DIFF.	.510	SAMPLING DURATION(MIN.)	15.00

CALC. MASS LOADING = 1.4189E-01 GR/ACF 1.7030E-01 GR/DSCF 3.2469E+02 MG/ACM 3.8971E+02 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	11.72	10.85	7.04	4.54	2.65	1.31	.86	.51	
MASS (MILLIGRAMS)	6.80	.50	1.00	1.90	4.10	12.60	12.50	12.90	12.30
MG/DSCM/STAGE	4.09E+01	3.01E+00	6.01E+00	1.14E+01	2.46E+01	7.58E+01	7.52E+01	7.76E+01	7.39E+01
CUM. PERCENT OF MASS SMALLER THAN D50	89.47	88.70	87.15	84.21	77.86	58.36	39.01	19.04	
CUM. (MG/ACM) SMALLER THAN D50	2.91E+02	2.88E+02	2.83E+02	2.73E+02	2.53E+02	1.89E+02	1.27E+02	6.18E+01	
CUM. (MG/DSCM) SMALLER THAN D50	3.49E+02	3.46E+02	3.40E+02	3.28E+02	3.03E+02	2.27E+02	1.52E+02	7.42E+01	
CUM. (GR/ACF) SMALLER THAN D50	1.27E-01	1.26E-01	1.24E-01	1.19E-01	1.10E-01	8.28E-02	5.53E-02	2.70E-02	
CUM. (GR/DSCF) SMALLER THAN D50	1.52E-01	1.51E-01	1.48E-01	1.43E-01	1.33E-01	9.94E-02	6.64E-02	3.24E-02	
GEO. MEAN DIA. (MICROMETERS)	2.42E+01	1.13E+01	8.74E+00	5.65E+00	3.47E+00	1.86E+00	1.06E+00	6.63E-01	3.63E-01
DM/DLOGD (MG/DSCM)	6.49E+01	8.98E+01	3.20E+01	5.98E+01	1.06E+02	2.48E+02	4.07E+02	3.48E+02	2.46E+02
DN/DLOGD (NO. PARTICLES/DSCM)	8.74E+06	1.20E+08	9.15E+07	6.33E+08	4.84E+09	7.31E+10	6.53E+11	2.28E+12	9.83E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH, READING, PA — ANTESBERGER

TEST C1M-2 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/28/81	04/28/81
TB	TIME-START	1800	1800
TF	TIME-FINISH	1815	1815
TT	NET TIME OF TEST, MIN.	15.0	15.0
Y	METER CALIBRATION FACTOR	.982	.982
DN	SAMPLING NOZZLE DIAMETER	.140 IN	3.6 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.51 IN-H2O	13.0 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	6.240 CU-FT	.177 CU-M
TM	AVERAGE GAS METER TEMP	92.0 F	33.3 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	5.855 SCF	.166 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	.089 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.85 IN-HG	758.19 MM-HG
PST	STATIC PRES OF STACK GAS	-1.30 IN-H2O	-33.02 MM-H2O
PS	STACK PRES, ABS.	29.75 IN-HG	755.76 MM-HG

TS	AVERAGE STACK TEMP	161. F	71. C
TF	GAS SAMPLED AT STACK CONDITIONS	7.03 ACF	.20 ACM
AS	STACK AREA	10816. SQ-IN	6.978 SQ-M
ISO	PERCENT ISOKINETIC	102.0	102.0
MT	TOTAL MASS OF PARTICLES	.997 GR	64.600 MG
PD	PARTICLE DENSITY	.06 GR/CT	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
CARPENTER TECH, READING, PA	ANTESBERGER	C1M-2	SITE #1 INLET
TEST DATE 04/28/81			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .997 / 7.026 = .1419 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .997 / 5.855 = .1703 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 64.600 / .199 = 324.6907 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 64.600 / .166 = 389.7106 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 6.80 / .166 = 40.88

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{12.50 + 12.90 + 12.30}{64.60 \text{ (MG)}} * 100 = 77.86$$

CUM.(MASS/VOLUME) — THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM, GR/ACF, GR/DSCF.

EXAMPLE CALCULATIONS

```
CUM.(MG/ACM) (5) = MASS(6) + MASS(7) + MASS(8) + MASS(9)
                   ------------------------------------
                                IF(ACM)

CUM.(MG/ACM) (5) =    12.60 +     12.50 +     12.90 +     12.30
                   ------------------------------------------------  =     252.82
                                      .20  (ACM)
```

GEO.MEAN DIA.(MICROMETERS) — THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

```
GEO.MEAN DIA.(J) = SQRT( D50(J) * D50(J-1))

GEO.MEAN DIA.(6) = SQRT(     1.31 *      2.65)  =      1.86
```

DM/DLOGD(MG/DSCM) — DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

```
DM/DLOGD(J) =   MG/DSCM/STAGE(J)
              --------------------
              LOG( D50(J-1) / D50(J))

DM/DLOGD (3) =          6.01
              ------------------------  =      32.01
              LOG(     10.85 /      7.04 )
```

DN/DLOGD — THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

```
DN/DLOGD(J) =          DM/DLOGD(J)
              ------------------------------------------
              5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)

DN/DLOGD (3) =          32.01
              ----------------------------------  =      91542400.00
              5.235999E-10 *      1.00  *      8.74
```

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	CARPENTER TECH, READING, PA	DATE	04/29/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	C1M-3
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	4 FT PIPE
OPERATOR	R ANTESBERGER	NOZZLE : I.D.	.146
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.60	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	FB8
FILTER NUMBER(S)	MARK III	METER HEAD DIFF.	1.91
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	0.
THERM. NO.	129	HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ 15.0 IN.HG		
METER CALIB. FACTOR	.982		
READ & RECORD DATA EVERY	2.5 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	940	610.265									
C-02	2.5	942	611.055	1.700	.74	.74	119.	70.	70.	.0	119.	47.
C-02	5.0	945	611.900	1.700	.74	.74	120.	70.	70.	.0	120.	46.
TOTALS	5.0		1.635									
AVERAGE					.74	.74	120.	70.	70.	.0	120.	47.

PERCENT ISOKINETIC 67.1

PLANT & CITY	CARPENTER TECH, READING, PA	IMPACTOR FLOWRATE(ACFM)	.358
SAMPLING LOCATION	SITE #1 INLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	119.5F 48.6C
DATE	04/29/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C1M-3	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	R ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	119.5F 48.6C	CO	.00
BAR.PRESS.(IN. HG)	29.60	N2	78.80
STACK PRESS.(IN. HG)	29.50	O2	19.11
NOZZLE:I.D.(IN.)	.146	H2O	1.50
METER HEAD DIFF.	.740	SAMPLING DURATION(MIN.)	5.00

CALC. MASS LOADING = 7.0643E-02 GR/ACF 7.9831E-02 GR/DSCF 1.6166E+02 MG/ACM 1.8268E+02 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	12.98	12.01	7.77	4.97	2.87	1.38	.87	.49	
MASS (MILLIGRAMS)	2.10	.00	.10	.00	.60	1.90	1.60	1.20	.70
MG/DSCM/STAGE	4.66E+01	0.00E+00	2.22E+00	0.00E+00	1.33E+01	4.22E+01	3.55E+01	2.66E+01	1.55E+01
CUM. PERCENT OF MASS SMALLER THAN D50	74.39	74.39	73.17	73.17	65.85	42.68	23.17	8.54	
CUM. (MG/ACM) SMALLER THAN D50	1.20E+02	1.20E+02	1.18E+02	1.18E+02	1.06E+02	6.90E+01	3.75E+01	1.38E+01	
CUM. (MG/DSCM) SMALLER THAN D50	1.36E+02	1.36E+02	1.34E+02	1.34E+02	1.20E+02	7.80E+01	4.23E+01	1.56E+01	
CUM. (GR/ACF) SMALLER THAN D50	5.26E-02	5.26E-02	5.17E-02	5.17E-02	4.65E-02	3.02E-02	1.64E-02	6.03E-03	
CUM. (GR/DSCF) SMALLER THAN D50	5.94E-02	5.94E-02	5.84E-02	5.84E-02	5.26E-02	3.41E-02	1.85E-02	6.81E-03	
GEO. MEAN DIA. (MICROMETERS)	2.55E+01	1.25E+01	9.66E+00	6.21E+00	3.77E+00	1.99E+00	1.09E+00	6.52E-01	3.45E-01
DM/DLOGD (MG/DSCM)	7.96E+01	0.00E+00	1.17E+01	0.00E+00	5.58E+01	1.32E+02	1.79E+02	1.06E+02	5.16E+01
DN/DLOGD (NO. PARTICLES/DSCM)	9.19E+06	0.00E+00	2.48E+07	0.00E+00	1.98E+09	3.22E+10	2.60E+11	7.31E+11	2.39E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

PLANT & CITY	CARPENTER TECH, READING, PA	IMPACTOR FLOWRATE(ACFM)	.358
		AT IMPACTOR CONDITIONS	
SAMPLING LOCATION	SITE #1 INLET	IMPACTOR TEMP.	119.5F 48.6C
DATE	04/29/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	CIM-3	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	R ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	119.5F 48.6C	CO	.00
BAR.PRESS.(IN. HG)	29.60	N2	78.80
STACK PRESS.(IN. HG)	29.50	O2	19.11
NOZZLE:I.D.(IN.)	.146	H2O	1.50
METER HEAD DIFF.	.740	SAMPLING DURATION(MIN.)	5.00

CALC. MASS LOADING = 7.0643E-02 GR/ACF 7.9831E-02 GR/DSCF 1.6166E+02 MG/ACM 1.8268E+02 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	13.07	12.10	7.85	5.06	2.96	1.46	.96	.57	
MASS (MILLIGRAMS)	2.10	.00	.10	.00	.60	1.90	1.60	1.20	.70
MG/DSCM/STAGE	4.66E+01	0.00E+00	2.22E+00	0.00E+00	1.33E+01	4.22E+01	3.55E+01	2.66E+01	1.55E+01
CUM. PERCENT OF MASS SMALLER THAN D50	74.39	74.39	73.17	73.17	65.85	42.68	23.17	8.50	
CUM. (MG/ACM) SMALLER THAN D50	1.20E+02	1.20E+02	1.18E+02	1.18E+02	1.06E+02	6.90E+01	3.75E+01	1.38E+01	
CUM. (MG/DSCM) SMALLER THAN D50	1.36E+02	1.36E+02	1.34E+02	1.34E+02	1.20E+02	7.80E+01	4.23E+01	1.56E+01	
CUM. (GR/ACF) SMALLER THAN D50	5.26E-02	5.26E-02	5.17E-02	5.17E-02	4.65E-02	3.02E-02	1.64E-02	6.03E-03	
CUM. (GR/DSCF) SMALLER THAN D50	5.94E-02	5.94E-02	5.84E-02	5.84E-02	5.26E-02	3.41E-02	1.85E-02	6.81E-03	
GEO. MEAN DIA. (MICROMETERS)	2.56E+01	1.26E+01	9.75E+00	6.30E+00	3.87E+00	2.08E+00	1.18E+00	7.41E-01	4.06E-01
DM/DLOGD (MG/DSCM)	8.00E+01	0.00E+00	1.18E+01	0.00E+00	5.71E+01	1.38E+02	1.93E+02	1.20E+02	5.16E+01
DN/DLOGD (NO. PARTICLES/DSCM)	9.15E+06	0.00E+00	2.44E+07	0.00E+00	1.88E+09	2.93E+10	2.22E+11	5.63E+11	1.48E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

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PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH, READING, PA — R ANTESBERGER

TEST C1M-3 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/29/81	04/29/81
TB	TIME-START	940	940
TF	TIME-FINISH	945	945
TT	NET TIME OF TEST, MIN.	5.0	5.0
Y	METER CALIBRATION FACTOR	.982	.982
DN	SAMPLING NOZZLE DIAMETER	.146 IN	3.7 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.74 IN-H2O	18.8 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	1.635 CU-FT	.046 CU-M
TM	AVERAGE GAS METER TEMP	70.0 F	21.1 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	1.585 SCF	.045 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	.024 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.60 IN-HG	751.84 MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30 IN-H2O	-33.02 MM-H2O
PS	STACK PRES, ABS.	29.50 IN-HG	749.41 MM-HG

TS	AVERAGE STACK TEMP	120. F	49. C
IF	GAS SAMPLED AT STACK CONDITIONS	1.79 ACF	.05 ACM
AS	STACK AREA	10816. SQ-IN	6.978 SQ-M
ISO	PERCENT ISOKINETIC	67.1	67.1
MT	TOTAL MASS OF PARTICLES	.127 GR	8.200 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
CARPENTER TECH, READING, PA	R ANTESBERGER	C1M-3	SITE #1 INLET
TEST DATE 04/29/81			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / TF(ACF)

CML = .127 / 1.791 = .0706 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .127 / 1.585 = .0798 GR/DSCF

CML(MG/ACM) = MT(MG) / TF(ACM)

CML = 8.200 / .051 = 161.6561 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 8.200 / .045 = 182.6812 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 2.10 / .045 = 46.63

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{1.60 + 0.20 + .70}{8.20 \text{ (MG)}} * 100 = 65.85$$

CUM.(MASS/VOLUME) THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM,GR/ACF,GR/DSCF.

EXAMPLE CALCULATIONS

```
CUM.(MG/ACM) (5) = MASS(6) + MASS(7) + MASS(8) + MASS(9)
                   ------------------------------------
                                 TF(ACM)

CUM.(MG/ACM) (5) =     1.90 +      1.60 +      1.20 +      .70
                   ------------------------------------------------  =     106.46
                                     .05  (ACM)
```

GEO.MEAN DIA.(MICROMETERS) THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

```
GEO.MEAN DIA.(J) = SQRT( D50(J) * D50(J-1))

GEO.MEAN DIA.(6) = SQRT(     1.46 *      2.96)  =      2.08
```

DM/DLOGD(MG/DSCM) DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

```
DM/DLOGD(J) =   MG/DSCM/STAGE(J)
              --------------------
              LOG( D50(J-1) / D50(J))

DM/DLOGD (3) =            2.22
              -------------------------  =      11.82
              LOG(     12.10 /      7.85 )
```

DN/DLOGD THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

```
DN/DLOGD(J) =          DM/DLOGD(J)
              ---------------------------------------------
              5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)

DN/DLOGD (3) =              11.82
              ------------------------------------  =      24352784.00
              5.235999E-10 *      1.00  *      9.75
```

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	CARPENTER TECH CO READING, PA	DATE	04/30/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	C1M-6
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	9 FT PIPE
OPERATOR	ANTESBERGER	NOZZLE # I.D.	.146
AMBIENT TEMP.(DEG.F)	75.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.70	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	F88
FILTER NUMBER(S)	MARK III	METER HEAD DIFF.	1.91
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	0.
THERM. NO.	129	HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ 15.0 IN.HG		
METER CALIB. FACTOR	.982		
READ & RECORD DATA EVERY	2.5 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	1450	916.835									
C-02	2.5	1452	918.000	1.800	.68	.68	120.	76.	76.	.0	120.	45.
C-02	5.0	1455	919.140	1.800	.68	.68	126.	76.	76.	.0	126.	45.
TOTALS	5.0		2.305									
AVERAGE					.68	.68	123.	76.	76.	.0	123.	45.

PERCENT ISOKINETIC 91.3

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PLANT & CITY	CARPENTER TECH CO READING, PA	IMPACTOR FLOWRATE(ACFM)	.502
SAMPLING LOCATION	SITE #1 INLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	123.0F 50.6C
DATE	04/30/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	CIM-6	MAX.PARTICLE DIAM.MICRONS	50.0
OPERATOR	ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	123.0F 50.6C	CO	.00
BAR.PRESS.(IN. HG)	29.70	N2	78.80
STACK PRESS.(IN. HG)	29.60	O2	19.11
NOZZLE:I.D.(IN.)	.146	H2O	1.50
METER HEAD DIFF.	.680	SAMPLING DURATION(MIN.)	5.00

CALC. MASS LOADING = 9.4616E-02 GR/ACF 1.0720E-01 GR/DSCF 2.1651E+02 MG/ACM 2.4532E+02 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	10.98	10.15	6.56	4.19	2.41	1.15	.72	.40	
MASS (MILLIGRAMS)	2.70	.30	.20	.30	1.40	4.60	3.20	1.90	.80
MG/DSCM/STAGE	4.29E+01	4.76E+00	3.18E+00	4.76E+00	2.22E+01	7.30E+01	5.08E+01	3.02E+01	1.27E+01
CUM. PERCENT OF MASS SMALLER THAN D50	82.47	80.52	79.22	77.27	68.18	38.31	17.53	5.19	
CUM. (MG/ACM) SMALLER THAN D50	1.79E+02	1.74E+02	1.72E+02	1.67E+02	1.48E+02	8.29E+01	3.80E+01	1.12E+01	
CUM. (MG/DSCM) SMALLER THAN D50	2.02E+02	1.98E+02	1.94E+02	1.90E+02	1.67E+02	9.40E+01	4.30E+01	1.27E+01	
CUM. (GR/ACF) SMALLER THAN D50	7.80E-02	7.62E-02	7.50E-02	7.31E-02	6.45E-02	3.62E-02	1.66E-02	4.92E-03	
CUM. (GR/DSCF) SMALLER THAN D50	8.84E-02	8.63E-02	8.49E-02	8.28E-02	7.31E-02	4.11E-02	1.88E-02	5.57E-03	
GEO. MEAN DIA. (MICROMETERS)	2.34E+01	1.06E+01	8.16E+00	5.24E+00	3.18E+00	1.67E+00	9.12E-01	5.36E-01	2.81E-01
DM/DLOGD (MG/DSCM)	6.51E+01	1.41E+02	1.67E+01	2.45E+01	9.26E+01	2.27E+02	2.52E+02	1.16E+02	4.22E+01
DN/DLOGD (NO. PARTICLES/DSCM)	9.67E+06	2.29E+08	5.88E+07	3.25E+08	5.50E+09	9.38E+10	6.35E+11	1.44E+12	3.62E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

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PLANT & CITY	CARPENTER TECH CO READING, PA	IMPACTOR FLOWRATE(ACFM)	.502
SAMPLING LOCATION	SITE #1 INLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	123.0F 50.6C
DATE	04/30/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	CIM-6	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	123.0F 50.6C	CO	.00
BAR.PRESS.(IN. HG)	29.70	N2	78.80
STACK PRESS.(IN. HG)	29.60	O2	19.11
NOZZLE:I.D.(IN.)	.146	H2O	1.50
METER HEAD DIFF.	.680	SAMPLING DURATION(MIN.)	5.00

CALC. MASS LOADING = 9.4616E-02 GR/ACF 1.0720E-01 GR/DSCF 2.1651E+02 MG/ACM 2.4532E+02 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	11.06	10.24	6.65	4.28	2.50	1.24	.81	.48	
MASS (MILLIGRAMS)	2.70	.30	.20	.30	1.40	4.60	3.20	1.90	.80
MG/DSCM/STAGE	4.29E+01	4.76E+00	3.18E+00	4.76E+00	2.22E+01	7.30E+01	5.08E+01	3.02E+01	1.27E+01
CUM. PERCENT OF MASS SMALLER THAN D50	82.47	80.52	79.22	77.27	68.18	38.31	17.53	5.19	
CUM. (MG/ACM) SMALLER THAN D50	1.79E+02	1.74E+02	1.72E+02	1.67E+02	1.48E+02	8.29E+01	3.80E+01	1.12E+01	
CUM. (MG/DSCM) SMALLER THAN D50	2.02E+02	1.98E+02	1.94E+02	1.90E+02	1.67E+02	9.40E+01	4.30E+01	1.27E+01	
CUM. (GR/ACF) SMALLER THAN D50	7.80E-02	7.62E-02	7.50E-02	7.31E-02	6.45E-02	3.62E-02	1.66E-02	4.92E-03	
CUM. (GR/DSCF) SMALLER THAN D50	8.84E-02	8.63E-02	8.49E-02	8.28E-02	7.31E-02	4.11E-02	1.88E-02	5.57E-03	
GEO. MEAN DIA. (MICROMETERS)	2.35E+01	1.06E+01	8.25E+00	5.34E+00	3.27E+00	1.76E+00	1.00E+00	6.25E-01	3.42E-01
DM/DLOGD (MG/DSCM)	6.54E+01	1.42E+02	1.69E+01	2.49E+01	9.52E+01	2.39E+02	2.75E+02	1.35E+02	4.22E+01
DN/DLOGD (NO. PARTICLES/DSCM)	9.60E+06	2.25E+08	5.75E+07	3.14E+08	5.19E+09	8.38E+10	5.25E+11	1.05E+12	2.02E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH CO READING, PA — ANTESBERGER

TEST C1M-6 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/30/81	04/30/81
TB	TIME-START	1450	1450
TF	TIME-FINISH	1455	1455
TT	NET TIME OF TEST, MIN.	5.0	5.0
Y	METER CALIBRATION FACTOR	.982	.982
DN	SAMPLING NOZZLE DIAMETER	.146 IN	3.7 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.68 IN-H2O	17.3 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	2.305 CU-FT	.065 CU-M
TM	AVERAGE GAS METER TEMP	76.0 F	24.4 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	2.217 SCF	.063 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	.034 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.70 IN-HG	754.38 MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30 IN-H2O	-33.02 MM-H2O
PS	STACK PRES, ABS.	29.60 IN-HG	751.95 MM-HG

TS	AVERAGE STACK TEMP	123.	F	51.	C
IF	GAS SAMPLED AT STACK CONDITIONS	2.51	ACF	.07	ACM
AS	STACK AREA	10816.	SQ-IN	6.978	SQ-M
ISO	PERCENT ISOKINETIC	91.3		91.3	
MT	TOTAL MASS OF PARTICLES	.238	GR	15.400	MG
PD	PARTICLE DENSITY	.06	GR/CI	1.00	GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
CARPENTER TECH CO READING, PA	ANTESBERGER	C1M-6	SITE #1 INLET
TEST DATE 04/30/81			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .238 / 2.512 = .0946 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .238 / 2.217 = .1072 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 15.400 / .071 = 216.5130 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 15.400 / .063 = 245.3207 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 2.70 / .063 = 42.86

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{3.20 + 1.90 + .80}{15.40 \text{ (MG)}} * 100 = 68.18$$

CUM.(MASS/VOLUME) THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM,GR/ACF,GR/DSCF.

EXAMPLE CALCULATIONS

```
                    MASS(6) + MASS(7) + MASS(8) + MASS(9)
CUM.(MG/ACM) (5) = ------------------------------------
                              IF(ACM)

                      4.60 +      3.20 +      1.90 +      .80
CUM.(MG/ACM) (5) = ------------------------------------------  =     147.62
                                   .07   (ACM)
```

GEO.MEAN DIA.(MICROMETERS) THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

```
GEO.MEAN DIA.(J) = SQRT( D50(J) * D50(J-1))

GEO.MEAN DIA.(6) = SQRT(     1.24 *      2.50)  =     1.76
```

DM/DLOGD(MG/DSCM) DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

```
                   MG/DSCM/STAGE(J)
DM/DLOGD(J) = --------------------
              LOG( D50(J-1) / D50(J))

                        3.18
DM/DLOGD (3) = ------------------------  =     16.91
               LOG(     10.24 /      6.65 )
```

DN/DLOGD THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

```
                      DM/DLOGD(J)
DN/DLOGD(J) = ----------------------------------------
              5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)

                        16.91
DN/DLOGD (3) = ----------------------------------  =     57452888.00
               5.235999E-10 *      1.00  *      8.25
```

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	CARTECH, READING, PA	DATE	04/28/81
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	RUN NUMBER	C2M-2
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	5 FOOT GALV
OPERATOR	DAN FITZGERALD	NOZZLE : I.D.	.261
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.77	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	.10	METER BOX NUMBER	FB2
FILTER NUMBER(S)	ANDERSON MARK 3	METER HEAD DIFF.	1.76
STACK INSIDE DIM.(IN)	66.00 .00		
PITOT TUBE COEFF.	.82	PROBE HEATER SETTING	0.
THERM. NO.	164	HEATER BOX SETTING	0.
LEAKAGE	.005 CFM @ 10.0 IN.HG		
METER CALIB. FACTOR	1.007	K FACTOR	2483.4
READ & RECORD DATA EVERY	10.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	937	995.538									
3R-9	10.0	947	999.915	.140	.57	.57	138.	68.	68.	1.0	138.	70.
3R-9	20.0	957	4.270	.140	.57	.57	137.	74.	68.	1.0	137.	44.
3R-9	30.0	1007	8.770	.140	.57	.57	129.	78.	69.	1.0	129.	42.
3R-9	40.0	1017	13.190	.140	.57	.57	123.	81.	71.	1.0	123.	42.
3R-9	50.0	1027	17.640	.140	.57	.57	120.	83.	74.	1.0	120.	42.
3R-9	60.0	1037	22.225	.140	.57	.57	119.	86.	75.	1.0	119.	42.
3R-9	70.0	1047	26.835	.140	.57	.57	120.	89.	78.	1.0	120.	42.
3R-9	80.0	1057	31.435	.140	.57	.57	119.	93.	81.	1.0	119.	42.
3R-9	90.0	1107	35.895	.140	.57	.57	120.	96.	84.	1.0	120.	42.
4R-8	100.0	1130	40.395	.140	.57	.57	137.	95.	90.	1.0	137.	42.
4R-8	110.0	1140	44.945	.140	.57	.57	131.	102.	91.	1.0	131.	42.
4R-8	120.0	1150	49.520	.140	.57	.57	129.	105.	93.	1.0	129.	42.
4R-8	130.0	1200	54.100	.140	.57	.57	128.	106.	95.	1.0	128.	42.
4R-8	140.0	1210	58.695	.140	.57	.57	126.	107.	97.	1.0	126.	42.
4R-8	150.0	1220	63.295	.140	.57	.57	127.	108.	98.	1.0	127.	42.
4R-8	160.0	1230	67.925	.140	.57	.57	128.	110.	99.	1.0	128.	42.
4R-8	170.0	1240	72.605	.140	.57	.57	129.	108.	99.	1.0	129.	42.
5R-9	180.0	1250	77.258	.140	.57	.57	125.	103.	97.	1.0	125.	42.
5R-9	190.0	1310	81.760	.140	.57	.57	148.	93.	92.	1.0	148.	44.
5R-9	200.0	1320	86.300	.140	.57	.57	151.	92.	89.	1.0	151.	46.
5R-9	210.0	1330	90.860	.140	.57	.57	142.	90.	87.	1.0	142.	44.
5R-9	220.0	1340	95.410	.140	.57	.57	133.	88.	85.	1.0	133.	44.
5R-9	230.0	1350	99.945	.150	.57	.57	127.	87.	83.	1.0	127.	44.
5R-9	240.0	1400	104.470	.150	.57	.57	125.	86.	82.	1.0	125.	44.
5R-9	250.0	1410	108.975	.140	.57	.57	125.	86.	82.	1.0	125.	46.
5R-9	260.0	1420	113.475	.140	.57	.57	125.	89.	82.	1.0	122.	48.
5R-9	270.0	1430	117.959	.140	.57	.57	122.	90.	82.	1.0	122.	48.
1R10	280.0	1502	122.520	.140	.57	.57	131.	86.	85.	1.0	131.	50.
1R10	290.0	1512	127.090	.150	.57	.57	128.	88.	84.	1.0	128.	45.
1R10	300.0	1522	131.625	.150	.57	.57	126.	89.	84.	1.0	126.	45.

PLANT CARTECH, READING, PA DATE 04/28/81

SAMPLING LOCATION SITE #2/BAGHOUSE OUTLET RUN NUMBER C2M-2

READ & RECORD DATA EVERY 10.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
1B10	310.0	1532	136.175	.150	.57	.57	125.	91.	84.	1.0	125.	45.
1B10	320.0	1542	140.725	.150	.57	.57	125.	93.	84.	1.0	125.	45.
1B10	330.0	1552	145.275	.150	.57	.57	123.	94.	84.	1.0	123.	45.
1B10	340.0	1606	149.815	.150	.57	.57	126.	96.	85.	1.0	126.	45.
1B10	350.0	1616	154.380	.150	.57	.57	129.	97.	86.	1.0	129.	45.
1B10	360.0	1626	158.909	.150	.57	.57	133.	98.	86.	1.0	133.	45.
2B-8	370.0	1704	163.565	.140	.57	.57	128.	92.	89.	1.0	128.	48.
2B-8	380.0	1714	168.220	.140	.57	.57	128.	92.	89.	1.0	128.	48.
2B-8	390.0	1724	172.860	.140	.57	.57	136.	93.	88.	1.0	138.	48.
2B-8	400.0	1734	177.500	.140	.57	.57	132.	94.	88.	1.0	132.	50.
2B-8	410.0	1744	182.065	.140	.57	.57	130.	95.	88.	1.0	130.	50.
2B-8	420.0	1754	186.610	.140	.57	.57	131.	95.	88.	1.0	131.	50.
2B-8	430.0	1804	191.220	.140	.57	.57	130.	95.	88.	1.0	130.	50.
2B-8	440.0	1814	195.735	.140	.57	.57	132.	95.	88.	1.0	132.	50.
2B-8	450.0	1824	200.286	.140	.57	.57	147.	94.	88.	1.0	147.	50.
TOTALS	450.0		204.748									
AVERAGE					.57	.57	129.	93.	85.	1.0	129.	46.

PERCENT ISOKINETIC 102.2

PLANT & CITY	CARTECH, READING, PA	IMPACTOR FLOWRATE(ACFM)	.500
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	129.4F 54.1C
DATE	04/28/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C2M-2	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	DAN FITZGERALD	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	129.4F 54.1C	CO	.00
BAR.PRESS.(IN. HG)	29.77	N2	78.80
STACK PRESS.(IN. HG)	29.78	O2	19.11
NOZZLE:I.D.(IN.)	.261	H2O	1.50
METER HEAD DIFF.	.570	SAMPLING DURATION(MIN.)	450.00

CALC. MASS LOADING = 2.8813E-04 GR/ACF 3.2814E-04 GR/DSCF 6.5934E-01 MG/ACM 7.5089E-01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	11.05	10.22	6.60	4.22	2.43	1.16	.73	.40	
MASS (MILLIGRAMS)	1.60	.60	.50	.50	.40	.10	.10	.00	.40
MG/DSCM/STAGE	2.85E-01	1.07E-01	8.91E-02	8.91E-02	7.13E-02	1.78E-02	1.78E-02	0.00E+00	7.13E-02
CUM. PERCENT OF MASS SMALLER THAN D50	61.90	47.62	35.71	23.81	14.29	11.90	9.52	9.52	
CUM. (MG/ACM) SMALLER THAN D50	4.08E-01	3.14E-01	2.35E-01	1.57E-01	9.42E-02	7.85E-02	6.28E-02	6.28E-02	
CUM. (MG/DSCM) SMALLER THAN D50	4.65E-01	3.58E-01	2.68E-01	1.79E-01	1.07E-01	8.94E-02	7.15E-02	7.15E-02	
CUM. (GR/ACF) SMALLER THAN D50	1.78E-04	1.37E-04	1.03E-04	6.86E-05	4.12E-05	3.43E-05	2.74E-05	2.74E-05	
CUM. (GR/DSCF) SMALLER THAN D50	2.03E-04	1.56E-04	1.17E-04	7.81E-05	4.69E-05	3.91E-05	3.13E-05	3.13E-05	
GEO. MEAN DIA. (MICROMETERS)	2.35E+01	1.06E+01	8.21E+00	5.28E+00	3.20E+00	1.68E+00	9.18E-01	5.40E-01	2.83E-01
DM/DLOGD (MG/DSCM)	4.35E-01	3.17E+00	4.69E-01	4.58E-01	2.97E-01	5.54E-02	8.83E-02	0.00E+00	2.37E-01
DN/DLOGD (NO. PARTICLES/DSCM)	6.40E+04	5.04E+06	1.62E+06	5.96E+06	1.73E+07	2.24E+07	2.18E+08	0.00E+00	1.99E+10

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

PLANT & CITY	CARTECH, READING, PA	IMPACTOR FLOWRATE(ACFM)	.500
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	129.4F 54.1C
DATE	04/28/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C2M-2	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	DAN FITZGERALD	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	129.4F 54.1C	CO	.00
BAR.PRESS.(IN. HG)	29.77	N2	78.80
STACK PRESS.(IN. HG)	29.78	O2	19.11
NOZZLE:I.D.(IN.)	.261	H2O	1.50
METER HEAD DIFF.	.570	SAMPLING DURATION(MIN.)	450.00

CALC. MASS LOADING = 2.8813E-04 GR/ACF 3.2814E-04 GR/DSCF 6.5934E-01 MG/ACM 7.5089E-01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	11.14	10.31	6.69	4.31	2.52	1.25	.81	.49	
MASS (MILLIGRAMS)	1.60	.60	.50	.50	.40	.10	.10	.00	.40
MG/DSCM/STAGE	2.85E-01	1.07E-01	8.91E-02	8.91E-02	7.13E-02	1.78E-02	1.78E-02	0.00E+00	7.13E-02
CUM. PERCENT OF MASS SMALLER THAN D50	61.90	47.62	35.71	23.81	14.29	11.90	9.52	9.52	
CUM. (MG/ACM) SMALLER THAN D50	4.08E-01	3.14E-01	2.35E-01	1.57E-01	9.42E-02	7.85E-02	6.28E-02	6.28E-02	
CUM. (MG/DSCM) SMALLER THAN D50	4.65E-01	3.58E-01	2.68E-01	1.79E-01	1.07E-01	8.94E-02	7.15E-02	7.15E-02	
CUM. (GR/ACF) SMALLER THAN D50	1.78E-04	1.37E-04	1.03E-04	6.86E-05	4.12E-05	3.43E-05	2.74E-05	2.74E-05	
CUM. (GR/DSCF) SMALLER THAN D50	2.03E-04	1.56E-04	1.17E-04	7.81E-05	4.69E-05	3.91E-05	3.13E-05	3.13E-05	
GEO. MEAN DIA. (MICROMETERS)	2.36E+01	1.07E+01	8.31E+00	5.37E+00	3.29E+00	1.77E+00	1.01E+00	6.29E-01	3.44E-01
DM/DLOGD (MG/DSCM)	4.37E-01	3.19E+00	4.74E-01	4.66E-01	3.05E-01	5.83E-02	9.65E-02	0.00E+00	2.37E-01
DN/DLOGD (NO. PARTICLES/DSCM)	6.35E+04	4.96E+06	1.58E+06	5.75E+06	1.63E+07	2.01E+07	1.81E+08	0.00E+00	1.11E+10

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARTECH, READING, PA — DAN FITZGERALD

TEST C2M-2 SITE #2/BAGHOUSE OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/28/81	04/28/81
TB	TIME-START	937	937
TF	TIME-FINISH	1824	1824
TT	NET TIME OF TEST, MIN.	450.0	450.0
Y	METER CALIBRATION FACTOR	1.007	1.007
DN	SAMPLING NOZZLE DIAMETER	.261 IN	6.6 MM
CP	PITOT TUBE COEFFICIENT	.82	.82
PM	AVERAGE ORIFICE PRESSURE DROP	.57 IN-H2O	14.5 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	204.748 CU-FT	5.798 CU-M
TM	AVERAGE GAS METER TEMP	89.1 F	31.7 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	197.550 SCF	5.594 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	3.008 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.77 IN-HG	756.16 MM-HG
PSI	STATIC PRES OF STACK GAS	.10 IN-H2O	2.54 MM-H2O
PS	STACK PRES, ABS.	29.78 IN-HG	756.34 MM-HG

8T

TS	AVERAGE STACK TEMP	129.	F	54.	C
IF	GAS SAMPLED AT STACK CONDITIONS	224.95	ACF	6.37	ACM
AS	STACK AREA	3421.	SQ-IN	2.207	SQ-M
ISO	PERCENT ISOKINETIC	102.2		102.2	
MT	TOTAL MASS OF PARTICLES	.065	GR	4.200	MG
PD	PARTICLE DENSITY	.06	GR/CT	1.00	GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
CARTECH, READING, PA	DAN FITZGERALD	C2M-2	SITE #2/BAGHOUSE OUTLET
TEST DATE 04/28/81			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .065 / 224.953 = .0003 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .065 / 197.550 = .0003 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 4.200 / 6.370 = .6593 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 4.200 / 5.594 = .7509 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 1.60 / 5.594 = .29

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{.10 + .00 + .40}{4.20 \text{ (MG)}} * 100 = 14.29$$

CUM.(MASS/VOLUME) — THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM,GR/ACF,GR/DSCF.

EXAMPLE CALCULATIONS

```
CUM.(MG/ACM) (5) = MASS(6) + MASS(7) + MASS(8) + MASS(9)
                   ----------------------------------
                                IF(ACM)

CUM.(MG/ACM) (5) =      .10 +      .10 +      .00 +      .40
                   ------------------------------------------ =      .09
                                  6.37  (ACM)
```

GEO.MEAN DIA.(MICROMETERS) — THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

```
GEO.MEAN DIA.(J) = SQRT( D50(J) * D50(J-1))

GEO.MEAN DIA.(6) = SQRT(     1.25 *     2.52)  =     1.77
```

DM/DLOGD(MG/DSCM) — DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

```
DM/DLOGD(J) =   MG/DSCM/STAGE(J)
              --------------------
              LOG( D50(J-1) / D50(J))

DM/DLOGD (3) =          .09
              ------------------------ =      .47
              LOG(    10.31 /    6.69 )
```

DN/DLOGD — THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

```
DN/DLOGD(J) =          DM/DLOGD(J)
              ----------------------------------------
              5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)

DN/DLOGD (3) =          .47
              ------------------------------------ =      1581353.75
              5.235999E-10 *     1.00  *     8.31
```

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	CARTECH, READING, PA	DATE	04/29/81
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	RUN NUMBER	C2M-3
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	5 FOOT GALV
OPERATOR	DAN FITZGERALD	NOZZLE : I.D.	.316
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.60	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	.10	METER BOX NUMBER	FB2
FILTER NUMBER(S)	ANDERSON MARK 3	METER HEAD DIFF.	1.76
STACK INSIDE DIM.(IN)	66.00 .00		
PITOT TUBE COEFF.	.82	PROBE HEATER SETTING	0.
THERM. NO.	164	HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ 10.0 IN.HG		
METER CALIB. FACTOR	1.007	K FACTOR	5339.9

READ & RECORD DATA EVERY 10.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	924	200.447									
3R-9	10.0	934	206.860	.140	1.27	1.27	112.	75.	74.	2.0	112.	60.
3R-9	20.0	944	213.300	.140	1.27	1.27	127.	81.	74.	2.0	127.	56.
3R-9	30.0	954	219.805	.140	1.27	1.27	139.	87.	77.	2.0	139.	40.
3R-9	40.0	1004	226.350	.140	1.27	1.27	133.	92.	80.	2.0	133.	40.
3R-9	50.0	1014	232.880	.140	1.27	1.27	132.	96.	82.	2.0	132.	40.
3R-9	60.0	1024	239.500	.140	1.27	1.27	127.	98.	83.	2.0	127.	42.
3R-9	70.0	1034	246.145	.140	1.27	1.27	124.	102.	88.	2.0	124.	42.
3R-9	80.0	1044	252.830	.140	1.27	1.27	123.	103.	90.	2.0	123.	40.
3R-9	90.0	1054	259.513	.160	1.27	1.27	124.	104.	92.	2.0	124.	40.
2R-8	100.0	1116	265.075	.130	1.27	1.27	123.	97.	92.	2.0	123.	40.
2R-8	110.0	1126	272.690	.150	1.27	1.27	122.	98.	92.	2.0	122.	40.
2R-8	120.0	1136	279.440	.140	1.27	1.27	120.	100.	92.	2.0	120.	40.
2R-8	130.0	1146	285.880	.140	1.27	1.27	129.	101.	92.	2.0	129.	40.
2R-8	140.0	1156	292.400	.140	1.27	1.27	147.	101.	92.	2.0	147.	40.
2R-8	150.0	1206	298.935	.140	1.27	1.27	141.	101.	92.	2.0	141.	40.
2R-8	160.0	1216	305.475	.140	1.27	1.27	133.	102.	92.	2.0	133.	40.
2R-8	170.0	1226	312.060	.140	1.27	1.27	127.	103.	93.	2.0	127.	40.
2R-8	180.0	1236	318.632	.140	1.27	1.27	127.	103.	93.	2.0	127.	40.
1R10	190.0	1258	325.325	.140	1.27	1.27	121.	96.	92.	2.0	121.	40.
1R10	200.0	1320	331.990	.140	1.27	1.27	120.	93.	91.	2.0	120.	40.
1R10	210.0	1330	338.620	.140	1.27	1.27	121.	86.	86.	2.0	121.	40.
1R10	220.0	1340	345.215	.140	1.27	1.27	153.	87.	85.	2.0	153.	40.
1R10	230.0	1350	351.795	.150	1.27	1.27	132.	89.	84.	2.0	132.	40.
1R10	240.0	1400	358.355	.140	1.27	1.27	141.	90.	84.	2.0	141.	40.
1R10	250.0	1410	364.920	.140	1.27	1.27	143.	91.	84.	2.0	143.	44.
1R10	260.0	1420	371.500	.160	1.27	1.27	132.	91.	84.	2.0	132.	44.
1R10	270.0	1430	378.063	.160	1.27	1.27	129.	90.	83.	2.0	129.	46.
5R-9	280.0	1454	384.590	.140	1.27	1.27	126.	83.	81.	2.0	126.	48.
5R-9	290.0	1504	391.165	.140	1.27	1.27	123.	83.	80.	2.0	123.	48.
5R-9	300.0	1514	397.695	.140	1.27	1.27	124.	85.	81.	2.0	124.	48.

PLANT CARTECH, READING, PA DATE 04/29/81
SAMPLING LOCATION SITE #2/BAGHOUSE OUTLET RUN NUMBER C2M-3

READ & RECORD DATA EVERY 10.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
5B-9	310.0	1524	404.230	.140	1.27	1.27	127.	87.	80.	2.0	127.	48.
5B-9	320.0	1534	410.765	.140	1.27	1.27	125.	88.	80.	2.0	125.	50.
5B-9	330.0	1544	417.285	.140	1.27	1.27	126.	88.	81.	2.0	126.	50.
5B-9	340.0	1554	423.775	.140	1.27	1.27	149.	89.	80.	2.0	149.	50.
5B-9	350.0	1604	430.275	.140	1.27	1.27	151.	90.	81.	2.0	151.	50.
5B-9	360.0	1614	436.634	.140	1.27	1.27	147.	90.	81.	2.0	147.	50.
4B-8	370.0	1632	443.300	.140	1.27	1.27	132.	86.	81.	2.0	132.	50.
4B-8	380.0	1642	449.900	.140	1.27	1.27	128.	86.	81.	2.0	128.	50.
4B-8	390.0	1652	456.470	.140	1.27	1.27	124.	88.	81.	2.0	124.	50.
4B-8	400.0	1702	463.065	.140	1.27	1.27	127.	90.	81.	2.0	127.	50.
4B-8	410.0	1712	469.650	.150	1.27	1.27	127.	91.	81.	2.0	127.	50.
4B-8	420.0	1722	476.235	.150	1.27	1.27	134.	92.	82.	2.0	134.	50.
4B-8	430.0	1732	482.815	.150	1.27	1.27	148.	92.	82.	2.0	148.	52.
4B-8	440.0	1742	489.390	.150	1.27	1.27	136.	92.	82.	2.0	136.	52.
4B-8	450.0	1752	495.970	.150	1.27	1.27	133.	92.	82.	2.0	133.	52.
TOTALS	450.0		295.523									
AVERAGE					1.27	1.27	131.	92.	84.	2.0	131.	45.

PERCENT ISOKINETIC 100.6

PLANT & CITY	CARTECH, READING, PA	IMPACTOR FLOWRATE(ACFM)	.726
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	130.9F 54.9C
DATE	04/29/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C2M-3	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	DAN FITZGERALD	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	130.9F 54.9C	CO	.00
BAR.PRESS.(IN. HG)	29.60	N2	78.80
STACK PRESS.(IN. HG)	29.61	O2	19.11
NOZZLE:I.D.(IN.)	.316	H2O	1.50
METER HEAD DIFF.	1.270	SAMPLING DURATION(MIN.)	450.00

CALC. MASS LOADING = 1.1816E-04 GR/ACF 1.3568E-04 GR/DSCF 2.7040E-01 MG/ACM 3.1048E-01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.16	8.47	5.47	3.49	2.00	.94	.59	.31	
MASS (MILLIGRAMS)	.90	.30	.20	.30	.20	.10	.00	.30	.20
MG/DSCM/STAGE	1.11E-01	3.71E-02	2.48E-02	3.71E-02	2.48E-02	1.24E-02	0.00E+00	3.71E-02	2.48E-02
CUM. PERCENT OF MASS SMALLER THAN D50	64.00	52.00	44.00	32.00	24.00	20.00	20.00	8.00	
CUM. (MG/ACM) SMALLER THAN D50	1.73E-01	1.41E-01	1.19E-01	8.65E-02	6.49E-02	5.41E-02	5.41E-02	2.16E-02	
CUM. (MG/DSCM) SMALLER THAN D50	1.99E-01	1.61E-01	1.37E-01	9.94E-02	7.45E-02	6.21E-02	6.21E-02	2.48E-02	
CUM. (GR/ACF) SMALLER THAN D50	7.56E-05	6.14E-05	5.20E-05	3.78E-05	2.84E-05	2.36E-05	2.36E-05	9.45E-06	
CUM. (GR/DSCF) SMALLER THAN D50	8.68E-05	7.06E-05	5.97E-05	4.34E-05	3.26E-05	2.71E-05	2.71E-05	1.09E-05	
GEO. MEAN DIA. (MICROMETERS)	2.14E+01	8.81E+00	6.81E+00	4.37E+00	2.64E+00	1.38E+00	7.45E-01	4.29E-01	2.21E-01
DM/DLOGD (MG/DSCM)	1.51E-01	1.10E+00	1.30E-01	1.90E-01	1.03E-01	3.80E-02	0.00E+00	1.36E-01	8.22E-02
DN/DLOGD (NO. PARTICLES/DSCM)	2.94E+04	3.07E+06	7.88E+05	4.36E+06	1.06E+07	2.79E+07	0.00E+00	3.29E+09	1.45E+10

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

PLANT & CITY	CARTECH, READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.726
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	IMPACTOR TEMP.	130.9F 54.9C
DATE	04/29/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C2M-3	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	DAN FITZGERALD	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	130.9F 54.9C	CO	.00
BAR.PRESS.(IN. HG)	29.60	N2	78.80
STACK PRESS.(IN. HG)	29.61	O2	19.11
NOZZLE:I.D.(IN.)	.316	H2O	1.50
METER HEAD DIFF.	1.270	SAMPLING DURATION(MIN.)	450.00

CALC. MASS LOADING = 1.1816E-04 GR/ACF 1.356AE-04 GR/DSCF 2.7040E-01 MG/ACM 3.1048E-01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.25	8.57	5.56	3.58	2.09	1.03	.67	.40	
MASS (MILLIGRAMS)	.90	.30	.20	.30	.20	.10	.00	.30	.20
MG/DSCM/STAGE	1.11E-01	3.71E-02	2.48E-02	3.71E-02	2.48E-02	1.24E-02	0.00E+00	3.71E-02	2.48E-02
CUM. PERCENT OF MASS SMALLER THAN D50	64.00	52.00	44.00	32.00	24.00	20.00	20.00	8.00	
CUM. (MG/ACM) SMALLER THAN D50	1.73E-01	1.41E-01	1.19E-01	8.65E-02	6.49E-02	5.41E-02	5.41E-02	2.16E-02	
CUM. (MG/DSCM) SMALLER THAN D50	1.99E-01	1.61E-01	1.37E-01	9.94E-02	7.45E-02	6.21E-02	6.21E-02	2.48E-02	
CUM. (GR/ACF) SMALLER THAN D50	7.56E-05	6.14E-05	5.20E-05	3.78E-05	2.84E-05	2.36E-05	2.36E-05	9.45E-06	
CUM. (GR/DSCF) SMALLER THAN D50	8.68E-05	7.06E-05	5.97E-05	4.34E-05	3.26E-05	2.71E-05	2.71E-05	1.09E-05	
GEO. MEAN DIA. (MICROMETERS)	2.15E+01	8.90E+00	6.90E+00	4.46E+00	2.74E+00	1.47E+00	8.35E-01	5.20E-01	2.83E-01
DM/DLOGD (MG/DSCM)	1.52E-01	1.11E+00	1.32E-01	1.94E-01	1.06E-01	4.04E-02	0.00E+00	1.64E-01	8.22E-02
DN/DLOGD (NO. PARTICLES/DSCM)	2.92E+04	3.00E+06	7.66E+05	4.18E+06	9.88E+06	2.43E+07	0.00E+00	2.23E+09	6.90E+09

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARTECH, READING, PA — DAN FITZGERALD

TEST C2M-3 SITE #2/BAGHOUSE OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/29/81	04/29/81
TB	TIME-START	924	924
TF	TIME-FINISH	1752	1752
TT	NET TIME OF TEST, MIN.	450.0	450.0
Y	METER CALIBRATION FACTOR	1.007	1.007
DN	SAMPLING NOZZLE DIAMETER	.316 IN	8.0 MM
CP	PITOT TUBE COEFFICIENT	.82	.82
PM	AVERAGE ORIFICE PRESSURE DROP	1.27 IN-H2O	32.3 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	295.523 CU-FT	8.368 CU-M
TM	AVERAGE GAS METER TEMP	88.3 F	31.3 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	284.385 SCF	8.053 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	4.331 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.60 IN-HG	751.84 MM-HG
PSI	STATIC PRES OF STACK GAS	.10 IN-H2O	2.54 MM-H2O
PS	STACK PRES, ABS.	29.61 IN-HG	752.03 MM-HG

95

TS	AVERAGE STACK TEMP	131. F	55. C
TF	GAS SAMPLED AT STACK CONDITIONS	326.50 ACF	9.25 ACM
AS	STACK AREA	3421. SQ-IN	2.207 SQ-M
ISO	PERCENT ISOKINETIC	100.6	100.6
MT	TOTAL MASS OF PARTICLES	.039 GR	2.500 MG
PD	PARTICLE DENSITY	.06 GR/CT	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
CARTECH, READING, PA	DAN FITZGERALD	C2M-3	SITE #2/BAGHOUSE OUTLET
TEST DATE 04/29/81			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .039 / 326.503 = .0001 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .039 / 284.385 = .0001 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 2.500 / 9.246 = .2704 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 2.500 / 8.053 = .3105 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = .90 / 8.053 = .11

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{.00 + .30 + .20}{2.50 \text{ (MG)}} * 100 = 24.00$$

CUM.(MASS/VOLUME) — THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM,GR/ACF,GR/DSCF.

EXAMPLE CALCULATIONS

```
CUM.(MG/ACM) (5) = MASS(6) + MASS(7) + MASS(8) + MASS(9)
                   ------------------------------------
                                IF(ACM)

CUM.(MG/ACM) (5) =      .10 +      .00 +      .30 +      .20
                   ------------------------------------------  =      .06
                              9.25  (ACM)
```

GEO.MEAN DIA.(MICROMETERS) — THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

```
GEO.MEAN DIA.(J) = SQRT( D50(J) * D50(J-1))

GEO.MEAN DIA.(6) = SQRT(     1.03 *      2.09)  =     1.47
```

DM/DLOGD(MG/DSCM) — DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

```
DM/DLOGD(J) =   MG/DSCM/STAGE(J)
              -------------------
              LOG( D50(J-1) / D50(J))

DM/DLOGD (5) =          .09
              ------------------------  =      .13
              LOG(     8.57 /     5.56 )
```

DN/DLOGD — THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

```
DN/DLOGD(J) =          DM/DLOGD(J)
              ------------------------------------------
              5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)

DN/DLOGD (3) =          .13
              ---------------------------------  =      766293.63
              5.235999E-10 *     1.00  *     6.90
```

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	CARTECH, READING, PA	DATE	04/30/81
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	RUN NUMBER	C2M-5
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	5 FOOT GALV
OPERATOR	DAN FITZGERALD	NOZZLE : I.D.	.315
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.70	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	.10	METER BOX NUMBER	FB3
FILTER NUMBER(S)	ANDERSON MARK 3	METER HEAD DIFF.	1.98
STACK INSIDE DIM.(IN)	66.00 .00		
PITOT TUBE COEFF.	.82	PROBE HEATER SETTING	0.
THERM. NO.	164	HEATER BOX SETTING	0.
LEAKAGE	.007 CFM @ 14.0 IN.HG		
METER CALIB. FACTOR	1.008	K FACTOR	6224.5
READ & RECORD DATA EVERY 15.0 MINUTES			

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	900	216.472									
5A10	15.0	915	226.230	.160	1.48	1.48	121.	73.	71.	1.0	121.	72.
5A10	30.0	930	236.000	.160	1.48	1.48	120.	82.	70.	1.0	120.	72.
5A10	45.0	945	245.795	.160	1.48	1.48	121.	87.	71.	1.0	121.	72.
5A10	60.0	1000	255.600	.160	1.48	1.48	120.	90.	72.	1.0	120.	72.
5A10	75.0	1015	265.445	.160	1.48	1.48	115.	93.	72.	1.0	115.	72.
5A10	90.0	1030	275.340	.160	1.48	1.48	113.	94.	79.	1.0	113.	72.
5A10	105.0	1045	285.295	.160	1.48	1.48	108.	95.	80.	1.0	108.	72.
5A10	120.0	1100	295.225	.160	1.48	1.48	104.	94.	81.	1.0	104.	72.
5A10	135.0	1115	305.210	.160	1.48	1.48	105.	96.	82.	1.0	105.	72.
5A10	150.0	1130	315.155	.160	1.48	1.48	108.	95.	83.	1.0	108.	72.
5A10	165.0	1145	325.085	.160	1.48	1.48	131.	94.	82.	1.0	131.	72.
5A10	180.0	1200	334.965	.160	1.48	1.48	119.	94.	82.	1.0	119.	72.
5A10	195.0	1215	344.860	.160	1.48	1.48	114.	96.	84.	1.0	114.	72.
5A10	210.0	1230	354.890	.160	1.48	1.48	114.	100.	85.	1.0	114.	72.
5A10	225.0	1245	364.975	.160	1.48	1.48	110.	103.	87.	1.0	110.	74.
5A10	240.0	1300	375.060	.160	1.48	1.48	111.	103.	88.	1.0	111.	74.
5A10	255.0	1315	385.215	.160	1.48	1.48	110.	103.	90.	1.0	110.	76.
5A10	270.0	1330	395.335	.160	1.48	1.48	135.	100.	90.	1.0	135.	76.
5A10	285.0	1345	405.355	.160	1.48	1.48	141.	98.	90.	1.0	141.	76.
5A10	300.0	1400	415.440	.160	1.48	1.48	120.	101.	90.	1.0	120.	76.
5A10	315.0	1415	425.495	.160	1.48	1.48	114.	101.	90.	1.0	114.	76.
5A10	330.0	1430	435.580	.160	1.48	1.48	112.	100.	90.	1.0	112.	76.
5A10	345.0	1445	445.670	.160	1.48	1.48	112.	99.	90.	1.0	112.	76.
5A10	360.0	1500	455.765	.160	1.48	1.48	110.	97.	89.	1.0	110.	76.
5A10	375.0	1515	465.855	.160	1.48	1.48	132.	96.	88.	1.0	132.	76.
5A10	390.0	1530	475.808	.160	1.48	1.48	122.	94.	87.	1.0	122.	76.
2A-5	405.0	1601	485.805	.130	1.48	1.48	116.	94.	86.	1.0	116.	76.
2A-5	420.0	1616	495.830	.120	1.48	1.48	115.	98.	86.	1.0	115.	76.
2A-5	435.0	1637	505.895	.120	1.48	1.48	116.	105.	86.	1.0	115.	76.
2A-5	450.0	1652	516.035	.120	1.48	1.48	134.	102.	90.	1.0	134.	76.

PLANT CARTECH, READING, PA
SAMPLING LOCATION SITE #2/BAGHOUSE OUTLET
DATE 04/30/81
RUN NUMBER C2M-5

READ & RECORD DATA EVERY 15.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
2A-5	465.0	1707	526.055	.130	1.48	1.48	137.	106.	90.	1.0	137.	76.
2A-5	480.0	1722	536.140	.130	1.48	1.48	130.	108.	93.	1.0	130.	76.
2A-5	495.0	1737	546.255	.130	1.48	1.48	118.	107.	94.	1.0	118.	76.
2A-5	510.0	1752	556.420	.130	1.48	1.48	118.	106.	94.	1.0	118.	76.
2A-5	525.0	1807	566.555	.130	1.48	1.48	117.	102.	94.	1.0	117.	76.
2A-5	540.0	1822	576.878	.130	1.48	1.48	141.	102.	93.	1.0	141.	76.
TOTALS	540.0		360.406									
AVERAGE					1.48	1.48	119.	97.	85.	1.0	119.	74.

PERCENT ISOKINETIC 99.0

100

PLANT & CITY	CARTECH, READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.720
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	IMPACTOR TEMP.	119.0F 48.3C
DATE	04/30/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C2M-5	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	DAN FITZGERALD	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	119.0F 48.3C	CO	.00
BAR.PRESS.(IN. HG)	29.70	N2	78.80
STACK PRESS.(IN. HG)	29.71	O2	19.11
NOZZLE:I.D.(IN.)	.315	H2O	1.50
METER HEAD DIFF.	1.480	SAMPLING DURATION(MIN.)	540.00

CALC. MASS LOADING = 1.0721E-04 GR/ACF 1.2023E-04 GR/DSCF 2.4534E-01 MG/ACM 2.7512E-01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.13	8.45	5.45	3.48	2.00	.94	.59	.31	
MASS (MILLIGRAMS)	1.50	.20	.40	.00	.20	.00	.20	.00	.20
MG/DSCM/STAGE	1.52E-01	2.03E-02	4.06E-02	0.00E+00	2.03E-02	0.00E+00	2.03E-02	0.00E+00	2.03E-02
CUM. PERCENT OF MASS SMALLER THAN D50	44.44	37.04	22.22	22.22	14.81	14.81	7.41	7.41	
CUM. (MG/ACM) SMALLER THAN D50	1.09E-01	9.09E-02	5.45E-02	5.45E-02	3.63E-02	3.63E-02	1.82E-02	1.82E-02	
CUM. (MG/DSCM) SMALLER THAN D50	1.22E-01	1.02E-01	6.11E-02	6.11E-02	4.08E-02	4.08E-02	2.04E-02	2.04E-02	
CUM. (GR/ACF) SMALLER THAN D50	4.77E-05	3.97E-05	2.38E-05	2.38E-05	1.59E-05	1.59E-05	7.94E-06	7.94E-06	
CUM. (GR/DSCF) SMALLER THAN D50	5.34E-05	4.45E-05	2.67E-05	2.67E-05	1.78E-05	1.78E-05	8.91E-06	8.91E-06	
GEO. MEAN DIA. (MICROMETERS)	2.14E+01	8.78E+00	6.79E+00	4.36E+00	2.64E+00	1.37E+00	7.45E-01	4.30E-01	2.22E-01
DM/DLOGD (MG/DSCM)	2.06E-01	6.01E-01	2.13E-01	0.00E+00	8.42E-02	0.00E+00	9.87E-02	0.00E+00	6.75E-02
DN/DLOGD (NO. PARTICLES/DSCM)	4.04E+04	1.69E+06	1.30E+06	0.00E+00	8.77E+06	0.00E+00	4.56E+08	0.00E+00	1.18E+10

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

PLANT & CITY	CARTECH, READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.720
SAMPLING LOCATION	SITE #2/BAGHOUSE OUTLET	IMPACTOR TEMP.	119.0F 48.3C
DATE	04/30/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	CPM-5	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	DAN FITZGERALD	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	119.0F 48.3C	CO	.00
BAR.PRESS.(IN. HG)	29.70	N2	78.80
STACK PRESS.(IN. HG)	29.71	O2	19.11
NOZZLE:I.D.(IN.)	.315	H2O	1.50
METER HEAD DIFF.	1.480	SAMPLING DURATION(MIN.)	540.00

CALC. MASS LOADING = 1.0721E-04 GR/ACF 1.2023E-04 GR/DSCF 2.4534E-01 MG/ACM 2.7512E-01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.22	8.54	5.54	3.57	2.08	1.03	.67	.40	
MASS (MILLIGRAMS)	1.50	.20	.40	.00	.20	.00	.20	.00	.20
MG/DSCM/STAGE	1.52E-01	2.03E-02	4.06E-02	0.00E+00	2.03E-02	0.00E+00	2.03E-02	0.00E+00	2.03E-02
CUM. PERCENT OF MASS SMALLER THAN D50	44.44	37.04	22.22	22.22	14.81	14.81	7.41	7.41	
CUM. (MG/ACM) SMALLER THAN D50	1.09E-01	9.09E-02	5.45E-02	5.45E-02	3.63E-02	3.63E-02	1.82E-02	1.82E-02	
CUM. (MG/DSCM) SMALLER THAN D50	1.22E-01	1.02E-01	6.11E-02	6.11E-02	4.08E-02	4.08E-02	2.04E-02	2.04E-02	
CUM. (GR/ACF) SMALLER THAN D50	4.77E-05	3.97E-05	2.38E-05	2.38E-05	1.59E-05	1.59E-05	7.94E-06	7.94E-06	
CUM. (GR/DSCF) SMALLER THAN D50	5.34E-05	4.45E-05	2.67E-05	2.67E-05	1.78E-05	1.78E-05	8.91E-06	8.91E-06	
GEO. MEAN DIA. (MICROMETERS)	2.15E+01	8.87E+00	6.88E+00	4.45E+00	2.73E+00	1.47E+00	8.32E-01	5.18E-01	2.82E-01
DM/DLOGD (MG/DSCM)	2.07E-01	6.07E-01	2.16E-01	0.00E+00	8.70E-02	0.00E+00	1.10E-01	0.00E+00	6.75E-02
DN/DLOGD (NO. PARTICLES/DSCM)	4.00E+04	1.66E+06	1.27E+06	0.00E+00	8.19E+06	0.00E+00	3.64E+08	0.00E+00	5.72E+09

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARTECH, READING, PA — DAN FITZGERALD

TEST C2M-5 SITE #2/BAGHOUSE OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/30/81	04/30/81
TB	TIME-START	900	900
TF	TIME-FINISH	1822	1822
TT	NET TIME OF TEST, MIN.	540.0	540.0
Y	METER CALIBRATION FACTOR	1.008	1.008
DN	SAMPLING NOZZLE DIAMETER	.315 IN	8.0 MM
CP	PITOT TUBE COEFFICIENT	.82	.82
PM	AVERAGE ORIFICE PRESSURE DROP	1.48 IN-H2O	37.6 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	360.406 CU-FT	10.206 CU-M
TM	AVERAGE GAS METER TEMP	91.3 F	33.0 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	346.612 SCF	9.815 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	5.278 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.70 IN-HG	754.38 MM-HG
PST	STATIC PRES OF STACK GAS	.10 IN-H2O	2.54 MM-H2O
PS	STACK PRES, ABS.	29.71 IN-HG	754.57 MM-HG

TS	AVERAGE STACK TEMP	119. F	48. C
IF	GAS SAMPLED AT STACK CONDITIONS	388.64 ACF	11.01 ACM
AS	STACK AREA	3421. SQ-IN	2.207 SQ-M
ISO	PERCENT ISOKINETIC	99.0	99.0
MT	TOTAL MASS OF PARTICLES	.042 GR	2.700 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
CARTECH, READING, PA	DAN FITZGERALD	C2M-5	SITE #2/BAGHOUSE OUTLET
TEST DATE 09/30/81			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .042 / 388.641 = .0001 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .042 / 346.612 = .0001 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 2.700 / 11.005 = .2453 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 2.700 / 9.815 = .2751 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 1.50 / 9.815 = .15

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{.20 + .00 + .20}{2.70 \text{ (MG)}} * 100 = 14.81$$

CUM.(MASS/VOLUME) — THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM,GR/ACF,GR/DSCF.

