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

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

EMISSION TESTING

at a

BY-PRODUCT COKE OVEN BATTERY

Wisconsin Steel Division
Chicago, Illinois
May 10-13, 1977

Prepared for the

U.S. Environmental Protection Agency
Emission Measurement Branch
Research Triangle Park, North Carolina 27711

Prepared by

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EMB REPORT #77-CKO-11

Work Assignment 1

Contract No. 68-02-2817

May, 1978

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I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) retained Clayton Environmental Consultants, Inc. to conduct a series of emission and efficiency tests on a Mikropul wet electrostatic precipitator (WESP). The WESP controls particulate emissions in exhaust gases from a coke-side shed at the No. 4 coke battery (Figure 1) at Wisconsin Steel Division, International Harvester Corporation, Chicago, Illinois. The objective of this study was to determine the comparative control of particulate emissions and polycyclic organic material (POM) emitted from a coke battery operation. The results of this study will assist in the formulation of possible regulations governing the emissions of POM. This study was commissioned as Project No. 77-CKO-11, Contract No. 68-02-1408, Task 29; and completed under Contract No. 68-02-2817, Work Assignment No. 1.

Clayton Environmental Consultants, Inc. (CEC) conducted quadruplicate particulate tests simultaneously at both the inlet and outlet of the Mikropul WESP. All sampling was performed during the period of May 10-14, 1977. The test runs were discontinuous to reflect emissions generated from only coke oven door leaks. Timed five-minute sampling delay periods were instituted during each coke pushing period. As indicated in Tables I through IV (Daily Composite Log), a ten-to twelve-hour period was required to collect an eight-hour sample.

Sampling was conducted in accordance with EPA Methods 1 through 5, with modifications as appropriate, and Method 9 for opacity determinations. In addition, the probe, filter holder, and

FIGURE 1

FLOW DIAGRAM
BY-PRODUCT COKE PLANT WITH WET ELECTROSTATIC PRECIPITATOR

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

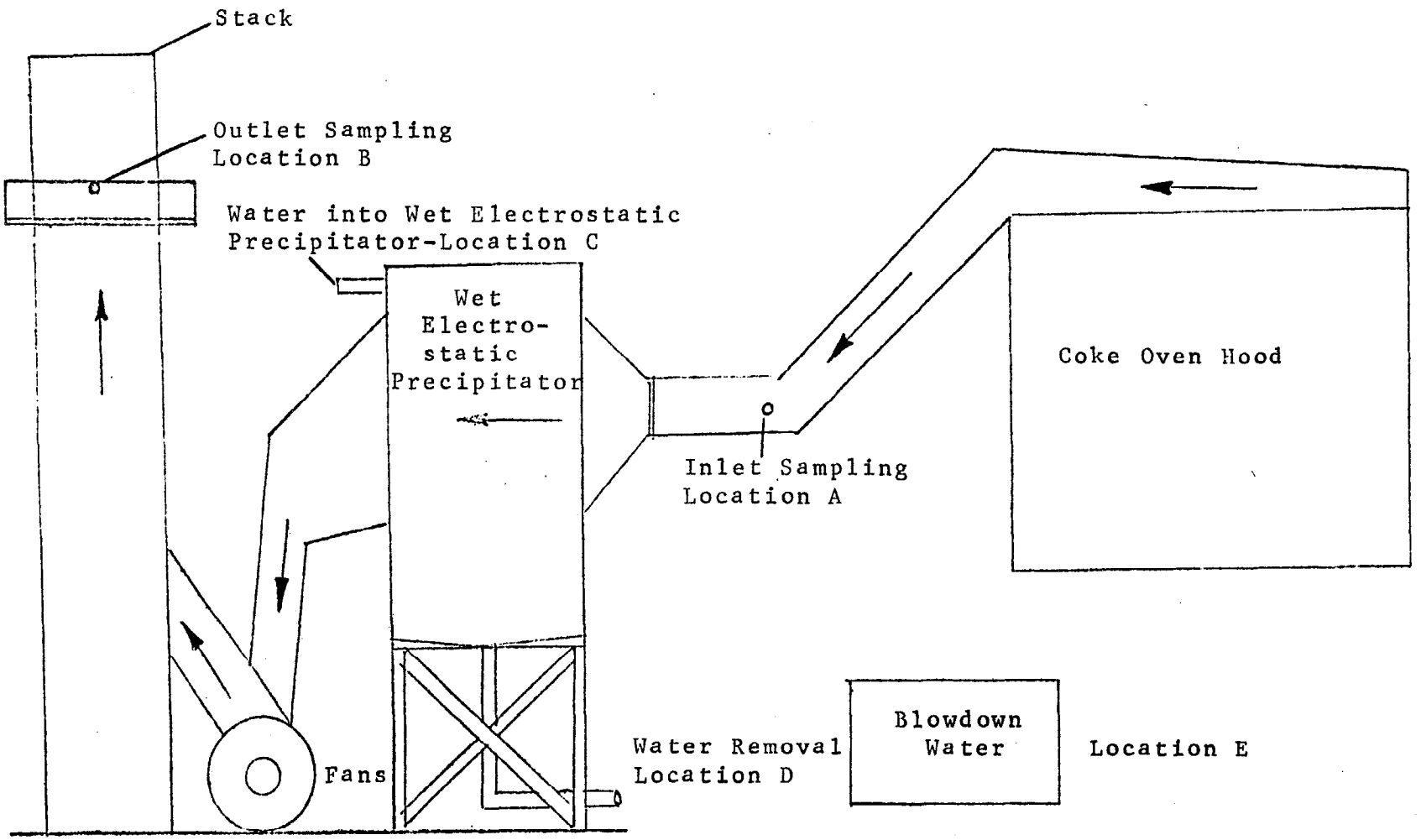


TABLE I

DAILY COMPOSITE TEST LOG

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10, 1977

Test 1

Clock Time		Particulate Sampling		POM[D] Sampling		Stack Visible Emissions	Integrated Bag Sample		Evacuated Flask		WESP Water Samples		
Sampling	Pushing	Inlet	Outlet	Inlet	Outlet		Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Blowdown
0800						B							
1000		B	B	B	B								
1115											G	G	G
1123		C											
1150				C									
1205											G	G	G
1303											G	G	G
1308		C											
1314				C									
1315													
1400							B						
1410			C		C						G	G	G
1434		C		C									
1443													
1500											G	G	G
1508	1542	A	A	A	A								
	1551	A	A	A	A								
1604	1605	A	A	A	A						G	G	G
1617		C		C									
1619													
	1627	A	A	A	A								
	1640	A	A	A	A								
	1650	A	A	A	A								
1705	1702	A	A	A	A						G	G	G
	1716	A	A	A	A								
	1730	A	A	A	A								
	1745	A	A	A	A								
1800						E 567min					G	G	G
1820		C		C									
1909			E 480min								G	G	G
	1918	A		A	A								
	1927	A		A	E 480min			E 330min					
	1939	A		A									
	1952	A		A									
2002		E 480min		E 480min									
2030										F	Composite	Composite	Composite

A - Coke pushing times began when pusher-ram entered each coke battery. A timed 5-minute sampling delay period was instituted during these intervals.

B - Begin test.

C - Changing ports, sampling stopped.

D - Polycyclic organic matter.

E - End test.

F - Composite of integrated bag sample.

G - Aliquot collected.

Clayton Environmental Consultants, Inc.

TABLE II

DAILY COMPOSITE TEST LOG

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 11,1977

Test 2

Clock Time		Particulate Sampling		POM[D] Sampling		Stack Visible Emissions	Integrated Bag Sample		Evacuated Flask		WESP Water Samples		
Sampling	Pushing	Inlet	Outlet	Inlet	Outlet		Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Blowdown
1000		B	B	B	B	B							
1030							B						
1050											G	G	G
1121		C		C									
1151											G	G	G
1244				C									
1248		C									G	G	G
1350											G	G	G
1402			C		C								
1408		C		C									
1416													
1448											G	G	G
1532				C									
1536		C											
	1539	A	A	A	A								
	1550	A	A	A	A								
1556											G	G	G
	1607	A	A	A	A								
	1624	A	A	A	A								
	1639	A	A	A	A								
	1653	A	A	A	A								
1655											G	G	G
	1707	A	A	A	A								
	1722	A	A	A	A								
	1739	C	A	C	A								
1746											G	G	G
1800						E							
1849						446min					G	G	G
1900			E		E		E						
1904		E	480min	E	480min		540min						
1930		480min		480min					F		Composite	Composite	Composite

A - Coke pushing times began when pusher-ram entered each coke battery. A timed 5-minute sampling delay period was instituted during these intervals.

B - Begin test.

C - Changing ports, sampling stopped.

D - Polycyclic organic matter.

E - End test.

F - Composite of integrated bag sample.

G - Aliquot collected.

Clayton Environmental Consultants, Inc.

TABLE III

DAILY COMPOSITE TEST LOG

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 12, 1977

Test 3

Clock Time		Particulate Sampling		POM[D] Sampling		Stack Visible Emissions	WESP Water Samples		
Sampling	Pushing	Inlet	Outlet	Inlet	Outlet		Inlet	Outlet	Blowdown
0900									
0918						B			
0930		B	B	B	B				
1014							G	G	G
1038		C		C					
1114							G	G	G
1203		C		C					
1224							G	G	G
1317							G	G	G
1325		C		C					
1340			C		C				
1418							G	G	G
1452		C		C					
1514							G	G	G
1516							Composite	Composite	Composite
	1540	A	A	A	A				
	1551	A	A	A	A				
	1604	A	A	A	A				
1626	1625	A	A	A	A		G	G	G
1634		C		C					
	1659	A	A	A	A				
	1715	A	A	A	A				
1729	1733	A	A	A	A		G	G	G
	1749	A	A	A	A				
1800									
	1810	A	A	A	A				
1826				E					
1829	.	E		480min		E	G	G	G
1842		480min	E		E	503min			
1900			480min		480min		Composite	Composite	Composite

[XAD-2 column located between filter and first impinger.]

A - Coke pushing times began when pusher-ram entered each coke battery. A timed 5-minute sampling delay period was instituted during these intervals.

B - Begin test.

C - Changing ports, sampling stopped.

D - Polycyclic organic matter.

E - End test.

F - Composite of integrated bag sample.

G - Aliquot collected.

Note: Separate composite water samples were collected during the nonpushing period (1012-1516) and push period (1625-1842)

TABLE IV

DAILY COMPOSITE TEST LOG

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 13-14, 1977

Test 4

Clock Time		Particulate Sampling		POM[D] Sampling		WESP Water Samples		
Sampling	Pushing	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Blowdown
5-13-77								
2014		B	B	B	B			
	2024	A	A	A	A			
	2046	A	A	A	A			
2100	2100	A	A	A	A	F	F	F
	2133	A	A	A	A			
2155		C		C				
2212						F	F	F
2310								
2314	2315	A	A	A	A	F	F	F
	2325	A	A	A	A			
2334		C		C				
	2344	A	A	A	A			
	2357	A	A	A	A			
5-14-77	0014	A	A	A	A			
0028	0032	A	A	A	A	F	F	F
	0048	A	A	A	A			
	0106	A	A	A	A			
0114			C		C			
0126		C		C		F	F	F
	0141	A	A	A	A			
0235						F	F	F
0300		C		C				
	0311	A	A	A	A			
	0321	A	A	A	A			
0330						F	F	F
	0339	A	A	A	A			
	0355	A	A	A	A			
	0417	A	A	A	A			
0423						F	F	F
	0431	A	A	A	A			
	0442	A	A	A	A			
0458		C		C				
	0507	A	A	A	A			
0524						F	F	F
	0548	A	A	A	A			
0612			E		E			
0632		E	480min	E	480min	F	F	F
0700		480min		480min		Composite	Composite	Composite

[XAD-2 column located after third impinger]

A - Coke pushing times began when pusher-ram entered each coke battery. A timed 5-minute sampling delay period was instituted during these intervals.

B - Begin test.

C - Changing ports, sampling stopped.

D - Polycyclic organic matter.

E - End test.

F - Aliquot collected.

Clayton Environmental Consultants, In

impingers were each rinsed with benzene following the acetone rinse. Battelle Memorial Institute, Columbus, Ohio was conducting parallel tests and was responsible for sampling and analyzing the WESP inlet and outlet gas streams for polycyclic organic matter. Results of this work are presented in a separate report prepared by Battelle. In two of the four tests (Nos. 3 and 4), an XAD-2 column was placed in the CEC inlet and outlet sampling trains for benzene soluble organic (BSO) analysis by Battelle's laboratory.

During each test, samples of inlet, outlet, and blowdown water were collected from the wet electrostatic precipitator. During the three daylight testing periods, plume opacity readings were also recorded by a certified visible emissions observer. Grab flask samples were analyzed from the Orsat integrated bag samples to determine gas composition. Auxiliary data included exhaust gas velocities, flowrates, and temperatures.

The Field Test Team of Clayton Environmental Consultants, Inc. included Messrs. V.W. Hanson, N.S. Walsh, G.J. Hawkins, T.V. Mattson, H.P. Flood, T.R. Julien, and G.M. Santorilla. Sampling activities were observed by Messrs. Frank Clay, Gene Riley, and Drew Trenholm of the EPA.

The following sections of this report present the summary of results, process description and operation, location of sampling points, and sampling and analytical procedures. Field and laboratory data are presented in the appendices as noted.

II. SUMMARY AND DISCUSSION OF RESULTS

Particulate Sampling Results

Four particulate tests were conducted simultaneously at the inlet and outlet to the WESP. Testing was completed during the week of May 9, 1977. All particulate sampling data were acquired during the non-push cycles and process conditions throughout all four tests were observed to be stable and constant. Tests 3 and 4 differed from Tests 1 and 2 in that XAD-2 columns, for simultaneous BSO analysis, were incorporated into the sampling trains.

Table V summarizes the particulate test results. Emission rates are presented in Tables VI and VII in English and metric units, respectively. Data are tabulated for the inlet and outlet sampling locations in terms of both filterable and total particulate concentrations and emission rates. Tests 1, 2 and 3 were conducted during the period of expected minimum emissions from door leaks (0700-2100). For this reason, two separate averages are presented, one for the first three tests only and one including the fourth, which was conducted during the period of expected maximum emissions from door leaks (2100-0700).

Inlet

Stack gas flow rate averaged 173,000 dry standard cubic feet per minute, (DSCFM) throughout the four tests at the inlet, varying by $\pm$ 1,000 DSCFM. Inlet stack temperature averaged 90°F and varied from 78°F to 100°F. Filterable particulate concentrations ranged from 0.0052 to 0.0135 grains per dry standard cubic feet (grains/DSCF) with an average value of 0.0082 grains/DSCF. Total particulate concentrations ranged from 0.0115 to 0.0149 grains/DSCF and averaged 0.0135 grains/DSCF. The impinger catch accounted for about 40 percent of the collected mass. Also, from Table V it is seen that the total filterable particulate emission rates ranged

TABLE V

SUMMARY OF PARTICULATE EMISSIONS

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14,1977

	Inlet						Outlet					
Run Number	1	2	3	Average[6] 1,2,3	4[7]	Average 1,2,3,4	1	2	3	Average[6] 1,2,3	4[7]	Average 1,2,3,4
Date	5-10-77	5-11-77	5-12-77		5-13-77 5-14-77		5-10-77	5-11-77	5-12-77		5-13-77 5-14-77	
Time	1000 2000	1000 1900	0900 1830		2000 0630		1000 2000	1000 1900	0900 1830		2000 0630	
Volume of dry gas sampled, SCF[1]	350.87	350.49	343.20	348.19	348.08	348.16	357.33	352.01	357.49	355.61	345.35	353.05
Stack flow rate, SCFM[2] dry	174,000	174,000	172,000	173,000	173,000	173,000	190,000	186,000	187,000	188,000	184,000	187,000
Stack flow rate, ACFM[3] wet	182,000	185,000	185,000	184,000	189,000	185,000	194,000	194,000	194,000	194,000	196,000	195,000
Percent moisture by volume	0.95	0.46	1.06	0.82	0.79	0.82	2.2	2.5	2.5	2.4	3.0	2.6
Stack gas temperature, °F	78.	88.	92.	86.	100.	90.	63.	71.	71.	68.	75.	70.
Percent Isokinetic	97.	97.	95.	96.	97.	97.	101.	101.	101.	101.	100.	101.
Particulates												
Probe and filter catch, mg	181.2	117.6	300.6	199.8	145.5	186.2	76.0	16.4	22.4	38.3	11.3	31.5
Grains/SCF, Dry	0.0080	0.0052	0.0135	0.0089	0.0064	0.0082	0.0033	0.0007	0.0010	0.0017	0.0005	0.0014
Grains/ACF, Wet	0.0076	0.0049	0.0125	0.0083	0.0058	0.0077	0.0032	0.0007	0.0010	0.0016	0.0005	0.0014
Pounds/hour	11.9	7.75	19.9	13.2	9.49	12.3	5.37	1.12	1.60	2.70	0.79	2.22
Pounds/ton coal charged[4]	0.278	0.181	0.465	0.308	0.222	0.287	0.126	0.026	0.037	0.063	0.018	0.052
Total catch, mg[5]	317.0	261.9	331.3[8]	303.4	312.9[9]	305.8	100.4	43.4	29.4[8]	57.7	29.3[9]	50.6
Grains/SCF, Dry	0.0139	0.0115	0.0149[8]	0.0134	0.0138[9]	0.0135	0.0043	0.0019	0.0013[8]	0.0025	0.0013[9]	0.0022
Grains/ACF, Wet	0.0133	0.0108	0.0138[8]	0.0126	0.0126[9]	0.0126	0.0042	0.0018	0.0012[8]	0.0024	0.0012[9]	0.0021
Pounds/hour	20.7	17.1	22.0[8]	19.9	20.5[9]	20.1	7.00	3.03	2.08[8]	4.04	2.05[9]	3.54
Pounds/ton coal charged	0.484	0.400	0.515[8]	0.466	0.480[9]	0.470	0.164	0.071	0.049[8]	0.095	0.048[9]	0.083
Impinger catch percent	42.8	55.1	9.3[8]	35.7[8]	53.5[9]	40.2[8]	24.3	62.2	23.8[8]	36.8[8]	61.4[9]	42.9[8]

1 Standard cubic feet, 68°F, 29.92 in. Hg.
2 Standard cubic feet per minute, 68°F, 29.92 in. Hg.
3 Actual cubic feet per minute.
4 Calculated using 28.5 tons of coal charged per oven per 24 hours, times 36 ovens = 1026 tons coal charged per day.
5 Includes impinger catch.
6 Runs 1, 2, and 3 conducted during period of expected minimum emissions from door leaks (0700 to 2100).
7 Run 4 conducted during period of expected maximum emissions from door leaks (2100 to 0700).
8 XAD-2 column located between filter and first impinger. Impinger catch was reduced by particulate mass being collected by XAD-2 adsorbent.
9 XAD-2 column located between third and fourth impingers. No loss in impinger catch was observed.

Clayton Environmental Consultants, Inc.

TABLE VI

SUMMARY OF PARTICULATE EMISSIONS

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

Run Number	1	2	3	Average[6] 1,2,3	4[7]	Average 1,2,3,4
Date	5-10-77	5-11-77	5-12-77		5-13-77 5-14-77	
Gas Volumetric Flow						
Inlet, DSCFM[1]	174,000	174,000	172,000	173,000	173,000	173,000
Outlet, DSCFM	190,000	186,000	187,000	188,000	184,000	187,000
Particulates (Probe and Filter)						
Inlet						
Grains/SCF, dry[2]	0.0080	0.0052	0.0135	0.0089	0.0064	0.0082
Pounds/hour	11.9	7.75	19.9	13.2	9.49	12.3
Pounds/ton coal charged[3]	0.278	0.181	0.465	0.308	0.222	0.287
Outlet						
Grains/SCF, dry	0.0033	0.0007	0.0010	0.0017	0.0005	0.0014
Pounds/hour	5.37	1.12	1.60	2.70	0.79	2.22
Pounds/ton coal charged	0.126	0.026	0.037	0.063	0.018	0.052
Removal Efficiency (Percent)[4]	54.9	85.5	92.0	77.5	91.7	81.0
Particulates (Total)[5]						
Inlet						
Grains,SCF, dry	0.0139	0.0115	0.0149[8]	0.0134	0.0138[9]	0.0135
Pounds/hour	20.7	17.1	22.0[8]	19.9	20.5[9]	20.1
Pounds/ton coal charged	0.484	0.400	0.515[8]	0.466	0.480[9]	0.470
Outlet						
Grains/SCF, dry	0.0043	0.0019	0.0013[8]	0.0025	0.0013[9]	0.0022
Pounds/hour	7.00	3.03	2.08[8]	4.04	2.05[9]	3.54
Pounds/ton coal charged	0.164	0.071	0.049[8]	0.095	0.048[9]	0.083
Removal Efficiency (Percent)	66.2	82.3	90.5[8]	79.7	90.0[9]	82.3

1 Dry standard cubic feet per minute, 68°F, 29.92 in. Hg.
2 Grains per standard cubic feet, dry 68°F, 29.92 in. Hg.
3 1026 tons of coal charged per day (28.5 tons/oven x 36 ovens).
4 Calculated using pounds per hour values.
5 Total includes impinger collections.
6 Runs 1, 2, and 3 conducted during period of expected minimum emissions from door leaks (0700 to 2100).
7 Run 4 conducted during period of expected maximum emissions from door leaks (2100 to 0700).
8 XAD-2 adsorbent column located between filter and first impinger. Impinger catch was reduced by particulate being collected by column adsorbent.
9 XAD-2 adsorbent column located between third and fourth impingers. No loss in impinger catch was observed.

TABLE VII
SUMMARY OF PARTICULATE EMISSIONS - METRIC
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

Run Number	1	2	3	Average[6] 1,2,3	4[7]	Average 1,2,3,4
Date	5-10-77	5-11-77	5-12-77		5-13-77 5-14-77	
Gas Volumetric Flow						
Inlet, DNm/min[1]	4,930	4,930	4,870	4,910	4,900	4,910
Outlet, DNm/min	5,380	5,270	5,300	5,320	5,210	5,290
Particulates (Probe and Filter)						
Inlet						
mg/Nm^3, dry[2]	18.3	11.9	30.9	20.4	14.6	18.9
kg/hr	5.40	3.52	9.03	5.98	4.30	5.56
kg/metric ton coal charged[3]	0.114	0.0745	0.191	0.127	0.0913	0.118
Outlet						
mg/Nm^3, dry	7.55	1.60	2.29	3.81	1.14	3.15
kg/hr	2.44	0.508	0.726	1.22	0.358	1.01
kg/metric ton coal charged	0.0518	0.0107	0.0152	0.0259	0.0074	0.0213
Removal Efficiency (Percent)[4]	54.8	85.6	92.0	77.5	91.7	81.0
Particulates (Total)[5]						
Inlet						
mg/Nm^3, dry	31.8	26.3	34.1[8]	30.7	31.6[9]	31.0
kg/hr	9.39	7.76	10.0[8]	9.05	9.30[9]	9.11
kg/metric ton coal charged	0.199	0.165	0.212[8]	0.192	0.197[9]	0.193
Outlet						
mg/Nm^3, dry	9.84	4.35	2.97[8]	5.72	2.97[9]	5.03
kg/hr	3.18	1.37	0.943[8]	1.83	0.930[9]	1.61
kg/metric ton coal charged	0.0675	0.0292	0.0202[8]	0.0390	0.0197[9]	0.0342
Removal Efficiency (Percent)	66.1	82.3	90.6[8]	79.7	90.0[9]	82.3

[1] Dry normal cubic meters per minute, 20°C, 760 mm Hg.

[2] mg per normal cubic meter, dry 20°C, 760 mm Hg.

[3] 1130 metric tons of coal charged per day (31.4 metric tons/oven x 36 ovens).

[4] Calculated using kg/hour values.

[5] Total includes impinger collection.

[6] Runs 1, 2, and 3 conducted during period of expected minimum emissions from door leaks (0700 to 2100).

[7] Run 4 conducted during period of expected maximum emissions from door leaks (2100 to 0700).

[8] XAD-2 adsorbent column located between filter and first impinger. Impinger catch was reduced by particulate being collected by column adsorbent.

[9] XAD-2 adsorbent column located between third and fourth impingers. No loss in impinger catch was observed.

from 7.75 to 19.9 pounds/hour, averaging 12.3 pounds/hour, while the total particulate emission rates ranged from 17.1 to 22.0 pounds/hour, averaging 20.1 pounds/hour. Corresponding results are presented in metric units in Table VII. Isokineticy averaged 97 percent for all tests.

Outlet

At the outlet (Table V), stack gas conditions were again constant; flowrates averaged 187,000 DSCFM with a variance of ± 6,000 DSCFM, while temperatures averaged 70.0°F. Measured filterable particulate concentrations averaged 0.0014 grains/DSCF with a range of 0.0005 to 0.0033 grains/DSCF, while total particulate concentrations averaged 0.0022 grains/DSCF with a range of 0.0013 to 0.0043 grains/DSCF. The filterable particulate emission rate at the outlet averaged 2.22 pounds/hour, while total particulate emission rates averaged 3.54 pounds/hour.

Removal efficiencies, based on the particulate inlet and outlet emission rates for the WESP are tabulated in Tables VI and VII. For filterable particulate, measured removal efficiency averaged 81.0 percent for the four tests and ranged from 54.9 to 92.0 percent. Removal efficiency for total particulate averaged 82.3 percent, ranging from 66.2 to 90.5 percent. The observed emission factor for total particulate at the outlet was 0.083 lb/ton coal charged.

Benzene Soluble Organics

The results of the benzene soluble organic analyses are presented in Table VIII. Front half fractions consist of the benzene rinse of the probe and filter conducted in the field and the benzene extraction of the acetone rinsings and the filter. Total benzene soluble organics include, in addition to the front half fractions, the benzene extractions of the water,

TABLE VIII

SUMMARY OF BENZENE SOLUBLE ORGANIC FRACTIONS

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

		Front half fractions (gms)			Back half fractions (gms)					Total benzene soluble organic mass
		Probe and filter			Method 5 impingers				XAD-2[2] adsorbent column benzene extraction	
		Benzene extract-probe/filter	Benzene field rinse	Total BSO	Benzene extract-water[1]	Benzene extract-chlor/ether and acetone	Benzene field rinse	Total BSO		
Pre/rinse (Blank)	Inlet	0.0003	0.0078	0.0081	0.0009	0.0020	0.0204	0.0233	0.0045	0.0359
	Outlet	0.0247	0.0234	0.0481	0.0011	0.0085	0.0194	0.0290	0.0045	0.0756
Run 1	Inlet	0.0950	0.0050	0.1000	0	0.0749	0.0612	0.1361	[3]	0.2361[3]
	Outlet	0.0574	0.0047	0.0621	0	0.0066	0.0287	0.0353	[3]	0.0974[3]
Run 2	Inlet	0.0675	0.0007	0.0682	0	0.0792	0.0503	0.1295	[3]	0.1977[3]
	Outlet	0.0115	0.0001	0.0116	0	0.0078	0.0830	0.0908	[3]	0.1024[3]
Run 3	Inlet	0.1130	0.0017	0.1147	0	0.0033	0.0493	0.0526	0.0113	0.1786
	Outlet	0.0120	0.0002	0.0122	0	0	0.0186	0.0186	0.0029	0.0337
Run 4	Inlet	0.0862	0.0007	0.0869	0	0.0833	0.0246	0.1079	0.0064	0.2012
	Outlet	0.0028	0.0007	0.0035	0	0.0018	0.0374	0.0392	0.0044	0.0471

[1] Water sample was evaporated to a residue at 105°C before extraction.

[2] XAD-2 column analysis conducted by Battelle Laboratories, Dayton, Ohio.

[3] Test runs were conducted without XAD-2 columns.

BSO fractions corrected for blank values presented below:

	Method 5 residues extracting mg/ml					Benzene field rinse mg/ml
	Filter(mg)	Acetone	Water	Chlor/ether	Benzene	Benzene
Pre/rinse	1.0	0.0047	0.0016	0.0060	0	0
Run 1	1.0	0.0047	0.0016	0.0060	0	0
Run 2	1.0	0.0017	0.0070	0.0140	0	0.0130
Run 3	1.0	0.0038	0.0067	0.0230	0	0.0008
Run 4	1.0	0.0064	0.0033	0.0110	0	0.0064

chloroform/ether and acetone, and the benzene rinse conducted in the field. Tests 3 and 4 also included the benzene extraction of the XAD-2 adsorbent column analyzed by Battelle. Results are reported in grams.

Inlet

Front half benzene soluble organics at the inlet ranged from 0.0682 to 0.1147 grams. The front half pre-rinse totaled 0.0081 grams. Total BSO mass at the inlet for Tests 1 and 2 was 0.2361 and 0.1977 grams respectively. Tests 3 and 4 which incorporated the XAD-2 column resulted in 0.1786 and 0.2012 grams respectively. The pre-rinse at the inlet collected 0.0359 grams of benzene soluble organic matter.

Outlet

Total Benzene soluble organic mass for the front half fractions at the outlet ranged from 0.0035 to 0.0621 grams at Tests 4 and 1, respectively. The front half pre-rinse totaled 0.0481 grams. Benzene soluble organic mass for all fractions at the outlet for Tests 1 and 2 totaled 0.0974 and 0.1024 grams, respectively, while Tests 3 and 4 with the XAD-2 column totaled 0.0337 and 0.0471 grams, respectively. The pre-rinse totaled 0.0756 grams of benzene soluble organic matter.

Integrated Gas Samples

Integrated samples of inlet and outlet exhaust gas were taken simultaneously with one of the four tests conducted at each location. The inlet test was conducted during Particulate Test 2, while the outlet test was conducted during Particulate Test 1. The results of the resultant Orsat analyses are summarized

in Appendix B, Section II, and demonstrate identical gas composition for both tests at the inlet and outlet (essentially ambient air).

Analysis of Water Samples

A summary of the solids content of the WESP water samples that were taken at the water inlet, outlet and blowdown drains (locations C, D, E - Figure 1) during each particulate test, is presented in Table IX. During Tests 1, 2, and 4, all water samples were taken during the non-push cycle only, while during Test 3 the samples were acquired during both push and non-push cycles. Averages and ranges cover only the samples collected during non-push cycles. At the inlet water sample location, total dissolved solids averaged 274 milligrams per liter (mg/l) with a range of 240 to 307 mg/l. At the outlet sample location, total dissolved solids averaged 348 mg/l ranging from 321 to 402 mg/l,; while total solids averaged 388 mg/l ranging from 357 to 428 mg/l. Total dissolved solids in the blowdown water averaged 330 mg/l with a range of 312 to 370 mg/l, while total solids averaged 362 mg/l over a range of 338 to 400 mg/l. Three samples were collected during the push cycle during Test 3. The results from the inlet samples were 317 and 332 mg/l for total dissolved solids and total solids, respectively. Samples taken from the outlet rusulted in 324 and 352 mg/l for total dissolved solids and total solids, respectively. Blowdown water sampled showed 344 and 366 mg/l for total dissolved solids and total solids, respectively.

TABLE IX

SOLIDS CONTENT OF PRECIPITATOR WATER SAMPLES
BY-PRODUCT COKE-OVEN BATTERY NO. 4
EMISSION TEST - WET ELECTROSTATIC PRECIPITATOR

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

1977 Date	Particulate Test No.	Sample Location					
		Inlet		Outlet		Blowdown	
		Total Dissolved Solids (mg/1)	Total Solids (mg/1)	Total Dissolved Solids (mg/1)	Total Solids (mg/1)	Total Dissolved Solids (mg/1)	Total Solids (mg/1)
5/10	1	307	321	331	361	370	400
5/11	2	258	272	321	408	313	339
5/12	3	240	251	402	428	312	338
5/12	3 (Pushing)	317	332	324	352	344	366
5/13, 5/14	4	291	302	338	357	327	372
Average [a]		274	286	348	388	330	362

[a] The water samples were taken during non-pushing cycles. Average does not include the three pushing samples taken on 5/12.

Clayton Environmental Consultants, Inc.

Visible Emissions

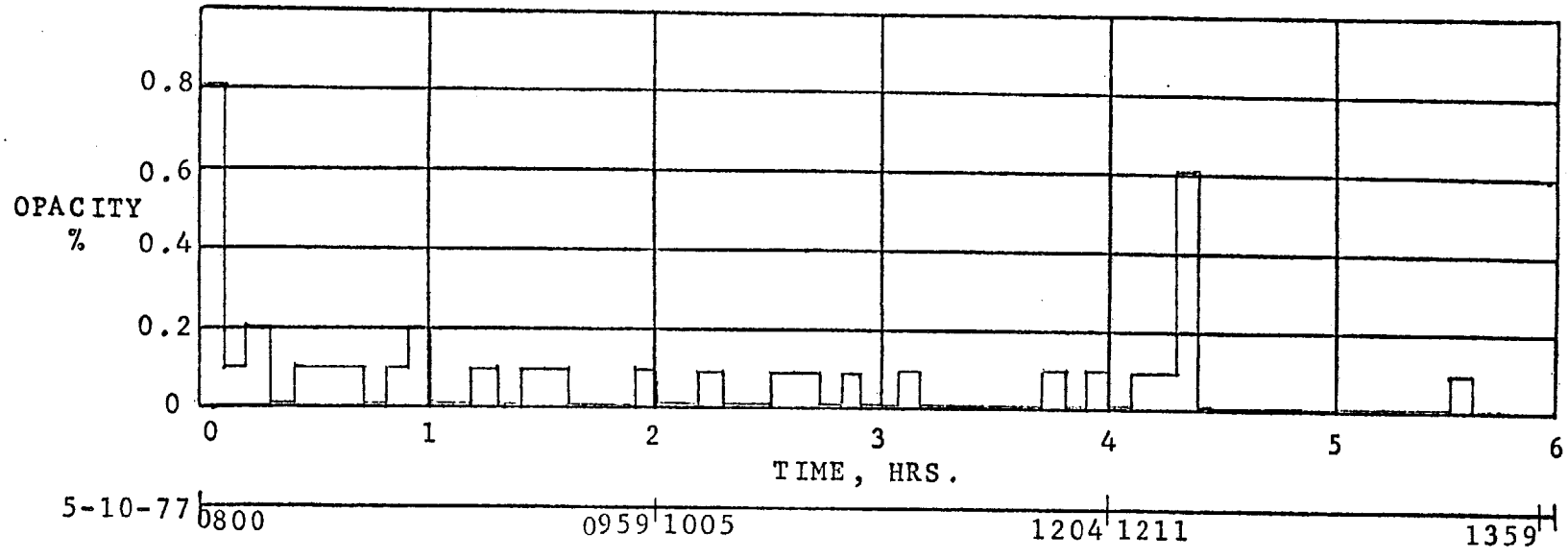
Visible emissions emanating from the wet electrostatic precipitator stack were observed during Tests 1, 2, and 3 by a certified visible emissions observer provided by Clayton Environmental Consultants, Inc. Opacities were estimated during the tests and for time intervals before and/or after each as appropriate (see Tables I-IV), in accordance with EPA Method 9. The observer recorded an opacity reading every 15 seconds during the observation period from two different locations relative to the plume. These readings are condensed and summarized in Figures 2-a through c. A series of six-minute averages are shown for each observation period. No opacity readings were taken during Test 4, since the test was conducted during the hours of darkness.

Plume opacities recorded during all tests observed,averaged below one percent for all six-minute average periods. The highest single readings were several excursions up to 20 percent opacity recorded during the pushing cycle of Test 3. Non-zero averages generally ranged from 0.7 to 2.2 percent with one excursion to 11.3 percent during this pushing cycle. Several "N"s were recorded, denoting a visible emission of less than five percent opacity, during the early part of Test 1. This, however, is not related to the pushing cycle as pushing did not begin until 1542 hours, during which there was one "N" recorded resulting in an average of 0.1 percent. During the earlier period the average remained less than one percent. The remaining average opacity readings were zero throughout the duration of all tests. Sky conditions varied from clear to partly cloudy and wind velocity averaged five to ten miles per hour.

FIGURE 2-a

VISIBLE EMISSIONS SUMMARY

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977



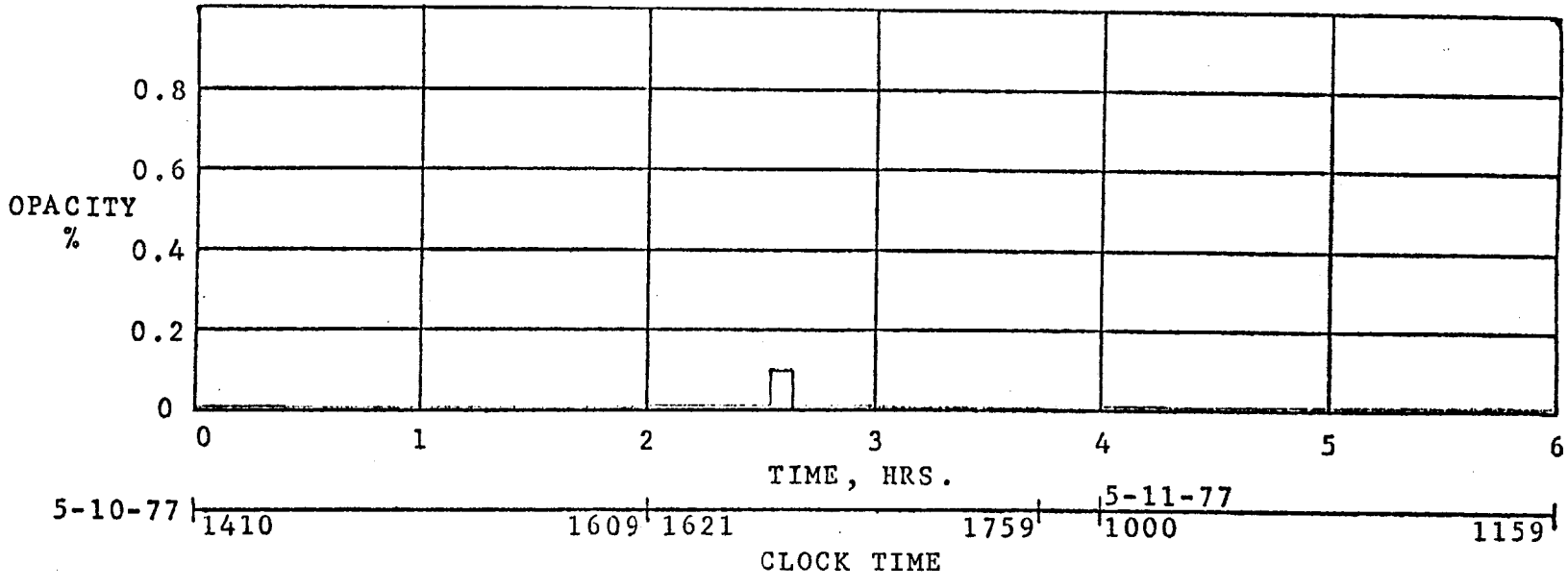
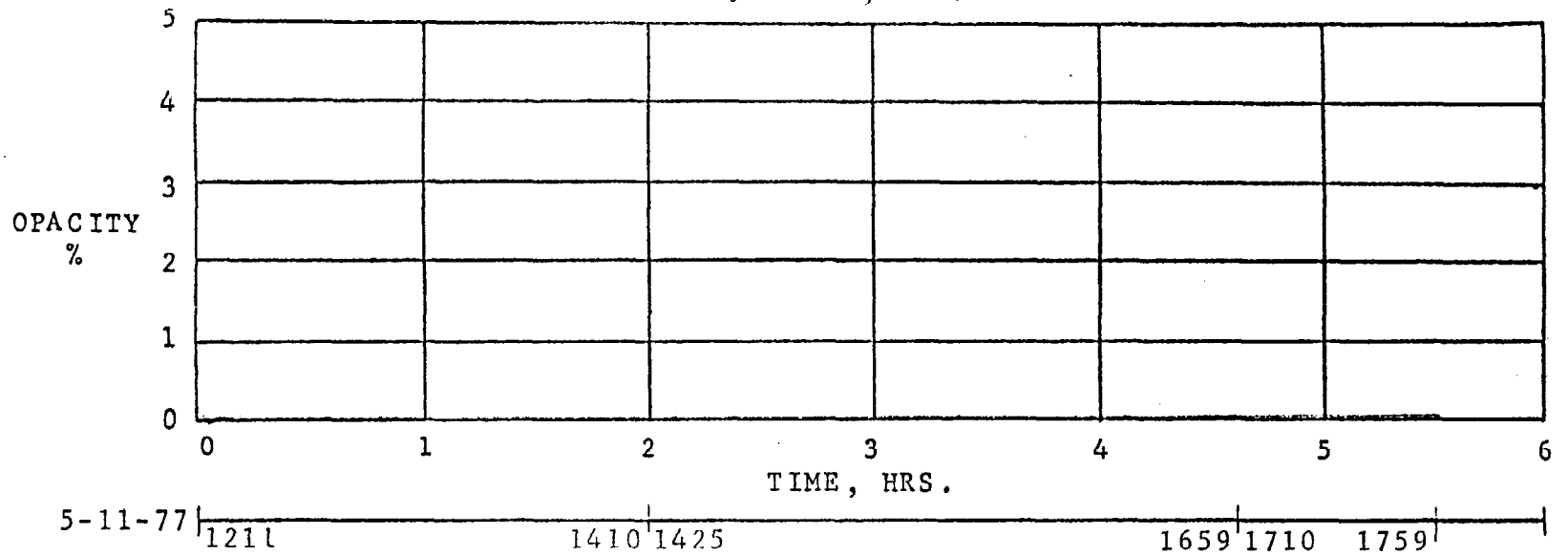