EXAMPLE CALCULATIONS

```
CUM.(MG/ACM) (5) = MASS(6) + MASS(7) + MASS(8) + MASS(9)
                   ----------------------------------
                                IF(ACM)

CUM.(MG/ACM) (5) =      .00 +      .20 +      .00 +      .20
                   ------------------------------------------  =      .04
                              11.01  (ACM)
```

GEO.MEAN DIA.(MICROMETERS) — THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

```
GEO.MEAN DIA.(J) = SQRT( D50(J) * D50(J-1))

GEO.MEAN DIA.(6) = SQRT(     1.03 *      2.08)  =      1.47
```

DM/DLOGD(MG/DSCM) — DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

```
DM/DLOGD(J) =   MG/DSCM/STAGE(J)
              -------------------
              LOG( D50(J-1) / D50(J))

DM/DLOGD (3) =              .04
              ------------------------  =      .22
              LOG(      8.54 /      5.54 )
```

DN/DLOGD — THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

```
DN/DLOGD(J) =          DM/DLOGD(J)
              ----------------------------------------
              5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)

DN/DLOGD (3) =              .22
              ---------------------------------  =      1269710.00
              5.235999E-10 *      1.00  *      6.88
```

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	CARPENTER TECH READING, PA	DATE	04/28/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	C1H-1
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	4 FT PIPE
OPERATOR	R ANTESBERGER	NOZZLE # I.D.	.140
AMBIENT TEMP.(DEG.F)	75.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.85	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	F88
FILTER NUMBER(S)	HIGH CAPACITY	METER HEAD DIFF.	1.91
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	0.
THERM. NO.	129	HEATER BOX SETTING	0.
LEAKAGE	.015 CFM @ 15.0 IN.HG		
METER CALIB. FACTOR	.982		
READ & RECORD DATA EVERY	5.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	1240	485.880									
B-02	5.0	1245	487.910	1.700	.51	.51	186.	84.	84.	.5	126.	45.
B-02	10.0	1250	489.970	1.700	.51	.51	129.	84.	84.	.5	129.	47.
B-02	15.0	1255	492.000	1.700	.51	.51	171.	84.	84.	.5	171.	48.
B-02	20.0	1300	494.100	1.700	.51	.51	192.	84.	84.	.5	192.	49.
B-02	25.0	1305	496.150	1.700	.51	.51	186.	84.	84.	.5	186.	49.
B-02	30.0	1310	498.200	1.700	.51	.51	163.	86.	84.	.5	163.	50.
B-02	35.0	1315	500.300	1.700	.51	.51	144.	86.	84.	.5	144.	50.
B-02	40.0	1320	502.300	1.700	.51	.51	147.	86.	84.	.5	147.	50.
B-02	45.0	1325	504.800	1.700	.51	.51	133.	86.	84.	.5	133.	51.
B-02	50.0	1330	506.520	1.700	.51	.51	128.	85.	83.	.5	128.	51.
B-02	55.0	1335	508.700	1.700	.51	.51	114.	85.	83.	.5	114.	51.
B-02	60.0	1340	509.930	1.700	.51	.51	129.	85.	82.	.5	129.	50.
B-02	65.0	1345	512.770	1.700	.51	.51	130.	85.	82.	.5	130.	50.
B-02	70.0	1350	514.900	1.700	.51	.51	129.	85.	82.	.5	129.	50.
B-02	75.0	1355	517.000	1.700	.51	.51	129.	85.	82.	.5	129.	49.
B-02	80.0	1400	519.250	1.700	.51	.51	126.	86.	82.	.5	126.	49.
B-02	85.0	1405	521.100	1.700	.51	.51	125.	86.	82.	.5	125.	48.
B-02	90.0	1410	523.350	1.700	.51	.51	121.	86.	83.	.5	121.	48.
B-02	95.0	1415	525.250	1.700	.51	.51	120.	86.	83.	.5	120.	49.
B-02	100.0	1420	527.750	1.700	.51	.51	148.	86.	83.	.5	148.	49.
B-02	105.0	1425	529.400	1.700	.51	.51	170.	88.	84.	.5	170.	49.
B-02	110.0	1430	531.430	1.700	.51	.51	156.	88.	84.	.5	156.	49.
B-02	115.0	1435	533.700	1.700	.51	.51	135.	88.	84.	.5	135.	50.
B-02	120.0	1440	535.600	1.700	.51	.51	138.	88.	84.	.5	138.	50.
B-02	125.0	1445	537.800	1.700	.51	.51	128.	88.	86.	.5	128.	49.
B-02	130.0	1450	539.630	1.700	.51	.51	128.	89.	86.	.5	128.	49.
B-02	135.0	1455	541.730	1.700	.51	.51	127.	89.	86.	.5	127.	50.
B-02	140.0	1500	543.830	1.700	.51	.51	128.	89.	86.	.5	128.	50.
B-02	145.0	1505	545.920	1.700	.51	.51	129.	89.	86.	.5	129.	50.
B-02	150.0	1510	547.100	1.700	.51	.51	127.	89.	86.	.5	127.	50.

PLANT CARPENTER TECH READING, PA DATE 04/28/81
SAMPLING LOCATION SITE #1 INLET RUN NUMBER C1H-1

READ & RECORD DATA EVERY 5.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
B-02	155.0	1515	550.100	1.700	.51	.51	123.	88.	85.	.5	123.	50.
B-02	160.0	1520	552.200	1.800	.51	.51	123.	87.	85.	.5	123.	50.
B-02	165.0	1525	554.300	1.800	.51	.51	126.	87.	85.	.5	126.	50.
B-02	170.0	1530	556.450	1.800	.51	.51	123.	88.	85.	.5	123.	49.
B-02	175.0	1535	558.450	1.800	.51	.51	126.	88.	86.	.5	126.	49.
B-02	180.0	1540	560.600	1.800	.51	.51	127.	88.	86.	.5	127.	49.
B-02	185.0	1545	562.800	1.800	.51	.51	127.	88.	85.	.5	127.	50.
B-02	190.0	1550	564.750	1.700	.51	.51	128.	88.	86.	.5	129.	49.
B-02	195.0	1600	566.800	1.700	.51	.51	133.	88.	86.	.5	133.	48.
B-02	200.0	1605	568.000	1.700	.51	.51	133.	88.	86.	.5	133.	48.
B-02	205.0	1610	571.000	1.700	.51	.51	136.	88.	86.	.5	136.	49.
B-02	210.0	1615	573.100	1.700	.51	.51	136.	88.	86.	.5	136.	50.
B-02	215.0	1620	575.150	1.700	.51	.51	147.	90.	86.	.5	147.	50.
B-02	220.0	1625	577.200	1.700	.51	.51	147.	90.	86.	.5	147.	51.
B-02	225.0	1650	579.350	1.700	.51	.51	183.	91.	88.	.5	178.	51.
B-02	230.0	1655	581.350	1.700	.51	.51	138.	91.	89.	.5	138.	51.
B-02	235.0	1700	583.400	1.700	.51	.51	135.	91.	89.	.5	135.	50.
B-02	240.0	1705	585.500	1.700	.51	.51	140.	91.	89.	.5	140.	50.
B-02	245.0	1710	587.600	1.700	.51	.51	135.	94.	90.	.5	135.	50.
B-02	250.0	1715	589.650	1.700	.51	.51	136.	94.	90.	.5	136.	50.
B-02	255.0	1720	591.800	1.700	.51	.51	134.	94.	90.	.5	134.	51.
B-02	260.0	1725	593.870	1.700	.51	.51	126.	96.	91.	.5	126.	52.
B-02	265.0	1730	596.200	1.700	.51	.51	137.	96.	91.	.5	137.	52.
B-02	270.0	1735	598.080	1.700	.51	.51	137.	96.	91.	.5	137.	52.
B-02	275.0	1740	600.150	1.700	.51	.51	138.	96.	91.	.5	138.	53.
B-02	280.0	1745	602.300	1.700	.51	.51	138.	96.	92.	.5	138.	53.
B-02	285.0	1750	603.650	1.700	.51	.51	137.	96.	92.	.5	137.	53.
TOTALS	285.0		117.770									
AVERAGE					.51	.51	137.	89.	86.	.5	137.	50.

PERCENT ISOKINETIC 90.8

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PLANT & CITY	CARPENTER TECH READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.451
SAMPLING LOCATION	SITE #1 INLET	IMPACTOR TEMP.	136.9F 58.3C
DATE	04/28/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	CIH-1	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	R ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	136.9F 58.3C	CO	.00
BAR.PRESS.(IN. HG)	29.85	N2	78.80
STACK PRESS.(IN. HG)	29.75	O2	19.11
NOZZLE:I.D.(IN.)	.140	H2O	1.50
METER HEAD DIFF.	.510	SAMPLING DURATION(MIN.)	285.00

CALC. MASS LOADING = 8.9352E-02 GR/ACF 1.0314E-01 GR/DSCF 2.0447E+02 MG/ACM 2.3602E+02 MG/DSCM

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. CIH-1 Date 4/28/81

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, µm	-	NA	12.0	6.4	1.56	-
Mass collected, mg	745.0	NA	133.0	8.9	159.7	443.4
Percent of total mass	100	NA	17.9	1.2	21.4	59.5
Cumulative percent of mass less than cut diameter	100	NA	82.1	81.0	59.5	-
Particulate[b] concentration, mg/dscm	235.2	NA	42.0	2.8	50.4	140.0
gr/dscf	0.1026		0.0183	0.0012	0.0220	0.0611

Impactor flowrate[c] 0.213 alps 0.451 acfm

Impactor temperature 58.3 °C 137 °F

Isokinetic sampling rate 90.8 %

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.

IMPACTOR FIELD DATA TABULATION

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PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH READING, PA — R ANTESBERGER

TEST C1H-1 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/28/81	04/28/81
TB	TIME-START	1240	1240
TF	TIME-FINISH	1750	1750
TT	NET TIME OF TEST, MIN.	285.0	285.0
Y	METER CALIBRATION FACTOR	.982	.982
DN	SAMPLING NOZZLE DIAMETER	.140 IN	3.6 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.51 IN-H2O	13.0 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	117.770 CU-FT	3.335 CU-M
TM	AVERAGE GAS METER TEMP	87.1 F	30.6 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	111.486 SCF	3.157 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	1.698 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FWO	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.85 IN-HG	758.19 MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30 IN-H2O	-33.02 MM-H2O
PS	STACK PRES, ABS.	29.75 IN-HG	755.76 MM-HG

TS	AVERAGE STACK TEMP	137. F	58. C
IF	GAS SAMPLED AT STACK CONDITIONS	128.67 ACF	3.64 ACM
AS	STACK AREA	10816. SQ-IN	6.978 SQ-M
ISO	PERCENT ISOKINETIC	90.8	90.8
MT	TOTAL MASS OF PARTICLES	11.497 GR	745.000 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

FIELD DATA

PLANT	CARPENTER TECH READING, PA	DATE	04/29/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	C1H-2
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	9 FT PIPE
OPERATOR	R ANTESBERGER	NOZZLE : I.D.	.140
AMBIENT TEMP.(DEG.F)	80.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.60	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	F88
FILTER NUMBER(S)	HIGH CAPACITY	METER HEAD DIFF.	1.91
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	0.
THERM. NO.	129	HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ 15.0 IN.HG		
METER CALIB. FACTOR	.982		
READ & RECORD DATA EVERY	5.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	1135	635.080									
C-02	5.0	1140	638.150	1.600	.61	.61	123.	78.	78.	.0	123.	55.
C-02	10.0	1145	640.350	1.600	.61	.61	123.	80.	78.	.0	123.	54.
C-02	15.0	1150	642.600	1.600	.61	.61	124.	80.	78.	.0	124.	54.
C-02	20.0	1155	644.830	1.600	.61	.61	124.	81.	78.	.0	124.	54.
C-02	25.0	1200	647.050	1.600	.61	.61	124.	82.	78.	.0	124.	55.
C-02	30.0	1205	649.300	1.600	.61	.61	125.	83.	79.	.0	125.	56.
C-02	35.0	1210	651.500	1.600	.61	.61	123.	84.	80.	.0	123.	55.
C-02	40.0	1215	654.000	1.600	.61	.61	124.	84.	80.	.0	124.	55.
C-02	45.0	1220	656.000	1.600	.61	.61	124.	84.	80.	.0	124.	55.
C-02	50.0	1225	658.300	1.600	.61	.61	124.	86.	80.	.0	124.	55.
C-02	55.0	1230	660.800	1.600	.61	.61	122.	86.	82.	.0	122.	55.
C-02	60.0	1235	662.900	1.600	.61	.61	122.	86.	82.	.0	122.	56.
C-02	65.0	1240	664.950	1.600	.61	.61	122.	87.	82.	.0	122.	56.
C-02	70.0	1245	667.200	1.600	.61	.61	122.	88.	83.	.0	122.	57.
C-02	75.0	1250	669.450	1.600	.61	.61	128.	88.	82.	.0	128.	57.
C-02	80.0	1255	671.700	1.600	.61	.61	126.	87.	82.	.0	126.	57.
C-02	85.0	1300	673.950	1.600	.61	.61	128.	87.	83.	.0	128.	57.
C-02	90.0	1320	676.275	1.600	.61	.61	126.	87.	83.	.0	126.	56.
C-02	95.0	1325	678.500	1.600	.61	.61	126.	84.	83.	.0	126.	56.
C-02	100.0	1330	680.650	1.600	.61	.61	128.	84.	83.	.0	128.	57.
C-02	105.0	1335	683.000	1.600	.61	.61	129.	86.	83.	.0	129.	58.
C-02	110.0	1340	685.150	1.600	.61	.61	128.	86.	83.	.0	128.	58.
C-02	115.0	1345	687.400	1.600	.61	.61	128.	87.	84.	.0	128.	58.
C-02	120.0	1350	689.650	1.600	.61	.61	128.	87.	84.	.0	128.	58.
C-02	125.0	1355	691.800	1.600	.61	.61	129.	88.	84.	.0	129.	56.
C-02	130.0	1400	694.150	1.600	.61	.61	130.	88.	84.	.0	130.	56.
C-02	135.0	1405	696.400	1.600	.61	.61	130.	88.	84.	.0	130.	56.
C-02	140.0	1410	698.650	1.600	.61	.61	130.	88.	84.	.0	130.	56.
C-02	145.0	1415	700.900	1.600	.61	.61	130.	90.	86.	.0	130.	56.
C-02	150.0	1420	703.160	1.600	.61	.61	129.	90.	86.	.0	130.	57.

PLANT CARPENTER TECH READING, PA DATE 04/29/81
SAMPLING LOCATION SITE #1 INLET RUN NUMBER C1H-2

READ & RECORD DATA EVERY 5.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
C-02	155.0	1425	705.400	1.600	.61	.61	129.	90.	86.	.0	129.	57.
C-02	160.0	1430	707.700	1.600	.61	.61	130.	90.	86.	.0	130.	57.
C-02	165.0	1435	710.000	1.600	.61	.61	131.	90.	87.	.0	131.	56.
C-02	170.0	1440	712.200	1.600	.61	.61	130.	90.	87.	.0	130.	56.
C-02	175.0	1445	714.450	1.600	.61	.61	131.	90.	87.	.0	131.	54.
C-02	180.0	1450	716.700	1.600	.61	.61	131.	90.	87.	.0	131.	53.
C-02	185.0	1455	719.000	1.600	.61	.61	131.	90.	87.	.0	131.	51.
C-02	190.0	1500	721.210	1.800	.61	.61	131.	91.	88.	.0	131.	51.
C-02	195.0	1505	723.450	1.800	.61	.61	133.	91.	88.	.0	133.	51.
C-02	200.0	1510	725.710	1.800	.61	.61	134.	91.	88.	.0	134.	51.
C-02	205.0	1515	727.960	1.800	.61	.61	136.	91.	88.	.0	136.	52.
C-02	210.0	1520	730.260	1.800	.61	.61	131.	91.	88.	.0	131.	52.
C-02	215.0	1525	732.480	1.800	.61	.61	128.	91.	88.	.0	128.	53.
C-02	220.0	1530	734.740	1.800	.61	.61	128.	91.	88.	.0	128.	53.
C-02	225.0	1535	737.000	1.800	.61	.61	129.	91.	88.	.0	129.	53.
C-02	230.0	1540	739.260	1.800	.61	.61	129.	91.	88.	.0	129.	46.
C-02	235.0	1545	741.500	1.800	.61	.61	136.	91.	89.	.2	136.	46.
C-02	240.0	1550	743.760	1.800	.61	.61	140.	91.	89.	.2	140.	46.
C-02	245.0	1555	746.030	1.800	.61	.61	147.	91.	89.	.0	146.	46.
C-02	250.0	1600	748.220	1.800	.61	.61	151.	92.	89.	.0	151.	46.
C-02	255.0	1605	750.540	1.800	.61	.61	134.	92.	89.	.0	134.	47.
C-02	260.0	1610	752.800	1.800	.61	.61	139.	92.	89.	.0	139.	46.
C-02	265.0	1615	755.100	1.800	.61	.61	131.	92.	89.	.0	130.	46.
C-02	270.0	1620	759.750	1.800	.61	.61	127.	92.	90.	.0	127.	47.
C-02	275.0	1625	761.820	1.800	.61	.61	120.	92.	90.	.0	120.	48.
C-02	280.0	1630	762.750	1.800	.61	.61	105.	92.	89.	.0	105.	48.
C-02	285.0	1635	764.150	1.800	.61	.61	102.	92.	89.	.0	102.	48.
C-02	290.0	1640	766.400	1.800	.61	.61	101.	92.	89.	.0	101.	49.
C-02	295.0	1645	768.670	1.800	.61	.61	106.	92.	89.	.0	106.	48.
C-02	300.0	1650	771.000	1.800	.61	.61	102.	92.	89.	.0	102.	48.
C-02	305.0	1655	773.350	1.800	.61	.61	101.	92.	89.	.0	101.	48.
C-02	310.0	1700	775.500	1.800	.61	.61	102.	92.	89.	.0	102.	48.
TOTALS	310.0		140.420									
AVERAGE					.61	.61	126.	88.	85.	.0	126.	53.

PERCENT ISOKINETIC 99.1

PLANT & CITY	CARPENTER TECH READING, PA	IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS	.486
SAMPLING LOCATION	SITE #1 INLET	IMPACTOR TEMP.	126.0F 52.2C
DATE	04/29/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C1H-2	MAX.PARTICLE DIAM.MICROS	50.0
OPERATOR	R ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	126.0F 52.2C	CO	.00
BAR.PRESS.(IN. HG)	29.60	N2	78.80
STACK PRESS.(IN. HG)	29.50	O2	19.11
NOZZLE:I.D.(IN.)	.140	H2O	1.50
METER HEAD DIFF.	.610	SAMPLING DURATION(MIN.)	310.00

CALC. MASS LOADING = 6.0960E-02 GR/ACF 6.9667E-02 GR/DSCF 1.3950E+02 MG/ACM 1.5942E+02 MG/DSCM

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. CIH-2 Date 4/29/81

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, µm	-	NA	11.4	6.1	1.42	-
Mass collected, mg	595.5	NA	138.2	5.40	83.4	368.5
Percent of total mass	100	NA	23.2	0.9	14.0	61.9
Cumulative percent of mass less than cut diameter	100	NA	76.8	75.9	61.9	-
Particulate[b] concentration, mg/dscm	158.9	NA	36.9	1.4	22.3	98.3
gr/dscf	0.0693		0.0161	0.0006	0.0097	0.0429

Impactor flowrate[c] 0.229 alps 0.486 acfm

Impactor temperature 52.2 °C 126 °F

Isokinetic sampling rate 99.1 %

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.

IMPACTOR FIELD DATA TABULATION

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PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH READING, PA — R ANTESBERGER

TEST C1H-2 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/29/81	04/29/81
TB	TIME-START	1135	1135
TF	TIME-FINISH	1700	1700
TT	NET TIME OF TEST, MIN.	310.0	310.0
Y	METER CALIBRATION FACTOR	.982	.982
DN	SAMPLING NOZZLE DIAMETER	.140 IN	3.6 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.61 IN-H2O	15.5 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	140.420 CU-FT	3.976 CU-M
TM	AVERAGE GAS METER TEMP	86.8 F	30.4 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	131.927 SCF	3.736 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	2.009 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PR	BAROMETRIC PRESSURE	29.60 IN-HG	751.84 MM-HG
PSI	STATIC PRES OF STACK GAS	-1.80 IN-H2O	-33.02 MM-H2O
PS	STACK PRES, ABS.	29.50 IN-HG	749.41 MM-HG

TS	AVERAGE STACK TEMP	126. F	52. C
IF	GAS SAMPLED AT * STACK CONDITIONS	150.75 ACF	4.27 ACM
AS	STACK AREA	10816. SQ-IN	6.978 SQ-M
ISO	PERCENT ISOKINETIC	99.1	99.1
MT	TOTAL MASS OF PARTICLES	9.190 GR	595.500 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

FIELD DATA

PLANT	CARPENTER TECH CO READING, PA	DATE	04/30/81
SAMPLING LOCATION	SITE #1 INLET	RUN NUMBER	C1H-3
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	9 FT PIPE
OPERATOR	R ANTESBERGER	NOZZLE 1 I.D.	.140
AMBIENT TEMP.(DEG.F)	75.	ASSUMED MOISTURE	2.0
BAR.PRESS.(IN.HG)	29.70	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.30	METER BOX NUMBER	FB8
FILTER NUMBER(S)	HIGH CAPACITY	METER HEAD DIFF.	1.91
STACK INSIDE DIM.(IN)	104.00 104.00		
PITOT TUBE COEFF.	.83	PROBE HEATER SETTING	0.
THERM. NO.	129	HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ .0 IN.HG		
METER CALIB. FACTOR	.982		

READ & RECORD DATA EVERY 10.0 MINUTES

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0	915	781.280									
C-02	10.0	925	785.820	1.800	.68	.68	100.	61.	58.	.0	100.	42.
C-02	20.0	935	790.400	1.800	.68	.68	103.	61.	58.	.0	103.	40.
C-02	30.0	945	795.000	1.800	.68	.68	175.	64.	60.	.0	175.	40.
C-02	40.0	955	799.650	1.800	.68	.68	171.	66.	60.	.0	171.	40.
C-02	50.0	1005	804.300	1.800	.68	.68	141.	68.	62.	.0	141.	41.
C-02	60.0	1015	808.900	1.800	.68	.68	121.	69.	63.	.0	121.	41.
C-02	70.0	1025	813.525	1.800	.68	.68	100.	70.	64.	.0	100.	40.
C-02	80.0	1035	818.150	1.800	.68	.68	101.	71.	64.	.0	101.	40.
C-02	90.0	1045	822.820	1.800	.68	.68	98.	72.	66.	.0	98.	41.
C-02	100.0	1055	827.600	1.800	.68	.68	100.	72.	66.	.0	100.	40.
C-02	110.0	1105	832.100	1.800	.68	.68	102.	73.	67.	.0	102.	41.
C-02	120.0	1115	836.800	1.800	.68	.68	107.	74.	68.	.0	107.	41.
C-02	130.0	1125	841.450	1.800	.68	.68	130.	74.	68.	.0	130.	41.
C-02	140.0	1135	846.100	1.800	.68	.68	150.	75.	69.	.0	150.	41.
C-02	150.0	1145	851.000	1.800	.68	.68	113.	75.	69.	.0	113.	42.
C-02	160.0	1155	855.450	1.800	.68	.68	114.	75.	69.	.0	114.	42.
C-02	170.0	1205	860.200	1.800	.68	.68	108.	76.	70.	.0	108.	42.
C-02	180.0	1215	864.650	1.800	.68	.68	105.	76.	70.	.0	105.	42.
C-02	190.0	1225	869.350	1.800	.68	.68	113.	78.	72.	.0	113.	43.
C-02	200.0	1235	874.200	1.800	.68	.68	113.	78.	73.	.5	113.	43.
C-02	210.0	1245	878.700	1.800	.68	.68	109.	78.	73.	.5	109.	43.
C-02	220.0	1255	883.450	1.800	.68	.68	106.	79.	74.	.5	106.	43.
C-02	230.0	1305	888.200	1.800	.68	.68	106.	80.	75.	.5	106.	42.
C-02	240.0	1315	892.900	1.800	.68	.68	114.	81.	76.	.5	114.	42.
C-02	250.0	1325	897.550	1.800	.68	.68	104.	81.	76.	.5	104.	42.
C-02	260.0	1335	902.270	1.800	.68	.68	119.	82.	77.	.5	119.	42.
C-02	270.0	1345	906.920	1.800	.68	.68	116.	82.	78.	.5	116.	42.
C-02	280.0	1355	911.750	1.800	.68	.68	114.	81.	77.	.5	114.	43.
C-02	290.0	1405	916.320	1.800	.68	.68	114.	81.	78.	.5	114.	43.
TOTALS	290.0		135.040									
AVERAGE					.68	.68	116.	74.	69.	.2	116.	42.

PERCENT ISOKINETIC 100.6

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A-124

PLANT & CITY	CARPENTER TECH CO READING, PA	IMPACTOR FLOWRATE(ACFM)	.506
SAMPLING LOCATION	SITE #1 INLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	116.1F 46.7C
DATE	04/30/81	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	C1H-3	MAX.PARTICLE DIAM.MICRON	50.0
OPERATOR	R ANTESBERGER	GAS COMPOSITION(PERCENT): CO2	.59
STACK TEMP.	116.1F 46.7C	CO	.00
BAR.PRESS.(IN. HG)	29.70	N2	78.80
STACK PRESS.(IN. HG)	29.60	O2	19.11
NOZZLE:I.D.(IN.)	.140	H2O	1.50
METER HEAD DIFF.	.680	SAMPLING DURATION(MIN.)	290.00

CALC. MASS LOADING = 6.9754E-02 GR/ACF 7.8099E-02 GR/DSCF 1.5962E+02 MG/ACM 1.7872E+02 MG/DSCM

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. CIH-3 Date 4/30/81

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, μm	-	NA	11.1	5.9	1.34	-
Mass collected, mg	662.7	NA	87.9	9.4	202.0	363.4
Percent of total mass	100	NA	13.3	1.4	30.5	54.8
Cumulative percent of mass less than cut diameter	100	NA	86.7	85.3	54.8	-
Particulate[b] concentration, mg/dscm	178.1	NA	23.6	2.53	54.3	97.7
gr/dscf	0.0776		0.0103	0.0011	0.0236	0.0426

Impactor flowrate[c] 0.239 alps 0.506 acfm

Impactor temperature 46.7 °C 116 °F

Isokinetic sampling rate 100.6 %

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.

IMPACTOR FIELD DATA TABULATION

2/3

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

CARPENTER TECH CO READING, PA — R ANTESBERGER

TEST C1M-3 SITE #1 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		04/30/81	04/30/81
TB	TIME-START	915	915
TF	TIME-FINISH	1405	1405
TT	NET TIME OF TEST, MIN.	290.0	290.0
Y	METER CALIBRATION FACTOR	.982	.982
DN	SAMPLING NOZZLE DIAMETER	.140 IN	3.6 MM
CP	PITOT TUBE COEFFICIENT	.83	.83
PM	AVERAGE ORIFICE PRESSURE DROP	.68 IN-H2O	17.3 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	135.040 CU-FT	3.824 CU-M
TM	AVERAGE GAS METER TEMP	71.6 F	22.0 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	130.961 SCF	3.708 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	1.994 SCF	.000 SCM
BWO	PERCENT MOISTURE BY VOLUME	1.50	1.50
FMD	MOLE FRACTION DRY GAS	.985	.985
PCO2	PERCENT CO2 BY VOL., DRY	.60	.60
PO2	PERCENT O2 BY VOL., DRY	19.40	19.40
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.00	80.00
MD	MOLECULAR WT-DRY STACK GAS	28.87	28.87
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.70 IN-HG	754.38 MM-HG
PSI	STATIC PRES OF STACK GAS	-1.30 IN-H2O	-33.02 MM-H2O
PS	STACK PRES, ABS.	29.60 IN-HG	751.95 MM-HG

TS	AVERAGE STACK TEMP	116.	F	47.	C
IF	GAS SAMPLED AT STACK CONDITIONS	146.62	ACF	4.15	ACM
AS	STACK AREA	10816.	SQ-IN	6.978	SQ-M
ISO	PERCENT ISOKINETIC	100.6		100.6	
MT	TOTAL MASS OF PARTICLES	10.227	GR	662.700	MG
PD	PARTICLE DENSITY	.06	GR/CI	1.00	GM/CC

* 68 DEG F, 29.92 IN.HG.

TABLE A-1[a]
50% EFFECTIVE CUT DIAMETER (MIRCOMETERS)
PARTICLE DENSITY = 1.0 g/cc

FLOW RATE ACFM	STAGE 1	STAGE 2	CYCLONE
AIR TEMP = 70°F			
0.3	13.0	7.6	2.1
0.4	12.3	6.5	1.6
0.5	11.0	5.9	1.3
0.6	10.0	5.4	1.1
0.7	9.3	4.9	0.94
AIR TEMP = 100°F			
0.3	13.1	7.6	2.1
0.4	12.4	6.6	1.6
0.5	11.1	5.9	1.3
0.6	10.1	5.4	1.1
0.7	9.4	5.0	0.98
AIR TEMP = 300°F			
0.3	14.5	8.5	2.6
0.4	13.7	7.3	2.2
0.5	12.3	6.5	1.9
0.6	11.2	6.0	1.7
0.7	10.4	5.5	1.5
AIR TEMP = 500°F			
0.3	15.8	9.2	3.2
0.4	15.0	8.0	2.7
0.5	13.4	7.1	2.4
0.6	12.2	6.5	2.2
0.7	11.3	6.0	2.0
AIR TEMP = 1000°F			
0.3	18.6	10.8	4.5
0.4	17.6	9.3	4.0
0.5	15.8	8.3	3.7
0.6	14.4	7.6	3.5
0.7	13.3	7.0	3.3

[a]Operating Manual for Andersen Samplers, Inc., Heavy Grain Loading Impactor Particle Size Stack Samplers; January 1, 1980, Table II, p. 41.

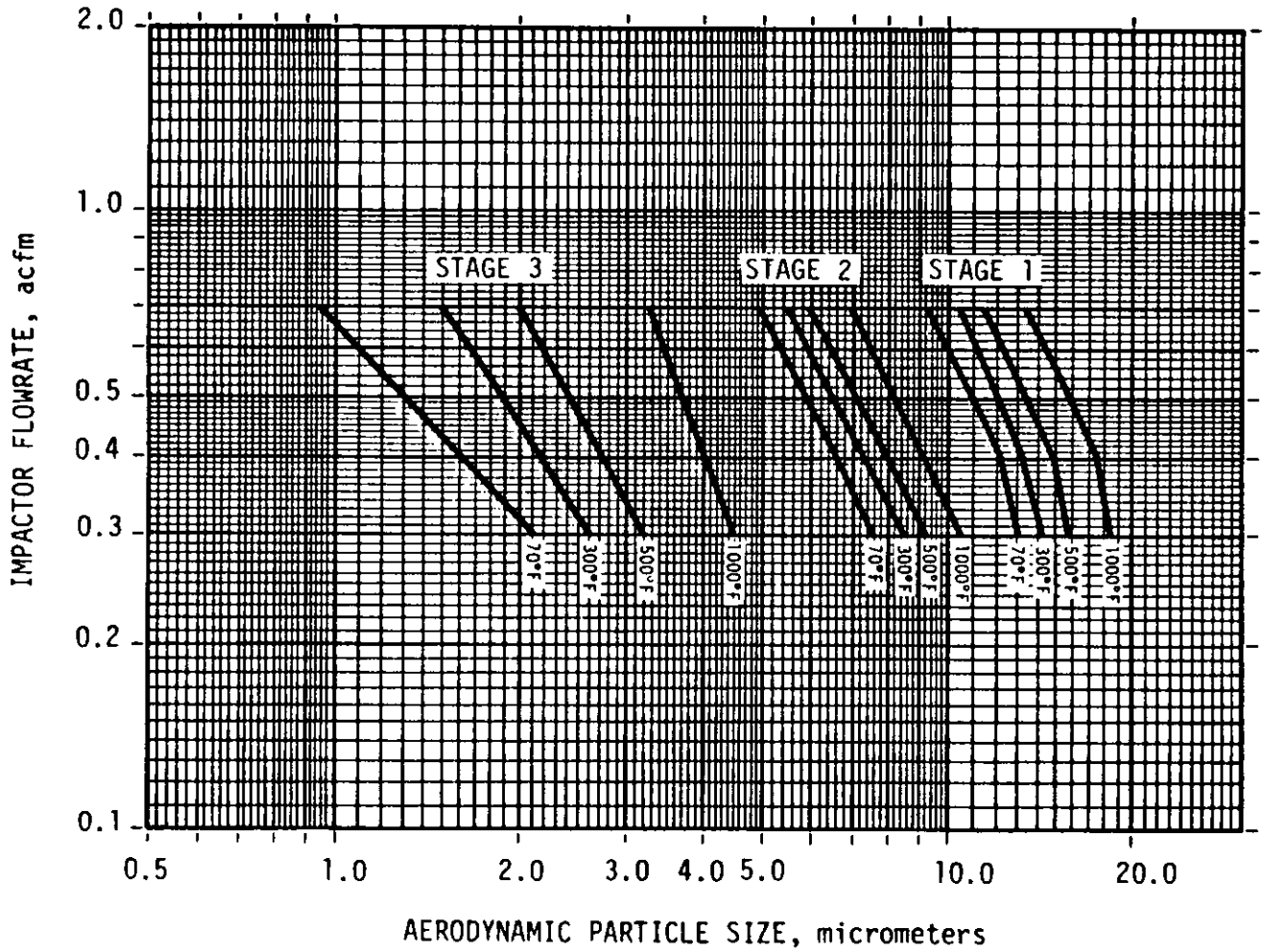


Figure A-1. Graphical presentation of data supplied by the manufacturer to determine cut diameters for the Andersen Heavy Grain Loading Impactor.

APPENDIX B

FIELD DATA

PARTICULATE

Site No. 1
Site No. 2

VELOCITY

Site No. 3
Site No. 4

PARTICLE SIZE

Site No. 1 - Andersen Mark III
Site No. 2 - Andersen Mark III
Site No. 1 - High Capacity

VISIBLE EMISSIONS

Melt Shop
Fabric Filter
Fugitive Emissions

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

Plant CARPENTER TECH. READING, PA

Date 4/26/81

Sampling location SITE #1 INLET

Inside of far wall to outside of nipple 108 3/8"

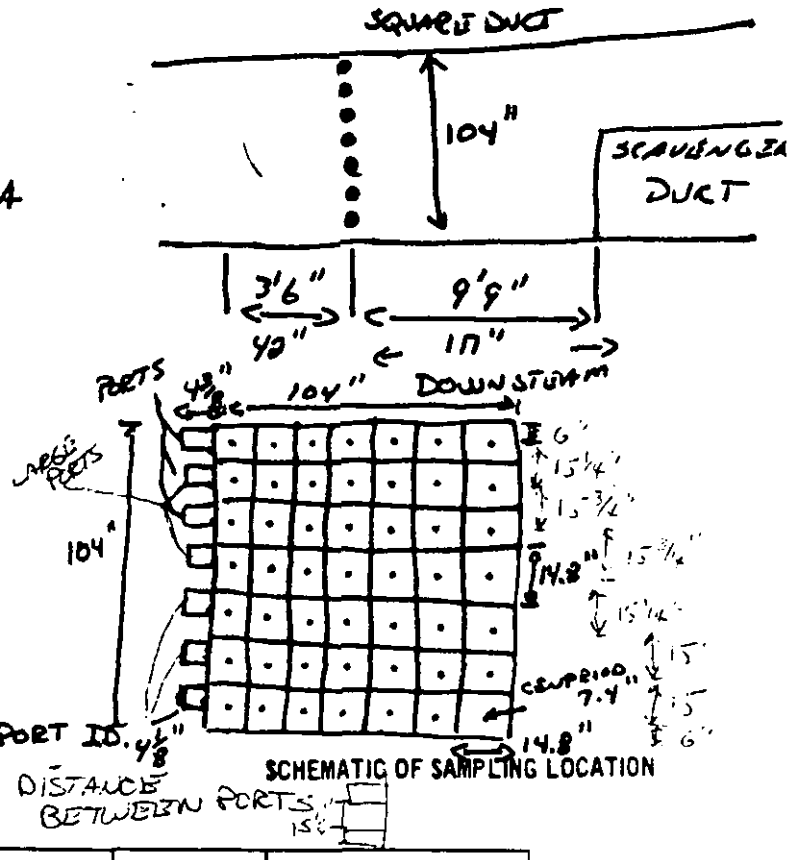
Inside of near wall to outside of nipple (nipple length) 4 3/8" - 4.375"

Stack I.D. 104" X 104"

Nearest upstream disturbance .403 dd

Nearest downstream disturbance 1.12 dd

Calculated by R. ANTESBERGER



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	NIPPLE LENGTH	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1		104"	7.4"	4.4"	11.8"
2		"	22.2"	4.4"	26.6"
3		"	37"	4.4"	41.4"
4		"	51.8"	4.4"	56.2"
5		"	66.6"	4.4"	71."
6		"	81.4"	4.4"	85.8"
7		"	96.2"	4.4"	100.6"

GAS VELOCITY AND VOLUME DATA

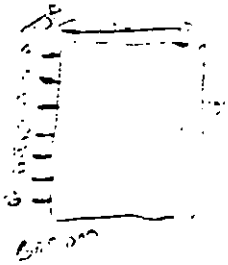
	PLANT AND CITY	RUN DATE
1.	[illegible]	5/4 / 87 / 8/11

SAMPLING LOCATION	CLOCK TIME
[illegible] INLET	1040

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. CV-V	[illegible]	[illegible]	29.85	~~29.85~~ -1.3

PRELIMINARY

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	[illegible]	[illegible]	~~0.84~~ 0.83	1.5 ← ASSUMED



FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F	
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41	
A1		1.6	~~115~~ 112	
2		1.7	~~115~~ 113	
3		1.7	~~115~~ 113	
4		1.8	~~115~~ 112	
5		1.7	111	
6		1.3	111	
7		1.3	110	Static -1.3
B1		1.8	111	
2		1.8	110	
3		1.8	110	
4		1.7	110	
5		1.6	110	
6		1.5	109	
7		1.5	111	Static -1.2
C1		1.7	112	
2		1.6	112	
3		1.5	113	
4		1.6	113	
5		1.5	112	
6		1.4	112	
7		1.1	112	Static -1.1
D1		1.4	113	
2		1.4	114	
3		1.5	115	
4		1.5	114	
5		1.5	113	
6		1.4	112	
7		1.2	112	Static -1.4
E1		1.4	113	
2		1.2	113	
3		1.4	114	
4		1.4	113	
5		1.6	111	
6		1.2	110	
7		1.1	111	Static -1.0
F1		1.1	113	
2		0.98	114	
3		1.4	114	
4		1.1	114	
5		0.92	114	
6		0.75	114	
7		0.67	115	Static -1.2

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. CARPENTER TECH. READING, PA	04 / 27 / 81

SAMPLING LOCATION	CLOCK TIME
SITE #1 INLET	[illegible]

#127 TRAVERSE

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. C0-V	ANTESBERGER	67	29.85	-1.3

PRELIMINARY

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	104"	104"	~~0.99~~ 0.83	

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
1		0.55	113
2		0.62	114
3		1.85	116
4		1.2	116
5		0.52	115
6		0.26	115
7		0.31	113

static -1.6

$\Delta \bar{p}$ = 1.3

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH, READING, PA	04/28/81	PV SITE INLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
CIP-1	R ANTHESBERGER	70	29.8	-1.3	00021159	104" / 104"	0.84	259	1 OF 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HERE
10 FT STAINLESS	0.138	27102	20		F86	1.53	9.73	15	0.006	124.9		250	250	1.7	PAC

initial 15.0 0.0

* LOST PROBE HEAT FROM PORT C TO END

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	10:15	213.955									
A-1	9.0	10:24	217.800	1.90	0.40	0.40	120	73	72	20	240	55
2	18.0	10:33	221.630	1.80	0.39	0.39	115	76	73	20	250	55
3	27.0	10:42	225.740	2.10	0.45	0.45	115	80	74	20	250	56
4	36.0	10:51	229.800	2.00	0.43	0.43	116	83	75	20	250	56
5	45.0	11:00	233.600	1.70	0.36	0.36	116	86	78	20	250	57
6	54.0	11:09	237.050	1.60	0.31	0.31	164	88	79	20	255	56
7	63.0	11:18	240.530	1.60	0.32	0.32	159	88	80	20	250	56
B-1	72.0	11:29	244.400	1.80	0.38	0.38	129	89	82	20	250	57
2	81.0	11:38	248.050	1.70	0.35	0.35	132	90	82	20	250	57
3	90.0	11:47	251.900	1.80	0.38	0.38	126	92	84	20	250	57
4	99.0	11:56	256.100	2.10	0.44	0.44	125	94	86	20	250	58
5	108.0	12:05	259.830	1.70	0.36	0.36	121	96	86	20	250	58
6	117.0	12:14	263.550	1.60	0.34	0.34	123	96	86	20	250	58
7	126.0	12:23	267.120	1.60	0.34	0.34	124	96	88	20	250	59
C-1	135.0	12:40	271.550	2.00	0.42	0.42	134	94	88	20	250	60
2	144.0	12:49	275.200	1.90	0.40	0.40	125	94	90	20	250	60
3	153.0	12:58	278.770	1.60	0.32	0.32	158	94	90	20	250	60
4	162.0	13:07	282.050	1.40	0.26	0.26	189	94	90	20	250	61
5	171.0	13:16	285.600	1.60	0.32	0.32	148	94	90	20	250	61
6	180.0	13:25	289.100	1.30	0.26	0.26	143	94	90	20	250	61
7	189.0	13:34	292.325	1.40	0.29	0.29	133	92	88	20	250	61

1234 A&B RUN NO. CIP-1

1235 A&B RUN NO. CIP-1

[redacted]MIS[redacted]N [redacted]TIN[redacted]IE[redacted]DAT[redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TITCH READING, PA	04/28/91	SITE #1 INLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
SIRI	ANTHONY BERGER	70	29.88	-1.3	19008150	19¼" 19¼"	0.84	2359	20 F 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
10 FT STAINLESS	0.488	0.102	2.0		FB6	1.53	0.973					250°F	250°F		60

✱ TAPPED AOD

✱ STOP TEST 15:55 ✱ START 16:00

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	13:40										
A-1	198.0	13:49	295.950	1.60	0.33	0.33	129	90	88	2.0	250	53
2	207.0	13:58	300.000	2.00	0.42	0.42	130	89	88	2.5	250	53
3	216.0	14:07	303.700	1.60	0.34	0.34	127	89	87	2.5	250	52
4	✱ 225.0	14:16	307.550	1.80	0.38	0.38	122	90	87	2.5	250	52
5	234.0	14:25	311.320	1.70	0.36	0.36	120	90	87	2.5	250	52
6	243.0	14:34	314.200	1.50	0.29	0.29	171	92	88	2.5	250	53
7	252.0	14:43	317.905	1.20	0.25	0.25	129	93	88	2.5	250	50
B-1	261.0	14:50	321.280	1.40	0.29	0.29	126	92	88	2.5	250	50
2	270.0	14:59	324.710	1.40	0.29	0.29	127	93	88	2.5	250	51
3	279.0	15:08	328.500	1.70	0.36	0.36	127	93	88	2.5	250	51
4	288.0	15:17	332.100	1.50	0.32	0.32	124	93	88	2.5	255	50
5	297.0	15:26	335.770	1.60	0.34	0.34	125	94	88	2.5	255	50
6	306.0	15:35	339.100	1.30	0.27	0.27	124	94	88	2.5	250	50
7	315.0	15:44	342.180	1.10	0.23	0.23	128	94	88	2.5	250	49
C-1	✱ 324.0	16:09	345.150	1.00	0.21	0.21	129	94	90	2.5	250	49
2	333.0	16:18	348.000	0.90	0.18	0.18	136	94	90	2.5	250	49
3	342.0	16:27	351.200	1.20	0.25	0.25	142	96	90	2.5	250	50
4	✱ 351.0	16:54	354.550	1.40	0.27	0.27	187	98	91	2.5	250	50
5	360.0	17:03	357.200	1.20	0.24	0.24	144	98	93	2.5	270	50
6	369.0	17:12	360.450	0.80	0.16	0.16	138	99	94	2.5	270	51
7	378.0	17:21	363.120	0.75	0.15	0.15	136	100	94	2.5	265	51

✱ STOP TEST 16:30

START 16:45

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH, READING, PA	04/28/81	SITE 1, INLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
01	R. ANTHESBERGER	70	29.38	-1.3	1002159	10.4" / 19.4"	0.84	2357	30 F 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
1/10 AT STAINLESS	2/128	27/02	20		FB6	1.53	0.973	6.0	0.010			250	250		90

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	17:25										
G-1	387.0	17:34	365.250	0.65	0.13	0.13	132	100	96	20	255	53
2	396.0	17:43	368.340	0.80	0.16	0.16	137	100	96	20	260	55
3	405.0	17:52	371.300	1.40	0.29	0.29	138	100	96	20	250	54
4	414.0	18:01	375.250	1.40	0.29	0.29	134	100	96	20	250	54
5	423.0	18:10	378.200	0.95	0.19	0.19	142	102	96	20	250	55
6	432.0	18:19	380.400	0.50	0.10	0.10	166	102	96	20	250	55
7	441.0	18:28	382.600	0.50	0.10	0.10	154	102	96	20	250	56

[redacted] [redacted] [redacted] [redacted] [redacted] MIS[redacted]N [redacted]TIN[redacted]IE[redacted]DAT[redacted] [redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH, READING, PA	04/09/81	SVTE[illegible] INLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	TIME BR NO.	PAGE
CIP-2	R. ANTIESBERGER	80	29.60	-1.2	00021 B2	19x19	19x19	9823259	1 of 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (l)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
1/2" STAINLESS	0.228	2-1/2	20	T1	FBC	1.53	0.973	15.0	0.0	1.2161		250°C	250°C	1.61	90

Initial 15.0 0.0

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	09:24	382.910									
A-1	9.0	09:33	387.000	1.70	0.36	0.36	114	70	69	1.0	235	47
2	18.0	09:42	391.250	2.20	0.46	0.46	117	73	70	2.0	240	47
3	27.0	09:51	394.780	1.80	0.37	0.37	119	78	72	2.0	250	48
4	36.0	10:00	398.500	1.80	0.37	0.37	121	80	73	2.0	250	50
5	45.0	10:09	402.150	1.70	0.35	0.35	120	84	76	2.0	250	50
6	54.0	10:18	404.530	1.50	0.31	0.31	120	86	76	2.0	250	50
7	63.0	10:27	408.375	0.98	0.20	0.20	122	87	79	2.0	250	50
B-2	72.0	10:45	412.000	1.70	0.35	0.35	122	88	82	2.0	250	51
2	81.0	10:54	416.000	2.00	0.41	0.41	126	89	82	2.0	250	50
3	90.0	11:03	420.130	2.20	0.45	0.45	125	91	83	2.0	250	50
4	99.0	11:12	424.300	2.20	0.45	0.45	127	92	84	2.0	250	51
5	108.0	11:21	428.500	2.20	0.45	0.45	124	93	84	2.0	255	50
6	117.0	11:30	432.850	2.30	0.48	0.48	123	94	84	2.0	250	50
7	126.0	11:39	437.000	2.20	0.45	0.45	124	94	84	2.0	250	50
DC-1	135.0	11:50	440.820	1.70	0.35	0.35	124	93	86	2.0	250	50
2	144.0	11:59	445.000	2.20	0.45	0.45	124	93	86	2.0	250	52
3	153.0	12:00	449.100	2.00	0.41	0.41	123	93	87	2.0	250	55
4	162.0	12:09	453.250	2.10	0.43	0.43	123	93	87	2.0	255	56
5	171.0	12:18	457.550	2.30	0.47	0.47	124	94	87	2.0	260	56
6	180.0	12:27	461.900	1.90	0.39	0.39	122	96	87	2.0	260	56
7	189.0	12:36	465.348	2.20	0.45	0.45	123	96	88	2.0	260	57

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH READING, PA	04/29/81	SIDE EFF. EXHAUST	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
GIA2	PANTEZ BARGER	80	29.90	-1.3	00021822	19.4" / 19.4"	0.83	259	20 of 20

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HRS
INCOLOY STAINLESS	0.128	27 PB	20			1.53	99.73			1.2141		250°F	250°F	GX	9:00

* STOP TEST 13:05 START 13:15

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	12:50										
E0-1	198.0	12:59	469.650	2.20	0.45	0.45	128	93	88	2.5	240	53
2	* 207.0	12:28	473.640	2.00	0.41	0.41	127	93	88	2.5	245	51
3	216.0	13:33	477.630	1.90	0.39	0.39	125	91	88	2.5	250	51
4	225.0	13:42	481.500	1.80	0.37	0.37	129	91	88	2.5	250	53
5	234.0	13:51	485.750	2.00	0.41	0.41	128	93	88	2.5	250	53
6	243.0	14:00	489.250	1.70	0.35	0.35	129	96	88	2.5	250	53
7	252.0	14:09	492.930	1.60	0.33	0.38	130	96	89	2.5	250	54
E1-1	261.0	14:19	496.030	1.10	0.22	0.22	129	96	90	2.5	250	54
2	270.0	14:28	498.800	0.85	0.17	0.17	129	96	90	2.5	250	55
3	279.0	14:37	502.150	1.40	0.28	0.28	130	96	90	2.5	250	55
4	288.0	14:46	505.950	1.70	0.35	0.35	131	96	91	2.5	250	52
5	297.0	14:55	509.500	1.40	0.29	0.29	130	96	91	2.5	250	57
6	306.0	15:04	512.470	1.00	0.20	0.20	130	98	91	2.5	250	58
7	315.0	15:13	515.270	0.93	0.19	0.19	134	96	91	2.0	250	60
E2-1	324.0	15:22	517.890	0.74	0.15	0.15	128	96	91	1.8	250	64
2	333.0	15:31	520.380	0.67	0.14	0.14	128	96	92	1.6	250	66
3	342.0	15:40	522.250	1.30	0.27	0.27	134	96	92	2.2	250	66
4	351.0	15:49	526.300	1.10	0.22	0.22	132	97	92	2.0	250	66
5	360.0	15:58	529.500	0.80	0.16	0.16	130	98	92	2.0	250	65
6	369.0	16:07	532.050	0.70	0.14	0.14	142	98	93	2.0	250	64
7	378.0	16:16	534.500	0.65	0.13	0.13	129	99	93	2.0	250	65

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH READING, PA	04/29/81	SITE #1 INLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
CLP24	R. AUTESBERGER	80	29.40	-.73	10902187	18" x 18"	0.83	259	30 of 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
1/2" SS	0.228	27 PP	20	536	1.53	1.973	5 PPP		1.21			250	250	1.4	180

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
1	387.	16:38	538.050	1.50	0.31	0.31	130	98	94	2.0	250	65
2	396.	16:47	542.170	2.00	0.43	0.43	98	98	94	2.5	250	64
3	405.	16:56	546.300	1.90	0.41	0.41	102	98	94	2.5	250	64
4	414.	17:05	550.300	1.80	0.39	0.39	101	100	94	2.5	250	66
5	423.	17:14	554.400	2.00	0.43	0.43	102	102	94	3.0	250	66
6	432.	17:23	558.600	1.40	0.30	0.30	98	104	94	3.0	250	66
7	441.	17:32	561.310	1.20	0.26	0.26	97	104	94	3.0	250	68

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH CO READING, PA	04/20/81	SINTERING PLANT	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THE BOX NO.	PAGE
C1P3	PLANTES 3 & 6	75	29.20	-17.3		104.0 / 104.0	.84	259	1 OF 3

C1P-3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (E)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
LIGHT INITIAL MAGGIE	.148	2/1/02	1.30	□	FB6	1.53	99.73	0.0	0.0000	1.209		250°F	250°F	.14	PAC

START 09:35

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	[redacted]	561.680									
A-1	9.0	09:44	565.470	2.00	0.39	0.39	154	62	62	20	240	49
2	18.0	09:53	569.145	2.00	0.38	0.38	171	64	62	20	250	49
3	27.0	10:02	573.300	2.10	0.45	0.45	106	66	64	20	250	47
4	36.0	10:11	577.050	1.80	0.38	0.38	166	68	64	20	250	47
5	45.0	10:40	580.150	1.70	0.37	0.37	99	71	65	20	260	48
6	54.0	10:49	584.000	1.70	0.37	0.37	99	74	66	20	255	48
7	63.0	10:58	588.130	1.50	0.32	0.32	100	76	68	20	250	48
B-1	72.0	11:10	591.750	1.90	0.36	0.36	99	76	70	20	250	49
2	81.0	11:19	595.050	2.00	0.37	0.37	116	77	70	20	250	49
3	90.0	11:28	598.850	1.70	0.29	0.29	175	79	71	20	255	50
4	99.0	11:37	602.150	1.60	0.30	0.30	112	80	72	20	250	50
5	108.0	11:46	605.800	1.90	0.35	0.35	125	80	72	20	250	50
6	117.0	11:55	609.100	1.60	0.30	0.30	110	81	73	20	250	51
7	126.0	12:04	612.450	1.60	0.30	0.30	109	82	74	20	250	57
D-1	135.0	12:20	615.900	1.70	0.32	0.32	112	81	76	20	250	54
2	144.0	12:29	619.420	1.70	0.32	0.32	113	81	76	20	250	54
3	153.0	12:38	623.300	2.10	0.39	0.39	111	82	76	20	250	55
4	162.0	12:47	626.900	1.80	0.34	0.34	103	84	77	20	250	55
5	171.0	12:56	630.700	1.90	0.36	0.36	106	85	78	20	250	55
6	180.0	13:05	634.200	1.80	0.34	0.34	106	86	79	20	250	53
7	189.0	13:14	637.620	1.60	0.30	0.30	115	88	80	20	250	52
	•		•	•	•	•				•		
	•		•	•	•	•				•		

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH CO / READING, PA	9/30/84	SINTER PLANT	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
9/A3	B ANTIESBERGER	75	29.70	29.70		10.94" / 10.44"	0.84	3-59	4D, F 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
STAINLESS	9/28	207/012	20		FAB	1.53	0.9973			1.3225		350°F	350°F	1.54	90

SUP TEST - 16:20 START 16:25 PITOT - 1.90

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK) (13.20)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
E-1	(198.0) 198.0	13:29	640.850	1.40	0.26	0.26	121	86	81	2.0	250	51
2	(207.0) 207.0	13:38	644.050	1.40	0.26	0.26	118	86	81	2.0	250	52
3	(216.0) 216.0	13:47	647.700	1.90	0.35	0.35	115	86	81	2.0	250	52
4	(225.0) 225.0	13:56	651.300	1.80	0.34	0.34	112	86	81	2.0	250	54
5	(234.0) 234.0	14:05	654.830	1.70	0.32	0.32	114	87	81	2.0	250	54
6	(243.0) 243.0	14:14	658.250	1.60	0.30	0.30	110	88	81	2.0	250	55
7	(252.0) 252.0	14:23	661.220	1.10	0.21	0.21	106	88	81	2.0	250	54
E-1	(261.0) 261.0	14:40	664.320	1.30	0.24	0.24	114	86	80	2.0	250	55
2	(270.0) 270.0	14:49	666.900	0.85	0.16	0.16	114	86	80	2.0	250	56
3	(279.0) 279.0	14:58	670.000	1.40	0.26	0.26	115	86	80	2.0	250	56
4	(288.0) 288.0	15:07	673.300	1.50	0.27	0.27	132	87	81	2.0	250	58
5	(297.0) 297.0	15:16	676.200	1.20	0.21	0.21	142	87	81	2.0	250	58
6	(306.0) 306.0	15:25	678.650	0.80	0.14	0.14	131	88	82	2.0	250	58
7	(315.0) 315.0	15:34	681.350	0.95	0.17	0.17	124	88	83	2.0	250	58
G-1	(324.0) 324.0	15:43	683.200	0.70	0.13	0.13	130	89	84	2.0	250	58
2	(333.0) 333.0	15:52	686.600	1.00	0.18	0.18	129	90	85	2.0	250	59
3	(342.0) 342.0	16:01	689.750	1.40	0.25	0.25	132	92	86	2.0	250	59
4	(351.0) 351.0	16:10	692.900	1.30	0.23	0.23	135	93	88	2.0	250	59
5	(360.0) 360.0	16:19	695.700	0.95	0.17	0.17	141	95	88	2.0	250	59
6	(369.0) 369.0	16:28	698.800	0.65	0.11	0.11	140	98	90	2.0	250	60
7	(379.0) 379.0	16:37	700.300	0.70	0.12	0.12	133	99	90	2.0	250	60

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH CO. READING, PA	04/30/81	SINTER PLANT STACK	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C1P13	R. ALTESBERGER	126	29.72	-1.3		10.4 / 10.4	0.84	250	30 F 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
VERN STAINLESS	1.28	37/02	1.20		780/513	1.673	1.673	0	0	1.209		250	250	1.54	90

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	16:45	•									
C-1	37 387.0	16:54	703.600	1.50	0.27	0.27	1345	95	91	20	250	60
2	38 396.0	17:03	706.800	1.60	0.28	0.28	144	96	92	20	250	60
3	39 405.0	17:12	709.625	1.10	0.20	0.20	135	97	92	20	250	61
4	40 414.0	17:21	712.550	1.20	0.22	0.22	130	98	92	20	250	61
5	41 423.0	17:30	715.600	1.30	0.24	0.24	129	98	92	20	250	61
6	42 432.0	17:39	718.500	1.10	0.20	0.20	128	98	92	20	250	62
7	43 441.0	17:48	721.170	1.10	0.20	0.20	128	98	92	20	250	62

DRY MOLECULAR WEIGHT DETERMINATION

PLANT CARTech

DATE 4/22/81 TEST NO CIF-1

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Baghouse Inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) yes

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 65°F

OPERATOR R. Campbell

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.6	0.6	0.6	0.6	0.6	0.6		44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.0	19.4	20.0	19.4	20.0	19.4		32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

Plant CARPENTER TECH. READING, PA

Date 4/26/8

Sampling location OUTLET, SITE #2

Inside of far wall to outside of nipple 66"

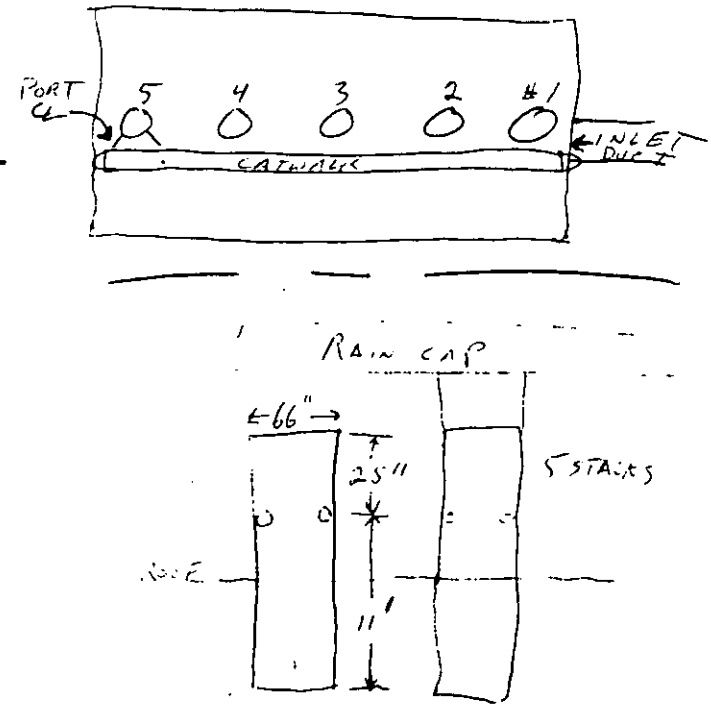
Inside of near wall to outside of nipple (nipple length) 0"

Stack I.D. 5' 6" - 66"

Nearest upstream disturbance .40 dd

Nearest downstream disturbance 2.0 dd

Calculated by R. ANTESBERGER



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	NIPPLE LENGTH	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	1.1	66"	3/4"	—	3/4"
2	3.2	66"	2 1/8"	-	2 1/8"
3	5.5	66"	3 5/8"	-	3 5/8"
4	7.9	66"	5 1/4"	-	5 1/4"
5	10.5	66"	7"	-	7"
6	13.2	66"	8 3/4"	-	8 3/4"
7	16.1	66"	10 5/8"	-	10 5/8"
8	19.4	66"	12 7/8"	-	12 7/8"
9	23.0	66"	15 1/8	-	15 1/8
10	27.2	66"	18"	-	18"
11	32.3	66"	21 3/8"	-	21 3/8"
12	39.8	66"	26 1/2"	-	26 1/2"
13	60.2	66"	39 3/4"	-	39 3/4"
14	67.7	66"	44 5/8"	-	44 5/8"
15	72.8	66"	48"	-	48"
16	77.0	66"	50 7/8"	-	50 7/8"
17	80.6	66"	53 1/4"	-	53 1/4"
18	83.9	66"	55 3/8"	-	55 3/8"
19	86.8	66"	57 1/4	-	57 1/4"
20	89.5	66"	59"	-	59"
21	92.1	66"	60 3/4"	-	60 3/4"
22	94.5	66"	62 3/8"	-	62 3/8"
23	96.8	66"	63 7/8"	-	63 7/8"
24	98.9	66"	65 1/4"	-	65 1/4"

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. Carpenter Technology Reading PA.	4/27/91

Page 1

SAMPLING LOCATION	CLOCK TIME
baghouse Outlet AOD #2	10:55 am

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. VT-1	R. Campbell P. Reinerman	62	29.85	

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	66		0.82	

#189

Pitot tube & line leak check OK

Thermocouple 129?

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
1A-1		.09	135
2		.095	134
3		.11	135
4		.12	137
5		.13	138
6		.16	139
7		.17	140
8		.17	140
9		.18	140
10		.19	140
11		.22	139
12		.22	139
13		.23	138
14		.22	138
15		.20	138
16		.19	138
17		.19	138
18		.17	138
19		.15	138
20		.14	137
21		.11	138
22		.12	137
23		.14	137
24		.13	137
1B-1		.09	136
2		.10	136
3		.11	137
4		.13	138
5		.15	139
6		.11	139
7		.13	139
8		.135	139
9		.14	139
10		.15	138
11		.15	138
12		.18	139
13		.20	138
14		.19	138
15		.19	138
16		.18	137
17		.17	139
18		.16	137

Static +.15

No. 1 $\sqrt{\Delta P}$ = ~~0.374~~ 0.390

$\overline{\Delta P}$ = 0.15

GAS VELOCITY AND VOLUME DATA

Page 2

PLANT AND CITY	RUN DATE
1. Carpenter Technology Reading Pa.	14 / 27 / 81

SAMPLING LOCATION	CLOCK TIME
Baghouse Outlet ACDH2	

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. VT-1	R. Campbell P. Reinerman	62		

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	66			

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
1B-19		.16	137
20		.15	137
21		.155	137
22		.14	137
23		.14	137
24		.13	137
2A-1		.09 .06	133
2		.095 .06	135
3		.10 .025	136
4		.11 .03	138
5		.13 .04	138
6		.14 .04	139
7		.15 .04	139
8		.17 .045	140
9		.19 .06	140
10		.20 .045	139
11		.22 .09	139
12		.22 .11	139
13		.20 .11	139
14		.17 .08	139
15		.15 .095	138
16		.17 .08	138
17		.16 .06	138
18		.15 .05	138
19		.15	137
20		.13	137
21		.13	137
22		.12	137
23		.13	137
24		.11	137
2B-1		.10	134
2		.08	137
3		.08	137
4		.09	137
5		.10	138
6		.11	138
7		.12	138
8		.14	138
9		.15	138
10		.17	139
11		.22	139
12		.24	139

11.05 am

Static + .12 Pressure

Static Pres. + .09

$2A = \sqrt{\Delta P} = .5835$

11.20 am

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. Carpenter Technology	14 / 07 / 91

Page -3

SAMPLING LOCATION	CLOCK TIME
Baghouse Outlet ACD42	

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. VT-1	P. Campbell P. Reinerman	62	29.85	

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	66			

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
3B-13		.22	138
14		.20	138
15		.20	138
16		.18	138
17		.17	138
18		.14	138
19		.13	138
20		.11	137
21		.10	137
22		.10	137
23		.10	137
3A-1		.065	137
2		.09	137
3		.11	136
4		.12	135
5		.14	136
6		.15	137
7		.16	137
8		.16	138
9		.17	138
10		.18	138
11		.20	139
12		.22	139
13		.21	138
14		.21	138
15		.20	138
16		.17	138
17		.16	138
18		.14	138
19		.14	138
20		.12	138
21		.12	138
22		.11	138
23		.11	138
24		.10	137
3B-1		.06	135
2		.065	136
3		.07	136
4		.075	137
5		.08	136
6		.10	136
7		.10	134

11.20 $\overline{\sqrt{\Delta P}}_A = 0.371 \Rightarrow \Delta P = 0.14$

$\overline{\sqrt{\Delta P}}_{3B} = 0.379$

~~$\overline{\sqrt{\Delta P}} = 0.3046$~~

24.01 137

Static Pressure +1.10"

11.21

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. Carpenter Technology Reading Pa.	4 / 27 / 81

SAMPLING LOCATION	CLOCK TIME
Baghouse Outlet ACD#2	

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RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. VT-1	R. Campbell / P. Panoman	62	29.85	

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	6.6			

FIELD DATA

11.32

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
3B-8		.13	135
9		.14	135
10		.16	135
11		.19	135
12		.23	135
13		.25	135
14		.21	134
15		.21	134
16		.20	134
17		.17	134
18		.16	133
19		.14	133
20		.14	133
21		.12	133
22		.115	133
23		.10	133
24		.10	133
4A-1		.108	132
2		.095	133
3		.11	133
4		.14	133
5		.14	133
6		.16	133
7		.165	133
8		.18	133
9		.19	133
10		.195	133
11		.19	133
12		.18	134
13		.16	133
14		.17	133
15		.175	133
16		.17	133
17		.15	133
18		.15	133
19		.155	133
20		.13	133
21		.12	133
22		.11	133
23		.11	133
24		.10	132

Static Pressure +.10

No.3 $\overline{\sqrt{\Delta P}} = 0.373 \Rightarrow \overline{\Delta P} = 0.14$

ΔP .147 .16 .134 .147 .133

Static Press +.13

11:41

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. Carpenter Technology Reading Pa	4 / 27 / 81

SAMPLING LOCATION	CLOCK TIME
Baghouse Outlet AOD #2	

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RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. VT-1	R. Campbell P. Rinnerman			

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
4B-1		.09	133
2		.09	134
3		.085	135
4		.105	135
5		.11	137
6		.12	138
7		.13	139
8		.14	140
9		.16	142
10		.18	143
11		.19	151
12		.23	153
13		.23	154
14		.22	155
15		.19	155
16		.17	156
17		.15	157
18		.14	157
19		.125	157
20		.12	158
21		.115	159
22		.11	159
23		.095	160
24		.09	160
5A-1		.08	154
2		.08	157
3		.10	157
4		.11	157
5		.11	148
6		.11	148
7		.11	149
8		.13	150
9		.14	151
10		.15	151
11		.22	152
12		.25	151
13		.23	152
14		.20	152
15		.20	152
16		.21	153
17		.17	154
18		.16	154

ΔP .141
151 °F

ΔP .147
150°F

$\sqrt{\Delta P} = 0.376 = \overline{\Delta P} = 0.14$

*E 11:40

Static pressure + .135

11.54

GAS VELOCITY AND VOLUME DATA

	PLANT AND CITY	RUN DATE
1.	Carpenter Technology Reading Pa	4 / 27 / 91

SAMPLING LOCATION	CLOCK TIME
Baghouse Outlet AcDH2	

Paget

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. VT-1	R. Campbell		29.85	

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	66			

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in.H_2O	STACK TEMP, °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
5A-19		.125	154
20		.13	154
21		.13	155
22		.135	155
23		.135	155
24		.12	156
5B-1		.09	157
2		.05	160
3		.11	163
4		.12	164
5		.12	164
6		.13	164
7		.15	164
8		.15	164
9		.15	165
10		.19	165
11		.21	165
12		.225	165
13		.23	165
14		.21	164
15		.20	164
16		.20	164
17		.20	164
18		.16	164
19		.16	164
20		.17	163
21		.18	163
22		.13	162
23		.115	162
24		.11	162

11:55

$\bar{\Delta P} = 0.5\sqrt{\Delta P} \Rightarrow \bar{\Delta P} = 0.15$

$\bar{\Delta P} = .158$
164

Static pressure + .13

12.00

[redacted] HIS[redacted]N T[redacted]IN[redacted]IEL[redacted]AT[redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Cantagalo Comp., Rice Lake, Pa.	4/28/81	4/5/10 Baghouse Outlet	Particulate

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
G2P-1	R. Campbell / Rich Lockwood	70	28.77	N/A	0092989	66	.841	164	1 of 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6ft glass	.375	6XXX	2.0	113	634	1.78	1.05	8"	0.0 cfm	11128.8		250	250		2.0

Pitot system leak check (OK)

Pitot tube #185

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	9:25	736.737									
1B-1	2.0		738.081	.08	1.58	1.58	108	75	70	2.0	250	67
2	4.0		739.525	.09	1.76	1.76	114	75	70	2.0	250	67
3	6.0		740.875	.07	1.34	1.34	126	75	70	2.0	250	64
4	8.0		742.220	.09	1.71	1.71	130	76	70	2.0	250	64
5	10.0		743.590	.10	1.88	1.88	135	76	70	2.0	250	64
6	12.0		745.060	.11	2.06	2.06	139	78	70	2.5	250	62
7	14.0		746.530	.12	2.24	2.24	142	79	70	3.0	250	60
8	16.0		748.040	.13	2.41	2.41	144	80	70	3.0	250	58
9	18.0		749.550	.13	2.41	2.41	145	82	70	3.0	250	58
10	20.0		751.160	.11	2.06	2.06	140	83	72	3.0	250	58
11	22.0		753.060	.19	3.57	3.57	137	83	72	3.0	250	58
12	24.0		755.150	.21	3.95	3.95	136	84	72	3.0	250	58
13	26.0		757.170	.18	3.39	3.39	135	86	74	4.0	255	60
14	28.0		759.130	.18	3.40	3.40	133	86	74	4.0	230	55
15	30.0		761.150	.19	3.61	3.61	130	87	74	4.0	235	53
16	32.0		763.110	.16	3.05	3.05	128	87	75	4.0	245	50
17	34.0		764.610	.08	1.52	1.52	129	88	75	4.0	250	50
18	36.0		766.185	.12	2.29	2.29	127	88	76	2.5	250	50
19	38.0		767.820	.11	2.11	2.11	125	88	76	2.5	255	52
20	40.0		769.430	.09	1.73	1.73	124	88	76	2.5	255	52
21	42.0		770.940	.08	1.54	1.54	129	88	76	2.5	255	54
22	44.0		772.310	.09	1.73	1.73	122	88	76	2.0	255	54
23	46.0		773.815	.10	1.93	1.93	121	89	77	2.0	255	54
24	48.0	10:13	775.422	.12	2.32	2.32	121	89	77	2.0	255	54

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/28/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
G2P-1-1	R.G. R.R.								0 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
	.375														

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	10115										
1A-1	50.		776.310	.04	0.77	0.77	120	88	79	1.0	250	54
2	52.0		777.480	.06	1.16	1.16	118	89	79	1.0	250	56
3	54.0		778.780	.08	1.55	1.55	119	89	79	1.5	255	56
4	56.		780.380	.09	1.74	1.74	120	90	80	1.5	250	56
5	58.		781.650	.10	1.93	1.93	122	90	80	1.5	250	56
6	60.		783.110	.09	1.73	1.73	122	90	80	2.0	250	58
7	62.		784.620	.10	1.93	1.93	121	92	80	2.0	255	60
8	64.		786.390	.13	2.51	2.51	120	92	86	3.0	260	60
9	66.		788.085	.13	2.51	2.51	120	94	81	3.0	265	60
10	68.		789.850	.14	2.71	2.71	119	94	81	3.0	260	60
11	70.		791.580	.14	2.71	2.71	119	97	84	3.5	260	60
12	72.		793.515	.17	3.29	3.29	119	97	83	4.0	250	62
13	74.		795.565	.19	3.68	3.68	119	97	83	4.0	250	62
14	76.		797.550	.18	3.49	3.49	119	98	84	4.5	250	62
15	78.		799.570	.18	3.49	3.49	119	99	84	4.5	255	62
16	80.		801.325	.12	2.32	2.32	120	100	85	3.5	255	64
17	82.		802.880	.09	1.74	1.74	120	101	85	3.0	255	66
18	84.		804.415	.11	2.13	2.13	120	101	86	2.0	250	60
19	86.		806.080	.12	2.32	2.32	120	102	87	2.5	250	60
20	86.		807.750	.12	2.31	2.31	122	102	88	2.5	250	60
21	90.		809.360	.11	2.10	2.10	127	103	88	2.5	255	58
22	92.		811.020	.11	2.08	2.08	132	103	89	2.0	255	58
23	94.		812.570	.08	1.50	1.50	137	103	89	1.0	255	56
24	96.	1110	813.757	.08	1.50	1.50	137	103	89	1.0	255	56

[redacted] MIS[redacted]N [redacted]TIN[redacted]IE[redacted]DAT[redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/28/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C29-1	RG, RE								0 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
	3785														

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
2B-1	98.	1112	814.885	0.06	1.14	1.14	~~129~~ 131	103	93	0.0	250	66
2	100.	1114	816.080	0.06	1.13	1.13	138	104	93	0.0	250	66
3	102.	1116	817.297	0.06	1.12	1.12	139	105	93	0.5	260	64
4	104.	1118	818.550	0.07	1.31	1.31	139	106	94	0.5	240	64
5	106.	1120	819.873	0.08	1.51	1.51	136	107	95	0.5	260	64
6	108.	1122	821.280	0.09	1.70	1.70	135	108	95	0.5	260	62
7	110.	1124	822.892	0.12	2.27	2.27	133 ~~138~~	109	96	1.5	270	62
8	112.	1126	824.545	0.12	2.27	2.27	133	110	96	1.5	275	60
9	114.	1128	826.389	0.16	3.03	3.03	132	110	96	3.5	270	60
10	116.	1130	828.026	0.11	2.09	2.09	131	111	98	1.0	260	62
11	118.	1132	829.630	0.11	2.09	2.09	130	111	99	1.0	250	62
12	120.	1134	831.405	0.15	2.86	2.86	129	112	100	3.5	245	62
13	122.	1136	833.465	0.20	3.81	3.81	129	112	100	5.0	250	64
14	124.	1138	835.420	0.16	3.05	3.05	129	112	100	4.0	250	64
15	126.	1140	837.131	0.12	2.29	2.29	129	112	100	2.5	260	64
16	128.	1142	838.918	0.14	2.67	2.67	128	112	100	3.0	255	64
17	130.	1144	840.599	0.12	2.29	2.29	128	112	100	2.5	265	62
18	132.	1146	842.236	0.11	2.10	2.10	128	112	100	2.0	270	62
19	134.	1148	843.774	0.10	1.91	1.91	128	112	100	2.0	255	62
20	136.	1150	845.494	0.13	2.48	2.48	129	112	102	2.5	240	63
21	138.	1152	847.030	0.09	1.72	1.72	129	112	103	1.5	250	63
22	140.	1154	848.547	0.10	1.91	1.91	127	112	103	1.5	260	64
23	142.	1156	849.949	0.10	1.91	1.91	126	112	103	2.0	260	64
24	144.	1158	851.670	0.12	2.30	2.30	126	112	103	2.5	260	66

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
2A-1									1 of 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
2A-1	146.	1204	852.750	0.05	0.96	0.96	122	112	103	0.0	250	66
2	148.	1206	853.939	0.06	1.15	1.15	123	112	103	0.0	260	66
3	150.	1208	855.222	0.07	1.34	1.34	127	112	103	0.0	260	66
4	152.	1210	856.609	0.08	1.53	1.53	128	113	104	0.5	260	66
5	154.	1212	858.029	0.09	1.72	1.72	128	113	104	1.0	250	64
6	156.	1214	859.486	0.09	1.72	1.72	129	114	104	1.0	250	63
7	158.	1216	861.190	0.13	2.48	2.48	128	114	104	3.0	270	64
8	160.	1218	862.933	0.13	2.48	2.48	129	115	104	3.0	260	64
9	162.	1220	864.626	0.13	2.48	2.48	128	115	104	3.0	270	64
10	164.	1222	866.489	0.15	2.86	2.86	128	115	104	3.0	250	66
11	166.	1224	868.309	0.14	2.67	2.67	128	116	105	3.0	260	66
12	168.	1226	870.293	0.19	3.62	3.62	128	116	105	4.5	260	64
13	170.	1228	872.180	0.14	2.67	2.67	128	116	105	3.0	250	60
14	172.	1230	874.000	0.16	3.06	3.06	127	114	105	3.5	260	60
15	174.	1232	876.111	0.18	3.45	3.45	126	114	105	4.0	260	58
16	176.	1234	878.000	0.14	2.68	2.68	127	114	105	3.0	240	56
17	178.	1236	879.181	0.04	0.77	0.77	125	111	102	0.0	250	56
18	180.	1238	880.370	0.06	1.15	1.15	125	110	101	0.0	255	56
19	182.	1240	881.837	0.10	1.92	1.92	125	109	100	2.0	260	56
20	184.	1242	883.266	0.08	1.53	1.53	126	107	100	1.5	260	58
21	186.	1244	884.748	0.10	1.91	1.91	126	106	100	2.0	270	58
22	188.	1246	886.278	0.10	1.92	1.92	125	106	100	2.0	260	60
23	190.	1248	887.750	0.09	1.73	1.73	125	105	99	2.0	250	60
24	192.	1250	889.453	0.13	2.48	2.48	129	105	98	3.0	255	60

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/28/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
3B-1	BG, JR								0 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	12:55										
3B-1	194.		890.620	.06	1.11	1.11	145	103	97	1.5	250	58
2	196.		891.820	.06	1.10	1.10	150	103	97	1.5	255	58
3	198.		893.110	.08	1.46	1.46	155	102	96	1.5	260	60
4	200.		894.620	.11	2.01	2.01	155	101	95	2.0	260	60
5	202.		896.020	.08	1.47	1.47	151	101	95	2.0	260	60
6	204.		897.510	.11	2.01	2.01	154	100	95	2.0	260	60
7	206.		899.110	.11	2.02	2.02	151	100	94	2.0	255	58
8	208.		900.690	.12	2.22	2.22	145	100	93	2.5	255	58
9	210.		902.415	.14	2.59	2.59	147	100	93	3.0	255	58
10	212.		904.140	.13	2.41	2.41	144	100	93	3.0	255	58
11	214.		905.940	.15	2.79	2.79	143	99	92	3.0	255	58
12	216.		908.010	.20	3.74	3.74	140	98	91	3.2	255	58
13	218.		910.040	.17	3.21	3.21	134	98	90	4.5	255	58
14	220.		911.930	.16	3.02	3.02	134	97	90	4.0	255	58
15	222.		913.710	.15	2.83	2.83	134	97	90	4.0	255	58
16	224.		915.630	.16	3.03	3.03	133	97	90	3.5	250	60
17	226.		917.450	.14	2.65	2.65	133	96	89	3.5	250	60
18	228.		919.220	.15	2.85	2.85	130	96	89	3.5	245	60
19	230.		921.120	.14	2.67	2.67	128	95	88	3.0	250	60
20	232.		923.050	.13	2.48	2.48	128	95	88	2.5	255	60
21	234.		924.550	.12	2.29	2.29	127	94	88	2.5	255	60
22	236.		926.210	.12	2.29	2.29	127	93	87	2.5	255	60
23	238.		927.810	.11	2.10	2.10	127	93	85	2.5	255	60
24	240.	13:49	929.371	.09	1.72	1.72	127	93	85	2.5	255	60

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/28/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C2P-1	RG, BB								0, F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS.
	3/15														

Leak check Subtract 929.480 − 929.371 = .109 cf leak check 10" Hg 0.005 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	13:50										
3A-1	242.		930.580	.07	1.36	1.36	119	91	85	1.0	250	62
2	244.		931.831	.09	1.73	1.73	124	91	85	1.0	250	60
3	246.		933.230	.09	1.73	1.73	124	91	85	1.5	250	62
4	248.		934.620	.08	1.53	1.53	126	90	84	1.5	250	60
5	250.		936.030	.10	1.92	1.92	125	90	83	1.5	250	60
6	252.		937.510	.10	1.92	1.92	125	90	83	2.0	250	60
7	254.		939.010	.12	2.30	2.30	125	90	83	2.0	250	60
8	256.		940.485	.12	2.28	2.28	130	90	83	2.5	250	60
9	258.		942.180	.14	2.68	2.68	127	91	83	3.0	250	60
10	260.		944.000	.15	2.88	2.88	129	92	84	3.0	250	58
11	262.		945.830	.15	2.88	2.88	129	94	84	3.0	250	58
12	264.		947.610	.11	2.12	2.12	123	95	85	3.5	250	58
13	266.		949.650	.18	3.46	3.46	123	96	85	4.0	250	58
14	268.		951.620	.17	3.27	3.27	122	96	85	4.0	255	58
15	270.		953.460	.14	2.69	2.69	123	97	86	3.5	250	60
16	272.		954.760	.06	1.15	1.15	124	97	86	1.5	250	64
17	274.		956.150	.10	1.90	1.90	129	98	87	2.0	250	64
18	276.		957.510	.07	1.32	1.32	135	98	87	1.0	250	60
19	278.		958.870	.08	1.50	1.50	138	98	87	1.0	250	60
20	280.		960.150	.07	1.31	1.31	140	98	87	1.0	250	60
21	282.		961.415	.09	1.67	1.67	143	98	87	1.0	250	60
22	284.		962.710	.09	1.68	1.68	139	98	87	1.0	250	60
23	286.		964.210	.09	1.68	1.68	139	98	88	1.5	250	62
24	288.		965.545	.08	1.49	1.49	143	100	88	1.5	250	64

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
62871									0 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
4B-1	290.	1427	906.485	[illegible]	0.76	0.76	131	100	90	0.0	270	68
2	292.	1429	967.670	0.06	1.14	1.14	131	102	90	0.0	260	66
3	294.	1451	968.935	0.07	1.33	1.33	132	100	90	0.0	240	55
4	296.	1453	970.430	0.11	2.08	2.08	133	100	90	2.0	250	55
5	298.	1455	971.875	0.10	1.90	1.90	131	100	90	2.0	250	55
6	300.	1457	973.422	0.11	2.09	2.09	129	100	90	2.0	250	55
7	302.	1459	975.000	0.11	2.09	2.09	128	100	90	2.0	250	54
8	304.	1501	976.593	0.12	2.29	2.29	127	100	90	2.0	250	52
9	306.	1503	978.495	0.15	2.86	2.86	128	99	89	3.0	260	52
10	308.	1505	979.985	0.10	1.91	1.91	127	96	88	2.0	250	52
11	310.	1507	981.681	0.13	2.48	2.49	127	96	88	3.0	250	52
12	312.	1509	983.695	0.19	3.63	3.63	127	96	88	4.5	255	52
13	314.	1511	985.721	0.18	3.45	3.45	125	96	88	4.0	250	52
14	316.	1513	987.765	0.19	3.65	3.65	124	96	89	5.0	260	55
15	318.	1515	989.906	0.19	3.46	3.46	124	96	88	4.0	255	55
16	320.	1517	991.086	0.15	2.88	2.88	124	99	89	3.0	255	55
17	322.	1519	993.512	0.16	3.07	3.07	125	98	90	4.0	255	56
18	324.	1521	995.385	0.12	2.29	2.29	124	100	90	3.0	255	56
19	326.	1523	997.290	0.12	2.29	2.29	124	100	90	3.0	260	58
20	328.	1525	998.925	0.13	2.49	2.49	126	101	90	3.0	270	60
21	330.	1527	000.600	0.12	2.30	2.30	126	101	90	3.5	260	60
22	332.	1529	002.210	0.11	2.11	2.11	125	101	90	3.0	250	60
23	334.	1531	003.922	0.13	2.50	2.50	124	101	90	3.0	255	62
24	336.	1533	005.248	0.07	1.34	1.34	124	101	90	0.0	255	62

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
99871	RG 98								0 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HRS

1 4 min

7 8 9 10 TRAVERSE POINT NUMBER	11 12 13 14 SAMPLING TIME, min	15 16 17 18 CLOCK TIME (24 hr CLOCK)	19 20 21 22 23 24 GAS METER READING (V_m), ft^3	25 26 27 28 29 VELOCITY HEAD (Δp_s), in. H_2O	30 31 32 33 34 ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	35 36 37 ACTUAL	38 39 40 41 STACK TEMPERATURE (T_s), °F	42 43 44 DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	45 46 47 OUTLET ($T_{m_{out}}$), °F	48 49 50 51 PUMP VACUUM, in. Hg	52 53 54 SAMPLE BOX TEMPERATURE °F	55 56 57 IMPINGER TEMPERATURE °F
	0											
4A-1	338.	1539	006.495	0.07	1.35	1.35	123	100	90	0.0	250	64
2	340.	1541	007.690	0.06	1.15	1.15	125	100	90	0.0	250	60
3	342.	1543	008.966	0.07	1.34	1.34	126	100	90	0.0	260	58
4	344.	1545	010.207	0.06	1.15	1.15	126	101	90	0.0	260	58
5	346.	1547	011.672	0.10	1.91	1.91	126	101	90	2.0	200	58
6	348.	1549	013.178	0.10	1.91	1.91	126	101	90	2.0	250	58
7	350.	1551	014.950	0.14	2.68	2.68	126	100	90	3.0	255	58
8	352.	1553	016.766	0.16	3.06	3.06	127	100	90	4.0	255	56
9	354.	~~1555~~	018.672	0.16	3.06	3.06	127	100	90	4.0	260	64
10	356.	~~1557~~	020.240	0.10	1.91	1.91	127	100	91	2.0	260	62
11	358.	~~1559~~	022.300	0.18	3.44	3.44	127	101	91	4.0	260	60
12	360.	~~1001~~	024.325	0.20	3.81	3.81	129	101	91	3.0	260	60
13	362.	~~1003~~	026.440	0.20	3.81	3.81	129	101	91	5.0	250	60
14	364.	~~1005~~	028.499	0.19	3.63	3.63	129	101	91	5.0	250	60
15	366.	~~1007~~	030.000	0.09	1.71	1.71	129	101	91	2.0	255	58
16	368.	~~1009~~	031.840	0.16	3.04	3.04	131	101	91	3.5	255	58
17	370.	~~1011~~	033.700	0.09	1.69	1.69	131	101	91	1.5	270	58
18	372.	~~1013~~	034.539	0.05	0.93	0.93	134	101	92	0.0	260	60
19	374.	~~1015~~	035.205	0.07	1.28	1.28	151	101	92	0.0	260	62
20	376.	~~1017~~	037.280	0.10	1.82	1.82	163	102	92	1.5	250	62
21	378.	~~1019~~	038.160	0.08	1.45	1.45	161	102	92	1.0	240	62
22	380.	~~1021~~	039.992	0.09	1.62	1.62	162	102	92	1.0	245	62
23	382.	1023	041.450	0.06	1.13	1.13	36	102	92	1.0	255	62
24	384.	1025	042.670	[illegible]	1.13	1.13	135	102	92	1.0	260	64

1553 SHUT DOWN PROCESS DELAY 4 min

[redacted] 1630 [redacted] MINUTE BOX LEAK [redacted] GOOD [redacted]

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
G2P-1									0 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	17:13	•									
5B-1	386.		1043.720	.03	0.58	0.58	123	92	87	1.0	250	58
2	388.		1044.725	.05	0.95	0.95	127	92	87	1.5	250	58
3	390.		1045.760	.05	0.95	0.95	130	92	87	1.5	255	60
4	392.		1047.025	.07	1.33	1.33	132	92	87	1.5	255	60
5	394.		1048.330	.08	1.52	1.52	132	93	87	2.0	260	60
6	396.		1049.915	.12	2.27	2.27	133	94	87	2.5	255	60
7	398.		1051.380	.09	1.71	1.71	130	94	88	1.5	255	58
8	400.		1052.860	.10	1.90	1.90	131	94	88	2.0	255	58
9	402.		1054.510	.13	2.47	2.47	131	94	87	2.5	253	58
10	404.		1056.270	.14	2.66	2.66	131	94	86	3.0	255	60
11	406.		1058.090	.15	2.85	2.85	131	94	86	3.5	250	60
12	408.		1059.940	.12	2.28	2.28	131	94	86	3.5	255	62
13	410.		1061.920	.18	3.42	3.42	130	94	87	4.0	250	62
14	412.		1063.515	.10	1.90	1.90	130	95	86	2.0	250	62
15	414.		1065.170	.14	2.66	2.66	131	94	86	3.0	255	60
16	416.		1067.025	.16	3.04	3.04	130	95	87	3.5	250	60
17	418.		1068.810	.13	2.47	2.47	131	95	87	3.0	250	60
18	420.		1070.470	.11	2.09	2.09	130	95	87	2.0	255	62
19	422.		1071.980	.11	2.09	2.09	129	95	87	2.0	255	62
20	424.		1073.560	.11	2.09	2.09	130	95	87	2.0	255	62
21	426.		1075.099	.10	1.90	1.90	129	95	87	2.0	255	62
22	428.		1076.540	.09	1.71	1.71	130	95	87	1.5	260	60
23	430.		1078.030	.10	1.89	1.89	133	95	87	2.0	255	60
24	432.	18:03	1079.455	.08	1.50	1.50	138	95	87	2.0	255	58

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	9/28/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
G2D-71									0 of

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
								10	90						

final leak check 10"Hg 0.0 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
5A-1	434.		1080.650	.07	1.30	1.30	142	94	87	1.0	250	60
2	436.		1081.910	.07	1.28	1.28	151	94	86	1.0	250	60
3	438.		1083.120	.06	1.09	1.09	154	93	86	1.0	250	66
4	440.		1084.520	.10	1.84	1.84	147	93	86	1.0	250	60
5	442.		1085.980	.10	1.84	1.84	149	93	85	1.5	255	62
6	444.		1087.580	.13	2.40	2.40	148	93	85	1.5	250	62
7	446.		1088.970	.07	1.30	1.30	143	93	85	1.0	250	62
8	448.		1090.880	.19	3.55	3.55	140	93	85	4.0	250	60
9	450.		1092.740	.14	2.63	2.63	137	93	85	3.0	250	60
10	452.		1094.570	.16	3.01	3.01	135	93	85	3.5	250	62
11	454.		1096.535	.19	3.59	3.59	133	94	85	4.0	255	63
12	456.		1098.630	.20	3.79	3.79	131	94	85	5.0	255	64
13	458.		1100.745	.20	3.80	3.80	130	94	85	5.0	255	64
14	460.		1102.150	.11	2.09	2.09	131	95	85	2.5	255	66
15	462.		1103.910	.09	1.71	1.71	130	95	85	1.5	250	64
16	464.		1105.320	.11	2.09	2.09	130	95	85	1.5	250	64
17	466.		1106.805	.10	1.90	1.90	130	95	85	1.5	250	64
18	468.		1108.245	.10	1.90	1.90	130	94	85	1.5	250	62
19	470.		1109.825	.11	2.09	2.09	129	94	85	2.0	250	62
20	472.		1111.245	.08	1.52	1.52	129	94	84	1.0	250	62
21	474.		1112.430	.06	1.15	1.15	127	94	84	1.0	250	62
22	476.		1113.610	.07	1.34	1.34	125	94	84	1.0	250	62
23	478.		1114.980	.07	1.33	1.33	128	94	84	1.0	250	62
24	480.	18:55	1115.921	.05	.95	.95	128	94	84	1.0	250	62

EMISSION TEST DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH, READING PA	11/29/81	SITE NO. 3, EXTRACT WASTE	PART. MS

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THE BOX NO.	PAGE
1	R. BEVMERMANN/KAMPDEE	80	29.40	-1	1009	16.09	.84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
16 FT. GLASS	3/8	20		28	1.79	1.059	10.0	0.0	1.32446		250	250	0.01	20

PITOT TUBE NO. 185
THERMAL COUPLE NO. 164

PRE TEST LEAK CHECK GOOD

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	BAG & BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	918	116.313									
SA-1	2.	921	117.729	0.09	1.77	1.77	112	85	81	2.0	250	66
2	4.	923	119.263	0.11	2.16	2.16	112	83	80	2.5	250	64
3	6.	925	120.827	0.11	2.15	2.15	113	84	80	2.5	250	58
4	8.	927	122.539	0.13	2.53	2.53	116	85	80	3.0	260	56
5	10.	929	124.230	0.13	2.50	2.50	124	86	80	3.0	260	56
6	12.	931	125.871	0.12	2.29	2.29	129	86	80	3.0	260	56
7	14.	933	127.500	0.13	2.47	2.47	131	87	81	3.0	260	56
8	16.	935	129.150	0.13	2.45	2.45	134	[illegible]	[illegible]	[illegible]	270	54
9	18.	937	131.185	0.21	3.95	3.95	137	90	81	6.0	260	54
10	20.	939	133.306	0.21	3.94	3.94	139	92	81	6.0	250	50
11	22.	941	135.493	0.23	4.30	4.30	140	93	81	6.5	240	50
12	24.	943	137.335	0.15	2.80	2.80	142	95	82	4.0	245	50
13	26.	945	139.492	0.24	4.50	4.50	142	96	83	7.5	255	50
14	28.	947	141.069	0.10	1.88	1.88	136	95	82	2.5	250	52
15	30.	949	142.670	0.12	2.27	2.27	133	95	82	3.0	250	52
16	32.	951	144.500	0.17	3.22	3.22	133	96	83	3.5	260	54
17	34.	953	146.435	0.17	3.22	3.22	133	97	83	5.0	260	54
18	36.	955	148.227	0.14	2.65	2.65	132	99	85	4.0	270	56
19	38.	957	149.899	0.12	2.28	2.28	130	101	86	3.5	260	60
20	40.	959	151.530	0.12	2.28	2.28	132	101	86	3.5	260	60
21	42.	1001	153.290	0.14	2.65	2.65	132	102	87	3.0	260	60
22	44.	1003	154.870	0.11	2.09	2.09	132	102	88	3.0	260	62
23	46.	1005	156.300	0.09	1.71	1.71	131	103	89	3.0	250	62
24	48.	1007	157.281	0.11	2.10	2.10	129	103	90	4.0	250	62

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	04/29/81	[illegible]	

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THE RUN NO.	PAGE
[illegible]	[illegible]								0 of 0

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
	376														

7 8 9 10 TRAVERSE POINT NUMBER	11 12 13 14 SAMPLING TIME, min	15 16 17 18 CLOCK TIME (24 hr CLOCK)	19 20 21 22 23 24 GAS METER READING (V_m), ft^3	25 26 27 28 29 VELOCITY HEAD (Δp_s), in. H_2O	30 31 32 33 34 35 36 37 ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	38 39 40 41 STACK TEMPERATURE (T_s), °F	42 43 44 DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	45 46 47 OUTLET ($T_{m_{out}}$), °F	48 49 50 51 PUMP VACUUM, in. Hg	52 53 54 SAMPLE BOX TEMPERATURE °F	55 56 57 IMPINGER TEMPERATURE °F
	0	1016	157.281									
SB-1	50.	1018	158.980	0.07	1.34	1.34	125	103	92	0.0	285	62
2	52.	1020	160.277	0.07	1.34	1.34	125	103	92	1.0	285	62
3	54.	1022	161.637	0.08	1.53	1.53	125	103	92	1.0	285	62
4	56.	1024	163.291	0.11	2.11	2.11	124	103	92	1.0	285	62
5	58.	1026	164.785	0.11	2.12	2.12	123	103	92	1.0	285	62
6	60.	1028	166.351	0.10	1.93	1.93	123	104	92	1.0	300	60
7	62.	1030	168.050	0.14	2.70	2.70	125	104	93	1.0	260	60
8	64.	1032	169.824	0.14	2.70	2.70	123	104	93	1.0	260	60
9	66.	1034	171.650	0.14	2.70	2.70	123	105	94	1.0	260	60
10	68.	1036	173.525	0.17	3.27	3.27	123	105	94	2.0	260	60
11	70.	1038	175.700	0.22	4.24	4.24	123	106	94	2.5	260	60
12	72.	1040	177.924	0.22	4.23	4.23	124	106	94	3.0	250	60
13	74.	1042	179.936	0.16	3.08	3.08	124	106	94	2.0	250	60
14	76.	1044	181.705	0.12	2.31	2.31	123	106	94	1.0	240	60
15	78.	1046	183.520	0.20	3.85	3.85	123	106	94	2.0	240	60
16	80.	1048	185.563	0.15	2.89	2.89	123	106	95	1.0	240	60
17	82.	1050	187.300	0.15	2.89	2.89	123	106	95	1.0	240	60
18	84.	1052	189.267	0.15	2.89	2.89	123	106	95	1.0	240	60
19	86.	1054	191.010	0.14	2.70	2.70	123	106	95	1.0	230	66
20	88.	1056	192.855	0.13	2.50	2.50	123	106	95	1.0	230	66
21	90.	1058	194.550	0.12	2.31	2.31	123	107	95	1.0	230	66
22	92.	1100	196.190	0.11	2.12	2.12	123	107	95	1.0	230	66
23	94.	1102	197.840	0.12	2.31	2.31	123	107	95	1.0	240	68
24	96.	1104	199.350	0.10	1.93	1.93	123	107	95	1.0	240	68

[redacted] MI[redacted]ON [redacted]TIN[redacted]IE[redacted]DAT[redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/29/81	047497	

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
22P-2	PR 80								3 OF 6

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
441	99.	1108	200.630	0.07	1.36	1.36	118	105	96	0.0	240	68
2	100.	1110	202.073	0.09	1.74	1.74	122	105	96	0.0	240	68
3	102.	1112	203.730	0.12	2.31	2.31	122	105	96	0.0	240	68
4	104.	1114	205.384	0.12	2.31	2.31	122	105	96	0.5	250	66
5	106.	1116	207.136	0.13	2.51	2.51	122	105	96	2.0	250	64
6	108.	1118	208.945	0.14	2.70	2.70	121	104	95	2.0	250	62
7	110.	1120	210.780	0.15	2.90	2.90	121	104	95	2.5	260	68
8	112.	1122	212.751	0.17	3.29	3.29	120	104	96	2.0	240	62
9	114.	1124	214.438	0.12	2.32	2.32	120	104	96	1.5	240	62
10	116.	1126	216.440	0.13	3.48	3.48	120	104	95	2.0	250	63
11	118.	1128	218.631	0.21	4.05	4.05	122	104	95	3.0	240	63
12	120.	1130	220.713	0.19	3.66	3.66	122	104	95	3.0	240	64
13	122.	1132	222.989	0.21	4.05	4.05	122	105	94	3.0	240	64
14	124.	1134	224.653	0.12	2.26	2.26	135	105	96	0.0	250	64
15	126.	1136	226.554	0.17	3.18	3.18	141	105	96	2.0	260	64
16	128.	1138	228.233	0.12	2.23	2.23	143	105	95	0.0	260	64
17	130.	1140	229.807	0.11	2.04	2.04	143	105	95	0.0	250	62
18	132.	1142	231.666	0.18	2.95	2.95	148	105	95	2.0	240	62
19	134.	1144	233.259	0.11	2.03	2.03	149	106	96	0.0	240	64
20	136.	1146	234.969	0.11	2.03	2.03	147	106	96	0.0	250	64
21	138.	1148	236.710	0.16	2.96	2.96	146	106	96	2.0	240	63
22	140.	1150	238.234	0.10	1.85	1.85	146	106	96	0.0	240	63
23	142.	1152	239.925	0.13	2.42	2.42	142	106	96	1.5	250	64
24	144.	1154	241.498	0.11	2.05	2.05	134	106	96	0.0	250	66

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/29/81	[illegible]	

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THE BOX NO.	PAGE
1-2-3	RL RL								8 of 9

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
	.375														30

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	2:02										
461	146.		242.750	.07	1.33	1.33	131	106	97	1.0	240	68
2	148.		244.015	.07	1.33	1.33	131	106	97	1.0	240	65
3	150.		245.440	.09	1.71	1.71	132	106	97	1.0	245	62
4	152.		246.900	.09	1.71	1.71	130	106	97	1.0	250	60
5	154.		248.410	.10	1.90	1.90	129	106	97	1.0	250	58
6	156.		249.985	.11	2.10	2.10	127	107	97	1.0	255	56
7	158.		251.620	.12	2.29	2.29	127	107	97	1.5	255	56
8	160.		253.180	.10	1.91	1.91	127	107	97	1.5	250	56
9	162.		254.930	.14	2.67	2.67	127	107	97	1.5	250	56
10	164.		256.620	.12	2.30	2.30	125	108	98	2.0	250	56
11	166.		258.500	.16	3.06	3.06	125	108	98	2.0	250	56
12	168.		260.610	.20	3.84	3.84	125	108	98	3.0	250	56
13	170.		262.720	.20	3.84	3.84	124	108	98	3.0	250	56
14	172.		264.820	.18	3.47	3.47	122	108	98	2.5	250	56
15	174.		266.710	.14	2.69	2.69	123	108	98	2.5	255	56
16	176.		268.670	.16	3.08	3.08	122	107	98	2.5	250	58
17	178.		270.570	.14	2.70	2.70	122	107	98	2.0	250	58
18	180.		272.210	.14	2.70	2.70	121	106	98	2.0	250	58
19	182.		274.050	.14	2.70	2.70	121	106	98	2.0	250	58
20	184.		275.710	.11	2.12	2.12	121	106	98	1.0	250	58
21	186.		277.310	.11	2.12	2.12	121	106	98	1.0	250	58
22	188.		278.925	.11	2.12	2.12	121	105	98	1.0	250	58
23	190.		280.560	.11	2.12	2.12	121	104	98	1.0	250	58
24	192.	12:50	282.154	.12	2.31	2.31	122	104	98	1.0	250	58

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	11/29/81	OUTLET	

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C28-12	RG RBR								

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	12:55										
3A-1	194.		283.370	.07	1.36	1.36	116	100	93	1.0	250	62
2	196.		284.660	.07	1.36	1.36	118	100	93	1.0	250	62
3	198.	*13:00 stop	286.077	.08	1.55	1.55	120	97	91	1.0	250	62
4	200.	13:13 start	287.440	.10	1.94	1.94	118	97	91	1.0	250	62
5	202.		288.970	.10	1.93	1.93	121	87	84	1.0	250	62
6	204.		290.610	.12	2.28	2.28	130	91	86	1.0	245	60
7	206.		292.380	.15	2.84	2.84	133	89	86	1.5	240	60
8	208.		294.280	.16	2.98	2.98	143	89	84	2.0	245	60
9	210.		296.110	.16	2.96	2.96	147	90	84	2.0	250	60
10	212.		298.110	.19	3.48	3.48	153	90	84	2.5	250	60
11	214.		300.080	.19	3.48	3.48	153	90	84	2.5	255	60
12	216		302.170	.21	3.83	3.83	155	90	84	2.5	250	62
13	218.		304.020	.15	2.80	2.80	142	91	84	3.0	250	62
14	220.		305.750	.13	2.44	2.44	137	91	83	1.8	250	62
15	222.		307.860	.20	3.79	3.79	132	92	83	3.0	250	62
16	224.		309.670	.12	2.63	2.63	137	92	83	2.0	250	62
17	226.		311.530	.17	3.17	3.17	141	92	83	2.2	255	62
18	228.		313.370	.15	2.79	2.79	143	92	83	2.0	250	64
19	230.		315.185	.15	2.78	2.78	146	92	83	2.0	245	64
20	232.		316.730	.11	2.06	2.06	140	92	83	2.0	245	64
21	234.		318.240	.10	1.86	1.86	143	92	83	1.0	250	64
22	236.		319.790	.09	1.67	1.67	145	92	83	1.0	255	64
23	238.		321.110	.09	1.68	1.68	141	92	83	1.0	255	64
24	240.	13:55	322.498	.11	2.05	2.05	141	92	83	1.0	255	64

* shut down due to process delay

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	04/29/81	OUTLET	

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C29-2	S.L., H.L., R.G., A.B.								6 OF 6

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O_2 (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
3D151															

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1400	322.498									
38-1	242.	1402	323.770	0.08	1.52	1.52	131	91	83	10	230	67
2	244.	1404	325.130	0.08	1.52	1.52	131	91	83	10	230	67
3	246.	1406	326.552	0.09	1.70	1.70	134	91	83	10	230	67
4	248.	1408	328.110	0.11	2.09	2.09	132	91	83	10	230	67
5	250.	1410	329.667	0.11	2.09	2.09	132	91	83	10	230	67
6	252.	1412	331.442	0.13	2.46	2.46	133	91	83	10	230	67
7	254.	1414	332.978	0.11	2.08	2.08	133	91	83	10	230	67
8	256.	1416	334.705	0.17	3.23	3.23	131	90	82	20	280	66
9	258.	1418	336.600	0.15	2.86	2.86	129	90	82	20	280	66
10	260.	1420	338.610	0.19	3.63	3.63	128	90	81	20	280	66
11	262.	1422	340.670	0.19	3.63	3.63	128	90	81	30	280	66
12	264.	1424	342.815	0.22	4.19	4.19	130	89	81	30	230	68
13	266.	1426	344.934	0.19	3.62	3.62	129	89	81	30	230	68
14	268.	1428	346.750	0.13	2.49	2.49	127	89	81	20	230	68
15	270.	1430	348.763	0.20	3.83	3.83	126	89	81	30	225	68
16	272.	1432	350.627	0.14	2.68	2.68	126	89	81	20	225	60
17	274.	1434	352.492	0.16	3.06	3.06	126	89	81	25	225	60
18	276.	1436	354.374	0.16	3.07	3.07	125	89	81	25	225	60
19	278.	1438	356.183	0.14	2.69	2.69	125	89	80	20	225	60
20	280.	1440	357.910	0.13	2.49	2.49	125	89	80	10	225	60
21	282.	1442	359.580	0.12	2.30	2.30	126	89	81	10	225	60
22	284.	1444	361.207	0.11	2.11	2.11	124	89	81	10	225	60
23	286.	1446	362.790	0.11	2.11	2.11	124	89	81	10	225	60
24	288.	1448	364.251	0.10	1.93	1.93	123	89	81	10	225	60

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	9/28/81	OUTLET	

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C2B-12									70 of 70

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUNS
	.3765														

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1454	364.251									
2A-1	290	1456	365.496	0.07	1.35	1.35	120	87	80	10	250	62
2	292	1458	366.853	0.08	1.55	1.55	121	87	80	10	250	62
3	294	1500	368.380	0.11	2.11	2.11	124	87	80	10	250	62
4	296	1502	370.100	0.14	2.69	2.69	124	87	80	10	250	62
5	298	1504	371.297	0.12	2.30	2.30	125	87	79	1.5	250	62
6	300	1506	373.390	0.11	2.11	2.11	125	87	79	1.0	250	62
7	302	1508	375.180	0.15	2.87	2.87	126	87	79	2.0	250	62
8	304	1510	376.870	0.12	2.30	2.30	126	87	79	1.5	250	62
9	306	1512	378.568	0.13	2.49	2.49	126	88	80	2.0	250	62
10	308	1514	380.599	0.20	3.84	3.84	125	88	80	3.5	250	62
11	310	1516	382.418	0.13	2.49	2.49	127	88	80	1.5	250	62
12	312	1518	384.290	0.18	3.45	3.45	126	89	80	2.5	250	62
13	314	1520	386.190	0.16	3.06	3.06	126	89	80	2.0	250	62
14	316	1522	388.257	0.20	3.84	3.84	125	89	80	3.5	250	62
15	318	1524	390.070	0.19	3.65	3.65	125	90	80	3.0	250	62
16	320	1526	392.098	0.11	2.11	2.11	126	90	80	1.0	250	68
17	322	1528	393.905	0.16	3.07	3.07	125	90	80	2.0	250	68
18	324	1530	395.780	0.13	2.49	2.49	126	90	80	1.5	250	68
19	326	1532	397.505	0.15	2.87	2.87	126	90	80	2.0	250	68
20	328	1534	399.390	0.16	3.04	3.04	130	90	80	2.5	250	68
21	330	1536	401.100	0.11	2.04	2.04	145/~~138~~	90	80	1.0	250	68
22	332	1538	402.605	0.10	1.86	1.86	143	90	80	1.0	250	68
23	334	1540	404.100	0.10	1.85	1.85	146	90	80	1.0	250	68
24	336	1542	405.490	.09	1.66	1.66	149	90	80	1.0	250	68

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	8/29/80		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
2A-B	[illegible]								40 of 40

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
[illegible]	.375														

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
B1	338.	1547	406.614	0.06	1.10	1.10	152	90	82	20	260	60
2	340.	1549	407.963	0.09	1.65	1.65	151	90	82	30	250	60
3	342.	1551	409.434	0.10	1.83	1.83	154	90	82	40	250	60
4	344.	1553	410.970	0.11	2.03	2.03	150	90	82	40	250	60
5	346.	1555	412.596	0.12	2.21	2.21	148	90	82	50	250	60
6	348.	1557	414.500	0.16	2.95	2.95	148	90	82	60	260	58
7	350.	1559	416.447	0.18	3.31	3.31	149	90	82	60	260	58
8	352.	1601	418.253	0.15	2.78	2.78	149	90	82	50	245	60
9	354.	1603	420.370	0.21	3.90	3.90	145	91	82	70	240	60
10	356.	1604	422.470	0.21	3.90	3.90	145	91	82	70	250	60
11	358.	1606	424.100	0.11	2.06	2.06	138	91	82	40	260	62
12	360.	1608	425.942	0.18	3.38	3.38	138	91	82	55	270	62
13	362.	1610	428.064	0.20	3.70	3.70	137	91	82	70	270	62
14	364.	1612	430.000	0.15	2.82	2.82	136	91	82	50	250	62
15	366.	1614	431.815	0.15	2.82	2.82	136	91	82	50	255	60
16	368.	1616	433.634	0.15	2.83	2.83	134	91	82	50	255	60
17	370.	1618	435.896	0.19	3.60	3.60	132	91	82	50	260	60
18	372.	1620	437.425	0.13	2.46	2.46	132	91	82	40	250	62
19	374.	1622	439.064	0.12	2.29	2.29	131	91	82	40	250	62
20	376.	1624	440.815	0.14	2.66	2.66	130	91	82	40	260	64
21	378.	1626	442.500	0.14	2.67	2.67	129	91	82	40	260	64
22	380.	1628	444.173	0.11	2.10	2.10	128	90	82	40	250	64
23	382.	1630	445.912	0.12	2.29	2.29	128	90	82	45	250	64
24	384	1632	447.425	0.11	2.10	2.10	127	90	82	45	250	64

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	07/29/87		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
12V-1A									9 of 10

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

7 8 9 10	11 12 13 14	15 16 17 18	19 20 21 . 22 23 24	25 26 27 28 29	30 31 32 33	34 35 36 37	38 39 40 41	42 43 44	45 46 47	48 49 50 51	52 53 54	55 56 57
TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0		.									
1	386.	1640	448.600	0.07	1.34	1.34	124	90	82	0.0	250	62
2	388.	1642	449.860	0.07	1.37	1.34	125	90	82	0.0	250	62
3	390.	1644	451.200	0.07	1.34	1.34	127	90	82	0.0	260	63
4	392.	1646	452.341	0.07	1.34	1.34	127	90	82	0.0	250	63
5	394.	1648	453.756	0.09	1.72	1.72	127	90	82	1.0	250	63
6	396.	1650	455.204	0.09	1.72	1.72	127	90	82	2.0	250	63
7	398.	1652	456.639	0.09	1.72	1.72	127	90	82	2.0	260	64
8	400.	1654	458.200	0.11	2.10	2.10	127	90	82	2.0	260	64
9	402.	1656	459.771	0.11	2.10	2.10	127	90	82	2.5	260	64
10	404.	1658	461.594	0.15	2.86	2.86	128	90	82	4.0	260	60
11	406.	1660	463.200	0.11	2.10	2.10	129	90	82	2.5	250	60
12	408.	1662	464.945	0.13	2.49	2.49	127	91	82	3.0	240	60
13	410.	1664	466.287	0.06	1.14	1.14	127	91	83	0.0	240	60
14	412.	1666	468.000	0.17	3.25	3.25	128	91	83	4.0	250	60
15	414.	1668	469.833	0.13	2.46	2.46	133	91	83	3.0	260	60
16	416.	1670	471.565	0.16	3.00	3.00	139	91	83	2.0	260	60
17	418.	1672	473.500	0.17	3.17	3.17	142	91	83	2.0	260	60
18	420.	1674	475.182	0.12	2.23	2.23	145	91	83	2.0	240	60
19	422.	1676	476.610	0.09	1.67	1.67	145	91	83	0.0	250	60
20	424.	1678	478.073	0.10	1.85	1.85	148	91	83	0.0	255	62
21	426.	1700	479.685	0.12	2.23	2.23	144	91	83	0.0	255	62
22	428.	1718	481.316	0.12	2.23	2.23	143	91	83	0.0	260	64
23	430.	1720	482.937	0.11	2.05	2.05	142	91	83	0.0	260	64
24	432.	1722	484.564	0.13	2.47	2.47	139	91	83	0.0	260	64

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/29/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C2B-12	KG PB								100 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O, (%)	SAMPLE BOX NO.	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA NEWS
								10"	0.02						

Leak check 10" 0.02 cfm

pitot system OK

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	17:32										
5B-1	434.		485.615	.05	0.94	0.94	135	91	83	1.0	245	62
2	436.		486.790	.05	0.94	0.94	135	92	83	1.5	245	62
3	438.		488.080	.10	1.89	1.89	134	91	84	1.5	250	64
4	440.		489.680	.11	2.08	2.08	133	91	84	1.5	250	64
5	442.		491.260	.09	1.70	1.70	134	91	84	1.0	250	64
6	444.		492.570	.09	1.70	1.70	134	91	84	1.0	250	62
7	446.		494.190	.12	2.28	2.28	131	91	84	1.5	250	62
8	448.		495.660	.09	1.71	1.71	130	91	83	1.5	255	62
9	450.		497.560	.16	3.04	3.04	130	91	83	2.5	255	60
10	452.		499.566	.13	2.47	2.47	130	91	82	1.5	255	60
11	454.		501.880	.14	2.66	2.66	136	91	83	1.5	255	60
12	456.		502.990	.17	3.23	3.23	131	91	83	2.0	250	60
13	458.		504.820	.15	2.86	2.86	128	91	83	2.0	245	60
14	460.		506.690	.15	2.87	2.87	127	91	83	2.0	250	58
15	462.		508.250	.11	2.10	2.10	127	90	82	1.5	250	58
16	464.		510.040	.13	2.49	2.49	125	90	82	1.5	250	58
17	466.		511.910	.16	3.06	3.06	125	90	82	2.0	250	58
18	468.		513.560	.13	2.50	2.50	121	90	82	1.5	250	58
19	470.		515.260	.11	2.31	2.31	124	90	82	1.5	245	58
20	472.		517.065	.15	2.88	2.88	124	90	82	2.0	240	60
21	474.		518.920	.10	1.92	1.92	124	90	82	1.0	240	60
22	476.		520.315	.10	1.92	1.92	124	90	82	1.0	240	60
23	478.		522.130	.16	3.07	3.07	124	90	82	2.0	240	62
Avg	480.		523.492	.09	1.35	1.35	129	90	82		240	62

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
WINCHESTER TECH READING PA	11/30/89	SITE NO 3	MSI REGULATORY

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
1-3	V. BEVINGTON	64	29.7	-1	2402-2198	16x16	1.00		1 OF 10

PITOT NUM 163

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6 FT GLASS	.375		20		FAB	1.8	1.0159	20	0.018	1.0246		250	250	0.14	20

4145.99

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1010	526.003									
1B1	2.	1012	527.500	0.10	1.96	1.96	113	76	71	3.5	240	66
2	4.	1014	529.125	0.12	2.35	2.35	113	81	75	5.0	270	60
3	6.	1016	530.838	0.13	2.56	2.56	111	81	75	5.0	270	60
4	8.	1018	532.666	0.15	2.95	2.95	110	82	75	6.0	260	60
5	10.	1020	534.439	0.14	2.76	2.76	110	82	75	6.0	260	60
6	12.	1022	536.064	0.11	2.17	2.17	110	82	75	7.0	260	55
7	14.	1024	537.936	0.17	3.35	3.35	109	82	75	7.5	270	56
8	16.	1026	539.984	0.19	3.75	3.75	109	83	76	9.0	260	56
9	18.	1028	541.992	0.18	3.56	3.56	108	84	76	8.0	250	56
10	20.	1030	544.108	0.20	3.95	3.95	108	84	76	9.5	255	56
11	22.	1032	546.081	0.17	3.37	3.37	106	85	77	7.5	245	50
12	24.	1034	548.290	0.23	4.56	4.56	106	85	77	10.5	260	50
13	26.	1036	550.424	0.20	3.97	3.97	105	85	77	9.5	260	50
14	28.	1038	552.617	0.22	4.39	4.39	103	86	77	10.5	245	48
15	30.	1040	554.700	0.19	3.79	3.79	103	86	78	9.0	255	48
16	32.	1042	556.814	0.19	3.78	3.78	103	87	78	9.0	255	50
17	34.	1044	558.750	0.17	3.38	3.38	103	87	78	7.5	250	50
18	36.	1046	560.712	0.17	3.38	3.38	104	87	78	7.5	260	50
19	38.	1048	562.700	0.16	3.18	3.18	104	87	79	7.0	260	50
20	40.	1050	564.369	0.13	2.59	2.59	104	88	79	5.0	260	52
21	42.	1052	566.164	0.14	2.79	2.79	104	89	79	5.5	245	52
22	44.	1054	567.831	0.12	2.39	2.39	104	89	80	5.0	250	52
23	46.	1056	569.626	0.11	2.19	2.19	104	90	80	4.5	260	52
24	48.	1058	570.961	0.10	1.99	1.99	105	90	81	4.0	260	54

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/30/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C2PF3									20 of 20

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
1A1	50.	1102	572.424	0.10	1.99	1.99	103	90	80	4.0	250	54
2	52.	1104	574.188	0.14	2.79	2.79	103	90	80	4.5	250	52
3	54.	1106	575.816	0.11	2.18	2.18	105	90	80	4.0	245	52
4	56.	1108	577.500	0.12	2.39	2.39	104	90	81	5.0	245	52
5	58.	1110	579.254	0.14	2.79	2.79	104	91	81	5.0	260	52
6	60.	1112	581.110	0.15	2.96	2.96	108	90	80	6.0	240	52
7	62.	1114	582.950	0.15	2.95	2.95	111	90	80	6.0	250	52
8	64.	1116	584.839	0.16	3.13	3.13	114	90	80	7.0	250	54
9	66.	1118	586.946	0.21	4.06	4.06	120	90	81	9.5	245	55
10	68.	1120	588.985	0.18	3.44	3.44	128	91	81	8.0	240	57
11	70.	1122	590.999	0.20	3.80	3.80	131	90	81	9.0	250	56
12	72.	1124	593.086	0.19	3.60	3.60	132	90	81	8.5	255	53
13	74.	1126	595.312	0.25	4.74	4.40	132	90	81	11.0	260	54
14	76.	1128	597.479	0.21	3.99	3.99	131	90	81	10.0	270	54
15	78.	1130	599.565	0.19	3.65	3.65	125	90	81	9.5	255	54
16	80.	1132	601.640	0.20	3.85	3.85	123	89	81	9.0	245	53
17	82.	1134	603.622	0.18	3.45	3.45	125	89	81	8.0	250	52
18	84.	1136	605.436	0.14	2.70	2.70	123	90	81	6.0	255	54
19	86.	1138	606.974	0.10	1.93	1.93	123	90	81	4.0	245	55
20	88.	1140	608.732	0.14	2.70	2.70	124	89	80	5.5	240	56
21	90.	1142	610.208	0.09	1.74	1.74	120	88	80	3.0	250	56
22	92.	1144	611.780	0.11	2.13	2.13	119	88	80	4.0	250	56
23	94.	1146	613.436	0.12	2.33	2.33	118	90	80	5.0	260	58
24	96.	1148	615.079	0.12	2.33	2.33	117	90	80	5.0	260	58

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	11/8/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
029-3									30, F/9

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HRS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1156	615.079									
2H	98.	1158	616.862	0.08	1.58	1.58	110	92	82	2.0	265	63
2	100.	1200	617.740	0.08	1.57	1.57	113	93	83	2.0	265	63
3	102.	1202	619.946	0.10	1.96	1.96	114	94	83	2.5	265	63
4	104.	1204	621.564	0.12	2.34	2.34	115	95	84	4.0	270	62
5	106.	1206	623.370	0.14	2.74	2.74	114	96	84	6.0	275	60
6	108.	1208	625.110	0.14	2.74	2.74	113	96	84	6.0	275	60
7	110.	1210	626.977	0.16	3.14	3.14	112	97	85	7.0	275	60
8	112.	1212	629.000	0.20	3.92	3.92	112	97	85	9.0	275	60
9	114.	1214	631.130	0.19	3.72	3.72	113	97	86	9.0	270	60
10	116.	1216	633.285	.20	3.91	3.91	114	98	87	9.5	270	60
11	118.	1218	635.425	.20	3.92	3.92	112	99	88	9.5	265	60
12	120.	1220	637.650	.23	4.51	4.51	112	99	88	9.5	260	60
13	122.	1222	639.875	.21	4.12	4.12	112	99	88	10.0	260	60
14	124.	1224	642.050	.21	4.12	4.12	111	99	88	10.0	255	58
15	126.	1226	644.010	.15	2.95	2.95	111	99	88	7.0	255	58
16	128.	1228	645.920	.16	3.14	3.14	111	100	89	6.5	255	58
17	130.	1230	647.930	.19	3.74	3.74	110	100	89	8.5	255	58
18	132.	1232	649.990	.14	2.75	2.75	111	100	90	6.0	255	58
19	134.	1234	651.790	.15	2.94	2.94	112	100	90	6.0	255	58
20	136.	1236	653.430	.13	2.36	2.36	112	100	90	5.0	250	56
21	138.	1238	655.270	.15	2.95	2.95	111	100	90	5.5	250	58
22	140.	1240	657.020	.15	2.95	2.95	111	100	90	5.5	250	58
23	142.	1242	658.650	.11	2.16	2.16	111	100	90	4.0	255	58
24	144.	1244	660.250	.11	2.16	2.16	111	100	90	4.0	250	60

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/13/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
G28-3									1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA REMS
															2

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	12:45										
2A1	146.		661.330	.05	0.99	0.99	106	101	91	1.5	250	60
2	148.		662.570	.07	1.38	1.38	109	101	91	2.0	250	60
3	150.		664.050	.10	1.97	1.97	110	101	91	2.0	250	60
4	152.		665.730	.14	2.76	2.76	110	101	91	5.0	250	60
5	154.		667.450	.12	2.36	2.36	110	101	92	5.0	250	60
6	156.		669.210	.13	2.56	2.56	110	101	92	5.0	250	60
7	158.		671.050	.15	2.95	2.95	110	101	92	6.0	250	60
8	160.		673.020	.17	3.34	3.34	111	101	92	7.0	250	60
9	162.		674.990	.18	3.54	3.54	111	101	92	7.5	255	58
10	164.		677.110	.20	3.93	3.93	111	101	92	8.5	255	56
11	166.		679.140	.18	3.53	3.53	113	101	92	8.0	255	56
12	168.		681.120	.16	3.12	3.12	115	101	92	7.0	255	56
13	170.		683.210	.20	3.83	3.83	126	100	91	9.0	255	56
14	172.		685.440	.24	4.55	4.55	132	99	91	10.0	255	58
15	174.		687.580	.20	3.76	3.76	137	98	90	9.0	255	58
16	176.		689.810	.21	3.94	3.94	138	98	90	9.0	255	58
17	178.		691.850	.20	3.73	3.73	141	97	90	9.0	255	58
18	180.		693.810	.17	3.15	3.15	146	97	90	6.5	255	58
19	182.		695.630	.15	2.78	2.78	146	97	90	6.0	255	58
20	184.		697.390	.13	2.41	2.41	144	96	90	5.5	255	58
21	186.		699.060	.12	2.26	2.26	137	96	90	5.0	250	60
22	188.		700.550	.09	1.68	1.68	141	96	90	3.5	250	60
23	190.		702.110	.11	2.07	2.07	137	96	90	4.0	250	60
24	192.	13:33	703.715	.13	2.63	2.63	137	96	90		250	60

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/30/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
639-3									50 of 82

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
															5

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
381	194.	1336	705.000	.08	1.55	1.55	119	97	90	3.0	250	63
2	196.	1338	706.448	0.09	1.74	1.74	120	98	90	3.0	250	63
3	198.	1340	707.996	0.10	1.94	1.94	120	98	90	3.5	250	64
4	200.	1342	709.424	0.09	1.74	1.74	119	98	90	3.0	250	64
5	202.	1344	711.060	0.12	2.32	2.32	120	99	90	5.0	258	65
6	204.	1346	712.719	0.12	2.33	2.33	118	99	90	5.0	255	65
7	206.	1348	714.600	0.16	3.11	3.11	117	99	91	7.0	260	65
8	208.	1350	716.679	0.19	3.69	3.69	118	100	91	8.5	250	65
9	210.	1352	718.752	0.19	3.70	3.70	116	100	90	8.5	250	65
10	212.	1354	720.677	0.20	3.90	3.90	115	101	90	9.0	255	65
11	214.	1356	722.526	0.16	3.12	3.12	115	101	90	7.0	260	65
12	216.	1358	725.063	0.24	4.69	4.41	114	101	90	11.0	260	65
13	218.	1400	727.260	0.20	3.91	3.91	114	101	90	9.0	245	65
14	220.	1402	729.329	0.22	4.31	4.31	113	100	90	10.5	240	64
15	222.	1404	731.627	0.21	4.11	4.11	113	100	90	10.5	250	64
16	224.	1406	733.826	0.21	4.11	4.11	113	100	90	10.5	260	63
17	226.	1408	735.833	0.17	3.34	3.34	112	99	90	7.5	260	62
18	228.	1410	737.710	0.15	2.94	2.94	112	99	90	6.0	260	62
19	230.	1412	739.397	0.12	2.35	2.35	112	100	90	5.0	260	62
20	232.	1414	741.136	0.13	2.55	2.55	111	100	90	5.0	250	62
21	234.	1416	742.759	0.11	2.17	2.17	110	100	90	4.0	240	60
22	236.	1418	744.374	0.11	2.10	2.10	111	100	90	4.0	265	60
23	238.	1420	746.000	0.11	2.16	2.16	111	100	90	4.0	245	62
24	240.	1422	747.709	.014	2.75	2.75	111	100	90	.5.0	260	62

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	6/30/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THE RUN NO.	PAGE
2A-3	RG RG GH								20 of 20

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
															20

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1430	747.769									
3A1	242.	1432	749.122	0.09	1.77	1.77	110	98	90	3.0	260	60
2	244.	1434	750.750	0.12	2.36	2.36	111	98	90	4.5	260	60
3	246.	1436	752.435	0.12	2.36	2.36	111	97	89	4.5	260	58
4	248.	1438	754.111	0.12	2.36	2.36	111	97	89	4.5	260	58
5	250.	1440	755.905	0.15	2.95	2.95	111	97	89	6.0	260	58
6	252.	1442	757.810	0.16	3.15	3.15	111	96	88	6.5	260	58
7	254.	1444	759.775	0.17	3.35	3.35	110	96	88	7.0	265	65
8	256.	1446	761.880	0.15	2.95	2.95	111	96	88	6.0	265	65
9	258.	1448	763.500	0.14	2.75	2.75	112	96	88	5.5	265	62
10	260.	1450	765.480	0.18	3.50	3.50	117	96	88	8.0	265	62
11	262.	1452	767.600	0.20	3.84	3.84	124	96	88	9.0	265	62
12	264.	1454	769.700	0.20	3.82	3.82	128	96	88	9.0	275	65
13	266.	1456	771.875	0.22	4.20	4.20	128	96	88	10.0	275	65
14	268.	1458	774.190	0.20	3.84	3.84	124	96	88	9.5	275	65
15	270.	1500	776.010	0.14	2.70	2.70	123	95	87	5.5	260	62
16	272.	1502	777.937	0.18	3.40	3.40	132	95	87	7.5	260	62
17	274.	1504	780.022	0.21	4.00	4.00	129	95	87	9.0	260	62
18	276.	1506	782.090	0.18	3.42	3.42	130	94	87	8.0	260	62
19	278.	1508	784.042	0.16	3.05	3.05	129	94	87	7.0	260	62
20	280.	1510	785.900	0.14	2.70	2.70	123	94	87	5.5	260	63
21	282.	1512	787.634	0.12	2.31	2.31	122	93	86	4.5	260	63
22	284.	1514	789.253	0.11	2.12	2.12	122	92	86	4.0	260	63
23	286.	1516	790.812	0.10	1.93	1.93	123	91	85	3.5	260	63
24	288.	1518	792.309	0.10	1.93	1.93	121	91	85	3.5	260	63

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/24/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C2B-3	154, 138, 129								70, F, G

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
															20

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
A	0	1501	792.309									
4 1	290.	1523	793.618	0.08	1.55	1.55	118	90	84	3.0	280	65
2	292.	1525	795.130	0.11	2.13	2.13	120	90	84	4.0	280	65
3	294.	1527	796.713	0.11	2.13	2.13	120	90	84	4.0	280	65
4	296.	1529	798.300	0.11	2.13	2.13	119	91	84	4.0	280	65
5	298.	1531	800.000	0.13	2.52	2.52	119	92	84	5.0	280	65
6	300.	1533	801.810	0.16	3.10	3.10	120	93	84	6.5	280	65
7	302.	1535	803.643	0.14	2.70	2.70	121	94	84	6.0	275	65
8	304.	1537	805.690	0.20	3.86	3.86	121	95	84	9.0	275	65
9	306.	1539	807.852	0.21	4.06	4.06	120	96	85	10.0	275	65
10	308.	1541	809.967	0.19	3.69	3.69	118	96	85	9.0	275	65
11	310.	1543	812.000	0.20	3.89	3.89	117	96	85	8.0	275	65
12	312.	1545	814.002	0.23	4.47	4.47	117	97	86	10.5	265	66
13	314.	1547	816.200	0.16	3.11	3.11	117	97	86	7.0	265	66
14	316.	1549	818.127	0.16	3.12	3.12	116	98	86	7.0	265	66
15	318.	1551	820.620	0.20	3.90	3.90	116	98	86	8.5	265	64
16	320.	1553	822.220	.16	3.12	3.12	115	98	86	7.5	265	64
17	322.	1555	824.010	.17	2.34	2.34	115	97	86	5.0	265	64
18	324.	1557	825.680	.17	2.34	2.34	115	97	86	5.0	265	64
19	326.	1559	827.370	.13	2.54	2.54	115	97	86	5.0	265	64
20	328.	1561	829.050	.11	2.14	2.14	115	97	86	4.5	265	64
21	330.	1563	830.615	.10	1.95	1.95	115	97	87	4.0	265	64
22	332.	1565	832.150	.10	1.95	1.95	114	97	87	4.0	265	64
23	334.	1567	833.740	.08	1.56	1.56	114	97	87	4.0	265	64
24	336.	1569	835.128	.09	1.76	1.76	114	97	87	4.0	265	64

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/30/91		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
2	9-3								20

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA NEWS

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	16:09										
1	335.		836.620	.10	1.96	1.96	115	98	88	4.0	265	60
2	340.		838.670	.08	1.56	1.56	115	98	88	3.5	265	60
3	342.	* 16:17 stop	839.385	.07	1.36	1.36	116	99	88	3.5	265	60
4	344.	16:22 start	840.710	.09	1.75	1.75	116	99	89	3.5	265	60
5	346.		842.210	.10	1.95	1.95	115	99	89	3.7	265	60
6	348.		843.710	.10	1.95	1.95	115	98	88	4.0	265	60
7	350.		845.370	.13	2.53	2.53	116	96	88	4.0	265	60
8	352.		847.065	.12	2.33	2.33	117	97	88	5.0	260	60
9	354.		848.810	.14	2.70	2.70	122	97	88	5.5	260	60
10	356.		850.680	.18	3.42	3.42	131	97	88	6.5	260	60
11	358.		852.620	.17	3.20	3.20	136	97	88	8.0	260	60
12	360.		854.635	.20	3.73	3.73	141	97	88	8.5	255	60
13	362.		856.815	.23	4.27	4.27	144	97	88	10.0	250	60
14	364.		858.750	.15	2.78	2.78	145	100	88	6.5	250	60
15	366.		860.750	.15	2.81	2.81	140	100	88	6.0	250	60
16	368.		862.505	.17	3.20	3.20	137	100	88	7.0	250	60
17	370.		864.445	.18	3.37	3.37	140	100	88	7.5	250	60
18	372.		866.320	.15	2.82	2.82	137	100	88	6.0	250	62
19	374.		868.080	.13	2.45	2.45	135	100	88	5.0	255	62
20	376.		869.870	.13	2.45	2.45	136	101	90	5.0	255	64
21	378.		871.610	.14	2.65	2.65	133	101	90	5.5	255	64
22	380.		873.415	.12	2.29	2.29	128	102	90	5.0	250	64
23	382.		874.995	.10	1.91	1.91	128	102	90	5.0	250	64
24	384.	17:01	876.484	.12	2.29	2.29	128	102	91	4.8	250	64

* process variation sample-train shutdown.