FIGURE 2-b

VISIBLE EMISSIONS SUMMARY

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977



CLOCK TIME

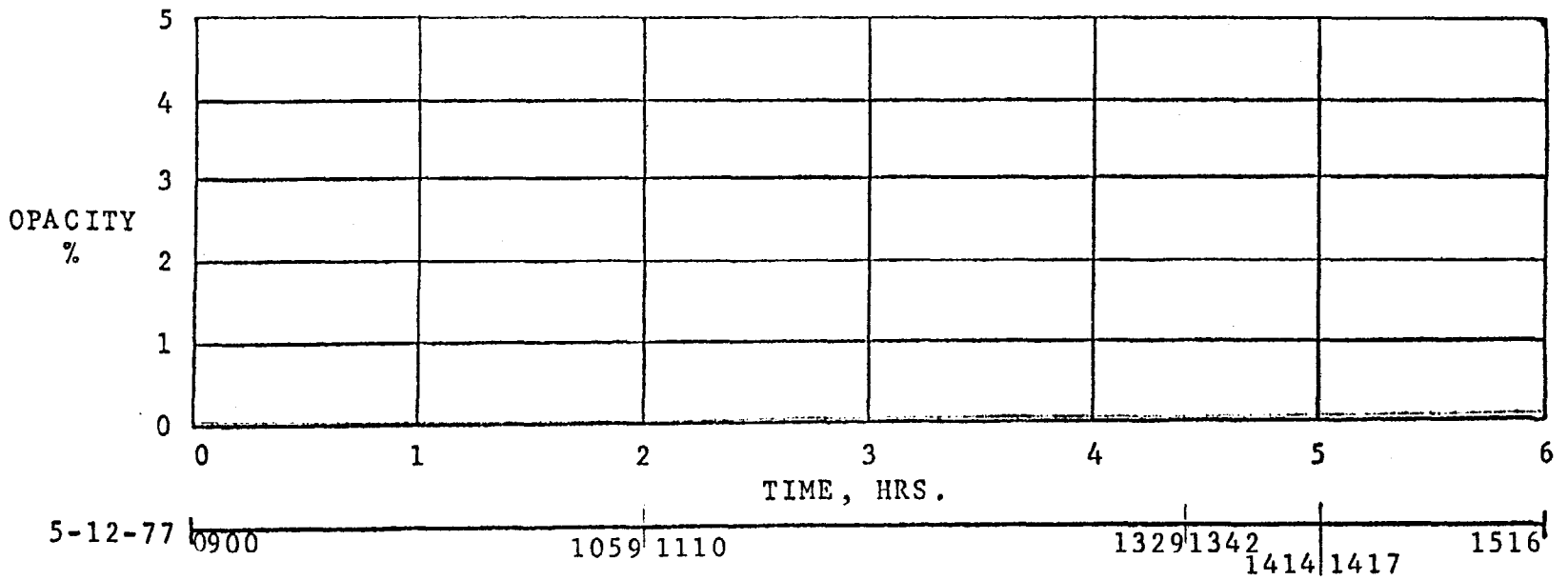
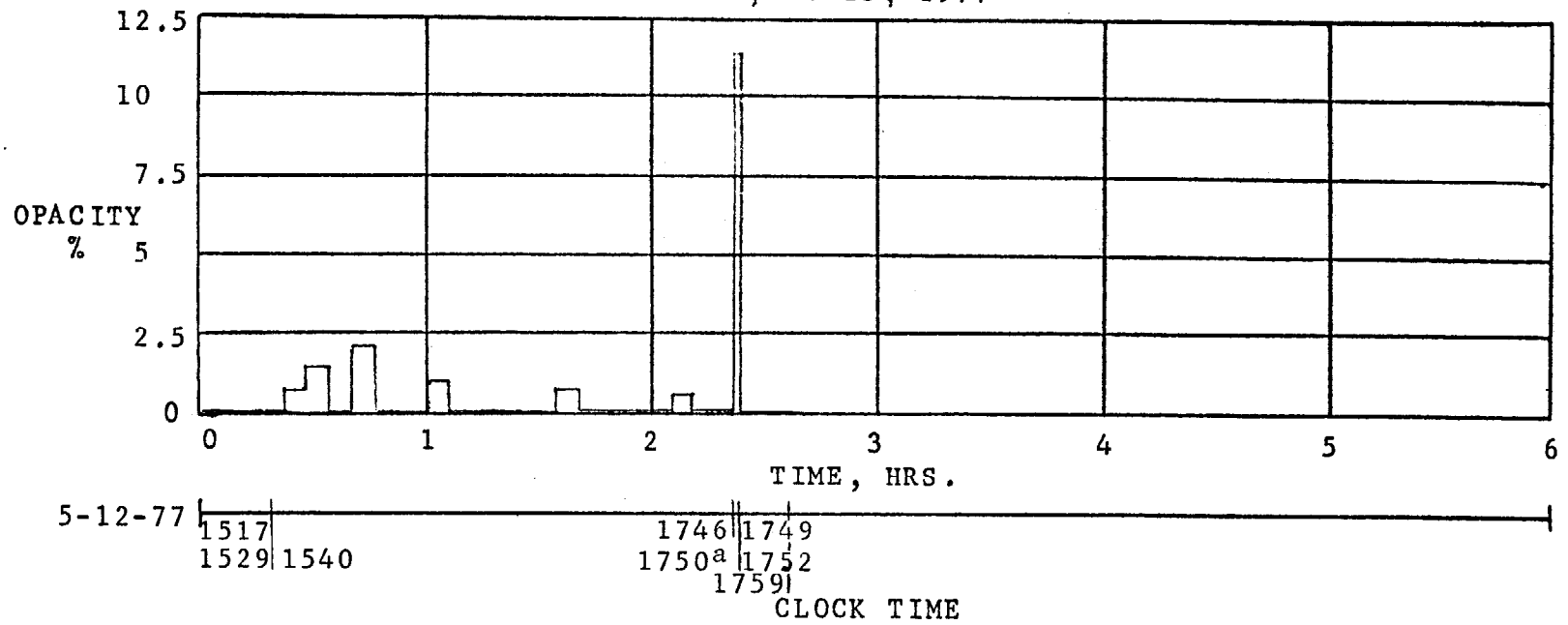
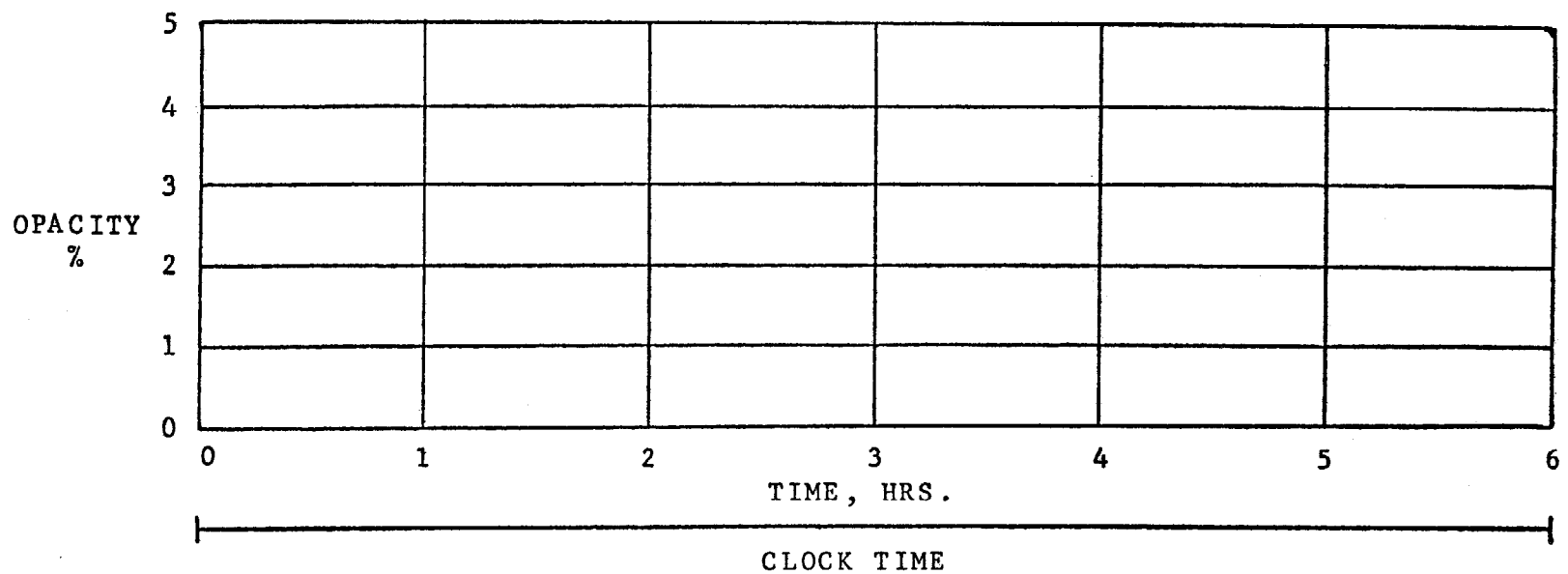


FIGURE 2-c

VISIBLE EMISSIONS SUMMARY

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977





[a] Discontinuous readings were caused by intervals of plume interference

III. PROCESS DESCRIPTION AND OPERATION

To be supplied by EPA.

IV. LOCATION OF SAMPLING POINTS

The following explains the particulate sampling locations and traverse points at the WESP inlet duct and outlet stack and the three sampling locations for acquiring water samples. Figure 3 depicts a schematic representation of the inlet ductwork, while Figure 4 shows a cross-sectional diagram of the six inlet sampling ports showing the sampling traverse points. The inlet sampling ports were located 2.5 equivalent diameters downstream of a 30 degree bend and 1.8 equivalent diameters upstream of a divergence split of the ductwork. Each of the inlet ports was accessed for sampling at the midpoints of eight equal rectangular areas, so that a total of 48 sampling points were incorporated in each test of the inlet duct. Each of these points was sampled for ten minutes, resulting in a total sampling time of 480 minutes per test.

Figure 5 depicts a schematic view of the sampling location of the WESP outlet stack showing the two ports and the sampling points used in the traverse. The two sampling ports were located on the South and West sides of the stack and were separated by a 90-degree angle. The port location allowed for 5.5 duct diameters downstream of the air flow entry point and 2.0 duct diameters upstream of the final atmospheric discharge point. Six equal annular areas were sampled at each outlet port for a total of 24 sampling points. Each of the points was sampled for 20 minutes (ten minutes on entering line traverse and ten minutes on egressing line traverse), resulting in a total sampling time

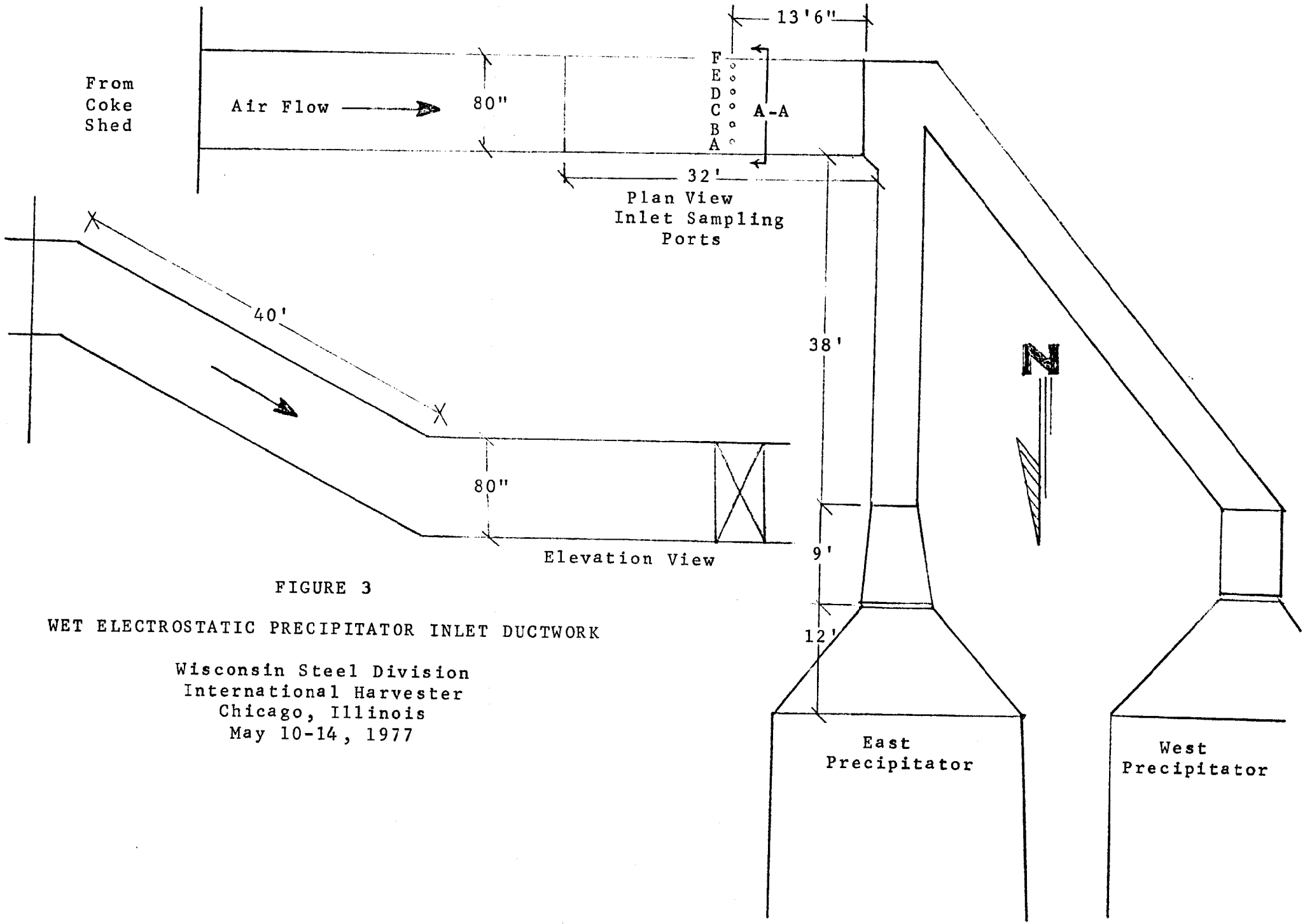


FIGURE 3

WET ELECTROSTATIC PRECIPITATOR INLET DUCTWORK

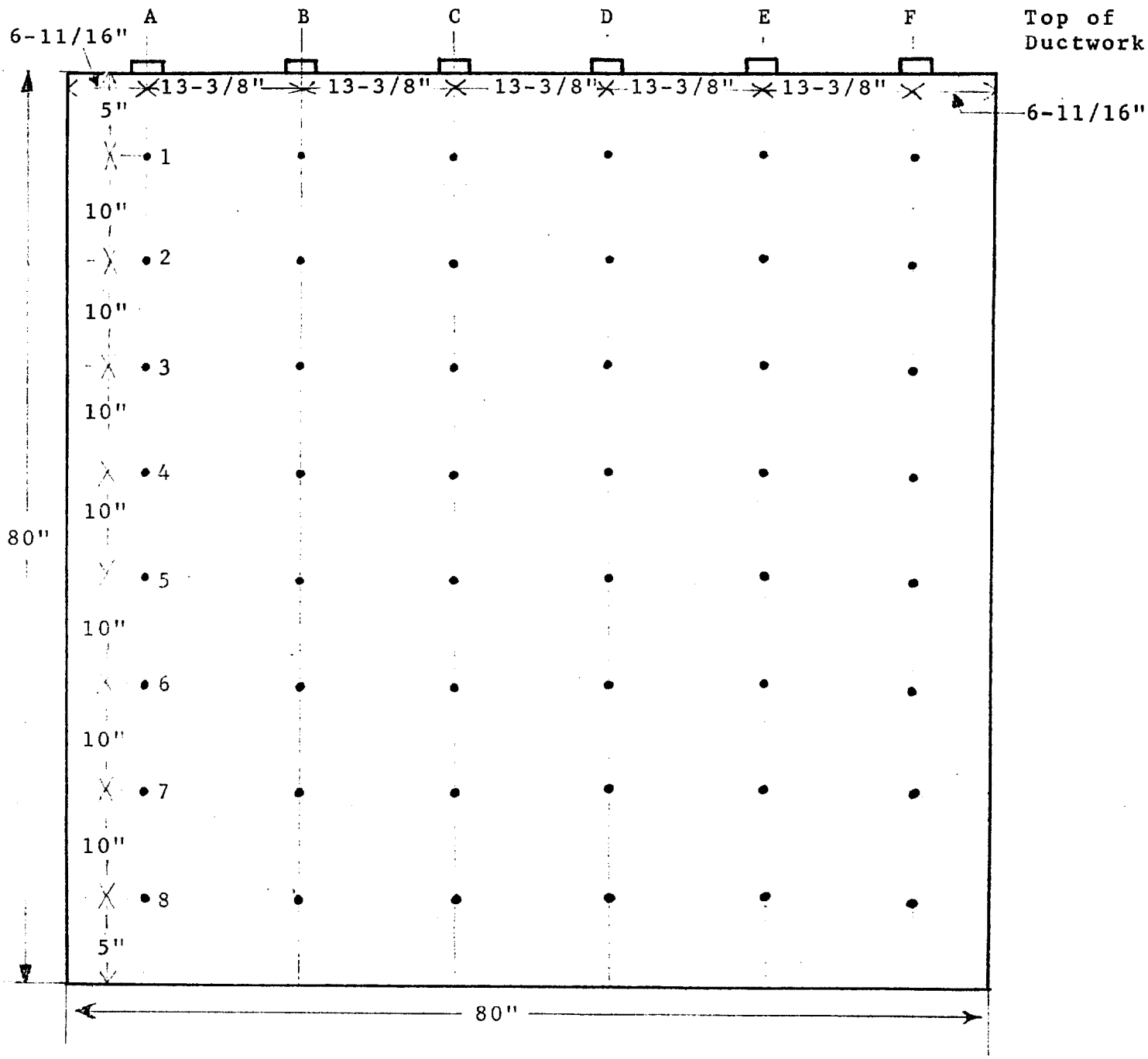
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

Clayton Environmental Consultants, Inc.

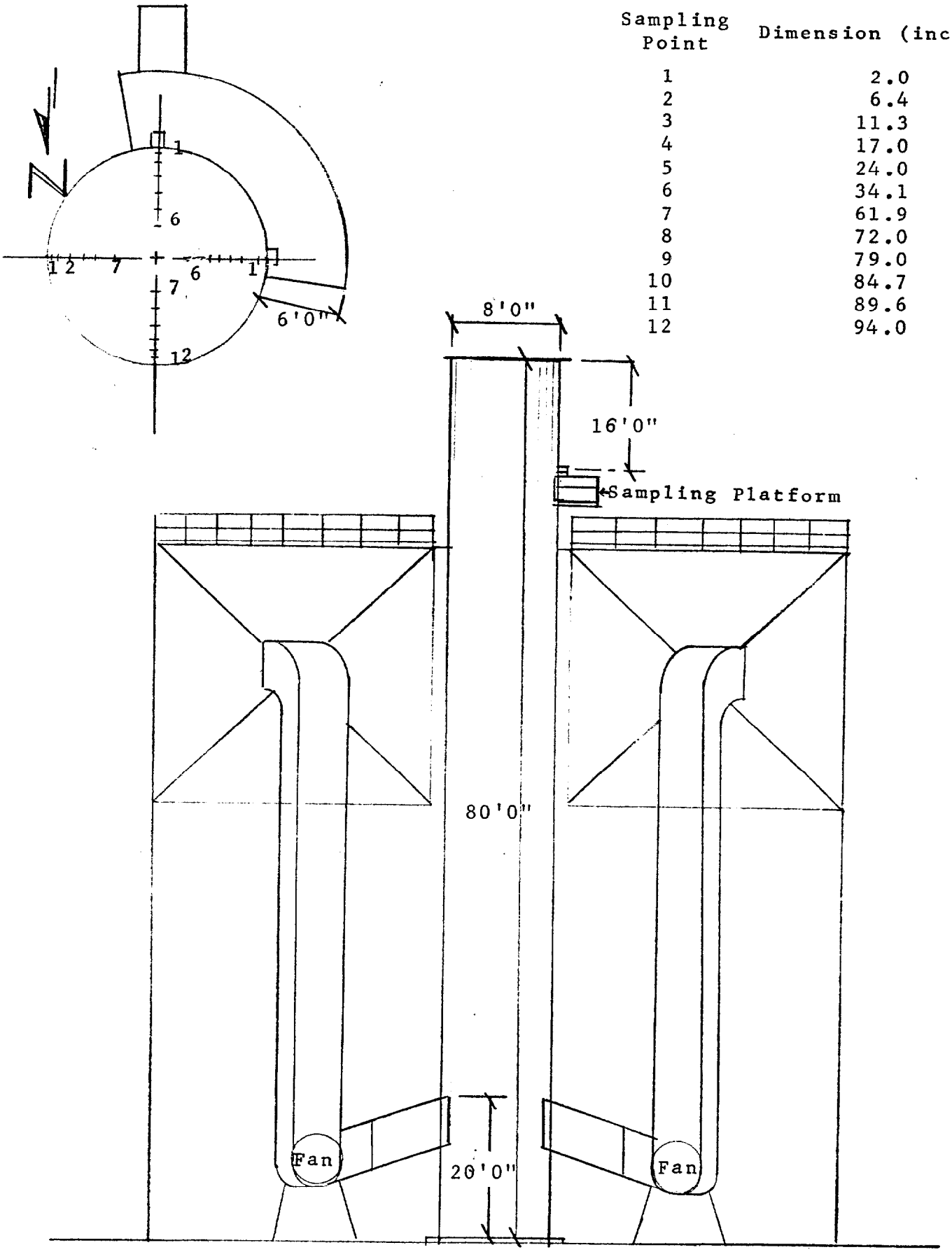
FIGURE 4

WET ELECTROSTATIC PRECIPITATOR INLET SAMPLING POINTS

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977
Section A-A



Clayton Environmental Consultants, Inc.



Sampling Point	Dimension (inches)
1	2.0
2	6.4
3	11.3
4	17.0
5	24.0
6	34.1
7	61.9
8	72.0
9	79.0
10	84.7
11	89.6
12	94.0

FIGURE 5
WET ELECTROSTATIC PRECIPITATOR OUTLET STACK AND SAMPLING POINTS
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

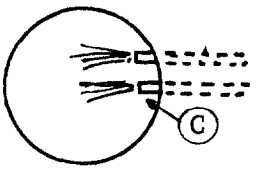
of 480 minutes.

Figure 6 depicts the three precipitator water sampling points; inlet, drain, and blowdown. Figure 7 shows the two locations from which plume opacity was observed and recorded during Tests 1, 2, and 3.

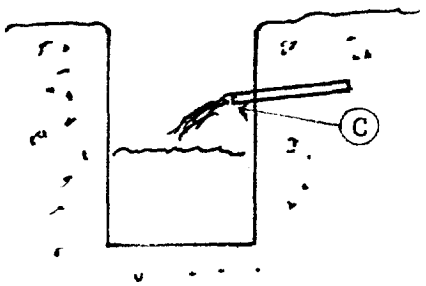
FIGURE 6

WATER SAMPLING POINTS-WESP

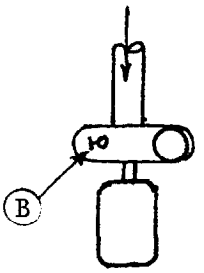
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

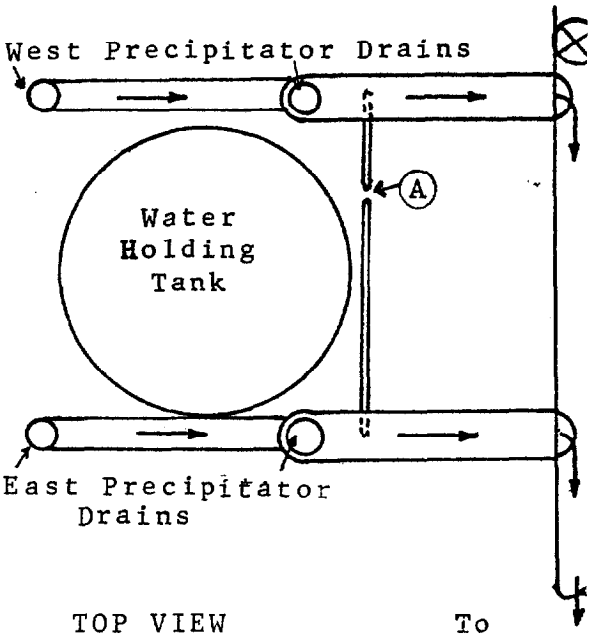


Top View



Side View
Lamella Blowdown





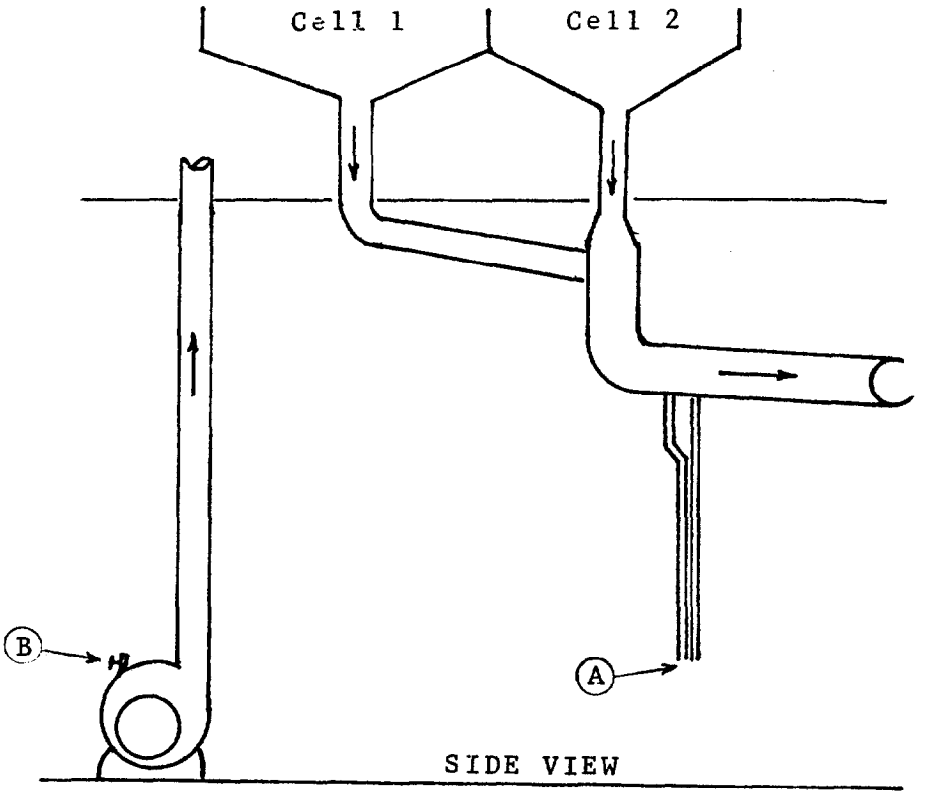
TOP VIEW

WATER SAMPLING LOCATIONS

(A) Combined Collector Drains Prior to Lamella

(B) Collectors Supply Water Pump Air Lock Valve

(C) Lamella Blowdown Drain in Sump at SW Corner of Building



SIDE VIEW

Collector Water Supply and Drain

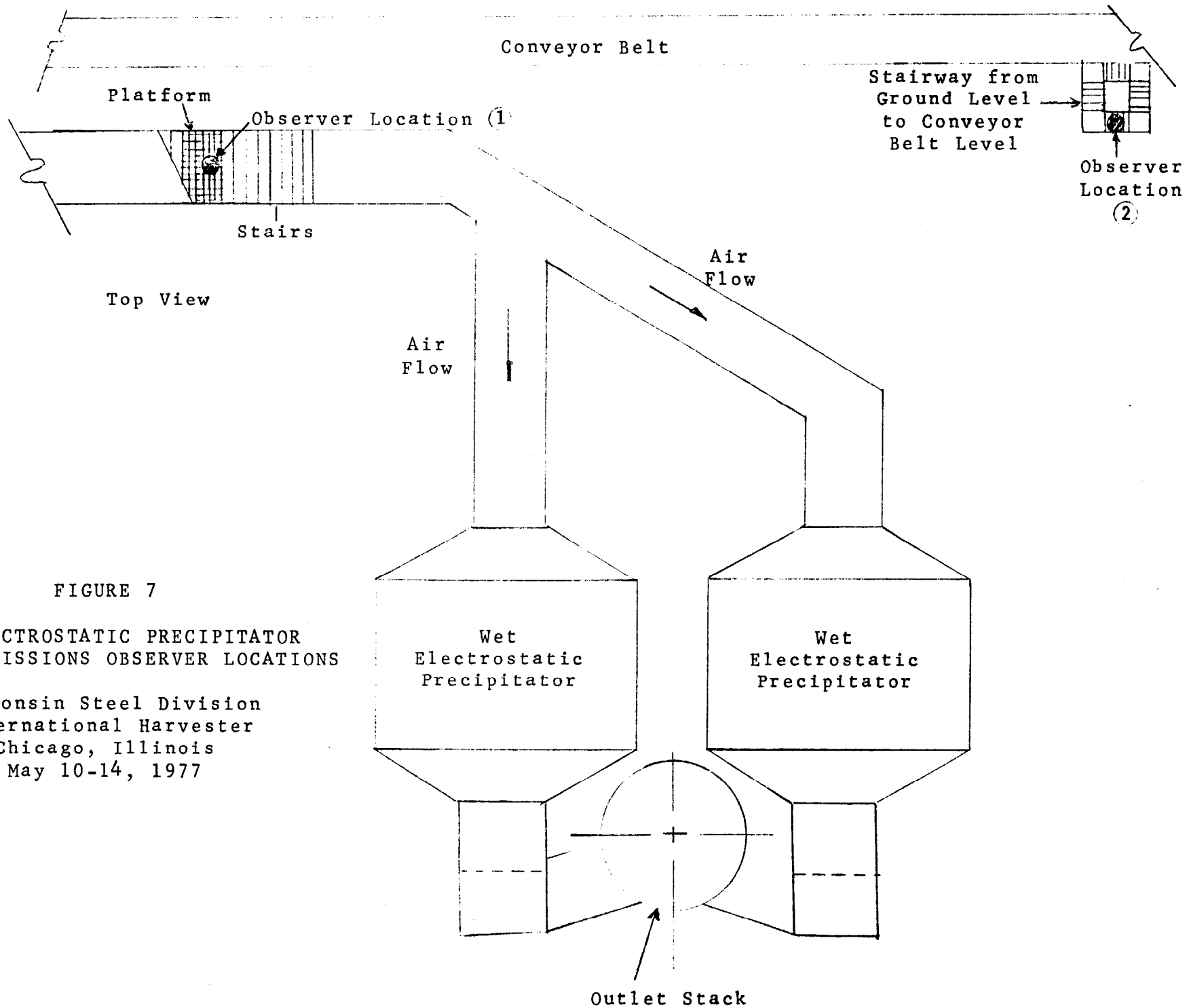


FIGURE 7

WET ELECTROSTATIC PRECIPITATOR
VISIBLE EMISSIONS OBSERVER LOCATIONS

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

V. SAMPLING AND ANALYTICAL PROCEDURES

Exahust gas sampling was conducted at the inlet and outlet of the WESP according to the guidelines outlined in the U.S. Environmental Protection Agency Standards of Performance for New Stationary Sources, (Federal Register, 40CFR60, December 23, 1971, as amended through September 24, 1976), with modifications as indicated in detail in Appendix E.

Exhaust gas velocity measurements were made using an S-type Pitot tube and inclined manometer calibrated in the Clayton Environmental Consultants' laboratory prior to and following field use. Velocity pressures were read in inches of water on the inclined manometer for each point in the traverse. Exhaust gas temperatures were measured at each traverse point using a calibrated potentiometer and an iron-constantan (I/C) thermocouple probe attached to the Pitot tube. Exhaust gas flowrates and isokinetic sampling rates were calculated from each velocity traverse. These methods are in accordance with, and further delineated in, Environmental Protection Agency Method 2 (see above) for determining stack gas velocity and volumetric flowrate. The stack gas moisture content was determined using the volumetric condensate procedure.

Schematic diagrams of the sampling trains used during testing at the inlet and outlet of the WESP are presented in Appendix E. The inlet train was modified from the EPA-Method 5 train as it utilized a separate filter box connected directly to the probe and connected to the first impinger by a flexible

Teflon coupling. Both inlet and outlet trains also included an extra impinger containing 400 grams of silica gel. During Tests 3 and 4, both trains were modified to include XAD-2 columns between the filter holder and first impinger, and between the third and fourth impingers, respectively. Extra temperature monitoring and control was maintained at the filter holder exits and the XAD-2 column exits. All XAD-2 columns were delivered to Battelle for analysis.

Recovery and cleanup procedures were in accordance with Method 5 with the addition of a benzene rinse following the acetone rinse of all train components. Efforts were made to remove residual stopcock grease from all train components during cleanup.

Simultaneously with Particulate Tests 1 and 2, an integrated exhaust gas sample was drawn by a pump through a probe, tubing, and condenser to a three-cubic-foot Tedlar bag. Exhaust gas gradually filled the bag at controlled flowrates during each test. Clayton Environmental Consultants conducted Orsat analyses of two samples, and because they generally showed the absence of products of combustion, the decision was made to not take integrated exhaust gas samples during Tests 3 and 4.

Analytical Procedures

Laboratory analyses were conducted in accordance with EPA Method 5 and are further delineated in Appendix E. Chloroform/ether extractions were performed on the impinger water. In addition, the acetone rinsings of probe and impingers, filter and the impinger water were extracted with benzene to determine benzene soluble organic matter.

Visible emission observations were taken and recorded during Tests 1, 2 and 3 by a certified visible emissions observer provided by Clayton Environmental Consultants, Inc. according to Method 9. Readings were recorded every 15 seconds during the observation period. Readings were made on a percent opacity basis in increments of five. For readings which were less than five and greater than zero the Clayton observer used the designation "N" as instructed by the EPA coordinator. The readings were condensed into six minute sums whereupon the "N's" resulted in a range. Averages were calculated on the midpoint of the range.

Two samples of inlet, outlet, and blowdown water were taken per particulate test. One was analyzed according to the guidelines outlined in the U.S. Environmental Protection Agency's Methods for Chemical Analysis of Water and Waste as amended through 1974 (STORET NO. 00530) for total and dissolved solids; the other was analyzed by Battelle for polycyclic organic material.

Particulate test results and example calculations are presented in Appendix A. Appendix B contains all the field data sheets as well as the sampling summary data. Visible emission summary sheets and associated field data sheets are presented in Appendix C. Sampling logs for the particulate tests, integrated bag sample data, visible emissions, and water samples are in Appendix D as well as the coke charging and pushing times. Appendix E presents a detailed summary of the sampling and analytical procedures. Appendix F contains the laboratory data including the summary of weight fractions, sample identification log,

pre-wash data summary, ph analysis of water samples and the benzene soluble organic data. The analytical data sheets as received from Battelle Columbus laboratories are available in Appendix G. Calibration data and the project participants are presented in Appendices H and I, respectively.

APPENDIX A

COMPLETE PARTICULATE TEST RESULTS
SAMPLE CALCULATIONS,
ENGLISH AND METRIC

TABLE A-1

INLET PARTICULATE SAMPLING DATA

Run No.		1	2	3	4
Test Date		5-10-77	5-11-77	5-12-77	5-13-77 5-14-77
Sampling Time, 24 hour clock		1000-2000	1000-1900	0930-1840	2020-0630
D_n	Sampling Nozzle Diameter, in.	0.1875	0.1875	0.1875	0.1875
T_t	Net Time of Test, Min.	480	480	480	480
P_b	Barometric Pressure, in. Hg Absolute	29.52	29.54	29.56	29.30
P_m	Average Orifice Pressure Drop, in. H_2O	1.99	2.03	2.01	2.00
V_m	Volume of Dry Gas Sampled at Meter Conditions, DCF	371.37	377.04	373.22	377.32
T_m	Average Gas Meter Temperature, °F	94	104	110	103
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions[a], DSCF	350.87	350.49	343.20	348.08
V_w	Total H_2O Collected in Impingers and Silica Gel, ml	71.8	34.2	77.8	59.2
$V_{w_{gas}}$	Volume of Water Vapor Collected at Standard Conditions[b], SCF	3.38	1.61	3.66	2.79
% M	% Moisture in Stack Gas, by Volume	0.95	0.46	1.06	0.79
M_d	Mole Fraction of Dry Gas	0.991	0.995	0.989	0.992
% CO_2	Volume % Dry	—	<0.1	—	—
% O_2	Volume % Dry	—	20.7	—	—
% CO	Volume % Dry	—	<0.1	—	—
% N_2	Volume % Dry	—	79.3	—	—
% EA	Percent Excess Air	—	—	—	—
MW_d	Molecular Weight of Stack Gas, Dry Basis	28.8	28.8	28.8	28.8

TABLE A-1 (cont.)

INLET PARTICULATE SAMPLING DATA

Run No.		1	2	3	4
MW	Molecular Weight of Stack Gas, Wet Basis	28.7	28.7	28.7	28.7
C_p	Pitot Tube Coefficient	0.851	0.851	0.851	0.851
T_s	Average Stack Temperature °F	78	88	92	100
N_p	Net Sampling Points	96	96	96	96
P_{st}	Static Pressure of Stack Gas, in. Hg	-0.23	-0.23	-0.23	-0.23
P_s	Stack Gas Pressure, in. Hg Absolute	29.3	29.3	29.3	29.1
V_s	Stack Gas Velocity at Stack Conditions, fpm	4100	4160	4160	4260
A_s	Stack Area, in.^{2}	6400	6400	6400	6400
Q_s	Dry Stack Gas Volumetric Flow Rate at Standard Conditions,[c] DSCFM	174,000	174,000	172,000	173,000
Q_a	Stack Gas Volumetric Flow Rate at Stack Conditions, ACFM	182,000	185,000	185,000	189,000
% I	Percent Isokinetic	97	97	96	97
% O	Percent Opacity	—	—	—	—
T_c	Unit Feed Rate-tons coal charged/day	1026	1026	1026	1026
m_f	Particulate - Probe, and Filter, mg	181.2	117.6	300.6	145.5
m_t	Particulate - Total, mg	317.0	261.9	331.3[d]	312.9[e]
I_c	% Impinger Catch	42.8	55.1	9.3[d]	53.5[e]
C_{an}	Particulate - Probe, and Filter, gr/SCF	0.0080	0.0052	0.0135	0.0064
C_{ao}	Particulate - Total, gr/SCF	0.0139	0.0115	0.0149[d]	0.0138[e]

TABLE A-1 (cont.)

INLET PARTICULATE SAMPLING DATA

Run No.		1	2	3	4
C_{at}	Particulate - Probe, and Filter, gr/ACF	0.0076	0.0049	0.0125	0.008
C_{au}	Particulate - Total, gr/ACF	0.0133	0.0108	0.0138[d]	0.0126[e]
C_{aw}	Particulate - Probe, and Filter, lb/hr.	11.9	7.75	19.9	9.49
C_{ax}	Particulate - Total, lb/hr.	20.7	17.1	22.0[d]	20.5[e]
P_{tf}	Particulate - Probe, and Filter, lb/ton coal charged	0.278	0.181	0.465	0.222
P_{tt}	Particulate - Total, lb/ton coal charged	0.484	0.400	0.515[d]	0.480[e]

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] Dry standard cubic feet per minute at 68°F, 29.92 in. Hg.

[d] XAD-2 after filter; impinger weight reduced

[e] XAD-2 after third impinger

TABLE A-2

OUTLET PARTICULATE SAMPLING DATA

Run No.		1	2	3	4
Test Date		5-10-77	5-11-77	5-12-77	5-13-77 5-14-77
Sampling Time, 24 hour clock		1000-2000	1000-1900	0930-1840	2020-0630
D_n	Sampling Nozzle Diameter, in.	0.189	0.189	0.191	0.189
T_t	Net Time of Test, Min.	480	480	480	480
P_b	Barometric Pressure, in. Hg Absolute	29.60	29.56	29.56	29.36
P_m	Average Orifice Pressure Drop, in. H_2O	2.03	2.03	2.08	1.95
V_m	Volume of Dry Gas Sampled at Meter Conditions, DCF	371.30	377.61	385.28	368.67
T_m	Average Gas Meter Temperature, °F	86	102	105	96
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions[a], DSCF	357.33	352.01	357.49	345.35
V_w	Total H_2O Collected in Impingers and Silica Gel, ml	168	189	196	226
$V_{w_{gas}}$	Volume of Water Vapor Collected at Standard Conditions[b], SCF	7.90	8.89	9.22	10.6
% M	% Moisture in Stack Gas, by Volume	2.2	2.5	2.5	3.0
M_d	Mole Fraction of Dry Gas	0.978	0.975	0.975	0.970
% CO_2	Volume % Dry	<0.1	—	—	—
% O_2	Volume % Dry	20.7	—	—	—
% CO	Volume % Dry	<0.1	—	—	—
% N_2	Volume % Dry	79.3	—	—	—
% EA	Percent Excess Air	—	—	—	—
MW_d	Molecular Weight of Stack Gas, Dry Basis	28.8	28.8	28.8	28.8

TABLE A-2 (cont.)

OUTLET PARTICULATE SAMPLING DATA

Run No.		1	2	3	4
MW	Molecular Weight of Stack Gas, Wet Basis	28.6	28.6	28.6	28.5
C_p	Pitot Tube Coefficient	0.8395	0.8395	0.8395	0.8395
T_s	Average Stack Temperature °F	63	71	71	75
N_p	Net Sampling Points	96	96	96	96
P_{st}	Static Pressure of Stack Gas, in. Hg	-0.07	-0.07	-0.07	-0.07
P_s	Stack Gas Pressure, in. Hg Absolute	29.5	29.5	29.5	29.3
V_s	Stack Gas Velocity at Stack Conditions, fpm	3860	3860	3870	3900
A_s	Stack Area, in.^{2}	7238	7238	7238	7238
Q_s	Dry Stack Gas Volumetric Flow Rate at Standard Conditions,[c] DSCFM	190,000	186,000	187,000	184,000
Q_a	Stack Gas Volumetric Flow Rate at Stack Conditions, ACFM	194,000	194,000	194,000	196,000
% I	Percent Isokinetic	101	101	101	100
% O	Percent Opacity	0.1	0	1.0	—
T_c	Unit Feed Rate- tons coal charged/day	1026	1026	1026	1026
m_f	Particulate - Probe, and Filter, mg	76.0	16.4	22.4	11.3
m_t	Particulate - Total, mg	100.4	43.4	29.4[d]	29.3[e]
I_c	% Impinger Catch	24.3	62.2	23.8[d]	61.4[e]
C_{an}	Particulate - Probe, and Filter, gr/SCF	0.0033	0.0007	0.0010	0.0005
C_{ao}	Particulate - Total, gr/SCF	0.0043	0.0019	0.0013[d]	0.0013[e]

TABLE A-2 (cont.)

OUTLET PARTICULATE SAMPLING DATA

Run No.		1	2	3	4
C_{at}	Particulate - Probe, and Filter, gr/ACF	0.0032	0.0007	0.0010	0.0005
C_{au}	Particulate - Total, gr/ACF	0.0042	0.0018	0.0012[d]	0.0012[e]
C_{aw}	Particulate - Probe, and Filter, lb/hr.	5.37	1.12	1.60	0.79
C_{ax}	Particulate - Total, lb/hr.	7.00	3.03	2.08[d]	2.05[e]
P_{tf}	Particulate - Probe, and Filter, lb/ton coal charged	0.126	0.026	0.037	0.018
P_{tt}	Particulate - Total, lb/ton coal charged	0.164	0.071	0.049[d]	0.048[e]

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] Dry standard cubic feet per minute at 68°F, 29.92 in. Hg.

[d] XAD-2 after filter; impinger weight reduced

[e] XAD-2 after third impinger

APPENDIX A. SAMPLE CALCULATIONS-ENGLISH

1. Volume of dry gas sampled at standard conditions[a], DSCF

$$V_{m_{std}} = \frac{17.65 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)} = \frac{17.65 \times \quad (\quad + \frac{\quad}{13.6})}{(\quad +460)} = \qquad \text{DSCF}$$

2. Volume of water vapor at standard conditions[b], SCF

$$V_{w_{gas}} = 0.0471 \times V_w = 0.0471 \times \quad = \qquad \text{SCF}$$

3. Percent moisture in stack gas

$$\% M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} = \frac{100 \quad \times}{+} =$$

4. Mole fraction of dry gas

$$M_d = \frac{100 - \% M}{100} = \frac{100 -}{100} =$$

5. Molecular weight of dry stack gas

$$MW_d = (\%CO_2 \times \frac{44}{100}) + (\%O_2 \times \frac{32}{100}) + \left[(\%CO + \%N_2) \times \frac{28}{100}\right] =$$

$$(\quad \times \frac{44}{100}) + (\quad \times \frac{32}{100}) + (\quad \times \frac{28}{100}) =$$

6. Molecular weight of wet stack gas

$$MW = MW_d \times M_d + 18\ (1 - M_d) = \quad \times \quad + 18\ (1 - \quad) =$$

7. Stack gas velocity at stack conditions, fpm[c]

$$V_s = 5128.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2} =$$

$$5128.8 \times \quad \times \left[\frac{1}{\quad \times \quad}\right]^{1/2} = \quad \text{fpm}$$

8. Stack gas volumetric flow rate at standard conditions[d], DSCFM

$$Q_s = \frac{0.123 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)} = \frac{0.123 \times \quad \times \quad \times \quad \times \quad}{(\quad + 460)} = \quad \text{DSC}$$

9. Stack gas volumetric flow rate at stack conditions, ACFM

$$Q_a = \frac{.05667 \times Q_s\ (T_s + 460)}{P_s \times M_d} = \frac{.05667 \times \quad (\quad + 460)}{\quad \times \quad} = \quad \text{ACFM}$$

10. Percent isokinetic

$$\%I = \frac{1{,}039 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2} = \frac{1{,}039 \times (\quad + 460) \times \quad}{\quad \times \quad \times \quad \times (\quad)^2} =$$

11. Particulate - probe, cyclone, and filter, gr/DSCF

$$C_{an} = 0.0154 \times \frac{m_f}{V_{m_{std}}} = 0.0154 \times \frac{\quad}{\quad} = \qquad \text{gr/DSCF}$$

12. Particulate - total, gr/DSCF

$$C_{ao} = 0.0154 \times \frac{m_t}{V_{m_{std}}} = 0.0154 \times \frac{\quad}{\quad} = \qquad \text{gr/DSCF}$$

13. Particulate - probe, cyclone, and filter at stack conditions, gr/ACF

$$C_{at} = \frac{17.6 \times C_{an} \times P_s \times M_d}{(T_s + 460)} = \frac{17.6 \times \quad \times \quad \times \quad}{(\quad + 460)} = \qquad \text{gr/ACF}$$

14. Particulate - total at stack conditions, gr/ACF

$$C_{au} = \frac{17.6 \times C_{ao} \times P_s \times M_d}{(T_s + 460)} = \frac{17.6 \times \quad \times \quad \times \quad}{(\quad + 460)} = \qquad \text{gr/ACF}$$

15. Particulate - probe, cyclone, and filter, lb/hr

$$C_{aw} = 0.00857 \times C_{an} \times Q_s = 0.00857 \times \quad \times \quad = \qquad \text{lb/hr}$$

16. Particulate - total, lb/hr

$$C_{ax} = 0.00857 \times C_{ao} \times Q_s = 0.00857 \times \quad \times \quad = \quad \text{lb/hr}$$

17. Particulate - probe, cyclone, and filter, lb/ton feed

$$P_{tf} = \frac{C_{aw} \times 24}{T_c} = \underline{\qquad} = \quad \text{lb/ton feed}$$

18. Particulate - total, lb/ton feed

$$P_{tt} = \frac{C_{ax} \times 24}{T_c} = \underline{\qquad} = \quad \text{lb/ton feed}$$

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[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔPs) and the absolute stack temperature from each sampling point.

[d] Dry standard cubic feet per minute at 68°F, 29.92 in. Hg.

APPENDIX A. SAMPLE CALCULATIONS-METRIC

Nomenclature

P_b	Barometric Pressure, mm. Hg.
P_m	Average Orifice Pressure Drop, mm. H_2O
T_m	Average Dry Gas Meter Temperature, °C
V_m	Volume of Dry Gas Sampled at Meter Conditions, Am^3
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions(1), Nm^3
V_w	Total H_2O Collected in Impingers and Silica Gel, ml
$V_{w_{std}}$	Volume of Water Vapor Collected at Standard Conditions(1), Nm^3
%M	Percent Moisture in Stack Gas, by Volume
M_d	Mole Fraction Dry Stack Gas
$\%CO_2$	Percent CO_2 by volume, dry
$\%O_2$	Percent O_2 by volume, dry
%CO	Percent CO by volume, dry
$\%N_2$	Percent N_2 by volume, dry
MW_d	Molecular Weight of Dry Stack Gas, gm/gm-mole
MW	Molecular Weight of Wet Stack Gas, gm/gm-mole
C_p	Pitot Tube Coefficient
P_s	Stack Gas Pressure, mm. Hg., absolute
T_s	Stack Gas Temperature, °C
$\overline{T}_s$	Average Stack Gas Temperature, °C
ΔP_s	Velocity head, mm. H_2O
V_s	Average Stack Gas Velocity, Stack Conditions, Am/s
A_s	Stack Area, m^2
Q_s	Stack Gas Flow Rate at Standard Conditions(1), dry Nm^3/min

Q_a	Stack Gas Flow Rate at Stack Conditions, Am^3/min
T_t	Net Time of Test, min.
D_n	Sampling Nozzle Diameter, mm.
%I	Percent Isokinetic
m_f	Particulate Collected in Probe, cyclone and filter, mg.
m_t	Total Particulate Collected, mg.
I_c	Percent of Particulate Caught in Impingers
C_{sf}	Particulate Concentrations at Standard Conditions(1), dry, based on probe, cyclone and filter catch, mg/Nm^3
C_{st}	Particulate Concentration at Standard Conditions(1), dry, based on total catch, mg/Nm^3
C_{af}	Particulate Concentration at Stack Conditions, based on probe, cyclone and filter catch, mg/Am^3
C_{at}	Particulate Concentration at Stack Conditions, based on total catch, mg/Am^3
E_f	Particulate Emission Rate, based on probe, cyclone and filter catch, kg/hr
E_t	Particulate Emission Rate, based on total particulate catch, kg/hr
P_u	Unit Process Rate, _____ _____
PE_f	Particulate Emission Rate on a Process Basis, probe, cyclone and filter catch, kg/_____
PE_t	Particulate Emission Rate on a Process Basis, total catch kg/_____
%EA	Percent Excess Air in Stack Gas

Calculations

1. Volume of Dry Gas Sampled at Standard Conditions[1]

$$V_{m_{std}} = \frac{0.3855 \times V_m \times (P_b + P_m/13.6)}{(T_m + 273)} = \frac{0.3855 \times \quad \times(\quad + 13.6\ )}{(\quad +273)}$$

$$= \quad Nm^3$$

2. Volume of Water Vapor at Standard Conditions[1]

$$V_{w_{gas}} = 0.00133 \times V = 0.00133 \times \quad = \quad Nm^3$$

3. Percent Moisture in Stack Gas by Volume

$$\%M = \frac{100 \times V_{w_{gas}}}{V_{w_{gas}} + V_{m_{std}}} = \frac{100 \times}{+} = \quad \%$$

4. Mole Fraction Dry Stack Gas

$$M_d = \frac{100 - \quad \%M}{100} = \frac{100 - \quad}{100} =$$

5. Molecular Weight of Dry Stack Gas

$$MW_d = (\%CO \times \frac{44}{100}) + (\%O_2 \times \frac{32}{100}) + [(\%CO + \%\ N_2) \times \frac{28}{100}] =$$

$$(\quad \times .44) + (\quad \times 0.32) + [(\quad + \quad) \times .28]$$

$$= \quad gm/gm\text{-}mole$$

6. Molecular Weight of Wet Stack Gas

$$MW = MW_d \times M_d + 18(1-M_d) = \quad \times \quad + 18(1- \quad)$$

$$= \quad gm/gm\text{-}mole$$

7. Stack Gas Velocity at Stack Conditions[2]

$$V_s = 34.97 \times C_p \times \sqrt{\Delta P_s \times (T_s + 273)} \left[\frac{1}{P_s \times MW}\right]^{\frac{1}{2}} =$$

$$34.97 \times \quad \times \quad \left[\frac{1}{\quad \times \quad}\right]^{\frac{1}{2}} = \qquad \text{Am/sec}$$

8. Stack Gas Volumetric Flow Rate at Standard Conditions[1], dry

$$Q_s = \frac{2.325 \times V_s \times A_s \times M_d \times P_s}{(T_s + 273)} = \frac{2.325 \times \quad \times \quad \times \quad \times \quad}{(\quad + 273)}$$

$$= \qquad \text{Nm}^3/\text{min}$$

9. Stack Gas Volumetric Flow Rate at Stack Conditions

$$Q_a = \frac{2.58 \times Q_s(\overline{T}_s + 273)}{P_s \times M_d} = \frac{2.58 \times \quad (\quad + 273)}{\quad \times \quad}$$

$$= \qquad \text{Am}^3/\text{min}$$

10. Percent Isokinetic

$$\%I = \frac{54{,}120 \times (\overline{T}_s + 273) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

$$= \frac{54{,}120 \times (\quad + 273) \times \quad}{\quad \times \quad \times \quad \times \quad (\quad)^2} = \qquad \%$$

11. Particulate Concentration at Standard Conditions[1], dry, based on probe, cyclone and filter catch

$$C_{sf} = \frac{m_f}{V_{m_{std}}} = \frac{\quad}{\quad} = \qquad \text{mg/Nm}^3$$

12. Particulate Concentration at Standard Conditions[1], dry, based on total catch

$$C_{st} = \frac{m_t}{V_{m_{std}}} = \underline{\qquad\qquad} = \qquad\qquad mg/Nm^3$$

13. Particulate Concentration at Stack Conditions, based on probe, cyclone, and filter catch

$$C_{af} = \frac{0.3855 \times C_{sf} \times P_s \times M_d}{(T_s + 273)} = \frac{0.3855 \times \qquad \times \qquad \times}{(\qquad + 273)}$$

$$= \qquad\qquad mg/Am^3$$

14. Particulate Concentration at Stack Conditions, based on total catch

$$C_{at} = \frac{0.3855 \times C_{sf} \times P_s \times M_d}{(\overline{T}_s + 273)} = \frac{0.3855 \times \qquad \times \qquad \times}{(\qquad + 273)}$$

$$= \qquad\qquad mg/Am^3$$

15. Particulate Emission Rate, based on probe, cyclone, and filter catch

$$E_f = 1{,}000{,}000 \times C_{sf} \times Q_s = 1{,}000{,}000 \times \qquad \times \qquad = \qquad\qquad kg/hr$$

16. Particulate Emission Rate, based on total catch

$$E_t = 1{,}000{,}000 \times C_{st} \times Q_s = 1{,}000{,}000 \times \qquad \times \qquad = \qquad\qquad kg/hr$$

17. Particulate Emission Rate on a Process Basis, probe, cyclone, and filter catch

$$PE_f = \frac{E_f}{P_u} = \underline{\qquad\qquad} = \underline{\qquad\qquad}$$

18. Particulate Emission Rate on a Process Basis, total catch

$$PE_t = \frac{E_t}{P_u} = \underline{\qquad\qquad} = \underline{\qquad\qquad}$$

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(1) Standard Conditions: 20 °C, 760 mm. Hg.

(2) $\sqrt{\Delta P_s \times (T_s + 273)}$ is determined by averaging the square root of the product of the velocity head (ΔP_s) and the absolute stack temperature (T_s + 273) at each sampling point.

APPENDIX B

SECTION I PARTICULATE FIELD DATA SHEETS
INLET

APPENDIX B

PARTICULATE FIELD DATA

SECTION I PARTICULATE FIELD DATA SHEETS

SECTION II PARTICULATE SAMPLING SUMMARY DATA

1.39 TM/TS X VEL.

SAMPLING TRAIN DATA

Company: EPA TASK # 29 - WISCONSIN STEEL ILL.
Source Designation: INLET
Date: 5/10/77
Test Number: P-1
Field Person: GEH & TVM
Filter Number: A-102-13
Barometric Pressure ("Hg): 29.52
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 45°
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): 0.1875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC #3, Corr. Factor: .980
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 29a
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock 10:08	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
		0			822.295	76	74		FILTER BOX / BLOWER		
D 8	5	10:08	1.20	530 70	825.835	535 76	74	1.68	300/285	60	5.0
8	10	10:13	1.26	70	829.545	538 80	76	1.76	285/257	57	5.0
7	15	10:18	1.25	535 75	833.150	542 88	76	1.76	270/255	50	5.0
7	20	10:23	1.25	75	837.275	549 90	78	1.77	267/245	60	5.0
6	25	10:28	1.25	75	840.510	546 92	80	1.77	265/245	57	5.0
6	30	10:33	1.25	75	844.700	547 94	80	1.77	260/245	63	5.0
5	35	10:38	1.45	75	847.995	94	80	2.06	260/245	60	5.0
5	40	10:43	1.45	75	852.045	549 96	82	2.07	255/227	57	5.0
4	45	10:48	1.55	75	856.400	96	82	2.22	255/223	57	5.0
4	50	10:53	1.55	75	860.200	551 98	84	2.22	255/210	60	5.0
3	55	10:58	1.55	75	864.385	552 100	84	2.22	255/212	60	5.0
3	60	11:03	1.60	75	869.875	553 100	86	2.20	255/210	60	6.0
2	65	11:08	1.45	75	872.910	555 102	85	2.09	255/210	60	5.0
2	70	11:13	1.45	75	876.915	102	88	2.09	255/245	60	5.0
1	75	11:18	.93	75	880.345	102	88	1.34	255/245	55	4.0
1	80	11:23	.95	75	883.475	556 102	90	1.37	255/227	55	4.0
AVERAGE (TOTAL)			1.426	1190	( )	3774 1512	1316	30.49	4202/3786	231	79

Clayton Environmental Consultants, Inc.

$1.39 \times \frac{TM}{TS} \times VEL$

SAMPLING TRAIN DATA

Company: EPA TASK #29 WISCONSIN STEEL ILL.
Source Designation: INLET
Date: 5/10/77
Test Number: P-1
Field Person: GEH & TVM
Filter Number: A-102-13
Barometric Pressure ("Hg): 29.52
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 55°
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC #3, Corr. Factor: .986
Meter Isokinetic Factor: 1.644
Assumed Moisture (%): 29a
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "H

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
										FILTER / ELBOW		
E	8	85	11:25	1.45	75	887.650	556 / 102	90	2.09	265 / 230	55	5.0
STOP	8	90	11:30	1.35	75	890.764	102	90	1.95	285 / 275	55	5.0
START	7	95	11:58	1.30	75	895.180	552 / 92	92	1.86	283 / 265	50	5.0
11:30 11:53	7	100	12:03	1.30	75	899.025	555 / 98	92	1.87	275 / 250	50	6.0
	6	105	12:08	1.70	75	903.720	556 / 100	92	2.46	275 / 250	50	5.0
	6	110	12:13	1.60	75	907.925	556 / 100	92	2.31	280 / 250	50	5.0
	5	115	12:18	1.60	75	911.785	558 / 104	92	2.32	280 / 235	50	5.0
	5	120	12:23	1.60	75	916.025	104	92	2.32	280 / 247	50	5.0
	4	125	12:28	1.50	75	920.430	104	92	2.17	280 / 250	50	5.0
	4	130	1233	1.40	75	922.135	104	92	2.03	280 / 250	50	5.0
	3	135	1238	1.40	75	928.335	104	92	2.03	280 / 263	55	5.0
	3	140	1243	1.50	75	932.425	104	92	2.17	275 / 240	55	5.0
	2	145	1248	1.20	75	936.185	559 / 104	94	1.74	275 / 245	57	5.0
	2	150	1253	1.20	75	937.935	104	94	1.74	275 / 245	55	3.0
	1	155	12:58	.80	75	944.695	104	94	1.16	275 / 250	55	3.0
	1	160	1303	.80	75	946.128	104	94	1.16	275 / 250	55	3.0
	AVERAGE (TOTAL)		1308			( )	891 / 1634	1476	31.37	4430 / 3995	840	75

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times VEL$

Company: EPA - TASK # 29 WISCONSIN STEEL ILL.
Source Designation: INLET
Date: 5/10/77
Test Number: P-1
Field Person: GEH. & TUM
Filter Number: A-102-13
Barometric Pressure ("Hg): 29.52
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RNC#3, Corr. Factor: .980
Meter Isokinetic Factor: 1.044
Assumed Moisture (%): 29a
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

AFTER DEF PORTS 0 AT 15 HG

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
F		13:14				555 96	94				
8	165	13:19	1.25	75	951.300	96	94	1.80	280/240	55	4.0
8	170	1324	1.25	75	955.350	558 102	94	1.81	275/235	50	5.0
7	175	1329	1.30	75	958.755	559 104	94	1.89	270/235	50	5.0
7	180	1334	1.30	75	962.075	104	94	1.89	270/240	50	3.0
6	185	1339	1.10	75	966.300	559 104	94	1.60	270/240	50	3.0
6	190	1344	1.10	75	970.535	104	94	1.60	270/245	50	3.0
5	195	1349	1.45	75	974.455	104	94	2.11	275/245	50	5.0
5	200	1354	1.45	75	978.320	559 104	94	2.11	275/245	50	5.0
4	205	1359	1.20	75	981.620	561 106	96	1.75	277/250	50	4.0
4	210	1404	1.20	75	985.335	106	96	1.75	275/245	50	5.0
3	215	1409	1.55	75	989.500	106	96	2.26	280/240	50	5.0
3	220	1414	1.55	75	993.815	106	96	2.26	280/240	50	6.0
2	225	1419	1.80	75	998.385	561 106	96	2.62	277/235	50	6.0
2	230	1424	1.80	75	1002.825	106	96	2.62	277/245	50	6.0
1	235	1429	1.20	75	1006.635	106	96	1.75	277/247	50	4.0
1	240	1434	1.20	75	1010.442	106	96	1.75	277/247	50	4.0
AVERAGE (TOTAL)					(.811)	1670	1590		4402/3874	803	73

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$1.39 \times \frac{TM}{TS} \times VOL$

SAMPLING TRAIN DATA

Company: EPA. TASK #29 WISCONSIN STEEL ILL.
Source Designation: INLET
Date: 5/10/77
Test Number: P-1
Field Person: GEH & TUM
Filter Number: A-102-13
Barometric Pressure ("Hg): 29.52
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RHC#3, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 2%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock 1443	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
A		1443		7	1011.253	555 / 96	94		[illegible]		
8	245	1448	1.30	535 / 75	1015.025	96 / 100	94	1.87	260 / 235	50	5.0
8	250	1453	1.40	75	1018.500	559 / 102	96	2.03	275 / 235	53	5.0
7	255	1458	1.10	75	1022.095	560 / 104	96	1.60	275 / 235	50	4.0
7	260	1503	1.20	75	1025.840	104	96	1.75	285 / 235	50	4.0
6	265	1508	1.20	75	1029.560	104	96	1.75	290 / 243	53	4.0
6	270	1513	1.20	75	1033.300	104	96	1.75	290 / 255	50	4.0
5	275	1518	1.60	75	1037.310	104	96	2.33	290 / 250	50	6.0
5	280	1523	1.70	75	1041.635	559 / 104	94	2.47	290 / 255	53	6.0
4	285	1528	1.50	75	1045.820	104	94	2.18	290 / 245	50	5.0
4	290	1533	1.50	75	1050.000	104	94	2.18	290 / 247	50	5.0
3	295	1538	1.60	75	1054.275	560 / 106	94	2.33	285 / 235	53	6.0
3	300	1546 / 15:48	1.60	75	1059.210	106	94	2.33	280 / 225	53	6.0
2	305	1556 / 15:58	1.60	545 / 85	1063.675	558 / 102	94	2.28	280 / 225	53	6.0
2	310	1603	1.50	550 / 90	1067.348	555 / 98	92	2.10	270 / 243	53	5.0
1	315	1614	1.20	90	1070.635	556 / 100	92	1.68	270 / 240	50	5.0
1	320	1619	1.20	90	1074.582	100	92	1.69	270 / 240	50	5.0
AVERAGE (TOTAL)				1255 ✓	( )	1642	1510	32.33	4490 / 3843	821	81

5:38 15:44 stop
top 15:40 15:46
top 1552 1556
top 1605 1609

Δ grab
□ start

SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times vol$

Company: EPA. TASK #29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5/10/77
Test Number: P-1
Field Person: G.E.H. & TVM
Filter Number: A-102-13
Barometric Pressure ("Hg): 29.52
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01375
Pitot Tube No. 28, Corr. Factor: 1851
Meter Box No. MC 3, Corr. Factor: .980
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 2%
Condensate Volume (ml): -5 ml
Silica Gel Weight Gain (g): 76.8
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
B		16:22							Filter Box / Elbow		
1627A / 1633□ 8	325	16:27	1.20	545 / 85	1078.775	557 / 96	98	1.70	270 / 235	50	4.0
8	330	16:38	1.20	540 / 80	1081.945	552 / 94	90	1.70	290 / 245	50	4.0
1640A / 1645□ 7	335	16:48	1.30	545 / 85	1085.740	553 / 96	90	1.83	300 / 260	50	5.0
1650A / 1655□ 7	340	16:58	1.30	85	1089.510	90	90	1.83	305 / 265	50	6.0
1702A / 1707□ 6	345	17:09	1.60	555 / 95	1093.810	548 / 90	86	2.20	305 / 270	50	6.0
1716A / 1720□ 6	350	17:14	1.60	550 / 90	1097.830	545 / 88	82	2.20	310 / 270	50	6.0
5	355	1724	1.50	90	1102.475	547 / 92	82	2.07	310 / 273	50	5.0
5	360	1729	1.50	90	1106.175	92	82	2.07	310 / 275	50	5.0
1731A / 1735□ 4	365	1740	1.50	90	1110.010	92	82	2.07	307 / 280	50	5.0
1745A / 1750□ 4	370	1745	1.50	90	1115.750	545 / 86	80	2.07	295 / 280	53	5.0
3	375	1755	1.70	90	1118.300	543 / 86	80	2.33	285 / 257	50	6.0
3	380	1800	1.70	90	1122.635	547 / 92	82	2.35	280 / 257	50	6.0
2	385	1805	1.25	550 / 90	1126.095	550 / 96	84	1.74	290 / 253	50	4.0
2	390	1810	1.25	90	1130.225	550 / 96	84	1.74	280 / 250	50	4.0
1	395	1815	.95	85	1133.170	552 / 98	86	1.34	280 / 255	50	3.0
1	400	1820	.95	85	1136.487	98	86	1.34	280 / 255	50	3.0
AVERAGE (TOTAL)				1410 ✓	( )	1488	1364		4699 / 4180	803	77

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STOP A
START □

1.39 X TM/TS X VEL

SAMPLING TRAIN DATA

Company: EPA TASK #29 WISCONSIN STEEL
Source Designation: INLET
Date: 5/10/77
Test Number: P-1
Field Person: GEH & TUM
Filter Number: A-102-13
Barometric Pressure ("Hg): 29.52
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 2%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg
AFTER 0 15

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
		1822							FILTER BOX / ELBOW		
C 8	405	1827	1.30	545 85	1140.575	553 98	88	1.83	285 / 225	50	5.0
8	410	1832	1.25	540 80	1144.045	552 96	88	1.78	290 / 245	50	5.0
7	415	1837	1.40	80	1147.945	553 98	88	1.99	290 / 250	50	5.0
7	420	1842	1.40	80	1151.900	553 98	88	1.99	290 / 250	50	5.0
6	425	1847	1.60	80	1156.085	555 100	90	2.29	295 / 250	50	6.0
6	430	1852	1.50	80	1160.225	100	90	2.14	295 / 255	50	5.0
5	435	1857	1.70	535 75	1165.435	100	90	2.45	300 / 255	50	6.0
5	440	1902	1.70	75	1169.000	100	90	2.45	295 / 255	50	6.0
4	445	1907	1.70	75	1173.300	100	90	2.45	290 / 250	50	6.0
4	450	1912	1.70	75	1177.835	100	90	2.45	290 / 250	50	6.0
1916 A 1923 □ 3	455	1917	1.70	75	1182.445	100	90	2.45	290 / 250	50	6.0
1927 A 1932 □ 3	460	1928	1.70	80	1186.625	548 90	86	2.39	290 / 257	50	6.0
1939 A 1944 □ 2	465	1937	1.70	85	1190.895	546 98	84	2.37	285 / 250	50	6.0
2	470	1948	1.70	545 85	1194.945	549 94	84	2.38	285 / 265	50	6.0
1952 A 1956 □ 1	475	1953	1.1	80	1198.495	94	84	1.55	285 / 253	50	4.0
1	480	2003 ~~1958~~	1.1	80	1202.050	94	84	1.55	285 / 253	50	4.0
AVERAGE (TOTAL)				78.4	371.37 (378.949)	8910 98.9	89.5	34.51 1.99	279.9 / 246.8	52.1	4.9

1270 ✓ 1550 1404 4640/4043 800 87

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SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times VB$

Company: EPA TASK #29 WISCONSIN STEEL ILL.
Source Designation: INLET
Date: 5/10/77
Test Number: P-2
Field Person: G.E.A & TUM
Filter Number: A-102-15
Barometric Pressure ("Hg): 29.54
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 80°
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. KM#3, Corr. Factor: .98
Meter Isokinetic Factor: 1.044
Assumed Moisture (%): 29
Condensate Volume (ml): -30
Silica Gel Weight Gain (g): 64.2
Leak Rate .01 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	0	10:04		70°	212.728				FILTER BOX / ELBOW		
A 8	5	1006	1.20	535 / 75	218.200	548 / 90	86	1.71 / ~~1.56~~	150 / 110	70	2.0
8	10	1011	1.20	540 / 75	220.425	551 / 94	88	1.72	185 / 125	70	2.0
7	15	1016	1.10	540 / 80	223.830	553 / 98	88	1.57	210 / 145	65	2.0
7	20	1021	1.30	540 / 80	227.545	555 / 100	90	1.86	230 / 155	63	2.0
6	25	1026	1.40	80	231.330	100	90	2.00	240 / 170	60	2.0
6	30	1031	1.40	80	236.100	557 / 102	92	2.00	263 / 183	60	2.0
5	35	1036	1.65	545 / 85	239.730	558 / 104	92	2.35	270 / 190	60	2.0
5	40	1041	1.65	85	243.825	104	92	2.35	280 / 200	57	2.0
4	45	1046	1.45	85	248.030	104	92	2.06	280 / 207	57	2.0
4	50	1051	1.45	85	252.045	559 / 104	94	2.07	295 / 215	55	2.0
3	55	1056	1.35	85	255.750	104	94	1.92	305 / 220	55	2.0
3	60	1101	1.35	85	259.725	560 / 106	94	1.93	305 / 225	55	2.0
2	65	1106	1.65	85	264.175	561 / 106	96	2.36	310 / 225	55	2.0
2	70	1111	1.65	85	268.655	563 / 108	98	2.37	315 / 230	55	2.0
1	75	1116	1.10	85	272.230	564 / 110	98	1.58	315 / 235	55	2.0
1	80	1121	1.20	95	275.733	563 / 108	98	1.72	315 / 255	55	2.0
AVERAGE (TOTAL)				1320	( )	1043	1482		42100 / 26500	947	32.00

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times VEL$

Company: EPA TASK #29
Source Designation: INLET
Date: 5/11/77
Test Number: P-2
Field Person: GEH & TVM
Filter Number: A-102-15
Barometric Pressure ("Hg): 29.54
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. KAC3, Corr. Factor: .986
Meter Isokinetic Factor: 1.644
Assumed Moisture (%): ~~29~~ 17
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .01 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
B		10:24							FILTER BOX / ELBOW		
8	85	1129	1.35	545 85	279.720	503 108	98	1.94 ~~2.94~~	323 / 247	35	2.0
8	90	1134	1.35	85	283.020	109	98	1.94	325 / 245	55	2.0
7	95	1139	1.40	85	288.435	108	98	2.01	325 / 247	50	2.0
7	100	1144	1.40	85	291.665	109	98	2.01	325 / 245	60	2.0
6	105	1149	1.75	85	296.010	108	98	2.51	310 / 230	60	2.0
6	110	1154	1.75	85	300.325	565 110	100	2.52	310 / 230	60	2.0
5	115	1159	1.60	85	304.845	110	100	2.30	290 / 220	60	2.0
5	120	1204	1.60	85	309.125	110	100	2.31	290 / 220	60	2.0
4	125	1209	1.65	85	313.400	567 112	102	2.39	300 / 220	65	2.0
4	130	1214	1.65	85	317.810	112	102	2.39	300 / 220	60	2.0
3	135	1219	1.65	85	322.225	112	102	2.39	290 / 220	53	2.0
3	140	1224	1.65	85	326.630	112	102	2.39	290 / 220	58	2.0
2	145	1229	1.25	85	330.410	112	102	1.81	290 / 223	53	2.0
2	150	1234	1.25	85	334.350	112	102	1.81	290 / 223	53	2.0
1	155	1239	.93	85	337.630	112	102	1.34	300 / 227	55	2.0
1	160	1244	.93	85	340.947	112	102	1.34	300 / 227	55	2.0
AVERAGE (TOTAL)			48.08	85	( )	110	100.08	30.00	4858 / 3664	910	32.0

1.39 x TM/TS x VOL

SAMPLING TRAIN DATA

Company: EPA TASK # 29 WISCONSIN STEEL LLC

Source Designation: INLET

Date: 5/11/77

Test Number: P-2

Field Person: GEH & TVM

Filter Number: A-102-15

Barometric Pressure ("Hg): 29.54

Stack Static Pressure ("H_2O): -3.30

Stack Dimensions: 80" x 80"

Plume Appearance: —

Ambient Temperature (°F): 70°

Record all Data Every 5 Minutes

Filter Heater Setting: 250

Probe Heater Setting: 80

Nozzle Number: 3/16, Dia. (in.): .0187

Pitot Tube No. 23, Corr. Factor: .851

Meter Box No. MHC #3, Corr. Factor: .980

Meter Isokinetic Factor: 1.644

~~Assumed~~ Moisture (%): 1%

Condensate Volume (ml):

Silica Gel Weight Gain (g):

Leak Rate .01 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
C		1248							FILTER BOX / ELBOW		
8	165	1253	1.35	85	344.900	564 108	100	1.94	320 / 245	57	2.0
8	170	1258	1.35	85	349.110	108	100	1.94	320 / 245	57	2.0
7	175	1303	1.35	85	352.550	108	100	1.94	320 / 245	57	2.0
7	180	1308	1.35	85	356.720	108	100	1.94	325 / 245	55	2.0
6	185	1313	1.45	85	360.825	108	100	2.09	325 / 245	55	2.0
6	190	1318	1.45	85	364.975	108	100	2.09	325 / 247	55	2.0
5	195	1323	1.65	85	369.255	108	100	2.37	330 / 245	60	2.0
5	200	1328	1.65	85	373.625	108	100	2.37	330 / 245	60	2.0
4	205	1333	1.55	85	377.985	565 110	100	2.23	323 / 240	50	2.0
4	210	1338	1.55	85	382.239	110	100	2.23	323 / 240	50	2.0
3	215	1343	1.65	85	387.155	110	100	2.37	323 / 240	50	2.0
3	220	1348	1.65	85	390.635	110	100	2.37	313 / 210	50	2.0
2	225	1353	1.75	85	395.100	110	100	2.52	313 / 210	50	2.0
2	230	1358	1.75	85	399.420	110	100	2.52	320 / 240	50	2.0
1	235	1403	1.30	85	403.320	567 112	100	1.88	320 / 243	60	2.0
1	240	1408	1.30	85	407.255	112	100	1.88	320 / 243	60	2.0
AVERAGE (TOTAL)					(.585)	.948	1.00		3150 / 3828	870	32.0

LEAK TEST

SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times VOL$

Company: EPA TASK #29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5/11/77
Test Number: P-2
Field Person: GEH & TUM
Filter Number: A-102-15
Barometric Pressure ("Hg): 29.54
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 70°
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. MAC#3, Corr. Factor: .98
Meter Isokinetic Factor: 1.644
~~Assume~~d Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .01 CFM at 15 "Hg

AFTER 0 15

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
D	~~240~~	~~14:16~~	~~2~~	~~95~~	~~407.840~~		~~98~~				
8	~~245~~	14:21	1.3	85	411.600	106	100	~~1.82~~ 1.87	325/~~250~~	60	2.5
8	250	14:26	1.3	85	415.530	108	100	1.87	325/~~250~~	60	2.0
7	~~255~~	14:31	1.4	85	420.500	108	100	~~1.87~~ 2.01	320/260	60	2.0
7	260	14:36	1.4	85	423.150	109	100	~~1.87~~ 2.01	330/260	60	2.5
6	265	14:42	1.55	80	427.240	110	101	~~2.01~~ 2.26	325/255	60	2.5
6	270	14:47	1.55	80	431.250	110	102	~~2.01~~ 2.26	325/250	65	2.5
5	275	14:52	1.55	80	435.250	111	102	2.26	325/250	65	2.5
5	280	14:57	1.55	80	439.520	112	102	2.26	325/250	60	2.5
4	285	15:02	1.60	85	443.820	112	102	~~2.26~~ 2.31	325/250	60	2.5
4	290	15:07	1.60	85	448.160	112	102	2.31	320/250	60	2.5
3	295	15:13	1.70	85	452.440	112	103	~~2.31~~ 3.01	325/250	60	2.0
3	300	15:18	1.70	85	457.200	112	102	~~3.01~~ 3.01	325/245	55	2.5
2	305	15:22	1.40	85	461.740	112	103	2.02	325/245	55	2.5
2	310	15:28	1.40	85	465.930	112	103	2.02	330/255	60	~~15~~ 3.0
1	315	15:34	.88	90	469.450	110	103	1.26	330/255	55	~~15~~ 3.0
1	320		.88	90	472.400	110	103	1.26	335/260	60	~~15~~ 3.0
AVERAGE (TOTAL)			143.39	1350	( )	17665	3394	34.00	5215/1043	955	47

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

(1.39 Th/TS)

Company: EPA Task 29 Wisconsin Steel Ill
Source Designation: Inlet
Date: 5-11-77
Test Number: P-2
Field Person: GEH & TVM
Filter Number: A-102-15
Barometric Pressure ("Hg): 29.54
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 70°
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RA 3, Corr. Factor: .980
Meter Isokinetic Factor: 1.644
Assumed Moisture (%): 17
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .01 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O) (After 0 / 15)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
D-1 8	320	15:39	—		472.400						
8	322.10	15:41	stop		473.790			~~2.03~~			
8	325	15:46 / 15:49	1.4	90	475.850	104	102	1.99	350/280	60	2.5
8	327.10	15:49	stop	90	477.085	104	102	1.99			
7	330	15:54 / 15:59	1.4	95	481.030	106	101	1.97	350/280	60	3.0
7	335	16:04	1.4	95	485.000	108	100	1.98	360/275	60	3.0
7	337.10	16:07	stop		487.400			1.85			
7	340	16:12	~~1.3~~	90	488.860	104	100	~~1.85~~	330/290	60	3.0
6	345	16:19	1.6	95	492.900	108	100	2.26	330/245	60	3.0
6	350	16:24	1.6	95	497.140	110	100	2.26	325/275	60	3.0
5	350	16:24	stop	90	497.380	~~104~~	~~100~~	~~2.41~~			
		16:30	1.7	90		104	100	2.41			
5	355	16:34	1.6	100	501.530	108	100	2.23	320/260	60	2.5
5	360	16:34	1.6	95	505.350	108	100	2.23	320/260	60	2.5
4		16:34.10	stop								
4		16:44	1.6	95	—	104	100	2.23			2.5
4	365	16:49	1.6	100	509.440	107	100	2.23	325/260	65	2.5
AVERAGE (TOTAL)				800	( )	106	100	19.00	3010/2395	542	25.0

SAMPLING TRAIN DATA

Company: EPA Task 29 Wisconsin Steel Ill.
Source Designation: Inlet
Date: 5-11-77
Test Number: P-2
Field Person: GEH & TVM
Filter Number: A-102-15
Barometric Pressure ("Hg): 29.54
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 70°
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .986
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .01 CFM at 15 "Hg
After 0 15

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
~~4~~	~~370~~	~~16:52~~	~~Stop~~		512.340			~~2.24~~			~~2.5~~
4	370	16:57	1.7	100	513.750	104	100	2.37	320/250	60	2.5
3	375	17:04	1.6	100	518.100	108	100	2.24	320/250	60	2.5
3	—	17:07	Stop	—	520.610	—					
		17:17	1.6	95	5	104	100	2.24	—		2.5
3	380	17:13	1.2	95	522.410	104	100	1.69	325/260	55	2.0
2	385	17:19	1.25	100	526.070	108	100	1.75	325/260	55	2.5
2	—	17:22	Stop	—	527.920						
2		17:26	1.2	95	—	104	100	1.69			
2	390	17:30	.85	100	529.800	104	100	1.18	330/250	60	2.0
1	395	17:35	.88	100	533.020	105	100	1.23	330/240	55	2.0
~~1~~	~~400~~	~~17:39~~	~~.88~~	~~100~~	~~535.670~~	~~105~~	~~100~~	STOPPED			
F 8	400	17:43	1.1	95	535.670	102	100	1.55	330/280	65	2.0
8	405	17:49	1.2	100	539.660	105	100	1.68	325/275	55	2.0
8	410	17:54	1.1	100	543.260	108	100	1.54	310/265	60	2.0
7	415	18:00	1.1	95	546.820	108	100	1.55	310/255	60	2.0
7	420	18:04	1.1	95	550.900	108	100	1.55	310/255	60	2.0
AVERAGE (TOTAL)				1080	( )	1104	1100	18.33	3535/2840	645	23.5

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA Task 29 Wisconsin Steel Ill.
Source Designation: Inlet
Date: 5-11-77
Test Number: P-2
Field Person: GEH & TVM
Filter Number: A-102-15
Barometric Pressure ("Hg): 29.54
Stack Static Pressure ("H_2O): ~~[illegible]~~ x -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): 01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .980
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0.01 CFM at 15 "Hg

After 0 15

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
~~8~~	~~400~~				~~535.610~~						
6	425	18:09	1.1	95	553.940	109	100	1.56	315/250	60	2.0
6	430	18:14	1.45	95	557.490	108	100	2.04	320/255	60	2.0
5	435	18:19	1.45	95	561.430	110	101	2.05	320/250	60	2.5
5	440	18:25	1.35	95	565.100	110	101	1.91	325/260	~~5~~ 65	2.5
4	445	18:29	1.25	95	569.250	110	102	1.77	320/255	65	2.5
4	450	18:34	1.70	90	573.000	110	102	2.43	320/260	65	3.0
3	455	18:39	1.75	95	577.300	110	102	2.48	320/250	60	3.0
3	460	18:44	1.75	95	581.730	110	102	2.48	320/255	60	3.0
2	465	18:49	1.70	90	586.150	111	102	2.43	325/250	60	3.0
2	470	18:54	1.20	90	590.400	111	102	1.71	325/255	60	2.5
1	475	18:59	1.20	90	594.290	110	102	1.72	325/260	60	2.5
1	480	19:04	1.20	90	598.046	110	102	1.72	325/250	60	2.5
				1115		1319	1218	24.30	3860/3050	730	31.0
AVERAGE (TOTAL)				87.9	377.038 (384.733)	108	99.3	2.03	311.4/234.1	58.5	2.32

434.89 1510 125.646 ~~2537~~ 3356 30.45

XAD COLUM FILTER THEN 1ST IMP

1.39 X TM/TS X V

SAMPLING TRAIN DATA

Company: EPA. TASK #29 WISCONSIN STEEL ILL.

Source Designation: INLET

Date: 5/12/77

Test Number: P-3

Field Person: GEH & TUM

Filter Number: A-102-17

Barometric Pressure ("Hg): 29.56

Stack Static Pressure ("H_2O): -3.3

Stack Dimensions: 80" X 80"

Plume Appearance: —

Ambient Temperature (°F): 60

Record all Data Every 5 Minutes

Filter Heater Setting: 250

Probe Heater Setting: 80

Nozzle Number: 3/16, Dia. (in.): .01875

Pitot Tube No. 23, Corr. Factor: .851

Meter Box No. NAC#3, Corr. Factor: .986

Meter Isokinetic Factor: 1644

~~Assumed~~ Moisture (%): 1%

Condensate Volume (ml): -23

Silica Gel Weight Gain (g): ~~68.5~~ 100.

Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
A		9:18			602.135	548 ~~88~~	~~88~~	~~1.96~~	FILTER ~~BOX~~ / ELBOW		COL / VAC
8	5	9:23	1.35	545 85	605.995	550 90	90	1.89	270 / 210	50	65 / 8.0
8	10	9:28	1.35	85	610.500	555 98	92	1.91	275 / 215	55	70 / 8.0
7	15	9:33	1.25	85	613.500	557 102	92	1.78	280 / 225	55	70 / 8.0
7	20	9:38	1.25	85	617.245	558 104	92	1.78	280 / 230	55	70 / 8.0
6	25	9:43	1.35	85	621.055	558 104	92	1.98	280 / 230	55	70 / 8.0
6	30	9:48	1.35	85	624.925	104	92	1.92	280 / 235	55	70 / 8.0
5	35	953	1.55	85	630.410	559 104	94	2.21	285 / 235	55	73 / 10.0
5	40	958	1.45	85	633.620	560 106	94	2.07	285 / 235	55	75 / 10.0
4	45	1003	1.45	85	637.120	108	94	2.07	280 / 230	60	75 / 10.0
4	50	1008	1.45	85	641.240	108	94	2.07	285 / 230	60	75 / 10.0
3	55	1013	1.75	85	645.515	562 108	96	2.51	285 / 230	60	75 / 12.0
3	60	1018	1.75	85	650.410	108	96	2.51	280 / 230	60	75 / 12.0
2	65	1023	1.55	85	654.095	563 110	96	2.23	280 / 230	55	75 / 11.0
2	70	1028	1.55	85	658.340	110	96	2.23	275 / 230	60	75 / 11.0
1	75	1033	1.35	85	662.325	565 112	98	1.95	280 / 230	60	70 / 10.0
1	80	1038	1.35	85	666.310	112	98	1.95	280 / 230	60	70 / 10.0
AVERAGE (TOTAL)			14		( )	1688	1500	33.0	4480 / 3655	410	1153 / 154

XAD COLUM FILTER THEN 1ST IMP.

SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times VEL$

Company: EPA. TASK #29 WISCONSIN STEEL ILL.
Source Designation: INLET
Date: 5/12/77
Test Number: P-3
Field Person: GEH. & TVM
Filter Number: A-102-17
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. PAC #3, Corr. Factor: .980
Meter Isokinetic Factor: 1.644
~~Assume~~d Moisture (%): 1
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
13		10:43							FILTER / ELBOW		COL / UMC
8	85	10:48	1.25	~~545~~ 85	670.435	562 / 106	98	1.79	285 / 245	60	75 / 9.0
8	90	1053	1.25	85	673.955	565 / 110	100	1.80	290 / 245	55	75 / 9.0
7	95	1058	1.30	85	677.775	566 / 102	100	1.87	285 / 245	60	75 / 9.0
7	100	1103	1.30	85	681.725	102	100	1.87	275 / 235	60	75 / 9.0
6	105	1108	1.55	85	685.845	567 / 104	100	2.24	275 / 230	50	75 / 11.0
6	110	1113	1.55	85	690.215	568 / 114	102	2.25	270 / 230	60	75 / 11.0
5	115	1118	1.55	85	694.355	114	102	2.25	270 / 230	60	75 / 11.0
5	120	1123	1.55	85	698.555	114	102	2.25	275 / 230	60	75 / 11.0
4	125	1128	1.55	85	702.845	569 / 116	102	2.25	280 / 230	60	75 / 11.0
4	130	1133	1.55	85	707.120	570 / 116	104	2.25	275 / 230	65	75 / 11.0
3	135	1138	1.60	85	711.420	571 / 118	104	2.33	275 / 230	60	75 / 11.0
3	140	1143	1.60	85	716.300	118	104	2.33	275 / 235	60	75 / 19.0
2	145	1148	1.20	85	719.500	118	104	1.75	275 / 240	60	75 / 9.0
2	150	1153	1.20	85	723.925	118	104	1.75	275 / 240	60	75 / 9.0
1	155	1158	1.0	85	726.520	118	104	1.46	280 / 240	60	75 / 8.0
1	160	1203	1.0	85	730.360	118	104	1.46	280 / 240	60	75 / 8.0
AVERAGE (TOTAL)		14			( )	1816	1634	31.90	4440 / 3777	930	1200 / 155

XAD COLUMN FILTER THEN 1ST IMP. 1.39. X TM/TS XUC

SAMPLING TRAIN DATA

Company: EPA TASK #29 WISCONSIN STEEL ILL

Source Designation: INLET

Date: 5/12/77

Test Number: P-3

Field Person: GEH & TUM

Filter Number: A-102-17

Barometric Pressure ("Hg): 29.56

Stack Static Pressure ("H_2O): -3.3

Stack Dimensions: 80" X 80"

Plume Appearance: —

Ambient Temperature (°F): 70°

Record all Data Every 5 Minutes

Filter Heater Setting: 250°

Probe Heater Setting: 80°

Nozzle Number: 3/16, Dia. (in.): .01875

Pitot Tube No. 23, Corr. Factor: .8

Meter Box No. KAC#3, Corr. Factor: .980

Meter Isokinetic Factor: 1.649

~~Assumed~~ Moisture (%): 1

Condensate Volume (ml):

Silica Gel Weight Gain (g):

Leak Rate 0 CFM at 15 "Hg

AFTER. 0 15

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
C		1205							FILTER / BLOCK		COL / UAC
8	165	1210	1.25 ~~[illegible]~~	545 / 85	734.180	571 / 116	106	1.82	280 / 245	60	75 / 9.0
8	170	1215	1.25	85	738.075	116	106	1.82	280 / 240	60	75 / 9.0
7	175	1220	1.25	85	741.800	116	106	1.82	270 / 235	60	75 / 9.0
7	180	1225	1.25	85	745.610	116	106	1.82	270 / 235	60	75 / 9.0
6	185	1230	1.35	85	749.535	116	106	1.97	270 / 230	60	75 / 10.0
6	190	1235	1.35	85	735.510	116	106	1.97	265 / 230	60	75 / 10.0
5	195	1240	1.55	85	757.620	572 / 118	106	2.26	270 / 230	55	75 / 11.0
5	200	1245	1.55	85	761.035	118	106	2.26	270 / 225	55	75 / 11.0
4	205	1250	1.55	85	766.280	573 / 120	106	2.27	260 / 225	55	80 / 11.0
4	210	1255	1.55	85	770.635	120	106	2.27	270 / 225	60	70 / 11.0
3	215	1300	1.55	550 / 90	774.855	574 / 120	108	2.25	270 / 225	60	65 / 11.0
3	220	1305	1.55	90	779.175	120	108	2.25	275 / 225	60	65 / 11.0
2	225	1310	1.65	90	784.720	120	108	2.39	275 / 225	60	70 / 11.0
2	230	1315	1.65	90	788.020	120	108	2.39	270 / 230	60	70 / 11.0
1	235	1320	1.35	90	791.970	120	108	1.96	270 / 230	60	70 / 10.0
1	240	1325	1.35	90	795.925	120	108	1.96	270 / 230	60	70 / 10.0
AVERAGE (TOTAL)			10	13[illegible]	(-.335)	[illegible]	[illegible]	33.48	4332 / 3685	945	1160 / 164

XAD COLUM FILTER THEN 1ST IMP.

SAMPLING TRAIN DATA

$1.39 \times \frac{TM}{TS} \times VC$

Company: EPA TASK #29 WISCONSIN STEEL ILL

Source Designation: INLET

Date: 5/12/77

Test Number: ~~EA~~ P-3

Field Person: GEH & TUM

Filter Number: A-102-17

Barometric Pressure ("Hg): 29.56

Stack Static Pressure ("H_2O): -3.30

Stack Dimensions: 80" x 80"

Plume Appearance: —

Ambient Temperature (°F): 80

Record all Data Every 5 Minutes

Filter Heater Setting: 250°

Probe Heater Setting: 80°

Nozzle Number: 3/16, Dia. (in.): .01875

Pitot Tube No. 23, Corr. Factor: .851

Meter Box No. RAC #3, Corr. Factor: .980

Meter Isokinetic Factor: 1644

~~Assumed~~ Moisture (%): 1

Condensate Volume (ml):

Silica Gel Weight Gain (g):

Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	240	13:32	—	—	796.260	—	—	—	FILTER BOX / ELBOW		CCL / VAC
8	245	13:37	1.3 / 1.40 start	90	800.160	114	107	1.87 / ~~2.00~~ START	260 / 230	60	75 / 9.5
8	250	13:42	1.3	90	804.060	118	108	1.87 / ~~1.88~~	260 / 225	60	75 / 9.5
7	255	13:47	1.3	90	807.950	120	108	1.88 / ~~1.89~~	260 / 230	60	75 / 9.5
7	260	13:52	1.35	90	811.840	120	108	1.89 / ~~1.96~~	260 / 230	65	75 / 9.5
6	265	13:57	1.35	90	815.770	120	109	1.96 / ~~1.96~~	265 / 230	65	75 / 9.5
6	270	14:02	1.45	85	819.730	120	109	1.96 / ~~2.12~~	275 / 230	65	75 / 9.5
5	275	14:07	1.45	85	823.820	120	110	2.12	270 / 230	65	80 / 10.5
5	280	14:12	1.55	90	827.960	120	110	2.13	260 / 225	60	75 / 11.0
4	285	14:17	1.55	90	832.200	120	110	2.25	260 / 220	60	75 / 11.5
4	290	14:22	1.55	90	836.470	120	110	2.25	255 / 215	65	75 / 11.5
3	295	14:27	1.65	90	840.800	122	110	2.25	260 / 220	60	75 / 12.0
3	300	14:32	1.40	90	845.200	122	110	2.40	265 / 225	60	75 / 10.0
2	305	14:37	1.45	90	849.240	122	110	1.97	270 / 220	60	75 / 10.0
2	310	14:42	.79	85	852.950	122	110	2.03	270 / 230	65	75 / 7.0
1	315	14:47	.78	90	856.390	120	110	1.16	270 / 230	60	75 / 7.0
1	320	14:52	.78	85	859.490	120	110	1.13	270 / 230	60	75 / 7.0
AVERAGE (TOTAL)			16	1420	( )	1920	1749	31.12	4230 / 3620	990	1205 / 154.5

$1.39 \times \frac{T_m}{T_s} \times V$

SAMPLING TRAIN DATA

Company: EPA Task #29 Wisconsin Steel Ill.
Source Designation: Inlet
Date: 5-12-77
Test Number: P-3
Field Person: GEH / TVM
Filter Number: A-102-17
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: –
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .980
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	320	14:52			859.490			~~Filter Box~~			Col. / Vac.
E 8	325	14:57	1.4	90	863.260	118	110	1.96	275 / 235	60	80 / 10.0
8	330	15:02	1.4 ~~1.35~~	90	867.250	120	110	2.03	265 / 230	60	80 / 10.0
7	335	15:08	1.35 ~~1.3~~	95	871.230	121	110	1.96	270 / 230	60	75 / 10.0
7	340	15:13	1.3 ~~1.75~~	95	875.170	120	110	1.87	265 / 225	60	75 / 12.5
6	345	15:18	1.75 ~~1.70~~	95	879.620	122	110	2.52	260 / 230	65	75 / 12.5
6	350	15:23	1.70 ~~1.65~~	95	884.160	123	110	2.45	260 / 225	60	75 / 12.0
5	355	15:28	1.65	95	888.490	123	111	2.38	265 / 225	60	80 / 12.0
5	360	15:33	1.60	95	892.870	124	112	2.31	260 / 225	60	75 / 11.5
4	365	15:38	1.55	100	897.170	124	112	2.24	260 / 225	60	75 / 11.5
4		15:40	~~1.55~~	~~stop~~	~~898.700~~			~~2.23~~			
~~4~~	~~370~~	~~15:46~~	~~1.55~~	~~100~~	~~901.470~~	~~118~~	~~110~~	~~2.23~~	~~260 / 225~~	~~65~~	~~75 / 11.0~~
4	370 ~~375~~	15:48	1.55	100	901.470	118	110	2.21	260 / 225	65	75 / 11.0
3		~~15:52~~	~~stop~~		~~903.875~~						
3	375 ~~380~~	15:57 15:59	1.55 1.55	105	905.650	116	110	2.21	265 / 225	65	75 / 11.0
3 ~~2~~	~~380~~	16:03	1.55	110	909.810	119	110	2.19	265 / 225	65	75 / 11.0
		~~16:04~~	~~stopped~~		~~910.020~~			~~2.17~~			
AVERAGE (TOTAL)			12	1[illegible]	( )	1448	1325	26.33	3170 / 2725	740	915 / 135

SAMPLING TRAIN DATA

Company: EPA Task #39 Wisconsin Steel Ill.
Source Designation: Inlet
Date: 5-12-77
Test Number: P-3
Field Person: GEH - TVM
Filter Number: A-102-17
Barometric Pressure ("Hg): 29.56"
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .980
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 17
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
3	380	16:04			910.020				Filter Box / Elbow		Column / Vac
2		~~16:09~~	~~1.35~~	~~105~~				~~1.89~~	~~260 / 225~~	~~65~~	~~75 / 9.5~~
2	385	16:14	1.4	110	913.660	115	108	1.89	255 / 225	65	80 / 10.0
2	390	16:19	~~1.87~~ 1.4	105	917.550	117	108	1.95	255 / 225	60	80 / 7.0
1	~~360~~ 395	16:24	.87	100	920.860	118	108	1.22	260 / 220	65	80 / 7.0
1		~~16:26~~	~~.79~~	~~Stopped~~	921.418			~~1.09~~			
1		16:31	.90	110		110	107				
1	400	16:35	.90	110	923.928	112	108	1.24	260 / 220	65	80 / 7.0
			.88								
		~~16:37~~	~~1.2~~	~~105~~	923.928	112	108				
8	405	16:42	1.2	105	927.480	114	108	1.68	285 / 250	70	80 / 9.0
8	410	16:47	1.3	100	931.310	117	108	~~1.82~~	285 / 250	65	95 / 10.0
7	415	16:52	Too Variable ~~1.1~~	100	934.670	118	108	TRIED TO TRACE	265 / 240	65	95 / 9.0
7	420	16:57	1.1	100	938.460	116	108	1.56	270 / 210	65	95 / 9.0
6		~~16:59~~	~~.72~~	~~Stopped~~	939.695			1.03			
		~~17:04~~	~~1.05~~	~~105~~		~~110~~	~~107~~				
6			~~1.05~~					1.46			
AVERAGE (TOTAL)			8	830	( )	927	864	12.92	2135 / 1840	529	68.5 / 68.0

SAMPLING TRAIN DATA

Company: EPA Task #29 Wisconsin Steel Ill.
Source Designation: Inlet
Date: 5-12-77
Test Number: P-3
Field Person: GEH - TVM
Filter Number: A-102-17
Barometric Pressure ("Hg): 29.56"
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .986
Meter Isokinetic Factor: 1.644
Assumed Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
									Filter Box / Elbow		Column / Vac
6		17:04	1.05	110	941.641	111	107	(1.46)	265 / 235	72	90 / 8.5
5	430	17:14	1.05	~~115~~ 105	945.240	114	108	1.46	270 / 230	65	90 / 10.5
5	—	17:16	1.55	Stopped	946.330			2.17			
5		17:21	1.6	100		110	106				
5	435	17:23	1.6	110	949.340	114	108	2.25	270 / 235	70	90 / 11.5
4	440	17:28	1.6	105	953.550	118	108	2.22	270 / 230	70	75 / 10.0
4	445	17:33	1.3	105	956.982	120	108	1.83	Stopped		
4	450	17:39	1.30	110	957.882	112	106	1.84	275 / 245	65	75 / 10.0
3	455	17:44	1.35	105	961.450	117	108	1.87	280 / 240	65	75 / 12.5
3	—	17:49	1.7	Stopped		~~120~~	~~109~~	2.39			
3	~~460~~	17:56	—	—	965.430						
3	460	17:56	1.7	110	965.790	114	108	2.39	280 / 245	65	75 / 13
2	465	18:01	1.85	105	970.210	120	109	2.58	~~280 / 245~~	~~65~~	~~75 / 12~~
2	470	18:06	1.90	105	974.770	123	110	2.69	280 / 240	60	75 / 14
									275 / 230	60	75 / 13
~~1~~		~~18:10~~	~~1.75~~	~~Stopped~~				~~2.48~~			
1	~~475~~				978.195						
AVERAGE (TOTAL)		10		1070	( )	1163	1080	20.59	2465 / 2139	592	720 / 103

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA Task #29 Wisconsin Steel Ill.
Source Designation: Inlet
Date: 5-12-77
Test Number: P-3
Field Person: GEH - TVM
Filter Number: A-102-17
Barometric Pressure ("Hg): 29.56"
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC 3, Corr. Factor: .980
Meter Isokinetic Factor: 1.644
Assumed Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
									Filter Box / Elbow		Column / VAC
~~1~~		~~18:15~~	~~Assumed~~								
1	475	18:16	1.8	110	979.355	114	108		270 / 225	70	75 /
		~~18:25~~	~~Stopped~~	~~leak test~~	~~979.611~~						
1	480	18:29	1.3	105	983.307	110	108	1.81	275 / 250	70	75 / 8.5
			2	215		224	216	1.81	545 / 475	140	156 / 8.5
AVERAGE (TOTAL)				91.8	373.22 (380.837)	115.4	105	2.01	271.6 / 230.6	60.9	75.7 / 10.1

X AD² BETWEEN DRY TRAP & SIGLA GELL

SAMPLING TRAIN DATA

Company: EPA-TASK #29 WISCONSIN STEEL ILL

Source Designation: INLET

Date: 5/13/77

Test Number: P-4

Field Person: GEH. & TVM

Filter Number: A-102-23

Barometric Pressure ("Hg): 29.30

Stack Static Pressure ("H_2O): -3.30

Stack Dimensions: 80" X 80"

Plume Appearance: —

Ambient Temperature (°F): 60°

Record all Data Every 5 Minutes

Filter Heater Setting: 250

Probe Heater Setting: 80°

Nozzle Number: 3/16, Dia. (in.): .0187

Pitot Tube No. 23, Corr. Factor: .851

Meter Box No. MAC #3, Corr. Factor: .98

Meter Isokinetic Factor: 1.644

Assumed Moisture (%): 19

Condensate Volume (ml): -25

Silica Gel Weight Gain (g): 84.2

Leak Rate 0 CFM at 15 "H

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) Filter Box / Elbow	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg) Col / Vac
A		0	2014			984.423						
	8	5	2019	1.35	110	988.995	100	100	1.84	235 / 180	75	6.5 / 7.0
STOP.	8	10	2024	1.10	110	991.732	108	104	1.52	250 / 190	65	6.0 / 6.0
START			2030									
	7	15	2035	1.35	110	995.600	112	104	1.86	295 / 220	65	6.5 / 7.0
	7	20	2040	1.20	110	999.795	112	106	1.65	280 / 225	65	7.0 / 6.0
STOP.	6	25	2045	1.35	110	1002.551	114	106	1.87	285 / 245	70	7.0 / 7.0
START			2050									
STOP	6	25	2055	1.35	110	1007.000	114	106	1.87	285 / 245	70	7.0 / 7.0
START			2100									
	6	30	2105	1.35	110	1011.325	114	106	1.87			7.0 / 8.0
	5	35	2110	1.70	110	1015.110	110	106	2.35	285 / 245	65	7.0 / 8.0
	5	40	2115	1.70	110	1019.300	110	106	2.35			7.0 / 8.0
	4	45	2120	1.40	110	1023.635	116	106	1.95	280 / 235	60	7.0 / 8.0
	4	50	2125	1.40	110	1027.425	116	106	1.95	280 / 235	60	7.0 / 8.0
AVERAGE (TOTAL)					1100	( )	1112	1055	19.21	2170 / 1775	525	6.80 / 7.30

SAMPLING TRAIN DATA

Company: EPA. TASK #29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5/13/77
Test Number: P-4
Field Person: GENE & TOM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" x 80"
Plume Appearance: —
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .85
Meter Box No. MC #3, Corr. Factor: 98
Meter Isokinetic Factor: 1.644
Assumed Moisture (%): 12
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "H

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter Temp (°F): Inlet	Dry Gas Meter Temp (°F): Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
A	3	55	2130	1.80	110	1032.125	116	106	2.51	275/235	70	70/9.0
STOP	3	60	2135	1.50	110	1036.280				275/235	70	/9.
START			2138									
	2	65	2140	1.55	110	1039.910	112	106	2.15	280/235	70	70/
	2	70	2145	1.55	110	1044.000	112	106	2.15	280/235	60	70/7.0
	1	75	2150	1.10	110	1047.955	116	106	1.53	290/240	60	70/6.0
	1	80	2155	1.10	100	1051.145	116	106	1.56	/		/
			2204									
B	8	86	[illegible]	1.35	100	[illegible]	112	106	1.91	280/245	60	70/7.0
	8	90	2214	1.35	100	1057.6[illegible]	112	106	1.91	280/240	60	70/7.0
	7	95	2219	1.45	100	106[illegible]	112	106	2.04	275/230	60	70/7.5
	7	100	2224	1.45	100	1066.735	114	106	2.04	275/230	60	70/7.5
	6	105	2229	1.55	100	1070.821	114	106	2.19	275/235	60	70/7.5
	6	110	2234	1.55	100	1074.912	114	106	2.19	275/230	60	70/7.5
	5	115	2239	1.60	100	1079.172	114	106	2.20	275/230	60	70/7.5
	5	120	2244	1.60	100	1083.312	114	106	2.20	280/230	65	70/7.5
	AVERAGE (TOTAL)				1450	( )	1478	1378	26.58	3015/3050	815	840/92

SAMPLING TRAIN DATA

Company: EPA TASK 29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5-13-77
Test Number: P-4
Field Person: GMS - TVM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O): -3.3
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: 0.85
Meter Box No. RAC3, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 17
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "H

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
B	4	125	2249	1.55	100	1087.621	114	106	2.19	280/230	60	70/8.0
	4	130	2254	1.55	100	1091.812	114	106	2.19	280/230	60	70/8.0
	3	135	2259	1.6	100	1095.982	114	106	2.2	280/230	60	70/8.0
	3	140	2304	1.6	100	1100.321	114	106	2.2	280/230	60	70/8.0
	2	145	2309	1.3	100	1104.241	114	106	1.84	280/230	55	70/7.5
STOP	2	150	2314	1.3	100	1107.942	114	106	1.84	285/235	60	70/7.5
START			2319									
STOP	1	154	2323	.87	100	1111.012	102	104	1.21	285/260	65	70/5.2
START			2327									
	1	160	2332	.87	100	1114.249	102	104	1.21	285/260	65	70/5.[illegible]
START C	8	165	2335	1.35	100	1111.791	102	104	1.88	280/260	65	70/5.3
STOP	8	170	2341	1.35	100	1121.783	102	104	1.88	270/235	65	70/7.0
START			2346									
STOP	7	175	2351	1.55	100	1125.774	104	104	2.16	265/230	60	70/7.0
START			2400									
	7	180	0005	1.55	100	1133.021	104	104	2.16	270/235	65	70/8.0
AVERAGE (TOTAL)					100	( )	1300	1260	20.96	334/[illegible]	740	840/84.7

SAMPLING TRAIN DATA

Company: EPA. TASK 29 WISCONSIN STEEL WORKS
Source Designation: INLET
Date: 5-13-77
Test Number: P-4
Field Person: GMS-TVM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80"x80"
Plume Appearance: —
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .85
Meter Box No. RAC23, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 1%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg
AFTER 0 15

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
ART	6	185	0010	1.55	100	1134.121	104	104	2.16	270/275	60	70/8.1
TOP	6	190	0014	1.55	100	1137.861	104	104	2.16	270/230	60	70/8.[illegible]
START			0019									
	5	195	0024	1.75	100	1142.476	110	104	2.39	270/235	60	70/8.5
	~~5~~	~~199~~	~~0029~~	~~1.75~~	~~100~~	~~1146.357~~	~~110~~	~~104~~	~~2.39~~	~~265/230~~	~~60~~	~~70/8.5~~
TOP.	5	200	0030	1.75	100	1146.755	110	104	2.39	265/235	60	70/8.5
TART	4	205	0034	1.60	100	1151.024	110	104	2.25	265/235	55	70/8.0
	4	210	0040	1.60	100	1155.312	110	104	2.25	265/230	55	70/8.0
OP	~~3~~	~~212~~	~~0046~~	~~1.60~~	~~100~~		~~110~~	~~104~~	~~2.24~~	~~265/230~~	~~55~~	~~70/8.0~~
START	3		0051									
	3	215	0056	1.60	100	1159.621	110	104	2.24	265/230	55	70/8.0
	3	220	0101	1.60	100	1164.012	110	104	2.24	270/230	55	70/8.0
STOP	2	225	0106	1.60	100	1169.102	110	104	2.24	270/230	55	70/8.0
TART			0112									
	2	230	0116	1.60	100	1172.78	110	104	2.24	270/240	55	70/8.0
	1	235	0121	1.20	100	1176.232	110	104	1.68	275/245	55	70/7.0
	1	240	0126	1.20	100	1179.757	110	104	1.68	275/245	55	70/7.0
AVERAGE (TOTAL)					1200	( )	1308	1248	25.92	3230/2810	680	840/95.3

SAMPLING TRAIN DATA

Company: EPA. TASK 29 WISCONSIN STEEL WORKS
Source Designation: INLET
Date: 5-13-77
Test Number: P-4
Field Person: G-MS-TOM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O):
Stack Dimensions: 80" X 80"
Plume Appearance:
Ambient Temperature (°F): 66
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .85
Meter Box No. RAC#3, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 19
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
START D			01:32									
	8	245	01:37	1.3	100	1183.937	110	104	1.82	275/250	60	70/7.0
STOP	~~8~~	~~248~~	~~01:40~~									
START	~~8~~		~~01:45~~									
	8	250	01:47	1.3	100	1187.632	110	104	1.82	270/240	60	70/7.0
	7	255	01:52	1.3	100	1191.543	110	104	1.82	260/235	55	70/7.0
	7	260	01:57	1.3	100	1195.123	110	104	1.82	260/235	55	70/7.0
	6	265	02:02	1.3	100	1198.943	110	104	1.82	260/230	65	70/7.0
	6	270	02:07	1.3	100	1202.324	110	104	1.82	260/230	60	70/7.0
	5	275	02:12	1.4	100	1206.311	110	104	1.96	260/230	60	70/7.0
	5	280	02:17	1.4	100	1209.247	110	104	1.96	260/220	55	70/7.0
	4	285	02:22	1.6	100	1214.317	110	104	2.24	260/230	60	70/8.0
	4	290	02:27	1.6	90	1219.875	108	96	2.24	260/210	60	70/8.0
	3	295	02:32	1.65	90	1223.865	108	96	2.34	260/210	60	70/9.0
	3	300	02:37	1.65	90	1227.635	108	96	2.34	260/210	60	70/9.0
	2	305	02:42	1.45	90	1232.525	108	96	2.06	265/210	60	70/8.0
	2	310	02:47	1.45	90	1235.555	108	96	2.06			
	AVERAGE (TOTAL)				1350	( )	1530	1416	28.12	3410/2940	770	910/98.5

SAMPLING TRAIN DATA

Company: EPA TASK 29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5/14/77
Test Number: P-4
Field Person: GEH. TUM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80" X 80"
Plume Appearance: —
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .01875
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. #3, Corr. Factor: .986
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 12
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) / Filter Elbow	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg) / Col / Vac
D	1	315	0252	0.98	90	1239.100	108	96	1.39	265 / 220	60	70 / 6.0
	1	320	0257	0.98	90	1242.358	108	96	1.39	265 / 220	60	70 / 6.0
START			0300									
E	8	325	0305	1.30	90	1246.175	108	96	1.85	275 / 235	60	70 / 7.0
STOP.	8	330	0310	1.36	90	1250.170	108	96	1.85	275 / 235	60	70 / 7.0
START			0316									
STOP	7	333	0319	1.35	90	1252.578	108	96	1.92	280 / 250	60	70 / 8.0
START			0324									
	7	335	0326	1.35	100	1256.625	108	96	1.92	280 / 250	60	70 / 8.0
	7	340	0331	1.35	100	1258.825	108	96	1.92	285 / 240	60	70 / 8.0
	6	345	0336	1.65	100	1262.100	100	92	2.28	280 / 240	60	70 / 9.0
STOP	6	347	0338	1.65	100	1263.800	100	96	2.28			
START			0343									
	6	350	0346	1.65	100	1266.375	100	96	2.28	280 / 245	60	65 / 9.0
	5	355	0351	1.65	100	1270.725	100	96	2.28	275 / 240	60	65 / 9.0
STOP.	5	356	0352	1.65	100	1271.705	100	96	2.28	275 / 240	60	65 / 9.0
	AVERAGE (TOTAL)				860	( )	948	860	17.16	2480 / 2125	540	620 / 69

SAMPLING TRAIN DATA

Company: EPA TASK #29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5/14/77
Test Number: P-4
Field Person: GEH & TVM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 60" X 80"
Plume Appearance: —
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .0182
Pitot Tube No. 23, Corr. Factor: .0187
Meter Box No. #2#3, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 19
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "H

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) FILTER / BOX / ELBOW	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg) COL / VAC.
START			03'58									
E.	5	360	0402	1.65	100	1275.095	100	96	2.28			
	4	365	0407	1.65	100	1279.135	100	90	2.28	275 / 230	60	70 / 9.0
	4	370	0412	1.65	100	1283.630	100	90	2.28	275 / 230	60	70 / 9.0
STOP.	~~3~~	~~373~~	~~0415~~	~~1.55~~	~~100~~	~~1285.715~~	~~100~~	~~90~~	~~2.14~~	275 / 230	65	70 / 9.0
START			0420									
	3	375	0422	1.55	100	1285.715	100	90	2.14	280 / 240	65	70 / 9.0
	3	380	0427	1.55	100	1291.700	100	90	2.14	280 / 240	65	70 / 9.0
STOP.	~~2~~	~~382~~	~~0429~~	~~1.25~~		~~1293.164~~	~~100~~	~~90~~	~~1.72~~	280 / 240	65	70 / 8.0
START			0434									
	2	385	0437	1.25	100	1295.565	100	90	1.72	280 / 240	65	70 / 8.0
	2	390	0442	1.25	100	1299.510	100	90	1.72	285 / 245	65	70 / 8.0
STOP	~~1~~	~~392~~	~~0444~~	~~.70~~	~~100~~	~~1300.590~~	~~100~~	~~90~~	~~.96~~	275 / 245	65	70 / 6.0
START			0450									
	1	395	0453	.80	100	1302.675	100	90	1.10	280 / 255	65	70 / 6.0
	1	400	0458	.80	100	1305.750	100	90	1.10	280 / 255	65	70 / 6.0
AVERAGE (TOTAL)					900	( )	900	816	16.76	2232 / 1935	610	560 / 64

SAMPLING TRAIN DATA

Company: EPA - TASK #29 WISCONSIN STEEL ILL
Source Designation: INLET
Date: 5/14/77
Test Number: P-4
Field Person: GEH & TVM
Filter Number: A-102-23
Barometric Pressure ("Hg): 29.30
Stack Static Pressure ("H_2O): -3.30
Stack Dimensions: 80"X80"
Plume Appearance: —
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 250
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .85
Meter Box No. RAC #3, Corr. Factor: .98
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 1.7
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "Hg

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) FILTER	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
										130 / ELBOW		COL / VAC
F			0501									
TOP	~~8~~	~~404~~	~~0505~~	1.45	100	1308.665	100	90	2.00	290 / 250	65	70 / 8.0
START			0510									
	8	405	05.11	1.45	100	1309.765	100	90	2.00	285 / 295	65	70 / 8.0
	8	410	0516	1.45	100	1313.810	100	90	2.00	285 / 295	65	70 / 8.0
	7	415	0521	1.45	100	1316.945	100	90	2.00	285 / 295	65	70 / 8.0
	7	420	0526	1.45	100	1321.125	100	90	2.00	280 / 235	65	70 / 8.0
	6	425	0531	1.25	100	1322.562	100	90	1.72	280 / 230	65	70 / 8.0
	6	430	0536	1.25	90	1329.355	100	90	1.75	275 / 230	70	70 / 8.0
	5	435	0541	1.55	90	1333.525	100	90	2.17	275 / 230	70	70 / 8.0
STOP	5	440	0546	1.55	90	1337.467	100	90	2.17	275 / 230	70	70 / 8.0
START	4		0552									
	4	445	0557	1.55	90	1341.467	100	90	2.17	280 / 240	60	70 / 8.5
	4	450	0602	1.55	90	1345.610	100	90	2.17	280 / 240	60	70 / 8.5
	3	455	0607	1.55	90	1359.401	100	90	2.17	285 / 240	70	70 / 8.5
	3	460	0612	1.55	90	1353.821	100	90	2.17	285 / 240	70	70 / 8.5
	AVERAGE (TOTAL)				1130	( )	1200	1080	24.49	3370 / 2960	795	840 / 98

SAMPLING TRAIN DATA

Company: EPA TASK 29 WISCONSIN STEEL
Source Designation: INLET
Date: 5-14-77
Test Number: P-4
Field Person: GMS + TVM
Filter Number: A-102-23
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions: 80" X 80"
Plume Appearance:
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 250°
Probe Heater Setting: 80°
Nozzle Number: 3/16, Dia. (in.): .0187
Pitot Tube No. 23, Corr. Factor: .851
Meter Box No. RAC #3, Corr. Factor: .980
Meter Isokinetic Factor: 1644
Assumed Moisture (%): 13
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0 CFM at 15 "H
AFTER Leak Rate

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
F 2	465	0617	1.8	90	1358.145	100	90	2.52	285/230	65	70/9.1
2	470	0622	1.8	90	1361.738	100	90	2.52	285/235	65	75/9.5
1	475	0627	1.2	90	1366.201	100	90	1.68	285/230	65	75/7.5
1	480	0632	1.2	90	1369.797	100	90	1.68	285/240	65	75/7.5
				360		400	360	8.4	1135/925	260	295/33.6
AVERAGE (TOTAL)				99.5	(385.024)	107.1	99.7	1.996	274.6/235.9	61.9	69.8/7.7

Clayton Environmental Consultants, Inc.

DRY MOLECULAR WEIGHT DETERMINATION (M_d)

Plant: Wisconsin Steel Test 29
Date: 5/11/77
Sampling Time (24-hour Clock): 10:00 – 12:00
Sampling Location:: Inlet

Sample Type (bag, integrated, continuous)
Analytical Method: Orsat
Ambient Temperature:
Operator:

Comments:

Gas \ Run	1 Actual Reading	1 Net	2 Actual Reading	2 Net	3 Actual Reading	3 Net	Average Net Volume	Multiplier	Molecular Weight Of Stack Gas (dry basis) M_d, lb/lb-mole
CO_2	0 (<0.1)	<0.1	0	<0.1			<0.1	44/100	0
O_2 (Net is actual O_2 reading minus actual CO_2 reading)	20.7	20.7	20.7	20.7			20.7	32/100	6.624
CO (net is actual CO reading minus actual O_2 reading)	<0.1	<0.1	<0.1	<0.1			<0.1	28/100	0
N_2 (Net is 100 minus actual CO reading)		79.2		79.3			79.3	28/100	22.204
								Total	28.828 = M_d

WET MOLECULAR WEIGHT DETERMINATION (M_s)

B_{wo} = Proportion by volume of water vapor in the gas stream

M_s = Molecular weight of stack gas (wet basis), lb/lb-mole = $M_d(1-B_{wo}) + 18(B_{wo})$

M_s = ( )(1-) + 18( ) =

$G_m = \frac{M_d}{28.96} = \frac{\quad}{28.96} =$, $G_s = \frac{M_s}{28.96} = \frac{\quad}{28.96} =$, $\frac{G_m}{G_s} = \frac{\quad}{\quad} =$

APPENDIX B

SECTION I PARTICULATE FIELD DATA SHEETS
OUTLET

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O): -.95
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 45°
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%): 2%
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .00 CFM at 15 "Hg

$\Delta m = 1.494 \frac{T_m}{I_s} \Delta H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W-1	0	10:01	1.10	460+ 60	665.025	460+ 60	460+ 59	1.65	362/185	53	0.0
W-1	5	10:06	1.10	460 60	668.45	65	60	1.65	250/175	50	0.0
W-2	10	10:11	1.45	60	671.87	70	61	2.19	242/168	48	0.0
W-2	15	10:16	1.45	60	675.65	75	64	2.20	230/155	47	0.0
W-3	20	10:21	1.55	60	679.58	79	67	2.37	225/150	47	0.0
	25	10:26	1.55	60	683.67	81	69	2.38	215/145	47	0.0
W-4	30	10:31	1.50	60	687.82	84	71	2.32	220/150	47	0.0
	35	10:36	1.50	60	691.97	86	74	2.33	227/150	48	0.0
W-5	40	10:41	1.40	60	696.16	86	76	2.18	230/150	48	0.0
	45	10:46	1.40	60	700.14	88	77	2.18	223/145	48	0.0
W-6	50	10:51	1.35	60	704.15	88	78	2.11	225/150	48	0.0
	55	10:56	1.35	60	708.10	89	80	2.11	221/150	47	0.0
W-7	60	11:01	1.30	60	712.06	89	80	2.03	220/145	47	0.0
		*	NOTE: ADD 5° TO EACH ELBOW TEMPERATURE								
				FOR SECOND HALF OF TEST							
AVERAGE (TOTAL)			13	780	( )	1040	916	27.70	2989/2020	625	0.0

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 100%
Probe Heater Setting: 80%
Nozzle Number: 3/16, Dia. (in.): .189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.494 \left(\frac{T_m}{T_s}\right) H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	65	11:06	1.25	60	715.97	90	85.5 81	1.96	225/145	47	0.0
W-8	70	11:11	1.30	60	719.78	90	85.5 81	2.04	230/145	48	0.0
	75	11:16	1.30	60	723.65	90	86 82	2.04	230/145	48	0.0
W-9	80	11:21	1.25	60	727.55	90	86 82	1.96	223/145	48	0.0
	85	11:26	1.25	60	731.35	90	86.5 83	1.96	230/150	48	0.0
W-10	90	11:31	1.25	60	735.16	90	83	1.96	200/145	48	0.0
	95	11:36	1.25	60	738.95	91	87.5 84	1.97	223/145	47	0.0
W-11	100	11:41	1.20	60	742.79	91	84	1.89	210/145	47	0.0
	105	11:46	1.20	60	746.58	91	84	1.89	210/140	46	0.0
W-12	110	11:51	1.10	60	750.34	91	84	1.73	205/140	46	0.0
	115	11:56	1.10	60	753.97	91	84	1.73	185/135	46	0.0
W-12	120	12:01	1.10	60	757.61	91	84	1.73	200/135	46	0.0
~~W-12~~	~~125~~	~~12:06~~	~~1.10~~	~~60~~	~~761.286~~	~~81~~	~~84~~	~~1.73~~			
~~W-12~~ W-11	125	12:15	1.10	60	761.286	86	83	1.72	200/135	51	0.0
W-11	130	12:20	1.2	60	764.89	86	84.5 83	1.85	210/140	49	0.0
			17.45	7.5		124	1.5	2.89			
AVERAGE (TOTAL)			14	840	( )	1258	1162	26.46	2991/1990	662	0.0

Battelle Column on train

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting: 100%
Probe Heater Setting: 80%
Nozzle Number: 3/16, Dia. (in.): .189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RK-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.494 \frac{T_M}{T_S} H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W-11	135	12:25	1.2	60	768.62	85	82	1.88	195/135	49	0.0
W-10	140	12:30	1.3	60	772.36	89	83	2.04	205/130	50	0.0
W-10	145	12:35	1.25	60	776.25	90	83	1.96	200/135	50	0.0
W-9	150	12:40	1.30	60	780.09	90	83	2.04	200/140	50	0.0
W-9	155	12:45	1.30	60	783.97	90	84	2.04	190/135	50	0.0
W-8	160	12:50	1.30	60	787.86	90	84	2.04	180/140	50	0.0
W-8	165	12:55	1.30	60	791.79	91	84	2.04	197/130	49	0.0
W-7	170	13:00	1.30	60	795.69	91	85	2.05	205/135	50	0.0
W-7	175	13:05	1.25	60	799.61	92	84	1.97	205/130	49	0.0
W-6	180	13:10	1.35	60	803.46	92	85	2.13	200/150	48	0.0
W-6	185	13:15	1.35	60	807.44	92	85	2.13	205/150	50	0.0
W-5	190	13:20	1.40	60	811.52	92	86	2.20	205/155	50	0.0
W-5	195	13:25	1.40	60	815.51	92	85	2.20	200/155	50	0.0
W-4	200	13:30	1.50	60	819.55	92	85	2.36	205/155	49	0.0
AVERAGE (TOTAL)			14	840	( )	1271	1178	29.08	2792/1953	694	0.0

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: 3/16, Dia. (in.): .187
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. BAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .02 CFM at 15 "Hg

$\Delta m = 1.494 \frac{T_m}{15} H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W-4	205	13:35	1.50	60	823.70	92	89 86	2.37	213/165	50	0.0
W-3	210	13:40	1.55	60	827.87	93	89.5 86	2.45	205/145	49	0.0
W-3	215	13:45	1.55	60	832.14	93	86	2.45	210/140	49	0.0
W-2	220	13:50	1.45	60	836.42	93	86	2.29	210/145	50	0.0
W-2	225	13:55	1.45	60	840.59	93	86	2.29	200/145	50	0.0
W-1	230	14:00	1.10	60	844.74	94	90 86	1.74	200/140	50	0.0
W-1	~~PORT CHANGE~~ 235	14:05	1.10	60	848.42	93	89.5 86	1.74	210/140	50	0.0
2	PORT CHANGE 240	14:10		60	852.066	93	86		210/145	51	0.0
				420%			626.5%	15.33			
			LEAK RATE	=	$\frac{15}{15}(.02) = .02$				at 15 "HG		
					852.350						
					187.041						
AVERAGE (TOTAL)			1	420	−3.93 (188.350)	621	602	15.33	1450/1020	348	0.0

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: 3/16, Dia. (in.): .189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.494 \frac{Tm}{Ts} H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Red Velocity Pressure ("H_2O) (H)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orange (set) Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) *	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S-1	0	1427	.95	60	852.350	86	84	1.49	240/190	60	0.0
	5	1432	.95	62	855.88	88	84	1.48	225/190 *	55	0.0
S-2	10	1437	1.35	61	859.10	90	84	2.11 ~~1.65~~	235/190 *	56	0.0
	15	1442	1.35	62	862.74	92	85	2.12	225/190	55	0.0
S-3	20	1447	1.45	63	866.74	93	85	2.28	220/190	54	0.0
	25	1452	1.45	63	870.83	94	86	2.28	215/185	55	0.0
S-4	30	1457	1.45	63	874.95	95	86	2.28	225/175	55	0.0
	35	1502	1.45	63	879.18	95	88	2.28	220/170	56	0.0
S-5	40	1507	1.40	63	883.22	95	88	2.21	215/170	55	0.0
	45	1512	1.40	63	887.37	95	88	2.21	215/170	56	0.0
S-6	50	1517	1.35	63	891.39	95	88	2.13	210/170	56	0.0
	55	1522	1.35	63	895.39	95	88	2.13	210/180	56	0.0
S-7	60	1527	1.25	63	899.29	95	88	1.97	225/190	57	0.0
			346.55 / 13	812 / 13		1165 / 13		26.97 / 13			
AVERAGE (TOTAL)			13	812	( )	1208	1122	26.97	2880 / 2425	726	0.0