[redacted] EMI[redacted]ON [redacted]TI[redacted]FIE[redacted]DA[redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/30/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
24/13									70 of 76

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	OFF. ΔP	RECORD DATA MINS
															3

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
5B1	386.	1706	877.699	.07	1.36	1.36	117	102	92	2.0	250	68
2	388.	1708	879.124	0.09	1.74	1.74	120	102	92	3.0	260	66
3	390.	1710	880.564	0.09	1.74	1.74	120	102	92	3.0	260	62
4	392.	1712	882.170	0.11	2.13	2.13	119	102	92	4.0	260	62
5	394.	1714	883.934	0.14	2.71	2.71	119	102	92	5.5	260	62
6	396.	1716	885.730	0.14	2.72	2.72	118	102	92	5.5	270	60
7	398.	1718	887.353	0.11	2.14	2.14	118	102	92	4.0	255	60
8	400.	1720	889.246	0.16	3.11	3.11	117	102	92	7.0	250	60
9	402.	1722	891.413	0.21	4.08	4.08	117	102	92	10.0	260	62
10	404.	1724	893.581	0.21	4.08	4.08	117	101	91	10.0	260	62
11	406.	1726	895.749	0.20	3.89	3.89	117	101	91	9.0	250	60
12	408.	1728	897.892	0.20	3.89	3.89	117	101	91	9.0	250	60
13	410.	1730	899.938	0.18	3.50	3.50	117	101	91	8.0	250	60
14	412.	1732	902.000	0.18	3.50	3.50	117	101	91	8.0	250	60
15	414.	1734	903.743	0.13	2.53	2.53	117	101	91	5.0	260	62
16	416.	1736	905.740	0.18	3.50	3.50	117	100	91	7.5	255	63
17	418.	1738	907.530	0.13	2.52	2.52	118	100	91	5.0	245	61
18	420.	1740	909.329	0.15	2.91	2.91	118	100	92	6.0	250	60
19	422.	1742	911.238	0.16	3.10	3.10	119	100	92	6.5	240	60
20	424.	1744	913.134	0.16	3.10	3.10	118	100	91	6.5	255	60
21	426.	1746	914.953	0.14	2.72	2.72	118	101	91	5.0	255	62
22	428.	1748	916.800	0.15	2.92	2.92	117	100	90	6.0	260	62
23	430.	1750	918.000	0.13	2.53	2.53	117	100	90	5.0	260	62
24	432.	1752	920.250	0.12	2.33	2.33	117	100	90	5.0	250	64

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
	4/30/81		

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM. NO.	PAGE
B2A-3									20 of 20

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O_2 (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
															2

STACK Temp Ave = 119.39 °F

$\sqrt{\Delta P}$ = .38672

3.45 = ΔH

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
SA1	434.	1757	921.081	0.09	1.76	1.76	117	97	89	3.0	250	63
2	436.	1759	923.664	0.10	1.90	1.90	132	96	89	3.5	250	60
3	438.	1801	924.950	0.15	2.82	2.82	138	96	89	6.0	255	60
4	440.	1803	926.776	0.15	2.81	2.81	140	96	89	6.0	255	60
5	442.	1805	928.654	0.16	2.98	2.98	143	97	89	6.0	255	60
6	444.	1807	930.843	0.22	4.07	4.07	146	97	89	9.5	260	61
7	446.	1809	932.999	0.22	4.09	4.09	144	98	89	9.5	260	61
8	448.	1811	935.246	0.23	4.27	4.27	145	98	90	10.0	265	61
9	450.	1813	937.299	0.19	3.52	3.52	146	98	90	8.0	245	61
10	452.	1815	939.348	0.19	3.52	3.52	146	99	90	8.0	250	60
11	454.	1817	941.200	0.15	2.79	2.79	143	98	88	6.0	260	61
12	456.	1819	943.235	0.21	3.92	3.92	141	97	88	7.5	260	61
13	458.	1821	945.438	0.24	4.48	4.41	141	96	88	11.0	260	61
14	460.	1823	947.686	0.24	4.48	4.40	139	96	88	11.0	260	61
15	462.	1825	949.890	0.22	4.12	4.15	136	96	88	10.0	250	61
16	464.	1827	951.590	0.12	2.27	2.27	133	95	88	4.5	270	60
17	466.	1829	953.490	0.17	3.23	3.23	131	95	89	5.5	260	62
18	468.	1831	955.230	0.13	2.47	2.47	130	95	89	5.0	260	67
19	470.	1833	956.800	0.10	1.90	1.90	131	95	89	3.5	260	62
20	472.	1835	958.317	0.10	1.90	1.90	129	96	87	3.5	260	63
21	474.	1837	959.799	0.09	1.72	1.72	127	96	87	3.5	250	63
22	476.	1839	961.091	0.07	1.34	1.34	126	96	87	2.0	250	63
23	478.	1841	962.543	0.09	1.73	1.73	125	96	87	3.0	250	64
24	480.	1843	963.942	0.09	1.73	1.73	124	96	87	3.0	250	68

DRY MOLECULAR WEIGHT DETERMINATION

PLANT CARTech
DATE 4/27/81 TEST NO C2P-1
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Baghouse Outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) bag
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 65°F
OPERATOR R. Campbell

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	0.6	0.6	0.6	0.6	0.6	0.6		44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.0	19.4	20.0	19.4	20.0	19.4		32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.0	0.0	20.0	0.0	20.0	0.0		28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

Plant Carpenter Tech. Reading Pa.

Date 4-26-81

Sampling location Scavenger Duct

Inside of far wall to outside of nipple 61 1/8"

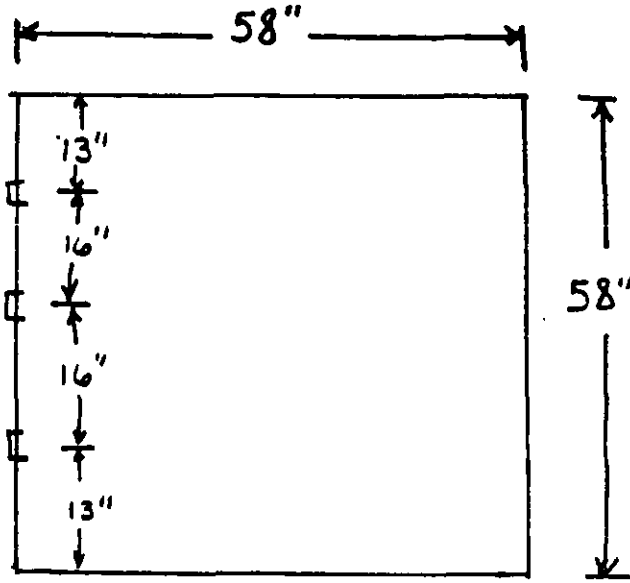
Inside of near wall to outside of nipple (nipple length) 4 1/8"

Stack I.D. 58"

Nearest upstream disturbance 4.7 dd

Nearest downstream disturbance 4.9 dd

Calculated by Phillips



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	NIPPLE LENGTH	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1		58	2 7/8"	4 1/8"	7"
2		58	8 5/8"	4 1/8"	12 3/4"
3		58	14 3/8"	4 1/8"	18 1/2"
4		58	20 1/8"	4 1/8"	24 1/4"
5		58	25 7/8"	4 1/8"	30"
6		58	31 5/8	4 1/8"	35 7/4"
7		58	37 3/8	4 1/8"	41 1/2"
8		58	43 1/8"	4 1/8"	47 1/4"
9		58	48 7/8	4 1/8"	53
10		58	54 5/8	4 1/8"	58 3/4"

GAS VELOCITY AND VOLUME DATA

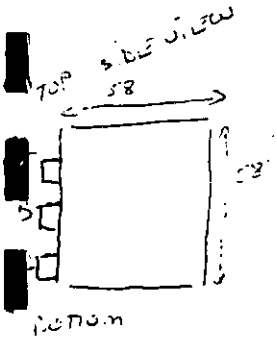
PLANT AND CITY	RUN DATE
1. CARPENTER TECH. READING, PA	04 / 27 / 91

SAMPLING LOCATION	CLOCK TIME
SITE #3 SCAVENGER DUCT	11

PITOT TUBE # 179

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. C3-V	ANTESBERGER	68	29.85	

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
	58"		~~0.99~~ ~~0.85~~ 0.82	



FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F	
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41	
A1		0.55	113	
2		0.68	113	
3		0.65	115	
4		0.74	115	
5		0.81	116	
6		0.77	117	
7		0.78	117	
8		0.82	117	
9		0.75	117	
10		0.76	117	static - 1.4
B1		0.58	113	
2		0.61	115	
3		0.68	116	
4		0.62	117	
5		0.82	117	
6		0.81	117	
7		0.71	118	
8		0.79	117	
9		0.83	119	
10		0.91	118	static - 1.3
C1		0.46	116	
2		0.57	117	
3		0.53	118	
4		0.64	119	
5		0.69	119	
6		0.75	119	
7		0.68	120	
8		0.85	120	
9		0.87	121	
10		0.93	121	static - 1.2

$\Delta \bar{s} = 0.74$

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH / READING, PA	04/23/81	BAGHOUSE INLET / SCAVENGER DUCT	VELOCITY TRAVERSE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C3-1W	MATTESBERGER	70	29.15	-1.0		58" / 58"	0.84		1 OF 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
PITOT			20												90

PITOT TUBE ON 6TH POINT Port C

TRAVERSE POINT NUMBER ACCORDING TO M-5	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
A-1				0.95			126					
2				0.90			127					
3				0.75			120					
4				0.80			121					
5				0.85			119					
6				0.78			118					
7				0.86			125					
B-1				0.84			124					
2				0.79			127					
3				0.75			124					
4				0.83			128					
5				0.85			131					
6				0.77			124					
7				0.79			125					
C-1				0.83			124					
2				0.70			121					
3				0.89			133					
4				0.80			130					
5				0.82			131					
6				0.71			131					
7				0.81			128					
D-1				0.87			129					
2				0.75			130					
3				0.85			129					

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
C3-1					C003173		0.82		20 of 23

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
D-4				0.70			121					
5				0.75			128					
6				0.80			128					
7				0.75			130					
E-1				0.82			128					
2				0.71			126					
3				0.85			125					
4				0.81			121					
5				0.91			131					
6				0.70			127					
7				0.76			127					
F-1				0.85			128					
2				0.81			130					
3				0.90			128					
4				0.89			127					
5				0.81			127					
6				0.81			128					
7												
G-1				0.85			130					
2				0.87			131					
3				0.89			140					
4				0.80			138					
5				0.71			139					
6				0.85			140					
7												

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARGILL, TECH READING, PA	9/29/81	SILICA STACK INLET, SCAVENGER	[redacted] HEMOCULTIDUST SCAVENGER DUCT

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C3M2	G. ANTESBERGER	80	29.69	-.3		58.9" 58.8	.88		40 F 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
			80		F38	1.91	0.932								90

PORT C POINT - 6 AVG. VELOCITY

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
A-1				0.63			121					
2				0.74			121					
3				0.65			122					
4				0.72			121					
5				0.73			122					
6				0.81			121					
7				0.83			120					
8				0.75			125					
B-1				0.85			126					
2				0.75			125					
3				0.81			125					
4				0.87			124					
5				0.81			124					
6				0.80			124					
7				0.83			124					
8				1.00			124					
C-1				0.85			125					
2				0.87			124					
3				0.90			122					
4				0.91			122					
5				0.90			121					
6				~~0.85~~			123					
7				~~0.90~~			132					
8												

[redacted]MIS[redacted]N [redacted]TIN[redacted]IE[redacted]DAT[redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH READING, PA	04/29/81	SITE #3 SCAVENGE DUCT	VELOCITY

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)		PITOT TUBE Cp	THERM NO.	PAGE
C3-2	ANTIESBERGER	80	29.40	-7.3		58"	58"	.83		2 OF 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
PITOT			20												5

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
DE-1				0.68			129					
2				0.60			128					
3				0.75			129					
4				0.79			129					
5				0.80			130					
6				0.83			129					
7				0.91			130					
FE-1				0.95			130					
2				0.65			129					
3				0.70			131					
4				0.75			131					
5				0.73			130					
6				0.75			130					
7				0.88			127					
GB-1				0.95			131					
2				0.92			131					
3				0.85			123					
4				0.90			132					
5				[illegible]			[illegible]					
6				0.80			135					
7				0.95			135					

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH CO. READING PA	9/29/81	SWITCH 3 SCAVENGER DUCT	INTERG

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C3-1	ANTIGASBERG	80	29.60	-.13		58" 58"	.83		30 of 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HRS
PITOT															90

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
C-1	•		•	0.35	•	•	130			•		
2	•		•	0.30	•	•	129			•		
3	•		•	0.30	•	•	129			•		
4	•		•	0.25	•	•	131			•		
5	•		•		•	•				•		
6	•		•		•	•				•		
7	•		•		•	•				•		
	•		•		•	•				•		
	•		•		•	•				•		
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	•		•		•	•				•		
	•		•		•	•				•		
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[redacted] [redacted] [redacted] [redacted] [redacted]MI[redacted]ON ([redacted]TI[redacted]IE[redacted]DA[redacted]) [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH CO. READING, PA	9/30/81	SITE 93 SCRUBBER INLET	HENOCITY

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C3-3	ANDERSON	[illegible]	[illegible]	-1.3		58" 58"	0.83		1 OF 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HERE
PITOT															90

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0											
A-1				1.00								
2				0.95			100					
3				0.62			99					
4				0.88			106					
5				0.87			105					
6				0.75			105					
7				0.80			110					
B-1				0.91			109					
2				0.85			111					
3				0.80			113					
4				0.76			115					
5				0.70			113					
6				0.71			113					
7				0.85			112					
C-1				0.90			115					
2				0.81			117					
3				0.80			118					
4				0.85			117					
5				0.80			117					
6				0.89			115					
7				0.95			113					
							112					

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTIER ITECH CO. READING PA	09/30/81	SUITE #3 SCAVENGER DUCT	HEXAVALENT

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
9373	AMTROS [illegible]	[illegible]	[illegible]	-1.3		51"	51"	923	20 of 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
PITOT															FIG

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
E-1				0.95			120					
2				0.90			121					
3				0.96			117					
4				0.70			116					
5				0.89			115					
6				0.78			114					
7				0.81			116					
F-1				0.85			118					
2				0.95			115					
3				0.80			113					
4				0.87			112					
5				0.90			115					
6				0.98			117					
7				0.85			120					
G-1				0.83			132					
2				0.90			133					
3				0.95			135					
4				0.81			123					
5				0.90			121					
6				0.90			118					
7				0.75			117					
				0.80			118					

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARGENTIA [illegible] RECLAIMING PLT	04/30/81	SINTER SCAVENGER DUCT	INFLUENZA

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
C-3	[illegible]	[illegible]	[illegible]	[illegible]		58" x 58"	.83		30 of 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (E)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
PITOT															90

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
C-1				0.78			136					
2				0.80			137					
3				0.83			131					
4				0.75			131					
5				0.76			133					
6				0.80			134					
7				0.90			131					

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

Plant CARTECH

Date 4-27-81

Sampling location SITE #4

Inside of far wall to outside of nipple 20"

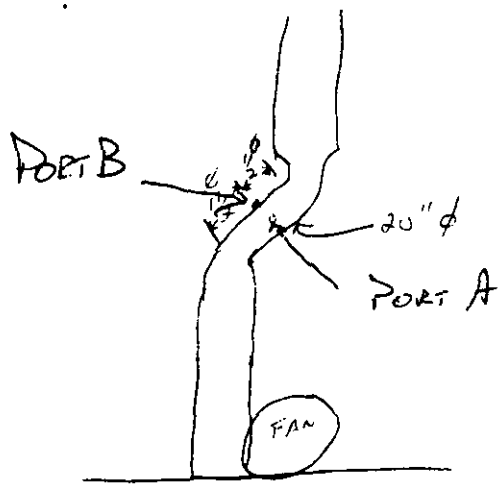
Inside of near wall to outside of nipple (nipple length) N/A

Stack I.D. 20"

Nearest upstream disturbance 1 1/2 dd

Nearest downstream disturbance 1/2 dd

Calculated by D. FITZGERALD



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	NIPPLE LENGTH	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.026	20.0"	1/2" (.52)	N/A	
2	.082		1 5/8" (1.64)		
3	.146		3" (2.92)		
4	.226		4 1/2" (4.52)		
5	.342		6 7/8" (6.84)		
6	.658		13 1/8" (13.16)		
7	.774		15 1/2" (15.48)		
8	.854		17" (17.08)		
9	.918		18 3/8" (18.36)		
10	.974		19 1/2" (19.48)		

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. CARTECH, READING, PA	4/27/81

SAMPLING LOCATION	CLOCK TIME
SITE #4 - TORCH CUTTER	1050

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. C4V-1	PROHASKA/FITZGERALD	65	29.84	- 5.5

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp	MOISTURE %
29	20.0	→	0.84	1.5

DIGITAL # 219 PITOT # 180
THERM. # 129
LEAK CHECK ± ✓
ZERO = +.01

FIELD DATA

	TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
	7, 8, 9, 10	11, 12, 13, 14	25, 26, 27, 28, 29	38, 39, 40, 41
Port A (Horz.)	1	1/2"	3.0	85
	2	1 3/8"	3.4	86
	3	3"	3.7	87
	4	4 1/2"	3.7	94
	5	6 7/8"	3.7	104
	6	13 1/8"	4.4	100
	7	15 1/2"	4.4	96
	8	17"	4.5	95
	9	18 3/8"	4.5	94
	10	19 1/2"	4.5	93
Port B (Vert.)	11	1/2"	4.2	91
	12	1 3/8"	4.5	92
	13	3"	4.8	93
	14	4 1/2"	5.0	92
	15	6 7/8"	4.8	92
	16	13 1/8"	4.3	91
	17	15 1/2"	3.7	96
	18	17"	3.0	90
	19	18 3/8"	1.4	91
	20	19 1/2"	1.5	91

STATIC = $-5.5''$ H_2O

$P_s = 29.8 - 0.4 = 29.4$ Hg

$\sqrt{\Delta P} = 1.93$

$\bar{T}_s = 92 = 552$

$\Rightarrow V_s \approx 108$ FPS

$A_s = \pi \frac{(\frac{20}{12})^2}{4} = 2.18$ FT^2

$Q = VA \approx 14{,}000$ CFM

$Q_{STD} \sim 12{,}900$ DSCFM

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH, READING, PA	04/23/81	SINTERING TUNNEL	PART. SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
CLM2	ANTHONY GREGOT	[illegible]	[illegible]	[illegible]	MARK III	10 1/4"	1.04	23/29	1	0.F.1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA ITEMS
GLASS PROBE	0.194		32		FB8 16	1.8022	1.9999								50

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	18:00	603.830									
Port	5.0	18:05	605.930	1.40	0.51	0.51	160	92	92	0.0	160	53
C	10.0	18:10	607.990	1.40	0.51	0.51	166	92	92	0.0	166	54
4	15.0	18:15	610.070	1.40	0.51	0.51	156	92	92	0.0	156	54

Cyclone

3833 A&B RUN NO. CLM-2

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
GARRINGER TOUCH, READING, PA	04/29/81	SINKING FINISH	PARTICULATE [redacted]

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	I M P	PAGE
CIM3	R. ANTIGSBERGER	80	29.40	-1.3	MARK III	10.44 / 10.44	0.84 / 0.83		1	40 of 40

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	DIF. ΔP	RECORD DATA MINS
6 FT PYREX	.184		20		FB8	1.86	0.98	15	0.00						25

7 8 9 10 TRAVERSE POINT NUMBER	11 12 13 14 SAMPLING TIME, min	15 16 17 18 CLOCK TIME (24 hr CLOCK)	19 20 21 22 23 24 GAS METER READING (V_m), ft^3	25 26 27 28 29 VELOCITY HEAD (Δp_s), in. H_2O	30 31 32 33 34 35 36 37 ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	38 39 40 41 STACK TEMPERATURE (T_s), °F	42 43 44 DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	45 46 47 OUTLET ($T_{m_{out}}$), °F	48 49 50 51 PUMP VACUUM, in. Hg	52 53 54 IMPACTOR TEMPERATURE °F	55 56 57 CONDENSER TEMPERATURE °F
	0	09:40	610.265									
PORT-C	2.5	09:42	611.055	1.70	.74	.74	119	70	70	0.0	119	47
POINT-2	5.0	09:45	611.900	1.70	.74	.74	120	70	70	0.0	120	46

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH CO. READING, PA	9/13/81	SINTER 9/ FINISH	PART. SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
CIM-6	ANTESBERGER	125	29.70	-1.3	MARK III	19"	1.99"	0.83 / 28	1	60 F

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
GLASS PIPE	NHG		20		PB81	1.9	0.982	15	0.040						25

LEAK CHECK AFTER

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	14:50	916.835									
PORE FC	25	14:52	918.000	1.80	0.68	0.68	120	76	76	0.0	120	45
2	50	14:55	919.140	1.80	0.68	0.68	126	76	76	0.0	126	40

3852 A/B + 53A FILTER NO. _____

RUN NO. CIM-6 LAB NO. _____

IMPACTOR EMISSION TESTING FIELD DATA

PITOT # 189

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTECH, READING PA	4/28/81	SITE #3 BAGHOUSE OUTLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
G3M-T4	DAN FITZGERALD	80	28.77	HOIP AND GRSOM	MARK 3	60	0.82	164	1	1 OF 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	DIF. ΔP	RECORD DATA MINS
6 INCH GLASS	0.361		29		FB2	1.79	1.9097	10.0000	0.005	248.34					VPP

* Change of stacks - begin @ 1120 ** Change of Stacks - begin @ 1300

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	0937	995.538									
3B-9	10.0	0947	999.915	0.14	0.57	0.57	138	69	68	10	138	70
3B-9	20.0	0957	004.270	0.14	0.57	0.57	137	74	68	10	137	44
3B-9	30.0	1007	008.770	0.14	0.57	0.57	129	78	69	10	129	42
3B-9	40.0	1017	013.190	0.14	0.57	0.57	123	81	71	10	123	42
3B-9	50.0	1027	017.640	0.14	0.57	0.57	120	83	74	10	120	42
3B-9	60.0	1037	022.225	0.14	0.57	0.57	119	86	75	10	119	42
3B-9	70.0	1047	026.835	0.14	0.57	0.57	120	89	78	10	120	42
3B-9	80.0	1057	031.435	0.14	0.57	0.57	119	93	81	10	119	42
3B-9	* 90.0	1107	035.895	0.14	0.57	0.57	120	96	84	10	120	42
4B-8	100.0	1130	040.395	0.14	0.57	0.57	137	95	90	10	137	42
4B-8	110.0	1140	044.945	0.14	0.57	0.57	131	102	91	10	131	42
4B-8	120.0	1150	049.520	0.14	0.57	0.57	129	105	93	10	129	42
4B-8	130.0	1200	054.100	0.14	0.57	0.57	128	106	95	10	128	42
4B-8	140.0	1210	058.695	0.14	0.57	0.57	126	107	97	10	126	42
4B-8	150.0	1220	063.295	0.14	0.57	0.57	127	108	98	10	127	42
4B-8	160.0	1230	067.925	0.14	0.57	0.57	128	110	99	10	128	42
4B-8	170.0	1240	072.645	0.14	0.57	0.57	129	108	99	10	129	42
5B-9	** 180.0	1250	077.258	0.14	0.57	0.57	125	103	97	10	125	42
5B-9	190.0	1310	081.760	0.14	0.57	0.57	148	93	92	10	148	44
5B-9	200.0	1320	086.300	0.14	0.57	0.57	151	92	89	10	151	46
5B-9	210.0	1330	090.860	0.14	0.57	0.57	142	90	87	10	142	44
5B-9	220.0	1340	095.410	0.14	0.57	0.57	133	88	85	10	133	44
5B-9	230.0	1350	099.945	0.15	0.57	0.57	127	87	83	10	127	44
5B-9	240.0	1400	104.470	0.15	0.57	0.57	125	86	82	10	125	44

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTIGCH, BGRAING, PA	4/28/91	SLITE #2/BAGHOUSE OUTLET	PARTICULATE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	I MP	PAGE
CZM-2	DAN FITZGERALD	60	28.97	-19.0	ANDERSON MARK 3	1969	.82	164	20	F 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
5 FGGTT GALV	.0261		20		FB2	1.76	1.007	1.00	.005	248.34					10.0

☆ Change of Stacks - begin @ 1452 ☆☆ Change of Stacks - begin @ 1654

□ Shut down @ 334.0 min - begin @ 1554

7 8 9 10	11 12 13 14	15 16 17 18	19 20 21	22 23 24	25 26 27 28 29	30 31	32 33	34 35	36 37	38 39 40 41	42 43	44 45	46 47	48 49 50 51	52 53 54	55 56 57
TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3		VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O			STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0					DESIRED	ACTUAL			INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
5B-9	250.0	1410	108.975		0.14	0.57	0.57		125	86	82	1.0	125	46
5B-9	260.0	1420	113.475		0.14	0.57	0.57		125	89	82	1.0	122	48
5B-9	☆270.0	1430	117.959		0.14	0.57	0.57		122	90	82	1.0	122	48
1B-10	280.0	1502	122.520		0.14	0.54	0.57		131	86	85	1.0	131	50
1B-10	290.0	1512	127.090		0.15	0.57	0.57		128	88	84	1.0	128	45
1B-10	300.0	1522	131.625		0.15	0.57	0.57		126	89	84	1.0	126	45
1B-10	310.0	1532	136.175		0.15	0.57	0.57		125	91	84	1.0	125	45
1B-10	320.0	1542	140.725		0.15	0.57	0.57		125	93	84	1.0	125	45
1B-10	330.0	1552	145.275		0.15	0.57	0.57		123	94	84	1.0	123	45
1B-10	□340.0	1606	149.815		0.15	0.57	0.57		126	96	85	1.0	126	45
1B-10	350.0	1616	154.380		0.15	0.57	0.57		129	97	86	1.0	129	45
1B-10	☆☆360.0	1626	158.909		0.15	0.57	0.57		133	98	86	1.0	133	45
2B-8	370.0	1704	163.565		0.14	0.57	0.57		128	92	89	1.0	128	48
2B-8	380.0	1714	168.220		0.14	0.57	0.57		128	92	89	1.0	128	48
2B-8	390.0	1724	172.860		0.14	0.57	0.57		136	93	88	1.0	136	48
2B-8	400.0	1734	177.500		0.14	0.57	0.57		132	94	88	1.0	132	50
2B-8	410.0	1744	182.065		0.14	0.57	0.57		130	95	88	1.0	130	50
2B-8	420.0	1754	186.610		0.14	0.57	0.57		131	95	88	1.0	131	50
2B-8	430.0	1804	191.220		0.14	0.57	0.57		130	95	88	1.0	130	50
2B-8	440.0	1814	195.735		0.14	0.57	0.57		132	95	88	1.0	132	50
2B-8	450.0	1824	200.286		0.14	0.57	0.57		147	94	88	1.0	147	50

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTIGH, BEAVER, PA	4/29/81	SITE #2 / BAGHOUSE INLET	PARTICULATE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
G2M-3	DAN FITZGERALD	80	29.60	+0.10	ANDERSON MARK 3	66.0	0.84	1649	1	1 of 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF ΔP	RECORD DATA MINS
6 FOOT GLASS	0.316		20		FB2	1.76	1.007	10	0.000	53399					10.0

* Change of Stacks - begin @ 1106 ** Change of Stacks - begin @ 1248

□ Temp. Shut down @ 1960 min resume testing @ 1316

DIGITAL #220
PITOT #189

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	0924	200.447									
3B-9	10.0	0934	206.860	0.14	1.27	1.27	112	75	74	20	112	60
3B-9	20.0	0944	213.300	0.14	1.27	1.27	127	81	74	20	127	56
3B-9	30.0	0954	219.805	0.14	1.27	1.27	139	87	77	20	139	40
3B-9	40.0	1004	226.350	0.14	1.27	1.27	133	92	80	20	133	40
3B-9	50.0	1014	232.880	0.14	1.27	1.27	132	96	82	20	132	40
3B-9	60.0	1024	239.500	0.14	1.27	1.27	127	98	83	20	127	42
3B-9	70.0	1034	246.145	0.14	1.27	1.27	124	102	88	20	124	42
3B-9	80.0	1044	252.830	0.14	1.27	1.27	123	103	90	20	123	40
3B-9	* 90.0	1054	259.513	0.16	1.27	1.27	124	104	92	20	124	40
2B-8	100.0	1116	266.075	0.13	1.27	1.27	123	97	92	2.0	123	40
2B-8	110.0	1126	272.690	0.15	1.27	1.27	122	98	92	20	122	40
2B-8	120.0	1136	279.440	0.14	1.27	1.27	120	100	92	20	120	40
2B-8	130.0	1146	285.880	0.14	1.27	1.27	129	101	92	20	129	40
2B-8	140.0	1156	292.400	0.14	1.27	1.27	147	101	92	20	147	40
2B-8	150.0	1206	298.935	0.14	1.27	1.27	141	101	92	20	141	40
2B-8	160.0	1216	305.475	0.14	1.27	1.27	133	102	92	20	133	40
2B-8	170.0	1226	312.060	0.14	1.27	1.27	127	103	93	20	127	40
2B-8	180.0	1236	318.632	0.14	1.27	1.27	127	103	93	20	127	40
1B-10	** 190.0	1258	325.325	0.14	1.27	1.27	121	96	92	20	121	40
1B-10	□ 200.0	1320	331.990	0.14	1.27	1.27	120	93	91	20	120	40
1B-10	210.0	1330	338.620	0.14	1.27	1.27	121	86	86	20	121	40
1B-10	220.0	1340	345.215	0.14	1.27	1.27	153	87	85	20	153	40
1B-10	230.0	1350	351.795	0.15	1.27	1.27	132	89	84	20	132	40
1B-10	240.0	1400	358.355	0.14	1.27	1.27	141	90	84	20	141	40

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTERET, REGADING, PA	4/29/81	SITE #2 / BAGHOUSE OUTLET	PARTICLE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE C_p	THERM NO.	IMP	PAGE
CBM-3	DAN FITZGERALD	80	29.66	+10.10	AMAGRSPM MARK 3	66.0	0.82	1694	1	20 F 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6' FBIGT GLASS	0.316		20		FB2/76	1.90	1.00	0.000		53399					100

★ Stack change - begin @ 1444 ★★ Change of Stacks - begin @ 1622

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0											
1B-10	250.0	1410	364.920	0.14	1.27	1.27	143	91	84	20	143	44
1B-10	260.0	1420	371.500	0.16	1.27	1.27	132	91	84	20	132	44
1B-10	★ 270.0	1430	378.063	0.16	1.27	1.27	129	90	83	20	129	46
5B-9	280.0	1454	384.590	0.14	1.27	1.27	126	83	81	20	126	48
5B-9	290.0	1504	391.165	0.14	1.27	1.27	123	83	80	20	123	48
5B-9	300.0	1514	397.695	0.14	1.27	1.27	124	85	81	20	124	49
5B-9	310.0	1524	404.230	0.14	1.27	1.27	127	81	80	20	127	48
5B-9	320.0	1534	410.765	0.14	1.27	1.27	125	88	80	20	125	50
5B-9	330.0	1544	417.285	0.14	1.27	1.27	126	88	81	20	126	50
5B-9	340.0	1554	423.775	0.14	1.27	1.27	149	89	80	20	149	50
5B-9	350.0	1604	430.275	0.14	1.27	1.27	151	90	81	20	151	50
5B-9	★★ 360.0	1614	436.634	0.14	1.27	1.27	147	90	81	20	144	50
4B-8	370.0	1632	443.300	0.14	1.27	1.27	132	86	81	20	132	50
4B-8	380.0	1642	449.900	0.14	1.27	1.27	128	86	81	20	128	50
4B-8	390.0	1652	456.470	0.14	1.27	1.27	124	88	81	20	124	50
4B-8	400.0	1702	463.065	0.14	1.27	1.27	127	90	81	20	127	50
4B-8	410.0	1712	469.650	0.15	1.27	1.27	127	91	81	20	127	50
4B-8	420.0	1722	476.235	0.15	1.27	1.27	134	92	82	20	134	50
4B-8	430.0	1732	482.815	0.15	1.27	1.27	148	92	82	20	148	52
4B-8	440.0	1742	489.390	0.15	1.27	1.27	136	92	82	20	136	52
4B-8	450.0	1752	495.97	0.15	1.27	1.27	133	92	82	20	133	52

[redacted] MPA[redacted]R [redacted]SSI[redacted]TES[redacted]G [redacted]LD [redacted]A [redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTIGGA, READING, PA	4/30/81	SITE #2 / BAGHOUSE OUTLET	PARTICULATE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	I M P	PAGE
C2475	DAN FITZGERALD	80	29.70	+0.10	ANDERSEN MARK III	60.3	0.84	1G9	1	1 of 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER Δ H@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	IMP. ΔP	RECORD DATA MINS
6 FOOT GLASS	0.316		20		FB3	1.95	1.008	19	0.0003	62345					150

DIGITAL # 220
PITOT # 189

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	0900	216.472									
SA-10	15.0	0915	226.230	0.16	1.48	1.48	121	73	71	10	121	72
SA-10	30.0	0930	236.000	0.16	1.48	1.48	120	82	70	10	120	72
SA-10	45.0	0945	245.795	0.16	1.48	1.48	121	87	71	10	121	72
SA-10	60.0	1000	255.600	0.16	1.48	1.48	120	90	72	10	120	72
SA-10	75.0	1015	265.445	0.16	1.48	1.48	115	93	72	10	115	72
SA-10	90.0	1030	275.240	0.16	1.48	1.48	113	94	79	10	113	72
SA-10	105.0	1045	285.295	0.16	1.48	1.48	108	95	80	10	108	72
SA-10	120.0	1100	295.225	0.16	1.48	1.48	104	94	81	10	104	72
SA-10	135.0	1115	305.210	0.16	1.48	1.48	105	96	82	10	105	72
SA-10	150.0	1130	315.155	0.16	1.48	1.48	108	95	83	10	108	72
SA-10	165.0	1145	325.085	0.16	1.48	1.48	131	94	82	10	131	72
SA-10	180.0	1200	334.965	0.16	1.48	1.48	119	94	82	10	119	72
SA-10	195.0	1215	344.860	0.16	1.48	1.48	114	96	84	10	114	72
SA-10	210.0	1230	354.890	0.16	1.48	1.48	114	100	85	10	114	72
SA-10	225.0	1245	364.975	0.16	1.48	1.48	110	103	87	10	110	74
SA-10	240.0	1300	375.060	0.16	1.48	1.48	111	103	88	10	111	74
SA-10	255.0	1315	385.215	0.16	1.48	1.48	110	103	90	10	110	76
SA-10	270.0	1330	395.335	0.16	1.48	1.48	135	100	90	10	135	76
SA-10	285.0	1345	405.355	0.16	1.48	1.48	141	98	90	10	141	76
SA-10	300.0	1400	415.440	0.16	1.48	1.48	120	101	90	10	120	76
SA-10	315.0	1415	425.495	0.16	1.48	1.48	114	101	90	10	114	76
SA-10	330.0	1430	435.580	0.16	1.48	1.48	112	100	90	10	112	76
SA-10	345.0	1445	445.670	0.16	1.48	1.48	112	99	90	10	112	76
SA-10	360.0	1500	455.765	0.16	1.48	1.48	110	97	89	10	110	76

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTIGGH, READING, PA	4/30/91	BAGHOUSE OUTLET / BLICKER 2	PARTIGLG GAGE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	I N P	PAGE
C2M-5	DAN GITTERMAN	80	29.77	~~[illegible]~~ +0.10	ANDERSON MARK 3	69	0.82	164	20 F	

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	DIF. ΔP	RECORD DATA MINS
6 FT GLASS	0.315		20		FB3	1.88	1.008	1.40	0.007	63.346					150

* Change of Stacks - begin @ 1546
□ Shut down temp for process - begin @ 1626

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (ΔP_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
5A-10	3750	1515	465.855	0.16	1.48	1.48	132	96	88	10	132	76
5A-10	*3900	1530	475.808	0.16	1.48	1.48	122	94	87	10	122	76
2A-5	4050	1601	485.805	0.13	1.48	1.48	116	94	86	10	116	76
2A-5	□4200	1616	495.830	0.12	1.48	1.48	115	98	86	10	115	76
2A-5	435.0	1637	505.895	0.12	1.48	1.48	116	105	86	10	115	76
2A-5	450.0	1652	516.035	0.12	1.48	1.48	134	102	90	10	134	76
2A-5	465.0	1707	526.055	0.13	1.48	1.48	137	106	90	10	137	76
2A-5	480.0	1722	536.140	0.13	1.48	1.48	130	108	93	10	130	76
2A-5	495.0	1737	546.255	0.13	1.48	1.48	118	107	94	10	118	76
2A-5	510.0	1752	556.420	0.13	1.48	1.48	118	106	94	10	118	76
2A-5	525.0	1807	566.555	0.13	1.48	1.48	117	102	94	10	117	76
2A-5	540.0	1822	576.878	0.13	1.48	1.48	141	102	95	10	141	76

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARTIERS, READING, PA	11/27/81	INLET	PARTICULATE & SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
G2978	DAN GUTRIGGRAYD	90	29.74	+1.0	ANDERSON MARK 3	69	.987		1	1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	DEF. ΔP	RECORD DATA MINS
6 FOOT GLASS			38		684/76		1.007	12F	0.008						10

PITOT #189

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	1547	913.494									
A-10	10.0	1557	918.105	0.16	0.57	0.57	145	90	90	2.0	145	60
	20.0	1607	922.655	0.16	0.57	0.57	125	90	88	2.0	125	58
	30.0	1617	927.310	0.16	0.57	0.57	122	92	87	2.0	122	56
	40.0	1627	931.930	0.16	0.57	0.57	120	92	86	2.0	120	52
	50.0	1637	936.545	0.16	0.57	0.57	124	94	86	2.0	124	52
	60.0	1647	941.135	0.16	0.57	0.57	124	92	86	2.0	124	52
	70.0	1657	945.690	0.16	0.57	0.57	136	92	86	2.0	136	52
	80.0	1707	950.290	0.16	0.57	0.57	140	90	83	2.0	140	52
	90.0	1717	954.880	0.16	0.57	0.57	128	90	83	2.0	128	52
	100.0	1727	959.470	0.16	0.57	0.57	128	90	83	2.0	128	50
	110.0	1737	964.060	0.14	0.57	0.57	121	90	83	2.0	121	50
	120.0	1747	968.695	0.14	0.57	0.57	122	90	83	2.0	122	52
	130.0	1757	973.275	0.14	0.57	0.57	122	90	82	2.0	122	54
	140.0	1807	977.370	0.14	0.57	0.57	122	90	83	2.0	122	56
	150.0	1817	982.375	0.15	0.57	0.57	137	90	83	2.0	137	56
	160.0	1827	986.775	0.15	0.57	0.57	159	89	82	2.0	159	56
	170.0	1837	991.140	0.15	0.57	0.57	148	91	82	2.0	148	58
	180.0	1847	995.404	0.15	0.57	0.57	133	94	84	2.0	133	58

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH READING, PA	04/28/81	SITE 4 INLET	PART SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	INP	PAGE
GIAMI	R. ANTRESSBERGER	75	29.25	-1.3	HIGH CAPACITY	19.4	19.4	88	23	1 of 1

PROBE LENGTH AND TYPE	NOZ/I.D. I.D.	NOZ/I.D. NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6' GLASS PIPE	N/A		2%		1B8	1.96	0.9822	1.50	0.0151						5

* TAPPED AOD

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	12:40	485.880									
POST-B	5.0	12:45	487.910	1.70	0.51	0.51	126	84	84	0.5	126	45
P-2	10.0	12:50	489.970	1.70	0.51	0.51	129	84	84	0.5	129	47
	15.0	12:55	492.000	1.70	0.51	0.51	171	84	84	0.5	171	48
	20.0	13:00	494.100	1.70	0.51	0.51	192	84	84	0.5	192	49
	25.0	13:05	496.150	1.70	0.51	0.51	186	84	84	0.5	186	49
	30.0	13:10	498.200	1.70	0.51	0.51	163	86	84	0.5	163	50
	35.0	13:15	500.300	1.70	0.51	0.51	144	86	84	0.5	144	50
	40.0	13:20	502.300	1.70	0.51	0.51	147	86	84	0.5	147	50
	45.0	13:25	504.800	1.70	0.51	0.51	133	86	84	0.5	133	51
	50.0	13:30	506.500	1.70	0.51	0.51	128	85	83	0.5	128	51
	55.0	13:35	508.700	1.70	0.51	0.51	114	85	83	0.5	114	51
	60.0	13:40	509.930	1.70	0.51	0.51	129	85	82	0.5	129	50
	65.0	13:45	512.770	1.70	0.51	0.51	130	85	82	0.5	130	50
	70.0	13:50	514.900	1.70	0.51	0.51	129	85	82	0.5	129	50
	75.0	13:55	517.000	1.70	0.51	0.51	129	85	82	0.5	129	49
	80.0	14:00	519.250	1.70	0.51	0.51	126	86	82	0.5	126	49
	85.0	14:05	521.100	1.70	0.51	0.51	125	86	82	0.5	125	48
	* 90.0	14:10	523.350	1.70	0.51	0.51	121	86	83	0.5	121	48
	95.0	14:15	525.250	1.70	0.51	0.51	120	86	83	0.5	120	49
	100.0	14:20	527.250	1.70	0.51	0.51	148	86	83	0.5	148	49
	105.0	14:25	529.400	1.70	0.51	0.51	170	88	84	0.5	170	49
	110.0	14:30	531.430	1.70	0.51	0.51	156	88	84	0.5	156	49
	115.0	14:35	533.700	1.70	0.51	0.51	135	88	84	0.5	135	50
	120.0	14:40	535.600	1.70	0.51	0.51	138	88	84	0.5	138	50

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH READING, PA	04/28/89	SUITE 9A INLET	PART SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
	GLAHL / VANTEIJBERGER	75	29.35	-1.3	HIGH CAPACITY	19.4" / 19.4"	0.83 / 1.20		70	3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
9FT. PIPE	N/A		20		288	1.91	0.982					250°	250°		5

* STOP TEST 15:55 * START - 16:00

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0											
	125.0	14:45	537.800	1.70	0.51	0.51	128	88	86	0.5	128	49
	130.0	14:50	539.630	1.70	0.51	0.51	128	89	86	0.5	128	49
	135.0	14:55	541.730	1.70	0.51	0.51	127	89	86	0.5	127	50
	140.0	15:00	543.830	1.70	0.51	0.51	128	89	86	0.5	128	50
	145.0	15:05	545.920	1.70	0.51	0.51	129	89	86	0.5	129	50
	150.0	15:10	547.100	1.70	0.51	0.51	127	89	86	0.5	127	50
	155.0	15:15	550.100	1.70	0.51	0.51	123	88	85	0.5	123	50
	160.0	15:20	552.200	1.80	0.51	0.51	123	87	85	0.5	123	50
	165.0	15:25	554.300	1.80	0.51	0.51	126	87	85	0.5	126	50
	170.0	15:30	556.450	1.80	0.51	0.51	123	88	85	0.5	123	49
	175.0	15:35	558.450	1.80	0.51	0.51	126	88	86	0.5	126	49
	180.0	15:40	560.600	1.80	0.51	0.51	127	88	86	0.5	127	49
	185.0	15:45	562.800	1.80	0.51	0.51	127	88	85	0.5	127	50
	190.0	15:50	564.750	1.70	0.51	0.51	128	88	86	0.5	129	49
	*195.0	~~16:00~~	566.800	1.70	0.51	0.51	133	88	86	0.5	133	48
	200.0	~~16:05~~	568.600	1.70	0.51	0.51	133	88	86	0.5	133	48
	205.0	~~16:10~~	571.000	1.70	0.51	0.51	136	88	86	0.5	136	49
	210.0	~~16:15~~	573.100	1.70	0.51	0.51	136	88	86	0.5	136	50
	215.0	~~16:20~~	575.150	1.70	0.51	0.51	147	90	86	0.5	147	50
	220.0	~~16:25~~	577.200	1.70	0.51	0.51	147	90	86	0.5	147	51
	*225.0	[illegible]	579.350	1.70	0.51	0.51	183	91	88	0.5	138	51
	230.0	[illegible]	581.350	1.70	0.51	0.51	138	91	88	0.5	138	51
	235.0	[illegible]	583.400	1.70	0.51	0.51	135	91	89	0.5	135	50
	240.0	[illegible]	585.500	1.70	0.51	0.51	140	91	89	0.5	140	50

* STOP TEST 16:30

* START - 16:45

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH. READING, PA	04/28/81	SITE #1 INLET	PART. SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
G1H1	ANTESBERGER	25	29.25	-1.3	HYGEM CPA	18 x 18	0.83	29		30 of 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6 FT. PIPE	0.169		1.30		FB8	1.8	0.980								30

7 8 9 10	11 12 13 14	15 16 17 18	19 20 21 22 23 24	25 26 27 28 29	30 31 32 33 34 35	36 37	38 39 40 41	42 43 44	45 46 47	48 49 50 51	52 53 54	55 56 57
TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	17:05	•									
	2450	17:10	587.600	1.70	0.51	0.51	135	94	90	0.5	135	50
	2500	17:15	589.650	1.70	0.51	0.51	136	94	90	0.5	136	50
	2550	17:20	591.800	1.70	0.51	0.51	134	94	90	0.5	134	51
	2600	17:25	593.870	1.70	0.51	0.51	126	96	91	0.5	126	52
	2650	17:30	596.200	1.70	0.51	0.51	137	96	91	0.5	137	52
	2700	17:35	598.080	1.70	0.51	0.51	137	96	91	0.5	137	52
	2750	17:40	600.150	1.70	0.51	0.51	138	96	91	0.5	138	53
	2800	17:45	602.300	1.70	0.51	0.51	138	96	92	0.5	138	53
	2850	17:50	603.650	1.70	0.51	0.51	137	96	92	0.5	137	53

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH, READING, PA	9/29/81	SILTECH INLET	PARTICULATE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	I M P	PAGE
C1/C2	R. ANTHONY BERGER	82	29.00	0.13	HIGH CAPACITY	10"x	10"	0.83/25	1	1 OF 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	OBH HEAT SET	REF. ΔP	RECORD DATA PERS
6 FT PIPE	0.194		20		F88	1.91	0.82	15	0.0						NO

★ STOP TEST 13:05
START 13:15

TRAVERSE POINT NUMBER PORT C	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	11:35	635.080									
POINT 2	5.0	11:40	638.150	1.60	0.61	0.61	123	78	78	0.0	123	55
	10.0	11:45	640.350	1.60	0.61	0.61	123	80	78	0.0	123	54
	15.0	11:50	642.600	1.60	0.61	0.61	124	80	78	0.0	124	54
	20.0	11:55	644.830	1.60	0.61	0.61	124	81	78	0.0	124	54
	25.0	12:00	647.050	1.60	0.61	0.61	124	82	78	0.0	124	55
	30.0	12:05	649.300	1.60	0.61	0.61	125	83	79	0.0	125	56
	35.0	12:10	651.500	1.60	0.61	0.61	123	84	80	0.0	123	55
	40.0	12:15	654.000	1.60	0.61	0.61	124	84	80	0.0	124	55
	45.0	12:20	656.080	1.60	0.61	0.61	124	84	80	0.0	124	55
	50.0	12:25	658.300	1.60	0.61	0.61	124	86	80	0.0	124	55
	55.0	12:30	660.800	1.60	0.61	0.61	122	86	82	0.0	122	55
	60.0	12:35	662.9	1.60	0.61	0.61	122	86	82	0.0	122	56
	65.0	12:40	664.950	1.60	0.61	0.61	122	87	82	0.0	122	56
	70.0	12:45	667.200	1.60	0.61	0.61	122	88	83	0.0	122	57
	75.0	12:50	669.450	1.60	0.61	0.61	128	88	82	0.0	128	57
	80.0	12:55	671.700	1.60	0.61	0.61	126	87	82	0.0	126	57
	85.0	13:00	673.950	1.60	0.61	0.61	128	87	83	0.0	128	57
★	90.0	13:05	676.275	1.60	0.61	0.61	126	87	83	0.0	126	56
	95.0	13:10	678.500	1.60	0.61	0.61	126	84	83	0.0	126	56
	100.0	13:15	680.650	1.60	0.61	0.61	128	84	83	0.0	128	57
	105.0	13:20	683.000	1.60	0.61	0.61	129	86	83	0.0	129	58
	110.0	13:25	685.150	1.60	0.61	0.61	128	86	83	0.0	128	58
	115.0	13:30	687.400	1.60	0.61	0.61	128	87	84	0.0	128	58
	120.0	13:35	689.650	1.60	0.61	0.61	128	87	84	0.0	128	58

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARA-KUTER TRASH, READING, PA	9/29/81	SINTER PLANT INLET	PARTICULATE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	TUBE NO.	IMP	PAGE
GUM2	MATTIBBERGER	90	29.60	-.13	HIGH CAPACITY	19X"	19X"	983/29		10 of 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	RE: ΔP	RECORD DATA REVS
9FT PYREX	9/64		32		FB8	1.9	1.002								SR

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0											
	125.0	13:55	691.800	1.60	0.61	0.61	129	88	84	0.0	129	56
	130.0	14:00	694.150	1.60	0.61	0.61	130	88	84	0.0	130	56
	135.0	14:05	696.400	1.60	0.61	0.61	130	88	84	0.0	130	56
	140.0	14:10	698.650	1.60	0.61	0.61	130	88	84	0.0	130	56
	145.0	14:15	700.900	1.60	0.61	0.61	130	90	86	0.0	130	56
	150.0	14:20	703.160	1.60	0.61	0.61	129	90	86	0.0	130	57
	155.0	14:25	705.400	1.60	0.61	0.61	129	90	86	0.0	129	57
	160.0	14:30	707.700	1.60	0.61	0.61	130	90	86	0.0	130	57
	165.0	14:35	710.000	1.60	0.61	0.61	131	90	87	0.0	131	58
	170.0	14:40	712.200	1.60	0.61	0.61	130	90	87	0.0	130	58
	175.0	14:45	714.450	1.60	0.61	0.61	131	90	87	0.0	131	54
	180.0	14:50	716.700	1.60	0.61	0.61	131	90	87	0.0	131	53
	185.0	14:55	719.000	1.60	0.61	0.61	131	90	87	0.0	131	51
	190.0	15:00	721.210	1.80	0.61	0.61	131	91	88	0.0	131	51
	195.0	15:05	723.450	1.80	0.61	0.61	133	91	88	0.0	133	51
	200.0	15:10	725.710	1.80	0.61	0.61	134	91	88	0.0	134	51
	205.0	15:15	727.960	1.80	0.61	0.61	136	91	88	0.0	136	52
	210.0	15:20	730.260	1.80	0.61	0.61	131	91	88	0.0	131	52
	215.0	15:25	732.480	1.80	0.61	0.61	128	91	88	0.0	128	53
	220.0	15:30	734.740	1.80	0.61	0.61	128	91	88	0.0	128	53
	225.0	15:35	737.000	1.80	0.61	0.61	129	91	88	0.0	129	53
	230.0	15:40	739.240	1.80	0.61	0.61	129	91	88	0.0	129	46
	235.0	15:45	741.500	1.80	0.61	0.61	136	91	89	0.2	136	46
	240.0	15:50	743.760	1.80	0.61	0.61	140	91	89	0.2	140	46

[redacted] MPA[redacted]OR [redacted]SSI[redacted]TES[redacted]NG [redacted]LD [redacted]A [redacted]

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER'S TRACK, CLEARFIELD, PA	9/29/81	SUTLER'S TANKER	BARTINGLE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
GHH2	[illegible]	20	29.60	-.63	HIGH GAS VOLUME	10.4	10.4"	0.83	1.29	1 of 3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
HIGH PURITY	N/A		20		188	1.91	1.98								

POST-D
P-2 ← MOVED TO [redacted]

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0											
★	245.0	15:55	746.030	1.80	0.61	0.61	147	91	89	00	146.9	46
	250.0	16:00	748.270	1.80	0.61	0.61	151	92	89	00	151	46
	255.0	16:05	750.540	1.80	0.61	0.61	134	92	89	00	134	47
	260.0	16:10	752.800	1.80	0.61	0.61	139	92	88	00	139	46
	265.0	16:15	755.100	1.80	0.61	0.61	131	92	89	00	130	46
	270.0	16:20	759.750	1.80	0.61	0.61	127	92	90	00	127	47
	275.0	16:25	761.820	1.80	0.61	0.61	120	92	90	00	120	48
	280.0	16:30	762.750	1.80	0.61	0.61	105	92	89	00	105	48
	285.0	16:35	764.150	1.80	0.61	0.61	102	92	89	00	102	48
	290.0	16:40	766.400	1.80	0.61	0.61	101	92	89	00	101	49
	295.0	16:45	768.670	1.80	0.61	0.61	106	92	89	00	106	48
	300.0	16:50	770.900	1.80	0.61	0.61	102	92	89	00	102	48
	305.0	16:55	773.350	1.80	0.61	0.61	101	92	89	00	101	48
	310.0	17:00	775.500	1.80	0.61	0.61	102	92	89	00	102	48

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
CARPENTER TECH ICG, READING, PA	04/30/81	OUTLET/INLET	PART. SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	I N P	PAGE
01H3	R. MATTHEWS/BROWN	75	29.70	-29.70 -1.30	HIGH CAPACITY	19¼" / 19¼"	0.84	1.20	1.0	2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	DIF. ΔP	RECORD DATA MINS
GLASS LINER	0.194		12	15	68	1.911	1.982								10

☆ VELOCITY READING (CHECK)

LEAK CHECK GOOD

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	09:15	781.280									
Port-C	100	09:25	785.820	1.80	0.68	0.68	100	61	58	0.0	100	42
2	200	09:35	790.400	1.80	0.68	0.68	103	61	58	0.0	103	40
☆	300	09:45	795.000	1.80	0.68	0.68	175	64	60	0.0	175	40
	400	09:55	799.650	1.80	0.68	0.68	171	66	60	0.0	171	40
	500	10:05	804.300	1.80	0.68	0.68	141	68	62	0.0	141	41
☆	600	10:15	808.900	1.80	0.68	0.68	121	69	63	0.0	121	41
	700	10:25	813.525	1.80	0.68	0.68	100	70	64	0.0	100	40
	800	10:35	818.150	1.80	0.68	0.68	101	71	64	0.0	101	40
☆	900	10:45	822.820	1.80	0.68	0.68	98	72	66	0.0	98	41
	1000	10:55	827.600	1.80	0.68	0.68	100	72	66	0.0	100	40
	1100	11:05	832.100	1.80	0.68	0.68	102	73	67	0.0	102	41
☆	1200	11:15	836.800	1.80	0.68	0.68	107	74	68	0.0	107	41
	1300	11:25	841.450	1.80	0.68	0.68	130	74	68	0.0	130	41
	1400	11:35	846.100	1.80	0.68	0.68	150	75	69	0.0	150	41
☆	1500	11:45	851.000	1.80	0.68	0.68	113	75	69	0.0	113	42
	1600	11:55	855.450	1.80	0.68	0.68	114	75	69	0.0	114	42
	1700	12:05	860.200	1.80	0.68	0.68	103	76	70	0.0	103	42
☆	1800	12:15	864.650	1.80	0.68	0.68	105	76	70	0.0	105	42
	1900	12:25	869.350	1.80	0.68	0.68	113	78	72	0.0	113	43
	2000	12:35	874.200	1.80	0.68	0.68	113	78	73	0.5	113	43
☆	2100	12:45	878.700	1.80	0.68	0.68	109	78	73	0.5	109	43
	2200	12:55	883.450	1.80	0.68	0.68	106	79	74	0.5	106	43
	2300	13:05	887.200	1.80	0.68	0.68	106	80	75	0.5	106	42
☆	2400	13:15	892.900	1.80	0.68	0.68	114	81	76	0.5	114	42

IMPACTOR PARTICULATE TESTING FIELD DATA

Plant & City	Date	Sampling Location	Sample Type
CARPENTER TECH CO. READING, PA	04/30/81	SITE 9 / INLET	PART SIZE

Run No.	Operator	Amb. Temp (°F)	Bar. Press. (in. Hg)	Static Press. (in. H_2O)	Impactor Type	Stack Inside Diam. (inches)	Pitot Tube Cp	Thermo No.	Jump	Page
01443	R. ANTIESIO	85	29.20	-1.3	HIGH CAPACITY	10.4" / 10.4"	0.83	29	1	0.F.2

Probe Length and Type	Nozzle I.D.	Nozzle No.	H_2O (%)	Sample Box No.	Meter Box No.	Meter Δ H@	Meter Cal. Factor Y	Leak Check in. Hg	Leak Check CFM	K Factor	C Factor	Probe Heat Set	Box Heat Set	Ref. ΔP	Record Data Pins
PART PIPE	0.14		20		148	1.91	0.982								190

Traverse Point Number	Sampling Time, min	Clock Time (24 hr Clock)	Gas Meter Reading (V_m), ft^3	Velocity Head (Δp_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O Desired	Orifice Pressure Differential (ΔH), in. H_2O Actual	Stack Temperature (T_s), °F	Dry Gas Meter Temperature Inlet ($T_{m_{in}}$), °F	Dry Gas Meter Temperature Outlet ($T_{m_{out}}$), °F	Pump Vacuum, in. Hg	Impactor Temperature °F	Condenser Temperature °F
	0											
	250.0	13:25	897.550	1.80	0.68	0.68	104	81	76	0.5	104	42
	260.0	13:35	902.270	1.80	0.68	0.68	119	82	77	0.5	119	42
✗	270.0	13:45	906.920	1.80	0.68	0.68	116	82	78	0.5	116	42
	280.0	13:55	911.750	1.80	0.68	0.68	114	81	77	0.5	114	43
	290.0	14:05	916.320	1.80	0.68	0.68	114	81	78	0.5	114	43
✗	~~300.0~~	~~14:15~~		~~1.80~~	~~0.68~~	~~0.68~~						

3858 A&B RUN NO. STAGE 0 CIH-3

3859 A&B RUN NO. STAGE-1 CIH-3

3860 A&B RUN NO. STAGE 2 CIH-3

3861 A&B RUN NO. STAGE 3 CIH-3

3862 A&B RUN NO. STAGE 4 CIH-3

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 11

COMPANY [illegible]
LOCATION [illegible]
TEST NO. [illegible]M-1
DATE 4/28
TYPE FACILITY [illegible]
CONTROL DEVICE

HOURS OF OBSERVATION [illegible] - 7:07
OBSERVER [illegible]
OBSERVER CERTIFICATION DATE [illegible]
OBSERVER AFFILIATION [illegible]
POINT OF EMISSIONS [illegible]
HEIGHT OF DISCHARGE POINT ≈ 50'

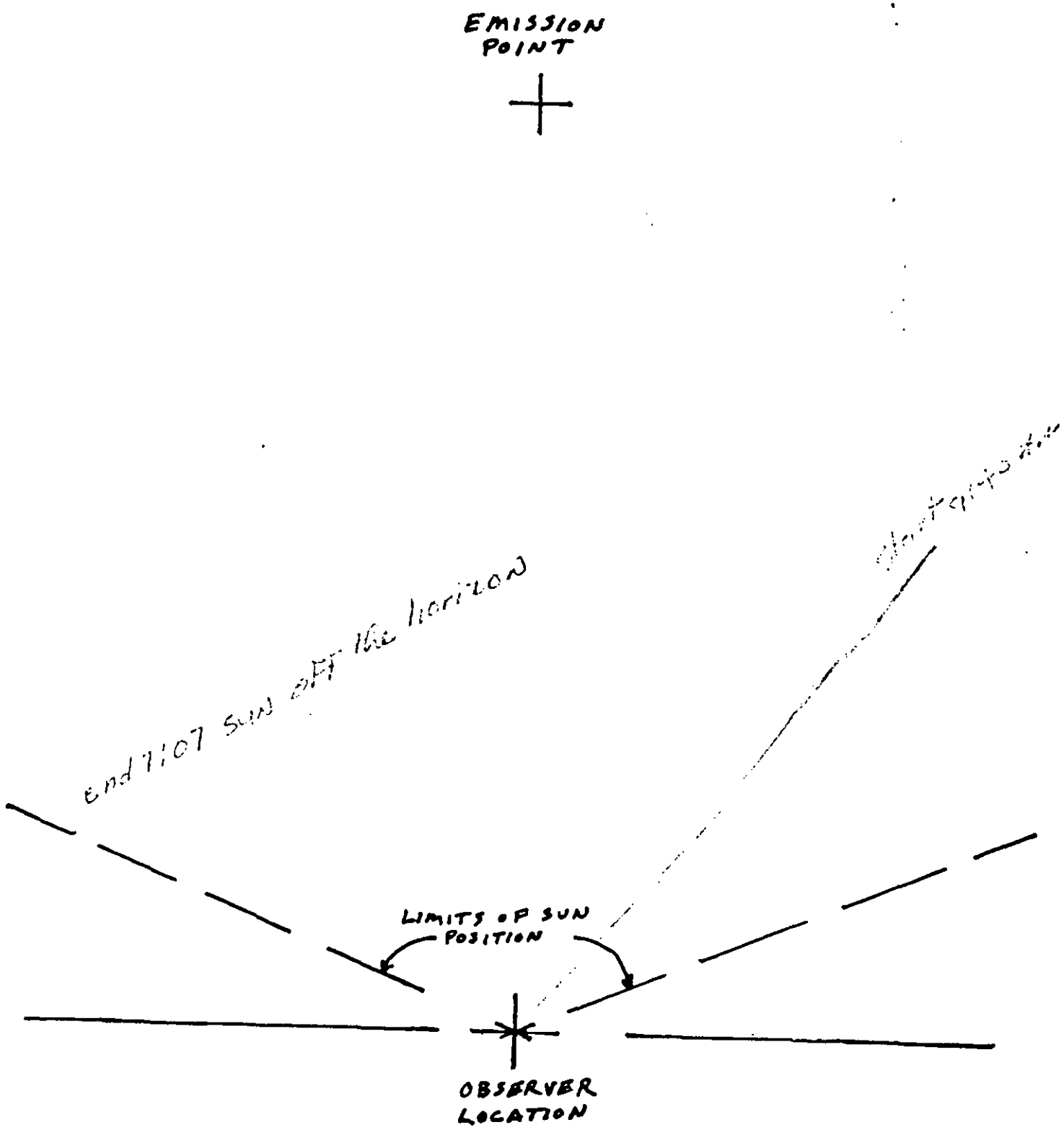
	Initial			Final
CLOCK TIME	[illegible]			7:07
OBSERVER LOCATION Distance to Discharge	250'			250'
Direction from Discharge	E			E
Height of Observation Point	Ground			Ground
BACKGROUND DESCRIPTION	Sky			Sky
WEATHER CONDITIONS Wind Direction	SW			SE
Wind Speed	0-3			7-9
Ambient Temperature	[illegible]			70°F
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	Part [illegible] 20%			PC 25%
PLUME DESCRIPTION Color				Gray
Distance Visible				20'
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	9:40 - 9:45	[illegible]	0
2	9:52 - 9:57	0	0
3	10:03 - 10:08	0	0
4	10:14 - 10:19	0	0
5	10:26 - 10:31	0	0
6	10:38 - 10:43	0	0
7	10:50 - 10:55	0	0
8	11:02 - 11:07	0	0
9	11:14 - 11:19	0	0
10	11:26 - 11:31	0	0
11	11:38 - 11:43	0	0
12	11:50 - 11:55	0	0
13	12:02 - 12:07	0	0
14	12:14 - 12:19	0	0
15	12:26 - 12:31	0	0
16	12:38 - 12:43	0	0
17	12:50 - 12:55	0	0
18	1:02 - 1:07	0	0
19	1:14 - 1:19	0	0
20	1:26 - 1:31	0	0

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with _____ at the time evaluation was made.



ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

cm-1

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE [illegible] OF [illegible]

COMPANY Carpenter Technology
LOCATION Reading PENNA
TEST NO. CMM-1
DATE 4/28/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE

HOURS OF OBSERVATION 1940 - 7:07
OBSERVER Thomas R. Clark
OBSERVER CERTIFICATION DATE 4/2/81
OBSERVER AFFILIATION EDCO Environmental, Inc
POINT OF EMISSIONS Melt shop
HEIGHT OF DISCHARGE POINT [illegible] 80'

	Initial			Final
CLOCK TIME	9:40			7:07
OBSERVER LOCATION Distance to Discharge	250'			250'
Direction from Discharge	E			E
Height of Observation Point	Ground			Ground
BACKGROUND DESCRIPTION				
WEATHER CONDITIONS Wind Direction	SW			SE
Wind Speed				7-9
Ambient Temperature	65 °F			70 °F
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	Partly cloudy 40%			PC 25%
PLUME DESCRIPTION Color				Gray
Distance Visible				20'
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
21	1:38 - 1:43	0	0
22	1:50 - 1:55	0	0
23	2:02 - 2:07	0	0
24	2:14 - 2:19	0	0
25	2:26 - 2:31	0	0
26	2:38 - 2:43	0	0
27	2:50 - 2:55	0	0
28	3:02 - 3:07	0	0
29	3:14 - 3:19	0	0
30	3:26 - 3:31	0	0
31	3:38 - 3:43	0	0
32	3:50 - 3:55	0	0
33	4:02 - 4:07	0	0
34	4:14 - 4:19	0	0
35	4:26 - 4:31	0	0
36	4:38 - 4:43	135	5% *
37	4:50 - 4:55	0	0
38	5:02 - 5:07	0	0
39	5:14 - 5:19	0	0
40	5:26 - 5:31	0	0

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with ____ at the time evaluation was made.

* Readings recorded during upset conditions in another section of the shop

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 1

COMPANY Carpenter Technology
LOCATION Reading Penn
TEST NO. CM-1
DATE 4/28/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE

HOURS OF OBSERVATION 0940 - 7:07
OBSERVER Thomas E. Clark
OBSERVER CERTIFICATION DATE 4/2/81
OBSERVER AFFILIATION PEDCo Environmental
POINT OF EMISSIONS Melt Shop
HEIGHT OF DISCHARGE POINT ≈ 50'

	Initial			Final
CLOCK TIME	9:40			7:07
OBSERVER LOCATION Distance to Discharge	250'			250'
Direction from Discharge	E			E
Height of Observation Point	Ground			Ground
BACKGROUND DESCRIPTION	Sky			Sky
WEATHER CONDITIONS Wind Direction	SW			SE
Wind Speed	0-3			7-9
Ambient Temperature	65°F			76°F
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	Partly Cloudy 20% C			PC 25% C
PLUME DESCRIPTION Color				Gray
Distance Visible				20'
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
41	5:38 - 5:43	0	0
42	5:50 - 5:55	0	0
43	6:02 - 6:07	0	0
44	6:14 - 6:19	0	0
45	6:26 - 6:31	0	0
46	6:38 - 6:43	0	0
47	6:50 - 6:55	0	0
48	7:02 - 7:07	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

OBSERVATION RECORD PAGE 2 OF 11

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. CM-1
DATE 9/28/87

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS [illegible]

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
9	40	0	0	0	0			
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	42	[illegible]	0	[illegible]	[illegible]			
	43	[illegible]	[illegible]	[illegible]	[illegible]			
	44		[illegible]	[illegible]	[illegible]			
	45	[illegible]	[illegible]	[illegible]	[illegible]			
9	50	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
[illegible]	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
10	[illegible]	0	0	0	0			
		0	0	0	0			
		0	0	0	0			
		0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
10	26	0	0	0	[illegible]			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	[illegible]	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 3 OF 11

COMPANY [illegible] Tech
OBSERVER [illegible]
LOCATION [illegible] Penn
TYPE FACILITY [illegible]
TEST NO. CM-1
POINT OF EMISSIONS [illegible]
DATE 4/[illegible]

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
10	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0		0	0			
[illegible]	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
11	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
11	14	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
[illegible]	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 4 OF 11

COMPANY Carpenter Tech
LOCATION Reading PA
TEST NO. CM-1
DATE 4/28/81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
11	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
12	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
12	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
12	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 5 OF 11

COMPANY Carpenter Tech.
LOCATION Reading Penna
TEST NO. Crm-1
DATE 4/28/81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
12	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
12	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
1	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
1	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
1	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 6 OF 11

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. [illegible]-1
DATE 4/28/81

OBSERVER T. Clark
TYPE FACILITY Enf/wod
POINT OF EMISSIONS Melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
1	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
1	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
2	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	[illegible]	0	0	0	0			
	07	0	0	0	0			
2	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
2	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 7 OF 11

COMPANY Carpenter Tech.
LOCATION Reading Penn
TEST NO. CMT-1
DATE 4/[illegible] 1981

OBSERVER T. Clark
TYPE FACILITY [illegible]
POINT OF EMISSIONS melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
2	39	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
2	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	55	0	0	0	0			
3	02	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	06	0	0	0	0			
	[illegible]	0	0	0	0			
3	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	19	0	0	0	0			
3	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 6 OF 11

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. CM-1
DATE 4/28/91

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
3	38	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
4	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
4	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
4	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 9 OF 11

COMPANY Carpenter Tech.
LOCATION Reading Penn
TEST NO. CM-1
DATE 9/28/81

OBSERVER T. Clark
TYPE FACILITY EAF 400
POINT OF EMISSIONS Melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
4	38	10	10	10	10			
	[illegible]	10	10	10	10			
	40	5	5	5	5			
	41	5	5	5	5			Readings resulted during
	42	5	5	5	0			upset conditions
	43	0	0	0	0			at the lower shop
4	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
5	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
5	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
5	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 10 OF 11

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. Cm-1
DATE 4/28/81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt Shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
5	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
5	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
6	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
6	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
6	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			

OBSERVATION RECORD PAGE 11 OF 11

COMPANY Carpenter Tech.
LOCATION Reading Penn
TEST NO. CM-1
DATE 4/28/81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt Shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
6	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
6	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
7	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 3

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. CM-2
DATE 4/29/81
TYPE FACILITY EAF/1100
CONTROL DEVICE

HOURS OF OBSERVATION 4:05 – 5:34
OBSERVER [illegible] Clark
OBSERVER CERTIFICATION DATE 4/[illegible]/81
OBSERVER AFFILIATION PEDCO Environmental
POINT OF EMISSIONS Melt shop
HEIGHT OF DISCHARGE POINT ≈ 50'

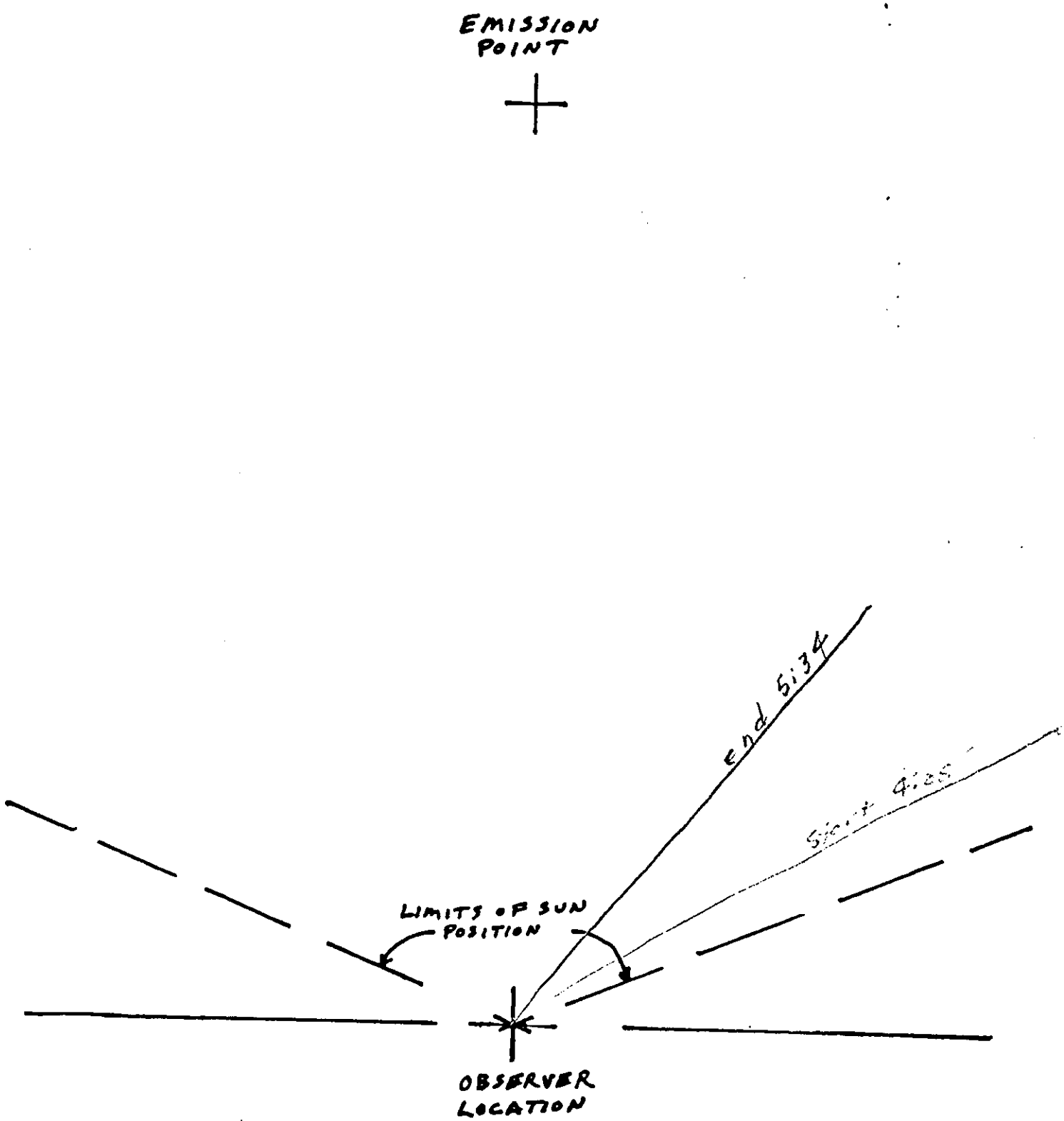
	Initial			Final
CLOCK TIME	4:05			5:34
OBSERVER LOCATION Distance to Discharge	250'			250'
Direction from Discharge	SE			SE
Height of Observation Point	Ground			Ground
BACKGROUND DESCRIPTION	Sky			Sky
WEATHER CONDITIONS Wind Direction	SW			SW
Wind Speed	7-9 mph			7-9 mph
Ambient Temperature	75°F			75°F
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position – see reverse	PC			PC 40%
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	4:05-4:10	0	0
2	4:17-4:22	0	0
3	4:29-4:34	0	0
4	4:41-4:46	0	0
5	4:53-4:58	0	0
6	5:05-5:10	0	0
7	5:17-5:22	0	0
8	5:29-5:34	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.



ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

CM-2

OBSERVATION RECORD PAGE 2 OF 3

COMPANY Carpenter Tech
LOCATION Reading, [illegible]
TEST NO. CM-2
DATE 4/29 81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS [illegible]

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
4	05	0	0	0	0			
	[illegible]	[illegible]	[illegible]	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]	[illegible]	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
4	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	[illegible]	0			
	21	0	0	0	0			
	22	0	0	0	0			
4	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
4	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
4	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			

OBSERVATION RECORD

COMPANY Carpenter Tech
LOCATION Reading, PENN
TEST NO. CM-2
DATE 4/29/81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
5	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
5	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
5	29	0	0	0	0			
	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			Reading stopped at 5:34 due to emissions drifting from the Lower Shop across the shop building, the NO. 2 AOD and baghouse.

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 3

COMPANY Co[illegible] Tools
LOCATION Read[illegible]
TEST NO. CM-3
DATE 4/30/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE

HOURS OF OBSERVATION 1:10 -
OBSERVER [illegible] R. Clark
OBSERVER CERTIFICATION DATE 4/2/81
OBSERVER AFFILIATION Pa[illegible] Environmental
POINT OF EMISSIONS Melt shop
HEIGHT OF DISCHARGE POINT ~50'

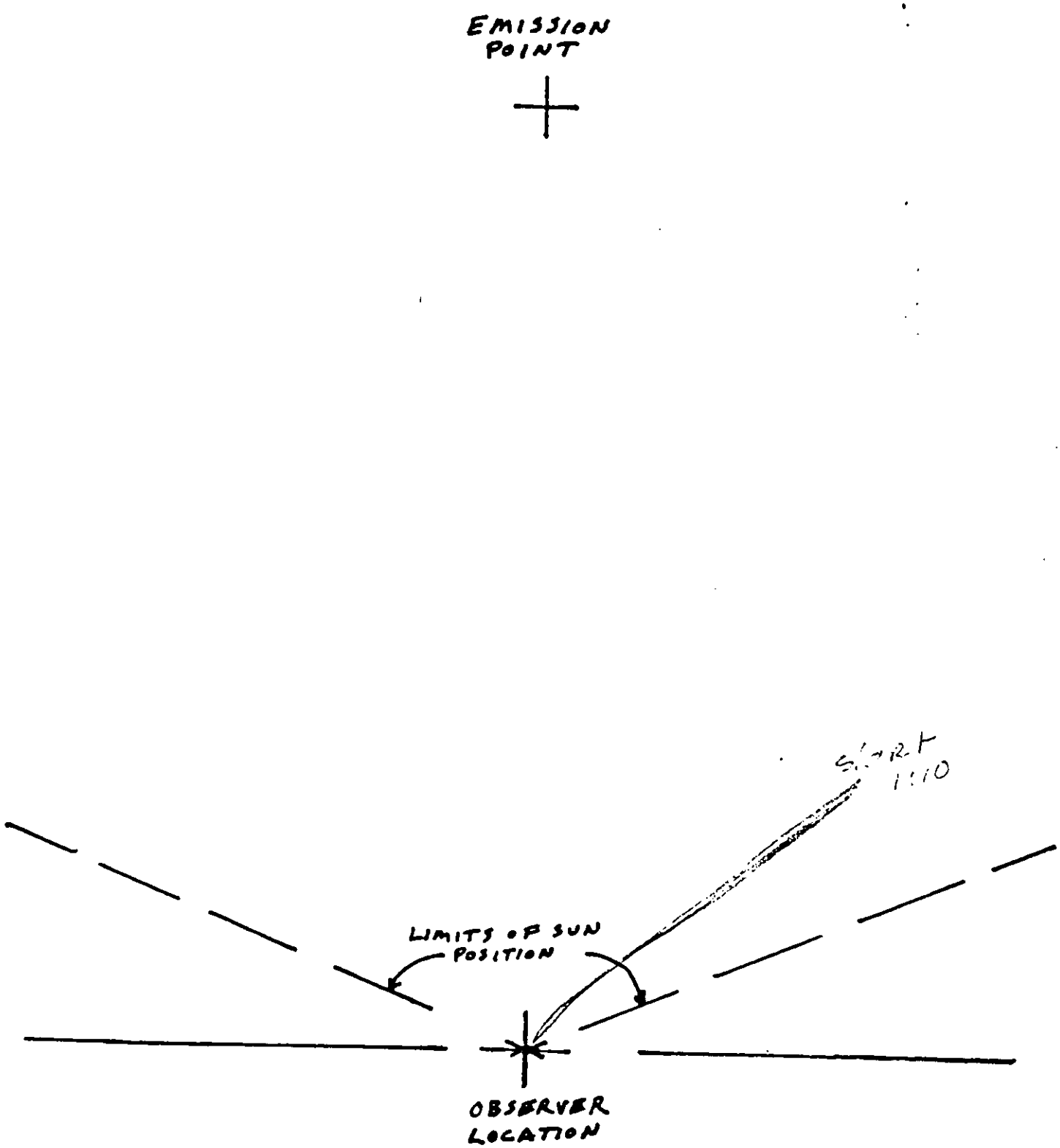
	Initial			Final
CLOCK TIME	1:10			2:09
OBSERVER LOCATION Distance to Discharge	~150'			~150'
Direction from Discharge	SE			SE
Height of Observation Point	Ground			Ground
BACKGROUND DESCRIPTION	sky			sky
WEATHER CONDITIONS Wind Direction	SW			SW
Wind Speed	5-7			5-7
Ambient Temperature	72°F			70°F
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	Partly cloudy 60%			Cloudy [illegible]
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	1:10 - 1:15	0	0
2	1:22 - 1:27	0	0
3	1:34 - 1:39	0	0
4	1:46 - 1:51	0	0
5	1:52 - 1:57	0	0
6	1:58 - 2:03	0	0
7	[illegible] - 2:09	0	0

Readings ranged from _____ to _____ % opacity

The source was/was not in compliance with _____ at the time evaluation was made.



ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

CM-3

OBSERVATION RECORD PAGE 2 OF 3

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. CM - 3
DATE 4/30/81

OBSERVER Thomas R. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt Shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	[illegible]	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
1	22	[illegible]	[illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]	[illegible]	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	[illegible]	0	0	0	0			
1	34	[illegible]	0	0	0			
	35	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
1	46	0	0	0	0			
	47	0	0	0	0			
	48	[illegible]	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
1	52	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	57	0	0	0	0			

OBSERVATION RECORD PAGE 3 OF 3

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. cm-3
DATE 4/20/81

OBSERVER T. Clark
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
1	58	0	0	0	0			
	59	0	0	0	0			
2	00	0	0	0	0			
	01	0	0	0	0			
	02	0	0	0	0			
	03	0	0	0	0			
2	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			Pennsylvania [illegible]
								[illegible]
								[illegible]

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE ___ OF 3

COMPANY Carpenter Tech
LOCATION [illegible]
TEST NO. CMI-4
DATE 4/30/81
TYPE FACILITY [illegible]
CONTROL DEVICE ___

HOURS OF OBSERVATION ___
OBSERVER [illegible]
OBSERVER CERTIFICATION DATE 4/-/81
OBSERVER AFFILIATION [illegible] Environmental
POINT OF EMISSIONS Mold Shop
HEIGHT OF DISCHARGE POINT ~50'

	Initial			Final
CLOCK TIME	4:15			
OBSERVER LOCATION Distance to Discharge	~200'			
Direction from Discharge	SE			
Height of Observation Point	Ground			
BACKGROUND DESCRIPTION	[illegible]			
WEATHER CONDITIONS Wind Direction	[illegible]			
Wind Speed	[illegible]			
Ambient Temperature	70°F			
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position – see reverse	Partly Cloudy 25%			
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	4:15 - 4:20	0	0
2	4:27 - 4:32	0	0
3	4:39 - 4:44	0	0
4	4:51 - 4:56	0	0
5	[illegible]	0	0
6	5:15 - 5:20	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

OBSERVATION RECORD PAGE 2 OF 3

COMPANY Carpenter Tech
LOCATION Reading PENN
TEST NO. [illegible]
DATE [illegible]

OBSERVER T. Clock
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS Roof Stop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
4	[illegible]	[illegible]	[illegible]	[illegible]	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
4	27	0	0	0	0			
	28	0	0	0	0			
	[illegible]	0	0	0	0			
	30	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
4	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
4	51	0	0	0	0			
	52	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
5	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			

OBSERVATION RECORD PAGE 3 OF 3

COMPANY Carpenter Tech
LOCATION Reading Penn
TEST NO. cm-4
DATE [illegible]

OBSERVER T. York
TYPE FACILITY [illegible]
POINT OF EMISSIONS melt shop

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
5	[illegible]	0	0	0	0			
	16	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
	[illegible]	0	0	0	0			
5	27							

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 10 OF 11

COMPANY CARTECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/28/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE BAGHOUSE

HOURS OF OBSERVATION 0930-1852
OBSERVER S. J. HOWLSON
OBSERVER CERTIFICATION DATE 4/1/81
OBSERVER AFFILIATION PEDCO ENVIRONMENTAL
POINT OF EMISSIONS BAGHOUSE
HEIGHT OF DISCHARGE POINT ~75'

	Initial			Final
CLOCK TIME	0930			1852
OBSERVER LOCATION Distance to Discharge	~200'			~200'
Direction from Discharge	SE			SE
Height of Observation Point	10'			10'
BACKGROUND DESCRIPTION	Sky			Sky
WEATHER CONDITIONS Wind Direction	NE			NE
Wind Speed	0-5			5-10
Ambient Temperature	60			60
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	OVERCAST ~~PTLY CLOUDY~~			OVERCAST
PLUME DESCRIPTION Color				
Distance Visible	N/A			N/A
OTHER INFORMATION	N/A			N/A

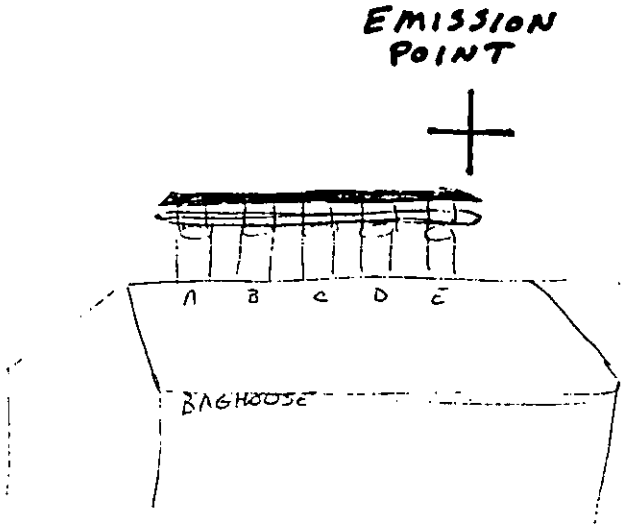
SUMMARY OF AVERAGE OPACITY

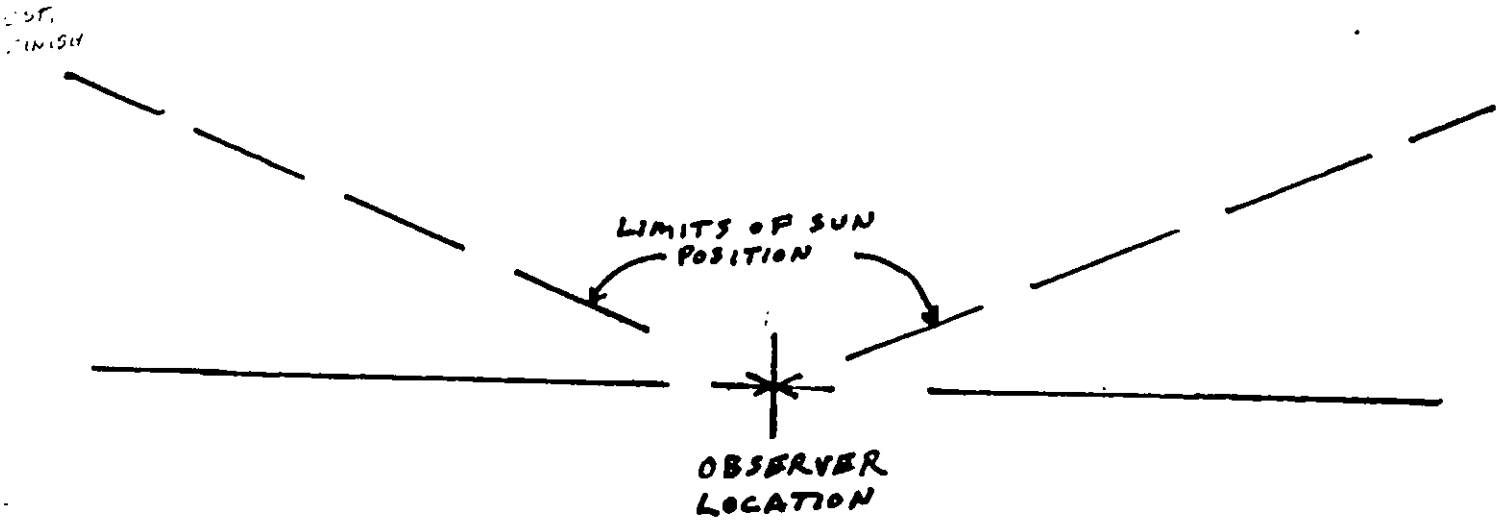
Set Number	Time Start-End	Opactity Sum	Opactity Average
1	0930-0935	0	0
2	0942-0947	0	0
3	0954-0959	0	0
4	1006-1011	0	0
5	1018-1023	0	0
6	1030-1035	0	0
7	1042-1047	0	0
8	1054-1059	0	0
9	1106-1111	0	0
10	1118-1123	0	0
11	1130-1135	0	0
12	1142-1147	0	0
13	1154-1159	0	0
14	1206-1211	0	0
15	1218-1223	0	0
16	1230-1235	0	0
17	1242-1247	0	0
18	1254-1259	0	0
19	1306-1311	0	0
20	1318-1323	0	0

CONT. ON PAGE 1B

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.





ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

CFH-1

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1b OF 11

COMPANY _____
LOCATION _____
TEST NO. CBH-1
DATE 4/27/81
TYPE FACILITY _____
CONTROL DEVICE _____

HOURS OF OBSERVATION _____
OBSERVER SJH
OBSERVER CERTIFICATION DATE _____
OBSERVER AFFILIATION _____
POINT OF EMISSIONS _____
HEIGHT OF DISCHARGE POINT _____

	Initial			Final
CLOCK TIME				
OBSERVER LOCATION Distance to Discharge				
Direction from Discharge				
Height of Observation Point				
BACKGROUND DESCRIPTION				
WEATHER CONDITIONS Wind Direction				
Wind Speed				
Ambient Temperature				
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position – see reverse				
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
21	13:30 - 13:35	0	0
22	13:42 - 13:47	0	0
23	13:54 - 13:59	0	0
24	14:06 14:11	0	0
25	14:18 - 14:23	0	0
26	14:30 - 14:35	0	0
27	14:42 - 14:47	0	0
28	14:54 - 14:59	0	0
29	15:06 15:11	0	0
30	15:18 - 15:23	0	0
31	15:30 - 15:35	0	0
32	15:42 - 15:47	0	0
33	15:54 - 15:59	0	0
34	16:11 - 16:16	0	0
35	16:23 - 16:28	0	0
36	16:35 - 16:40	0	0
37	16:47 - 16:52	0	0
38	16:59 - 17:04	0	0
39	17:11 - 17:16	0	0
40	17:23 - 17:28	0	0

CONT. ON PAGE 1C

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

RECORD OF VISUAL DETERMINATION OF OPACITY

COMPANY _____

LOCATION _____

TEST NO. CBH-1

DATE 4/22/81

TYPE FACILITY _____

CONTROL DEVICE _____

HOURS OF OBSERVATION _____

OBSERVER SJH

OBSERVER CERTIFICATION DATE _____

OBSERVER AFFILIATION _____

POINT OF EMISSIONS _____

HEIGHT OF DISCHARGE POINT _____

	Initial			Final
CLOCK TIME				
OBSERVER LOCATION Distance to Discharge				
Direction from Discharge				
Height of Observation Point				
BACKGROUND DESCRIPTION				
WEATHER CONDITIONS Wind Direction				
Wind Speed				
Ambient Temperature				
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse				
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
41	17:35-17:40	0	0
42	17:47-17:52	0	0
43	17:59-18:04	0	0
44	18:11-18:16	0	0
45	18:23-18:28	0	0
46	18:35-18:40	0	0
47	18:47-18:52	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

OBSERVATION RECORD PAGE 2 OF 11

COMPANY CARTECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/28/81

OBSERVER S. JHOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
09	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			RAIN
	58	0	0	0	0			↓
	59	0	0	0	0			✓
10	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			

OBSERVATION RECORD PAGE 3 OF 11

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/28/81

OBSERVER S.J. HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
10	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
11	06	0	0	0	0			RAIN
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			

OBSERVATION RECORD PAGE 4 OF 11

COMPANY CARTECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/28/81

OBSERVER S J HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
11	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
12	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			

OBSERVATION RECORD PAGE 5 OF 11

COMPANY CARTECH

LOCATION READING PA

TEST NO. CBH-1

DATE 4/23/81

OBSERVER S.J. HAWKSON

TYPE FACILITY EAF/AOD

POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
12	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
13	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			RAIN 13:23-13:27

OBSERVATION RECORD PAGE 6 OF 11

COMPANY CARTECH
LOCATION READING PA
TEST NO. CRH-1
DATE 4/27/81

OBSERVER S.J. HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
13	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			RAIN
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
14	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			

OBSERVATION RECORD PAGE 7 OF 11

COMPANY CARTECH
LOCATION READING PA
TEST NO. CRH-1
DATE 4/28/81

OBSERVER S J HOWIGON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
14	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
15	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			

OBSERVATION RECORD PAGE 8 OF 11

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/23/81

OBSERVER S.J. HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
15	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
16	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			

* OBSERVER BREAK

OBSERVATION RECORD PAGE 9 OF 11

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/28/81

OBSERVER SJ HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
16	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	59	0	0	0	0			
17	00	0	0	0	0			
	01	0	0	0	0			
	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			

OBSERVATION RECORD PAGE 10 OF 11

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-1
DATE 4/23/81

OBSERVER S.J. HOLLISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
17	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	59	0	0	0	0			
18	00	0	0	0	0			
	01	0	0	0	0			
	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			

OBSERVATION RECORD PAGE 11 OF 11

COMPANY CARTECH
LOCATION READING PA
TEST NO. CRH-1
DATE 4/23/81

OBSERVER S.J. HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
18	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 3

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-2
DATE 4/29/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE BAGHOUSE

HOURS OF OBSERVATION 16:00 - 1230
OBSERVER S.J. HOWISON
OBSERVER CERTIFICATION DATE 4/1/81
OBSERVER AFFILIATION PEDCO ENVIRONMENTAL
POINT OF EMISSIONS BAGHOUSE
HEIGHT OF DISCHARGE POINT ~75'

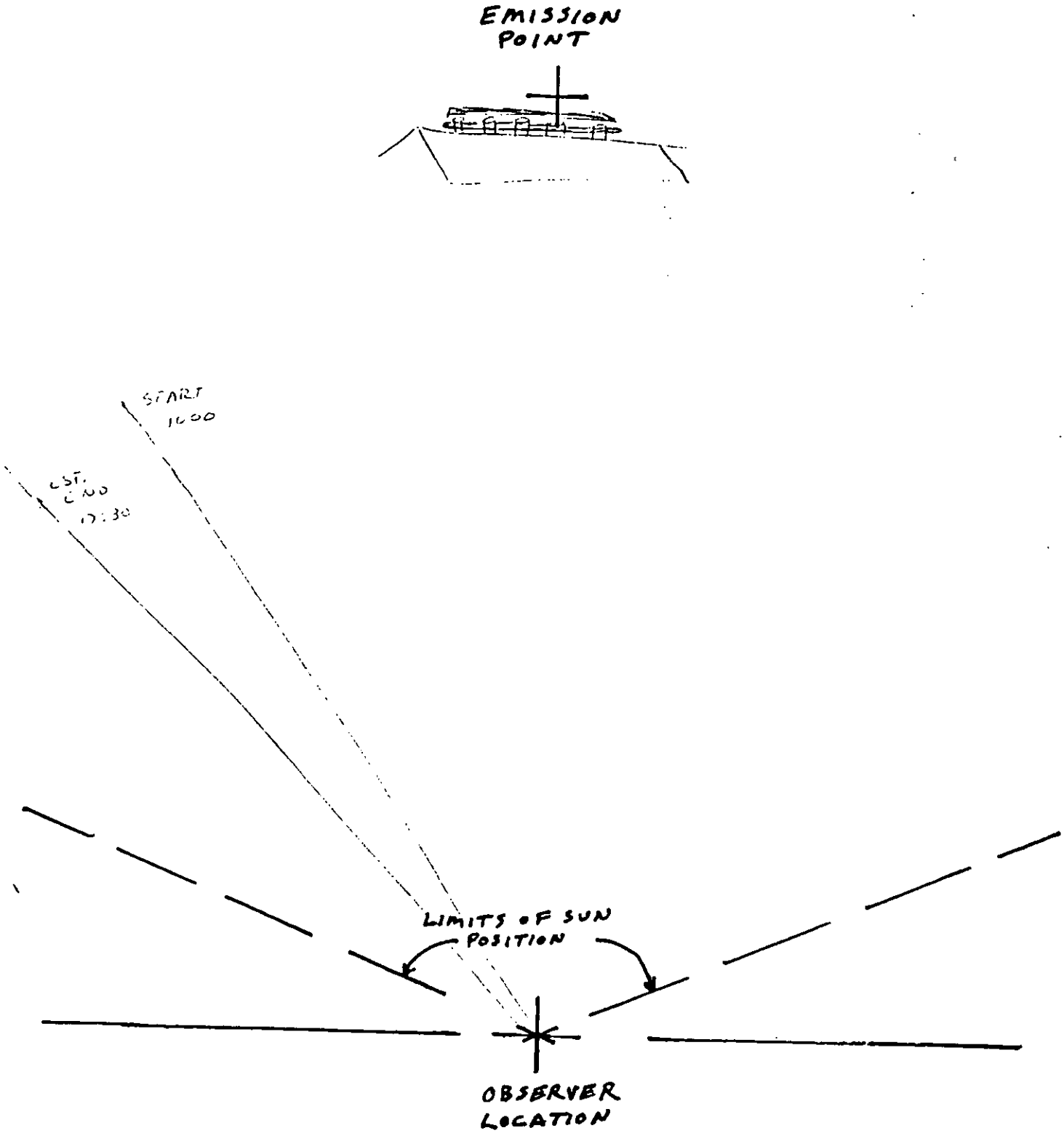
	Initial			Final
CLOCK TIME	1600			17:30
OBSERVER LOCATION Distance to Discharge	200'			200'
Direction from Discharge	SE			SE
Height of Observation Point	10'			10'
BACKGROUND DESCRIPTION	Sky			Sky
WEATHER CONDITIONS Wind Direction	N			N
Wind Speed	5-7			5-7
Ambient Temperature	70			70
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	OVERCAST			PTLY CLDY
PLUME DESCRIPTION Color	N/A			N/A
Distance Visible	N/A			N/A
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	16:01-16:06	0	0
2	16:13-16:18	0	0
3	16:25-16:30	0	0
4	16:37-16:42	0	0
5	16:49-16:54	0	0
6	17:01-17:06	0	0
7	17:13-17:18	0	0
8	17:25-17:30	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.



ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

CBH

OBSERVATION RECORD PAGE 2 OF 3

COMPANY CARTECH
LOCATION READING PA
TEST NO. CBH-2
DATE 4/29/81

OBSERVER S.J. HOWLISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
16	01	0	0	0	0			
	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			

OBSERVATION RECORD

COMPANY CARTECH

LOCATION READING PA

TEST NO. CBH-2

DATE 4/29/81

OBSERVER S.J. HOWISON

TYPE FACILITY EAF/AOD

POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
17	01	0	0	0	0			
	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			

TESTING STOPPED BECAUSE OF EMISSIONS FROM ADJACENT SHOP OBSCURING BAGHOUSE EXIT STACKS

RECORD OF VISUAL DETERMINATION OF OPACITY

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-3
DATE 4/30/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE BAGHOUSE

HOURS OF OBSERVATION 12:30 - 13:47
OBSERVER S J HOWISON
OBSERVER CERTIFICATION DATE 4/1/81
OBSERVER AFFILIATION PEDCO ENVIRONMENTAL
POINT OF EMISSIONS BAGHOUSE
HEIGHT OF DISCHARGE POINT ~75'

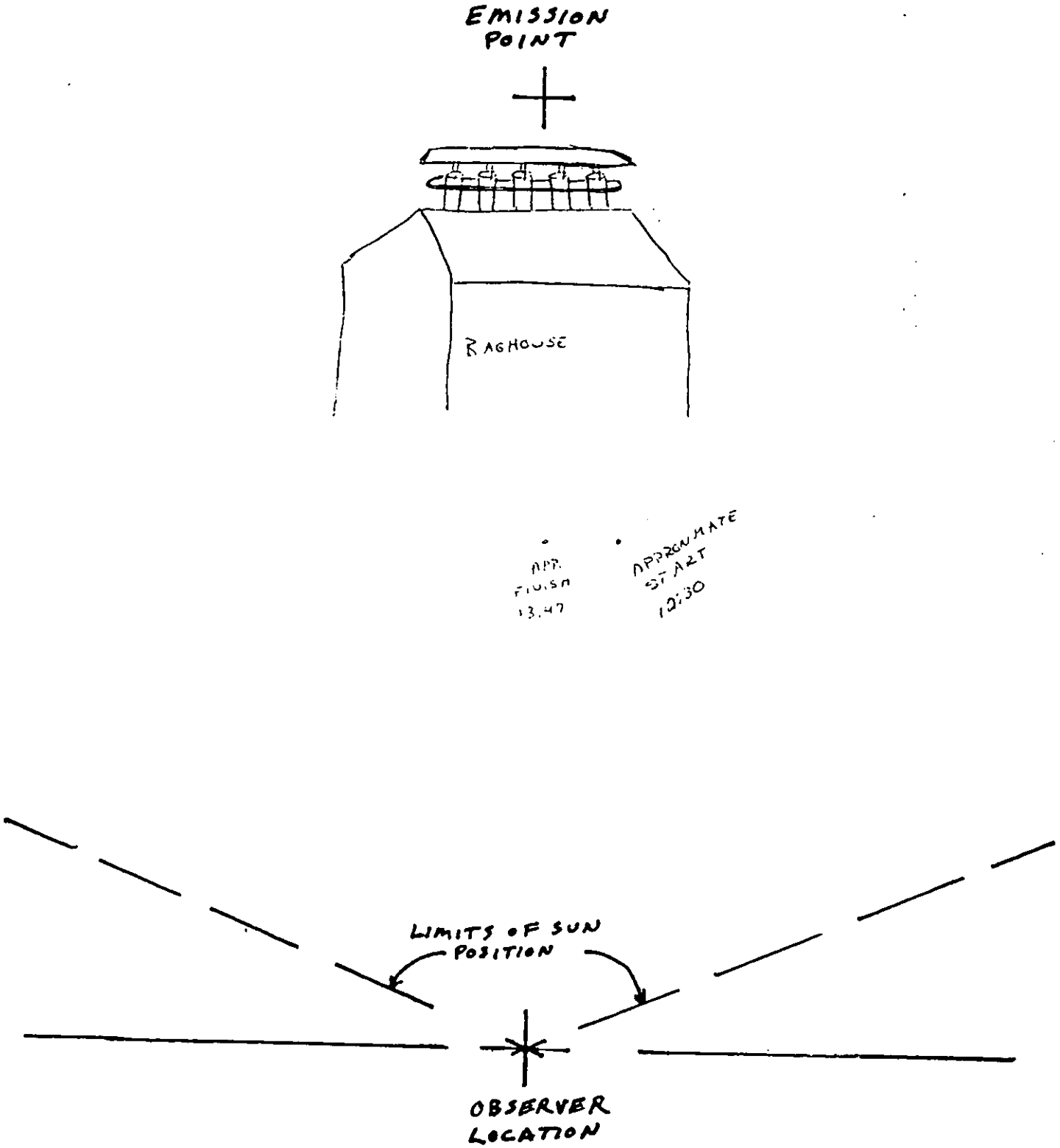
	Initial			Final
CLOCK TIME	12:30			13:47
OBSERVER LOCATION Distance to Discharge	200'			200'
Direction from Discharge	SE			SE
Height of Observation Point	10'			10'
BACKGROUND DESCRIPTION	SKY			SKY
WEATHER CONDITIONS Wind Direction	SW			SW
Wind Speed	0-5			0-5
Ambient Temperature	65			65
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	OVERCAST			OVERCAST
PLUME DESCRIPTION Color	N/A			N/A
Distance Visible	N/A			N/A
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	12:30-12:35	0	0
2	12:42-12:47	0	0
3	12:54-12:59	0	0
4	13:06-13:11	0	0
5	13:18-13:23	0	0
6	13:30-13:35	0	0
7	13:42-13:47	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.



ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

CBH-3

OBSERVATION RECORD - PAGE 2 OF 3

COMPANY CAR TECH

LOCATION READING PA

TEST NO. CBH-3

DATE 4/30/81

OBSERVER S.J. HOWISON

TYPE FACILITY EAF/AOD

POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
12	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
13	06	0	0	0	0			
	07	0	0	0	0			
	08	0	0	0	0			
	09	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			

OBSERVATION RECORD PAGE 3 OF 3

COMPANY CARTECH

LOCATION READING PA

TEST NO. CRH-3

DATE 4/30/81

OBSERVER S.J. HOWARSON

TYPE FACILITY EAF/AOD

POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
13	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			

RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 3

COMPANY CARTECH
LOCATION READING PA
TEST NO. CBH-3b
DATE 4/30/81
TYPE FACILITY EAF/AOD
CONTROL DEVICE BAGHOUSE

HOURS OF OBSERVATION 16:13-17:18
OBSERVER S.J. HOWISON
OBSERVER CERTIFICATION DATE 4/[illegible]/81
OBSERVER AFFILIATION PEDCO ENVIRONMENTAL
POINT OF EMISSIONS BAGHOUSE
HEIGHT OF DISCHARGE POINT ~75'

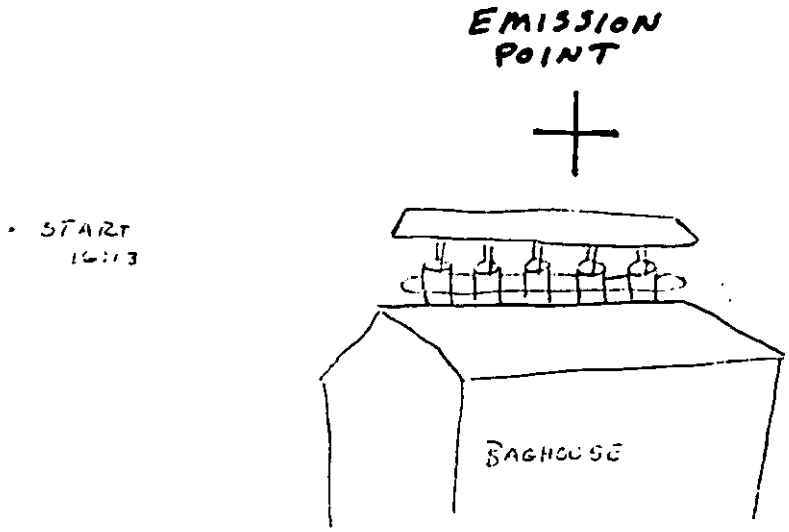
	Initial			Final
CLOCK TIME	16:13			17:18
OBSERVER LOCATION Distance to Discharge	200'			200'
Direction from Discharge	SE			SE
Height of Observation Point	10'			10'
BACKGROUND DESCRIPTION	SKY			SKY
WEATHER CONDITIONS Wind Direction	NE			NE
Wind Speed	0-5			0-5
Ambient Temperature	70			70
SKY CONDITIONS (clear, overcast, % clouds, etc.) Sun position - see reverse	PTLY CLDY			PTLY CLDY
PLUME DESCRIPTION Color	N/A			N/A
Distance Visible	N/A			N/A
OTHER INFORMATION				

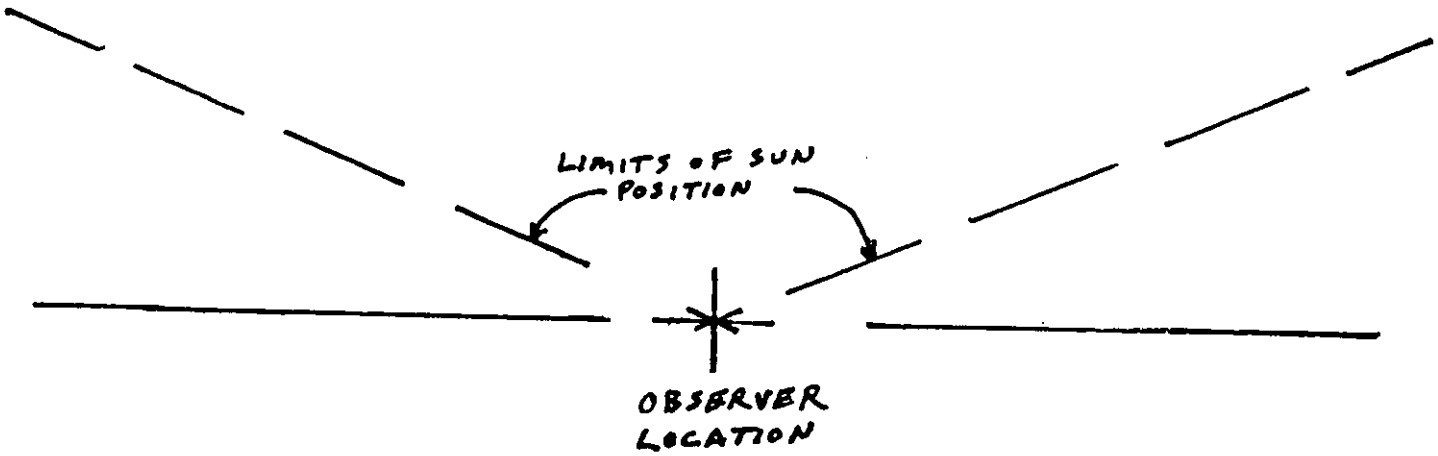
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	16:13-16:18	0	0
2	16:25-16:30	0	0
3	16:37-16:42	0	0
4	16:49-16:54	0	0
5	17:01-17:06	0	0
6	17:13-17:18	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.





ORIENT THE PAGE TOWARD THE EMISSION POINT. POSITION THE TIP OF A STANDARD SIZE PEN ON THE OBSERVER LOCATION. INDICATE THE DIRECTION AND LENGTH OF THE SHADOW CAST BY THE PEN WHEN IT IS IN A VERTICAL POSITION. THE SHADOW MUST BE WITHIN THE INDICATED LIMITS. WIND AND PLUME DIRECTION CAN ALSO BE SHOWN.

CBH-36

OBSERVATION RECORD PAGE 2 OF 3

COMPANY CAR TECH
LOCATION READING PA
TEST NO. CBH-3b
DATE 4/30/81

OBSERVER S.J. HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
16	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			
	30	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
17	01	0	0	0	0			
	02	0	0	0	0			
	03	0	0	0	0			
	04	0	0	0	0			
	05	0	0	0	0			
	06	0	0	0	0			

OBSERVATION RECORD PAGE 3 OF 3

COMPANY CARTECH
LOCATION READING PA
TEST NO. CBN-3b
DATE 4/30/81

OBSERVER S J HOWISON
TYPE FACILITY EAF/AOD
POINT OF EMISSIONS BAGHOUSE

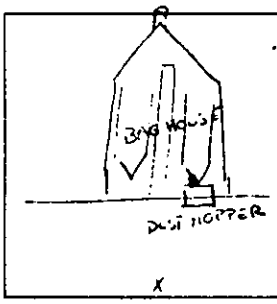
Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
17	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			

CF-1

FUGITIVE EMISSION INSPECTION

Company CAR TECH	Inspector S.J. HOWISON
Location READING PA	Affiliation PEDCO ENVIRONMENTAL
Company Rep.	Date 4/22/81
Sky Conditions PTLY CLDY TO OVERCAST	Wind Direction 0-5
Precipitation LIGHT AND INTERMITTENT	Wind Speed NE
Facility Type EAF/AOD	Emission Source BAGHOUSE DUST COLLECTION

Sketch emission source, indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

	Time	Accumulated Observation Period (Min:Sec)	Accumulated Emission Time (Min:Sec)
Begin Observation	10:20 - 10:40	20:00	0:00
	13:35 - 13:55	20:00	0:00
	17:30 - 17:50	20:00	0:00
		60:00	0:00
End Observation			

APPENDIX C

SAMPLE RECOVERY AND ANALYTICAL DATA

PARTICULATE

Site No. 1
Site No. 2

PARTICLE SIZE

Site No. 1 - Andersen Mark III
Site No. 2 - Andersen Mark III
Site No. 1 - High Capacity

BLANKS

DUST SAMPLES

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4/28/81

Sample location INLET Recovery date "

Run number CIP-1 Recovered by SJH etc

Filter number(s) 0002150 B4632

MOISTURE

Impingers			Silica gel		
Final volume (wt)	200	ml(g)	Final wt	436.4	g
Initial volume (wt)	200	(ml)(g)	Initial wt	400	g
Net volume (wt)	0	ml(g)	Net wt	36.4	g
Description of impinger water	Clear			20 % spent	

Total moisture 36.4 g

RECOVERED SAMPLE

Filter container number(s) 1234B Sealed ✓

Description of particulate on filter Very heavy, very dark brown cake

Probe rinse container no.	1234A	Liquid level marked	✓
Acetone blank container no.	1228A	Liquid level marked	✓
Impinger contents container no.	1235A	Liquid level marked	✓
Water blank container no.	1229A	Liquid level marked	✓

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81

Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant U.S. EPA - EMB Run No. CIP-1

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 1234A BU614

Acetone rinse volume (Vaw) 908 ml ✓

Acetone blank residue concentration (Ca) .0061 mg/g ✓

Wa = Ca Vaw ρa = (.0061) (908) (.7908) = 4.4 mg ✓

Date and time of wt 5-15-81 10:15am Gross wt 111138.0 mg ✓

Date and time of wt 5-15-81 6:30pm Gross wt 111138.4 mg ✓

Average gross wt 111138.2 mg ✓

Tare wt 111039.3 mg ✓

Less acetone blank wt (Wa) 4.4 mg ✓

Weight of particulate in acetone rinse 94.5 mg ✓

Filter(s) container no. BU632 #0002150

Date and time of wt 5-9-81 3:30pm Gross wt 936.3 mg ✓

Date and time of wt 5-11-81 9:45am Gross wt 936.3 mg ✓

Average gross wt 936.3 mg ✓

Tare wt 364.9 mg ✓

Weight of particulate on filter(s) 571.4 mg ✓

Weight of particulate in acetone rinse 94.5 mg ✓

Total weight of particulate 665.9 mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl Jones

Signature of reviewer John Bennett T.J.W.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CAR TECH Sample date 4/29/81
Sample location INLET Recovery date "
Run number CIP-2 Recovered by SJH etc
Filter number(s) 0002182 B4633

MOISTURE

Impingers			Silica gel		
Final volume (wt)	225	ml(g)	Final wt	434.7	g
Initial volume (wt)	200	(ml)(g)	Initial wt	400	g
Net volume (wt)	25	ml(g)	Net wt	34.7	g
Description of impinger water	Clear			30	% spent

Total moisture 59.7 g

RECOVERED SAMPLE

Filter container number(s) 1236 B Sealed —
Description of particulate on filter Very heavy very dark brown

Probe rinse container no. 1236A Liquid level marked ✓
~~Acetone~~ blank container no. 1228A Liquid level marked ✓
Impinger contents container no. 1237A Liquid level marked ✓
H_2O blank container no. 1229A Liquid level marked ✓
Samples stored and locked ✓
Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant U.S. EPA - EMB Run No. CIP-2

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 1236A BU 615

Acetone rinse volume (Vaw) 628 ml

Acetone blank residue concentration (Ca) .0061 mg/g

Wa = Ca Vaw ρa = (.0061)(628)(.7908) = 3.0 mg

Date and time of wt 5-15-81 10:15am Gross wt 103194.3 mg

Date and time of wt 5-15-81 6:30pm Gross wt 103194.5 mg

Average gross wt 103194.4 mg

Tare wt 103087.9 mg

Less acetone blank wt (Wa) 3.0 mg

Weight of particulate in acetone rinse 103.5 mg

Filter(s) container no. BU633 #0002182

Date and time of wt 5-9-81 3:30pm Gross wt 917.8 mg

Date and time of wt 5-11-81 9:45am Gross wt 917.4 mg

Average gross wt 917.6 mg

Tare wt 361.8 mg

Weight of particulate on filter(s) 555.8 mg

Weight of particulate in acetone rinse 103.5 mg

Total weight of particulate 659.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4/30/81
Sample location INLET Recovery date "
Run number CIP-3 Recovered by STH etc
Filter number(s) 0002087 B4634

MOISTURE

Impingers			Silica gel		
Final volume (wt)	200	ml(g)	Final wt	428.0	g
Initial volume (wt)	200	(ml)(g)	Initial wt	400	g
Net volume (wt)	0	ml(g)	Net wt	28.0	g
Description of impinger water	CLEAR			30	% spent

Total moisture 28.0 g

RECOVERED SAMPLE

Filter container number(s) 1240B Sealed ✓
Description of particulate on filter Very heavy very dark brown

Probe rinse container no. 1240A Liquid level marked ✓
ACETONE-blank container no. 1228A Liquid level marked ✓
Impinger contents container no. 1241A Liquid level marked ✓
WATER blank container no. 1229A Liquid level marked ✓
Samples stored and locked ✓
Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant U.S. EPA - EMB Run No. CIP-3

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 1240A BU 616

Acetone rinse volume (Vaw) 692 ml

Acetone blank residue concentration (Ca) .0061 mg/g

Wa = Ca Vaw ρa = (.0061)(692)(.7908) = 33 mg

Date and time of wt 5-15-81 10:15am Gross wt 107758.4 mg

Date and time of wt 5-15-81 6:30pm Gross wt 107758.2 mg

Average gross wt 107758.3 mg

Tare wt 107528.3 mg

Less acetone blank wt (Wa) 3.3 mg

Weight of particulate in acetone rinse 226.7 mg

Filter(s) container no. BU634 #0002087

Date and time of wt 5-9-81 3:30am Gross wt 1023.6 mg

Date and time of wt 5-11-81 9:45am Gross wt 1023.4 mg

Average gross wt 1023.5 mg

Tare wt 354.0 mg

Weight of particulate on filter(s) 669.5 mg

Weight of particulate in acetone rinse 226.7 mg

Total weight of particulate 896.2 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.W.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date ~~4/27/81~~ 4-28-81 5-18-81 [illegible]

Sample location OUTLET Recovery date "

Run number C2P-1 Recovered by SJH etc

Filter number(s) 000 ~~2457~~ 2089 ~~BU635~~ BU636 5-18-81 [illegible]

MOISTURE

Impingers			Silica gel		
Final volume (wt)	160	ml(g)	Final wt	266	g
Initial volume (wt)	200	ml(g)	Initial wt	200	g
Net volume (wt)	-40	ml(g)	Net wt	66.0	g
Description of impinger water	Clear			100	% spent

Total moisture 22.0 g

RECOVERED SAMPLE

Filter container number(s) 1232B Sealed ✓

Description of particulate on filter Very light gray

Probe rinse container no.	1232A	Liquid level marked	✓
Acetone blank container no.	1228A	Liquid level marked	✓
Impinger contents container no.	1233A	Liquid level marked	✓
Water blank container no.	1229A	Liquid level marked	✓

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81

Remarks

Analytical Organic Particulate Data

Plant U.S. EPA - EMB Run No. C2P-1

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
Impinger rinse	yes	yes
Filter (s)	yes	yes

FRONT HALF

Acetone wash of nozzle, probe, cyclone (bypass), flask, front half of filter holder. Container no. 1232A BU 618 Volume 253 ml ✓

Date and time of wt. 5-15-81 10:15am Gross wt. 106772.9 mg ✓

Date and time of wt. 5-15-81 6:30pm Gross wt. 106773.1 mg ✓

(.0061)✓(253)(.7908) = 1.2 ✓ Average gross wt. 106773.0 mg ✓

Tare wt. 106764.1 mg ✓

Less acetone blank wt. (Wa) 1.2 mg ✓

Weight of particulate in acetone rinse 7.7 mg ✓

Filter(s) container no. BU 636 # 000 2089

Date and time of wt. 5-9-81 3:30pm Gross wt. 353.8 mg ✓

Date and time of wt. 5-11-81 9:45am Gross wt. 353.8 mg ✓

Average gross wt. 353.8 mg ✓

Tare wt. 352.6 mg ✓

Weight of particulate on filter (s) 1.2 mg ✓

Weight of particulate in acetone rinse 7.7 mg ✓

Total weight of particulate 8.9 mg ✓

FRONT HALF SUBTOTAL 8.9 mg ✓

T.J.W.
JrB

BACK HALF ETHER-CHLOROFORM EXTRACTION

Impinger contents and water wash of impingers, connectors, and back half of filter holder. Container no. 1233A BU 627 C2P-1

Inorganic fraction container no. BU 627 "aq"

Date and time of wt. 5-13-81 10:30am Gross wt. 103415.1 mg

Date and time of wt. 5-13-81 6:30pm Gross wt. 103415.4 mg

(.0052) (500) (1.0) = 2.5

Average gross wt. 103415.2 mg

Volume - sample was diluted to 1000ml and 500ml used in extraction

Tare wt. 103410.6 mg

Less water blank wt. 2.6 mg

Total weight of inorganic phase 2.0x2 mg = 4.0

Organic fraction container no. BU 627 "org"

Date and time of wt. 5-12-81 2:30pm Gross wt. 66311.9 mg

Date and time of wt. 5-13-81 10:30am Gross wt. 66311.7 mg

(.004) (150) (1.098) = 0.7

Average gross wt. 66311.8 mg

Tare wt. 66311.1 mg

Less ether-chloroform blank wt. 0.7 mg

Total weight of organic phase 0.0 mg

BACK HALF SUBTOTAL 4.0 mg

TOTAL WEIGHT 12.9 mg

Signature of analyst Cheryl Jones

Signature of reviewer Jim Bennett T.J.N.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CAR TECH Sample date 4/29/81
Sample location OUTLET Recovery date "
Run number C2P-2 Recovered by SJN etc
Filter number(s) 0001998 BA637

MOISTURE

Impingers			Silica gel		
Final volume (wt)	198	ml(g)	Final wt	520.8	g
Initial volume (wt)	200	ml(g)	Initial wt	400	g
Net volume (wt)	-2	ml(g)	Net wt	120.8	g
Description of impinger water	Clear			100	% spent

Total moisture 118.8 g

RECOVERED SAMPLE

Filter container number(s) 1238B Sealed ✓
Description of particulate on filter Light gray

Probe rinse container no. 1238A Liquid level marked ✓
Acetone blank container no. 1228A Liquid level marked ✓
Impinger contents container no. 1239A Liquid level marked ✓
H_2O blank container no. 1229A Liquid level marked ✓
Samples stored and locked ✓
Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

Analytical Organic Particulate Data

Plant U.S. EPA - EMB Run No. C2P-2

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
Impinger rinse	yes	yes
Filter (s)	yes	yes

FRONT HALF

Acetone wash of nozzle, probe, cyclone (bypass), flask, front half of filter holder. Container no. 1238A BU 619 Volume 354ml ✓

Date and time of wt. 5-15-81 10:15am Gross wt. 102614.7 mg ✓

Date and time of wt. 5-15-81 6:30 pm Gross wt. 102614.7 mg ✓

(.0061) (354) (.7908) = 1.7 ✓ Average gross wt. 102614.7 mg ✓

Tare wt. 102608.8 mg ✓

Less acetone blank wt. (Wa) 1.7 mg ✓

Weight of particulate in acetone rinse 4.2 mg ✓

Filter(s) container no. BU 637 # 000 1998

Date and time of wt. 5-9-81 3:30 pm Gross wt. 366.0 mg ✓

Date and time of wt. 5-11-81 9:45am Gross wt. 365.8 mg ✓

Average gross wt. 365.9 mg ✓

Tare wt. 364.4 mg ✓

Weight of particulate on filter (s) 1.5 mg ✓

Weight of particulate in acetone rinse 4.2 mg ✓

Total weight of particulate 5.7 mg ✓

FRONT HALF SUBTOTAL 5.7 mg ✓

T.J.W.
7-98

BACK HALF ETHER-CHLOROFORM EXTRACTION

Impinger contents and water wash of impingers, connectors, and back half of filter holder. Container no. 1239A BU 628 C2P-2

Inorganic fraction container no. BU 628 "aq"

Date and time of wt. 5-13-81 10:30am Gross wt. 105379.3 mg

Date and time of wt. 5-13-81 6:30pm Gross wt. 105379.0 mg

(.0052)(500)(1.0) = 2.6

Average gross wt. 105379.2 mg

Volume - sample was diluted to 1000ml. 500ml used in extraction

Tare wt. 105375.1 mg

Less water blank wt. 2.6 mg

Total weight of inorganic phase 1.5 x 2 mg = 3.0

Organic fraction container no. BU 628 "org"

Date and time of wt. 5-12-81 2:30pm Gross wt. 66718.3 mg

Date and time of wt. 5-13-81 10:30am Gross wt. 66718.0 mg

(.004)(150)(1.098) = 0.7

Average gross wt. 66718.2 mg

Tare wt. 66717.1 mg

Less ether-chloroform blank wt. 0.7 mg

Total weight of organic phase 0.4 x 2 = 0.8 mg

BACK HALF SUBTOTAL 3.8 mg

TOTAL WEIGHT 9.5 mg

Signature of analyst Cheryl Jones

Signature of reviewer Ida Barnett T.J.N.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4/30/81
Sample location OUTLET Recovery date "
Run number C2P-3 Recovered by SJH etc
Filter number(s) C0001918 B21634

MOISTURE

Impingers			Silica gel		
Final volume (wt)	142	ml(g)	Final wt	507.5	g
Initial volume (wt)	200	ml(g)	Initial wt	400	g
Net volume (wt)	-58	ml(g)	Net wt	107.5	g
Description of impinger water	Clear			100	% spent

Total moisture 49.5 g

RECOVERED SAMPLE

Filter container number(s) 1242B Sealed ✓
Description of particulate on filter Light gray

Probe rinse container no. 1242A Liquid level marked ✓
Acetone blank container no. 1228A Liquid level marked ✓
Impinger contents container no. 1243A Liquid level marked ✓
H_2O blank container no. 1229A Liquid level marked ✓
Samples stored and locked ✓
Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

Analytical Organic Particulate Data

Plant U.S. EPA - EMB Run No. C2P-3

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
Impinger rinse	yes	yes
Filter (s)	yes	yes

FRONT HALF

Acetone wash of nozzle, probe, cyclone (bypass), flask, front half of filter holder. Container no. 1242A BU 620 Volume 344ml ✓

Date and time of wt. 5-15-81 10:15am Gross wt. 104309.5 mg ✓

Date and time of wt. 5-15-81 6:30 pm Gross wt. 104309.6 mg ✓

(.0061) (344) (.7908) = 1.7 ✓ Average gross wt. 104309.6 mg ✓

Tare wt. 104301.8 mg ✓

Less acetone blank wt. (Wa) 1.7 mg ✓

Weight of particulate in acetone rinse 6.1 mg ✓

Filter(s) container no. BU638 # 0001918

Date and time of wt. 5-9-81 3:30pm Gross wt. 369.5 mg ✓

Date and time of wt. 5-11-81 9:45am Gross wt. 369.5 mg ✓

Average gross wt. 369.5 mg ✓

Tare wt. 367.5 mg ✓

Weight of particulate on filter (s) 2.0 mg ✓

Weight of particulate in acetone rinse 6.1 mg ✓

Total weight of particulate 8.1 mg ✓

FRONT HALF SUBTOTAL 8.1 mg ✓

T.J.M. 2-23

BACK HALF ETHER-CHLOROFORM EXTRACTION

Impinger contents and water wash of impingers, connectors, and back half of filter holder. Container no. 1243A BU629 C2P-3

Inorganic fraction container no. BU 629 "aq"

Date and time of wt. 5-13-81 10:30am Gross wt. 103544.9 mg

Date and time of wt. 5-13-81 6:30pm Gross wt. 103545.3 mg

(.0052)(500)(1.0) = 2.6

Average gross wt. 103545.1 mg

Volume - sample diluted to 1000ml, 500ml used in extraction

Tare wt. 103539.7 mg

Less water blank wt. 2.6 mg

Total weight of inorganic phase 2.8x2 = mg 5.6

Organic fraction container no. BU 629 "org"

Date and time of wt. 5-12-81 2:30pm Gross wt. 65852.3 mg

Date and time of wt. 5-13-81 10:30 am Gross wt. 65852.1 mg

(.004)(150)(1.098) = 0.7

Average gross wt. 65852.2 mg

Tare wt. 65849.7 mg

Less ether-chloroform blank wt. 0.7 mg

Total weight of organic phase 1.8x2 = mg 3.6

BACK HALF SUBTOTAL 9.2 mg

TOTAL WEIGHT 17.3 mg

Signature of analyst Cheryl Jones

Signature of reviewer Edw. Burnell T.J.N.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Carpenter
Sample location Site #1 Inlet
Run number C1M-2

Sample date 4-28-81
Recovery date 4-28-81
Recovered by Phillips

RECOVERY SAMPLE

Cyclone particulate container number NA
Liquid level marked ✓

Cyclone and nozzle rinse container number 3833A
Liquid level marked ✓

Nozzle (or inlet chamber) rinse container number 3834A
Liquid level marked ✓

Acetone blank container number 3823 A
Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	W97	2290	✓	Low Loading
1	W98	2291	✓	Low " "
2	W99	2292	✓	Avg " "
3	W100	2293	✓	Heavy " "
4	W25	2294	✓	Very Heavy " "
5	X00	2295	✓	Very Heavy " "
6	X01	2296	✓	Very Heavy " "
7	W26	2297	✓	Very Heavy " "
Backup	B205	2298	✓	Very Heavy " "

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson
Date 5-4-81
Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. Cim-2

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)		

Acetone rinse container no. 3833A Lab no. BU 669

Acetone rinse volume (Vaw) 160 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (160) (.7908) = 0.9 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 70364.8 mg ✓

Date and time of wt 5-12-81 8:30am Gross wt 70364.8 mg ✓

Average gross wt 70364.8 mg ✓

Tare wt 70359.1 mg ✓

Less acetone blank wt (Wa) 0.9 mg ✓

Weight of particulate in acetone rinse 4.8 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0					
1					
2					
3					
4					
5					
6					
7					
Backup					

Weight of particulate in acetone rinse

Total

Signature of analyst Cheryl Jones

Signature of reviewer John Barnett T.J.N.