*NOTE: ADD 5° TO EACH ELBOW TEMPERATURE FROM HERE TO END OF TEST

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: WALSH/JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 60
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta M = 1.494\ T_m/T_s\ H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	
	65	1532	1.25	63	903.20	95	88	1.97	235/180	58	0.0	
S-8	70	1537	1.30	63	907.04	95	88	2.05	245/180	59	0.0	PU
	~~74~~	~~1541~~			~~910.224~~							SH
	~~74~~	~~1546~~	~~1.30~~	~~63~~	~~910.224~~	~~95~~	~~88~~	~~2.05~~	~~245/180~~	~~59~~	~~0.0~~	DOW RES
	75	1547	1.30	67	910.84	92	87	2.02	270/200	63	0.0	
S-9	~~80~~	~~1552~~			~~914.798~~							PU SH DOW
	80	1557	1.30	71	914.798	88	86	2.00	260/205	61	0.0	RES
	85	1602	1.30	71	918.52	90	86	2.00	250/195	60	0.0	
	~~87.5~~	~~1604.5~~			~~920.41~~							PUSH SHU DOW
	~~87.5~~	~~1610~~	~~1.30~~	~~71~~	~~920.41~~	~~90~~	~~86~~	~~2.00~~	~~250/195~~	~~60~~	~~0.0~~	RESTA
S-10	90	1612	1.40	71	922.37	88	85	2.15	270/190	62	0.0	
	95	1617	1.40	70	926.22	90	84	2.15	265/185	60	0.0	
S-11	100	1622	1.30	69	930.17	90	84	2.01	260/185	60	0.0	
	~~105~~	~~1627~~			~~934.183~~							PUSH SHU DOW
	105	1632	1.30	67	934.183	88	83	2.02	275/200	63	0.0	RESTA
S-12	110	1637	1.20	66	937.99	89	84	1.86	255/195	60	0.0	
			62.37	1.76		880		20.23				
AVERAGE (TOTAL)			10	678	( )	405	850	20.23	2582 1965	606		

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 66
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$A_m = 1.494\ T_m/P_s\ H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	
	112	1639			939.752							PUSH SHUT DOWN
S-12	112	1645	1.20	68	939.752	87	82	1.85	255/195	60	0.0	REST
	115	1648	1.15	68	941.71	87	82	1.77	275/205	63	0.0	
	118	1650.8			943.728							PUSH SHUT DOWN
	118	1656	1.15	70	943.728	86	82	1.77	275/205	63	0.0	REST
S-12	120	1658	1.10	70	945.34	86	82	1.69	275/205	64	0.0	
	125	1703		~~70~~ now	948.768	~~88~~ now	~~82~~					PUSH SHUT DOWN
	125	1708	1.15	70	948.768	85	81	1.75	285/205	65	0.0	REST
S-1B	130	1713	1.25	71	952.41	86	81	1.91	270/195	62	0.0	
	133	1716			954.607							PUSH SHUT DOWN
	133	1721	1.30	71	954.607	85	80	1.98	270/195	62	0.0	REST
	135	1723	1.30	71	956.22	85	80	1.98	280/200	63	0.0	
S-10	140	1728	1.20	71	959.85	87	80	1.84	260/195	58	0.0	
	142	1730			961.419							PUSH SHUT DOWN
	142	1735	1.20	70	961.419	85	80	1.83	260/195	58	0.0	REST
	145	1738	1.20	70	963.55	85	80	1.83	270/200	60	0.0	
						583.5						
AVERAGE (TOTAL)			1	491	( )	601	564	12.77	1915/1440	435	0.0	

SAMPLING TRAIN DATA

Company: EPA-TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: WALSH/JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96" DIA
Plume Appearance:
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: 3/16, Dia. (in.): 0.187
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. PK-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.494\ T_m/T_s\ H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S-9	150	1743	1.25	70	967.26	88	80	1.92	265/195	58	0.0
	~~152~~	~~1745~~			~~968.723~~						
	~~152~~	~~1750~~	~~1.30~~	~~72~~	~~968.723~~	~~86~~	~~80~~	~~1.98~~	~~265/195~~	~~58~~	~~0.0~~
	155	1753	1.30	72	970.09	86	80	1.98	270/200	61	0.0
S-8	160	1758	1.25	71	974.81	84	80	1.91	265/190	59	0.0
	165	1803	1.25	69	978.59	89	81	1.92	260/190	59	0.0
S-7	170	1808	1.30	65	982.36	90	82	2.02	260/190	58	0.0
	175	1813	1.30	66	986.21	90	82	2.02	255/185	58	0.0
S-6	180	1818	1.35	65	990.10	91	82	2.10	255/185	58	0.0
	185	1823	1.35	65	994.02	91	83	2.10	250/190	57	0.0
S-5	190	1828	1.40	65	997.96	91	83	2.18	245/190	57	0.0
	195	1833	1.40	65	1,002.01	92	84	2.18	240/190	56	0.0
S-4	200	1838	1.50	64	1,006.01	91	83	2.34	225/185	56	0.0
	205	1843	1.50	64	1,010.15	92	84	2.34	230/180	56	0.0
S-3	210	1848	1.40	64	1,014.34	91	83	2.18	240/180	56	0.0
	215	1853	1.40	63	1,018.40	90	83	2.18	235/180	56	0.0
AVERAGE (TOTAL)			14	928	( )	1250	1150	29.37	3495/3700	805	0.0

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SAMPLING TRAIN DATA

Company: EPA - TASK 29
Source Designation: ESP OUTLET
Date: 5/10/77
Test Number: P-1
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.60
Stack Static Pressure ("H_2O):
Stack Dimensions: 96" DIA
Plume Appearance:
Ambient Temperature (°F): 55
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RK-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml): 87
Silica Gel Weight Gain (g): 80.7
Leak Rate .03 CFM at 15 "Hg

$\Delta m = 1.494\ T_m/T_s\ H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S-2	220	1858	1.10	62	1,022.42	90	82	1.72	230/180	56	0.0
	225	1903	1.10	62	1,026.10	89	81	1.72	235/185	57	0.0
S-1	230	1908	1.05	62	1,029.77	89	82	1.64	235/185	57	0.0
	235	1913	0.95	62	1,033.23	88	82	1.48	230/185	57	0.0
END	240	1918		62	1,036.576	88	81				0.0
				FINAL	LEAK	RATE = .03					
						@ 15" Hg					
			4	248		354	327	6.56	930/755	227	0.0
AVERAGE (TOTAL)				[illegible]	371.297 (367.621)	89	82.1	2.03	229.4/164.5	53.4	0.0

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP DISCHARGE
Date: 5/11/77
Test Number: P-2
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NIL
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .0875 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W-1	0	10:02	1.10	65	40.248	87	86	1.71	235/135	60	1.0
	5	10:07	1.10	65	43.80	90	86	1.72	240/150	58	1.0
W-2	10	10:12	1.45	65	47.40	93	87	2.27	255/165	56	1.0
	15	10:17	1.45	65	51.45	96	88	2.28	255/180	55	2.0
W-3	20	10:22	1.50	65	55.60	98	89	2.36	257/185	55	2.0
	25	10:27	1.50	70	59.76	99	90	2.34	260/190	56	2.0
W-4	30	10:32	1.45	70	64.00	100	91	2.27	260/190	58	2.0
	35	10:37	1.45	70	68.16	100	92	2.27	255/185	58	2.0
W-5	40	10:42	1.40	70	72.7	101	93	2.20	260/190	58	2.0
	45	10:47	1.40	70	76.40	102	94	2.20	270/195	59	2.0
W-6	50	10:52	1.30	70	80.50	102	94	2.04	270/190	58	1.8
	55	10:57	1.30	70	84.49	102	95	2.04	270/195	60	1.8
W-7	60	11:02	1.25	70	88.43	102	95	1.97	265/190	60	1.8
	65	11:07	1.25	70	92.32	103	96	1.97	265/190	60	1.8
W-8	70	11:12	1.25	70	96.18	103	96	1.97	275/205	62	1.8
	75	11:17	1.25	70	100.06	103	96	1.97	275/205	60	1.8
AVERAGE (TOTAL)		10		1095	( )	1581	1465	33.58	4172/2940	133	27.8

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: P-2
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: —
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. BK-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W-9	80	11:22	1.25	70	103.95	104	100 96	1.97	275/310	58	1.8
	85	11:27	1.25	70	107.84	104	100.5 97	1.97	275/310	57	1.8
W-10	90	11:32	1.25	70	111.72	104	97	1.97	275/315	58	1.8
	95	11:37	1.25	70	115.60	104	97	1.97	275/310	58	1.8
W-11	100	11:42	1.20	70	119.26	104	101 98	1.90	280/310	60	1.8
	105	11:47	1.15	70	123.05	104	98	1.82	280/315	60	1.5
W-12	110	11:52	1.05	70	126.86	104	98	1.66	285/310	60	1.0
	115	11:57	1.05	70	130.44	105	101.5 98	1.66	285/315	60	1.0
W-12	120	12:02	1.05	70	134.01	104	101 98	1.66	270/300	62	1.0
	125	12:07	1.05	70	137.60	104	98	1.66	270/305	61	1.0
W-11	130	12:12	1.20	70	141.20	105	102 99	1.90	268/190	62	1.5
	135	12:17	1.20	70	145.00	106	103.5 99	1.90	270/190	62	1.5
W-10	140	12:22	1.20	70	148.85	106	103 100	1.90	255/185	60	1.5
10	145	12:27	1.25	70	152.71	106	100	1.98	270/190	60	1.5
W-9	150	12:32	1.25	70	156.61	107	103.5 100	1.98	280/200	60	1.5
	155	12:37	1.25	70	160.57	107	100	1.99	265/195	60	1.8
									~~260/195~~	~~61~~	
AVERAGE (TOTAL)			16	1120	( )	1078	1573	29.9	4322/3250	958	23.8

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: P-2
Field Person: T. JULIEN, S. WALSH
Filter Number:
Barometric Pressure ("Hg): 29.58
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: —
Ambient Temperature (°F): 76
Record all Data Every _____ Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .02 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W-8	160	12:42	1.30	70	164.49	107	103.5 / 100	2.06	272/200	60	1.8
	165	12:47	1.30	70	168.45	108	104.5 / 101	2.07	270/195	61	1.8
W-7	170	12:52	1.25	70	172.46	108	101	1.99	265/190	62	1.8
	175	12:57	1.25	70	176.44	108	105 / 102	1.99	265/195	61	1.8
W-6	180	13:02	1.30	70	180.36	108	101	2.07	260/185	62	1.8
	185	13:07	1.30	70	184.33	108	105 / 102	2.07	265/190	62	1.8
W-5	190	13:12	1.40	70	188.33	108	105 / 102	2.23	260/190	64	2.0
	195	13:17	1.40	70	192.47	108	102	2.23	265/190	64	2.0
W-4	200	13:22	1.45	70	196.65	109	105.5 / 102	2.31	265/190	63	2.0
	205	13:27	1.45	70	200.88	109	102	2.31	265/190	62	2.0
W-3	210	13:32	1.50	70	204.12	110	106 / 102	2.39	265/200	63	2.0
	215	13:37	1.50	70	209.45	110	102	2.39	265/195	64	2.1
W-2	220	13:42	1.40	70	213.77	110	106.5 / 103	2.23	265/195	64	2.0
	225	13:47	1.40	70	217.97	110	103	2.23	265/200	64	2.0
W-1	230	13:52	1.10	70	222.16	110	103	1.76	265/200	64	1.5
	235	13:57	1.10	70	225.92	109	106 / 103	1.76	260/200	64	1.5
	~~240~~	~~12:02~~			229.641				~~260/195~~	~~64~~	
AVERAGE (TOTAL)			16	1120	229.943 (-4.046)	1740	1631	34.09	4237/3105	1004	29.9
				3335	189.393	4671					

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA-TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: P-2
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.58
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 76
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. PAC 4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .02 CFM at 15 "Hg

$\Delta m = 1.494$ Tm/Ts H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter Volume (ft^3)	Dry Gas Meter Temp (°F) Inlet	Dry Gas Meter Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S-1	0	1415	0.98	70	229.966	103	101	1.55	255/250	69	<0.5 0.0
	5	1420	0.98	70	233.57	105	101	1.56	255/245	69	<0.5 0.0
S-2	10	1425	1.30	70	237.03	106	102	2.06	250/220	64	<0.5 0.0
	15	1430	1.30	69	240.75	108	101	2.07	240/240	64	<0.5 0.0
S-3	20	1435	1.35	69	244.71	110	101	2.16	245/245	64	<0.5 0.0
	25	1440	1.40	69	248.75	111	101	2.21	255/245	66	<0.5 0.0
S-4	30	1445	1.45	70	252.88	112	102	2.32	250/240	66	<0.5 0.0
	35	1450	1.45	69	257.10	112	104	2.33	250/245	67	<0.5 0.0
S-5	40	1455	1.40	69	261.44	113	104	2.25	250/245	66	1.0
	45	1500	1.40	70	265.54	114	104	2.25	235/245	66	1.0
S-6	50	1505	1.30	69	269.72	114	104	2.09	250/240	66	1.0
	55	1510	1.32	69	273.78	114	104	2.12	245/245	67	0.7
S-7	60	1515	1.25	70	277.83	114	104	2.00	250/245	66	0.5
	65	1520	1.20	70	281.93	113	105	1.92	250/240	66	0.5
S-8	70	1525	1.30	70	285.68	113	106	2.09	250/240	66	0.5
AVERAGE (TOTAL)				1043	( )	1662	1542	31.01	3730/3125	992	5.2

SAMPLING TRAIN DATA

Company: EPA-TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: P-2
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.58
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 76
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.): 0.187
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. 24C4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.494$ T_m/T_s H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	75	1530	1.25	70	289.66	113	105	2.00	250/210	66	0.7
S-9	80	1535	1.30	70	293.61	113	104	2.08	250/210	67	0.5
	83.5 ~~85~~	1538.5 ~~1540~~			296.404						
~~S-10~~	83.5 ~~85~~	1544 ~~1545~~	1.30	70	296.404	109	104	2.08	255/225	70	0.5
	85	1546 ~~1548.5~~	1.30	70	297.59	109	104	2.08	255/225	70	0.5
	89	1550		~~72~~	~~300.828~~						
~~S-10~~	89	1555	1.30	70	~~300.828~~	109	104	2.08	255/225	70	0.5
S-10	90	1556	1.35	75	301.53	106	102	2.13	270/230	70	0.5
	95	1601	1.35	75	305.55	107	102	2.13	260/220	67	1.0
S-11	100	1606	1.30	75	309.58	109	102	2.05	260/220	66	0.5
	~~101.5~~	~~1607.5~~	~~1.395~~		~~310.845~~						
	~~101.5~~	1612	~~1.35~~	~~72~~	~~310.845~~	106	101	2.14	260/220	66	0.5
	105	1615	1.35	72	313.61	106	100	2.14	250/220	68	0.0
S-12	110	1620	1.15	72	317.66	108	101	1.82	250/215	64	0.0
	~~114~~	~~1624~~			~~320.733~~						
	~~114~~	~~1630~~	~~1.15~~	~~72~~	~~320.733~~	~~108~~	~~101~~	~~1.82~~	~~250/215~~	~~64~~	~~0.0~~
	115	1631	1.15	72	321.48	104	100	1.81	270/230	70	0.0
AVERAGE (TOTAL)	9			651	( )	175	920	18.24	2312/1980	608	3.7

SAMPLING TRAIN DATA

Company: EPA - TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: P-2
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.58
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 76
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.494\ T_m / T_s H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	
S-12	124	1637	1.20	72	325.96	105	100	1.89	265/220	64	0.0	
	123.5	1639			327.832							PUSH SHUT DOWN
	123.5	1644	1.20	75	327.832	104	99	1.88			0.0	RESTAR
	125	1646	1.20	75	328.96	104	99	1.88	270/230	69	0.0	
S-11	130	1651	1.30	75	332.73	105	99	2.04	270/225	65	0.0	
	132	1653			334.244							PUSH SHUT DOWN
	132	1658	1.30	75	334.244	102	98	2.03	270/225	65	0.0	RESTAR
	135	1701	1.30	76	336.59	102	98	2.03	265/230	68	0.0	
S-10	140	1706	1.35	76	340.40	105	98	2.11	265/225	65	0.0	
	142	1708			342.065							PUSH SHUT DOWN
	142	1712	1.35	76	342.065	101	97	2.10	265/225	65	0.0	RESTAR
	145	1715	1.30	76	344.43	103	98	2.03	275/230	68	0.0	
S-9	150	1720	1.25	76	348.35	105	98	1.96	275/225	65	0.0	
	152	1722			349.912							PUSH SHUT DOWN
	152	1727	1.25	75	349.912	102	98	1.96	275/225	65	0.0	RESTAR
	155	1730	1.25	75	352.19	103	98	1.96	280/235	69	0.0	
AVERAGE (TOTAL)			8	601	( )	830	785	15.9	2165/1820	533	0.0	

SAMPLING TRAIN DATA

Company: EPA-TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: P-2
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.58
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 76
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC 4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta M \leq .494 \, T_m / T_s \, H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S-8	160	1735	1.25	76	356.01	104	98	1.95	275/230	65	0.0
	~~164~~	~~1739~~			~~359.083~~						
	~~164~~	~~1744~~	~~1.25~~	~~76~~	~~359.083~~	~~101~~	~~97~~	~~1.95~~	~~275/240~~	~~70~~	~~0.0~~
	165	1745	1.25	76	359.84	101	97	1.95	275/240	70	0.0
S-7	170	1750	1.25	76	364.44	103	97	1.95	275/230	66	0.0
	175	1755	1.20	76	367.50	105	98	1.87	275/230	65	0.0
S-6	180	1800	1.25	75	371.28	106	98	1.87	275/230	65	0.0
	185	1805	1.25	75	375.04	106	98	1.96	275/230	64	0.0
S-5	190	1810	1.35	75	378.82	106	99	2.12	275/230	61	0.0
	195	1815	1.35	75	382.85	107	99	2.12	280/230	60	0.0
S-4	200	1820	1.40	75	386.85	108	99	2.20	285/225	60	0.0
	205	1825	1.40	73	391.78	108	99	2.20	285/230	60	0.0
S-3	210	1830	1.40	73	395.04	109	100	2.20	285/230	62	0.0
	215	1835	1.40	73	399.15	108	100	2.21	280/235	62	0.0
S-2	220	1840	1.25	73	403.27	108	100	1.98	280/235	61	0.0
AVERAGE (TOTAL) 13				471	( )	1379	1282	26.58	3626/3005	821	0.0

876.8 INIT
881.6

SAMPLING TRAIN DATA

Company: EPA- TASK 29
Source Designation: ESP OUTLET
Date: 5/11/77
Test Number: D-2
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.58
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 76
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 70
Nozzle Number: 7/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC 4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml): 114
Silica Gel Weight Gain (g): 74.8
Leak Rate .03 CFM at 15 "Hg

$\Delta m = 1.494\ T_m/T_s\ H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	225	1845	1.25	73	408.01	108	100	1.98	280/235	62	0.0
SH	230	1850	1.00	72	411.14	108	100	1.58	283/235	64	0.0
	235	1855	0.97	72	414.71	107	100	1.53	285/235	66	0.0
END	240	1900		~~72~~	418.164	~~106~~	~~100~~		~~285/240~~	~~68~~	~~0.0~~
				FINAL LEAK RATE = ___ @ ___ " Hg							
										NAW	
			3	217	188.198	323	300	5.09	845/105	192	0.0
AVERAGE (TOTAL)			96	3482 71.0	377.609 (373.87)	105.9	99.0	2.025	264.7/207.4	62.9	0.94

SILICA GEL 951.0 + 882.2
FINAL WTS:

Clayton Environmental Consultants, Inc.

96

5.14 70 ± 10

SAMPLING TRAIN DATA

Company: ~~ESP~~ EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: T. JULIEN, S. WALSH
Filter Number: A-102-2C
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NIL
Ambient Temperature (°F): 65
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 1/4, Dia. (in.): .251 (3/16 .1)
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%): 2
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .01 CFM at 15 "Hg

1/4" NOZZLE [4.521 $\frac{T_m}{T_s}$ H] 1.458 $\frac{T_m}{T_s}$ H FOR 3/16" NOZZLE

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F) 2	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) 3	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	AFT Col 4
W-1	0	9:18	1.10	70	420.163	84	82.5 81	5.09	255/195	62	12.5	55
	5	9:23	1.10	70	425.95	90	86 82	~~5.12~~ 4.70	245/190	60	12.6	5
W-2	10	9:28	1.45	70	431.80	97	90.5 84	~~6.80~~ 4.28	250/190	60	13.0	55
	~~15~~	~~9:33~~	~~1.45~~	~~70~~	~~437.375~~			~~6.50~~ 4.28			~~13.0~~	
	changed	to	3/16	nozzle								
W-2	15	9:37	1.40	76	437.375	96	91 86	2.12	200/190	60	6.5	
W-3	20	9:42	1.50	70	441.38	97	91.5 86	2.28	245/195	65	7.2	60
	25	9:47	1.50	70	445.47	100	93.5 87	2.25	255/200	64	7.4	6
W-4	30	9:52	1.55	70	449.64	102	95 88	2.34	255/200	64	7.5	7
	35	9:57	1.55	80	453.82	104	97 90	2.33	250/205	64	7.7	70
W-5	40	10:02	1.45	75	458.05	106	99 92	2.20	230/200	66	7.2	7
	45	10:07	1.40	75	462.19	107	99.5 92	2.13	245/200	66	7.1	7
W-6	50	10:12	1.35	75	466.29	108	101 94	2.06	255/205	66	6.5	7
	55	10:17	1.35	75	470.27	109	102 95	2.07	255/205	67	6.5	6
W-7	60	10:22	1.35	75	474.22	109	102.5 96	2.07	250/205	68	6.6	7
AVERAGE (TOTAL)	13			950	( )	1309	1153	35.96	3190/2380 12	832	108.3	78

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: T. JULIEN / S. WALSH
Filter Number: A-102-20
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: —
Ambient Temperature (°F): 65
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC 4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%): 2
Condensate Volume (ml): 113
Silica Gel Weight Gain (g): 82.7
Leak Rate _____ CFM at _____ "Hg

1.458 $\frac{T_m}{T_s}$ H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	
W-7	65	10:27	1.35	75	478.27	109	103 97	2.07	235/200	66	6.8	65
W-8 ~~[illegible]~~	70	10:32	1.30	70	482.15	110	104 98	2.02	250/205	64	6.5	65
	~~75~~	~~10:37~~			~~486.109~~	~~110~~	~~104 98~~					
		~~10:37~~	shut down to change elbow leak .023 at 15"									
~~W-8~~	~~75~~		in column									
W-8	75	10:52	1.30	70	486.47	100	98.5 97	2.00	260/230	70	6.4	65
W-9	80	10:57	1.30	70	490.36	102	99.5 97	2.00	250/220	65	6.3	65
	85	11:02	1.30	70	494.30	105	101 97	2.01	245/210	62	6.2	65
W-10	90	11:07	1.30	70	498.24	106	102 98	2.01	245/205	60	6.3	65
	95	11:12	1.30	70	502.20	106	101.3 97	2.01	240/200	61	6.2	65
W-11	100	11:17	1.25	65	506.16	107	102 97	1.95	240/200	61	6.0	65
	105	11:22	1.25	70	~~509~~ 510.06	107	102.5 98	1.93	245/200	62	6.0	65
W-12	110	11:27	1.05	70	513.97	107	98	1.62	240/200	62	5.0	60
	115	11:32	1.05	70	517.62	107	98	1.62	245/205	62	5.0	65
W-12	120	11:37	.95	70	521.20	108	103.5 99	1.47	205/190	62	4.5	60
	125	11:42	.98	70	524.68	107	103 99	1.52	245/200	62	4.5	65
			~~[illegible]~~									
AVERAGE (TOTAL)			13	910	(-.362)	1381	1270	24.23	3145/2665	819	75.7	835

328.1336772

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: T. JULIEN, S. WALSH
Filter Number: A-102-20
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: —
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. MAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%): 2
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

1.458 $\frac{T_m}{T_s}$ H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	Col
W-11	130	11:47	1.25	70	528.79	106	103.5 99	1.93	245/200	64	5.8	6
	135	11:52	1.25	65	531.78	107	103 99	1.95	250/200	64	5.8	6
W-10	140	11:57	1.25	70	535.66	108	104 100	1.94	250/200	64	5.6	7
	145	12:02	1.25	65	539.54	108	104 100	1.96	250/205	67	5.6	7
W-9	150	12:07	1.30	65	543.44	108	104 100	2.04	250/205	67	5.8	7
	155	12:12	1.25	65	547.42	109	100	1.96	252/205	66	5.5	7
W-8	160	12:17	1.30	65	551.3	110	105 100	2.04	255/205	66	5.8	7
	165	12:22	1.30	70	555.26	109	105 101	2.02	255/210	66	5.8	7
W-7	170	12:27	1.25	65	559.25	110	105.5 101	1.96	255/210	67	5.5	7
	175	12:32	1.30	65	563.15	110	101	2.04	255/210	68	5.8	7
W-6	180	12:37	1.35	65	567.10	110	105.5 101	2.12	252/210	67	5.9	7
	185	12:42	1.35	65	571.12	110	106 102	2.12	255/210	68	5.9	7
W-5	190	12:47	1.40	70	575.16	110	106 102	2.18	250/210	67	6.1	7
	195	12:52	1.45	65	579.29	110	106 102	2.28	250/210	66	6.3	7
W-4	180	12:57	1.50	65	583.52	111	106.5 102	2.36	250/210	66	6.5	7
	185	13:02	1.50	65	587.80	111	102	2.36	250/210	66	6.4	7
W-3	190	13:07	1.55	65	592.07	112	107 102	2.44	250/210	66	6.7	7
AVERAGE (TOTAL)			17	1125	( )	1859	1714	35.7	4262/3509	1125	100.8	11

451.2968894

SAMPLING TRAIN DATA

Company: ERA TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: T. JULIEN, S. WALSH
Filter Number: A-102-20
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O): _____
Stack Dimensions: 96"
Plume Appearance: —
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): .189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. BAC-4, Corr. Factor: 1.010
Meter Isokinetic Factor: _____
Assumed Moisture (%): 2
Condensate Volume (ml): _____
Silica Gel Weight Gain (g): _____
Leak Rate _____ CFM at _____ "Hg

1.458 TM +1

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	Col
W-3	13:12	195	1.50	65	596.44	112	107 102	2.36	250/210	66	6.3	70
W-2	200	13:17	1.45	65	600.73	112	107 102	2.28	250/210	66	6.2	70
	205	13:22	1.40	65	604.95	112	102	2.20	250/205	66	6.1	70
W-1	210	13:27	1.05	65	609.13	112	107.5 103	1.65	250/210	66	4.8	75
	215	13:32	1.10	65	612.84	111	107 103	1.73	250/215	70	5.0	75
END		13:37	~~1.10~~	~~65~~	616.535	~~111~~	~~103~~	~~1.73~~	~~250~~	~~70~~		~~75~~
			Leak rate =			.023		at 15"				
AVERAGE (TOTAL)			5	322	(-.3)	559	512	10.22	1250/1050	334	28.4	360

130.274 cfm

SAMPLING TRAIN DATA

Company: EPA - TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.) 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No RAC 4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate .023 CFM at 15 "Hg

1.458 Tm/Ts H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	CO
S-1	0	1356	0.92	68	616.835	102	100	1.42	280/240	81	3.8	8
	5	1401	0.92	68		102	100	1.42	280/240	81	3.8	7
S-2	10	1406	1.20	68	623.34	104	100	1.86	275/232	77	3.8	76
	15	1411	1.20	70	626.85	108	100	1.86	270/232	74	5.0	7
S-3	20	1416	1.35	70	630.61	110	100	2.09	265/228	69	5.2	75
	25	1421	1.35	70	634.49	112	101	2.10	265/225	66	5.2	75
S-4	30	1426	1.40	70	639.30	113	102	2.18	265/224	67	5.5	7
	35	1431	1.40	70	642.54	114	102	2.18	265/221	68	5.5	75
S-5	40	1436	1.40	71	646.64	116	104	2.19	265/220	66	5.5	7
	45	1441	1.40	71	650.74	117	104	2.19	265/219	66	5.5	7
S-6	50	1446	1.30	71	654.85	118	105	2.04	265/221	66	5.5	76
	55	1451	1.28	72	659.00	118	106	2.00	265/225	66	5.5	75
S-7	60	1456	1.25	71	662.82	119	106	1.96	265/225	65	5.0	7
	65	1501	1.25	71	666.77	119	106	1.96	265/222	66	5.0	7
S-8	70	1506	1.25	71	670.66	118	107	1.96	265/222	66	5.0	7
	75	1511	1.30	93	674.54	118	108	2.04	265/220	66	5.0	74
S-9	80	1516	1.30	71	678.47	118	107	2.04	265/220	66	5.0	71
AVERAGE (TOTAL)	17			1194	( )	1926	1758	33.49	4550/3533	1174	84.8	127

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: [illegible] / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 7/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAL4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

1.458 Tm/Ts H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	COL
S-9	85	1521	1.30	71	682.47	118	108	2.04	265/219	67	5.0	71
S-10	90	1526	1.30	71	686.46	120	108	2.05	265/218	69	5.5	75
	95	1531	1.30	72	690.44	119	109	2.04	265/218	69	5.5	75
S-11	100	1536	1.3	73	694.42 ~~690.44~~	119 ~~119~~	108 ~~109~~	2.04	~~265~~/217	70 ~~69~~	5.5	76
	~~104~~	~~1540~~			~~697.608~~							POSH SHUT DOW
~~S-10~~	~~104~~	~~1545~~	~~1.25~~	~~78~~	~~697.608~~	~~114~~	~~106~~	~~1.93~~	~~265/225~~	~~76~~	~~5.0~~	RESTA
	105	1546	1.25	78	698.48	114	106	1.93	265/	76	5.0	72
S-12	~~110~~	~~1551~~			~~702.294~~							POSH SHUT DOWN
	110	1556	1.10	80	702.294	110	105	1.68	275/210	79	5.0	RESTA 85
	115	1601	1.15	85	705.89	112	105	1.75	260/216	75	4.5	72
	~~118~~	~~1604~~			708.084							POSH SHUT DOWN
	~~118~~	~~1609~~	~~1.15~~	~~78~~	~~708.084~~	~~109~~	~~103~~	~~1.76~~	~~260/208~~	~~76~~	~~5.0~~	RESTA ~~72~~
S-12	120	1611	1.15	75	709.49	109	103	1.76	260/208	76	5.0	72
	125	1616	1.15	75	713.18	110	104	1.77	265/208	75	5.0	75
S-11	130	1621	1.35	73	716.87	112	104	2.10	270/212	73	5.0	71
	~~134~~	~~1625~~			~~719.948~~							POSH SHUT DOWN
	134	1630	1.35	73	719.948	110	103	2.09	280/215	79	5.5	RESTA 75
AVERAGE (TOTAL)	11			826	( )	1253	1163	21.25	~~2935~~ 2141 / 10	808	56.5	819

SAMPLING TRAIN DATA

Company: EPA-TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: WALSH/JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.458$ T_m/T_s H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	COL
S-10	140	1636	1.30	76	724.78	112	103	2.00	270/220	71	6.0	7
	145	1641	1.30	76	728.75	114	104	2.01	255/215	70	5.5	7
S-9	150	1646	1.30	73	732.66	115	104	2.02	255/212	70	5.5	75
	155	1651	1.35	73	736.59	116	104	2.10	255/212	70	5.5	7
S-8	160	1656	1.30	74	740.59	117	105	2.02	265/212	70	5.5	74
	~~163~~	~~1659~~			~~742.988~~							(PU SI OC
	~~163~~	~~1704~~	~~1.30~~	~~77~~	~~742.988~~	~~112~~	~~104~~	~~2.00~~	~~270/230~~	~~75~~	~~5.5~~	RE 75
	165	1706	1.30	77	744.57	112	104	2.00	270/230	75	5.5	75
S-7	170	1711	1.20	77	748.51	114	104	1.85	270/213	72	5.5	7
	~~174~~	~~1715~~			~~751.574~~							(PU SM 26
	174	1720	1.25	75	751.574	111	104	1.93	280/235	80	5.5	RE 75
S-6	180	1726	1.30	78	756.17	112	104	2.00	265/225	72	5.5	74
	185	1731	1.30	75	760.06	115	104	2.02	265/220	72	5.5	75
	~~186~~	~~1732~~			760.847							(PO SA OC
	~~186~~	~~1738~~	~~1.30~~	~~75~~	760.847	110	103	2.00	275/245	75	~~5.5~~	RE 75
S-5	190	1742	1.35	75	764.01	110	103	2.08	275/232	75	5.5	75
	195	1747	1.35	75	767.59	113	103	2.08	270/228	71	5.5	7
AVERAGE (TOTAL)	12			904	( )	1361	1249	24.11	3192/2654	868	66.5	89

SAMPLING TRAIN DATA

Company: EPA-TASK 29
Source Designation: ESP OUTLET
Date: 5/12/77
Test Number: P-3
Field Person: WALSH / JULIEN
Filter Number:
Barometric Pressure ("Hg): 29.56
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance: NONE
Ambient Temperature (°F): 80
Record all Data Every 5 Minutes

Filter Heater Setting: 100
Probe Heater Setting: 80
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

Δm = 1.458 Tm/Ts H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	Col
	~~197~~	~~1749~~			~~769.570~~							POSI SHUT DOWN
	~~197~~	~~1755~~	~~1.35~~	~~78~~	~~769.570~~	~~110~~	~~103~~	~~2.07~~	~~275/245~~	~~75~~	~~5.5~~	RES 78
S-4	200	1758	1.40	78	771.91	110	103	2.15	275/245	75	5.5	78
	205	1803	1.40	75	776.78	113	103	2.15	270/235	70	5.5	72
S-3	210	1808	1.30	70	780.04	118	104	2.04	270/235	70	5.5	73
	~~212~~	~~1810~~			~~781.614~~							POSI SHUT DOWN
	~~212~~	~~1814~~	~~1.35~~	~~80~~	~~781.614~~	~~110~~	~~103~~	~~2.06~~	~~275/236~~	~~75~~	~~5.5~~	RES 75
	215	1817	1.35	80	784.01	111	104	2.06	275/236	75	5.5	75
S-2	220	1822	1.15	78	787.98	112	104	1.77	270/232	71	5.5	73
	225	1827	1.20	75	791.69	114	104	1.86	270/234	72	5.5	73
S-1	230	1832	0.95	75	795.47	115	104	1.47	270/235	71	4.0	75
	235	1837	0.95	75	798.91	114	104	1.47	270/235	70	4.0	75
END	~~240~~	~~1842~~	~~0.95~~	~~75~~	802.288	~~115~~	~~105~~	~~1.47~~	~~270/235~~	~~70~~	~~4.0~~	~~75~~
					FINAL LEAK RATE = .02						@ 15" Hg	
											41.0	59
			8'	606		907	830	14.97	2170/1887	57		
AVERAGE (TOTAL)			96	71.3	385.278 (381.463)	109.9	100.5	2.083	257.3/214.1	68.1	5.854	70

SAMPLING TRAIN DATA

Company: EPA TASK 29 WISCONSIN STEEL ILL.
Source Designation: ESP OUTLET
Date: 5-13-77
Test Number: P-4 Pg 1
Field Person: SHP, TRJ, S W
Filter Number: A-102-24
Barometric Pressure ("Hg): 29.36
Stack Static Pressure ("H_2O): 0.00
Stack Dimensions: 96" ID
Plume Appearance: —
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting: 270
Probe Heater Setting: 270
Nozzle Number: 3/16, Dia. (in.): 0.189
Pitot Tube No. 18, Corr. Factor: 0.8395
Meter Box No. RPC-4, Corr. Factor: 1010
Meter Isokinetic Factor: 16 99
Assumed Moisture (%): 2.0 %
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0.01 CFM at (4) 15 "Hg

1.46 Tm/Ts H (2)

FB/ELBOW

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W	1	0	20:17	1.05	75	803.871	105	105	1.66	275/235	75	2.5
	1	5	20:22	1.1	75	807.46	104	104	1.73	275/235	75	2.5
STOP	1	7	20:24			808.918						
START	1	7	20:30	1.1	75	808.918	106	102	1.69	280/240	76	3.0
	2	10	20:33	1.4	75	811.13	106	102	2.15	280/240	76	3.5
	2	15	20:38	1.4	75	815.15	108	104	2.16	280/235	71	3.5
	3	20	20:43	1.5	75	819.17	110	104	2.32	285/230	70	3.5
STOP	3	23	20:46			821.685						
START	3	23	20:51	1.5	75	821.685	106	102	2.31	290/240	76	3.5
	3	25	20:53	1.5	75	823.45	106	102	2.31	290/245	76	3.5
	4	30	20:58	1.5	80	827.54	108	102	2.32	280/240	68	3.5
STOP	4	34	21:01			830.044						
START	4	34	21:06	1.5	80	830.044	105	101	2.28	285/240	70	3.5
	4	35	21:07	1.5	80	831.05	105	101	2.28	285/240	72	3.5
	5	40	21:12	1.4	70	835.86	106	100	2.17	280/240	68	3.5
	5	45	21:17	1.5	75	839.97	106	100	2.30	275/240	67	3.5
	6	50	21:22	1.35	75	843.07	107	101	2.07	275/235	66	3.5
	AVERAGE (TOTAL)			11	830	( )	1171	1125	23.47	3080/2615	784	36.5

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29 WISCONSIN STEEL
Source Designation: ESP OUTLET
Date: 5-13-77
Test Number: P-4 Pg 2
Field Person: [illegible], JRI, S W
Filter Number: A-102-24
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every 5 Minutes ②

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: , Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC 4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate CFM at "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) FB. / ELBOW ③	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	COL.
6	55	21:27	1.4	75	848.07	107	101	2.15	270/230	66	3.5	70
7	60	21:32	1.4	75	852.18	107	100	2.15	270/230	66	3.5	70
7	~~61~~	~~21:33~~			~~853.018~~							
7	~~61~~	~~21:~~	~~1.25~~	~~75~~	~~853.018~~	~~104~~	~~98~~	~~1.91~~	~~285/230~~	~~72~~	~~3.5~~	~~70~~
7	65	21:41	1.35	75	855.98	103	98	2.06	280/230	72	3.5	70
8	70	21:46	1.3	75	859.90	104	98	1.99	275/230	68	3.5	70
8	75	21:51	1.3	75	863.78	104	98	1.99	275/230	68	3.5	70
9	80	21:56	1.35	75	867.67	105	99	2.07	275/230	69	3.5	70
9	85	2:01	1.35	75	871.59	105	98	2.07	270/230	70	3.5	70
10	90	22:06	1.30	75	875.55	105	98	1.99	270/230	71	3.5	70
10	95	22:11	1.30	75	879.37	105	98	1.99	270/230	70	3.5	70
11	100	22:16	1.20	75	883.40	106	98	1.84	270/225	69	3.5	70
11	105	22:22	1.2	75	887.20	106	98	1.84	270/225	70	3.5	70
12	110	22:27	0.97	75	891.00	105	98	1.49	270/225	70	2.5	70
	115	2232	0.97	75	894.41	105	98	1.49	270/230	70	3.0	70
12	120	2237	0.97	~~70~~ 75	897.84	104	98	1.49	270/230	72	3.0	70
AVERAGE (TOTAL)			14	1050	( )	1471	1378	26.61	3805/3205	971	47.0	980

SAMPLING TRAIN DATA

Company: EPA-TASK 29 WISCONSIN STEEL
Source Designation: ESP OUTLET
Date: 5/13/77
Test Number: P-4 Pg 3
Field Person: WALSH/FLOOD/JULIEN
Filter Number: A-102-24
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: , Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate CFM at "Hg

$\Delta m = 1.46$ Tm/TS H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	CO
12	125	2242	0.97	70	901.25	104	98	1.50	270/230	72	3.0	7
11	130	2247	1.20	70	904.66	103	98	1.85	275/230	73	3.0	7
	135	2252	1.20	70	908.28	103	97	1.85	275/230	73	3.0	7
10	140	2257	1.30	70	912.05	103	97	2.00	275/230	70	3.0	7
	145	2302	1.30	70	915.92	103	97	2.00	275/230	68	3.0	70
9	150	2307	1.30	70	919.84	104	96	2.00	275/230	68	3.0	7
	155	2312	1.30	70	923.74	104	96	2.00	270/230	68	3.0	7
~~[illegible]~~	159 ~~160~~	2316 ~~2317~~			~~926.856~~							PU SH DO
	159	2322	1.30 ~~1.25~~	75	~~926.856~~	100	96	~~2.00~~	280/235	72	3.0	ST 7
8	160	2323	1.25	75	927.68	100	96	1.90	280/235	72	3.0	7
	~~163~~	~~2326~~			~~930.089~~							PUS SH DO
	~~163~~	~~2330~~	~~1.25~~	~~75~~	~~930.089~~	~~98~~	~~94~~	~~1.90~~	~~270/235~~	~~72~~	~~3.0~~	ST 7
	165	2332	1.30	75	931.52	98	94	1.97	270/235	72	3.0	7
7	170	2337	1.35	75	935.35	100	93	2.05	270/230	70	3.0	7
	175	2342	1.30	75	939.25	100	93	1.97	270/225	68	3.0	7
	~~177~~	~~2344~~			940.797							PUS SH DO
	177	2349	1.25	75	940.797	97	92	1.89	270/235	68	3.0	ST 7
AVERAGE (TOTAL)			11	790	( )	1122	1055	21.09	~~3000~~ 2535	774	33.0	7

SAMPLING TRAIN DATA

Company: EPA-TASK 29 WISCONSIN STEEL
Source Designation: ESP OUTLET
Date: 5/13/77
Test Number: P-4 Pg 4
Field Person: WALSH/FLOOD/JULIEN
Filter Number: A-102-24
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: , Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