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIM-2

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3834A Lab no. BU 668

Acetone rinse volume (Vaw) 269 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (269) (.7908) = 1.6 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 66589.4 mg ✓

Date and time of wt 5-12-81 8:30 am Gross wt 66589.5 mg ✓

Average gross wt 66589.4 mg ✓

Tare wt 66586.0 mg ✓

Less acetone blank wt (Wa) 1.6 mg ✓

Weight of particulate in acetone rinse 1.8 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
		FROM PAGE 1 - CYCLONE PRECUTTER			4.8 ✓
0	W97	BU703	145.0 ✓	144.8 ✓	0.2 ✓
1	W98	BU704	134.8 ✓	134.3 ✓	0.5 ✓
2	W99	BU705	147.4 ✓	146.4 ✓	1.0 ✓
3	W100	BU706	140.5 ✓	138.6 ✓	1.9 ✓
4	W25	BU707	153.0 ✓	148.9 ✓	4.1 ✓
5	X00	BU708	153.1 ✓	140.5 ✓	12.6 ✓
6	X01	BU709	158.0 ✓	145.5 ✓	12.5 ✓
7	W26	BU710	152.1 ✓	139.2 ✓	12.9 ✓
Backup	B205	BU711	199.8 ✓	187.5 ✓	12.3 ✓

Weight of particulate in acetone rinse 1.8 ✓

Total 64.6 ✓

Signature of analyst Cheryl Jones

Signature of reviewer Ida Barnett T.J.N.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Carpenter Tech
Sample location Site #1 Inlet
Run number C1M-3

Sample date 4-29-81
Recovery date 4-29-81
Recovered by Phillips

RECOVERY SAMPLE

Cyclone particulate container number NA
Liquid level marked

Cyclone and nozzle rinse container number 3838 A
Liquid level marked ✓

Impactor Nozzle (or inlet chamber) rinse container number 3837 A
Liquid level marked ✓

Acetone blank container number 3823 A
Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	X-71	2319	✓	Very Light
1	[illegible]-46	2320	–	Very Light
2	Y-21	2321	✓	Light
3	Z-18	[illegible]	✓	Light
4	Y-05	2323	✓	Avg
5	Y-[illegible]	2324	✓	Avg
6	Y-15	2325	✓	Avg
7	Y-[illegible]	2326	✓	Avg
Backup	B-207	2327	✓	Avg

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson
Date 5-4-81
Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIM-3

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)		

Acetone rinse container no. 3838A Lab no. BU 671

Acetone rinse volume (Vaw) 144 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (144) (.7908) = 0.8 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 66561.5 mg ✓

Date and time of wt 5-12-81 8:30am Gross wt 66561.0 mg ✓

Average gross wt 66561.2 mg ✓

Tare wt 66559.1 mg ✓

Less acetone blank wt (Wa) 0.8 mg ✓

Weight of particulate in acetone rinse 1.3 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0					
1					
2					
3					
4					
5					
6					
7					
Backup					

Weight of particulate in acetone rinse

Total

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.W.

ANDERSON IMPACTOR ANALYTICAL DATA

page 2 of 2

Plant U.S EPA - EMB Run No. CIM-3

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3837A Lab no. BU 670

Acetone rinse volume (Vaw) 216 ml

Acetone blank residue concentration (Ca) .0074 mg/g

Wa = Ca Vaw ρa = (.0074) (216) (.7908) = 1.3 mg

Date and time of wt 5-11-81 1:30 pm Gross wt 66429.5 mg

Date and time of wt 5-12-81 8:30 pm Gross wt 66429.2 mg

Average gross wt 66429.4 mg

Tare wt 66427.3 mg

Less acetone blank wt (Wa) 1.3 mg

Weight of particulate in acetone rinse 0.8 mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
			FROM PAGE 1-	CYCLONE PRECUTTER	1.3
0	X71	BU 712	134.6	134.8	(-0.2)*
1	Z46	BU 713	126.8	127.0	(-0.2)*
2	Y21	BU 714	135.9	135.8	0.1
3	Z18	BU 715	127.4	127.6	(-0.2)*
4	Y05	BU 716	136.7	136.1	0.6
5	Y62	BU 717	129.8	127.9	1.9
6	Y15	BU 718	136.2	134.6	1.6
7	Y64	BU 719	129.0	127.8	1.2
Backup	B207	BU 720	185.6	184.9	0.7

Weight of particulate in acetone rinse 0.8

Total 8.2

Signature of analyst Cheryl Jones *NOT INCLUDED IN TOTAL

Signature of reviewer Ida Bennett T.J.N.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Carpenter Tech. Sample date 4-30-81
Sample location Site #1 Inlet Recovery date 4-30-81
Run number CIM-6 Recovered by Phillips

RECOVERY SAMPLE

Cyclone particulate container number NA Liquid level marked

Cyclone and nozzle rinse container number 3852 A Liquid level marked ✓

Nozzle (or inlet chamber) rinse container number 3853 A Liquid level marked

Acetone blank container number 3823 A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	W-19	2400	✓	Light
1	W-72	2401	✓	Light
2	W-09	2402	✓	Light
3	W-18	2403	✓	Avg
4	W-71	2404	✓	Avg
5	W-92	2405	✓	Avg
6	W-17	2406	✓	heavy
7	W-76	2407	✓	heavy
Backup	B-190	2399	✓	heavy

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

page 1 of 2

Plant U.S EPA Run No. CIM-6

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)		

Acetone rinse container no. 3852A Lab no. BU 677

Acetone rinse volume (Vaw) 173 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (173) (.7908) = 1.0 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 70965.5 mg ✓

Date and time of wt 5-12-81 8:30 am Gross wt 70965.2 mg ✓

Average gross wt 70965.4 mg ✓

Tare wt 70963.2 mg ✓

Less acetone blank wt (Wa) 1.0 mg ✓

Weight of particulate in acetone rinse 1.2 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0					
1					
2					
3					
4					
5					
6					
7					
Backup					

Weight of particulate in acetone rinse

Total

Signature of analyst Cheryl Jones

Signature of reviewer Ida Jennett T.J.N.

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIM-6

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3853A Lab no. BU 676

Acetone rinse volume (Vaw) 199 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (199) (.7908) = 1.2 mg ✓

Date and time of wt 5-11-81 1:30 pm Gross wt 76434.7 mg ✓

Date and time of wt 5-12-81 8:30 am Gross wt 76435.0 mg ✓

Average gross wt 76434.8 mg ✓

Tare wt 76432.3 mg ✓

Less acetone blank wt (Wa) 1.2 mg ✓

Weight of particulate in acetone rinse 1.3 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
		FROM PAGE 1 - CYCLONE PRECUTTER			1.2 ✓
0	W19	BU 739	148.6 ✓	148.4 ✓	0.2 ✓
1	W72	BU 740	134.1 ✓	133.8 ✓	0.3 ✓
2	W09	BU 741	149.6 ✓	149.4 ✓	0.2 ✓
3	W18	BU 742	138.4 ✓	138.1 ✓	0.3 ✓
4	W71	BU 743	149.2 ✓	147.8 ✓	1.4 ✓
5	W92	BU 744	138.0 ✓	133.4 ✓	4.6 ✓
6	W17	BU 745	151.8 ✓	148.6 ✓	3.2 ✓
7	W76	BU 746	135.8 ✓	133.9 ✓	1.9 ✓
Backup	B-190	BU 747	185.0 ✓	184.2 ✓	0.8 ✓ *

Weight of particulate in acetone rinse 1.3 ✓

Total 15.4 ✓

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

* WEIGHT VERIFIED WITHIN ± 0.2 mg of 2nd GROSS @ 185.2 mg on 5-16-81 TJW & JP. ALSO CHECKED 1st & 2nd WEIGHINGS of TARES AND GROSS; ALL ≤ 0.2 mg DIFFERENCES. ALSO VERIFIED AGAINST BU 720 + BU 729.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4-28-81
Sample location SITE #2 Recovery date 4-29-81
Run number C2M-2 Recovered by M.P. / D.F.

RECOVERY SAMPLE

Cyclone particulate container number NA Liquid level marked

Cyclone and nozzle rinse container number NA Liquid level marked

Nozzle ~~(or inlet chamber)~~ rinse container number 3836A Liquid level marked ✓

Acetone blank container number 3823A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	X-47	2310	✓	Very Light
1	X-50	2311	✓	Very Light
2	X-45	2312	✓	Light
3	X-04	2313	✓	Avg
4	X-25	2314	✓	Avg
5	X-02	2315	✓	Avg
6	W-61	2316	✓	Light
7	W-40	2317	✓	Very Light
Backup	~~3449~~ B435	2318	✓	Very Light

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C2m-2

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3836A Lab no. BU680

Acetone rinse volume (Vaw) 128 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (128) (.7908) = 0.7 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 69359.0 mg ✓

Date and time of wt 5-12-81 8:30am Gross wt 69358.7 mg ✓

Average gross wt 69358.8 mg ✓

Tare wt 69356.8 mg ✓

Less acetone blank wt (Wa) 0.7 mg ✓

Weight of particulate in acetone rinse 1.3 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	X47	BU775	146.5 ✓	146.2 ✓	0.3 ✓
1	X50	BU776	134.7 ✓	134.1 ✓	0.6 ✓
2	X45	BU777	145.6 ✓	145.1 ✓	0.5 ✓
3	X04	BU778	139.7 ✓	139.2 ✓	0.5 ✓
4	X25	BU779	149.8 ✓	149.4 ✓	0.4 ✓
5	X02	BU780	139.3 ✓	139.2 ✓	0.1 ✓
6	W61	BU781	147.1 ✓	147.0 ✓	0.1 ✓
7	W40	BU782	136.8 ✓	136.8 ✓	0.0 ✓
Backup	B-435	BU783	204.0 ✓	203.6 ✓	0.4 ✓

Weight of particulate in acetone rinse 1.3 ✓

Total 4.2 ✓

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH
Sample date 4-29-81
Sample location SITE 2 - OUTLET
Recovery date 4-29-81
Run number C2M-3
Recovered by DAN FITZGERALD

RECOVERY SAMPLE

Cyclone particulate container number NA
Liquid level marked

Cyclone and nozzle rinse container number NA
Liquid level marked

Nozzle ~~(or inlet chamber)~~ rinse container number 3845A
Liquid level marked ✓

Acetone blank container number
Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	W-67	2360	✓	No loading
1	W-68	2361	✓	Very light
2	W-43	2362	✓	" "
3	X-44	2363	✓	OK
4	W-65	2364	✓	OK
5	W-54	2365	✓	OK
6	X-43 ~~W-69~~	2366	✓	Very light
7	W-44	2367	✓	" "
Backup	B-209	2368	✓	No loading

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson
Date 5-4-81
Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C2M-3

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3845A Lab no. Bu681

Acetone rinse volume (Vaw) 53 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (53) (.7908) = 0.3 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 71195.9 mg ✓

Date and time of wt 5-12-81 8:30 am Gross wt 71196.1 mg ✓

Average gross wt 71196.0 mg ✓

Tare wt 71194.8 mg ✓

Less acetone blank wt (Wa) 0.3 mg ✓

Weight of particulate in acetone rinse 0.9 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	W67	Bu784	147.0 ✓	147.2 ✓	(-0.2)* ✓
1	W68	Bu785	135.2 ✓	134.9 ✓	0.3 ✓
2	W43	Bu786	149.7 ✓	149.5 ✓	0.2 ✓
3	X44	Bu787	134.8 ✓	134.5 ✓	0.3 ✓
4	W65	Bu788	147.2 ✓	147.0 ✓	0.2 ✓
5	W54	Bu789	135.9 ✓	135.8 ✓	0.1 ✓
6	X43	Bu790	149.6 ✓	149.9 ✓	(-0.3)* ✓
7	W44	Bu791	138.0 ✓	137.7 ✓	0.3 ✓
Backup	B-209	Bu792	186.6 ✓	186.4 ✓	0.2 ✓

Weight of particulate in acetone rinse 0.9 ✓

Total 2.5 ✓

Signature of analyst Cheryl Jones * NOT INCLUDED IN TOTAL

Signature of reviewer Ida Bennett T.J.N.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH

Sample date 4-30-81

Sample location SIDE 2-OUTLET

Recovery date 4-30-81

Run number C2M-5

Recovered by DAN FITZGERALD

RECOVERY SAMPLE

Cyclone particulate container number NA

Liquid level marked

Cyclone and nozzle rinse container number NA

Liquid level marked

Nozzle (or inlet chamber) rinse container number 3855A

Liquid level marked ✓

Acetone blank container number 3823 A

Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	Z-31	2356	✓	No loading
1	Y-34	2344	✓	Very light
2	X-81	2343	✓	" "
3	Y-38	2342	✓	No loading
4	X-61	2341	✓	Very light
5	Y-92	2340	✓	light
6	X-99	2339	✓	Light
7	Y-68	2338	✓	Very light
Backup	B-211	2337	✓	No loading

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Newton

Date 5-4-81

Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C2m-5

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3855a Lab no. BU 683

Acetone rinse volume (Vaw) 49 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074) (49) (.7908) = 0.3 mg ✓

Date and time of wt 5-11-81 1:30pm Gross wt 68540.6 mg ✓

Date and time of wt 5-12-81 8:30 am Gross wt 68540.8 mg ✓

Average gross wt 68540.7 mg ✓

Tare wt 68538.9 mg ✓

Less acetone blank wt (Wa) 0.3 mg ✓

Weight of particulate in acetone rinse 1.5 mg ✓

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	Z31	BU802	136.0 ✓	136.0 ✓	0.0 ✓
1	Y34	BU803	126.4 ✓	126.2 ✓	0.2 ✓
2	X81	BU804	136.2 ✓	135.8 ✓	0.4 ✓
3	Y38	BU805	126.9 ✓	126.9 ✓	0.0 ✓
4	X61	BU806	136.0 ✓	135.8 ✓	0.2 ✓
5	Y92	BU807	128.6 ✓	128.6 ✓	0.0 ✓
6	X99	BU808	136.0 ✓	135.8 ✓	0.2 ✓
7	Y68	BU809	127.7 ✓	127.8 ✓	(-0.1)* ✓
Backup	B-211	BU810	184.4 ✓	184.2 ✓	0.2 ✓

Weight of particulate in acetone rinse 1.5 ✓

Total 2.7 ✓

Signature of analyst Cheryl Jones *NOT INCLUDED IN TOTAL

Signature of reviewer Ida Bennett T.J.R.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH

Sample date 4-28-81

Sample location SITE 1-INLET

Recovery date 4-28-81

Run number C1H-1

Recovered by VP

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
0-Cyclone precutter	NA	OK ✓	3827A	✓
1	NA	VERY LIGHT ✓	3828A	✓
2	NA	LIGHT	3829A	✓
3-Cyclone	NA		3830A	HEAVY ✓
4-Backup	1	3831B	3831A	LIGHT ✓

Samples stored and locked ✓

Remarks FILTER LOADING OK

Blank is 3823A

LABORATORY CUSTODY

Received by James Watson

Date 5-4-81

Remarks

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA Run No. CIH-1

Sample location Lab # BU640

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3827A Stage 0

Acetone rinse volume (Vaw) 39 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(39)(.7908) = 0.2 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 99424.6 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 99424.3 mg ✓

Average gross wt 99424.4 mg ✓

Tare wt 99298.4 mg ✓

Less acetone blank wt (Wa) 0.2 mg ✓

Weight of particulate in acetone rinse 125.8 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-1

Sample location Lab # BU 641

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3828A Stage 1

Acetone rinse volume (Vaw) 79 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(79)(.7908) = 0.5 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 105347.4 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 105347.5 mg ✓

Average gross wt 105347.4 mg ✓

Tare wt 105339.7 mg ✓

Less acetone blank wt (Wa) 0.5 mg ✓

Weight of particulate in acetone rinse 7.2 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-1

Sample location Lab# BU642

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3829A Stage 2

Acetone rinse volume (Vaw) 76 ml

Acetone blank residue concentration (Ca) .0074 mg/g

Wa = Ca Vaw ρa = (.0074)(76)(.7908) = 0.4 mg

Date and time of wt 5-13-81 10:30a Gross wt 99087.6 mg

Date and time of wt 5-13-81 4:45pm Gross wt 99087.6 mg

Average gross wt 99087.6 mg

Tare wt 99078.3 mg

Less acetone blank wt (Wa) 0.4 mg

Weight of particulate in acetone rinse 8.9 mg

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett I.J.B.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-1

Sample location Lab# BU643

Relative humidity 50%

Density of acetone (pa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3830A Stage 3

Acetone rinse volume (Vaw) 156 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw pa = (.0074)(156)(.7908) = 0.9 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 108767.9 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 108768.0 mg ✓

Average gross wt 108768.0 mg ✓

Tare wt 108607.4 mg ✓

Less acetone blank wt (Wa) 0.9 mg ✓

Weight of particulate in acetone rinse 159.7 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-1

Sample location Lab# BU644

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 3831A Stage 4

Acetone rinse volume (Vaw) 67 ml

Acetone blank residue concentration (Ca) .0074 mg/g

Wa = Ca Vaw ρa = (.0074)(.67)(.7908) = 0.4 mg

Date and time of wt 5-13-81 10:30am Gross wt 91676.2 mg

Date and time of wt 5-13-81 4:45pm Gross wt 91675.9 mg

Average gross wt 91676.0 mg

Tare wt 91671.6 mg

Less acetone blank wt (Wa) 0.4 mg

Weight of particulate in acetone rinse 4.0 mg

Thimble container no. BU645 #1

Date and time of wt 5-9-81 3:30pm Gross wt 2639.8 mg

Date and time of wt 5-11-81 9:45am Gross wt 2639.9 mg

Average gross wt 2639.8 mg

Tare wt 2200.4 mg

Weight of particulate in Thimble 439.4 mg

Weight of particulate in acetone rinse 4.0 mg

Total weight of particulate in stage 4 443.4 mg

Total stage 0 125.8 mg

Total stage 1 7.2 mg

Total stage 2 8.9 mg

Total stage 3 159.7 mg

Total stage 4 443.4 mg

Total particulate 745.0 mg

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH

Sample date 4-29-81

Sample location SITE 1-INLET

Recovery date 4-29-81

Run number CIH-2

Recovered by VP

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
0 - Cyclone precutter	NA		3840A	✓ HEAVY LOADING
1	NA		3841A	✓ LIGHT "
2	NA		3842A	✓ "
3 - Cyclone	NA		3843A	✓ HEAVY
4 - Backup	THIMBLE No. 2	(3844B)	3844A	✓ OK

Samples stored and locked ✓

Remarks

Blank is 3823A

LABORATORY CUSTODY

Received by James Watson

Date 5-4-81

Remarks

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA-EMB Run No. CIH-2

Sample location Lab# BU646

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3840A Stage 0

Acetone rinse volume (Vaw) 139 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(139)(.7908) = 0.8 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 96953.2 mg ✓

Date and time of wt 5-13-81 4:45p.m Gross wt 96953.7 mg ✓

Average gross wt 96953.4 mg ✓

Tare wt 96819.8 mg ✓

Less acetone blank wt (Wa) 0.8 mg ✓

Weight of particulate in acetone rinse 132.8 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.W.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA-EMB Run No. CIH-2

Sample location Lab # BU647

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3841A Stage 1

Acetone rinse volume (Vaw) 106 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(106)(.7908) = 0.6 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 107040.4 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 107040.8 mg ✓

Average gross wt 107040.6 mg ✓

Tare wt 107034.6 mg ✓

Less acetone blank wt (Wa) 0.6 mg ✓

Weight of particulate in acetone rinse 5.4 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. QIH-2

Sample location Lab# BU 648

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3842A Stage 2

Acetone rinse volume (Vaw) 128 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(128)(.7908) = 0.7 mg ✓

Date and time of wt 5-13-81 10:30pm Gross wt 107877.4 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 107877.4 mg ✓

Average gross wt 107877.4 mg ✓

Tare wt 107871.3 mg ✓

Less acetone blank wt (Wa) 0.7 mg ✓

Weight of particulate in acetone rinse 5.4 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett I.J.B.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C1H-2

Sample location Lab# BU649

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3843A Stage 3

Acetone rinse volume (Vaw) 314 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(3.4)(.7908) = 1.8 mg ✓

Date and time of wt 5-13-81 10:30 am Gross wt 93000.2 mg ✓

Date and time of wt 5-13-81 4:30 pm Gross wt 93000.5 mg ✓

Average gross wt 93000.4 mg ✓

Tare wt 92915.2 mg ✓

Less acetone blank wt (Wa) 1.8 mg ✓

Weight of particulate in acetone rinse 83.4 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-2

Sample location Lab # BU650

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 3844A Stage 4

Acetone rinse volume (Vaw) 176 ml

Acetone blank residue concentration (Ca) .0074 mg/g

Wa = Ca Vaw ρa = (.0074)(176)(.7908) = 1.0 mg

Date and time of wt 5-13-81 10:30am Gross wt 100487.3 mg

Date and time of wt 5-13-81 4:45pm Gross wt 100487.5 mg

Average gross wt 100487.4 mg

Tare wt 100483.1 mg

Less acetone blank wt (Wa) 1.0 mg

Weight of particulate in acetone rinse 3.3 mg

Thimble container no. BU651 #2

Date and time of wt 5-9-81 3:30pm Gross wt 2378.0 mg

Date and time of wt 5-11-81 9:45am Gross wt 2378.1 mg

Average gross wt 2378.0 mg

Tare wt 2012.8 mg

Weight of particulate in Thimble 365.2 mg

Weight of particulate in acetone rinse 3.3 mg

Total weight of particulate in stage 4 368.5 mg

Total stage 0 132.8 mg

Total stage 1 5.4 mg

Total stage 2 5.4 mg

Total stage 3 83.4 mg

Total stage 4 368.5 mg

Total particulate 595.5 mg

Signature of analyst Cheryl Jones

Signature of reviewer Ed Bennett T.J.N.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH

Sample date 4-30-81

Sample location SITE 1 - INLET

Recovery date 4-30-81

Run number C1H-3

Recovered by JP

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	NA		3858A	✓ HEAVY LOADING
1	NA		3859A	✓ LIGHT LOADING
2	NA		3860 A	✓ LIGHT LOADING
Cyclone	NA		3861 A	✓ HEAVY LOADING
Backup	THIMBLE No. 3	(3862 B)	3862A	✓ LOADING OK

Samples stored and locked ✓

Remarks

Blank is 3823A

LABORATORY CUSTODY

Received by James Watson

Date 5-4-81

Remarks

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C1H-3

Sample location Lab # BU 652

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3858A Stage 0

Acetone rinse volume (Vaw) 27 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(27)(.7908) = 0.2 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 107466.0 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 107465.9 mg ✓

Average gross wt 107466.0 mg ✓

Tare wt 107383.2 mg ✓

Less acetone blank wt (Wa) 0.2 mg ✓

Weight of particulate in acetone rinse 82.6 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C1H-3

Sample location Lab # BU 653

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3859A Stage 1

Acetone rinse volume (Vaw) 121 ml

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(121)(.7908) = 0.7 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 109946.0 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 109946.1 mg ✓

Average gross wt 109946.0 mg ✓

Tare wt 109940.0 mg ✓

Less acetone blank wt (Wa) 0.7 mg ✓

Weight of particulate in acetone rinse 5.3 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-3

Sample location Lab # BU654

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3860A Stage 2

Acetone rinse volume (Vaw) 153 ml ✓

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(153)(.7908) = 0.9 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 103523.4 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 103523.3 mg ✓

Average gross wt 103523.4 mg ✓

Tare wt 103513.1 mg ✓

Less acetone blank wt (Wa) 0.9 mg ✓

Weight of particulate in acetone rinse 9.4 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CIH-3

Sample location Lab# BU655

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate		

Acetone rinse container no. 3861A Stage 3

Acetone rinse volume (Vaw) 207 ml

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(207)(.7908) = 1.2 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 102241.2 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 102241.2 mg ✓

Average gross wt 102241.2 mg ✓

Tare wt 102038.0 mg ✓

Less acetone blank wt (Wa) 1.2 mg ✓

Weight of particulate in acetone rinse 202.0 mg ✓

Particulate container no. _____

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Stage _____

Weight of particulate _____ mg

Weight of particulate in acetone rinse _____ mg

Total weight of particulate stage _____ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.W.

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C1H-3

Sample location Lab# BU656

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 3862A Stage 4

Acetone rinse volume (Vaw) 129 ml

Acetone blank residue concentration (Ca) .0074 mg/g ✓

Wa = Ca Vaw ρa = (.0074)(129)(.7908) = 0.8 mg ✓

Date and time of wt 5-13-81 10:30am Gross wt 105463.6 mg ✓

Date and time of wt 5-13-81 4:45pm Gross wt 105463.8 mg ✓

Average gross wt 105463.7 mg ✓

Tare wt 105453.0 mg ✓

Less acetone blank wt (Wa) 0.8 mg ✓

Weight of particulate in acetone rinse 9.9 mg ✓

Thimble container no. BU657 #3

Date and time of wt 5-9-81 3:30pm Gross wt 2420.8 mg ✓

Date and time of wt 5-11-81 9:45am Gross wt 2420.9 mg ✓

Average gross wt 2420.8 mg ✓

Tare wt 2067.3 mg ✓

Weight of particulate in Thimble 353.5 mg ✓

Weight of particulate in acetone rinse 9.9 mg ✓

Total weight of particulate in stage 4 363.4 mg ✓

Total stage 0 82.6 mg ✓

Total stage 1 5.3 mg ✓

Total stage 2 9.4 mg ✓

Total stage 3 202.0 mg ✓

Total stage 4 363.4 mg ✓

Total particulate 662.7 mg ✓

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.R.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4-30-81
Sample location — Recovery date —
Run number CPBF Recovered by —
Filter number(s) 0002029 B4639

MOISTURE

Impingers		Silica gel	
Final volume (wt)	ml(g)	Final wt	g
Initial volume (wt)	ml(g)	Initial wt	g
Net volume (wt)	ml(g)	Net wt	g
Description of impinger water		% spent	

Total moisture NA g

RECOVERED SAMPLE

Filter container number(s) 3863 B Sealed ✓
Description of particulate on filter —

Probe rinse container no. NA Liquid level marked
_____ blank container no. NA Liquid level marked
Impinger contents container no. NA Liquid level marked
_____ blank container no. NA Liquid level marked
Samples stored and locked ✓
Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81
Remarks

BLANK ANALYTICAL DATA FORM

PARTICULATE ACETONE + FILTER BLANK

Plant U.S. EPA - EMB Lab # BU621

Sample location Container # 1228A

Relative humidity 50%

Liquid level marked and container sealed yes

Density of acetone (ρ_a) .7908 g/ml

Blank volume (V_a) 537 ml

Date and time of wt 5-15-81 10:15am Gross wt 105351.5 mg

Date and time of wt 5-15-81 6:30 pm Gross wt 105351.7 mg

Average gross wt 105351.6 mg

Tare wt 105349.0 mg

Weight of blank (m_a) 2.6 mg

$$C_a = \frac{m_a}{V_a \rho_a} \quad \frac{(2.6)}{(537)(.7908)} \quad .0061 \text{ mg/g}$$

Note: In no case should a blank residue greater than 0.01 mg/g) or 0.001% of the blank weight be subtracted from the sample weight.

Filters Lab # BU639 Filter number 0002029

Date and time of wt 5-9-81 3:30pm Gross wt 363.4 mg

Date and time of wt 5-11-81 9:45am Gross wt 363.4 mg

Average gross wt 363.4 mg

Tare wt 363.0 mg

Difference wt 0.4 mg

Note: Average difference must be less than ~~±8~~ ±0.5 mg or 2% of total sample weight whichever is greater.

Remarks

Signature of analyst Cheryl Jones

Signature of reviewer John Bennett T.J.W

BLANK ANALYTICAL DATA

Plant U.S. EPA

Sample location

Relative humidity 50%

Type of blank H_2O

Liquid level at mark and container sealed yes

Density of blank (ρa) 1.0 g/ml ✓

Blank volume (Va) 500 ml ✓

Date and time of wt. 5-13-81 10:30 am Gross wt. 110641.0 mg ✓

Date and time of wt. 5-13-81 6:30 pm Gross wt. 110640.8 mg ✓

Average gross wt. 110640.9 mg ✓

Tare wt. 110638.3 mg ✓

Weight of blank (ma) 2.6 mg ✓

$$Ca = \frac{ma}{Va\ \rho a} = \frac{(2.6)}{(500)(1.0)} = .0052 \text{ mg/g}$$ ✓

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of blank used be subtracted from the sample weight.

Remarks: CONTAINER 1229A

Signature of analyst Cheryl Jones

Signature of reviewer [illegible] T.J.N.

BLANK ANALYTICAL DATA

Plant U.S. EPA - EMB Lab # BU630 "org"

Sample location

Relative humidity 50%

Type of blank ether chloroform

Liquid level at mark and container sealed Yes

Density of blank (ρa) 1.098 g/ml ✓

Blank volume (Va) 150 ml ✓

Date and time of wt. 5-12-81 2:30pm Gross wt. 62555.9 mg ✓

Date and time of wt. 5-13-81 10:30am Gross wt. 62555.5 mg ✓

Average gross wt. 62555.7 mg ✓

Tare wt. 62555.0 mg ✓

Weight of blank (ma) 0.7 mg ✓

$$Ca = \frac{ma}{Va\ \rho a} = \frac{(0.7)}{(150)(1.098)} = .004 \text{ mg/g}$$ ✓

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of blank used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.W.

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET (Filter Blanks)

Plant CARTECH Sample date 4-29-81

Sample location – Recovery date —

Run number CMBF Recovered by JP

RECOVERY SAMPLE

Cyclone particulate container number NA Liquid level marked

Cyclone and nozzle rinse container number NA Liquid level marked

Nozzle (or inlet chamber) rinse container number NA Liquid level marked

Acetone blank container number NA Liquid level marked

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	W39	2246	✓	
1	W42	2357	✓	
2	X39	2358	✓	
3	W38	2359	✓	
4	W35	2309	✓	
5	W34	2299	✓	
6	W31	2289	✓	
7	W32	2279	✓	
Backup	B217	2259	✓	

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81

Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CMB-F

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse		
filter(s)	yes	yes

Acetone rinse container no. _____ Lab no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( ) ( ) ( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	W39	BU820	149.2 ✓	148.7 ✓	0.5 ✓
1	W42	BU821	136.4 ✓	136.7 ✓	(-0.3)* ✓
2	X39	BU822	149.6 ✓	149.2 ✓	0.4 ✓
3	W38	BU823	136.8 ✓	136.6 ✓	0.2 ✓
4	W35	BU824	147.3 ✓	147.2 ✓	0.1 ✓
5	W34	BU825	138.0 ✓	137.8 ✓	0.2 ✓
6	W31	BU826	148.8 ✓	147.6 ✓	1.2 ✓ a
7	W32	BU827	136.0 ✓	135.8 ✓	0.2 ✓
Backup	B-217	BU828	188.0 ✓	188.1 ✓	(-0.1)* ✓

Weight of particulate in acetone rinse —

Total 2.8

Signature of analyst Cheryl Jones *NOT INCLUDED IN TOTAL

Signature of reviewer Ida Bennett T.J.N.

a) DIFFERENCE BETWEEN 1ST + 2nd WEIGHINGS ≤ 0.2 mg FOR BOTH GROSS AND TARE. CHECKED 5-16-81 [illegible]

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET (FILTER BLANK RUN)

Plant CARTECH
Sample date 4-27-81
Sample location SITE 2 - OUTLET
Recovery date 4-27-81
Run number C2MB
Recovered by J PROHASKA

RECOVERY SAMPLE

Cyclone particulate container number NA
Liquid level marked

Cyclone and nozzle rinse container number NA
Liquid level marked

Nozzle (~~or inlet chamber~~) rinse container number NA
Liquid level marked

Acetone blank container number ~~3823A~~ NA
Liquid level marked ✓

Filters 47 mm FILTER 1000 633
PREFILTER B414

Stage	Filter number	Container number	Container sealed	Comments
0	W07	2260	✓	NO LOADING
1	W08	2261	✓	"
2	W05	2262	✓	"
3	W06	2263	✓	"
4	W03	2264	✓	"
5	W04	2265	✓	"
6	W01	2266	✓	"
7	W02	2267	✓	"
Backup	B407	2268	✓	"

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson
Date 5-4-81
Remarks

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. C2M-P

Sample location

Relative humidity 50%

Density of acetone (ρa) g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse		
filter(s)		

Acetone rinse container no. Lab no.

Acetone rinse volume (Vaw) ml

Acetone blank residue concentration (Ca) mg/g

Wa = Ca Vaw ρa = ( ) ( ) ( ) = mg

Date and time of wt Gross wt mg

Date and time of wt Gross wt mg

Average gross wt mg

Tare wt mg

Less acetone blank wt (Wa) mg

Weight of particulate in acetone rinse mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	W07	BU748	148.8 ✓	149.0 ✓	-0.2 ✓
1	W08	BU749	139.1 ✓	139.2 ✓	-0.1 ✓
2	W05	BU750	149.6 ✓	150.2 ✓	-0.6 ✓
3	W06	BU751	138.8 ✓	139.4 ✓	-0.6 ✓
4	W03	BU752	149.2 ✓	149.0 ✓	0.2 ✓
5	W04	BU753	138.8 ✓	138.6 ✓	0.2 ✓
6	W01	BU754	149.0 ✓	149.0 ✓	0.0 ✓
7	W02	BU755	137.8 ✓	138.0 ✓	-0.2 ✓
Backup	B407	BU756	198.8 ✓	198.3 ✓	0.5 ✓

Weight of particulate in acetone rinse

Total -0.8

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

BLANK ANALYTICAL DATA FORM Acetone Blank

Plant U.S EPA - EMB Lab# BU 663

Sample location Container # 3823A

Relative humidity 50%

Liquid level marked and container sealed yes

Density of acetone (ρ_a) .7908 g/ml

Blank volume (V_a) 221 ml

Date and time of wt 5-11-81 1:30 pm Gross wt 62142.9 mg

Date and time of wt 5-12-81 8:30 am Gross wt 62142.7 mg

Average gross wt 62142.8 mg

Tare wt 62141.5 mg

Weight of blank (m_a) 1.3 mg

$$C_a = \frac{m_a}{V_a \rho_a} \quad \frac{(1.3)}{(221)(.7908)} \quad .0074 \text{ mg/g}$$

Note: In no case should a blank residue greater than 0.01 mg/g) or 0.001% of the blank weight be subtracted from the sample weight.

Filters Filter number

Date and time of wt Gross wt mg

Date and time of wt Gross wt mg

Average gross wt mg

Tare wt mg

Difference wt mg

Note: Average difference must be less than ±5 mg or 2% of total sample weight whichever is greater.

Remarks

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4-29-81

Sample location — Recovery date —

Run number CHBF-1 Recovered by —

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	NA		NA	
1	NA		NA	
2	NA		NA	
Cyclone	NA		NA	
Backup	THIMBLE No. 4 (2247)		NA	

Samples stored and locked —

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81

Remarks

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CHBF-1

Sample location Lab # BU 658

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
Particulate	yes	yes

Acetone rinse container no. _____ Stage _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

~~Particulate~~ Thimble container no. BU 658 #4

Date and time of wt 5-9-81 3:30pm Gross wt 1880.6 mg

Date and time of wt 5-11-81 9:45am Gross wt 1880.6 mg

Average gross wt 1880.6 mg

Tare wt 1878.1 mg

Stage —

Weight of particulate 2.5 mg

Weight of particulate in acetone rinse — mg

Total weight of particulate stage 2.5 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.B.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4-29-81

Sample location – Recovery date –

Run number CHBF-2 Recovered by –

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	NA		NA	
1	NA		NA	
2	NA		NA	
Cyclone	NA		NA	
Backup	THIMBLE No. 5	(2248)	NA	

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Watson Date 5-4-81

Remarks

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CHBF-2

Sample location

Relative humidity 50%

Density of acetone (ρa) .7908 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
Particulate	yes	yes

Acetone rinse container no. _____ Stage _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Particulate container no. BU 659 #5

Date and time of wt 5-9-81 3:30pm Gross wt 2122.6 mg ✓

Date and time of wt 5-11-81 9:45am Gross wt 2122.6 mg ✓

Average gross wt 2122.6 mg ✓

Tare wt 2120.2 mg ✓

Stage —

Weight of particulate 2.4 mg ✓

Weight of particulate in acetone rinse — mg

Total weight of particulate stage 2.4 mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.N.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant CARTECH Sample date 4-29-81

Sample location — Recovery date —

Run number CHBF-3 Recovered by —

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	NA		NA	
1	NA		NA	
2	NA		NA	
Cyclone	NA		NA	
Backup	THIMBLE No 6	(2249)	NA	

Samples stored and locked ✓

Remarks

LABORATORY CUSTODY

Received by James Weston Date 5-4-81

Remarks

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. CMBF-3

Sample location

Relative humidity 50%

Density of acetone (ρa) .7905 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
Particulate		

Acetone rinse container no. _____ Stage _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ g

Date and time of wt _____ Gross wt _____ g

Average gross wt _____ g

Tare wt _____ g

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Particulate container no. BU660 #6

Date and time of wt 5-9-81 3:30pm Gross wt 2332.0 mg ✓

Date and time of wt 5-11-81 9:45am Gross wt 2332.1 mg ✓

Average gross wt 2332.0 mg ✓

Tare wt 2329.2 mg ✓

Stage —

Weight of particulate 2.8 mg ✓

Weight of particulate in acetone rinse — mg

Total weight of particulate stage 2.8 mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl Jones

Signature of reviewer Ida Bennett T.J.B.

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Thomas J. Wagner
PEDCo Enviromental, Inc.
11499 Chester Road
Cincinnati, OH 45246

Date: June 16, 1981

Analyst: J. Oldham

P. O. No.: PEI-81-4012-3530-2

Sample No.: BU610
CTE - PS-1 4-28-81

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-G525-515-04

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	<0.6	Terbium		Ruthenium		Vanadium	270
Thorium	<0.8	Gadolinium		Molybdenum	MC	Titanium	MC
Bismuth	70	Europium		Niobium	21	Scandium	≤0.1
Lead	MC	Samarium		Zirconium	3	Calcium	MC
Thallium	2	Neodymium	≤0.4	Yttrium	0.7	Potassium	MC
Mercury	NR	Praseodymium	0.2	Strontium	65	Chlorine	510
Gold		Cerium	2	Rubidium	16	Sulfur	>560
Platinum		Lanthanum	0.9	Bromine	8	Phosphorus	390
Iridium		Barium	430	Selenium	280	Silicon	MC
Osmium		Cesium	1	Arsenic	19	Aluminum	>90
Rhenium		Iodine	0.4	Germanium	9	Magnesium	MC
Tungsten	89	Tellurium	0.7	Gallium	75	Sodium	>230
Tantalum	≤0.3	Antimony	7	Zinc	MC	Fluorine	MC
Hafnium		Tin	16	Copper	MC	Oxygen	NR
Lutetium		Indium	STD	Nickel	MC	Nitrogen	NR
Ytterbium		Cadmium	27	Cobalt	MC	Carbon	NR
Thulium		Silver	84	Iron	MC	Boron	2
Erbium		Palladium		Manganese	>920	Beryllium	<0.1
Holmium		Rhodium		Chromium	MC	Lithium	3
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected <0.1ppm
MC — Major Component
INT — Interference

Approved:

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Thomas J. Wagner
PEDCo Enviromental, Inc.
11499 Chester Road
Cincinnati, OH 45246

Date: June 16, 1981

Analyst: J. Oldham

P. O. No.: PEI-81-4012-3530-2

Sample No.: BU611
CTE-PS-2 4-29-81

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-G525-515-04

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	<0.9	Terbium		Ruthenium		Vanadium	99
Thorium	2	Gadolinium		Molybdenum	MC	Titanium	680
Bismuth	45	Europium	0.3	Niobium	17	Scandium	< 0.1
Lead	MC	Samarium	1	Zirconium	4	Calcium	MC
Thallium	6	Neodymium	0.6	Yttrium	1	Potassium	MC
Mercury	NR	Praseodymium	0.9	Strontium	53	Chlorine	740
Gold		Cerium	6	Rubidium	51	Sulfur	>810
Platinum		Lanthanum	5	Bromine	11	Phosphorus	560
Iridium		Barium	140	Selenium	640	Silicon	MC
Osmium		Cesium	2	Arsenic	27	Aluminum	>130
Rhenium		Iodine	0.6	Germanium	13	Magnesium	MC
Tungsten	73	Tellurium	2	Gallium	110	Sodium	>330
Tantalum		Antimony	10	Zinc	MC	Fluorine	MC
Hafnium	≤0.8	Tin	26	Copper	MC	Oxygen	NR
Lutetium		Indium	STD	Nickel	MC	Nitrogen	NR
Ytterbium		Cadmium	10	Cobalt	MC	Carbon	NR
Thulium		Silver	140	Iron	MC	Boron	5
Erbium		Palladium		Manganese	MC	Beryllium	<0.1
Holmium		Rhodium		Chromium	MC	Lithium	8
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1ppm
MC — Major Component
INT — Interference

Approved:
C-67

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Thomas J. Wagner
PEDCo Enviromental, Inc.
11499 Chester Road
Cincinnati, OH 45246

Date: June 15, 1981

Analyst: J. Oldham

P. O. No.: PEI-81-4012-3530-2

Sample No.: BU612
CTE-PS-3 4-30-81

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-G525-515-04

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	<0.7	Terbium		Ruthenium		Vanadium	180
Thorium	<0.8	Gadolinium		Molybdenum	MC	Titanium	150
Bismuth	33	Europium	0.2	Niobium	12	Scandium	≤0.1
Lead	MC	Samarium	0.5	Zirconium	6	Calcium	MC
Thallium	5	Neodymium	0.5	Yttrium	0.7	Potassium	MC
Mercury	NR	Praseodymium	0.4	Strontium	31	Chlorine	540
Gold		Cerium	2	Rubidium	21	Sulfur	>600
Platinum		Lanthanum	2	Bromine	8	Phosphorus	170
Iridium		Barium	260	Selenium	290	Silicon	MC
Osmium		Cesium	1	Arsenic	20	Aluminum	>96
Rhenium		Iodine	0.5	Germanium	10	Magnesium	MC
Tungsten	85	Tellurium	0.7	Gallium	80	Sodium	>250
Tantalum		Antimony	8	Zinc	MC	Fluorine	MC
Hafnium		Tin	19	Copper	MC	Oxygen	NR
Lutetium		Indium	STD	Nickel	MC	Nitrogen	NR
Ytterbium		Cadmium	7	Cobalt	MC	Carbon	NR
Thulium		Silver	40	Iron	MC	Boron	2
Erbium		Palladium		Manganese	MC	Beryllium	<0.1
Holmium		Rhodium		Chromium	MC	Lithium	6
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1ppm
MC — Major Component
INT — Interference

Approved:

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Thomas J. Wagner
PEDCo Enviromental, Inc.
11499 Chester Road
Cincinnati, OH 45246

Date: June 16, 1981

Analyst: J. Oldham

P. O. No.: PEI-81-4012-3530-2

Sample No.: BU1001
NBS-SRM-1633

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-G525-515-04

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	13	Terbium	0.6	Ruthenium		Vanadium	110
Thorium	16	Gadolinium	2	Molybdenum	7	Titanium	MC
Bismuth	0.9	Europium	2	Niobium	19	Scandium	21
Lead	59	Samarium	12	Zirconium	95	Calcium	MC
Thallium	4	Neodymium	16	Yttrium	48	Potassium	MC
Mercury	NR	Praseodymium	8	Strontium	240	Chlorine	8
Gold		Cerium	85	Rubidium	56	Sulfur	>910
Platinum		Lanthanum	68	Bromine	3	Phosphorus	MC
Iridium		Barium	MC	Selenium	4	Silicon	MC
Osmium		Cesium	10	Arsenic	31	Aluminum	>150
Rhenium		Iodine	0.3	Germanium	8	Magnesium	MC
Tungsten	1	Tellurium		Gallium	48	Sodium	>370
Tantalum		Antimony	3	Zinc	96	Fluorine	≈23
Hafnium	2	Tin	3	Copper	49	Oxygen	NR
Lutetium	0.3	Indium	STD	Nickel	27	Nitrogen	NR
Ytterbium	2	Cadmium	0.5	Cobalt	11	Carbon	NR
Thulium	0.2	Silver	≤0.3	Iron	MC	Boron	14
Erbium	0.6	Palladium		Manganese	74	Beryllium	11
Holmium	0.8	Rhodium		Chromium	170	Lithium	>410
Dysprosium	1					Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1ppm
MC — Major Component
INT — Interference

Approved: M Speeds

C-69

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST 44TH AVENUE, GOLDEN, COLORADO 80401, PHONE: 303-278-9521

To: Mr. Thomas J. Wagner
PEDCo Enviromental, Inc.
11499 Chester Road
Cincinnati, OH 45246

Date: June 16, 1981

Analyst: J. Oldham

P. O. No.: PEI-81-4012-3530-2

Sample No.: NBS SRM1632 SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS IAD No.: 97-G525-515-04

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	1	Terbium		Ruthenium		Vanadium	17
Thorium	2	Gadolinium		Molybdenum	3	Titanium	MC
Bismuth		Europium	0.1	Niobium	5	Scandium	0.5
Lead	4	Samarium	2	Zirconium	23	Calcium	MC
Thallium		Neodymium	1	Yttrium	7	Potassium	MC
Mercury	NR	Praseodymium	1	Strontium	150	Chlorine	200
Gold		Cerium	13	Rubidium	31	Sulfur	>560
Platinum		Lanthanum	21	Bromine	3	Phosphorus	*620
Iridium		Barium	430	Selenium	2	Silicon	MC
Osmium		Cesium	1	Arsenic	5	Aluminum	>90
Rhenium		Iodine	2	Germanium	2	Magnesium	MC
Tungsten		Tellurium	0.2	Gallium	13	Sodium	>230
Tantalum		Antimony	0.2	Zinc	15	Fluorine	≈14
Hafnium		Tin	0.4	Copper	12	Oxygen	NR
Lutetium		Indium	STD	Nickel	9	Nitrogen	NR
Ytterbium		Cadmium	0.7	Cobalt	0.7	Carbon	NR
Thulium		Silver		Iron	MC	Boron	19
Erbium		Palladium		Manganese	46	Beryllium	2
Holmium		Rhodium		Chromium	10	Lithium	51
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1ppm
MC — Major Component
INT — Interference

* Heterogeneous

Approved:

4125-B

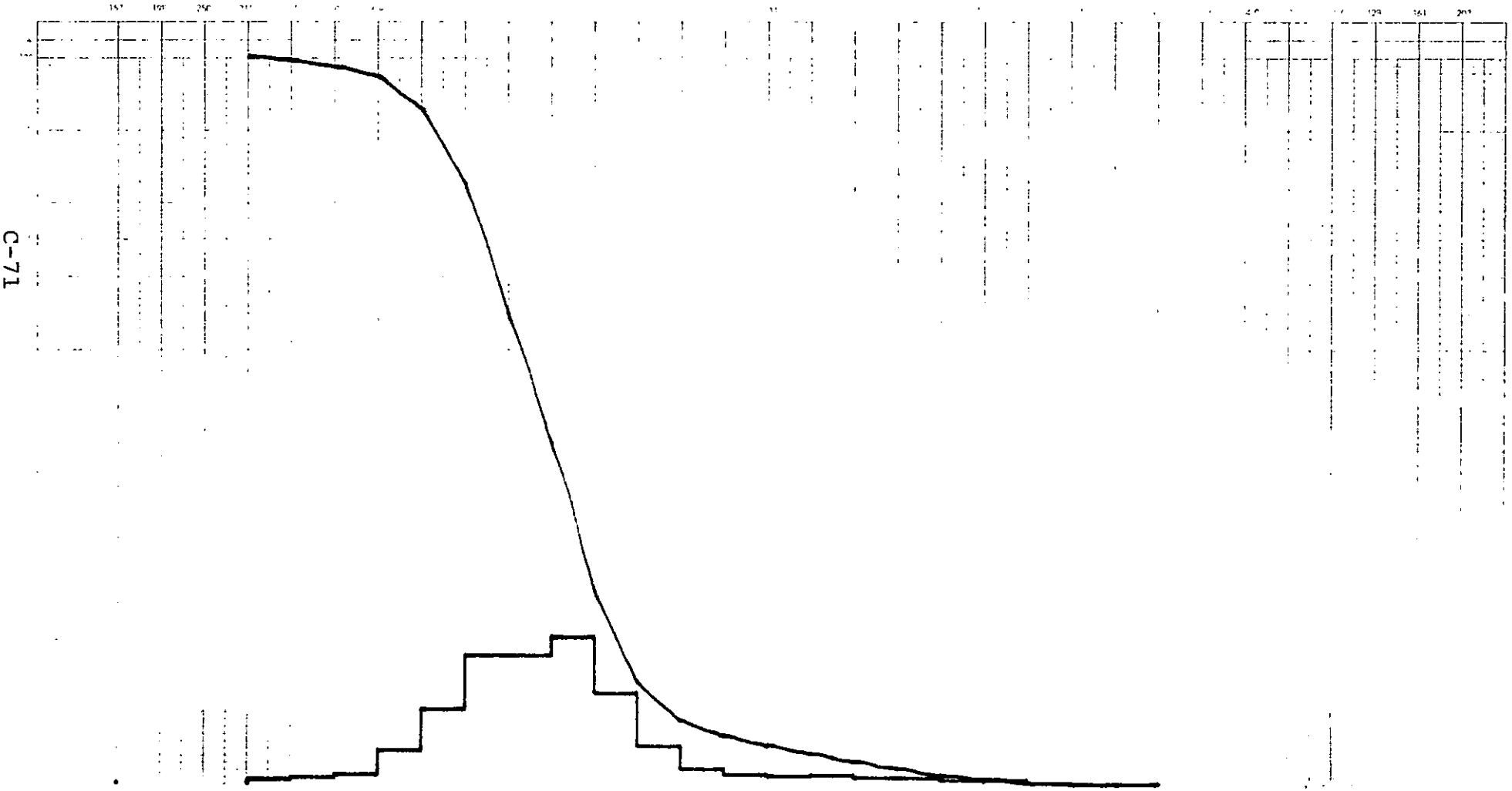
COULTER COUNTER Model T&TA

PARTICLE SIZE ANALYSIS

COULTER ELECTRONICS INC.
590 W 20 ST.
HIALEAH, FLA. 33010

ORGANIZATION PEDCO
OPERATOR KK
EQUIPMENT TAII

SAMPLE	ELECTROLYTE		APER SIZE			FOR MODEL TA PART DIA		± TA	A	SAMPLE SETTINGS DIA.		± TA	
BU 610	ISOTON, 4% NACL/H20	IA, 1 MIN ULTRA	70UM	8484	MICROSPHERES	506	8	840	173	504	8	840	144
			30UM	6102030	POLYSTYRENE								



4125-C-Vol

COULTER COUNTER Model T&TA

PARTICLE SIZE ANALYSIS

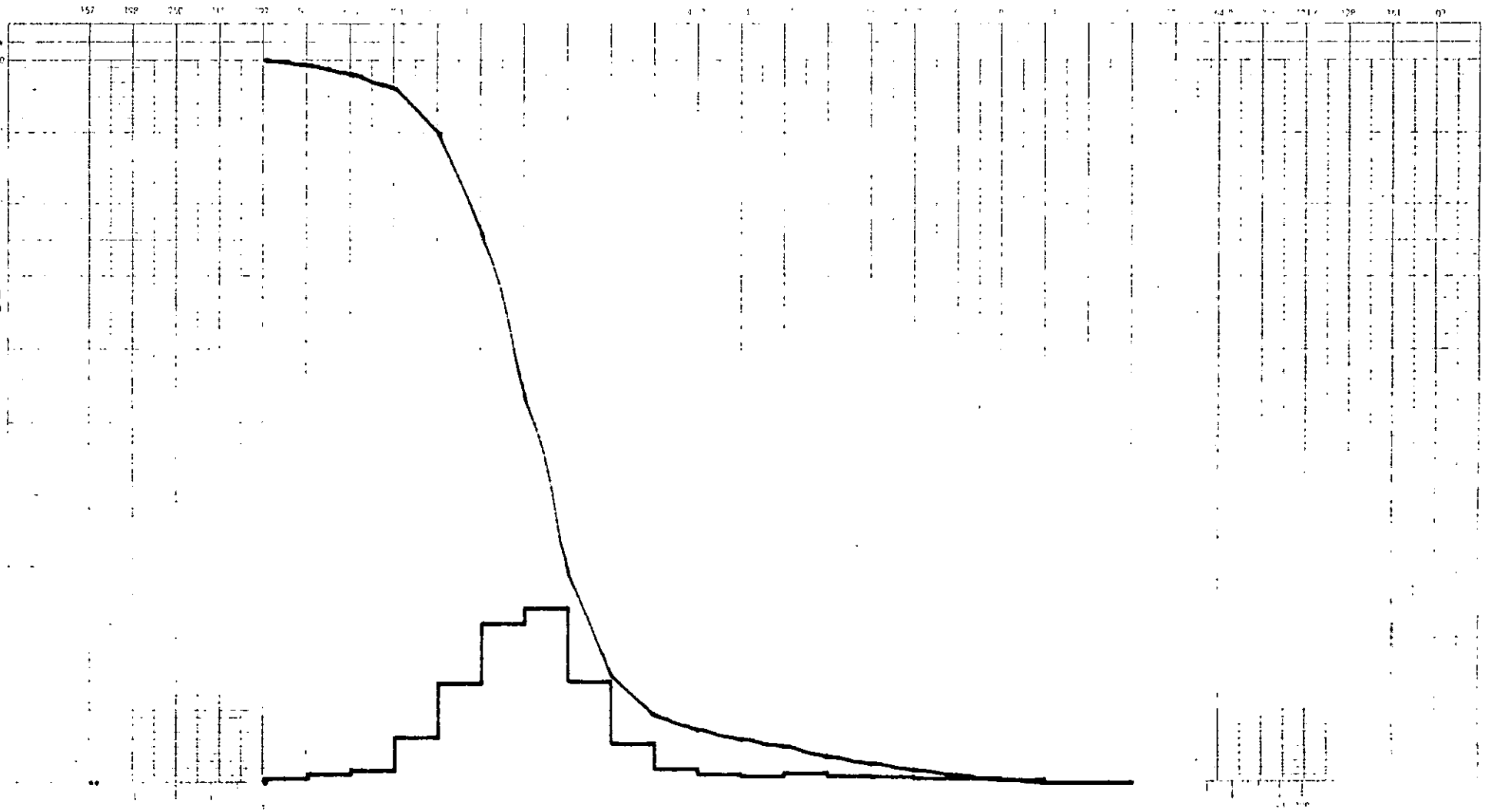
.15 - 200μ
X PERCENT

COULTER ELECTRONICS INC.
590 - 20 ST.
HIALEAH, FLA. 33010

ORGANIZATION PEDCO
OPERATOR KK
EQUIPMENT TAII

SAMPLE BU 611 ISOTON, 4% NACL/H20 IA, 1 MIN ULTRA.

APER. SIZE	SERIES		PART DIA.	W	± IA	A	SAMPLE SETTINGS DIA.	W	± IA	A
70UM	8484	MICROSPHERES	506	8	840	123	504	8	840	1244
19UM	58266	LATEX	202	9	1680	1572	200	9	1680	1619



4125-A-Vol

COULTER COUNTER Model T&TA

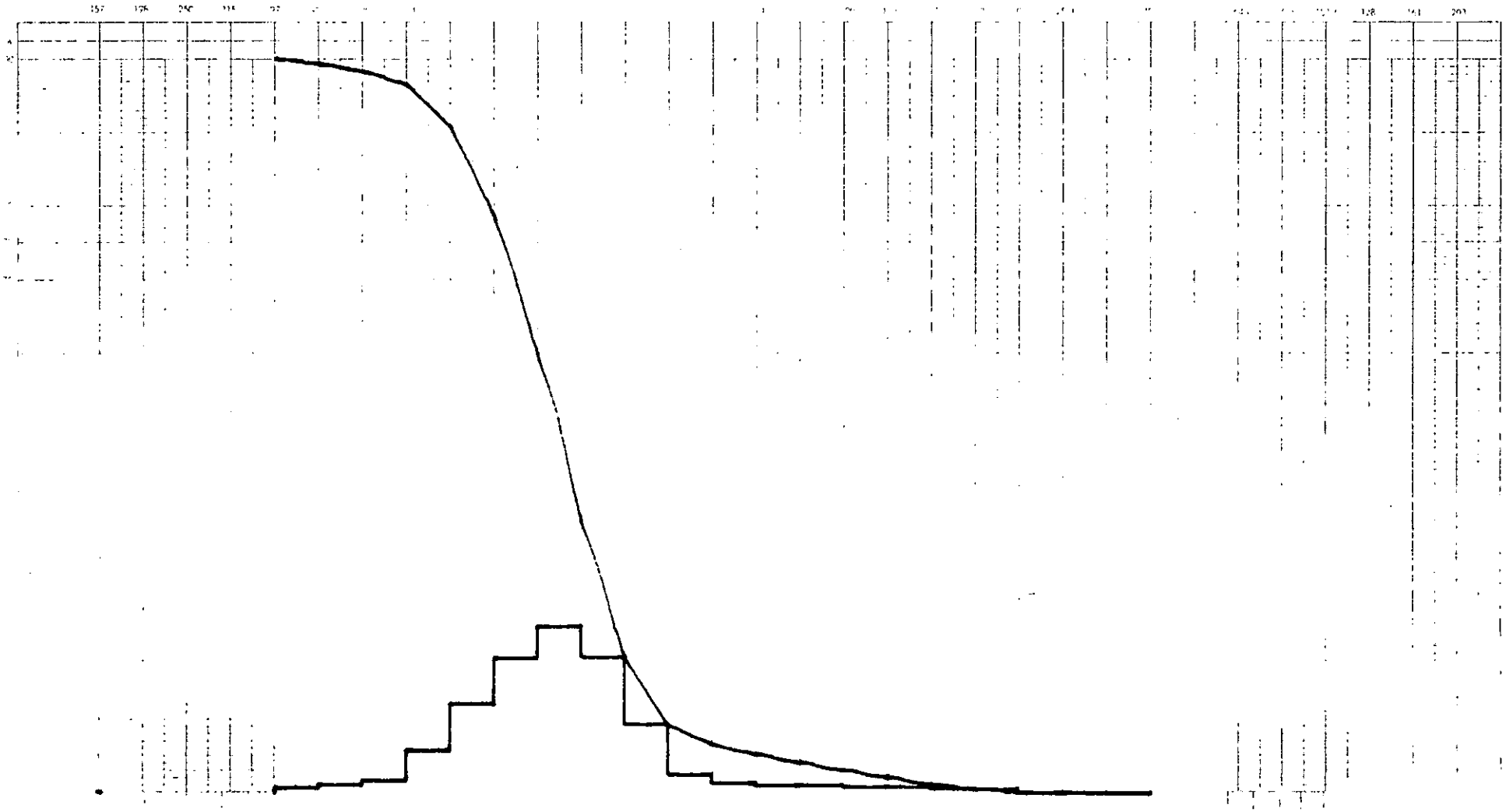
PARTICLE SIZE ANALYSIS

COULTER ELECTRONICS INC.
293 W 29 ST.
HIALEAH, FLA. 33010

ORGANIZATION PEDCO
OPERATOR KK
EQUIPMENT TAII

SAMPLE BU 612 ISOTON 4% NACL/H20 IA, 1 MIN ULTRA.

												SAMPLE SETTINGS					
												DIA.					
70UM	8485	MICROSPHERES	964	11	1680	151	1008	11	1521	840							
19UM	58266	LATEX	202	9	1680	1572	200	9	1680	1613							



CE #4125/B DATE: 5/29/81
ORGANIZATION: PEDCO
SAMPLE: BU 610
ELECTROLYTE: ISOTON 4%NACL/H2O
DISPERSANT: 1.A. 1 MIN ULTRASONICS
EQUIPMENT: T.A.11
OPERATOR: KK
APERTURES: 70.30

VOL. %

SIZE	CUM	DIF
.315	100.	.5
.397	99.5	.9
.5	98.6	1.3
.63	97.3	4.6
.794	92.7	10.3
1.	82.4	17.7
1.26	64.6	17.7
1.587	46.9	20.4
2.	26.5	12.5
2.52	14.	5.3
3.175	8.7	2.
4.	6.7	1.4
5.04	5.4	1.1
6.35	4.2	1.2
8.	3.	.9
10.079	2.1	.9
12.699	1.2	.5
16.	.7	.5
20.159	.2	.2
25.398	0.	0.
32.	0.	0.

VOL.GEO MEAN 1.604 STANDARD DEV. 1.831

MEDIAN 1.525 MODE 1.682

CE #4125/C DATE: 5/29/81
ORGANIZATION: PEDCO
SAMPLE: BU611
ELECTROLYTE: ISOTON 4%NACL/H2O
DISPERSANT: 1.A. 1 MIN ULTRASONICS
EQUIPMENT: T.A.11
OPERATOR: KK
APERTURES: 70 19

VOL. %

SIZE	CUM	DIF
.397	100.	.7
.5	99.3	1.3
.63	98.1	1.8
.794	96.2	6.4
1.	89.8	13.9
1.26	75.9	22.2
1.587	53.7	24.4
2.	29.3	14.2
2.52	15.1	5.6
3.175	9.5	2.
4.	7.5	1.4
5.04	6.1	1.
6.35	5.2	1.4
8.	3.7	1.
10.079	2.7	.9
12.699	1.8	.7
16.	1.1	.6
20.159	.5	.5
25.398	0.	0.
32.	0.	0.

VOL.GEO MEAN 1.762 STANDARD DEV. 1.806

MEDIAN 1.643 MODE 1.653

PLOT CUM. VOL.
DATA GROUP # 7

CE 84125/A DATE: 5/29/81
ORGANIZATION: PEDCO
SAMPLE: BU 612
ELECTROLYTE: ISOTON 4%NACL/H2O
DISPERSANT: 1.A. 1 MIN ULTRASONICS
EQUIPMENT: T.A.11
OPERATOR: KK
APERTURES: 70 19

P
VOL. %

SIZE	CUM	DIF
.397	100.	.7
.5	99.3	1.1
.63	98.2	1.8
.794	96.5	5.8
1.	90.7	12.2
1.26	78.5	18.5
1.587	60.	22.7
2.	37.3	18.6
2.52	18.6	9.4
3.175	9.2	2.6
4.	6.6	1.4
5.04	5.2	1.1
6.35	4.1	1.1
8.	3.	.9
10.079	2.1	.9
12.699	1.2	.6
16.	.6	.6
20.159	0.	0.
25.398	0.	0.
32.	0.	0.

VOL.GEO MEAN 1.828 STANDARD DEV. 1.742

MEDIAN 1.757 MODE 1.784

PEDCo ENVIRONMENTAL
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700

ANALYTICAL RESULTS

Client: USEPA

Sample received:
Results reported: 7/22/81
Attn:

Parameter	Units	Sample number				
		SOLID CTE-PS-1	SOLID CTE-PS-2			
PEDCo Sample Number	-	BU610	BU611			
Specific Gravity	-	3.79	3.83			

Comments: FABRIC FILTER DUST SAMPLES

Submitted by: Ray H Caldwell

CHESTER TOWERS

BRANCH OFFICES

Crown Center
Kansas City, Mo.

Professional Village
Chapel Hill, N.C.

PEDCo ENVIRONMENTAL, INC.
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700
TELEX (513) 782-4807

LABORATORY REPORT

FLUORIDE ANALYSES

Run No.	F^- in rinse (mg)	F^- on filter(s) (mg)	Total F^-
C2P-1	0.07	*	0.07
C2P-3	0.07	0.26	0.33

* Not analyzed

Run No.	Total F^-, mg/g
CTE-PS-1	14.2
CTE-PS-2	16.1

Samples corrected for blanks.

Reagent blank for rinses = <0.04 mg F^-/flask
Reagent blank for filters = 0.24 mg F^-/flask
Filter blank = 0.30 mg F^-

Submitted By: Ida Bennett

Date: 9-15-81

CHESTER TOWERS

BRANCH OFFICES

DALLAS, TEXAS
KANSAS CITY, MISSOURI
COLUMBUS, OHIO
DURHAM, NORTH CAROLINA

PEDCo ENVIRONMENTAL, INC.
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700
TELEX (513) 782-4807

PARTICULATE RUNS

Run No.	Total µg metal		
	Chromium	Lead	Nickel
C2P-P (Method 5 set)	52	<18	59
C2P-2 (Method 5 set)	63	<18	52

All blanks: Non-detectable

BULK SAMPLES

Run No.	mg/g metal		
	Chromium	Lead	Nickel
CTE-PS-1	42.2	2.20	21.6
CTE-PS-2	56.3	2.20	21.4

Date: September 9, 1981

Submitted By: Ray H Caldwell

Comments TOTAL PARTICULATE SAMPLE WEIGHTS WERE AS FOLLOWS: (IN mg) C2P-P = 12.9, C2P-2 = 5.7

BRANCH OFFICES

DALLAS, TEXAS
KANSAS CITY, MISSOURI
COLUMBUS, OHIO
DURHAM, NORTH CAROLINA

CHESTER TOWERS

APPENDIX D

MRI PROCESS SUMMARY

MIDWEST RESEARCH INSTITUTE
4505 Creedmoor Road
Raleigh, N.C. 27612
Telephone (919) 781-5750

FINAL

Date: May 18, 1981

Subject: Source Test--Carpenter Technology Corporation, Reading, Pa.
Electric Arc Furnaces in the Steel Industry
EPA Contract No. 68-02-3059; ESED Project No. 79/9
MRI Project No. 4663-L

From: William Terry, MRI

To: Reid Iversen, Lead Engineer
ESED/ISB/SSAS (MD-13)
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

I. Purpose

The purpose of this visit was to observe the operation of the No. 2 argon-oxygen decarburization (AOD) vessel and to monitor its associated environmental control equipment during the source test at the Carpenter Technology Corporation (CarTech) plant in Reading, Pennsylvania.

II. Place and Date

Carpenter Technology Corporation
101 Bern Street
Reading, Pennsylvania 19601
Telephone: (215) 371-2000
April 27-30, 1981

III. Attendees

A. Carpenter Technology Corporation (CarTech)

Larry H. Geiser, Air Quality Control Engineer
George Michael, Air Quality Control Technician

B. PEDCo Environmental, Inc. (PEDCo)

John Prohaska, Team Leader

C. Midwest Research Institute (MRI)

William Terry, MRI/Raleigh
Lalit Banker, MRI/Raleigh

Principal Laboratories 425 Volker Boulevard, Kansas City, Missouri 6411C

IV. Dicussion

A. Background

CarTech was selected for source testing because it operates an AOD associated with a separate control system. At other sites, typically the electric arc furnaces (EAF's) and AOD vessels are ducted to a common control system. Additionally, the control system exhausts the cleaned air through five stub stacks, which made it amenable for particulate matter sampling by EPA Method 5. This was an excellent source of obtaining very valuable uncontrolled and controlled emissions data from an AOD process. Particulate matter (PM) and particle size distribution (PSD) measurements were performed on the inlet and outlet of the control system (fabric filter) associated with the No. 2 AOD vessel. Velocity measurements were performed on the scavenger ducts, and visible emission (VE) readings were taken from the meltshop roof and the fabric filter outlet. Also, fugitive emission (FE) readings were made of the fabric filter dust handling system, and grab samples were taken of the fabric filter dust during the source test. The test was performed on April 27-30, 1981, and covered 15 full heats and parts of 6 additional heats.

CarTech operates a total of five EAF's and two AOD's at their Reading plant. The No. 2 AOD has a rated capacity of 18.1 megagrams (Mg) (20 tons) and typically refines a 15.4-Mg (17-ton) charge of molten metal. The Reading plant can make approximately 400 different grades of steel which are used in numerous industries such as electronics, automotive, appliance, aerospace, and industrial equipment.

During the test, the CarTech facility was operating at normal capacity, which is 3 shifts per day, 5 days per week.

B. Process

Each of the five EAF's has a rated capacity of 13.6 Mg (15 tons) and produces an average heat of 15.4 Mg (17 tons). The No. 1 AOD has a rated capacity of 15.4 Mg (17 tons), while the No. 2 AOD has a rated capacity of 18.1 Mg (20 tons). The No. 2 AOD vessel normally operates continuously with only a 5- to 10-minute delay between a tap and a subsequent charge of molten metal. The molten metal charge comes from one of the two EAF's which are designated as "C" and "E" by CarTech. No refractory gunning is performed on the AOD, which allows for the short period of time between tap and charge. Periodically, longer delays can occur if maintenance is performed on the AOD vessel or if charging the vessel is delayed because a crane is not available. A delay in tapping the vessel could occur if the continuous caster is still casting the metal from the No. 1 AOD or if the continuous caster is broken down.

Each heat in the No. 2 AOD vessel begins with the charging of molten metal from either of two EAF's ("C" or "E") followed by the addition of the fluxing agent (lime). The vessel blow begins almost immediately

after the charge with an oxygen-to-argon ratio of 3:1. The meter on the control panel indicated a flow rate of 33,000 standard cubic feet per hour (scfh) of oxygen and 11,000 scfh of argon. Some of the heats also used nitrogen in a ratio of 3:1:1 (oxygen:argon:nitrogen) for the first phase of the heat (33,000 scfh of oxygen, 11,000 scfh of argon, and 11,000 scfh of nitrogen). After a gas blow of 15 to 30 minutes, the vessel is turned down for a temperature check. Alloy additions are made at this time if the temperature is close to 1923°K (3182°F). The alloys that are added to the vessel include any of the metals and metallic compounds listed in Table 1. The type and weight of the alloys added depends on the final product specifications.

For the next stage of the heat (approximately one hour), the orientation of the vessel alternates between an upright position for blowing or stirring the molten metal with oxygen, argon, or nitrogen gas and a turned down position for temperature measurement, sample acquisition, and alloy and flux addition. The blowing at this stage of the heat has an oxygen-to-argon ratio of 1:3 (11,000 scfh of oxygen to 33,000 scfh of argon). The AOD vessel operators make the necessary alloy and flux additions, which are determined by mathematical calculations based on the gross weight of the heat. Near the end of the heat, the slag is poured off into a slag pot to remove the lime and impurities which are chemically bound in the slag.

At the end of the heat, after the final sample (CarTech's designation "V4") results are available, the final chemical additions are made. After the alloys are melted into the bath by stirring with argon or nitrogen gas, the molten metal is tapped into a ladle to be transferred to the continuous caster area.

C. Air Pollution Control System

The process emissions generated during the refining in the No. 2 AOD vessel are captured by a canopy hood built into the roof trusses approximately 13 meters (m) [42.7 feet (ft)] above the mouth of the vessel. The fumes are directed to the canopy hood by a diverter hood which is movable and is located 1.5 m (5 ft) above the mouth of the AOD vessel. The diverter hood swings out of the way for charging and tapping the vessel. The shop roof above the No. 2 AOD is closed, and any emissions not captured by the canopy hood remain inside the building and are drawn into two scavenger ducts located in the peak of the roof between the AOD canopy and the continuous caster area. The scavenger ducts are ducts that open into the building, and they do not have any hoods attached. The AOD shop and the continuous caster building are separated by a sheet metal wall which is suspended from the ceiling to about 6.1 m (20 ft) above the floor. The molten metal ladle from the AOD is passed under this wall to the ladle stirring area before being delivered to the single-strand continuous caster.

The canopy hood and scavenger ducts are combined to form a main inlet duct, which is then split into two ducts. Each of these two ducts has a 522-kilowatt (kW) [700-horsepower (hp)] fan which routes the emissions to the inlet plenum of the fabric filter. The emissions from the continuous caster-cutting torch are routed to the fabric filter by a small duct. However, since this duct was closed off during the source test at the request of MRI Personnel, the cutting torch cutter emissions would not mix with the AOD emissions.

The AOD gases are treated in a positive pressure Carborundum fabric filter to remove the particulate matter. The cleaned exhaust gases exit via one of five short stacks on the fabric filter. Table 2 presents the technical data available on the No. 2 AOD and the associated control device.

CarTech has installed a shopwide pneumatic system to gather all the dust from the two control devices at the arc melt shop to a single location for storage before recycling. The solid waste is hauled away by a reclamation company, INMETCo. of Ellwood City, Pennsylvania and pelletized, reduced, and smelted. Then CarTech buys metal back from the reclaimer at current market value. CarTech inspects the control devices regularly and performs maintenance as required.

D. Test Observation

Table 3 presents a summary of the sampling plan for CarTech. PM and PSD measurements were performed at the inlet and outlet of the fabric filter. Velocity measurements were taken in the scavenger ducts. VE readings were taken of the meltshop roof and the fabric filter stacks, and fugitive emission (FE) readings were taken of the fabric filter dust-handling system. Grab samples of the fabric filter dust were also taken for laboratory analyses.

Attachment 1 contains the observation sheets made of the AOD operation at CarTech. Table 4 presents a summary of the charge and tap times of the heats covered during the 4-day source test. The No. 2 AOD operated with only minor delays during the source test, and the times of these delays are indicated in Table 3. Figure 1 provides a schematic top view of the control system at CarTech with the sampling points indicated. The time between heats averaged under 5 minutes, and the testing was stopped between heats when maintenance was to be performed or when the AOD operators indicated that there would be a delay. The testing was also stopped during a heat if a significant emission drift was observed from the No. 1 AOD.

VE readings were taken from the meltshop roof and fabric filter during favorable weather on April 28, 29, and 30. All observations indicated zero percent opacity during normal operations. However, due to upset conditions and extended delays, the testing was briefly stopped four times during the source test.

The operation of the vessel and the fabric filter was monitored by William Terry of MRI. The AOD vessel operated normally during the source tests with very few short delays. The fabric filter was operating normally and was observed approximately every hour. The fabric filter control room contained indicator dials that showed which compartment was closed for cleaning, the amperage on each of the two fans, the inlet exhaust gas temperature, and the fan amperage of the reverse air fan. The reverse air fan amperage was typically 100 to 105 amps when the fan was in the cleaning operation; the fan was pulling 60 amps when it was not cleaning a compartment. The other control room indicator dial readings are recorded on the lower section of the heat sheets contained in Attachment 1.

V. Conclusions and Recommendations

The test conditions were representative and should provide useful data on controlled and uncontrolled emissions from an individually controlled AOD vessel. The most significant emissions occurred during the blowing operation, and the flow to the fabric filter appeared to be adequate to capture almost all of the emissions in the canopy hood. The small amount of emissions not captured by the canopy drifted northward toward the continuous caster area and was captured by the scavenger ducts. The charging and tapping emissions were minimal and were predominantly captured by the canopy hood.

TABLE 1. ALLOYS USED IN STEEL REFINING AT CARPENTER TECHNOLOGY CORPORATION

Ferro-silicon	Monel (copper-nickel compound)
Ferro-chrome silicon	Ferro-boron
Nickel	Ferro-molybdenum
High carbon manganese	Cobalt
Low carbon chrome	Molybdenum
Aluminum	Molybdenum oxide
Manganese	Charge chrome
Silicon	Iron shot

TABLE 2. TECHNICAL DATA FOR PROCESS AND CONTROL SYSTEM
CARPENTER TECHNOLOGY CORPORATION

A. Argon-oxygen decarburization vessel	
1. Capacity	18.1 Mg (20 tons)
2. Average charge size	15.4 Mg (17 tons)
3. Vessel dimensions	Diameter 2.8 m (9.2 ft); Height 4.4 m (14.5 ft)
4. Tapping temperature	1755°-1866°K (2700°-2900°F)
5. Refining time (average)	1.6 hours
B. Capture system	
1. Design	Canopy hood
2. Hood size	8.5 m (28 ft) by 11 m (36 ft)
3. Distance above vessel	13.0 m (42.7 ft)
4. Design flow	
Total	141.6 m^3/s (300,000 acfm)
Canopy hood	106.2 m^3/s (225,000 acfm)
Scavenger ducts	35.4 m^3/s (75,000 acfm)
C. Control system--fabric filter	
1. Manufacturer	Carborundum
2. Type	Positive pressure
3. Compartments	10
4. Total number of bags	1,200 (Dacron polyester)
5. Bag dimensions	Diameter 29.2 cm (11.5 in.); Length 9.6 m (31.6 ft)
6. Air-to-cloth ratio	2.68:1 (gross); 3.17:1 (net)
7. Cleaning	Reverse air
8. Two fans (each)	522 kW (700 bhp); 2,300 volts; 710 rpm
9. Pressure drop	0.6 to 1.5 kPa (2.5 to 6 in. water)
10. Inlet temperature	330°K (135°F)

TABLE 3. SAMPLING PLAN FOR CARPENTER TECHNOLOGY CORPORATION

Sampling site	Sample type	Sampling method	No. of samples	Time for each sample
No. 1--Inlet	Particulate	EPA 5	3	~8 hours
	Particle size	High capacity impactor	3	~3 hours
		Impactor	3	~1/2 hour
No. 2--Outlet	Particulate	EPA 5	3	~8 hours
	Particle size	Impactor	3	~8 hours
	VE	EPA 9	3	~8 hours
No. 3--Scavenger duct	Velocity	EPA 2--Average point	3	~8 hours
Meltshop	VE	EPA 9	3	~8 hours
Fabric filter dust handling system	FE	EPA 22	3	~8 hours
	Dust	Grab	3 Composites	4 grabs/day = 1 composite

TABLE 4. SUMMARY OF SOURCE TEST CHARGE AND TAP PERIODS
CARPENTER TECHNOLOGY CORPORATION

Test run No.	Start observation	Heat No.	Charge Start	Charge Finish	Tap Start	Tap Finish	Stop observation
			April 27, 1981				
1	1525:00						
		C40469	--	--	1621:00	1623:00	
		C40470	1625:00	1628:00	1751:00	1752:00	
		C40473	1754:00	1755:00			
							1905:00
			April 28, 1981				
2	0921:00						
		C40492	0921:00	0924:00	1041:00	1044:00	
		C40493	1047:00	1053:00	1231:00	1232:00	
		C40496	1240:00	1247:00	1410:00	1412:00	
		C40497	1417:00	1421:00			
	Test interrupted:		1555:00	to	1602:00		
		C40497			1602:00	1603:00	
		C40500	1608:00	1613:00			
	Test interrupted:		1631:00	to	1647:00		
		C40500			1747:00	1748:00	
		C40501	1752:00	1757:00			
							1900:00
			April 29, 1981				
3	0922:00						
		C40521	0926:00	0927:00	1121:00	1122:00	
		C40522	1127:00	1129:00	1255:00	1256:00	
	Test interrupted:		1303:00	to	1316:00		
		C40525	1316:00	1318:00	1523:00	1526:00	
		C40526	1528:00	1532:00	1659:00	1701:00	
		C40529	1702:00	1707:00			
							1825:00

TABLE 4. SUMMARY OF SOURCE TEST CHARGE AND TAP PERIODS
CARPENTER TECHNOLOGY CORPORATION
(concluded)

Test run No.	Start observation	Heat No.	Charge Start	Charge Finish	Tap Start	Tap Finish	Stop observation
			April 30, 1981				
4	0850:00						
		C40548	--	--	0907:00	0908:00	
		C40549	0914:00	0926:00	1101:00	1103:00	
		C40552	1106:00	1113:00	1255:00	1258:00	
		C40553	1301:00	1306:00	1434:00	1435:00	
		C40556	1438:00	1444:00	1616:00	1617:00	
	Test interrupted:		1619:00	to	1624:00		
		C40557	1624:00	1628:00	1748:00	1749:00	
		C40560	1754:00	1756:00			
							1843:00

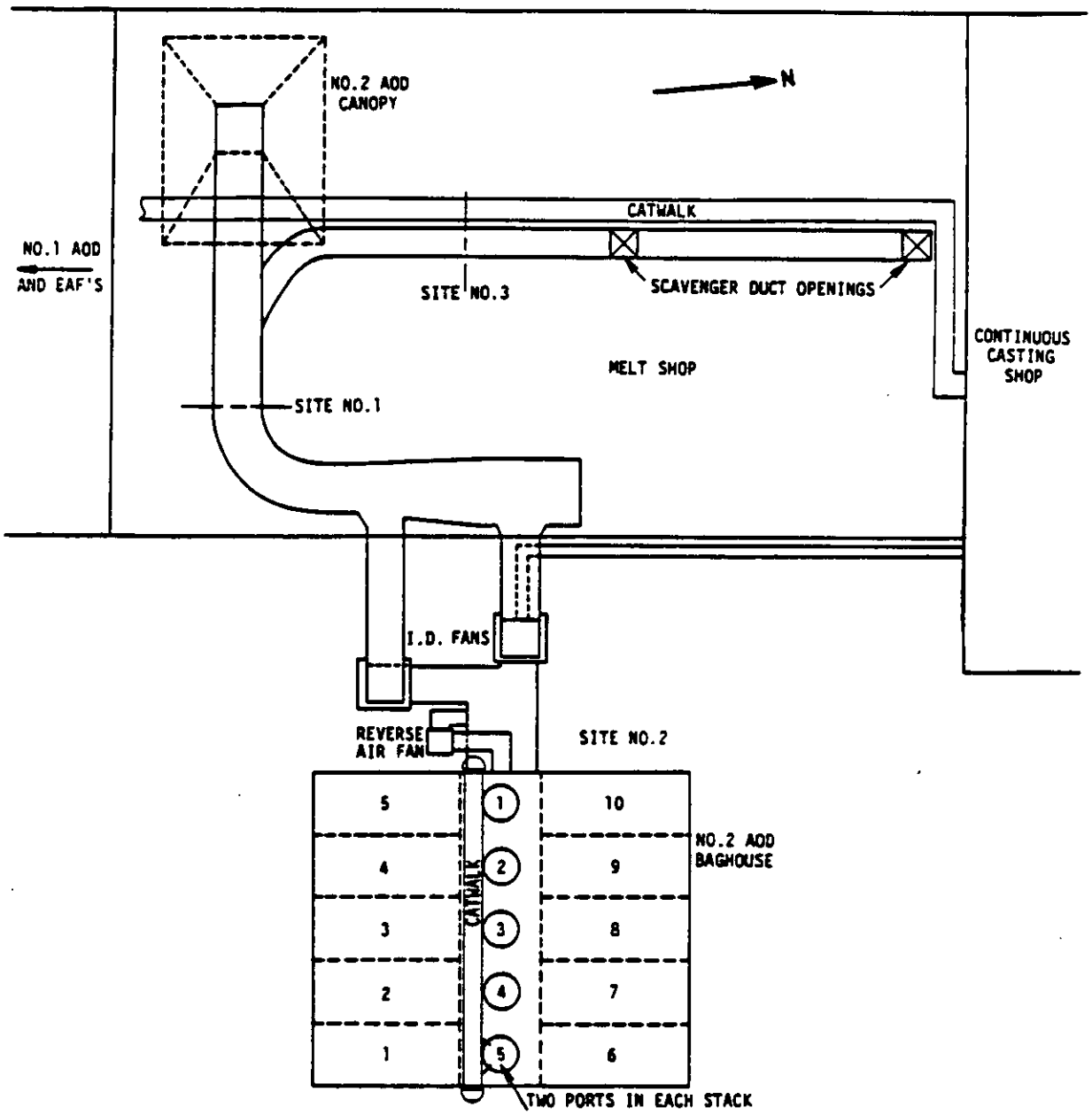


Figure 1. Control system schematic at Carpenter Technology Corporation.

Attachment 1

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 1 DATE: 4/27/81 HEAT NO. C40469

NO. HEATS ON VESSEL: 15 TRADE NAME Type 430

START	FINISH	COMMENT
15:25		Test begins
		(Charge at 14:55)
15:25	15:34	Blow - dense brown emissions
15:34	15:36	AOD reduction mix
15:36	15:43	Blow; then at 15:43, stir with argon
15:44	15:47	Turn down, sample taken
15:51	15:54	Slag; then wait on ladle
16:10	16:18	Stir molten metal with argon
16:21	16:23	Tap

TOTAL GAS USED (SCF): Oxygen 16,610 Argon 17,290 Nitrogen 330

FINAL BILLET WEIGHT: 36,750 lb

COMMENTS: Baghouse observation:

15:18 - compart. 6 - cleaning, temp. 140°F, fan amps - 115

16:19 - compart. 8 - cleaning, temp. 135°F, fan amps - 115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 1 DATE: 4/27/81 HEAT NO. C40470

NO. HEATS ON VESSEL: 16 TRADE NAME 304 modified

START	FINISH	COMMENT
16:25		Addition of fluxes
16:27	16:28	Charge - 31,100#
16:29	16:43	Blow - O_2 - 33, N_2 - 11 (x 1,000 = SCFH)
16:44	16:45	Alloy addition
16:45	16:54	Blow
16:54		Turn down - sample taken
17:02	17:06	Blow - O_2 - 11, Ar - 33
17:06	17:07	Add reduction mix
17:07	17:12	Blow
17:12		Stir with argon
17:16		Turn down, temp. check, sample taken
17:21	17:24	Slagging
17:34		Final alloy addition - reheat
17:36	17:38	Blow - reheat
17:41		Turn down - temp. check, wait to tap
17:51	17:52	Tap

TOTAL GAS USED (SCF): Oxygen 14,030 Argon 9,770 Nitrogen 3,960

FINAL BILLET WEIGHT: 33,140 lb

COMMENTS: Baghouse observation

16:47 - compart. 8 cleaning, temp. 150°F, fan amps - 110

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 1 DATE: 4/27/81 HEAT NO. C40473

NO. HEATS ON VESSEL: 17 TRADE NAME Type 430

START	FINISH	COMMENT
17:54	17:55	Charge metal (34,400#)
18:00	18:01	Alloy addition
18:01	18:20	Blow - O_2 - 33, Ar - 11
18:20	18:21	Turn down - temp. check
18:23	18:24	Addition
18:30	18:34	Blow
18:34		Turn down - temp. check
18:39	18:44	Blow
18:45	18:46	Turn down - take sample
18:46	18:59	Blow
18:59	19:00	Turn down - add reduction mix
19:00	19:03	Blow
19:03	19:05	Stir with argon
19:05		Test finished

TOTAL GAS USED (SCF): Oxygen 21,110 Argon ss,510 Nitrogen --

FINAL BILLET WEIGHT: 31,670 lb

COMMENTS: Baghouse observation

17:56 - compart. 3 cleaning, temp. 123°F, fan amps - 115

18:36 - compart. 7 cleaning, temp. 130°F, fan amps - 115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. 40492

NO. HEATS ON VESSEL: 25 TRADE NAME Type 430

START	FINISH	COMMENT
9:20		Charge addition
9:22		Charge 37,500# *test begins*
9:24	9:42	Blow - O_2 - 33, Ar - 11
9:43	9:44	Turn down, temp. check
9:44	9:52	Blow - O_2 - 11, Ar - 33
9:45	9:49	Crane deflecting emissions
9:52	9:54	Turn down, sample taken, temp. check
9:54	10:05	Blow - O_2 - 11, Ar - 33
10:05	10:07	Turn down; add reduction mix
10:07	10:12	Blow
10:12	10:17	Stir with argon
10:17		Turn down, temp. check, sample
10:21	10:23	Slagging
10:35	10:36	Turn up, stir with argon
10:36	10:40	Turn down, temp. checked
10:41	10:44	Tap
10:44		Temp. checked.

TOTAL GAS USED (SCF): Oxygen 18,280 Argon 17,690 Nitrogen --

FINAL BILLET WEIGHT: 36,205 lb

COMMENTS: Baghouse observation

1. 9:31 - compart. 10 cleaning, temp. 155°F, fan amps - 110
2. 10:24 - compart. 10 cleaning, temp. 120°F, fan amps - 110-120

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. 40493

NO. HEATS ON VESSEL: 26 TRADE NAME Type 316L

START	FINISH	COMMENT
10:47	10:48	Charge (35,200#)
10:53		Addition
10:54	11:10	Blow
11:11		Turn down, temp. check
11:13	11:16	Blow
11:17	11:18	Addition
11:18	11:23	Blow
11:20	11:21	Addition
11:23	11:24	Addition of alloys
11:25	11:31	Blow
11:32		Sample taken
11:35	11:42	Blow - heavy emissions - good capture
11:43	11:44	Addition of reduction mix
11:45		Stir with argon
11:54		Turn down, sample taken, temp. check
11:58	12:01	Slagging then wait on sample results
12:22	12:23	Final adds
12:31	12:32	Tap

TOTAL GAS USED (SCF): Oxygen 16,440 Argon 17,680 Nitrogen 2,980

FINAL BILLET WEIGHT: 38,950 lb

COMMENTS: Baghouse control panel observation

10:59 - compart. 2 cleaning, temp. 150°F, fan amps - 105-110

11:35 - compart. 5 cleaning, temp. 130°F, fan amps - 110-120

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. C40496

NO. HEATS ON VESSEL: 26 TRADE NAME Type 430

START	FINISH	COMMENT
12:40	12:41	Charge metal (34,000#)
12:46	12:47	Addition
12:47	13:03	Blow - O_2 - 33, Ar - 11
13:03	13:04	Turn down, temp. check
13:04	13:10	Blow
13:10		Addition
13:11	13:15	Blow
13:15	13:16	Turn down, temp. check
13:16	13:18	Blow
13:18		Turn down, temp. check, sample taken
13:22	13:30	Blow - O_2 - 11, Ar - 33
13:30		Sample for carbon
13:34	13:39	Blow - crane deflects emissions
13:39		Add reduction mix
13:41	13:49	Blow
13:50		Turn down, take V4 sample
13:55	13:58	Slagging, then stir metal with argon
14:10	14:12	Tap

TOTAL GAS USED (SCF): Oxygen 19,800 Argon 18,900 Nitrogen --

FINAL BILLET WEIGHT: 34,695 lb

COMMENTS: Baghouse observation

12:49 - compart. 2 cleaning, temp. 130°F, fan amps - 110-115

13:46 - compart. 2 cleaning, temp. 125°F, fan amps - 110-115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. C40497

NO. HEATS ON VESSEL: 28 TRADE NAME Type 316

START	FINISH	COMMENT
14:17		Addition
14:19	14:21	Charge metal (31,400#)
14:22	14:34	Blow - O_2 - 33, Ar -11
14:34	14:35	Turn down, temp. check
14:35	14:37	Blow
14:37		Addition of alloys
14:38	14:41	Blow
14:41	14:42	Turn down, temp. check
14:42	14:46	Blow
14:46	14:51	Turn down, temp. check, add alloys
14:51	14:59	Blow - removed diverter stack temporarily - still good capture but more drift
14:59	15:01	Addition
15:01	15:06	Blow - O_2 - 11, Ar - 33
15:06	15:18	Turn down, add redux mix
15:27		Stir with argon
15:30		Turn down, temp. check, throw in bags of lime
15:32	15:35	Blow
15:35	15:42	Slag

TOTAL GAS USED (SCF): Oxygen 14,940 Argon 10,890 Nitrogen 4,400

FINAL BILLET WEIGHT: 33,705 lb

COMMENTS: Baghouse observation

14:28 - compart. 2 cleaning, temp. 150°F, fan amps - 110, 115

15:21 - compart. 7 cleaning, temp. 125°F, fan amps - 115, 120

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. C40497

NO. HEATS ON VESSEL: 28 TRADE NAME Type 316

START	FINISH	COMMENT
15:42	15:53	Stir; then wait for sample results
15:54		Turn down, final addition
---	---	---
15:55	16:02	Stopped test, waiting on crane
---	---	---
16:00	16:01	Addition
16:02	16:03	Tap

TOTAL GAS USED (SCF): Oxygen _____ Argon _____ Nitrogen _____

FINAL BILLET WEIGHT: _____

COMMENTS: _____

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. C40500

NO. HEATS ON VESSEL: 29 TRADE NAME Type 430

START	FINISH	COMMENT
16:08	16:10	Charge metal 35,400#
16:13	16:14	Additions
16:14	16:31	Blow - O_2 - 33, Ar - 11 (crane deflecting emissions for several minutes)
16:31	16:47	*Test stopped - too much drift from No. 1 AOD
16:47		Addition
16:48	16:51	Blow
16:51		Turn down
16:52	16:55	Blow
16:55	16:58	Turn down, sample taken, temp. check
16:58	17:06	Blow
17:06	17:09	Add reduction mix
17:09	17:13	Blow
17:13	17:21	Stir molten metal bath with argon
17:21		Turn down - sample
17:26	17:29	Slag
17:39		Throw in 3 bags of lime
17:40		Blow
17:42	17:44	Stir with argon
17:44		Turn down, temp. check
17:47	17:48	Tap

TOTAL GAS USED (SCF): Oxygen 19,790 Argon 20,350 Nitrogen --

FINAL BILLET WEIGHT: 33,185 lb

COMMENTS: Baghouse observation

16:17 - compart. 7 cleaning, temp. 140°F, fan amps - 110-115

17:14 - compart. 7 cleaning, temp. 135°F, fan amps - 110-115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 2 DATE: 4/28/81 HEAT NO. C40501

NO. HEATS ON VESSEL: 30 TRADE NAME Custom Flo 302

START	FINISH	COMMENT
17:52	17:53	Charge - 31,300# molten metal
17:56	17:57	Addition
17:57	18:11	Blow - O_2 - 33, Ar -11, N_2 - 11
18:11	18:13	Turn down, temp. check
18:13	18:19	Blow - at 18:16 switch to O_2 - 11, Ar - 33, N_2 - 11
18:19		Turn down, temp. check
18:21		Molten metal leak at joint in vessel
18:27	18:31	Pack with refractory by hand
18:31		Addition
18:32	18:39	Blow
18:40	18:41	Addition
18:41	18:43	Blow without diverter stack - dispersion of fumes due to cross drafts
18:43	18:44	Addition
18:44	18:46	Blow
18:46		Turn down, temp. check
18:47	18:56	Blow, then sample
19:00		*Stop testing*

TOTAL GAS USED (SCF): Oxygen 19,500 Argon 26,030 Nitrogen 2,560

FINAL BILLET WEIGHT: 36,620 lb

COMMENTS: Baghouse observation

18:13 - compart. 9 cleaning, temp. 145°F, fan amps - 105-110

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40521

NO. HEATS ON VESSEL: 4 TRADE NAME Type 309

START	FINISH	COMMENT
9:22		Test begins
9:22		Charge, add flux material
9:26	9:27	Charge 33,700#
9:27	9:37	Blow - O_2 - 33, N_2 - 11
9:37		Addition
9:38	9:48	Blow
9:48	9:51	Turn down, temp. check
9:51	9:52	Blow
9:52	9:53	Alloy addition
9:53	9:57	Blow
9:54		Fugitive emissions from truck unloading alloys
9:57	9:58	Turn down, temp. check
9:58	10:11	Blow - O_2 - 11, Ar - 33
10:11	10:13	Turn down, sample taken
10:14	10:30	Blow
10:30	10:31	Turn down - add reduction mix
10:38	10:42	Stir molten metal with argon
10:42		Turn down, sample, temp. check

TOTAL GAS USED (SCF): Oxygen 19,940 Argon 25,840 Nitrogen 4,380

FINAL BILLET WEIGHT: 34,310 lb

COMMENTS: Baghouse observation

9:44 - compart. 5 cleaning, temp. 150°F, fan amps - 105-110

10:38 - compart. 5 cleaning, temp. 125°F, fan amps - 110-115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40521

NO. HEATS ON VESSEL: 4 TRADE NAME Type 309

START	FINISH	COMMENT
10:45	10:46	Addition
10:46	10:48	Stir with argon
10:52	10:55	Slag. into slag pot
10:56	11:10	Waiting to get final sample results
11:10		Final addition
11:13	11:15	Stir molten metal with argon
11:16		Sample to determine solidifying temp.
11:19	11:20	Addition, then stir
11:21	11:22	Tap

TOTAL GAS USED (SCF): Oxygen _____ Argon _____ Nitrogen _____

FINAL BILLET WEIGHT: _____

COMMENTS: _____

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40522

NO. HEATS ON VESSEL: 5 TRADE NAME Type 430

START	FINISH	COMMENT
11:27	11:28	Charge - 34,100# of molten metal
11:28	11:29	Addition
11:29	11:52	Blow - O_2 - 33, Ar - 11 (x 1,000 = SCFH)
11:52		Turn down, temp. check
11:53	11:59	Blow
11:59	12:00	Addition
12:00	12:04	Blow
12:04		Turn down, temp. check
12:05	12:09	Blow - switch to O_2 - 11, Ar - 33
12:09	12:11	Turn down while blowing - take sample
12:11	12:21	Blow - O_2 - 11, Ar - 33
12:21	12:22	Add reduction mix
12:22	12:28	Blow - O_2 - 33, Ar - 11 for 192 counts O_2
12:28	12:33	Stir with argon
12:33		Turn down, take sample
12:36	12:40	Slag, then wait for sample results
12:45		Addition
12:55	12:56	Tap

TOTAL GAS USED (SCF): Oxygen 20,380 Argon 18,430 Nitrogen --

FINAL BILLET WEIGHT: 34,905 lb

COMMENTS: Baghouse observation

11:41 - compart. 7 cleaning, temp. 160°F, fan amps - 105-110

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40525

NO. HEATS ON VESSEL: 6 TRADE NAME Type 309

START	FINISH	COMMENT
13:03	13:16	Test stopped - remove slag pots
13:16		Addition
13:17	13:18	Charge - 32,800#
13:18	13:32	Blow - O_2 - 33, Ar - 11, N - 11
13:32	13:38	Turn down, temp. check
13:33	13:37	Blow
13:37	13:39	Addition
13:40	13:46	Blow
13:46	13:47	Turn down, temp. check
13:47	13:53	Blow
13:53	13:54	Turn down, temp. check
13:54	13:58	Blow
13:58	14:03	Turn down, temp. check, addition
14:04	14:06	Blow
14:06	14:07	Turn down, addition
14:07	14:12	Blow
14:12	14:13	Turn down, take sample, temp. check
14:13	14:23	Blow

TOTAL GAS USED (SCF): Oxygen 25,350 Argon 15,720 Nitrogen 6,960

FINAL BILLET WEIGHT: 35,415 lb

COMMENTS: Baghouse observation

13:27 - compart. 6 cleaning, temp. 160°F, fan amps - 105-110

14:32 - compart. 9 cleaning, temp. 125°F, fan amps - 110

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40525

NO. HEATS ON VESSEL: 6 TRADE NAME Type 309

START	FINISH	COMMENT
14:23	14:31	Turn down, take sample
14:31	14:34	Blow
14:34		Turn down (end step 2)
14:38		Add reduction mix
14:38	14:49	Stir
14:49		Turn down, temp. check
14:54	14:55	Addition
14:55	14:58	Blow
14:58		Turn down, temp. check
15:00		Take sample
15:06	15:08	Slag
15:14		Addition
15:16	15:22	Stir
15:22		Turn down, temp. check
15:23	15:26	Tap

TOTAL GAS USED (SCF): Oxygen 25,350 Argon 15,720 Nitrogen 6,960

FINAL BILLET WEIGHT: 35,415 lb

COMMENTS:

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40526

NO. HEATS ON VESSEL: 7 TRADE NAME Type 430

START	FINISH	COMMENT
15:28		Addition
15:31	15:32	Charge molten metal 34,400#
15:32	15:49	Blow - O_2 - 33, Ar - 11
15:49	15:51	Turn down, temp. check
15:51	15:54	Blow
15:54	15:56	Turn down, addition
15:56	16:01	Blow
16:01	16:02	Turn down, temp. check
16:02	16:07	Blow
16:07	16:09	Turn down, take sample
16:09	16:23	Blow (small fire in AOD bay - some emissions out louvers in wall)
16:23	16:24	Add reduction mix
16:25	16:36	Turn up, stir for approx. 5 minutes
16:36		Turn down, take sample
16:37	16:42	Blow and stir
16:42	16:53	Slagging - 2 minutes; then wait on sample results
16:53		Addition
16:55	16:58	Stir. Molten metal bath
16:58	16:59	Tap

TOTAL GAS USED (SCF): Oxygen 20,680 Argon 19,900 Nitrogen --

FINAL BILLET WEIGHT: 19,035 lb plus ingots , total approx. 38,000 lb

COMMENTS: Baghouse observation

15:34 - compart. 2 cleaning, temp. 130°F, fan amps - 110, 115

16:33 - compart. 3 cleaning, temp. 125°F, fan amps - 105, 115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40529

NO. HEATS ON VESSEL: 8 TRADE NAME Custom Flo 302

START	FINISH	COMMENT
17:02		Addition
17:06	17:07	Charge - 30,600# of molten metal
17:07	17:21	Blow - O_2 - 33, Ar - 11, N - 11
17:21	17:22	Turn down, temp. check
17:22	17:28	Blow
17:28	17:29	Addition
17:29	17:32	Blow
17:32	17:33	Turn down, addition (kept blowing while turning down)
17:33	17:37	Blow
17:37	17:38	Turn down, try to check temp.
17:39	17:40	Blow
17:40	17:42	Turn down, check temp., sample
17:43	17:49	Blow (begin step 2) O_2 - 11, Ar - 33
17:49	17:51	Stir
17:51	17:52	Add reduction mix
17:52	17:55	Blow
17:55	18:02	Stir

TOTAL GAS USED (SCF): Oxygen 17,470 Argon 19,100 Nitrogen 2,510

FINAL BILLET WEIGHT: 34,975 lb

COMMENTS: Baghouse observation

17:11 - compart. 7 cleaning, temp. 155°F, fan amps - 110

18:57 - compart. 3 cleaning, temp. 150°F, fan amps - 110

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 3 DATE: 4/29/81 HEAT NO. C40529

NO. HEATS ON VESSEL: 8 TRADE NAME Custom Flow 302

START	FINISH	COMMENT
18:02	18:03	Turn down, temp. check, take sample (V4)
18:03	18:07	Blow
18:07	18:11	Slag
18:11	18:16	Blow
18:16		Idle - waiting on sample results
18:25	------	Stop test

TOTAL GAS USED (SCF): Oxygen 17,470 Argon 19,100 Nitrogen 2,510

FINAL BILLET WEIGHT: 34,975 lb

COMMENTS:

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40548

NO. HEATS ON VESSEL: 16 TRADE NAME Custom Flo 302

START	FINISH	COMMENT
7:25		Charged (29,400#)
8:22		Add reduction mix
8:40		Slag
8:50		Begin observing for test
8:59		Final addition
9:00	9:07	Stir for approx. 2 minutes
9:07	9:08	Tap, final wt 35,700# (approx.)

TOTAL GAS USED (SCF): Oxygen 14,900 Argon 16,980 Nitrogen 2,060

FINAL BILLET WEIGHT: 34,410 lb

COMMENTS:

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40549

NO. HEATS ON VESSEL: 17 TRADE NAME Type 430

START	FINISH	COMMENT
9:14		Addition
9:24	9:25	Charge - 30,300#
9:26	9:52	Blow - O_2 - 33, Ar - 11, - at 9:35 - flames
9:52	9:53	Addition
9:53	9:54	Turn down, temp. check
9:54	9:57	Blow
9:57	9:58	Turn down - addition
9:58	10:04	Blow
10:04	10:05	Turn down, temp. check
10:05	10:10	Blow (end step 1) - O_2 - 11, Ar - 33
10:10	10:12	Turn down while blowing, take sample
10:12	10:16	Blow
10:17	10:21	Turn down and wait on reduction mix
10:21	10:23	Addition reduction mix
10:23	10:28	Blow
10:28	10:31	Stir
10:31	10:35	Turn down, temp. check, take V4 sample
10:36	10:43	Waiting on crane to start slagging

TOTAL GAS USED (SCF): Oxygen 20,660 Argon 15,560 Nitrogen --

FINAL BILLET WEIGHT: 33,950 lb

COMMENTS: Baghouse observation

9:28 - compart. 10 cleaning, temp. 105°F, fan amps - 115, 120

10:14 - compart. 7 cleaning, temp. 110°F, fan amps - 115, 120

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40549

NO. HEATS ON VESSEL: 17 TRADE NAME Type 430

START	FINISH	COMMENT
10:43	10:46	Slag - then wait on ladle
10:56		Additions
10:57	10:59	Stir
10:59		Turn down, temp. check
11:01	11:03	Tap, final wt - 35,500# (approx.)

TOTAL GAS USED (SCF): Oxygen 20,660 Argon 15,560 Nitrogen

FINAL BILLET WEIGHT: 33,950 lb

COMMENTS:

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40552

NO. HEATS ON VESSEL: 18 TRADE NAME Type 430

START	FINISH	COMMENT
11:06	11:08	Charge - 31,700#
11:12	11:13	Addition
11:13	11:29	Blow - O_2 - 33, N - 11
11:21		Fugitive emissions from unloading lime truck
11:29	11:31	Blow - O_2 - 33, Ar - 11
11:31	11:32	Turn down, temp. check
11:32	11:33	Blow
11:33	11:34	Turn down, addition
11:34	11:37	Blow
11:37	11:38	Turn down, addition
11:38	11:43	Blow
11:43		Turn down - while blowing - check temp.
11:45	11:46	Addition
11:46	11:50	Blow
11:50	11:52	Turn down - addition
11:52	12:10	Blow
12:10		Turn down - add reduction mix
12:12		Stir

TOTAL GAS USED (SCF): Oxygen 23,840 Argon 18,210 Nitrogen 5,020

FINAL BILLET WEIGHT: 41,380 lb

COMMENTS: Baghouse observation

11:14 - compart. 8 cleaning, temp. 120°F, fan amps - 110, 115

12:09 - compart. 8 cleaning, temp. 110°F, fan amps - 110, 115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40552

NO. HEATS ON VESSEL: 18 TRADE NAME Type 430

START	FINISH	COMMENT
12:14	12:16	Blow
12:16	12:23	Stir
12:23		Turn down, sample (V4), then wait on slag pot to slag
12:31	12:34	Slag, wait on sample results
12:48	12:49	Final adds
12:49	12:50	Blow - 1 minute
12:50	12:52	Stir
12:52	12:53	Turn down, temp. check
12:53	12:55	Stir
12:55	12:58	Tap

TOTAL GAS USED (SCF): Oxygen 23,840 Argon 18,210 Nitrogen 5,020

FINAL BILLET WEIGHT: 41,380 lb

COMMENTS:

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40553

NO. HEATS ON VESSEL: 19 TRADE NAME Type 430

START	FINISH	COMMENT
13:01		Addition
13:05	13:06	Charge 31,700#
13:06	13:30	Blow - O_2 - 33, Ar - 11
13:30		Turn down, addition
13:31	13:32	Blow without diverter stack in place
13:32	13:37	Moved diverter stack into place
13:37	13:38	Turn down, temp. check, take sample
13:38	13:44	Blow - O_2 - 11, Ar - 33
13:44	13:49	Turn down - add reduction mix
13:50	13:54	Stir 1 minute, then blow
13:54	13:58	Stir
13:58		Turn down, temp. check, take V4 sample
14:02	14:06	Slag, then wait on results
14:22		Final adds
14:24	14:28	Stir
14:29		Turn down, temp. check
14:34	14:35	Tap, 34,600# approx. final wt

TOTAL GAS USED (SCF): Oxygen 17,220 Argon 11,000 Nitrogen 3,870

FINAL BILLET WEIGHT: 33,110 lb

COMMENTS: Baghouse observation

13:08 - compart. 9 cleaning, temp. 115°F, fan amps - 110, 115

14:03 - compart. 10 cleaning, temp. 112°F, fan amps - 115, 120

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40556

NO. HEATS ON VESSEL: 20 TRADE NAME Type 316

START	FINISH	COMMENT
14:38		Addition
14:42	14:44	Charge - 33,400#
14:44	15:01	Blow - O_2 - 33, Ar - 11, N_2 - 11
15:01	15:02	Turn down, temp. check
15:02	15:05	Blow
15:05	15:08	Turn down, addition
15:09	15:13	Blow
15:13	15:16	Turn down, temp. check, take sample
15:16	15:21	Blow
15:22	15:29	Turn down, add reduction mix
15:30	15:40	Stir and blow
15:40		Turn down, temp. check, take sample (V4)
15:47	15:49	Slag then wait on sample results
15:52		Put newly relined ladle by door - smoke going out door
16:02		Throw in 2 bags of lime
16:06		Final adds
16:10	16:12	Stir
16:12		Turn down, temp. check
16:13		Addition
16:15	16:16	Stir with nitrogen
16:16	16:18	Tap, approx. final wt 38,000#
16:19	16:24	Stopped test - "pulling collar" off AOD with crane

TOTAL GAS USED (SCF): Oxygen 12,570 Argon 12,000 Nitrogen 4,050

FINAL BILLET WEIGHT: 35,595 lb

COMMENTS: Baghouse observation

14:48 - compart. 6 cleaning, temp. 130°F, fan amps - 115, 115

15:47 - compart. 7 cleaning, temp. 115°F, fan amps - 110, 115

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40557

NO. HEATS ON VESSEL: 21 TRADE NAME Type 430

START	FINISH	COMMENT
16:24		Addition
16:27	16:28	Charge - 32,000#
16:28	16:44	Blow - O_2 - 33, Ar - 11, N_2 - 11
16:44	16:45	Turn down, temp. check
16:45	16:49	Blow
16:49	16:50	Turn down, addition
16:50	16:56	Blow
16:56	16:58	Turn down, sample, temp. check
16:58	17:02	Blow
17:02	17:03	Add reduction mix
17:03	17:18	Blow - O_2 - 11, Ar - 33
17:18	17:22	Turn down, temp. check, take V4 sample
17:22	17:24	Slag then wait on sample results
17:28		Pneumatically loading lime bin - some emissions
17:42	17:43	Final addition
17:43		Stir with argon
17:45	17:48	Turn down, temp. check
17:48	17:49	Tap, final est. wt. - 35,000#

TOTAL GAS USED (SCF): Oxygen 17,880 Argon 13,490 Nitrogen 3,250

FINAL BILLET WEIGHT: 32,715 lb

COMMENTS: Baghouse observation

16:30 - compart. 3 cleaning, temp. 120°F, fan amps - 115, 120

17:54 - compart. 10 cleaning, temp. 120°F, fan amps - 110, 120

CARPENTER TECHNOLOGY CORPORATION

AOD VESSEL NO. 2

TEST RUN 4 DATE: 4/30/81 HEAT NO. C40560

NO. HEATS ON VESSEL: 22 TRADE NAME Type 316L

START	FINISH	COMMENT
17:54		Addition
17:55	17:56	Charge - 36,400#
17:57	18:07	Blow - O_2 - 33, Ar - 11, N_2 - 11
18:07	18:08	Turn down, addition
18:08	18:09	Blow
18:09		Turn down, temp. check
18:10	18:18	Blow
18:18	18:19	Turn down, take sample, temp. check
18:19	18:25	Blow - O_2 - 11, Ar - 33
18:25	18:26	Turn down, addition
18:26	18:34	Blow
18:34	18:37	Turn down, take sample
18:37		Blow - heavy emissions, good capture
18:43		Test ended

TOTAL GAS USED (SCF): Oxygen 21,210 Argon 18,490 Nitrogen 4,760

FINAL BILLET WEIGHT: 38,350 lb

COMMENTS: Baghouse observation

18:00 - compart. 5 cleaning, temp. 135°F, fan amps - 110

APPENDIX E

CALIBRATION PROCEDURES AND RESULTS

CALIBRATION PROCEDURES AND RESULTS

All of the equipment used was calibrated according to the procedures outlined in Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment.*

NOZZLE DIAMETER

The nozzles were calibrated by making 3 separate measurements of different inside diameters and calculating the average. If a deviation of more than 0.004 inches was found, the nozzle was either discarded or reamed out and remeasured. A micrometer was used for measuring. This calibration data is shown in Figure E-1.

PITOT TUBE CALIBRATION

The pitot tubes used in sampling were constructed by PEDCo Environmental and met all requirements of Method 2, Section 4.1 of the Federal Register.** All pitot tubes were calibrated before field use according to the Quality Assurance Handbook for Air Pollution Measurement Systems*** to determine a base line coefficient. See Figures E-2 and E-2a for alignment requirements of Method 2, and Figure E-3 for actual inspection and calibration data of the pitot tubes used during the test program.

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*Office of Air Programs Publication No. APTD-0576.

**40 CFR 60, Appendix A, July 1, 1980.

***Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. III, August 1977.

NOZZLE CALIBRATION

Date 4-26-81 Calibrated by Phillips

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
2-103	.126	.125	.124	.002	.125

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

.Figure E-1. Nozzle calibration data.

NOZZLE CALIBRATION

Date 4-27-81 Calibrated by FITZGERALD

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
C2M-P	0.252	0.253	0.253	0.001	0.253
C2M-1 VP	0.251	0.252	0.252	0.001	0.252
C2M-2 VP	0.261	0.261	0.262	0.001	0.261
C2-M-3 VP	0.316	0.316	0.316	0	0.316
C2M-4 VP	0.315	0.315	0.315	0	0.315
6XXX	0.375	0.375	0.375	0	0.375

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in. Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in. Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Figure E-1 (continued)

NOZZLE CALIBRATION

Date 4/27/81 Calibrated by ANTESBERGER

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
C1M-P	.140	.139	.140	.01	.140
C1M-3					
~~C1H-2~~	0.147	0.145	0.146	0.002	0.146
C1H-2	0.139	0.142	0.140	0.003	0.140
C1H-3	0.139	0.140	0.141	0.002	0.140

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in. Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in. Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Figure E-1 (continued)

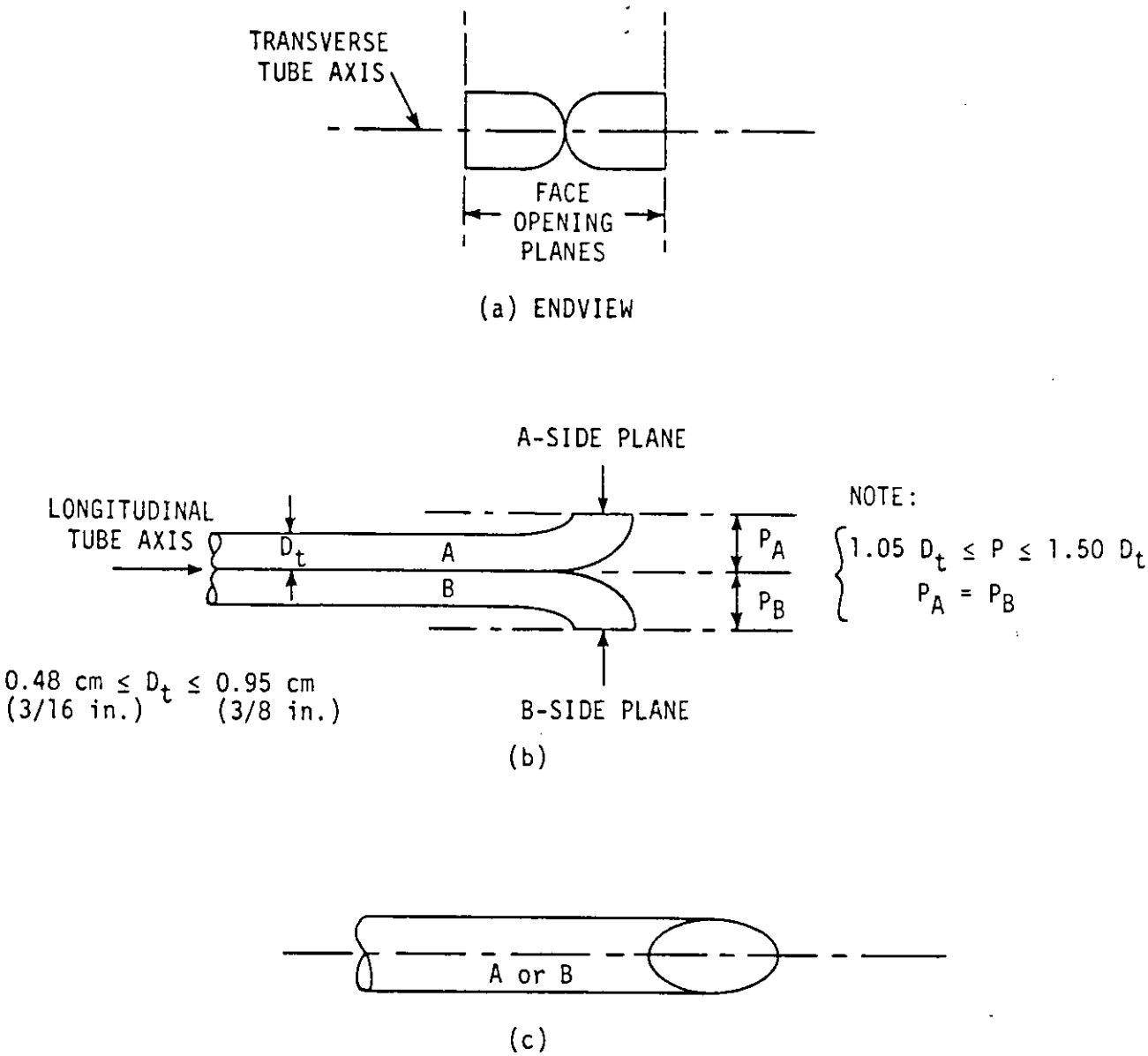

Figure E-2. Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

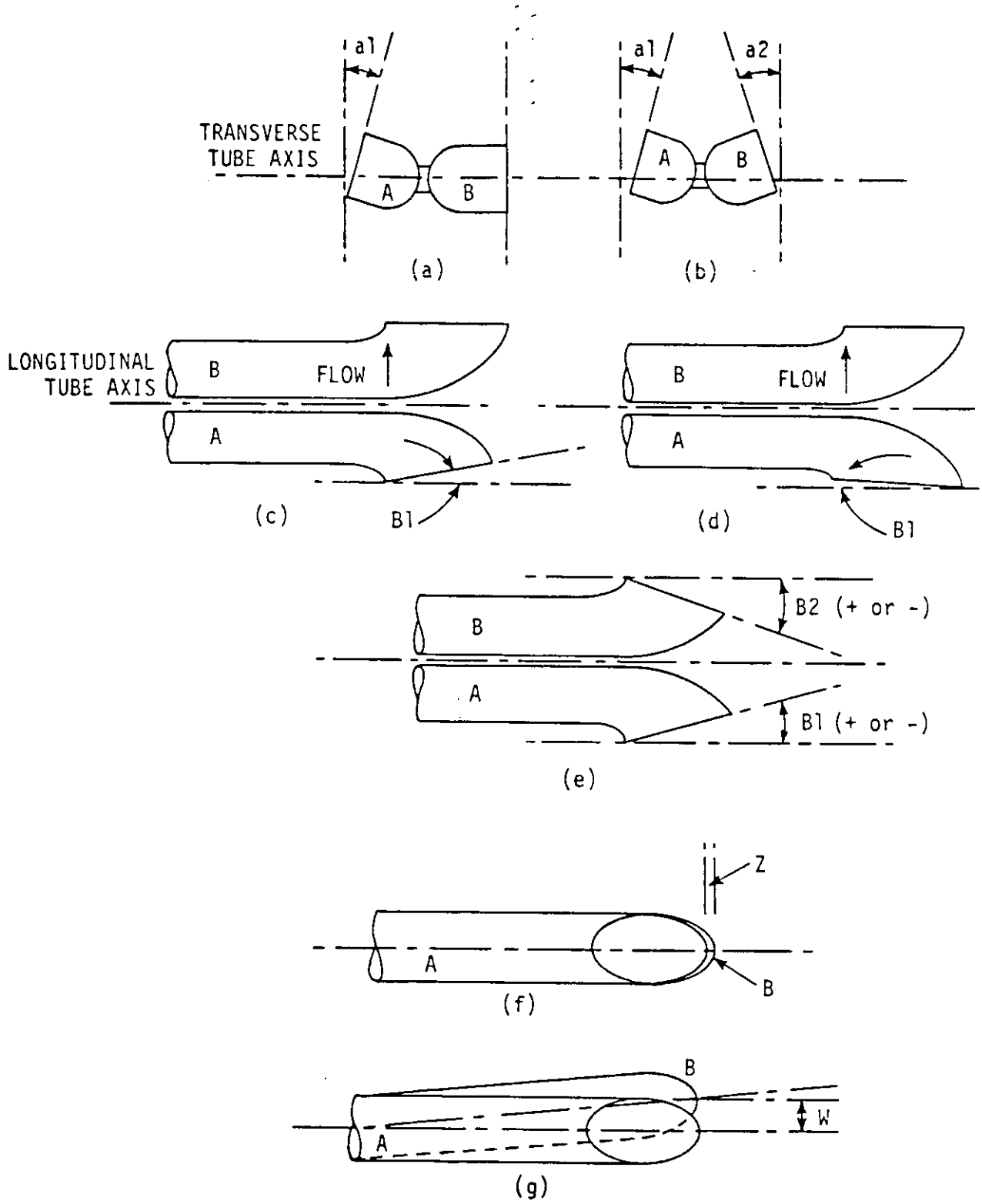

Figure E-2a. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect Cp so long as a_1 and a_2 <10°, B_1 and B_2 <5°, z <0.32 (1/8 in.) and w <0.08 cm (1/32 in.).

PITOT TUBE INSPECTION DATA SHEET

α_1 = 1.0 ° (must be less than 10°)

α_2 = 0.0 ° (must be less than 10°)

β_1 = 2.0 ° (must be less than 5°)

β_2 = 3.0 ° (must be less than 5°)

γ = 4.5 °

θ = 0.0 °

A = .908 inches

z = A sin γ = .071 inches (must be less than 0.125 inches)

w = A sin θ = .000 inches (must be less than 0.03125 inches)

P_A = .454 inches

P_B = .454 inches

P_t = .376 inches

Pitot tube No. # 179

Need calibration ____ yes X no

Inspector [illegible]

Date 1/29/81

Figure E-3. Pitot tube inspection and calibration data.

PITOT TUBE CALIBRATION DATA SHEET

Pitot tube No.: 179 Date: 2/9/81 Calibrator: B. Armstrong

Reference pitot tube No.: 502 Type: standard Cp: 0.99

Side	ΔP_{std} in. H_2O	Δp_s in. H_2O	Cp(s) a	Dev. b		$\bar{C}p(s)$	$\lvert\bar{C}p(A)-\bar{C}p(B)\rvert$ c
A	0.49	0.73	0.81	0.00		0.82	0.01
A	0.33	0.49	0.81	0.00	$\bar{C}p(A)$	$\overline{Dev.}(A)$ c	
A	0.23	0.34	0.81	0.00	0.81	0.00	
B	0.49	0.70	0.83	0.01			
B	0.33	0.49	0.81	0.01	$\bar{C}p(B)$	$\overline{Dev.}(B)$ c	
B	0.23	0.34	0.81	0.01	0.82	0.01	

[a] $Cp(s) = (Cp_{std})(\Delta P_{std}/\Delta p_s)^{1/2}$

[b] Deviation = $\lvert Cp(s)-\bar{C}p(A \text{ or } B)\rvert$

[c] Must be less than or equal to 0.01.

Figure E-3 (continued)

PITOT TUBE INSPECTION DATA SHEET

α_1 = 0.0 ° (must be less than 10°)

α_2 = 1.0 ° (must be less than 10°)

β_1 = 3.0 ° (must be less than 5°)

β_2 = 4.0 ° (must be less than 5°)

γ = 0.0 °

θ = 1.0 °

A = 1.066 inches

z = A sin γ = 0.000 inches (must be less than 0.125 inches)

w = A sin θ = 0.019 inches (must be less than 0.03125 inches)

P_A = 0.580 inches

P_B = 0.486 inches

P_t = 0.375 inches

Pitot tube No. 180

Need calibration _____ yes X no

Inspector B. Amstutz

Date 2/11/81

Figure E-3 (continued)

PITOT TUBE CALIBRATION DATA SHEET

Pitot tube No.: 180 Date: 2/11/81 Calibrator: R. Armstrong

Reference pitot tube No.: 502 Type: standard Cp: 0.99

Side	ΔP_{std} in. H_2O	Δp_s in. H_2O	Cp(s) a	Dev. b		$\bar{C}p(s)$	$\lvert\bar{C}p(A)-\bar{C}p(B)\rvert$ c
A	0.50	0.74	0.81	0.00		0.81	0.00
A	0.32	0.47	0.82	0.01	$\bar{C}p(A)$	$\overline{Dev.}(A)$ c	
A	0.23	0.34	0.81	0.00	0.81	0.003	
B	0.50	0.74	0.81	0.00			
B	0.32	0.47	0.82	0.01	$\bar{C}p(B)$	$\overline{Dev.}(B)$ c	
B	0.23	0.34	0.81	0.00	0.81	0.003	

[a] $Cp(s) = (Cp_{std})(\Delta P_{std}/\Delta p_s)^{1/2}$

[b] Deviation = $|Cp(s)-\bar{C}p(A \text{ or } B)|$

[c] Must be less than or equal to 0.01.

Figure E-3 (continued)

PITOT TUBE INSPECTION DATA SHEET

α_1 = 1.0 ° (must be less than 10°)

α_2 = 2.0 ° (must be less than 10°)

β_1 = 3.0 ° (must be less than 5°)

β_2 = 1.0 ° (must be less than 5°)

γ = 1.0 °

θ = 2.0 °

A = .845 inches

z = A sin γ = .0147 inches (must be less than 0.125 inches)

w = A sin θ = .0294 inches (must be less than 0.03125 inches)

P_A = .4225 inches

P_B = .4225 inches

P_t = .377 inches

Pitot tube No. F125

Need calibration _____ yes X no

Inspector [illegible]

Date 1/30/81

Figure E-3 (continued)

PITOT TUBE CALIBRATION DATA SHEET

Pitot tube No.: 185 Date: 2/5/81 Calibrator: B. Armstrong

Reference pitot tube No.: 502 Type: standard Cp: 0.99

Side	ΔP_{std} in. H_2O	Δp_s in. H_2O	Cp(s) a	Dev. b		$\bar{C}p(s)$	$\lvert\bar{C}p(A)-\bar{C}p(B)\rvert$ c
A	0.49	0.67	0.85	0.01		0.84	0.00
A	0.33	0.47	0.83	0.01	$\bar{C}p(A)$	$\overline{Dev.}(A)$ c	
A	0.23	0.33	0.83	0.01	0.84	0.01	
B	0.49	0.67	0.85	0.01			
B	0.33	0.47	0.83	0.01	$\bar{C}p(B)$	$\overline{Dev.}(B)$ c	
B	0.23	0.33	0.83	0.01	0.84	0.01	

[a] $Cp(s) = (Cp_{std})(\Delta P_{std}/\Delta p_s)^{1/2}$

[b] Deviation = $|Cp(s)-\bar{C}p(A \text{ or } B)|$

[c] Must be less than or equal to 0.01.