$\Delta m = 1.46 T_m / T_s H$

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	CO
6	180	2352	1.35	75	943.13	97	92	2.04	270/235	~~68~~ 72	3.0	70
	185	2357	1.35	~~80~~	946.99	98	92		257/215	72	3.5	70
STOP	186	~~2358~~	~~1.35~~		947.778	94	90		~~257~~	~~72~~		
START 6	186	0002	1.35	75	947.778	94	90	2.03	257/230	72	3.5	70
5	190	0007	1.40	75	950.25	95	90	2.11	275/230	74	3.8	70
5	195	0012	1.45	75	954.23	97	90	2.19	270/225	72	4.0	70
				~~75~~		~~98~~	~~91~~					
STOP ~~4~~	~~200~~	~~0017~~			~~958.317~~							
START 4	200	0021	1.50	75	958.317	95	90	2.26	280/235	74	4.0	70
4	205	0026	1.45	75	962.46	96 93	90	2.18	270/230	77	4.0	70
3	210	0031	1.45	75	966.54	98 94	90	2.19	270/230	76	4.0	70
~~3~~	~~211~~	~~0032~~			~~967.354~~							
START 3	211	0036	1.50	75	967.354	95	90	2.26	275/235	78	4.0	70
3	215	0040	1.50	80	970.64	96	90	2.24	275/230	70	4.0	70
2	220	0045	1.35	75	974.80	97 935	90	2.04	270/225	73	3.4	60
~~2~~	~~223~~	~~0048~~			~~977.184~~							
~~2~~	~~223~~	~~0058~~	~~1.40~~	~~75~~	~~977.184~~	~~95~~	~~89~~	~~2.11~~	~~275/230~~	~~72~~	~~3.4~~	70
AVERAGE (TOTAL)			4	680	( )	869	814	17.25	2431/2055	1660	33.7	62

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5/13/77
Test Number: P-4 Ps 5
Field Person: JULIEN/WALSH/FLOOD
Filter Number: A-102-24
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions: 96"
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate ____ CFM at ____ "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	col
2	225	0055	1.35	75	978.87	95	89	2.02	275/230	72	3.4	70
2	230	0100	1.10	75	982.68	96 (95)	89	1.66	270/225	70	3.0	6.
1	235	0105	1.10	75	986.27	96 (93)	90	1.66	270/225	70	3.0	Cs
1	238	0108			988.393							
1	238	0107	1.10	75	988.393	94 (91.5)	89	1.66	275/225	70	3.0	6
	240				989.808							
					LEAK TEST							
AVERAGE (TOTAL)	3			225	(3.787)	287	288	5.34	815/680	212	9.4	20

LEAK TEST

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5-14-77
Test Number: P-4 Pg 6
Field Person: LPA, JRJ, S W
Filter Number:
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F): 70
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate ____ CFM at ____ "Hg

1.46 m/s H ② FB/ELBOW

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	Co
1	240	01:22	0.92	75	990.057	92	88	1.38	280/240	72	2.5	6
1	245	01:27	0.91	75	993.25	92	88	1.37	280/240	72	2.5	65
2	250	01:32	1.25	75	996.50	94	88	1.88	275/235	70	3.0	65
2	255	01:37	1.25	75	1000.23	96	88	1.88	275/235	70	3.0	65
STOP 2	~~259~~	~~01:41~~	~~R~~		~~1003.28~~							
2	~~259~~	~~01:46~~	~~1.25~~	~~75~~	~~1003.29~~	~~94~~	~~88~~	~~1.88~~	~~285/235~~	~~72~~	~~3.0~~	~~65~~
3	260	01:47	1.4	75	1003.99	94	88	2.11	285/235	72	3.5	70
3	265	01:52	1.35	75	1007.92	95	88	2.03	280/230	70	3.5	70
4	270	01:57	1.4	75	1011.82	96	88	2.11	270/230	70	3.5	65
4	275	02:02	1.35	75	1015.75	97	89	2.03	270/225	70	3.5	65
5	280	02:07	1.3	75	1019.62	98	90	1.96	270/225	70	3.5	65
5	285	02:12	1.4	75	1023.48	98	90	2.11	270/220	70	3.5	65
6	290	02:17	1.4	75	1027.55	98	90	2.11	270/220	68	3.5	70
6	295	02:22	1.35	75	1031.37	98	90	2.03	270/230	68	3.5	65
7	300	02:27	1.3	70	1035.27	99	90	2.00	270/235	67	3.5	65
7	305	02:32	1.3	70	1039.15	99	91	2.00	270/230	67	3.5	70
8	310	02:37	1.3	75	1043.05	99	91	1.99	270/225	65	3.5	70
AVERAGE (TOTAL)			1.3	1115	( )	1445	1337	28.99	4102/3459	1044	49.5	100

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5-14-77
Test Number: P-4 Pg 7
Field Person: WPA, JRS, S W
Filter Number:
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every _____ Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

1.46 Tm/75 H ②

FB/ELBOW ③

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	Co
8	315	02:42	1.3	75	1047.95	100	92	1.97	270/225	62	3.5	6
9	320	02:47	1.4	70	1050.81	100	92	2.14	270/225	61	3.5	6
9	325	02:52	1.4	70	1054.65	100	92	2.14	270/220	61	3.5	70
10	330	02:57	1.45	70	1058.83	100	92	2.22	270/220	61	3.5	70
10	335	03:02	1.4	70	1062.87	100	92	2.22	270/220	61	3.5	65
11	340	03:07	1.35	70	1066.91	100	92	2.07	270/220	62	3.5	65
STOP ~~11~~	~~344~~	~~03:11~~			~~1070.004~~	~~96~~	~~90~~					
START ~~11~~	~~344~~	~~03:16~~	~~1.35~~	~~75~~	~~1070.004~~	~~96~~	~~90~~	~~2.04~~	~~285/235~~	~~75~~	~~3.5~~	6
12	345	03:17	1.15	75	1070.79	96	90	1.73	285/235	75	3.0	65
STOP ~~12~~	~~349~~	~~03:21~~			1073.731							
START ~~12~~	~~349~~	~~0326~~	~~1.20~~	~~80~~	~~1073.731~~	~~92~~	~~90~~	~~1.79~~	~~285/235~~	~~66~~	~~3.0~~	70
12	350	0327	1.20	80	1074.46	92	90	1.79	285/235	66	3.0	70
12	355	0332	1.20	80	1078.14	94	89	1.79	285/230	60	3.0	70
12	360 ~~400~~	0337	1.15	75	1081.82	95	89	1.73	270/230	60	3.0	70
STOP ~~12~~	~~363~~	~~0340~~			~~1083.978~~							
START ~~12~~	~~363~~	~~0345~~	~~1.15~~	~~75~~	~~1083.978~~	~~92~~	~~89~~	~~1.73~~	~~280/230~~	~~64~~	~~3.0~~	70
12	365	0347	1.30	75	1085.43	92	89	1.95	280/230	64	3.0	70
AVERAGE (TOTAL)	11			110	( )	1069	999	21.75	3025/2490	693	36.0	95

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA-TASK 29 : WISCONSIN STEEL
Source Designation: ESP OUTLET
Date: 5/14/77
Test Number: P-4 PP8
Field Person: WALSH/FLOOD/JULIEN
Filter Number:
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F): 65
Record all Data Every 5 Minutes
$\Delta m = 1.46\ T_m/T_s H$

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: , Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate CFM at "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	CO
11	370	0352	1.30	75	1089.17	93	89	1.95	275/230	60	3.0	70
~~11~~	~~373~~	~~0355~~			~~1091.428~~							
~~11~~	~~373~~	~~0400~~	~~1.30~~	~~75~~	~~1091.428~~	~~92~~	~~88~~	~~1.95~~	~~280/230~~	~~64~~	~~3.0~~	~~65~~
11	375	0402	1.30	75	1092.98	92	88	1.95	280/230	64	3.0	65
10	380	0407	1.35	75	1096.83	94	88	2.03	270/215	60	3.0	70
10	385	0412	1.35	75	1100.67	95	88	2.03	270/215	60	3.0	65
~~9~~	~~390~~	~~0417~~	~~1.25~~	~~75~~	~~1104.536~~	~~96~~	~~88~~		~~280/215~~	~~64~~	~~3.0~~	~~65~~
9	390	0422	1.25	75	1104.536	96	88	1.88	280/215	64	3.0	65
9	395	0427	1.30	75	1108.32	93	88	1.95	275/225	64	3.0	70
~~9~~	~~399~~	~~0431~~			~~1111.363~~							
~~9~~	~~399~~	~~0436~~	~~1.30~~	~~75~~	~~1111.363~~	~~91~~	~~87~~	~~1.95~~	~~285/225~~	~~65~~	~~3.0~~	~~65~~
8	400	0437	1.25	75	1112.13	91	87	1.87	285/225	65	3.0	65
8	405	0442	1.30	75	1115.87	92	86	1.95	275/225	65	3.0	70
~~8~~ 7	~~409~~ 410	~~0447~~	~~1.25~~	~~80~~	~~1119.655~~	~~91~~	~~86~~	~~1.85~~	~~280/210~~	~~65~~	~~3.0~~	~~65~~
~~8~~ 7	~~404~~ 410	0452	1.25	80	1119.655	91	86	1.85	280/210	65	3.0	65
~~7~~ 9	~~410~~ 415	0457	1.25	80	1123.36	92	87	1.85	270/225	60	3.0	65
6	420	0502	1.35	80	1127.06	93	86	2.00	265/220	59	3.0	70
AVERAGE (TOTAL)			11	840	( )	1022	961	21.29	3025/2435	686	33.0	74

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 29
Source Designation: ESP OUTLET
Date: 5-14-77
Test Number: P-4 Pg 9
Field Person: TRT, TRJ, S W
Filter Number:
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.):
Pitot Tube No. 18, Corr. Factor: .8395
Meter Box No. RAC4, Corr. Factor: 1.010
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml): 132
Silica Gel Weight Gain (g): 94.0
Leak Rate ____ CFM at ____ "Hg

$\Delta m = 1.46 T_m / T_s H$

	Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F) FB/ELB	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)	Cor
STOP	~~6~~	~~425~~	~~05:07~~	~~1.3~~	~~75~~	~~1130.871~~	~~94~~	~~86~~					
START	6	425	05:12	1.3	75	1130.871	90	86	1.94	265/220	72	3.5	65
	5	430	05:17	1.35	80	1134.73	93	88	2.01	270/220	59	3.5	65
	5	435	05:22	1.35	75	1138.60	96	88	2.03	270/215	59	3.5	65
	4	440	0527	1.45	75	1142.46	97	88	2.19	270/220	58	3.5	70
	4	445	0532	1.45	75	1146.45	97	88	2.19	270/220	58	3.5	70
	3	450	0537	1.40	75	1150.50	98	88	2.11	275/220	56	3.5	65
	3	455	0542	1.40	70	1154.50	98	89	2.18	275/220	58	3.5	65
	2	460	0547	1.25	70	1158.47	97	89	1.90	270/220	55	3.5	65
STOP	~~2~~	~~462~~	~~0549~~			1160.050							
START	~~2~~	~~462~~	~~0554~~	1.20	75	1160.050	94	88	1.80	~~285/205~~	~~61~~	~~3.5~~	~~65~~
	2	465	0557	1.25	75	1162.26	92	88	1.88	280/230	60	3.0	65
	1	470	0602	0.94	75	1165.98	94	88	1.41	280/225	59	3.0	65
	1	475	0607	0.96	75	1169.40	93	87	1.44	280/225	60	3.0	65
END		480	0612			1172.681							
				11	80		1045	967	21.23	3010/2435	652	37	75
						FINAL LEAK RATE = 0.018 a					15	"Hg	
AVERAGE (TOTAL)				99	74.6	368.673 (365.023)	99.0	92.8	1.948	2740/228.2	67.4	3.28	70

Clayton Environmental Consultants, Inc.

DRY MOLECULAR WEIGHT DETERMINATION (M_d)

Plant: Wisconsin Steel EPA Test 29
Date: 5/10/77
Sampling Time (24-hour Clock): 14:00 - 1930
Sampling Location:: Outlet

Sample Type (bag, integrated, continuous)
Analytical Method: ORSAT
Ambient Temperature:
Operator: HANSON

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	0.0	<0.1	0.0	<0.1	0.0	<0.1	0	44/100	0
O_2 (Net is actual O_2 reading minus actual CO_2 reading)	20.7	20.7	20.7	20.7	20.7	20.7	20.7	32/100	6.624
CO (net is actual CO reading minus actual O_2 reading)	—	<0.1	—	<0.1	—	<0.1	<0.1	28/100	0
N_2 (Net is 100 minus actual CO reading)		79.3		79.3		79.3	79.3	28/100	22.204
								Total	28.828 = M_d

WET MOLECULAR WEIGHT DETERMINATION (M_s)

B_{wo} = Proportion by volume of water vapor in the gas stream

M_s = Molecular weight of stack gas (wet basis), lb/lb-mole = $M_d(1-B_{wo}) + 18(B_{wo})$

M_s = ( )(1-) + 18( ) =

$G_m = \frac{M_d}{28.96} = \frac{\quad}{28.96} =$, $G_s = \frac{M_s}{28.96} = \frac{\quad}{28.96} =$, $\frac{G_m}{G_s} = \frac{\quad}{\quad} =$

APPENDIX B

SECTION II PARTICULATE SAMPLING SUMMARY DATA

SAMPLING SUMMARY SHEET

Plant WISCONSIN STEEL DIVISION Location Chicago, Illinois

Sampled Source By-Product Coke-Oven Battery No. 4 Wet Electrostatic Precipitator Inlet

Run	Date	N_p	P_m	P_b	V_m	T_m	$V_{m_{std}}$	V_w	$V_{w_{gas}}$	%M	M_d
P-1	5-10-77	96	1.99	29.52	371.37	94.2	350.87	71.8	3.38	0.95	0.991
P-2	5-11-77	96	2.03	29.54	377.038	103.7	350.49	34.2	1.61	0.46	0.995
P-3	5-12-77	96	2.01	29.56	373.22	110.2	343.20	77.8	3.66	1.06	0.989
P-4	5-13-77	96	2.00	29.30	377.324	103.4	348.08	59.2	2.79	0.79	0.992

Run	MW_d	MW	P_{st}	P_s	C_p	$\sqrt{\Delta P_s X (T_s+460)^c}$	V_s	T_s	T_t	D_n	%I
P-1	28.8	28.7	-0.24	29.28	0.851	27.260	4100	78.4	480	0.1875	96.8
P-2	28.8	28.7	-0.24	29.30	0.851	27.727	4160	87.9	480	0.1875	96.6
P-3	28.8	28.7	-0.24	29.32	0.851	27.717	4160	91.8	480	0.1875	95.2
P-4	28.8	28.7	-0.24	29.06	0.851	28.236	4270	99.5	480	0.1875	96.7

$$V_{m_{std}} = \frac{17.65 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)}$$

$$V_{w_{gas}} = 0.0471 \times V_w$$

$$\% M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}}$$

$$M_d = \frac{100 - \% M}{100}$$

$$MW_d = (\%CO_2 \times \tfrac{44}{100}) + (\%O_2 \times \tfrac{32}{100}) + (\%CO + \%N_2) \times \tfrac{28}{100}$$

$$MW = MW_d \times M_d + 18 (1 - M_d)$$

$$P_s = P_b \pm P_{st}$$

$$V_s = 5128.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\%I = \frac{1,039 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

N_p Total No. of Sampling Points

P_m Average Orifice Pressure Drop, in. H_2O

P_b Barometric Pressure, in. Hg. Absolute

V_m Volume of Dry Gas at Meter Conditions, DCF

T_m Average Meter Temperature, °F

$V_{m_{std}}$ Volume of Dry Gas at STP, DSCF[a]

V_w Total H_2O Collected in Impingers and Silica Gel, ml

$V_{w_{gas}}$ Volume of Water Vapor Collected at STP, SCF[b]

% H % Moisture by Volume

M_d Mole Fraction of Dry Gas

$\% CO_2$ Volume % Dry

$\% O_2$ Volume % Dry

% CO Volume % Dry

$\% H_2$ Volume % Dry

MW_d Molecular Weight of Stack Gas, Dry Basis

MW Molecular Weight of Stack Gas, Wet Basis

P_{st} Static Pressure of Stack Gas, in. Hg

P_s Stack Gas Pressure, in. Hg Absolute

C_p Pitot Tube Coefficient

V_s Stack Gas Velocity at Stack Conditions, fpm.

T_s Average Stack Temperature °F

T_t Net Time of Test, Min.

D_n Sampling Nozzle Diameter, in.

% I Percent Isokinetic

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the

SAMPLING SUMMARY SHEET

Plant WISCONSIN STEEL DIVISION Location Chicago, Illinois

Sampled Source By-Product Coke-Oven Battery No. 4 Wet Electrostatic Precipitator Outlet

Run	Date	N_p	P_m	P_b	V_m	T_m	$V_{m_{std}}$	V_w	$V_{w_{gas}}$	%M	M_d
P-1	5-10-77	96	2.03	29.60	371.297	85.6	357.33	167.7	7.899	2.2	0.978
P-2	5-11-77	96	2.03	29.56	377.609	102.5	352.01	188.8	8.892	2.5	0.975
P-3	5-12-77	96	2.08	29.56	385.278	105.2	357.49	195.7	9.217	2.5	0.975
P-4	5-13-77	96	1.95	29.36	368.673	95.9	345.35	226.0	10.645	3.0	0.970

Run	MW_d	MW	P_{st}	P_s	C_p	$\sqrt{\Delta P_s X (T_s+460)^c}$	V_s	T_s	T_t	D_n	%I
P-1	28.8	28.6	-0.07	29.53	0.8395	26.028	3860	62.9	480	0.189	101
P-2	28.8	28.6	-0.07	29.49	0.8395	26.047	3860	71.0	480	0.189	101
P-3	28.8	28.6	-0.07	29.49	0.8395	26.102	3870	71.3	480	0.191	101
P-4	28.8	28.5	-0.07	29.29	0.8395	26.290	3900	74.6	480	0.189	100

$$V_{m_{std}} = \frac{17.65 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)}$$

$$V_{w_{gas}} = 0.0471 \times V_w$$

$$MW_d = (\%CO_2 \times \tfrac{44}{100}) + (\%O_2 \times \tfrac{32}{100}) + (\%CO + \%N_2) \times \tfrac{28}{100}$$

$$MW = MW_d \times M_d + 18 (1 - M_d)$$

$$P_s = P_b \pm P_{st}$$

$$V_s = 5128.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\%I = \frac{1.039 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

$$\%M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}}$$

$$M_d = \frac{100 - \%M}{100}$$

N_p Total No. of Sampling Points

P_m Average Orifice Pressure Drop, in. H_2O

P_b Barometric Pressure, in. Hg. Absolute

V_m Volume of Dry Gas at Meter Conditions, DCF

T_m Average Meter Temperature, °F

$V_{m_{std}}$ Volume of Dry Gas at STP, DSCF[a]

V_w Total H_2O Collected in Impingers and Silica Gel, ml

$V_{w_{gas}}$ Volume of Water Vapor Collected at STP, SCF[b]

%M % Moisture by Volume

M_d Mole Fraction of Dry Gas

$\%CO_2$ Volume % Dry

$\%O_2$ Volume % Dry

%CO Volume % Dry

$\%N_2$ Volume % Dry

MW_d Molecular Weight of Stack Gas, Dry Basis

MW Molecular Weight of Stack Gas, Wet Basis

P_{st} Static Pressure of Stack Gas, in. Hg

P_s Stack Gas Pressure, in. Hg Absolute

C_p Pitot Tube Coefficient

V_s Stack Gas Velocity at Stack Conditions, fpm.

T_s Average Stack Temperature °F

T_t Net Time of Test, Min.

D_n Sampling Nozzle Diameter, in.

%I Percent Isokinetic

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔP_s) and the absolute

TABLE B-1

SUMMARY OF EXHAUST GAS COMPOSITION
BY-PRODUCT COKE-OVEN BATTERY NO. 4
EMISSION TEST - WET ELECTROSTATIC PRECIPITATOR

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Sampling Location	1977 Date	Exhaust Gas Composition (Percent Dry Basis)			
		Carbon Dioxide	Oxygen	Carbon Monoxide	Nitrogen and Inerts
Inlet	5/11	<0.1	20.7	<0.1	79.3
Outlet	5/10	<0.1	20.7	<0.1	79.3

APPENDIX C

VISIBLE EMISSIONS

SECTION I SUMMARY OF AVERAGE OPACITY

SECTION II OPACITY OBSERVATIONS FIELD DATA SHEETS

APPENDIX C

SECTION I SUMMARY OF AVERAGE OPACITY

TABLE C-1

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-10-77
Type of Discharge: Stack
Height of Point of Discharge: 85 ft.
Wind Direction: NE
Color of Plume: Clear
Observer No.: 1
Type of Plant: Steel Mill
Location of Discharge: Between two ESP's
Description of Sky: Clear
Wind Velocity: 5-10 mph
Detached Plume: No
Duration of Observation: 5 hours
Distance from Observer to Discharge Point: 125 feet
Direction of Observer from Discharge Point: 90° East of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Blue sky

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	08:00	08:05	0<S<35[a]	0.8	21	10:05	10:10	0	0
2	08:06	08:11	0<S<5	0.1	22	10:11	10:16	0	0
3	08:12	08:17	0<S<10	0.2	23	10:17	10:22	0<S<5	0.1
4	08:18	08:23	0	0	24	10:23	10:28	0	0
5	08:24	08:29	0<S<5	0.1	25	10:29	10:34	0	0
6	08:30	08:35	0<S<5	0.1	26	10:35	10:40	0<S<5	0.1
7	08:36	08:41	0<S<5	0.1	27	10:41	10:46	0<S<5	0.1
8	08:42	08:47	0	0	28	10:47	10:52	0	0
9	08:48	08:53	0<S<5	0.1	29	10:53	10:58	0<S<5	0.1
10	08:54	08:59	0<S<10	0.2	30	10:59	11:04	0	0
11	09:00	09:05	0	0	31	11:05	11:10	0	0
12	09:06	09:11	0	0	32	11:11	11:16	0<S<5	0.1
13	09:12	09:17	0<S<5	0.1	33	11:17	11:22	0	0
14	09:18	09:23	0	0	34	11:23	11:28	0	0
15	09:24	09:29	0<S<5	0.1	35	11:29	11:34	0	0
16	09:30	09:35	0<S<5	0.1	36	11:35	11:40	0	0
17	09:36	09:41	0	0	37	11:41	11:46	0	0
18	09:42	09:47	0	0	38	11:47	11:52	0<S<5	0.1
19	09:48	09:53	0	0	39	11:53	11:58	0	0
20	09:54	09:59	0<S<5	0.1	40	11:59	12:04	0<S<5	0.1

[a] For opacities which were read as less than 5 and greater than 0, an "N" was recorded. This created a range for the sun. The six minute average was calculated on the midpoint of the range.

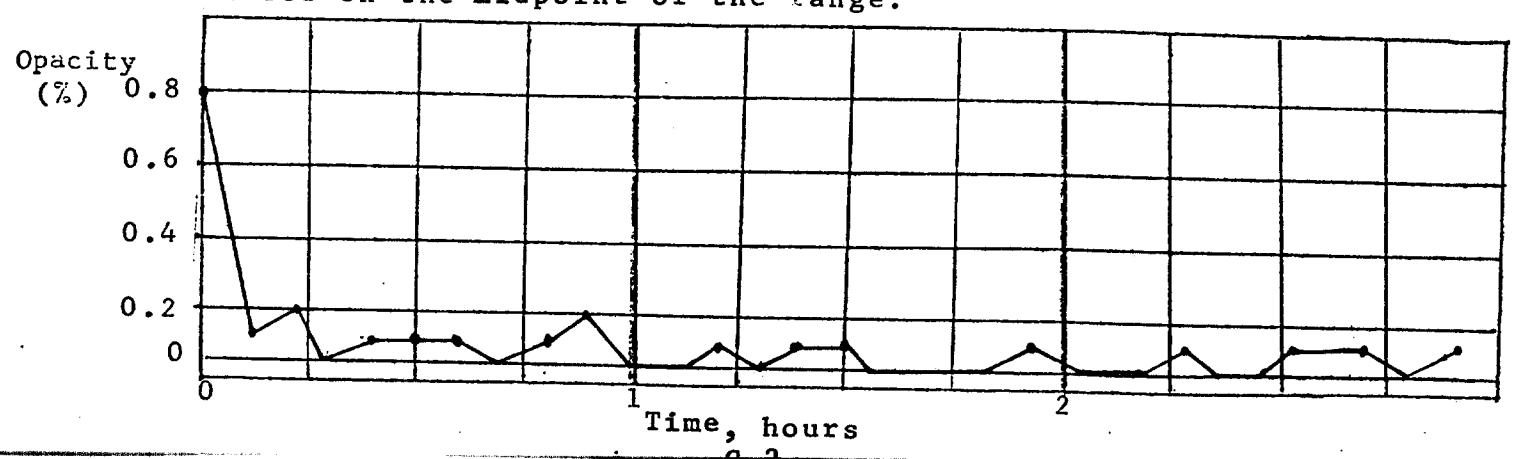


TABLE C-1 Continued

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-10-77
Type of Plant: Steel Mill
Type of Discharge: Stack
Location of Discharge: Between two ESP's
Height of Point of Discharge: 85 ft.
Description of Sky: Clear
Wind Direction: NE
Wind Velocity: 5-10 mph
Color of Plume: Clear
Detached Plume: No
Observer No.: 1
Duration of Observation: 5 hours
Distance from Observer to Discharge Point: 125 feet
Direction of Observer from Discharge Point: 90° East of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Blue sky

SUMMARY OF AVERAGE OPACITY									
Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	12:05	12:05	0	0	21				
2	12:11	12:16	0	0	22				
3	12:17	12:22	0<S<5	0.1	23				
4	12:23	12:28	0<S<5	0.1	24				
5	12:29	12:34	0<S<15	0.6	25				
6	12:35	12:40	0	0	26				
7	12:41	12:46	0	0	27				
8	12:47	12:52	0	0	28				
9	12:53	12:58	0	0	29				
10	12:59	13:04	0	0	30				
11	13:05	13:10	0	0	31				
12	13:11	13:16	0	0	32				
13	13:17	13:22	0	0	33				
14	13:23	13:28	0	0	34				
15	13:29	13:34	0	0	35				
16	13:35	13:40	0	0	36				
17	13:41	13:46	0<S<5	0.1	37				
18	13:47	13:52	0	0	38				
19	13:53	13:58	0	0	39				
20	13:59	13:59	0	0	40				

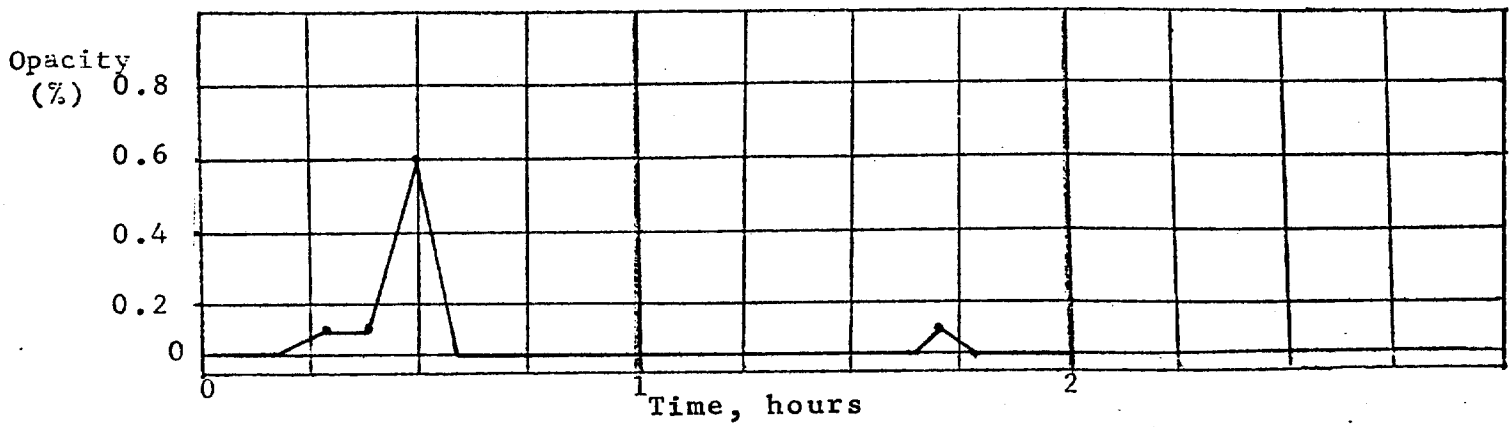


TABLE C-2

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-10-77
Type of Discharge: Stack
Height of Point of Discharge: 85 ft.
Wind Direction: NE
Color of Plume: Clear
Observer No.: 1
Type of Plant: Steel Mill
Location of Discharge: Between two ESP's
Description of Sky: Clear
Wind Velocity: 5-10 mph
Detached Plume: No
Duration of Observation: 3 hrs. 50 min.
Distance from Observer to Discharge Point: 175 feet
Direction of Observer from Discharge Point: 140° South of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Blue sky

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	14:10	14:15	0	0	21	16:21	16:26	0	0
2	14:16	14:21	0	0	22	16:27	16:32	0	0
3	14:22	14:27	0	0	23	16:33	16:38	0	0
4	14:28	14:33	0	0	24	16:39	16:44	0	0
5	14:34	14:39	0	0	25	16:45	16:50	0	0
6	14:40	14:45	0	0	26	16:51	16:56	0<S<5	0.1
7	14:46	14:51	0	0	27	16:57	17:02	0	0
8	14:52	14:57	0	0	28	17:03	17:08	0	0
9	14:58	15:03	0	0	29	17:09	17:14	0	0
10	15:04	15:09	0	0	30	17:15	17:20	0	0
11	15:10	15:15	0	0	31	17:21	17:26	0	0
12	15:16	15:21	0	0	32	17:27	17:32	0	0
13	15:22	15:27	0	0	33	17:33	17:38	0	0
14	15:28	15:33	0	0	34	17:39	17:44	0	0
15	15:34	15:39	0	0	35	17:45	17:50	0	0
16	15:40	15:45	0	0	36	17:51	17:56	0	0
17	15:46	15:51	0	0	37	17:57	17:59	0	0
18	15:52	15:57	0	0	38				
19	15:58	16:03	0	0	39				
20	16:04	16:09	0	0	40				

Sketch Showing How Opacity Varied With Time:

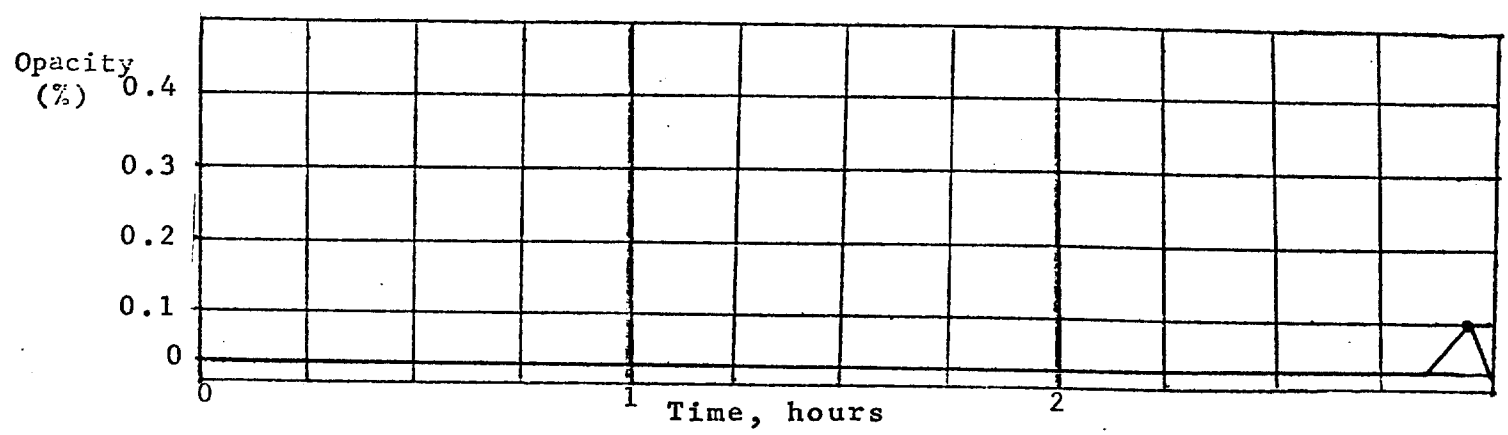


TABLE C-3

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-11-77
Type of Plant: Steel Mill
Type of Discharge: Stack
Location of Discharge: Between two ESP's
Height of Point of Discharge: 85 ft.
Description of Sky: Partly Cloudy
Wind Direction: NE
Wind Velocity: 5-10 mph
Color of Plume: Clear
Detached Plume: No
Observer No.: 1
Duration of Observation: 4 hours 10 min.
Distance from Observer to Discharge Point: 125 feet
Direction of Observer from Discharge Point: 90° East of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Partly cloudy

SUMMARY OF AVERAGE OPACITY									
Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	10:00	10:05	0	0	21	12:11	12:16	0	0
2	10:06	10:11	0	0	22	12:17	12:22	0	0
3	10:12	10:17	0	0	23	12:23	12:28	0	0
4	10:18	10:23	0	0	24	12:29	12:34	0	0
5	10:24	10:29	0	0	25	12:35	12:40	0	0
6	10:30	10:35	0	0	26	12:41	12:46	0	0
7	10:36	10:41	0	0	27	12:47	12:52	0	0
8	10:42	10:47	0	0	28	12:53	12:58	0	0
9	10:48	10:53	0	0	29	12:59	13:04	0	0
10	10:54	10:59	0	0	30	13:05	13:10	0	0
11	11:00	11:05	0	0	31	13:11	13:16	0	0
12	11:06	11:11	0	0	32	13:17	13:22	0	0
13	11:12	11:17	0	0	33	13:23	13:28	0	0
14	11:18	11:23	0	0	34	13:29	13:34	0	0
15	11:24	11:29	0	0	35	13:35	13:40	0	0
16	11:30	11:35	0	0	36	13:41	13:46	0	0
17	11:36	11:41	0	0	37	13:47	13:52	0	0
18	11:42	11:47	0	0	38	13:53	13:58	0	0
19	11:48	11:53	0	0	39	13:59	14:04	0	0
20	11:54	11:59	0	0	40	14:05	14:10	0	0

Sketch Showing How Opacity Varied With Time:

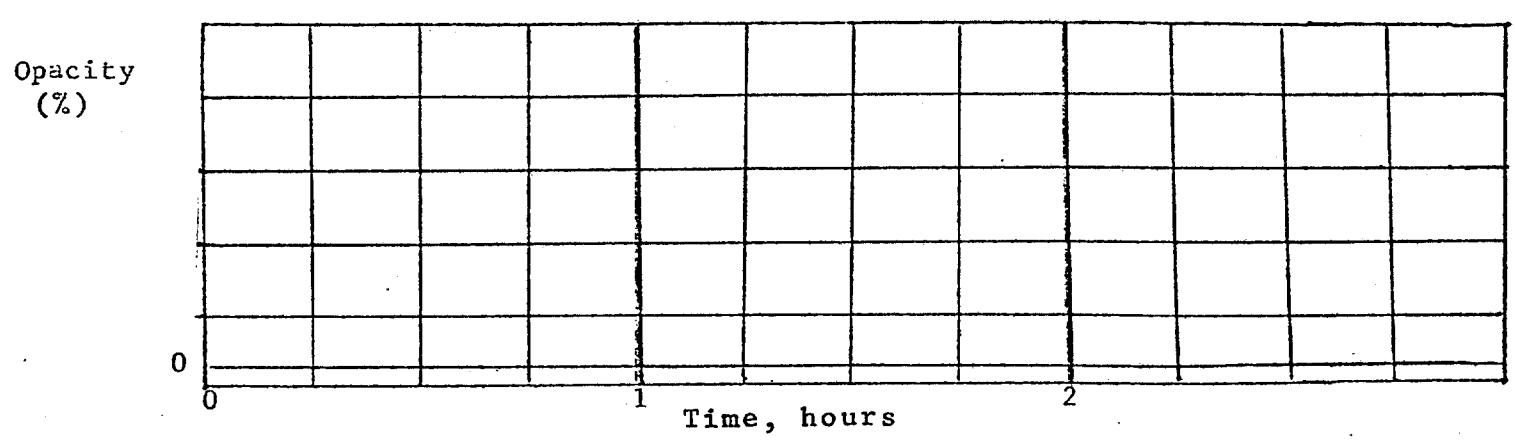


TABLE C-4

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-11-77
Type of Discharge: Stack
Height of Point of Discharge: 85 ft.
Wind Direction: NE
Color of Plume: Clear
Observer No.: 1
Type of Plant: Steel Mill
Location of Discharge: Between two ESP's
Description of Sky: Partly Cloudy
Wind Velocity: 5-10 mph
Detached Plume: No
Duration of Observation: 3 hours 35 min.
Distance from Observer to Discharge Point: 175 feet
Direction of Observer from Discharge Point: 140° South of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Hazy

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	14:25	14:30	0	0	21	16:25	16:30	0	0
2	14:31	14:36	0	0	22	16:31	16:36	0	0
3	14:37	14:42	0	0	23	16:37	16:42	0	0
4	14:43	14:48	0	0	24	16:43	16:48	0	0
5	14:49	14:54	0	0	25	16:49	16:54	0	0
6	14:55	15:00	0	0	26	16:55	16:59	0	0
7	15:01	15:06	0	0	27	17:10	17:15	0	0
8	15:07	15:12	0	0	28	17:16	17:21	0	0
9	15:13	15:18	0	0	29	17:22	17:27	0	0
10	15:19	15:24	0	0	30	17:28	17:33	0	0
11	15:25	15:30	0	0	31	17:34	17:39	0	0
12	15:31	15:36	0	0	32	17:40	17:45	0	0
13	15:37	15:42	0	0	33	17:46	17:51	0	0
14	15:43	15:48	0	0	34	17:52	17:57	0	0
15	15:49	15:54	0	0	35	17:58	17:59	0	0
16	15:55	16:00	0	0	36				
17	16:01	16:06	0	0	37				
18	16:07	16:12	0	0	38				
19	16:13	16:18	0	0	39				
20	16:19	16:24	0	0	40				

Sketch Showing How Opacity Varied With Time:

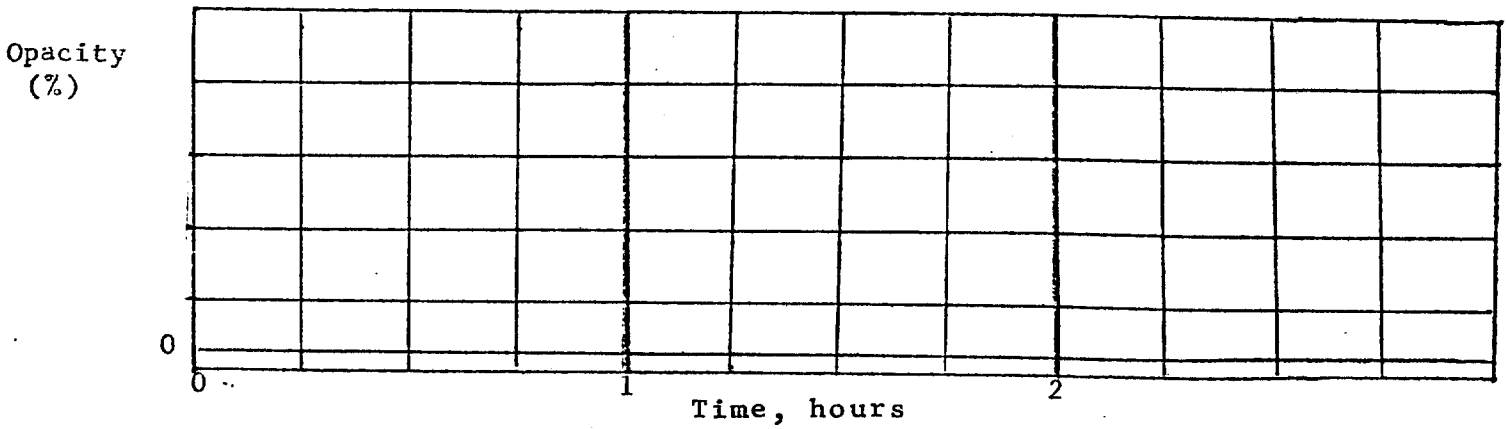


TABLE C-5

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-12-77
Type of Plant: Steel Mill
Type of Discharge: Stack
Location of Discharge: Between two ESP's
Height of Point of Discharge: 85 ft.
Description of Sky: Partly Cloudy
Wind Direction: NE
Wind Velocity: 5-10 mph
Color of Plume: Clear
Detached Plume: No
Observer No.: 1
Duration of Observation: 4 hours 30 min.
Distance from Observer to Discharge Point: 125 feet
Direction of Observer from Discharge Point: 90° East of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Partly Cloudy

SUMMARY OF AVERAGE OPACITY									
Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	09:00	09:05	0	0	21	11:10	11:15	0	0
2	09:06	09:11	0	0	22	11:16	11:21	0	0
3	09:12	09:17	0	0	23	11:22	11:27	0	0
4	09:18	09:23	0	0	24	11:28	11:33	0	0
5	09:24	09:29	0	0	25	11:34	11:39	0	0
6	09:30	09:35	0	0	26	11:40	11:45	0	0
7	09:36	09:41	0	0	27	11:46	11:51	0	0
8	09:42	09:47	0	0	28	11:52	11:57	0	0
9	09:48	09:53	0	0	29	11:58	12:03	0	0
10	09:54	09:59	0	0	30	12:04	12:09	0	0
11	10:00	10:05	0	0	31	12:10	12:15	0	0
12	10:06	10:11	0	0	32	12:16	12:21	0	0
13	10:12	10:17	0	0	33	12:22	12:27	0	0
14	10:18	10:23	0	0	34	12:28	12:33	0	0
15	10:24	10:29	0	0	35	12:34	12:39	0	0
16	10:30	10:35	0	0	36	12:40	12:45	0	0
17	10:36	10:41	0	0	37	12:46	12:51	0	0
18	10:42	10:47	0	0	38	12:52	12:57	0	0
19	10:48	10:53	0	0	39	12:58	13:03	0	0
20	10:54	10:59	0	0	40	13:04	13:09	0	0

Sketch Showing How Opacity Varied With Time:

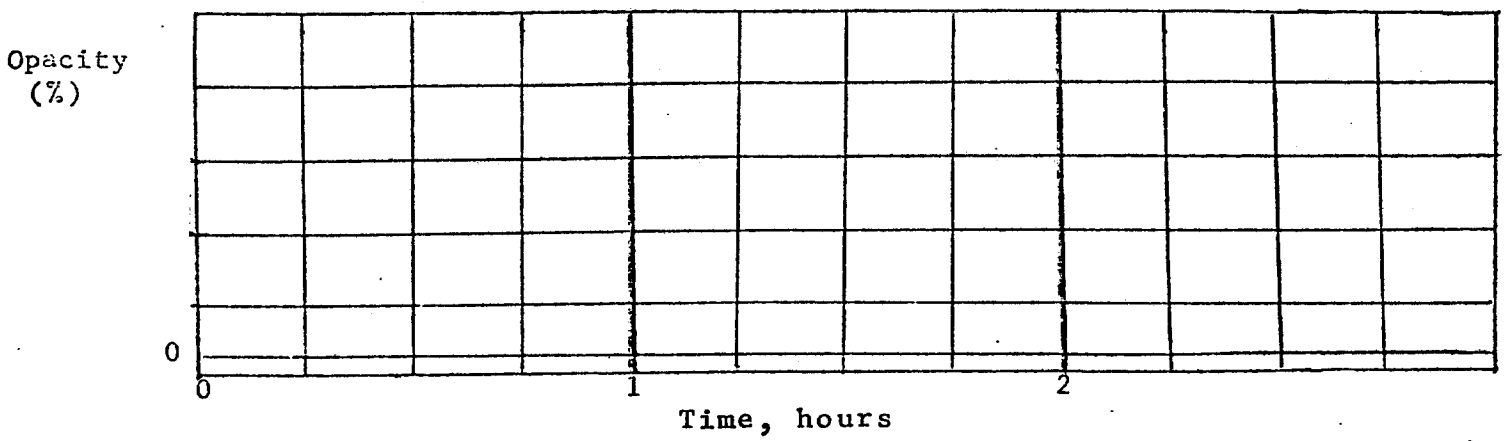


TABLE C—5 Continued

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-12-77
Type of Plant: Steel Mill
Type of Discharge: Stack
Location of Discharge: Between two ESP's
Height of Point of Discharge: 85 ft.
Description of Sky: Partly Cloudy
Wind Direction: NE
Wind Velocity: 5-10 mph
Color of Plume: Clear
Detached Plume: No
Observer No.: 1
Duration of Observation: 4 hours 30 min.
Distance from Observer to Discharge Point: 125 feet
Direction of Observer from Discharge Point: 90° East of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Partly Cloudy

SUMMARY OF AVERAGE OPACITY									
Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	13:10	13:15	0	0	21				
2	13:16	13:21	0	0	22				
3	13:22	13:27	0	0	23				
4	13:28	13:29	0	0	24				
5					25				
6					26				
7					27				
8					28				
9					29				
10					30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

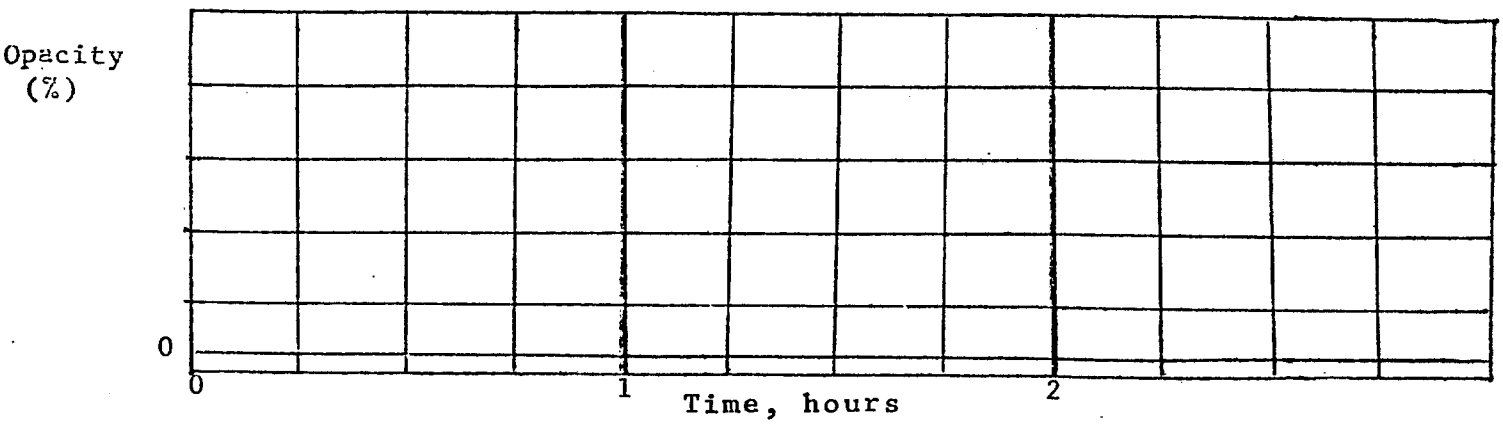


TABLE C—6

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-12-77
Type of Plant: Steel Mill
Type of Discharge: Stack
Location of Discharge: Between two ESP's
Height of Point of Discharge: 85 ft.
Description of Sky: Partly Cloudy
Wind Direction: NE
Wind Velocity: 5-10 mph
Color of Plume: Clear
Detached Plume: No
Observer No.: 1
Duration of Observation: 5 hours 18 min.
Distance from Observer to Discharge Point: 175 feet
Direction of Observer from Discharge Point: 140° South of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Partly Cloudy

SUMMARY OF AVERAGE OPACITY									
Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	13:42	13:47	0	0	21	15:46	15:51	20	0.8
2	13:48	13:53	0	0	22	15:52	15:57	30<S<40	1.5
3	13:54	13:59	0	0	23	15:58	16:03	0	0
4	14:00	14:05	0	0	24	16:04	16:09	45<S<60	2.2
5	14:06	14:11	0	0	25	16:10	16:15	0	0
6	14:12	14:14	0	0	26	16:16	16:21	0	0
7	14:17	14:22	0	0	27	16:22	16:27	15<S<30	0.9
8	14:23	14:28	0	0	28	16:28	16:33	0	0
9	14:29	14:34	0	0	29	16:34	16:39	0	0
10	14:35	14:40	0	0	30	16:40	16:45	0	0
11	14:41	14:46	0	0	31	16:46	16:51	0	0
12	14:47	14:52	0	0	32	16:52	16:57	0	0
13	14:53	14:58	0	0	33	16:58	17:03	15<S<25	0.8
14	14:59	15:04	0	0	34	17:04	17:09	0	0
15	15:05	15:10	0	0	35	17:10	17:15	0	0
16	15:11	15:16	0	0	36	17:16	17:21	0	0
17	15:17	15:22	0	0	37	17:22	17:27	0	0
18	15:23	15:28	0	0	38	17:28	17:33	5<S<30	0.7
19	15:29	15:29	0	0	39	17:34	17:39	0	0
20	15:40	15:45	0	0	40	17:40	17:45	0	0

Sketch Showing How Opacity Varied With Time:

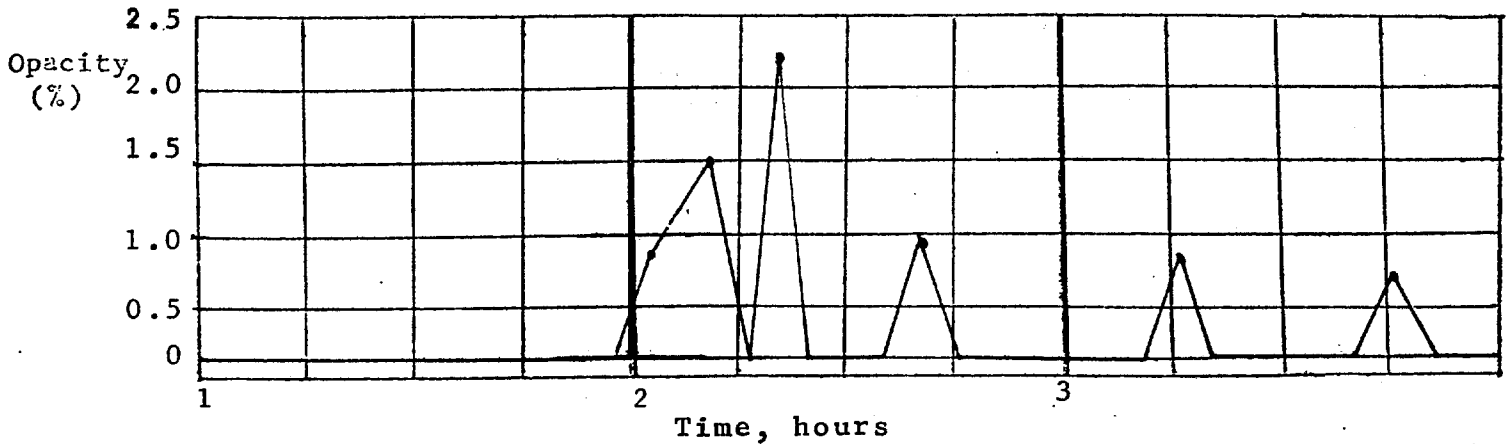


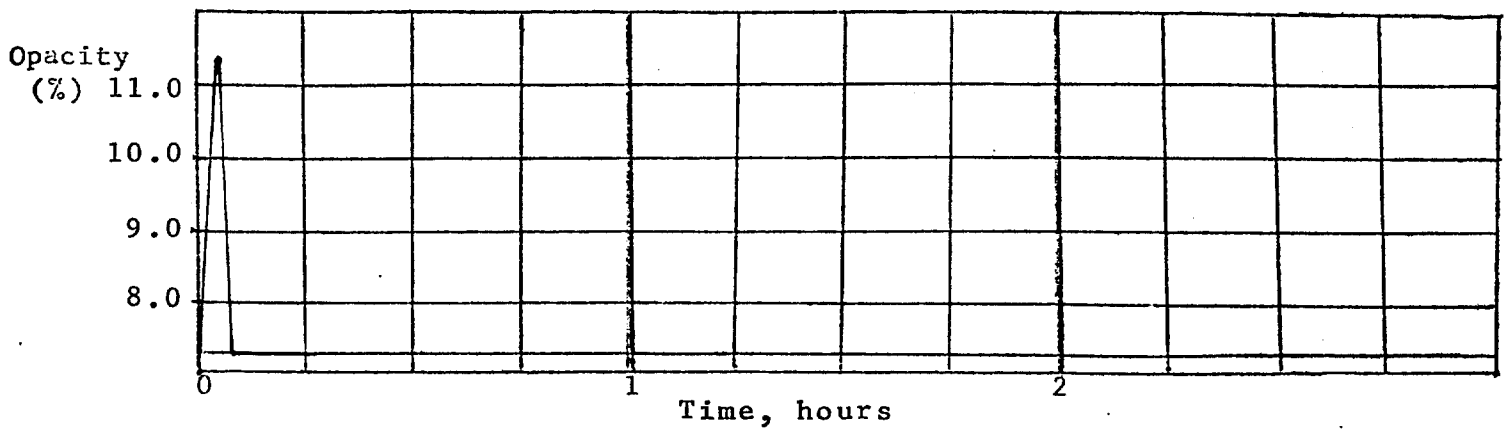
TABLE C-6 Continued

SUMMARY OF VISIBLE EMISSIONS
WISCONSIN STEEL DIVISION
International Harvester
Chicago, Illinois
May 10-13, 1977

Date: 5-12-77
Type of Plant: Steel Mill
Type of Discharge: Stack
Location of Discharge: Between two ESP's
Height of Point of Discharge: 85 ft.
Description of Sky: Partly Cloudy
Wind Direction: NE
Wind Velocity: 5-10 mph
Color of Plume: Clear
Detached Plume: No
Observer No.: 1
Duration of Observation: 5 hours 18 min.
Distance from Observer to Discharge Point: 175 feet
Direction of Observer from Discharge Point: 140° South of Stack Outlet
Height of Observation Point: 70 feet above ground
Description of Background: Partly Cloudy

SUMMARY OF AVERAGE OPACITY									
Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	17:46	17:46	0	0	21				
2	17:49	17:50	90	11.3	22				
3	17:52	17:57	0	0	23				
4	17:58	17:59	0	0	24				
5					25				
6					26				
7					27				
8					28				
9					29				
10					30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:



APPENDIX C

SECTION II OPACITY OBSERVATIONS FIELD DATA SHEETS

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant STEEL MILL EPA TASK 29 Date 5-10-77

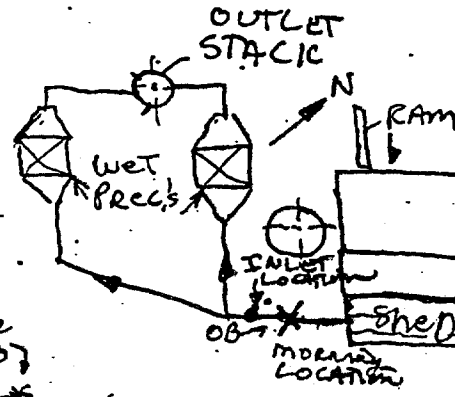
Company Name WIS. STEEL. Hours of Observation ≈ 10 HR'S

Plant Address CALUMET ILL. Observer GEORGE M. SANTORI

Type of Discharge (STACK) OTHER _____

Discharge Location BETWEEN TWO ELECTROSTATICS

Height of Point of Discharge ≈85 FT. FROM GR. LINE.



Observer's Location:

Distance to Discharge Point ≈125 FT FOR #1, ≈175 FT FOR #2

Height of Observation Point ≈ 70 FT ABOVE GR. LINE

Direction from Discharge Point ≈ 90° EAST OF STACK OUTLET

Background Description BLUE SKY

Weather: (Clear) Overcast Partly Cloudy Other _____ Color _____

Wind Direction N-E Wind Velocity 5-10 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black White Other Clear

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible ≈ 10 FT

Summary of Observations:

Opacity	Aggregate Time @ Opacity		Opacity	Aggregate Time @ Opacity
0	min.	sec.	55	
5			60	
10			65	
15			70	
20			75	
25			80	
30			85	
35			90	
40			95	
45			100	
50				

RECORD OF VISIBLE EMISSIONS

Company Name WIS. STL.

Date 5-10-77

Plant Address CALUMET

Observer GEORGE M. SANDRIL

Stack Location

Observer's Location ≈ 90° EAST OF STACK

Weather Conditions CLEAR

START TIME 8:00 AM

HR	MIN	SECONDS 00	15	30	45
	00	N	N	N	N
	01	0	0	0	0
	02	0	0	0	0
	03	0	N	N	0
	04	0	N	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	N
	10	0	0	0	0
	11	0	0	0	0
	12	0	N	N	0
	13	0	0	0	0
	14	0	0	0	0
	15	0	0	0	0
	16	0	0	0	0
	17	0	0	0	0
	18	0	0	0	0
	19	0	0	0	0
	20	0	0	0	0
	21	0	0	0	0
	22	0	0	0	0
	23	0	0	0	0
	24	0	0	0	0
	25	0	0	0	0
	26	0	0	0	0
	27	0	0	0	N
	28	0	0	0	0
	29	0	0	0	0

COMMENTS

"N" DENOTES READINGS BETWEEN 0 & 5

RECORD OF VISIBLE EMISSIONS

Company Name WIS, STL.

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILLA

Stack Location

Observer's Location ≈ 90° EAST OF STAK OUTLET

Weather Conditions CLEAR

TIME 8:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	O	O	O	O	
	31	O	O	N	O	
	32	O	O	O	O	
	33	O	O	O	O	
	34	O	O	O	O	
	35	O	O	O	O	
	36	O	O	O	O	
	37	O	O	O	O	
	38	O	O	O	O	
	39	O	O	O	O	
	40	O	O	O	O	
	41	N	O	O	O	
	42	O	O	O	O	
	43	O	O	O	O	
	44	O	O	O	O	
	45	O	O	O	O	
	46	O	O	O	O	
	47	O	O	O	O	
	48	O	O	O	N	
	49	O	O	O	O	
	50	O	O	O	O	
	51	O	O	O	O	
	52	O	O	O	O	
	53	O	O	O	O	
	54	O	O	O	O	
	55	O	O	O	O	
	56	O	O	O	O	
	57	O	O	O	O	
	58	O	O	N	N	
	59	O	O	O	O	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STL

Plant Address CALUMET ILL

Stack Location

Weather Conditions CLEAR

Date 5-10-77

Observer GEORGE M. SANTORILLA

Observer's Location ≈ 90° EAST OF STACK

TIME 9:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	N	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	N	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

VISIBLE EMISSIONS

Company Name WISCONSIN STL.

Plant Address CALUMET ILL.

Stack Location

Weather Conditions Clear

Date 5-10-77

Observer GEORGE M. SANTORILLA

Observer's Location ≈ 90° EAST OF STACK OUTLET

TIME 9:30

HR	MIN	SECONDS 00	15	30	45
	30	0	0	0	0
	31	0	0	0	0
	32	N	0	0	0
	33	0	0	0	0
	34	0	0	0	0
	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	N	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

COMMENTS

"N" DENOTES READINGS BETWEEN 0 & 5

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILLA

Stack Location

Observer's Location ≈ 90° EAST OF STACK

Weather Conditions CLEAR

TIME 10:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					STOP READINGS FOR BREAK
	31					"
	32					"
	33					"
	34					"
	35	0	0	0	0	START at 10:05 1st TEST Approx.
	36	0	0	0	0	this time.
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	N	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILL

Stack Location

Observer's Location ≈90° EAST OF STACK OUTLET

Weather Conditions CLEAR

TIME 10:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	N	0	
	41	N	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	N	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	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILL

Stack Location

Observer's Location ~90° EAST OF STACK OUTLE

Weather Conditions CLEAR

TIME 11:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	N	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions CLEAR

Date 6-10-77

Observer GEORGE M. SANTORICA

Observer's Location ≈ 90° EAST OF STACK OUTLET

TIME 11:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	N	
	52	0	0	0	G	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-10-77

Plant Address CALUMET ILL. Observer GEORGE M. SANDRILLI

Stack Location

Weather Conditions CLEAR Observer's Location ≈ 90° EAST OF OUTLET STACK

TIME 12:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	N	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36					STOPED READINGS FOR BREAK
	37					" " " "
	38					" " " "
	39					" " " "
	40					" " " "
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	N	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	N	
	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	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN ILL.

Date 5-10-77

Plant Address CALUMET

Observer GEORGE M. SANTORILLA

Stack Location

Weather Conditions CLEAR

Observer's Location ≈90° EAST OF OUTLET STACK

TIME 12:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	N	0	
	32	0	0	0	N	
	33	0	0	0	0	
	34	0	0	N	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILL

Stack Location

Observer's Location ~90° EAST OF OUTLET STACK

Weather Conditions CLEAR

TIME 1:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTURILL

Stack Location

Observer's Location ≈ 90° EAST OF OUTLE STACK

Weather Conditions CLOAK

TIME 1:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	N	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILLA

Stack Location

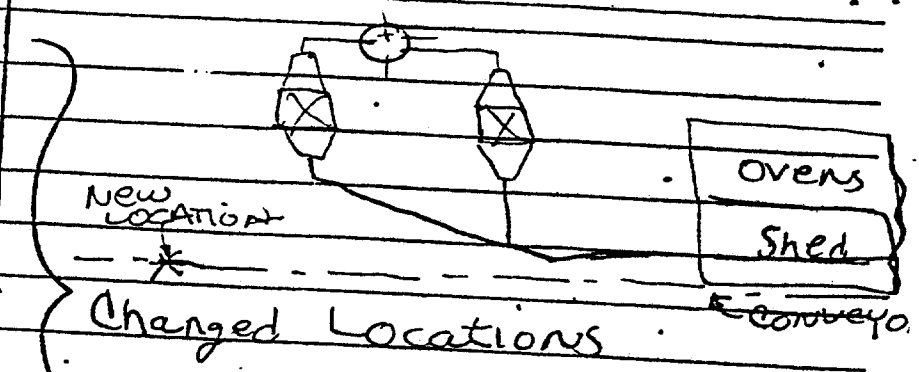
Observer's Location ≈140° SOUTH OF STACK OUTLET

Weather Conditions CLEAR

TIME 2:00

HR	MIN	SECONDS 00	15	30	45
	30				
	31				
	32				
	33				
	34				
	35				
	36				
	37				
	38				
	39				
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS



RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 6-10-77

Plant Address CALUMET ILL

Observer GEORGE M. SANTORILL

Stack Location

Observer's Location ≈ 140° SOUTH OF OUT STACK

Weather Conditions CLEAR

TIME 2:30

HR	MIN	SECONDS 00	15	30	45
	30	0	0	0	0
	31	0	0	0	0
	32	0	0	0	0
	33	0	0	0	0
	34	0	0	0	0
	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-10-77

Plant Address CALUMET ILL Observer GEORGE M. SAMORILL

Stack Location

Weather Conditions CLEAR Observer's Location ≈140° SOUTH OF STACK

TIME 3:00 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	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	
	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	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions CLEAR

Date 5-10-77

Observer GEORGE M. SANTORI

Observer's Location ≈140' SOUTH OF STACK OUTLET

TIME 3:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-10-77

Plant Address CALUMET ILL. Observer GEORGE M. SANDERS

Stack Location

Weather Conditions Clear Observer's Location ≈140' SOUTH OF OUTLET STACK

TIME 4:00 pm

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	STOP FOR BREAK
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Wisconsin Steel

Date 5-10-77

Plant Address Calumet Ill.

Observer George M. Santori

Stack Location

Observer's Location ≈140° South of outlet Stack

Weather Conditions Clear

TIME 4:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	N	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET

Observer GEORGE M. SANTORIU

Stack Location

Observer's Location ≈ 140° SOUTH OF OU STACK

Weather Conditions Clear

TIME 5:00 PM

HR	MIN	SECONDS 00	15	30	45
	30	0	0	0	0
	31	0	0	0	0
	32	0	0	0	0
	33	0	0	0	0
	34	0	0	0	0
	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS

I AM GETTING SOME INTERFERENCE OFF OF COKE OVENS, ONLY FOR SHORT PERIODS OF TIME THOUGH.

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-10-77

Plant Address CALUMET

Observer GEORGE M. SAMORIL

Stack Location

Observer's Location ≈140° SOUTH OF STACK OUTLET

Weather Conditions CLEAR

TIME 5:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	FINISH at 6:00

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COKE OVENS Date 6-11-77

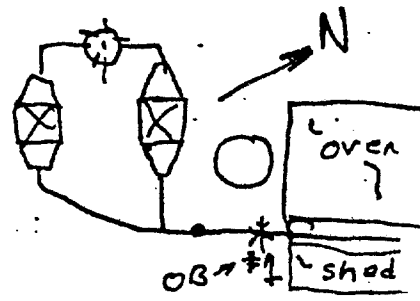
Company Name WISCONSIN STEEL WORKS Hours of Observation ≈8 hrs

Plant Address CALUMET Observer GEORGE M. SANTORII

Type of Discharge (STACK) OTHER _____

Discharge Location BETWEEN TWO ELECTROSTATICS PRECIPITATORS

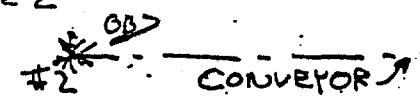
Height of Point of Discharge ≈ 85 FT FROM GROUNDLINE



Observer's Location:

Distance to Discharge Point ≈ 125 FT FT FOR #1; 175 FT FOR #2

Height of Observation Point _____



Direction from Discharge Point ≈ 90° EAST OF STACK OUTLET

Background Description PARTLY CLOUDY — SKY

Weather: Clear Overcast (Partly Cloudy) Other _____ Color _____

Wind Direction N-E Wind Velocity 5-10 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black White Other Clear

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible ≈ 10 FT

Summary of Observations:

Opacity	Aggregate Time @ Opacity		Opacity	Aggregate Time @ Opacity
0	min.	sec.	55	
5			60	
10			65	
15			70	
20			75	
25			80	
30			85	
35			90	
40			95	
45			100	
50				

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions PT. CLOUDY

Date 5-11-77

Observer GEORGE M. CANTARILLA

Observer's Location ≈ 90° EAST OF STACK OUTLET

START TIME 10:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	2ND TEST READINGS
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET ILL

Observer GEORGE M. SANTORILLY

Stack Location

Observer's Location ~~90~~ 90° EAST OF OUTLET STACK

Weather Conditions PT. CLOUDY

TIME 10:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET ILL.

Observer CHARLES M. SANTORILL

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ~90° EAST OF OUTLET STACK

TIME 11:00 AM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 6-11-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILLA

Stack Location

Observer's Location ~90° EAST OF STACK OUTLET

Weather Conditions PT. CLOUDY

TIME 11:30 AM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 6-11-71

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILL

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location

TIME 12:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					BREAK FROM READINGS
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILLA

Stack Location

Observer's Location ~90° EAST OF STACK OUTLET

Weather Conditions PT. CLOUDY

TIME 12:30

HR	MIN	SECONDS 00	15	30	45
	30	0	0	0	0
	31	0	0	0	0
	32	0	0	0	0
	33	0	0	0	0
	34	0	0	0	0
	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 6-11-77

Plant Address CALUMET ILL.

Observer GEORGE M. SAMORILL

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ~90° EAST OF STACK OUTLET

TIME 1:00 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	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	
	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	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANDRILLA

Stack Location

Observer's Location ~90° EAST OF STACK OUTLET

Weather Conditions PT. CLOUDY

TIME 1:30 PM

HR	MIN	SECONDS 00	15	30	45
	30	0	0	0	0
	31	0	0	0	0
	32	0	0	0	0
	33	0	0	0	0
	34	0	0	0	0
	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS

SEEING A BACKGROUND HAZE REAL SLIGHT LOOKS LIKE IT WON'T CLEAR UP. BUT CAN STILL READ OPACITIES

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions PT. CLOUDY

Date 5-11-77

Observer GEORGE M. SANTORILL

Observer's Location ~90° EAST OF STACK OUTLET

TIME 2:00 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	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	
	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	
	11	0				Changed Location, to #2
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25	0	0	0	0	BACKGROUND STILL SLIGHTLY HAZY
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET ILL

Observer GEORGE M. SANTORILLA

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ~140° SOUTH OF STACK OUTLET

TIME 2:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	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	(CAN'T SEE ~~DOWNTOWN~~ CHICAGO, LOOKS
	35	0	0	0	0	BAD FROM HERE)
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant _____ Date _____

Company Name _____ Hours of Observation _____

Plant Address _____ Observer _____

Type of Discharge STACK OTHER _____

Discharge Location _____

Height of Point of Discharge _____

Observer's Location:

Distance to Discharge Point _____

Height of Observation Point _____

Direction from Discharge Point _____

Background Description _____

Weather: Clear Overcast Partly Cloudy Other _____ Color _____

Wind Direction _____ Wind Velocity _____ mi/hr

Plume Description:

Detached: Yes No

Color: Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

Summary of Observations:

Opacity	Aggregate Time @ Opacity		Opacity	Aggregate Time @ Opacity
0	min.	sec.	55	
5			60	
10			65	
15			70	
20			75	
25			80	
30			85	
35			90	
40			95	
45			100	
50				

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET

Observer George M. SARTORELLI

Stack Location

Observer's Location

Weather Conditions PT. CLOUDY

TIME 3:00 pm

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 6-11-77

Plant Address CALUMET ILL

Observer George M. Santorica

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ~140' SOUTH OF OUTLET STACK

TIME 3:30 PM

HR	MIN	SECONDS 00	15	30	45
	30	0	0	0	0
	31	0	0	0	0
	32	0	0	0	0
	33	0	0	0	0
	34	0	0	0	0
	35	0	0	0	0
	36	0	0	0	0
	37	0	0	0	0
	38	0	0	0	0
	39	0	0	0	0
	40	0	0	0	0
	41	0	0	0	0
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 6-11-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORILL

Stack Location

Observer's Location ~ 140° SOUTH OF STACK OUTLET

Weather Conditions CLEAR

TIME 4:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	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	STILL CAN'T SEE CHICAGO!
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-11-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORULLA

Stack Location

Observer's Location ~ 140° SOUTH OF OUTLET STACK

Weather Conditions Clear

TIME 4:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions clear

Date 5-11-77

Observer George M. SANTORILL

Observer's Location ~140° SOUTH OF OUR STACK

TIME 5:00

HR	MIN	00	15	30	45	COMMENTS
	30					BREAK FROM READINGS
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-11-77

Plant Address CALUMET ILL. Observer GEORGE M. SANTORILL

Stack Location

Weather Conditions Clear Observer's Location ~140' SOUTH OF OUTLET STACK

TIME 5:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	Finish 6:00

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COKE OVENS

Date 5-12-77

Company Name WISCONSIN STEEL

Hours of Observation

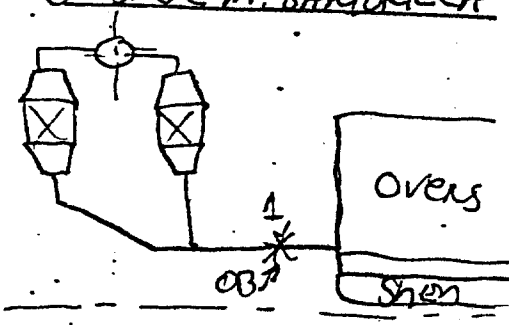
Plant Address CALUMET ILL

Observer GEORGE M. SANTORILLA

Type of Discharge (STACK) OTHER

Discharge Location BETWEEN TWO ELECTROSTATIC PRECIPITATORS

Height of Point of Discharge ≈ 85FT FROM GR. LINE



Observer's Location:

Distance to Discharge Point ≈ 125 FT FOR #1, ≈ 175 FT FOR #2

Height of Observation Point

Direction from Discharge Point ≈ #1 90° EAST OF STACK OUTLET, #2 ≈ 140° SOUTH OF STACK OUTLET

Background Description PT. CLOUDY — SKY

Weather: Clear Overcast (Partly Cloudy) Other Color

Wind Direction N-E Wind Velocity 5-10 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black White Other Clear

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other

Estimated Distance Plume Visible ≈ 10 FT

Summary of Observations:

Opacity	Aggregate Time @ Opacity		Opacity	Aggregate Time @ Opacity
0	min.	sec.	55	
5			60	
10			65	
15			70	
20			75	
25			80	
30			85	
35			90	
40			95	
45			100	
50				

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANDRILL

Stack Location

Observer's Location ≈90° EAST OF STACK OUTLET

Weather Conditions PT. CLOUDY

TIME 9:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	00	0	0	0	0	3RD. TEST READINGS
	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	
	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	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	TEST STARTED
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORI

Stack Location

Observer's Location ~90° EAST OF STACK OUTLET

Weather Conditions PT. CLOUDY

TIME 9:30 AM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 6-12-77

Plant Address CALUMET ILL. Observer GEORGE M. SANTORI

Stack Location Observer's Location ≈90° EAST OF STAC OUTLET

Weather Conditions PT. CLOUDY

TIME 10:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions PT. CLOUDY

Date 5-12-77

Observer GEORGE M. SANTORIL

Observer's Location ≈ 90° EAST OF STA OUTLET

TIME 10:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-12-77

Plant Address CALUMET ILL. Observer GEORGE M. SANTORILL

Stack Location Observer's Location ≈ 90° EAST OF STAC OUTLET

Weather Conditions PT. CLOUDY

TIME 11:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					BREAK FROM READINGS
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORI

Stack Location

Observer's Location ≈90° EAST OF STA OUTLET

Weather Conditions PT. CLOUDY

TIME 11:30 AM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	Some BACKground Fumes
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions PT. CLOUDY

Date 5-12-77

Observer GEORGE M. SANTORILL

Observer's Location ≈ 90° EAST OF STACK OUTLET

TIME 12:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL

Stack Location

Weather Conditions PT. CLOUDY

Date 5-12-77

Observer GEORGE M. SANTORI

Observer's Location ≈ 90' EAST OF OUTLET STACK

TIME 12:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Plant Address CALUMET ILL.

Stack Location

Weather Conditions PT. CLOUDY

Date 5-12-77

Observer GEORGE M. SANTORI

Observer's Location ≈ 90' EAST OF OUTLET STACK

TIME 1:00 pm

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL

Observer GEORGE M. SANTORI

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ~140° SOUTH OF OUTLET STACK

TIME 1:30

HR	MIN	SECONDS 00	15	30	45
	30				
	31				
	32				
	33				
	34				
	35				
	36				
	37				
	38				
	39				
	40				
	41				
	42	0	0	0	0
	43	0	0	0	0
	44	0	0	0	0
	45	0	0	0	0
	46	0	0	0	0
	47	0	0	0	0
	48	0	0	0	0
	49	0	0	0	0
	50	0	0	0	0
	51	0	0	0	0
	52	0	0	0	0
	53	0	0	0	0
	54	0	0	0	0
	55	0	0	0	0
	56	0	0	0	0
	57	0	0	0	0
	58	0	0	0	0
	59	0	0	0	0

COMMENTS

MOVED TO #2 LOCATION (PORT change)

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORIC

Stack Location

Observer's Location ≈ 140° South of STA OUTLET

Weather Conditions PT. CLOUDY

TIME 2:00 pm

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	–	–	–	–	WIND IS KICKING UP DUST
	46	–	–	–	–	CANNOT READ STACK
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANDRILL

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ≈140' SOUTH OF OUTLET STACK

TIME 2:30

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-12-77

Plant Address CALUMET ILL. Observer GEORGE M. SANDRILL

Stack Location Observer's Location ≈140° SOUTH OF OUTLET STACK

Weather Conditions PT. CLOUDY

TIME 3:00

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-12-77

Plant Address CALUMET ILL. Observer GEORGE M. SANTOK

Stack Location _____ Observer's Location ≈140° SOUTH OF OUTLET STACK

Weather Conditions PT. CLOUDY

TIME 3:30 PM.

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	Ø				BRAKE FROM READING
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40	0	0	0	0	Comming OUT OF Shed prety BAD (where Doors ARE) (Not push)
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	Push
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	10	10	Real BAD push Comming OUT OF The Shed Doors BOTH SIDES.
	52	10	10	5	5	
	53	N	N	0	0	push
	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	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANDRILL

Stack Location

Weather Conditions PT. CLOUDY

Observer's Location ≈ 140° SOUTH OF OUTLET STACK

TIME 4:00 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	N	10	10	
	35	10	5	5	5	Another BAD push. Realy comes OUT OF TOP OF Shed DOORS (NOT A Real good Seal)
	36	N	N	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	When the Quench CAR OPENS DOORS TO Discharge COKE, IT ALSO LOOKS BAD.
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	N	5	5	BAD one
	56	5	N	N	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL

Date 5-12-77

Plant Address CALUMET ILL.

Observer GEORGE M. SANTORI

Stack Location

Observer's Location ≈140° SOUTH OF OUT STACK

Weather Conditions PT. CLOUDY

TIME 4:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	5	5	5	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-12-77.

Plant Address CALUMET ILL. Observer GEORGE M. SANTORILLA

Stack Location

Weather Conditions PT. CLOUDY Observer's Location ≈ 140° SOUTH OF OUTLET STACK

TIME 5:00 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	N	N	O	O	
	31	O	O	O	O	Push
	32	O	O	O	O	
	33	O	O	O	O	
	34	O	O	O	O	
	35	O	O	O	O	
	36	O	O	O	O	
	37	O	O	O	O	
	38	O	O	O	O	
	39	O	O	O	O	
	40	O	O	O	O	
	41	O	O	O	O	
	42	O	O	O	O	
	43	O	O	O	O	
	44	O	O	O	O	
	45	O	O	O	O	
	46	O	O	O	O	Good push
	47	O	O	O	O	
	48	O	O	O	O	
	49	O	O	O	O	
	50	O	O	O	O	
	51	O	O	O	O	
	52	O	O	O	O	
	53	O	O	O	O	
	54	O	O	O	O	
	55	O	O	O	O	
	56	O	O	O	O	
	57	O	O	O	O	
	58	O	O	O	O	
	59	O	O	O	O	

RECORD OF VISIBLE EMISSIONS

Company Name WISCONSIN STEEL Date 5-12-77

Plant Address CALUMET Observer GEORGE M. SANTORIL

Stack Location

Weather Conditions PT. CLOUDY Observer's Location ≈ 140° SOUTH OF OUTLET STACK

TIME 5:30 PM

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	N	N	
	33	5	N	N	N	FAIRLY BAD PUSH
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	—	—	—	GITTING INTERFERENCE FROM
	48	—	—	—	—	ANOTHER MILL NEARBY
	49	10	20	20	10	REALY BAD PUSH!!
	50	10	10	5	5	
	51	N	—	—	—	SHED EMMISIONS - CANNOT READ OUTLET STACK
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	FINISH 6:00 PM

APPENDIX D

SAMPLING LOGS

1. Particulate Test Inlet Outlet
2. Integrated Bag
3. Visible Emissions
4. Water Samples
5. Coke Charging And Pushing Times

Inlet Run 1

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 10, 1977

Plant Location Chicago, Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	1	Inlet Port D	Part.	10:03	11:23	80	
Switched Ports	1			11:23	11:25		
Continued sampling	1	Inlet Port E	Part.	11:25	11:30	5	
Stopped to work on equipment	1			11:30	11:53		
Continued sampling	1	Inlet Port E	Part	11:53	13:08	75	
Switched Ports	1			13:08	13:14		
Continued sampling	1	Inlet Port F	Part.	13:14	14:34	80	
Switched Ports	1			14:34	14:43		
Continued sampling	1	Inlet Port A	Part.	14:43	15:42	59	
Pushing coke - sampling stopped	1			15:42	15:48		
Continued sampling	1	Inlet Port A	Part.	15:48	15:52	4	
Pushing coke -	1			15:52	15:56		
Continued sampling	1	Inlet Port A	Part	15:56	16:05	9	
Pushing coke -	1			16:05	16:11		
Continued sampling	1	Inlet Port A	Part	16:11	16:19	8	
Switched ports	1			16:19	16:22		
Continued sampling	1	Inlet Port B	Part	16:22	16:27	5	
Pushing coke -	1			16:27	16:33		
Continued sampling	1	Inlet Port B	Part	16:33	16:40	7	
Pushing coke -	1			16:40	16:46		
Continued sampling	1	Inlet Port B	Part.	16:46	16:50	4	
Pushing coke -	1			16:50	16:55		
Continued sampling	1	Inlet Port B	Part.	16:55	17:02	7	
Pushing coke -	1			17:02	17:08		

continued Inlet Run 1

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 10, 1977

Plant Location Chicago Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	1	Inlet Port B	Part.	17:08	17:16	8	
Pushing coke — stopped sampling	1			17:16	17:21		
Continued sampling	1	Inlet Port B	Part.	17:21	17:30	9	
Pushing coke —	1			17:30	17:35		
Continued sampling	1	Inlet Port B	Part.	17:35	17:45	10	
Pushing coke —	1			17:45	17:50		
Continued sampling	1	Inlet Port B	Part.	17:50	18:20	30	
Switched ports	1			18:20	18:22		
Continued sampling	1	Inlet Port C	Part.	18:22	19:18	56	
Pushing coke —	1			19:18	19:24		
Continued sampling	1	Inlet Port C	Part.	19:24	19:27	3	
Pushing coke —	1			19:27	19:32		
Continued sampling	1	Inlet Port C	Part.	19:32	19:39	7	
Pushing coke —	1			19:39	19:44		
Continued sampling	1	Inlet Port C	Part.	19:44	19:52	8	
Pushing coke —	1			19:52	19:56		
Continued sampling	1	Inlet Port C	Part.	19:56	2002	6	
Completed sampling run	1			2002	Total time	480 min	

Inlet Beam

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 11, 1977

Plant Location Chicago Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	2	Inlet Port A	Part.	10:01	11:21	80	
Switched ports	2			11:21	11:24		
Continued sampling	2	Inlet Port B	Part.	11:24	12:44	80	
Switched ports	2			12:44	12:48		
Continued sampling	2	Inlet Port C	Part.	12:48	14:08	80	
Switched ports	2			14:08	14:16		
Continued sampling	2	Inlet Port D	Part.	14:16	15:36	80	
Switched ports	2			15:36	15:39		
Pushing coke	2			15:39	15:44		
Continued sampling	2	Inlet Port E	Part.	15:44	15:50	6	
Pushing coke –	2			15:50	15:55		
Continued sampling	2	Inlet Port E	Part.	15:55	16:07	12	
Pushing coke –	2			16:07	16:12		
Continued sampling	2	Inlet Port E	Part.	16:12	16:24	12	
Pushing coke –	2			16:24	16:29		
Continued sampling	2	Inlet Port E	Part.	16:29	16:39	10	
Pushing coke –	2			16:39	16:44		
Continued sampling	2	Inlet Port E	Part.	16:44	16:53	9	
Pushing coke –	2			16:53	16:58		
Continued sampling	2	Inlet Port E	Part.	16:58	17:07	9	
Pushing coke –	2			17:07	17:12		
Continued sampling	2	Inlet Port E	Part.	17:12	17:22	10	
Pushing coke –	2			17:22	17:27		

continued Inlet Run 2

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 11, 1977

Plant Location Chicago, Ill.
Recorded by C. E. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	2	Inlet Port E	Part.	17:27	17:39	12	
Switched ports (Reading coke)	2			17:39	17:44		
Continued sampling	2	Inlet Port F	Part.	17:44	19:04	80	
Completed sampling run	2			19:04		Total time 480 min.	

Inlet [illegible]

SAMPLING TASK LOG

[illegible] D-- [illegible] and 1st impinger.

Plant Wisconsin Steel
Date May 12, 1977

Plant Location Chicago Ill.
Recorded by C.E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	3	Inlet Port A	Part.	09:18	10:38	80	
Switched ports	3			10:38	10:43		
Continued sampling	3	Inlet Port B	Part.	10:43	12:03	80	
Switched ports	3			12:03	12:05		
Continued sampling	3	Inlet Port C	Part.	12:05	13:25	80	
Switched ports	3			13:25	13:32		
Continued sampling	3	Inlet Port D	Part.	13:32	14:52	80	
Switched ports	3			14:52	14:53		
Continued sampling	3	Inlet Port E	Part.	14:53	15:40	47	
Pushing coke - stopped sampling	3			15:40	15:46		
Continued sampling	3	Inlet Port E	Part.	15:46	15:51	5	
Pushing coke -	3			15:51	15:56		
Continued sampling	3	Inlet Port F	Part.	15:56	16:04	8	
Pushing coke -	3			16:04	16:09		
Continued sampling	3	Inlet Port F	Part.	16:09	16:25	16	
Pushing coke -	3			16:25	16:31		
Continued sampling	3	Inlet Port E	Part.	16:31	16:35	4	
Switched ports	3			16:34	16:37		
Continued sampling	3	Inlet Port F	Part.	16:37	16:59	22	
Pushing coke -	3			16:59	17:04		
Continued sampling	3	Inlet Port F	Part.	17:04	17:15	11	
Pushing coke -	3			17:15	17:20		
Continued sampling	3	Inlet Port F	Part.	17:20	17:33	13	
Pushing coke -	3			17:33	17:39		

Continued Inlet Run 3

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 12, 1977

Plant Location Chicago Ill.
Recorded by C. S. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	3	Inlet Port F	Part.	17:39	17:49	10	
Pushing coke	3			17:49	17:56		
Continued sampling	3	Inlet Port F	Part.	17:56	18:10	14	
Pushing coke	3			18:10	18:15		
Continued sampling	3	Inlet Port F	Part.	18:15	18:21	6	
Stopped for leak test	3			18:21	18:25		
Continued sampling	3	Inlet Port F	Part.	18:25	18:29	4	
Completed sampling run	3			18:29		Total time	480 min

9-22

Inlet run 4

XAD-2 column between 3rd impinger and silica gel.