Figure E-3 (continued)

PITOT TUBE INSPECTION DATA SHEET

α_1 = 0.0 ° (must be less than 10°)

α_2 = 0.0 ° (must be less than 10°)

β_1 = 4.0 ° (must be less than 5°)

β_2 = 3.0 ° (must be less than 5°)

γ = 0.0 °

θ = 5.0 °

A = 0.905 inches

z = A sin γ = 0.000 inches (must be less than 0.125 inches)

w = A sin θ = 0.000 inches (must be less than 0.03125 inches)

P_A = 0.574 inches

P_B = 0.431 inches

P_t = 0.376 inches

Pitot tube No. 157

Need calibration _____ yes X no

Inspector P. Armstrong

Date 2/4/81

Figure E-3 (continued)

PITOT TUBE CALIBRATION DATA SHEET

Pitot tube No.: 187 Date: 2/9/81 Calibrator: B. Amstrong

Reference pitot tube No.: 502 Type: standard Cp: 0.99

Side	ΔP_{std} in. H_2O	Δ_{ps} in. H_2O	Cp(s) a	Dev. b		$\bar{C}p(s)$	$\lvert\bar{C}p(A)-\bar{C}p(B)\rvert$ c
A	0.51	0.73	0.83	0.00		0.83	0.000
A	0.33	0.47	0.83	0.00	$\bar{C}p(A)$	$\overline{Dev.}(A)$ c	
A	0.22	0.32	0.82	0.01	0.83	0.003	
B	0.51	0.73	0.83	0.00			
B	0.33	0.47	0.83	0.00	$\bar{C}p(B)$	$\overline{Dev.}(B)$ c	
B	0.22	0.32	0.82	0.01	0.83	0.003	

[a] $Cp(s) = (Cp_{std})(\Delta P_{std}/\Delta_{ps})^{1/2}$

[b] Deviation = $|Cp(s)-\bar{C}p(A \text{ or } B)|$

[c] Must be less than or equal to 0.01.

Figure E-3 (continued)

PITOT TUBE INSPECTION DATA SHEET

α_1 = 4.0 ° (must be less than 10°)

α_2 = 0.0 ° (must be less than 10°)

β_1 = 0.0 ° (must be less than 5°)

β_2 = 2.0 ° (must be less than 5°)

γ = 0.0 °

θ = 0.0 °

A = 0.978 inches

z = A sin γ = 0.000 inches (must be less than 0.125 inches)

w = A sin θ = 0.000 inches (must be less than 0.03125 inches)

P_A = 0.500 inches

P_B = 0.478 inches

P_t = 0.375 inches

Pitot tube No. 189

Need calibration _____ yes X no

Inspector B. Armstrong

Date 2/11/81

Figure E-3 (continued)

PITOT TUBE CALIBRATION DATA SHEET

Pitot tube No.: 189 Date: 2/11/81 Calibrator: B. Armstrong

Reference pitot tube No.: 502 Type: standard Cp: 0.99

Side	ΔP_{std} in. H_2O	Δp_s in. H_2O	Cp(s) a	Dev. b		$\bar{C}p(s)$	$\lvert\bar{C}p(A)-\bar{C}p(B)\rvert$ c
A	0.50	0.72	0.82	0.00		0.82	0.00
A	0.32	0.45	0.83	0.01	$\bar{C}p(A)$	$\overline{Dev.}(A)$ c	
A	0.23	0.34	0.81	0.01	0.82	0.01	
B	0.50	0.74	0.81	0.01			
B	0.32	0.46	0.83	0.01	$\bar{C}p(B)$	$\overline{Dev.}(B)$ c	
B	0.23	0.34	0.81	0.00	0.82	0.01	

[a] $Cp(s) = (Cp_{std})(\Delta P_{std}/\Delta p_s)^{1/2}$

[b] Deviation = $\lvert Cp(s)-\bar{C}p(A \text{ or } B)\rvert$

[c] Must be less than or equal to 0.01.

Figure E-3 (continued)

PITOT TUBE INSPECTION DATA SHEET

α_1 = 0.0 ° (must be less than 10°)

α_2 = 0.0 ° (must be less than 10°)

β_1 = 2.0 ° (must be less than 5°)

β_2 = 2.0 ° (must be less than 5°)

γ = 1.0 °

θ = 0.0 °

A = 1.097 inches

z = A sin γ = 0.019 inches (must be less than 0.125 inches)

w = A sin β = 0.000 inches (must be less than 0.03125 inches)

P_A = 0.592 inches

P_B = 0.595 inches

P_t = 0.376 inches

Pitot tube No. 192

Need calibration _____ yes ✓ no

Inspector J Armstrong

Date 3/4/81

Figure E-3 (continued)

PITOT TUBE CALIBRATION DATA SHEET

Pitot tube No.: 192 Date: 2/9/81 Calibrator: B Armstrong

Reference pitot tube No.: 502 Type: standard Cp: 0.99

Side	ΔP_{std} in. H_2O	Δp_s in. H_2O	Cp(s) a	Dev. b		$\bar{C}p(s)$	$\lvert\bar{C}p(A)-\bar{C}p(B)\rvert$ c
A	0.51	0.73	0.83	0.00		0.83	0.00
A	0.33	0.47	0.83	0.00	$\bar{C}p(A)$	$\overline{Dev.}(A)$ c	
A	0.22	0.32	0.82	0.01	0.83	0.003	
B	0.51	0.73	0.83	0.00			
B	0.33	0.47	0.83	0.00	$\bar{C}p(B)$	$\overline{Dev.}(B)$ c	
B	0.22	0.32	0.82	0.01	0.83	0.003	

[a] $Cp(s) = (Cp_{std})(\Delta P_{std}/\Delta p_s)^{1/2}$

[b] Deviation = $\lvert Cp(s)-\bar{C}p(A \text{ or } B)\rvert$

[c] Must be less than or equal to 0.01.

Figure E-3 (continued)

DRY GAS METER AND ORIFICE METER

Figure E-4 was the set-up used for the initial and post-test calibration. A wet test meter with a 2-cubic-feet-per-minute capacity and ±1 percent accuracy was used. The pump was run for approximately 15 minutes at an orifice manometer setting of 0.5 inch of water to heat up the pump and wet the interior surface of the wet test meter. The information on Figure E-5 (example calculation sheet) was gathered for the initial calibration and then, the ratio of accuracy of the wet test meter to the dry test meter, and the ΔH@ were calculated.

POST-TEST METER CALIBRATION CHECK

A post-test meter calibration check was made on the meter box used during the test to check its accuracy against its last calibration check. This post-test calibration must be within ±5 percent of the initial calibration. The initial calibration was performed as described in APTD-0576. The post-test calibration was performed using the same method as the initial calibration. Three calibration runs were made using the average orifice setting obtained during each test run and with the vacuum set at the average value obtained during each test run. After running the post-test calibration check all three runs were within the ±5 percent range allowed by the Federal Register.*

The initial and post-test meter box calibration data are presented in Figure E-6.

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*40 CFR 60, Appendix A, July 1, 1980.

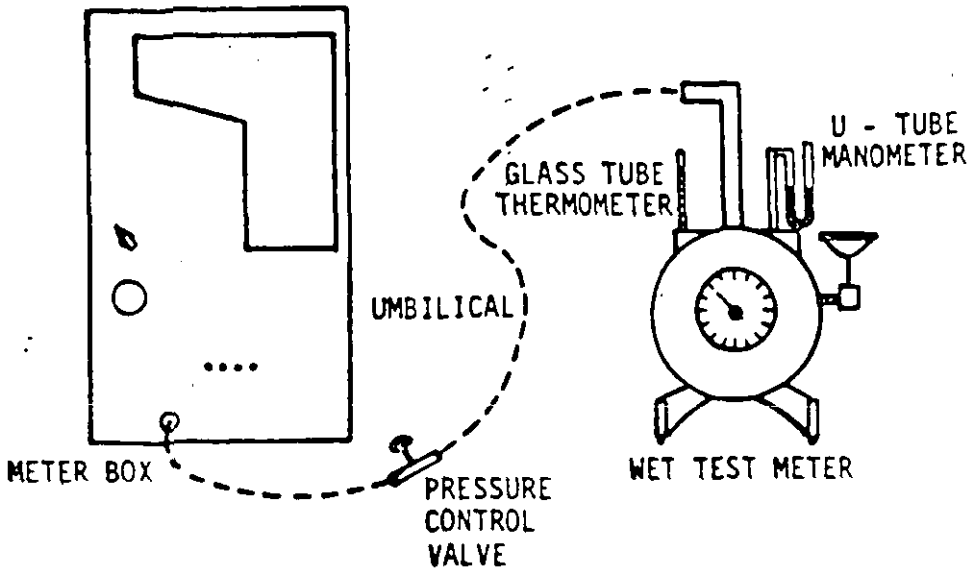

Figure E-4. Calibration setup.

DATE_____ METER BOX NO._____

BAROMETRIC PRESSURE, P_b = _____in. Hg. DRY GAS METER NO._____

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft_3	Gas volume dry gas meter V_d, ft_3	Wet test meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min	γ	$\Delta H@$
0.5	5								
1.0	5								
1.5	10								
2.0	10								
3.0	10								
4.0	10								

Average _____

ΔH	$\frac{\Delta H}{13.6}$	γ $\frac{V_w P_b (t_d + 400)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	$\Delta H@$ $\frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w} \right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

γ = Ratio of accuracy of wet test meter to dry test meter. Tolerance = ± 0.01
$\Delta H@$ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in H_2). Tolerance = +0.15.

Figure E-5. Calibration data sheet.

DRY GAS METER AND ORIFICE CALIBRATION DATA SHEET

LEAK CHECK:

POSITIVE*: ✓

NEGATIVE**: vacuum used 27.5" Hg leakage rate 0.000 cfm***

DATE 2/12/80 METER BOX NO. FB-2

BAROMETRIC PRESSURE, P_b = 30.33 in. Hg. CALIBRATOR B. Armstrong

VACUUM USED DURING CALIBRATION ~10" Hg

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test Meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	Y	ΔH@
0.5	5	675.500	71.0	73	69	72.0	12 19.2/60	1.000	1.68
		680.507	71.0	76	70				
1.0	5	680.900	71.0	76	70	74.0	8 45.4/60	1.002	1.69
		685.907	71.0	80	70				
1.5	10	686.400	71.0	80	70	77.0	14 46.3/60	1.006	1.80
		696.416	71.0	85	73				
2.0	10	696.900	71.0	85	73	80.0	12 53.6/60	1.010	1.81
		706.932	71.0	88	74				
3.0	10	707.300	71.0	88	74	82.0	10 26.4/60	1.012	1.78
		717.309	71.0	90	76				
4.0	10	717.703	71.0	90	76	83.0	9 06.9/60	1.012	1.80
		727.707	71.0	90	76				
							Average	1.007	1.76

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\,\Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5.000)(30.33)(532.0)}{(5.001)(30.3668)(531.0)}$	$\frac{(0.0317)(0.5)}{(30.33)(532.0)}\left[\frac{(531.0)(12.328)}{(5.000)}\right]^2$
1.0	0.0737	$\frac{(5.000)(30.33)(534.0)}{(5.007)(30.4037)(531.0)}$	$\frac{(0.0317)(1.0)}{(30.33)(534.0)}\left[\frac{(531.0)(8.757)}{(5.000)}\right]^2$
1.5	0.110	$\frac{(10.000)(30.33)(537.0)}{(10.016)(30.440)(531.0)}$	$\frac{(0.0317)(1.5)}{(30.33)(537.0)}\left[\frac{(531.0)(14.772)}{(10.000)}\right]^2$
2.0	0.147	$\frac{(10.000)(30.33)(540.0)}{(10.032)(30.477)(531.0)}$	$\frac{(0.0317)(2.0)}{(30.33)(540.0)}\left[\frac{(531.0)(12.893)}{(10.000)}\right]^2$
3.0	0.221	$\frac{(10.000)(30.33)(542.0)}{(10.009)(30.551)(531.0)}$	$\frac{(0.0317)(3.0)}{(30.33)(542.0)}\left[\frac{(531.0)(10.440)}{(10.000)}\right]^2$
4.0	0.294	$\frac{(10.000)(30.33)(543.0)}{(10.004)(30.624)(531.0)}$	$\frac{(0.0317)(4.0)}{(30.33)(543.0)}\left[\frac{(531.0)(9.115)}{(10.000)}\right]^2$

Y = Ratio of accuracy of wet test meter to dry test meter.
Tolerance = ± 0.02Y

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.
Tolerance = 0.15.

* At least five inches water pressure.

** Within three inches mercury of absolute vacuum.

*** Not to exceed 0.005 cfm.

Figure E-6. Pretest and post-test dry gas meter calibration data.

Date 5/4/81

Barometric pressure, P_b = 29.54 "Hg

Meter Box No. FB-2

Dry Gas Meter No. N/A

Plant CARTECH.

P/N 3530-2

Project Manager JOHN PROCHASKA

Pretest Y 1.007

Test No.	Orifice manometer setting, ΔH,* in H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °F	Temperature: Dry gas meter Inlet t_{di}, °F	Temperature: Dry gas meter Outlet t_{do}, °F	Temperature: Dry gas meter Average[a] t_d, °F	Time θ, min.	Vacuum setting in Hg**	Yi	Yi: $\frac{V_w P_b (t_d + 460)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	1.30	10	867.010	73.5	78	72	77	15 6/10	5	.994	(10.000)(29.54)(537)
			877.100	73.5	84	74					(10.090)(29.636)(533
2	1.30	10	877.100	73.5	84	74	80.5	15 5/10	5	.997	(10.000)(29.54)(540.5
			887.225	73.5	88	76					(10.125)(29.636)(533.
3	1.30	14	887.225	73.5	88	76	82.75	21 8/10	5	.998	(14.000)(29.54)(542.75
			901.445	73.5	89	78					(14.220)(29.636)(533

Post-test y = .996.

Calibrated by Rick Cartesberger
Signature

* If there is only one thermometer on the dry gas meter record the temperature under t_d.

where:

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry test meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry test meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry test meter, °F.

t_d = Average temperature of the gas in the dry test meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry test meter for each run.

Y = Average ratio of accuracy of wet test meter to dry test meter for all three runs.
Tolerance = Pretest Y ±0.05 Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, minutes.

* To be the average ΔH used during the test series
** To be the maximum vacuum used during the test series

Figure E-6 (continued)

DRY GAS METER AND ORIFICE CALIBRATION DATA SHEET

LEAK CHECK:

POSITIVE*: ✓BA

NEGATIVE**: vacuum used 27.0 "Hg leakage rate 0.000 cfm***

DATE 3/4/81 METER BOX NO. FB-3

BAROMETRIC PRESSURE, P_b = 29.26 in. Hg. CALIBRATOR B. Armstrong

VACUUM USED DURING CALIBRATION ~10 "Hg

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test Meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	γ	ΔH@
0.5	5	830.940	72.5	82	74	78.5	$12\frac{52.5}{60}$	1.005	1.89
		835.963	72.5	84	74				
1.0	5	836.250	72.5	85	75	80.25	$9\frac{16.5}{60}$	1.003	1.96
		841.294	72.5	86	75				
1.5	11	841.550	72.5	86	75	82.5	$16\frac{47.8}{60}$	1.008	1.98
		852.625	72.5	91	78				
2.0	10	852.850	72.5	90	78	85.0	$13\frac{12.9}{60}$	1.010	1.99
		862.934	72.5	93	79				
3.0	10	863.502	72.5	94	79	87.25	$10\frac{54.9}{60}$	1.010	2.01
		873.602	72.5	96	80				
4.0	10	874.050	72.5	96	80	88.5	$9\frac{29.9}{60}$	1.011	2.02
		884.740	72.5	98	80				
							Average	1.008	1.98

ΔH	$\frac{\Delta H}{13.6}$	γ: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\,\Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5.000)(29.26)(538.5)}{(5.023)(29.2968)(532.5)}$	$\frac{(0.0317)(0.5)}{(29.26)(538.5)}\left[\frac{(532.5)(12.8750)}{(5.000)}\right]^2$
1.0	0.0737	$\frac{(5.000)(29.26)(540.25)}{(5.044)(29.3331)(532.5)}$	$\frac{(0.0317)(1.0)}{(29.26)(540.25)}\left[\frac{(532.5)(9.2750)}{(5.000)}\right]^2$
1.5	0.110	$\frac{(11.000)(29.26)(542.5)}{(11.075)(29.370)(532.5)}$	$\frac{(0.0317)(1.5)}{(29.26)(542.5)}\left[\frac{(532.5)(16.7967)}{(11.000)}\right]^2$
2.0	0.147	$\frac{(10.000)(29.26)(545.0)}{(10.084)(29.407)(532.5)}$	$\frac{(0.0317)(2.0)}{(29.26)(545.0)}\left[\frac{(532.5)(13.2983)}{(10.000)}\right]^2$
3.0	0.221	$\frac{(10.000)(29.26)(547.25)}{(10.100)(29.481)(532.5)}$	$\frac{(0.0317)(3.0)}{(29.26)(547.25)}\left[\frac{(532.5)(10.9150)}{(10.000)}\right]^2$
4.0	0.294	$\frac{(10.000)(29.26)(548.5)}{(10.090)(29.554)(532.5)}$	$\frac{(0.0317)(4.0)}{(29.26)(548.5)}\left[\frac{(532.5)(9.4983)}{(10.000)}\right]^2$

γ = Ratio of accuracy of wet test meter to dry test meter.
Tolerance = ± 0.02γ

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.
Tolerance = 0.15.

* At least five inches water pressure.

** Within three inches mercury of absolute vacuum.

*** Not to exceed 0.005 cfm.

Figure E-6 (continued)

Date 5/4/81

Barometric pressure, P_b = 29.54 "Hg

Meter Box No. FB-3

Dry Gas Meter No. N/A

Plant Cartech

P/N 3450-2

Project Manager J. Prehoska

Pretest Y 1.008

Test No.	Orifice manometer setting, ΔH,* in H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °F	Temperature: Dry gas meter Inlet t_{di}, °F	Temperature: Dry gas meter Outlet t_{do}, °F	Temperature: Dry gas meter Average[a] t_d, °F	Time θ, min.	Vacuum setting in Hg**	Yi	Yi: $\frac{V_w P_b (t_d + 460)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	1.5	10	588.000	73.5	76	76	78.5	15 1/10	3.5	1.033	(10.000)(29.54)(538.5 / (9.738)(29.65)(533.5
			597.738	73.5	84	78					
2	1.5	10	597.738	73.5	84	78	82.5	15 1/10	3.5	1.036	(10.000)(29.54)(542. / (9.782)(29.65)(
			607.520	73.5	88	80					
3	1.5	10	607.520	73.5	76	70	74.75	15 1/10	3.5	1.036	(10.000)(29.54)(534.7 / (9.640)(29.65)(533.5
			617.160	73.5	83	70					

Post-test y = 1.035

Calibrated by Ric Cortesberger
Signature

[a] If there is only one thermometer on the dry gas meter record the temperature under t_d.

where:

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry test meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry test meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry test meter, °F.

t_d = Average temperature of the gas in the dry test meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry test meter for each run.

Y = Average ratio of accuracy of wet test meter to dry test meter for all three runs. Tolerance = Pretest Y ±0.05 Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, minutes.

* To be the average ΔH used during the test series
** To be the maximum vacuum used during the test series

Figure E-6 (continued)

DRY GAS METER AND ORIFICE CALIBRATION DATA SHEET

LEAK CHECK:

POSITIVE*: ✓

NEGATIVE**: vacuum used 26.2 leakage rate 0.0009 cfm***

DATE 6/12/80 METER BOX NO. FB-4

BAROMETRIC PRESSURE, P_b = 29.80 in. Hg. CALIBRATOR B Armstrong

VACUUM USED DURING CALIBRATION 11 in Hg

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test Meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	Y	ΔH@
0.5	5	413.401	73.5	89	91	90.0	12 31/60	1.048	1.72
		418.312	73.5	89	91				
1.0	5	418.932	73.5	89	89	89.0	8 52/60	1.051	1.73
		423.816	73.5	90	88				
1.5	10	445.606	73.5	92	87	89.5	14 35/60	1.052	1.76
		455.363	73.5	92	87				
2.0	10	456.045	73.5	91	86	88.5	12 55/60	1.049	1.87
		465.794	73.5	91	86				
3.0	10	466.312	73.5	91	86	89.0	10 31/60	1.048	1.84
		476.056	73.5	93	86				
4.0	10	476.551	73.5	92	86	89.5	9 9/60	1.049	1.85
		486.274	73.5	94	86				
							Average	1.050	1.79

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\,\Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5.000)(29.80)(550)}{(4.911)(29.84)(533.5)}$	$\frac{(0.0317)(0.5)}{(29.80)(550)}\left[\frac{(533.5)(12.5167)}{(5000)}\right]^2$
1.0	0.0737	$\frac{(5.000)(29.80)(549)}{(4.884)(29.87)(533.5)}$	$\frac{(0.0317)(1.0)}{(29.80)(549)}\left[\frac{(533.5)(8.66667)}{(5000)}\right]^2$
1.5	0.110	$\frac{(10.000)(29.80)(549.5)}{(9.757)(29.91)(533.5)}$	$\frac{(0.0317)(1.5)}{(29.80)(549.5)}\left[\frac{(533.5)(14.5833)}{(10.000)}\right]^2$
2.0	0.147	$\frac{(10.000)(29.80)(548.5)}{(9.744)(29.95)(533.5)}$	$\frac{(0.0317)(2.0)}{(29.80)(548.5)}\left[\frac{(533.5)(12.91667)}{(10.000)}\right]^2$
3.0	0.221	$\frac{(10.000)(29.80)(549.0)}{(9.744)(30.02)(533.5)}$	$\frac{(0.0317)(3.0)}{(29.80)(549.0)}\left[\frac{(533.5)(10.53333)}{(10.000)}\right]^2$
4.0	0.294	$\frac{(10.000)(29.80)(549.5)}{(9.723)(30.09)(533.5)}$	$\frac{(0.0317)(4.0)}{(29.80)(549.5)}\left[\frac{(533.5)(9.1500)}{(10.000)}\right]^2$

Y = Ratio of accuracy of wet test meter to dry test meter.
Tolerance = ± 0.02Y

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.
Tolerance = 0.15.

Figure E-6 (continued)

* At least five inches water pressure.

** Within three inches mercury of absolute vacuum.

*** Not to exceed 0.005 cfm.

Date 5/5/81

Barometric pressure, P_b = 29.49 "Hg

Meter Box No. FB-4

Dry Gas Meter No. 2/1

Plant CARTECH

P/N 3530-2

Project Manager JOHN FERNAGRA

Pretest Y 1.050

Test No.	Orifice manometer setting, ΔH,* in H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °F	Temperature: Dry gas meter Inlet t_{di}, °F	Temperature: Dry gas meter Outlet t_{do}, °F	Temperature: Dry gas meter Average[a] t_d, °F	Time θ, min.	Vacuum setting in Hg**	Yi	Yi $\frac{V_w P_b (t_d + 460)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	2.5	10	976.250	74	76	70	73.5	11 5/10	10	1.030	(10.000)(29.49)(533.5) / (9.640)(29.67)(534)
			986.390	74	78	70					
2	2.5	10	986.390	74	78	70	75	11 4/10	10	1.032	(10.000)(29.49)(535) / (9.645)(29.67)(5..)
			996.035	74	80	72					
3	2.5	14	996.030	74	80	72	76.25	16 1/10	10	1.032	(14.000)(29.49)(536.2) / (9.545)(29.67)(534)
			009.580	74	81	72					

Post-test y = 1.031

Calibrated by [signature]
Signature

[a] If there is only one thermometer on the dry gas meter record the temperature under t_d.

where:

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry test meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry test meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry test meter, °F.

t_d = Average temperature of the gas in the dry test meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry test meter for each run.

Y = Average ratio of accuracy of wet test meter to dry test meter for all three runs.
Tolerance = Pretest Y ±0.05 Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, minutes.

* To be the average ΔH used during the test series
** To be the maximum vacuum used during the test series

Figure E-6 (continued)

DRY GAS METER AND ORIFICE CALIBRATION DATA SHEET

LEAK CHECK:

POSITIVE*: ✓

NEGATIVE**: vacuum used 27.0" Hg leakage rate 0.000 cfm***

DATE 8/27/80 METER BOX NO. FB-6

BAROMETRIC PRESSURE, P_b = 29.64 in. Hg. CALIBRATOR Bruce Armstrong

VACUUM USED DURING CALIBRATION ~11" Hg

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test Meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	Y	ΔH@
0.5	5	269.300	73.4	78	74	76.5	$11\frac{21.9}{60}$	0.973	1.47
		274.460	73.4	79	75				
1.0	5	280.600	73.4	79	75	77.75	$8\frac{15.2}{60}$	0.973	1.54
		285.768	73.4	82	75				
1.5	10	286.900	73.4	82	75	79.25	$13\frac{25.7}{60}$	0.973	1.53
		297.252	73.4	84	76				
2.0	10	298.900	73.4	84	76	80.75	$11\frac{40.3}{60}$	0.973	1.53
		309.265	73.4	86	77				
3.0	10	310.000	73.4	86	77	82.25	$9\frac{33.2}{60}$	0.974	1.54
		320.365	73.4	88	78				
4.0	10	321.100	73.4	88	78	83.0	$8\frac{17.3}{60}$	0.974	1.54
		331.446	73.4	88	78				

Average 0.973 1.53

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w}\right]^2$
0.5	0.0368	$\frac{(5.000)(29.64)(536.5)}{(5.160)(29.6768)(533.4)}$	$\frac{(0.0317)(0.5)}{(29.64)(536.5)}\left[\frac{(533.4)(11.365000)}{(5.000)}\right]^2$
1.0	0.0737	$\frac{(5.000)(29.64)(537.75)}{(5.168)(29.7137)(533.4)}$	$\frac{(0.0317)(1.0)}{(29.64)(537.75)}\left[\frac{(533.4)(8.2533333)}{(5.000)}\right]^2$
1.5	0.110	$\frac{(10.000)(29.64)(539.25)}{(10.352)(29.750)(533.4)}$	$\frac{(0.0317)(1.5)}{(29.64)(539.25)}\left[\frac{(533.4)(13.4283333)}{(10.000)}\right]^2$
2.0	0.147	$\frac{(10.000)(29.64)(540.75)}{(10.365)(29.787)(533.4)}$	$\frac{(0.0317)(2.0)}{(29.64)(540.75)}\left[\frac{(533.4)(11.6716667)}{(10.000)}\right]^2$
3.0	0.221	$\frac{(10.000)(29.64)(542.25)}{(10.365)(29.861)(533.4)}$	$\frac{(0.0317)(3.0)}{(29.64)(542.25)}\left[\frac{(533.4)(9.5533333)}{(10.000)}\right]^2$
4.0	0.294	$\frac{(10.000)(29.64)(543.0)}{(10.346)(29.934)(533.4)}$	$\frac{(0.0317)(4.0)}{(29.64)(543.0)}\left[\frac{(533.4)(8.2883333)}{(10.000)}\right]^2$

Y = Ratio of accuracy of wet test meter to dry test meter.
Tolerance = ± 0.02.

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.
Tolerance = 0.15.

Figure E-6 (continued)

* At least five inches water pressure.

** Within three inches mercury of absolute vacuum.

*** Not to exceed 0.005 cfm.

Date 5/12/81

Barometric pressure, P_b = 29.58 "Hg

Meter Box No. FB-6

Dry Gas Meter No. N/A

Plant Cinpente (EPA)

P/N 3530-2

Project Manager J. Prohaska

Pretest Y 0.973

Test No.	Orifice manometer setting, ΔH,* in H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °F	Temperature: Dry gas meter Inlet t_{di}, °F	Temperature: Dry gas meter Outlet t_{do}, °F	Temperature: Dry gas meter Average[a] t_d, °F	Time θ, min.	Vacuum setting in Hg**	Yi	Yi $\frac{V_w P_b (t_d + 460)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	2.5	10	802.100	73.0	90	77	84.5	10.3	4.0	0.973	(10.000)(29.58)(544.5) / (10.434)(29.764)(533.0)
			812.534	73.0	93	78					
2	2.5	10	812.534	73.0	93	78	86.25	10.3	4.0	0.974	(10.000)(29.58)(546.25) / (10.461)(29.764)(533.0)
			822.995	73.0	94	80					
3	2.5	10	822.995	73.0	94	80	87.5	10.3	4.0	0.973	(10.000)(29.58)(547.5) / (10.497)(29.764)(533.0)
			833.492	73.0	96	80					

Post-test y = 0.973

Calibrated by Bruce Armstrong
Signature

[a] If there is only one thermometer on the dry gas meter record the temperature under t_d.

where:

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry test meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry test meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry test meter, °F.

t_d = Average temperature of the gas in the dry test meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry test meter for each run.

Y = Average ratio of accuracy of wet test meter to dry test meter for all three runs.
Tolerance = Pretest Y ±0.05 Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, minutes.

* To be the average ΔH used during the test series
** To be the maximum vacuum used during the test series

Figure E-6 (continued)

DRY GAS METER AND ORIFICE CALIBRATION DATA SHEET

LEAK CHECK:

POSITIVE*: ✓ 3A

NEGATIVE**: vacuum used 26.5" Hg leakage rate 0.000 cfm***

DATE 1/20/81 METER BOX NO. FB-8

BAROMETRIC PRESSURE, P_b = 29.47 in. Hg. CALIBRATOR Bruce Armstrong

VACUUM USED DURING CALIBRATION ~10 in Hg

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test Meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	γ	ΔH@
0.5	5	180.000	71.5	77	72	74.75	12 48.0/60	0.972	1.86
		185.170	71.5	77	73				
1.0	5	185.400	71.5	78	74	76.25	9 9.7/60	0.990	1.90
		190.485	71.5	79	74				
1.5	10	191.400	71.5	80	75	77.75	14 58.9/60	0.981	1.90
		201.617	71.5	81	75				
2.0	10	202.000	71.5	82	76	79.25	12 58.8/60	0.985	1.90
		212.251	71.5	82	77				
3.0	10	212.800	71.5	82	77	79.75	10 12.4/60	0.983	1.94
		223.058	71.5	83	77				
4.0	10	229.100	71.5	81	77	79.5	9 21.7/60	0.980	1.97
		239.360	71.5	82	78				
							Average	0.982	1.91

ΔH	$\frac{\Delta H}{13.6}$	γ: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\,\Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\,\theta}{V_w}\right]^2$
0.5	0.0368	(5.000)(29.47)(534.75) / (5.170)(29.5068)(531.5)	(0.0317)(0.5) / (29.47)(534.75) [(531.5)(12.8000) / 5.000]²
1.0	0.0737	(5.000)(29.47)(536.25) / (5.085)(29.5437)(531.5)	(0.0317)(1.0) / (29.47)(536.25) [(531.5)(9.1617) / 5.000]²
1.5	0.110	(10.000)(29.47)(537.75) / (10.217)(29.580)(531.5)	(0.0317)(1.5) / (29.47)(537.75) [(531.5)(14.9817) / 10.000]²
2.0	0.147	(10.000)(29.47)(539.25) / (10.251)(29.617)(531.5)	(0.0317)(2.0) / (29.47)(539.25) [(531.5)(12.9800) / 10.000]²
3.0	0.221	(10.000)(29.47)(539.75) / (10.258)(29.691)(531.5)	(0.0317)(3.0) / (29.47)(539.75) [(531.5)(10.7067) / 10.000]²
4.0	0.294	(10.000)(29.47)(539.5) / (10.260)(29.764)(531.5)	(0.0317)(4.0) / (29.47)(539.5) [(531.5)(9.3617) / 10.000]²

γ = Ratio of accuracy of wet test meter to dry test meter.
Tolerance = ± 0.02γ

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.
Tolerance = 0.15.

* At least five inches water pressure.

** Within three inches mercury of absolute vacuum.

*** Not to exceed 0.005 cfm.

Figure E-6 (continued)

Date 5/5/81

Barometric pressure, P_b = 29.49 "Hg

Meter Box No. FB-8

Dry Gas Meter No. N/A

Plant CARTECH

P/N 3530-2

Project Manager JOHN PROHASKA

Pretest Y .982

Test No.	Orifice manometer setting, ΔH,* in H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °F	Temperature: Dry gas meter Inlet t_{di}, °F	Temperature: Dry gas meter Outlet t_{do}, °F	Temperature: Dry gas meter Average[a] t_d, °F	Time θ, min.	Vacuum setting in Hg**	Yi	Yi $\frac{V_w P_b (t_d + 460)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1	.60	10	925.160	74.5	72	70	72.75	23 3/10	2.5	.995	(10.000)(29.49)(532.7) / (10.002)(29.53)(534.1)
			935.162	74.5	76	73					
2	.60	10	935.162	74.5	76	73	75.25	23 4/10	2.5	.996	(10.000)(29.49)(535) / (10.038)(29.53)(534.1)
			945.200	74.5	78	74					
3	.60	12 10	945.200	74.5	78	74	76	27 7/10	2.5	.996	(12.000)(29.49)(536) / (12.060)(29.53)(534.1)
			957.260	74.5	78	74					

Post-test y = .995

Calibrated by [signature]
Signature

[a] If there is only one thermometer on the dry gas meter record the temperature under t_d.

where:

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry test meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry test meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry test meter, °F.

t_d = Average temperature of the gas in the dry test meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry test meter for each run.

Y = Average ratio of accuracy of wet test meter to dry test meter for all three runs. Tolerance = Pretest Y ±0.05 Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, minutes.

* To be the average ΔH used during the test series

** To be the maximum vacuum used during the test series

Figure E-6 (continued)

THERMOCOUPLE

Thermocouples were calibrated by comparison against an ASTM-2F thermometer at approximately 32°F, ambient temperature, 100°F, and 500°F. The thermocouples read within 1.5 percent of the reference thermometer throughout the entire range when expressed in degrees Rankine. If the thermocouple did not read within 1.5 percent, a correction formula based on a least squares analysis of the data was utilized. The correction formula corrected the data to within 1.5 percent. The thermocouple was checked at ambient temperature at the test site to verify the calibration. Calibration data is presented in Figure E-7.

DIGITAL INDICATOR FOR THERMOCOUPLE READOUT

A digital indicator was calibrated by feeding a series of millivolt signals to the input, and comparing the indicator reading with the reading the signal should have generated. Error did not exceed 0.5 percent when the temperatures were expressed in degrees Rankine. Calibration data are shown in Figure E-8.

DRY GAS THERMOMETERS

The dry gas thermometers were calibrated by comparison against an ASTM-2F thermometer at approximately 32°F, at ambient temperature, and at approximately 110°F. The thermometer agreed within 5°F of the reference thermometer. The thermometers were checked prior to each test series at ambient temperature to verify calibration. Calibration data are included in Figure E-9.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 5/14/80 Thermocouple No.: 129

Ambient temperature: 75 °F Barometric pressure: 29.50 " Hg

Calibrator: B Armstrong Reference: ASTM-2F

Reference point No.	Source,* (specify)	Reference thermometer temperature, °F***	Thermocouple temperature, °F	Difference, %**
1	2	75	75	0.00
2	1	37	37	0.00
3	3	116	112	0.69
4	3	498	518	-2.09

Correction factor****: Slope: 0.9538 Intercept: 4.57

Reference point No.	Reference thermometer temperature, °F	Corrected thermocouple temperature, °F	Difference, %**
1	75	76	-0.19
2	37	40	-0.60
3	116	111	0.87
4	498	499	-0.10

Critical test points are 32°, 100°, and 500°.

*Source: 1) Ice bath
2) Ambient
3) Furnace

**Percent difference

$$\frac{\text{Reference temp. °F - thermocouple temp. °F}}{\text{(Reference temp. °F + 460°F)}} \times 100\%$$

Each percent difference must be less than or equal to 1.5%.

***Reference thermometer must be ASTM.

****Correction factor must be determined if any percent difference is >1.5%.

Figure E-7. Thermocouple calibration data.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 6/3/80 Thermocouple No.: 164

Ambient temperature: 70 °F Barometric pressure: 29.34 " Hg

Calibrator: B. Armstrong Reference: Thermocouple #139

Reference point No.	Source,* (specify)	Reference thermometer temperature, °F***	Thermocouple temperature, °F	Difference, %**
1	2	70 (70)	70	0.00
2	1	34 (35)	34	0.20
3	3	100 (99)	107	-1.43
4	3	516 (497)	520	-2.40

Correction factor****: Slope: 0.9527 Intercept: 1.1

Reference point No.	Reference thermometer temperature, °F	Corrected thermocouple temperature, °F	Difference, %**
1	70	68	0.38
2	35	34	0.20
3	99	103	-0.72
4	497	497	0.00

Critical test points are 32°, 100°, and 500°.

*Source: 1) Ice bath
2) Ambient
3) Furnace

**Percent difference

$$\frac{\text{Reference temp. °F} - \text{thermocouple temp. °F}}{(\text{Reference temp. °F} + 460\text{°F})} \times 100\%$$

Each percent difference must be less than or equal to 1.5%.

***Reference thermometer must be ASTM.

****Correction factor must be determined if any percent difference is >1.5%.

Figure E-7 (continued)

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 4/21/81 Thermocouple No.: 256

Ambient temperature: 74 °F Barometric pressure: 29.76 " Hg

Calibrator: B. Amstog Reference: ASTM-3F

Reference point No.	Source,* (specify)	Reference thermometer temperature, °F***	Thermocouple temperature, °F	Difference, %**
1	2	74	74	0.00
2	1	32	32	0.00
3	3	102	102	0.00
4	3	510	512	-0.21

Correction factor****: Slope: _____ Intercept: _____

Reference point No.	Reference thermometer temperature, °F	Corrected thermocouple temperature, °F	Difference, %**

Critical test points are 32°, 100°, and 500°.

*Source: 1) Ice bath
2) Ambient
3) Furnace

**Percent difference

$$\frac{\text{Reference temp. °F} - \text{thermocouple temp. °F}}{(\text{Reference temp. °F} + 460\text{°F})} \times 100\%$$

Each percent difference must be less than or equal to 1.5%.

***Reference thermometer must be ASTM.

****Correction factor must be determined if any percent difference is >1.5%.

Figure E-7 (continued)

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 4/21/81 Thermocouple No.: 259

Ambient temperature: 74 °F Barometric pressure: 29.76 " Hg

Calibrator: B. Armstrong Reference: ASTM-3F

Reference point No.	Source,* (specify)	Reference thermometer temperature, °F***	Thermocouple temperature, °F	Difference, %**
1	2	74	74	0.00
2	1	32	32	0.00
3	3	102	102	0.00
4	3	501	504	-0.31

Correction factor****: Slope: _____ Intercept: _____

Reference point No.	Reference thermometer temperature, °F	Corrected thermocouple temperature, °F	Difference, %**

Critical test points are 32°, 100°, and 500°.

*Source: 1) Ice bath
2) Ambient
3) Furnace

**Percent difference

$$\frac{\text{Reference temp. °F - thermocouple temp. °F}}{\text{(Reference temp. °F + 460°F)}} \times 100\%$$

Each percent difference must be less than or equal to 1.5%.

***Reference thermometer must be ASTM.

****Correction factor must be determined if any percent difference is >1.5%.

Figure E-7 (continued)

DIGITAL READOUT CALIBRATION DATA SHEET

Date: 5/14/80 Digital readout No. 124

Ambient Temperature: 70°F Ice bath temp.: 32°F

Calibrator: B. Armstrong Digital readout manuf.: Dytec

Reference point No.	Millivolts	Reference temperature, °F	Thermocouple potentiometer temperature, °F	Difference, %**
1	0.00	32	32.0	0.00
2	1.52	100	98.0	0.36
3	3.82	200	199.0	0.15
4	6.09	300	299.7	0.04
5	8.31	400	399.4	0.07
6	10.57	500	500.0	0.00
7	15.18	700	700.5	-0.04
8	22.26	1000	1003.1	-0.21

Percent difference must be less than or equal to 0.5.

**Percent difference

$$\frac{\text{Reference temp. °F} - \text{thermocouple temp. °F}}{(\text{Reference temp. °F} + 460\text{°F})} \times 100$$

Figure E-8. Digital readout calibration data.

DIGITAL READOUT CALIBRATION DATA SHEET

Date: 5/13/80 Digital readout No. 125

Ambient Temperature: 72°F Ice bath temp.: 32°F

Calibrator: B. Armstrong Digital readout manuf.: Digitec

Reference point No.	Millivolts	Reference temperature, °F	Thermocouple potentiometer temperature, °F	Difference, %**
1	0.00	32	32.9	-0.18
2	1.52	100	97.9	0.38
3	3.82	200	198.4	0.24
4	6.09	300	298.6	0.18
5	8.31	400	397.6	0.28
6	10.57	500	498.0	0.21
7	15.18	700	697.7	0.20
8	22.20	1000	999.9	0.01

Percent difference must be less than or equal to 0.5 .

**Percent difference

$$\frac{\text{Reference temp. °F} - \text{thermocouple temp. °F}}{(\text{Reference temp. °F} + 460\text{°F})} \times 100$$

Figure E-8 (continued)

DIGITAL READOUT CALIBRATION DATA SHEET

Date: 6/18/80 Digital readout No. 219

Ambient Temperature: 71°F Ice bath temp.: 32°F

Calibrator: B. Armstrong Digital readout manuf.: Newport

Reference point No.	Millivolts	Reference temperature, °F	Thermocouple potentiometer temperature, °F	Difference, %**
1	0.[illegible]	32	32	0.00
2	1.52	100	101	-0.18
3	3.82	200	200	0.00
4	6.09	300	300	0.00
5	8.31	400	398	0.23
6	10.57	500	499	0.10
7	15.18	700	699	0.09
8	22.26	1000	1002	-0.14

Percent difference must be less than or equal to 0.5.

**Percent difference

$$\frac{\text{Reference temp. °F} - \text{thermocouple temp. °F}}{(\text{Reference temp. °F} + 460\text{°F})} \times 100$$

Figure E-8 (continued)

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-2 Inlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	71	1.0
2	1	32.7	33	0.3
3	3	125.1	122	3.1

Figure E-9. Dry gas thermometer calibration data.

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-2 Outlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	71	1.0
2	1	32.7	30	0.3
3	3	130.0	126	4.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-3 Inlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	72	0.0
2	1	32.7	32	0.7
3	3	116.0	113	3.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-3 Outlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-25

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	71	1.0
2	1	32.7	30	2.7
3	3	114.0	112.0	2.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-4 Inlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	72	0.0
2	1	32.7	32	0.7
3	3	117.0	114	3.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB 4 Outlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	73	1.0
2	1	32.7	34	1.3
3	3	116.0	115.	1.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-6 Inlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	72	0.0
2	1	32.7	32	0.7
3	3	115.0	114	1.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 6/10/80 Thermometer No.: FB-6 Outlet

Ambient temperature: 72 °F Barometric pressure: 29.38 " Hg

Calibrator: B. Armstrong Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	72.0	73	1.0
2	1	32.7	32	0.7
3	3	119.0	116.	3.0

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: NOVEMBER 4, 1980 Thermometer No.: FB#8 INLET

Ambient temperature: 73 °F Barometric pressure: 29.41 " Hg

Calibrator: DAN FITZGERALD Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	36°F	38°F	2°F
2	1	73°F	74°F	1°F
3	3	108°F	108°F	0°F

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: NOVEMBER 4, 1980 Thermometer No.: AB#8 OUTLET

Ambient temperature: 29.41 °F Barometric pressure: 29.41 " Hg

Calibrator: DAN FITZGERALD Reference: ASTM-2F

Reference point No.	Source,*	Reference thermometer temperature, °F***	Thermometer temperature, °F	Difference, **
1	2	36°F	33°F	3°F
2	1	73°F	72°F	1°F
3	3	108°F	105°F	3°F

Figure E-9 (continued)

*Source: 1) Ice bath
2) Ambient
3) Furnace set at approximately 110°F

**Difference must be less than or equal to ±5°F.

***Reference thermometer must be ASTM.

TRIP BALANCE

The trip balance was calibrated by comparison with a Class-S standard weight and agreed within 0.5 g. Calibration data are shown in Figure E-10.

BAROMETER

The field barometer was calibrated to within 0.1 in. Hg of an NBS-traceable mercury-in-glass barometer before each test series. The field barometer was checked against the mercury-in-glass barometer after each test series to determine if it read within 0.2 in. Hg. If it did not read within 0.2 in. Hg, a correction factor was determined for the last test series. Calibration data are included in Figure E-11.

ORSAT ANALYZER

The orsat analyzer was calibrated before each test series by determining the percentages of oyxgen, carbon monoxide, and carbon dioxide in a calibration gas containing known percentages of each. The analyzer read within 0.5 percent of the known value for each gas. Calibration data are shown in Figure E-12.

TRIP BALANCE ACCURACY LOG

Trip bal. number	Date	Calibrator	Ref. weight	Weight observed	Difference
194	6/9/80	B. Armstrong	200	200.10	0.10
195	6/9/80	B Armstrong	200	199.95	0.05
196	6/9/80	B. Armstrong	200	199.80	0 20
197	6/9/80	B. Armstrong	200	200.10	0.10
198	6/9/80	B. Armstrong	200	200.00	0.00

Figure E-10. Trip balance calibration data.

BAROMETER CALIBRATION LOG

Barometer Number	225	227	237	225			
Project Number	5166-B		5174	3530-2			
Pre-test	4/11/81	4/15/81	4/17/81	4/22/81			
Barometer Reading	29.50	30.15	29.48	29.46			
Reference Barometer Reading	29.50	30.12	29.44	29.46			
Difference*	0.00	0.03	.04	0.00			
Post-test	4/22/81			5/5/81			
Barometer Reading	29.46			29.46			
Reference Barometer Reading	29.46			29.44			
Difference**	0.00			0.02			

* Barometer is adjusted so that difference does not exceed 0.1"Hg.
** Barometer is <u>not</u> adjusted, difference must not exceed 0.2"Hg.

Figure E-11. Barometer calibration data.

ORSAT CALIBRATION DATA SHEET

Orsat No.: 232 Gas (circle one): O_2 CO_2 CO

Calibrator	Date	Value Det.
J. Sjutz	8/14/80	1.6
B. Armstrong	9/24/80	1.8
J. Iverson	10/22/80	1.8
B. Armstrong	11/15/80	1.8
D. Schaffer	12/1/80	1.7
J. Iverson	1/14/81	1.7
D. Schaffer	2/16/81	1.7
P. Gustafson	3/9/81	1.8
B. Armstrong	4/1/81	2.0

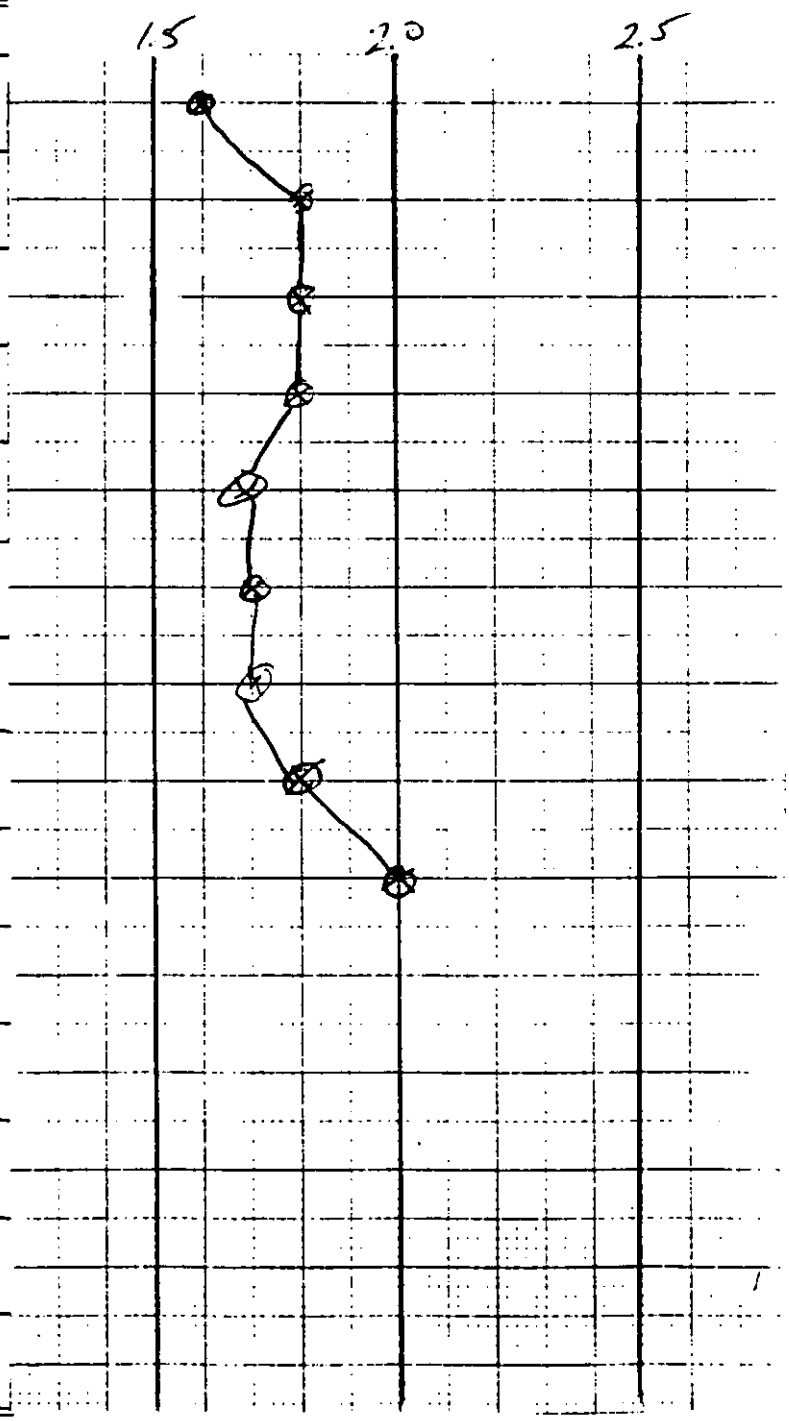

Figure E-12. Orsat calibration data.

ORSAT CALIBRATION DATA SHEET

Orsat No.: 232 Gas (circle one): O_2 CO_2 CO

Calibrator	Date	Value Det.
J. Jutze	8/14/80	4.2
B. Armstrong	8/24/80	4.2
J. Iverson	10/23/80	4.2
B. Armstrong	11/15/80	4.2
D. Schaffel	12/1/80	4.2
J. Iverson	1/14/81	4.2
D. Schaffel	2/14/81	4.0
P. Curtesberg	3/9/81	4.0
B. Armstrong	4/1/81	4.0

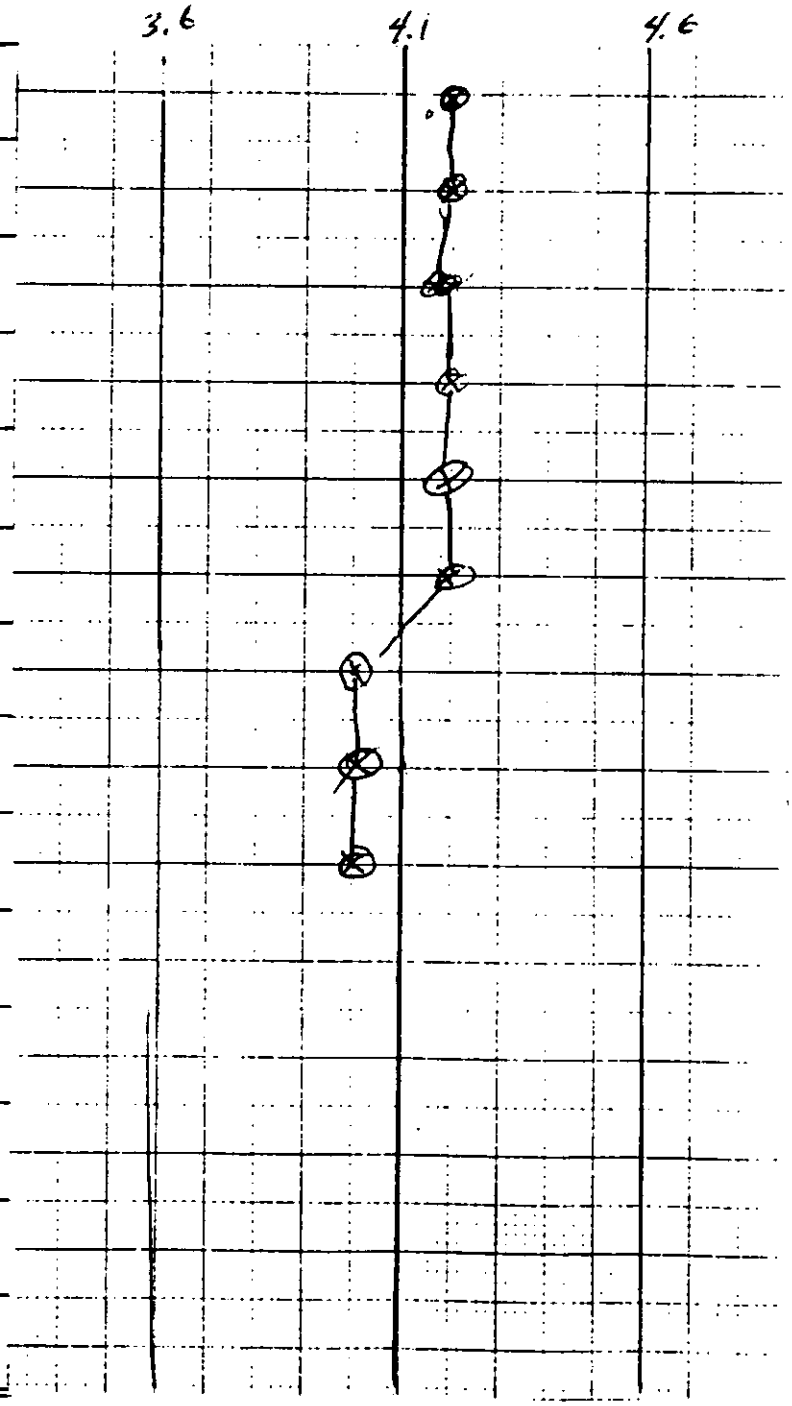

Figure E-12 (continued)

ORSAT CALIBRATION DATA SHEET

Orsat No.: 232 Gas (circle one): O_2 CO_2 CO

Calibrator	Date	Value Det.
[illegible]	8/14/80	15.2
B. Armstrong	9/24/80	15.0
J. Iverson	10/22/80	15.0
B. Armstrong	11/15/80	14.8
D. Schaffel	12/1/80	15.0
J. Iverson	1/14/81	15.0
D. Schaffel	2/16/81	14.7
P. [illegible]	3/9/81	14.8
B. Armstrong	4/1/81	15.2

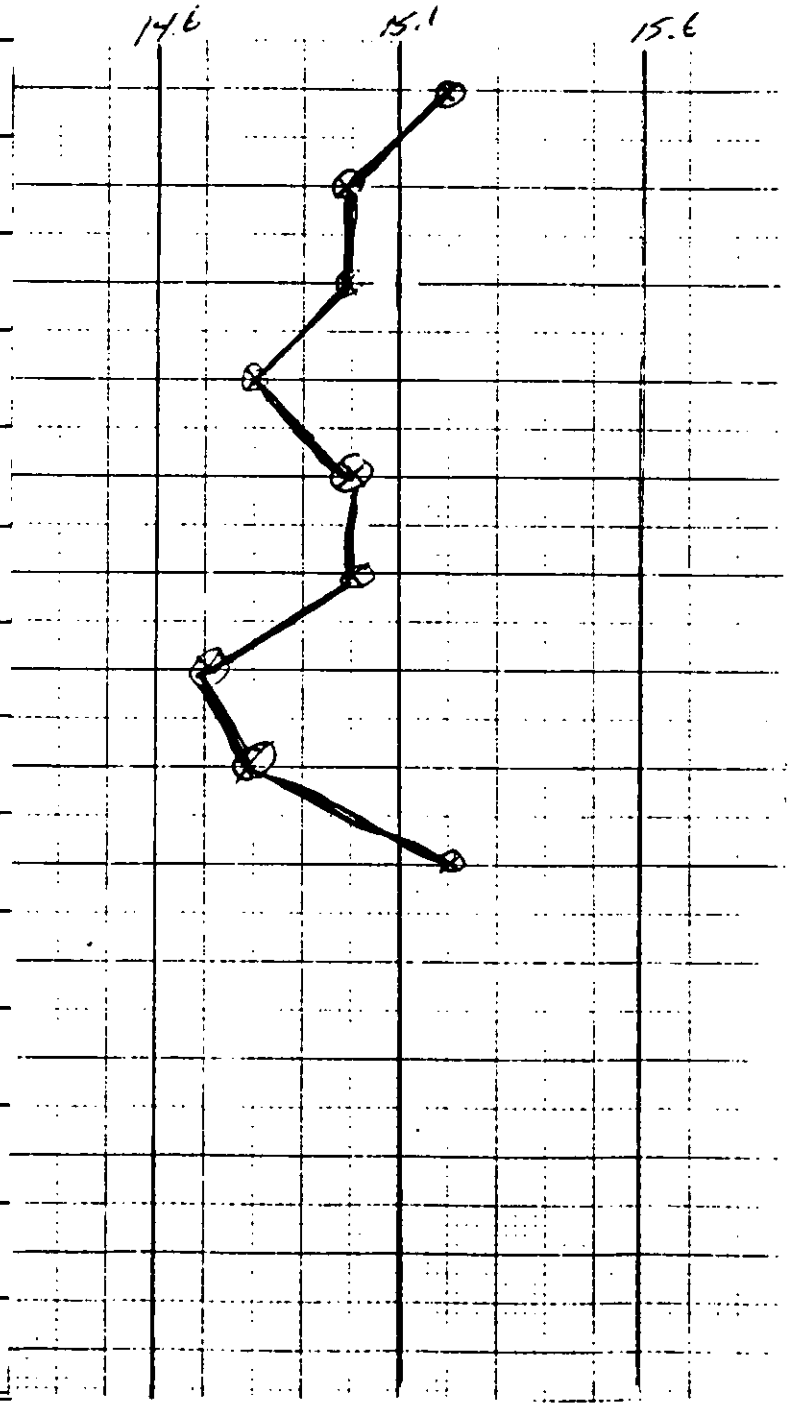

Figure E-12 (continued)

APPENDIX F

QUALITY ASSURANCE SUMMARY

QUALITY ASSURANCE SUMMARY

The following summary addresses factors that ultimately are used to ensure data quality and accuracy for any given emission test project.

PROJECT ORGANIZATION AND RESPONSIBILITES

The project organization and responsibilities are generally defined in the test plan. Specific responsibilities for this field test are shown in the list of project participants in Appendix G.

QA OBJECTIVE

The QA objective of the data collection was for potential NSPS standards setting. Therefore, all procedures used to collect and analyze emissions samples followed EPA reference methods where applicable. No attempt was made to determine precisions, because the precision of these reference methods had previously been determined. The completeness of the data was the same as required for a performance test as defined in 40 CFR 60, Section 60.8. The emission results were to be representative of normal operations. The data and results were presented in several units to allow for comparability with data from all other organizations wishing to access the data summary.

DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction and reporting have been shown to be great potential sources of system error. Most of PEDCo's test method calculations are performed by a validated computer program to minimize error. The field data sheets are also set up on a standard computer card to allow accurate input of data into the computer by individuals unfamiliar with testing procedures. The data printout is then validated by comparison with the field and analytical data sheets. In addition, hand calculation checks are generally made to validate the computer output. Other data validations are made whenever possible. The particulate emission test results were validated by good agreement with the particle size sample results. The reporting format provides efficient and effective review of all data and results.

PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

When feasible, PEDCo performs both performance and system audits. A performance audit for accuracy was performed in the field on all dry gas meter systems using critical orifices that were supplied and calibrated by the EPA. The EMB task manager was unable to be onsite to perform a general system audit. The PEDCo team leader was therefore given the responsibility for performing this audit. Items checked were similar to those on the checklist in "Quality Assurance Handbook"; however, no written record was made.

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

No attempt was made to assess data precision, which had been reported elsewhere or else was not in the scope of the report. Precision results for EPA reference methods are summarized in "The EPA Program for the Standardization of Stationary Source Emission Test Methodology, A Review," EPA-600/4-76-044. PEDCo has been a collaborator in several of the EPA programs to determine method precision. In all cases of final data summary reporting, PEDCo was within two standard deviations of the method precision. Based on the quality and experience of the test team used in this test series, all data summaries are likely to be within one standard deviation of the documented precision, as determined for a single run for each specific reference method. The accuracy audit procedure used for the dry gas meter is the standardized written procedure used by the EPA Quality Assurance Division program. The procedure for determining completeness of data is the same as that specified in 40 CFR 60, Section 60.8.

INTERNAL QUALITY CONTROL CHECKS

Several internal quality control checks are usually made for each test. The majority of these checks usually deal with the field sample analysis. Filter blanks were returned to the laboratory for gravimetric analysis. This control checked the quality of both the initial and the final weighing. Results of the control sample checks are included in Section 5.

CORRECTIVE ACTION

PEDCo has two methods for corrective action. The first is the use of control limits. Examples of control limits are audit sample results, control sample results, and calibration results. When any of these limits show that data are of questionable integrity, then the procedure is repeated, additional data are collected, or the data are rejected. The second method is the use of red tags. Whenever any piece of equipment is suspected of producing unacceptable data, the entire apparatus or malfunctioning component is replaced and a red tag is placed on the item. That piece of equipment is then rejected until its ability to perform its function properly is verified by the proper individuals. The use of control limits and red tags reduces the amount of unacceptable data and provides a system to track and correct unacceptable items and procedures.

PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

PEDCo has a comprehensive preventive maintenance program. Many major components of test equipment have pretest checklists. These checklists ensure that all functions are checked and that action is taken to repair or replace any part likely to malfunction. These checks are made before every field test series; however, only the control console (meter box) checks are recorded. Although the preventive maintenance program and schedule are not in writing, PEDCo's commitment of three full-time, experienced personnel for equipment construction, preparation, calibration, and maintenance has resulted in a program based on

experience and skill that cannot be matched by a program based on written guidelines.

QUALITY ASSURANCE REPORTS TO MANAGEMENT

The standard quality assurance procedures used in this test program generate sufficient documentation to indicate the quality of data. All evidence of the execution of the quality assurance guidelines is reviewed by management. In addition, all PEDCo's EMB task managers and project managers meet weekly. During these group meetings all aspects of each task, including quality assurance, are discussed. No written reports result from these meetings because all interested parties are verbally apprised of the situation during each meeting.

Two other reports not related to EMB task are made to management. PEDCo's emission test and laboratory groups participate in all EPA QAD's national audits; and PEDCO's quality assurance coordinator, Mr. T.J. Wagner, makes several independent checks for management.

APPENDIX G

PROJECT PARTICIPANTS AND ACTIVITY LOG

TABLE G-1. PROJECT PARTICIPANTS

Name	Affiliation	Activities
J. Prohaska	PEDCo	Coordinate test activities, liaison with MRI, site preparation, collect dust samples, recovery of PSD samples
R. Campbell	PEDCo	Team leader Site 2, particulate (PM) runs at Site 2, sample recovery
M. Phillips	PEDCo	Team leader Site 1, site preparation, assist in PM and PSD runs at Site 1, sample recovery
R. Antesberger	PEDCo	Tests at Site 1, site preparation, sample recovery
D. Fitzgerald	PEDCo	PSD runs at Site 2, sample recovery
P. Reinermann	PEDCo	Assist in tests at Site 2, site preparation, sample recovery
S. Howison	PEDCo	Visible emissions from fabric filter, fugitive emissions from dust handling system, sample recovery
T. Clark	PEDCo	Visible emissions from the melt shop, sample recovery
W. Terry	MRI	Monitor process operation
L. Geiser	Cartech	Plant contact, general assistance
G. Michael	Cartech	General assistance

TABLE G-2. FIELD SAMPLING LOG

Day	Date, 1981	Activity
Friday	4/24	Transported equipment to site (P.R., R.A.)
Saturday	4/25	Transported equipment to site (cont.); traveled to site (J.P., M.P.)
Sunday	4/26	Set-up equipment, took Method 1 measurements, prepared sampling trains (4 men); traveled to site (D.F., R.C.)
Monday	4/27	Took Method 2 measurements at all sites; completed preliminary and blank test runs (6 men); traveled to site (S.H., T.C.)
Tuesday	4/28	Conducted one run at all sites (entire crew)
Wednesday	4/29	Conducted one run at all sites
Thursday	4/30	Conducted one run at all sites; packed equipment and left site
Friday	5/1	Returned to base (6 men); returned with equipment and samples (P.R., R.A.)