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 13, 14, 1977

Plant Location Chicago, Ill.
Recorded by C.E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	4	Inlet Port A	Part.	2014	2024	10	
Pushing coke - sampling stopped	4			2024	2030		
Continued sampling	4	Inlet Port A	Part.	2030	2046	16	
Pushing coke -	4			2046	2051		
Continued sampling	4	Inlet Port A	Part.	2051	2100	9	
Pushing coke -	4			2100	2105		
Continued sampling	4	Inlet Port A	Part.	2105	2133	28	
Pushing coke -	4			2133	2138		
Continued sampling	4	Inlet Port A	Part.	2138	2155	17	80
Switched ports	4			2155	2204		
Continued sampling	4	Inlet Port B	Part.	2204	2315	71	
Pushing coke -	4			2315	2320		
Continued sampling	4	Inlet Port B	Part.	2320	2325	5	
Pushing coke -	4			2325	2330		
Continued sampling	4	Inlet Port B	Part.	2330	2334	4	80
Switched ports	4			2334	2335		
Continued sampling	4	Inlet Port C	Part.	2335	2344	9	
Pushing coke -	4			2344	2349		
Continued sampling	4	Inlet Port C	Part.	2349	2357	8	
Pushing coke -	4			2357	0002		
Continued sampling (5-14-77)	4	Inlet Port C	Part.	0002	0014	12	
Pushing coke -	4			0014	0019		

10

Continued inlet run 4

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 14, 1977

Plant Location Chicago, Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	4	Inlet Port C	Part.	0019	0032	13	
Pushing coke —	4			0032	0037		
Continued sampling	4	Inlet Port C	Part.	0037	0048	11	
Pushing coke	4			0048	0053		
Continued sampling	4	Inlet Port C	Part.	0053	0106	13	
Pushing coke —	4			0106	0112		
Continued sampling	4	Inlet Port C	Part.	0112	0126	14	50
Switched ports	4			0126	0132		
Continued sampling	4	Inlet Port D	Part.	0132	0141	9	
Pushing coke —	4			0141	0146		
Continued sampling	4	Inlet Port D	Part.	0146	0257	71	50
Switched ports	4			0257	0300		
Continued sampling	4	Inlet Port E	Part.	0300	0311	11	
Pushing coke —	4			0311	0316		
Continued sampling	4	Inlet Port E	Part.	0316	0321	5	
Pushing coke —	4			0321	0327		
Continued sampling	4	Inlet Port E	Part.	0327	0339	12	
Pushing coke —	4			0339	0344		
Continued sampling	4	Inlet Port E	Part.	0344	0355	11	
Pushing coke —	4			0355	0401		
Continued sampling	4	Inlet Port E	Part.	0401	0417	16	
Pushing coke —	4			0417	0422		
Continued sampling	4	Inlet Port E	Part.	0422	0431	9	
Pushing coke —	4			0431	0436		

3

Continued inlet run 4

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 14, 1977

Plant Location Chicago Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	4	Inlet Port E	Part.	0436	0442	16	
Pushing coke —	4			0442	0448		
Continued sampling	4	Inlet Port E	Part.	0448	0458	10	80
Switched ports	4			0458	0501		
Continued sampling	4	Inlet Port F	Part.	0501	0507	6	
Pushing coke —	4			0507	0513		
Continued sampling	4	Inlet Port F	Part.	0513	0548	35	
Pushing coke —	4			0548	0553		
Continued sampling	4	Inlet Port F	Part.	0553	0632	39	80
Completed sampling run				0632	Total time	480 min	

Outlet Run 1

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 10, 1977

Plant Location Chicago, Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	1	Outlet Port W	Part.	10:01	12:06	125	
Changed Battell column on train	1			12:06	12:15		
Continued sampling	1	Outlet Port W	Part.	12:15	14:10	115	
Switched ports	1			14:10	14:27		
Continued sampling	1	Outlet Port S	Part.	14:27	15:42	75	
Pushing coke - stopped sampling	1			15:42	15:47		
Continued sampling	1	Outlet Port S	Part.	15:47	15:52	5	
Pushing coke -	1			15:52	1557		
Continued sampling	1	Outlet Port S	Part.	1557	1605	8	
Pushing coke -	1			1605	1610		
Continued sampling	1	Outlet Port S	Part.	1610	1627	17	
Pushing coke -	1			1627	1632		
Continued sampling	1	Outlet Port S	Part.	1632	1640	8	
Pushing coke -	1			1640	1646		
Continued sampling	1	Outlet Port S	Part.	1646	1650	4	
Pushing coke -	1			1650	1655		
Continued sampling	1	Outlet Port S	Part.	1655	1702	7	
Pushing coke -	1			1702	1707		
Continued sampling	1	Outlet Port S	Part.	1707	1716	9	
Pushing coke -	1			1716	1721		
Continued sampling	1	Outlet Port S	Part.	1721	1730	9	
Pushing coke -	1			1730	1735		
Continued sampling	1	Outlet Port S	Part.	1735	1745	10	
Pushing coke -	1			1745	1750		

Continued Outlet Run 1

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 10, 1977

Plant Location Chicago, Ill.
Recorded by C. F. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	1	Outlet Ports	Part.	1750	1918	88	
Completed sampling run.	1			1918	Total time	480 min	

Outlet Run 2

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 11, 1977

Plant Location Chicago Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	2	Outlet Port W	Part.	1002	1402	240	
Switched ports	2			1402	1415		
Continued sampling	2	Outlet Port S'	Part.	1415	1539	84	
Pushing coke - stopped sampling	2			1539	1544		
Continued sampling	2	Outlet Port S'	Part.	1544	1550	6	
Pushing coke -	2			1550	1555		
Continued sampling	2	Outlet Port S	Part.	1555	1607	12	
Pushing coke -	2			1607	1612		
Continued sampling	2	Outlet Port S	Part.	1612	1624	12	
Pushing coke -	2			1624	1629		
Continued sampling	2	Outlet Port S	Part.	1629	1639	10	
Pushing coke -	2			1639	1644		
Continued sampling	2	Outlet Port S	Part.	1644	1653	9	
Pushing coke -	2			1653	1658		
Continued sampling	2	Outlet Port S	Part.	1658	1707	9	
Pushing coke -	2			1707	1712		
Continued sampling	2	Outlet Port S	Part.	1712	1722	10	
Pushing coke -	2			1722	1727		
Continued sampling	2	Outlet Port S	Part.	1727	1739	12	
Pushing coke -	2			1739	1744		
Continued sampling	2	Outlet Port S	Part.	1744	1900	76	
Completed sampling run	2			1900	Total time 480 min		

Outlet Run — XAD-2 column, stripe filter and 1st impinger.

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 12, 1977

Plant Location Chicago Ill
Recorded by C. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling run	3	Outlet Port W	Part.	0918	0933	15	
Changed sampling nozzle from .251 to .189	3			1933	0937		
Continued sampling	3	Outlet Port W	Part.	0937	1037	60	
Changed glassware on XAD-2 column	3	cleaned grease		1037	1052		
Continued sampling	3	Outlet Port W	Part.	1052	1337	165	
Switched ports	3			1337	1356		
Continued sampling	3	Outlet Port S	Part.	1356	1540	104	
Pushing coke - stopped sampling	3			1540	1545		
Continued sampling	3	Outlet Port S	Part.	1545	1551	6	
Pushing coke -	3			1551	1556		
Continued sampling	3	Outlet Port S	Part.	1556	1604	8	
Pushing coke -	3			1604	1609		
Continued sampling	3	Outlet Port S	Part.	1609	1625	16	
Pushing coke -	3			1625	1630		
Continued sampling	3	Outlet Port S	Part.	1630	1659	29	
Pushing coke -	3			1659	1704		
Continued sampling	3	Outlet Port S	Part.	1704	1715	11	
Pushing coke -	3			1715	1720		
Continued sampling	3	Outlet Port S	Part.	1720	1733	13	
Pushing coke -	3			1733	1738		
Continued sampling	3	Outlet Port S	Part.	1738	1749	11	
Pushing coke -	3			1749	1755		
Continued sampling	3	Outlet Port S	Part.	1755	18:10	15	
Pushing coke -	3			18:10	18:15		

Continued Outlet Run 3

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 12, 1977

Plant Location Chicago Ill.
Recorded by [illegible]

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	3	Outlet Ports	Part.	1815	1842	27	
Completed sampling run	3			1842		Total time	480 min.

#2

Outlet run 4

SAMPLING TASK LOG

Xrn D - 60" [illegible] Pot [illegible]
3 [illegible] impinger and [illegible] gel.

Plant Wisconsin Steel
Date May 13, 14, 1977

Plant Location Chicago, Ill.
Recorded by C.E. Kelley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started sampling	4	Outlet Port W	Part.	2014	2024	10	
Pushing coke - stop sampling	4			2024	2029		
Continued sampling	4	Outlet Port W	Part.	2029	2046	17	
Pushing coke -	4			2046	2051		
Continued sampling	4	Outlet Port W	Part.	2051	2100	9	
Pushing coke -	4			2100	2105		
Continued sampling	4	Outlet Port W	Part.	2105	2133	28	
Pushing coke -	4			2133	2138		
Continued sampling	4	Outlet Port W	Part	2138	2315	97	
Pushing coke -	4			2315	2320		
Continued sampling	4	Outlet Port W	Part.	2320	2325	5	
Pushing coke -	4			2325	2330		
Continued sampling	4	Outlet Port W	Part.	2330	2344	14	
Pushing coke -	4			2344	2349		
Continued sampling	4	Outlet Port W	Part.	2349	2357	8	
Pushing coke -	4			2357	0002		
Continued sampling	4	Outlet Port W	Part.	0002	0014	12	
Pushing coke -	4			0014	0019		
Continued sampling	4	Outlet Port W	Part.	0019	0032	13	
Pushing coke -	4			0032	0037		
Continued sampling	4	Outlet Port W	Part.	0037	0048	11	
Pushing coke -	4			0048	0053		
Continued sampling	4	Outlet Port W	Part.	0053	0106	13	
Pushing coke -	4			0106	0111		

Continued Outlet run 4

SAMPLING TASK LOG

Plant Wisconsin Steel
Date May 11, 1977

Plant Location Chicago, Ill.
Recorded by C. E. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Continued sampling	4	Outlet Port W	Part	0111	0114	3	240
Switched ports	4			0114	0122		
Continued sampling	4	Outlet Port S	Part.	0122	0141	19	
Pushing coke —	4			0141	0146		
Continued sampling	4	Outlet Ports	Part.	0146	0311	85	
Pushing coke —	4			0311	0316		
Continued sampling	4	Outlet Ports	Part.	0316	0321	5	
Pushing coke —	4			0321	0326		
Continued sampling	4	Outlet Port S	Part.	0326	0339	13	
Pushing coke —	4			0339	0344		
Continued sampling	4	Outlet Ports	Part.	0344	0355	11	
Pushing coke —	4			0355	0400		
Continued sampling	4	Outlet Ports	Part.	0400	0417	17	
Pushing coke —	4			0417	0422		
Continued sampling	4	Outlet Ports	Part.	0422	0431	9	
Pushing coke —	4			0431	0436		
Continued sampling	4	Outlet Port S	Part.	0436	0442	6	
Pushing coke —	4			0442	0447		
Continued sampling	4	Outlet Ports	Part.	0447	0507	20	
Pushing coke —	4			0507	0512		
Continued sampling	4	Outlet Ports	Part.	0512	0548	36	
Pushing coke	4			0548	0553		
Continued sampling	4	Outlet Port S	Part.	0553	0612	19	
Completed sampling run	4				0612	Total time	480 min

Orsat

SAMPLING TASK LOG

Plant Wisconsin Steel
Date 5-10-77 to 5-12-77

Plant Location Chicago Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Flask Sample Nos.
5-10-77							
Collected sample for evacuated flask		Inlet	Benzene	1205	1900	415	S77-002-316
Collected sample for orsat + evacuated flask		Outlet CO_2 O_2	Benzene	1400 1200?	1930	3 30	S77-002-317
5-11-77							
Collected sample for orsat, evacuated flask		Inlet CO_2 O_2	Benzene	1030	1900	510	S77-002-326
Collected sample for evacuated flask		Outlet	Benzene	1030	1900	510	S77-002-327
5-12-77							
Collected sample for evacuated flask		Inlet	Benzene	0930	1830	468	S77-002-33[illegible]
Collected sample for evacuated flask		Outlet	Benzene	0930	1830	456	S77-002-33[illegible]

(Note)

Samples were collected in an integrated bag during the above clock times and withdrawn for orsat and grab flasks afterwards.

Integrated samples collected on 5-12-77 were collected only during non-pouring times. Previous integrated samples collected on 5-10-77 and 5-11-77 were collected during the entire sampling period (pouring and non-pouring)

Opacity of coke oven ESP discharge

SAMPLING TASK LOG

Plant: Wisconsin Steel
Date: 5-10-77

Plant Location: Chicago, Ill.
Recorded by: C. E. [illegible]

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started visible emissions test	1	Outlet stack		0800	1000	120	
Stopped for brief break	1			1000	1005		
Continued visible emissions test	1	Outlet stack		1005	1205	120	
Stopped for brief break	1			1205	1211		
Continued visible emissions test	1	Outlet stack		1211	1400	109	
Changed observation location	1			1400	1410		
Continued visible emissions test	1	Outlet stack		1410	1609	119	
Stopped for break	1			1609	1621		
Continued visible emissions test	1	Outlet stack		1621	1800	99	
Completed test	1			1800			
				Total time 567 min.			

Opacity of coke oven ESP discharge

SAMPLING TASK LOG

Plant Wisconsin Steel
Date 5-11-77

Plant Location Chicago, Ill.
Recorded by C. E. Riley

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started visible emissions test	2	Outlet stack		1000	1200	120	
Stopped for brief break	2			1200	1211		
Continued visible emissions test	2	Outlet stack		1211	1410	121	
Changed observation location	2			1410	1425		
Continued visible emissions test	2	Outlet stack		1425	1700	155	
Stopped for break	2			1700	1710		
Continued visible emissions test	2	Outlet stack		1710	1800	50	
Completed test	2			1800			
				Total time 446 min.			

Opacity of coke oven ESP discharge

SAMPLING TASK LOG

Plant Wisconsin Steel
Date 5-17-77

Plant Location Chicago, Ill.
Recorded by C. E. Bailey

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
Started visible emissions test	3	Outlet stack		0900	1100	120	
Stopped for brief break	3			1100	1110		
Continued visible emissions test	3	Outlet stack		1110	1330	140	
Changed observation location	3			1330	1342		
Continued visible emissions test	3	Outlet stack		1342	1415	33	
Wind + dust interferences	3			1415	1417		
Continued visible emissions test	3	Outlet stack		1417	1530	73	
Stopped for brief break	3			1530	1540		
Continued visible emissions test	3	Outlet stack		1540	1747	127	
Smoke Interferences from adjacent process	3			1747	1749		
Continued visible emissions test	3	Outlet stack		1749	1751	2	
Interferences from shed emissions	3			1751	1752		
Continued visible emissions test	3	Outlet stack		1752	1800	8	
Completed test	3			1800			
				Total time		503 min.	

TABLE D-1

SAMPLING LOG WESP WATER SAMPLES
BY-PRODUCT COKE-OVEN BATTERY NO. 4
EMISSION TEST - WET ELECTROSTATIC PRECIPITATOR
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-14, 1977

1977 Date	Sample Location					
	Inlet Water Sampling Point C		Outlet Water Sampling Point D		Blowdown Water Sampling Point E	
	Time	pH	Time	pH	Time	pH
5/10	1108	5.0	1115	5.0	1120	5.0
	1202	5.5	1205	5.0	1208	4.5
	1301	5.0	1303	4.5	1306	4.5
	1407	5.0	1409	4.5	1411	4.5
	1505	5.5	1508	5.5	1512	5.0
	1603	5.0	1604	4.5	1608	5.0
	1703	6.0	1705	6.0	1709	5.5
	1805	5.5	1810	5.5	1813	5.5
	1906	5.5	1909	5.0	1912	5.0
5/11	1047	5.5	1050	5.0	1052	4.5
	1149	5.0	1151	5.0	1153	5.0
	1250	5.5	1251	5.5	1253	5.0
	1349	5.5	1350	6.0	1353	5.0
	1446	—	1448	—	1451	—
	1554	5.0	1556	5.0	1558	5.0
	1653	5.5	1655	5.0	1657	5.0
	1745	5.0	1746	5.5	1749	4.5
	1846	6.0	1849	6.0	1855	5.5
5/12	1012	5.0	1014	4.5	1016	6.0
	1112	6.0	1114	5.5	1116	6.0
	1222	5.5	1224	6.0	1226	5.5
	1315	5.5	1317	6.0	1319	5.5
	1416	5.5	1418	6.0	1420	6.0
	1512	6.0	1514	6.0	1516	5.5
5/12 (Push Cycle)	1625	6.0	1626	5.5	1628	5.5
	1726	6.0	1729	6.0	1731	5.5
	1835	—	1837	6.0	1842	5.0
5/13	2055	5.0	2100	6.0	2105	5.5
	2210	5.0	2212	5.5	2216	5.0
	2310	6.0	2314	6.0	2320	6.0
5/14	0026	5.5	0028	6.0	0032	5.5
	0126	5.5	0128	5.5	0130	6.0
	0230	6.0	0235	6.0	0240	6.0
	0325	5.5	0330	5.5	0335	6.0
	0421	6.0	0423	6.5	0425	6.0
	0522	6.0	0524	6.5	0527	6.0
	0628	5.5	0630	5.5	0633	5.0

COKE PLANT

WISCONSIN STEEL WORKS

DAILY REPORT OF PUSHING AND CHARGING TIME

PUSHERMAN ENDING 6 A. M. 5-9-77

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED
1	83	3:10	3:35	4:05	510/300	32	102	11:10	11:20	11:40	500/300	63				
2	93	35	3:45	4:25	510/330	33	74	35	11:30	12:10	500/300	64				
3	103	4:-	4:10	4:40	510/300	34	84	12:00	11:55	12:30	500/300	65				
4	113	25	4:30	4:50	510/300	35	94	25	12:20	12:50	500/300	66				
5	75	50	4:55	5:20	510/330	36	76	50	12:40	1:10	500/300	67				
6	85	5:15	5:15	5:50	510/300	37	86	1:10	1:00	1:30	500/300	68				
7	95	40	5:35	6:10	510/300	38	96	40	1:20	1:50	500/300	69				
8	115	6:05	6:-	6:20	510/300	39	106	2:05	2:00	2:15	500/300	70				
9	77	30	6:25	7:30	510/300	40	116	30	2:05	3:30	500/300	71				
10	87	7:10	7:20	7:50	510/330	41	68	3:10	3:20	3:45	500/300	72				
11	97	35	7:40	8:10	510/300	42	78	35	3:35	4:00	500/300	73				
12	107	8:-	8:-	8:20	510/300	43	88	4:10	3:50	4:25	500/300	74				
13	69	35	8:30	8:55	510/300	44	98	25	4:15	4:45	500/300	75				
14	79	50	8:50	9:15	510/300	45	71	50	4:35	5:10	500/300	76				
15	89	9:15	9:10	9:30	510/300	46	81	5:15	4:55	5:30	500/300	77				
16	73	40	9:40	9:55	510/300	47	91	40	5:20	5:45	500/300	78				
17	83	10:15	10:00	10:15	510/300	48	101	6:00	5:55	6:10	500/300	79				
18	93	35	10:25	10:35	510/300	49	73	30	6:20	6:35	500/300	80				
19						50						81				
20						51						82				
21						52						83				
22						53						84				
23						54						85				
24						55						86				
25						56						87				
26						57						88				
27						58						89				
28						59						90				
29						60						91				
30						61						92				
31						62						93				

SW 315.

COKE PLANT

WISCONSIN STEEL WORKS

DAILY REPORT OF PUSHING AND CHARGING TIME

_____ PUSHERMAN ENDING 6 A. M. 5-10-77

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY
1	83	310	340	405	510/300
2	93	35	350	420	480/300
3	75	4-	415	440	510/300
4	85	25	445	5-	510/300
5	95	50	455	520	510/300
6	105	515	510	540	510/300
7	77	40	530	6-	510/300
8	87	605	545	625	510/300
9	97	30	610	720	510/300
10	117	710	730	750	510/330
11	69	35	745	810	510/330
12	79	8-	805	830	540/330
13	89	25	825	855	540/300
14	99	50	845	920	510/300
15	109	915	910	940	480/300
16	72	40	945	10-	480/300
17	82	1005	1010	1020	480/300
18	92	30	1030		510/300
19					
20					
21			1605		
22			1716		
23					
24					
25					
26					
27					
28					
29					
30					
31					

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46		Tests 5-10-77			
47		Pushing Times			
48			1542		
49			1552		
50			1605		
51			1627		
52			1640		
53			1650		
54			1702		
55			1716		
56			1730		
57			1745		
58			1918		
59			1927		
60			1937		
61			1952		
62					

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED
63	112	1110	1120	1145
64	44	35	1135	1210
65	84	12-	12-	1230
66	64	25	1220	1250
67	104	50	1240	115
68	114	115	105	130
69	76	40	125	155
70	86	205	145	220
71	66	30	210	325
72	68	316	315	345
73	78	35	335	410
74	88	4-	4-	435
75	108	25	420	455
76	71	50	445	515
77	81	515	505	535
78	91	40	525	6-
79	111	605	545	610
80	73	30	620	630
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				

SW 315.

COKE PLANT

WISCONSIN STEEL WORKS

DAILY REPORT OF PUSHING AND CHARGING TIME

#4 Battery PUSHERMAN ENDING 6 A. M. 5-11-

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED
1	83	310	345	405	480/300	32						63	102	1110	1115	1205
2	93	35	350	420	510/300	33						64	74	35	1130	1235
3	103	4-	410	440	510/300	34						65	84	12	1210	1250
4	113	35	430	5-	510/300	35						66	94	25	1240	105
5	75	50	450	520	510/300	36						67	76	50	1255	125
6	85	510	510	540	510/300	37						68	86	110	115	140
7	95	40	530	6-	500/300	38						69	96	40	130	155
8	105	605	550	630	510/300	39						70	104	205	145	220
9	77	30	625	730	480/370	40						71	114	30	205	325
10	87	710	720	750	510/300	41						72	68	310	315	350
11	97	35	740	810	510/300	42						73	78	35	335	410
12	107	8-	8-	830	510/300	43						74	88	4-	4-	430
13	69	35	820	855	540/300	44						75	98	25	420	5-
14	79	50	850	925	510/300	45						76	71	50	450	520
15	89	905	920	950	510/300	46						77	81	510	510	545
16	99	40	945	1010	510/300	47						78	91	40	530	625
17	82	1015	10-	1029	510/300	48		Pushing Times				79	101	410	550	645
18	92	35	1025	1035	510/370	49			1539			80	73	30	630	650
19						50			1550			81				
20						51			1607			82				
21						52			1629			83				
22						53			1639			84				
23						54			1653			85				
24						55			1707			86				
25						56			1722			87				
26						57			1739			88				
27						58						89				
28						59						90				
29						60						91				
30						61						92				
31						62						93				

SW 313

COKE PLANT — WISCONSIN STEEL WORKS

DAILY REPORT OF PUSHING AND CHARGING TIME

PUSHERMAN — ENDING 6 A. M. 5-12-77

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY
1	43	310	340	400	500/300
2	93	335	350	420	500/300
3	75	400	410	440	500/300
4	85	425	425	510	500/300
5	95	450	500	540	500/300
6	105	515	530	555	500/300
7	77	540	545	615	500/300
8	87	605	605	640	500/300
9	97	630	625	725	500/300
10	107	740	715	745	500/300
11	69	735	735	805	500/300
12	79	800	755	825	500/300
13	89	825	815	840	500/300
14	99	850	830	910	500/300
15	109	905	855	935	500/300
16	72	940	920	945	500/300
17	82	1005	1000	1020	500/300
18	92	1030	1010	1030	500/300
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY
32			1540		
33			1551		
34			1604		
35			1625		
36			1659		
37			1715		
38			1733		
39			1749		
40			1810		
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED
63	112	1110	1115	1135
64	74	35	1125	1150
65	84	12-	1145	1205
66	94	25	12-	1225
67	104	50	1215	1245
68	114	115	1235	105
69	74	40	1255	120
70	84	205	130	140
71	94	30	150	205
72	68	310	350	410
73	78	35	4-	425
74	88	4-	415	440
75	108	25	430	455
76	71	50	445	515
77	81	515	505	525
78	91	40	520	540
79	111	605	555	610
80	73	30	620	635
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				

SW 315.

COKE PLANT — WISCONSIN STEEL WORKS

DAILY REPORT OF PUSHING AND CHARGING TIME

2nd PUSHERMAN 3rd Turn ENDING 6 A. M. 5 - 13 -

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	TIME DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED
1	83	3:10	3:40	4:00	500/300	32	102	1110	1115	1140	500/300	63			2024	Tes
2	93	3:35	3:50	4:15	500/300	33	74	35	1125	1155	500/300	64			2046	pus
3	103	4:00	4:05	4:40	500/300	34	84	12—	11,50	12,15	500/300	65			2100	E O
4	113	4:25	4:30	5:00	500/300	35	94	25	1205	1240	500/300	66			2133	
5	75	4:50	4:50	5:20	500/300	36	76	50	12,30	1—	500/280	67			2315	
6	85	5:15	5:10	5:40	500/300	37	86	115	12,05	130	500/280	68			2325	
7	95	5:40	5:30	6:05	500/300	38	96	140	145	1,55	500/280	69			2344	
8	115	6:15	5:50	6:20	500/300	39	106	205	205	2,15	500/300	70			2357	
9	77	6:30	6:30	7:25	500/300	40	116	230	230	2,40	500/300	71			0014	
10	87	7:00	7:15	7:45	500/300	41	68	3,10	315	340	500/300	72			0032	
11	97	7:35	7:35	8:10	500/300	42	78	25	3,30	355	500/300	73			0048	
12	107	8:00	7:55	8:25	500/300	43	88	4—	4—	4,10	500/300	74			0106	
13	69	8:25	8:15	8:45	500/300	44	98	25	420	430	550/350	75			0141	
14	79	8:50	8:35	9:15	500/300	45	71	50	4,55	5,00	500/300	76			0311	
15	89	9:15	9:00	9:55	500/300	46	81	515	515	520	500/280	77			0321	
16	72	9:40	9:45	10:05	500/300	47	91	40	5,35	5,50	500/300	78			0339	
17	82	10:05	10:05	10:25	500/300	48	101	605	6,10	620	500/300	79			0355	
18	92	10:30	10:30	10:45	500/300	49	73	630	630	6,35	500/300	80			0417	
19						50						81			0431	
20						51						82			0442	
21						52						83			0507	
22						53						84			0548	
23						54						85				
24						55						86				
25						56						87				
26						57						88				
27						58						89				
28						59						90				
29						60						91				
30						61						92				
31						62						93				

SW 518.

COKE PLANT

WISCONSIN STEEL WORKS

DAILY REPORT OF PUSHING AND CHARGING TIME

_____ PUSHERMAN ENDING 6 A. M. 5-14-7

NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED	DELAY	NO.	OVEN NO.	SCHEDULE TIME	TIME PUSHED	TIME CHARGED
1	93	310	325	350	500/300	32	112	110	120	145	510/270	63				
2	93	335	335	410	500/300	33	74	35	135	125	510/270	64				
3	75	400	400	430	500/300	34	84	12-	150	120	510/270	65				
4	85	425	420	450	500/300	35	94	35	135	155	510/270	66				
5	95	450	440	510	500/300	36	104	50	150	120	510/270	67				
6	105	515	500	535	500/300	37	114	115	110	140	510/270	68				
7	77	540	515	535	500/300	38	76	40	135	2-	540/300	69				
8	87	605	545	555	500/300	39	86	215	155	215	510/300	70				
9	97	630	605	620	500/300	40	96	30	130	320	510/270	71				
10	117	710	715	740	500/300	41	68	310	315	450	540/270	72				
11	69	735	730	810	500/300	42	78	35	335	5-	510/270	73				
12	79	800	755	825	500/300	43	88	4-	455	512	510/270	74				
13	89	825	815	845	500/300	44	108	25	510	530	500/300	75				
14	99	850	835	905	500/300	45	71	50	525	545	540/300	76				
15	109	915	855	925	500/300	46	81	515	535	555	510/300	77				
16	72	940	915	950	500/300	47	91	40	550	615	510/300	78				
17	82	1005	935	1010	500/300	48	111	610	610	625	510/270	79				
18	92	1030	1020	1035	500/300	49	73	30	630	640	510/300	80				
19						50						81				
20						51						82				
21						52						83				
22						53						84				
23						54						85				
24						55						86				
25						56						87				
26						57						88				
27						58						89				
28						59						90				
29						60						91				
30						61						92				
31						62						93				

APPENDIX E

SECTION I DETAILED SUMMARY
SAMPLING AND ANALYTICAL PROCEDURES

SECTION II EPA FIELD AND LABORATORY DIRECTIONS

APPENDIX E

SECTION I DETAILED SUMMARY SAMPLING AND ANALYTICAL PROCEDURES

DETAILED SUMMARY
SAMPLING AND ANALYTICAL PROCEDURES

Particulate Sampling Trains

The WESP inlet was sampled during Tests 1 and 2 using the sampling train depicted in Figure E-1. The train consisted of a sharp, tapered stainless-steel nozzle attached to an eight foot long heated Teflon probe, followed by a heated filter box containing a preweighed 110-mm Type A glass-fiber filter in a glass filter holder. Following the filter was a flexible Teflon line connected to a modified Greenburg-Smith impinger containing 100 ml of distilled water, a standard Greenburg-Smith impinger containing 100 ml of distilled water, an empty modified Greenburg-Smith impinger, two modified Greenburg-Smith impingers with 400 grams of silica gel in each and a bimetallic thermometer in the latter, a leakless pump with vacuum gauge, a calibrated dry gas meter equipped with bimetallic inlet and outlet thermometers, and a calibrated orifice-type flowmeter that was connected to an inclined manometer. The sampling probe and filter box heating was varied throughout the tests in order to maintain the actual exiting gas temperature behind the filter at 250°F $\pm$ 25°F. The temperature of the gas exiting the filter holder was monitored with an iron/constantan (I/C) thermocouple inserted through the 90 degree glass elbow connector. The filter box temperature was also monitored by an I/C thermocouple assembly.

The impingers, connected in series, were immersed in an ice bath to maintain the temperature in the last impinger

below 70°F. The temperature at this point was also monitored and recorded throughout the tests.

The WESP outlet sampling train used for Tests 1 and 2 is depicted in Figure E-2. The only difference between the inlet and outlet trains used in Tests 1 and 2 is that the outlet filter holder is connected directly to the first impinger, without the interconnecting Teflon line. The temperature of the gas exiting the filter holder was monitored and controlled similar to the inlet.

XAD-2 Sampling Trains

The sampling trains utilized for Test 3 are depicted in Figure E-3 (inlet) and Figure E-4 (outlet). An XAD-2 adsorbent column was connected between the filter holder and the flexible teflon tubing in the inlet train for the purpose of collecting organic material not captured by the filter. The adsorbent column was wrapped in aluminum foil to prevent photo-oxidation by sunlight and other sources of ultra-violet radiation. In the outlet train, two XAD-2 columns were connected in parallel between the filter holder and first impinger. The standard impingers in both trains were replaced with modified impingers to reduce system vacuum.

The sampling trains used for Test 4 are depicted in Figure E-5 (inlet) and Figure E-6 (outlet). The XAD-2 columns were connected between the first silica gel impinger and the dry trap for both the inlet and outlet trains. The order of the other train components was as depicted in Figures E-3 and E-4 respectively.

The temperature of the gas stream exiting the XAD-2 columns was monitored with an I/C thermocouple inserted into the glass connector following the XAD-2 column. This gas temperature was maintained at 70°F ± 10°F by means of an ice water recirculation bath.

Sampling Procedures

Temperatures were maintained within specific limits and monitored at several points in the sampling trains.

1. Filter box - 250°F, varied between 180°F and 360°F;
2. Sample stream exiting filter holder - 250°F ± 25°F;
3. Sample stream exiting XAD-2 columns - 70°F ± 10°F (during Tests 3 and 4 only);
4. Sample stream exiting silica gel impinger - 70°F ± 10°F.

Prior to and upon completion of all tests, the entire sampling train was leak tested, in accordance with the requirement that a leak rate of 0.02 cubic feet per minute at 15 inches of mercury vacuum not be exceeded.

Isokinetic sampling rates were maintained by monitoring the exhaust gas velocity pressure and temperature, and gas-meter temperatures continuously at each of the 24 sampling points (outlet) and 48 sampling points (inlet), and making appropriate adjustments in the sampling flowrate. During pushing cycles, sampling was discontinued as the pusher ram entered the coke oven and the sampling probes were rotated 180 degrees to avoid impaction of undesired particles.

WESP Water Sampling

During Tests 1, 2, 3, and 4, water samples were acquired from the WESP inlet, outlet and blowdown points as two 400-500 ml aliquots and integrated over the test to give a composite sample. One of the samples was provided to Battelle for POM analysis. During sample collection, water was allowed to run free for several minutes before being captured, to ensure that any residues remaining in the valves or piping were not collected. Samples were retained at ambient temperatures until analysis. Analyses were conducted to determine the total and dissolved solids content in accordance with the guidelines in the U. S. Environmental Protection Agency's Methods for Chemical Analysis of Water and Wastes as amended through 1974 (STORET No. 00530).

Integrated Bag Sampling

Integrated bag sampling was conducted during Tests 1, 2, and 3 by Battelle personnel. Samples of exhaust gas were drawn, at controlled flowrates, through a probe, condenser and Teflon tubing into a Tedlar bag located in a sealed container. At the conclusion of each run, grab flask samples were taken from the bag for Orsat analyses by Clayton Environmental Consultants (two samples only) and by Battelle for benzene and acetylene analyses.

Pre-cleanup of Sampling Trains

Prior to Test 1, all train components were rinsed first with acetone, then with benzene to ensure completely clean surfaces. The rinsings were retained in glass sample bottles. The data is summarized in Table F-2.

Benzene-Acetone Field Cleanup

Sample transfer and recovery clean-up conformed to the guidelines outlined in EPA Method 5 with several modifications. The nozzle and probe were disconnected from the pitot-probe assembly, the openings sealed, and the exterior surfaces cleaned of excess debris so as not to contaminate the sample. The ball joint on the end of the probe was cleaned with an acetone soaked paper towel then with a benzene soaked towel to remove any stopcock grease. The inside of the ball joint was then checked for residual stopcock grease; any present was removed with an acetone soaked Q-tip.

The probe was washed and brushed three times with acetone followed by three rinsings with benzene and the rinsings retained in separate glass sample bottles with Teflon lined caps. The probe was then rinsed again with acetone as a drying agent; (this rinse was discarded). The nozzle was brushed and rinsed in a similar fashion and the rinsings retained in the same respective glass sample bottles.

The filter holder was carefully transferred to a clean work area and disassembled. The filter was removed from the holder and transferred to its original petri dish. The front half of the filter holder was then wiped clean of any visible stopcock grease with a benzene soaked towel and a benzene soaked Q-tip. The filter holder was then rinsed with acetone, followed by benzene and the rinsings retained in the same glass sample bottles as above. The filter holder was rinsed with a final acetone rinse as a drying agent, which was discarded.

The Teflon frit within the filter holder was rinsed with acetone, followed by benzene, then again with acetone. The latter was discarded, being used only as a drying agent. The acetone and benzene rinsings were retained as above. The aforementioned were the components considered to be the front half of the sampling train.

The back half of the filter holder was cleaned of excess stopcock grease in the same manner as the front half. It was rinsed first with acetone, then with benzene, and the rinsings retained in separate glass sample bottles with Teflon lined caps. The filter holder was rinsed a third time with acetone as a drying agent, which was discarded.

The liquid from each impinger was measured and placed in a glass sample bottle. The impingers were then rinsed three times with water, three times with acetone, and three times with benzene and the rinsings retained in separate glass sample bottles. The final rinse was acetone, which was used as the drying agent, then discarded. Each "U" tube joint was also cleaned in the same manner. The aforementioned parts of the train were considered to constitute the back half of the train.

At the inlet sampling location of the WESP, a flexible Teflon line was used to connect the heated filter to the impingers. This line was considered part of the back half and was brushed and rinsed in a similar fashion as the probe.

At the end of each test during which XAD-2 columns were added to the trains, each XAD-2 column was removed from the train, sealed and given to Battelle personnel for analysis.

The connecting glassware from the impingers to the XAD-2 columns was also given to Battelle for analysis.

Therefore, at the end of each test, six sample fractions had been collected:

1. Acetone rinsings of the nozzle, probe, and filter holder;
2. Benzene rinsings of the nozzle, probe, and filter holder;
3. 110-mm front filter;
4. Distilled water impinger contents and water rinsings;
5. Acetone rinsings of impingers and flexible coupling; and,
6. Benzene rinsings of impingers and flexible coupling.

During Test 3, one of the glassware components at the exit of the XAD-2 column retained excess stopcock grease on the interior surface and was replaced with a new part. Also during Test 3, isokinetics could not be maintained in the outlet train using a 1/4 inch nozzle. Fifteen minutes into the test, the nozzle was changed to a 3/16 inch size per recommendations of Gene Riley, Project Officer, EPA, Emission Measurement Branch.

XAD-2 Column Analysis

The XAD-2 Columns were removed at the conclusion of Tests 3 and 4 along with the connecting glassware and delivered to Battelle personnel for benzene soluble organics and total POM analyses. At the end of both Tests 3 and 4, some of the XAD-2 material had been entrained from the column into the adjacent glass connection fitting.

The connecting glassware from the impingers to the XAD-2 columns was also given to Battelle for analysis.

Therefore, at the end of each test, six sample fractions had been collected:

1. Acetone rinsings of the nozzle, probe, and filter holder;
2. Benzene rinsings of the nozzle, probe, and filter holder;
3. 110-mm front filter;
4. Distilled water impinger contents and water rinsings;
5. Acetone rinsings of impingers and flexible coupling; and,
6. Benzene rinsings of impingers and flexible coupling.

During Test 3, one of the glassware components at the exit of the XAD-2 column retained excess stopcock grease on the interior surface and was replaced with a new part. Also during Test 3, isokinetics could not be maintained in the outlet train using a 1/4 inch nozzle. Fifteen minutes into the test, the nozzle was changed to a 3/16 inch size per recommendations of Gene Riley, Project Officer, EPA, Emission Measurement Branch.

XAD-2 Column Analysis

The XAD-2 Columns were removed at the conclusion of Tests 3 and 4 along with the connecting glassware and delivered to Battelle personnel for benzene soluble organics and total POM analyses. At the end of both Tests 3 and 4, some of the XAD-2 material had been entrained from the column into the adjacent glass connection fitting.

In order to determine total dissolved solids, an aliquot of the well-mixed sample was filtered through a Gelman Type A glass fiber filter. The filtrate was then evaporated in a tared 250 ml beaker at 105°C. The result was then reported on a milligrams per liter basis.

To determine total suspended solids, an aliquot of well-mixed sample was filtered through a preweighed Gelman Type A glass fiber Filter. This filter was then dried at 105°C and weighed to constant weight. The result was total suspended solids and was tabulated on a milligrams per liter basis. The total suspended solids result was added to the total dissolved solids result to yield the total solids result for the sample in milligrams per liter.

Benzene Soluble Organic Analysis

The filter and acetone rinsings of the front portions of the sampling train were analysed for benzene soluble organic material. The filter was initially dessicated to constant weight. The acetone was dried at room temperature in a preweighed beaker and then desiccated to constant weight. The filter was then placed in the corresponding acetone residue beaker and macerated with 25 ml of benzene. This benzene was allowed to remain in the beaker for 24 hours and was then filtered through a Watman 41 filter into a preweighed 250 ml beaker. The macerated filter/acetone residue was then extracted with at least two more 25 ml aliquots of benzene. This benzene was also filtered into the 250 ml beaker. The benzene filtrate was then evaporated at

room temperature and desiccated to constant weight. The resulting benzene soluble organic material was reported in milligrams.

For the back half of the sampling train, the acetone samples were first evaporated at room temperature and desiccated to constant weight in 250 ml beakers. Water samples were extracted with chloroform and ether according to EPA procedures. The aqueous fraction was then dried at 105°C to constant weight in 250 ml beakers. Chloroform-ether extractables were dried in 250 ml beakers at room temperature and desiccated to constant weight. The aqueous residues were then extracted three times with 25 ml portions of benzene and the benzene then evaporated at room temperature and desiccated to constant weight. As before, the first aliquot of benzene was allowed to remain on the samples for 24 hours and then all three of the benzene extracts were filtered through Watman 41 filter paper and dried as before. The acetone residue was combined with the corresponding chloroform-ether extracted residue and 25 ml of benzene was added to them. This benzene was allowed to sit on the samples for 24 hours and then filtered into a preweighed 25 ml beaker. Two more aliquots of benzene were used to extract these residues, with all three extracts being filtered into a tared 250 ml beaker. The benzene was then evaporated at room temperature and desiccated to constant weight. The reason for not combining the aqueous residue with the acetone/chloroform ether extractable residue was that the aqueous sample had already been dried at 105°C with a probable loss of most of the benzene soluble material: Thus, the aqueous residue was extracted separately to determine if any benzene soluble organic material was left in the sample.

1. Heated Teflon Probe Assembly
2. Thermocouple and Pyrometer Assembly
3. S-Type Pitot Tube
4. Filter Heater Box With 110-mm Glass-fiber Filter
5. Flexible Teflon Line
6. Modified and Standard Impingers with 100 ml Distilled Water each
7. Modified Impinger Dry Trap
8. Impingers with 400 g Silica Gel each
9. Leakless Pump
10. Calibrated Dry Gas Meter
11. Calibrated Orifice
12. Dual Inclined Manometer

T Temperature Monitor

P Pressure Monitor

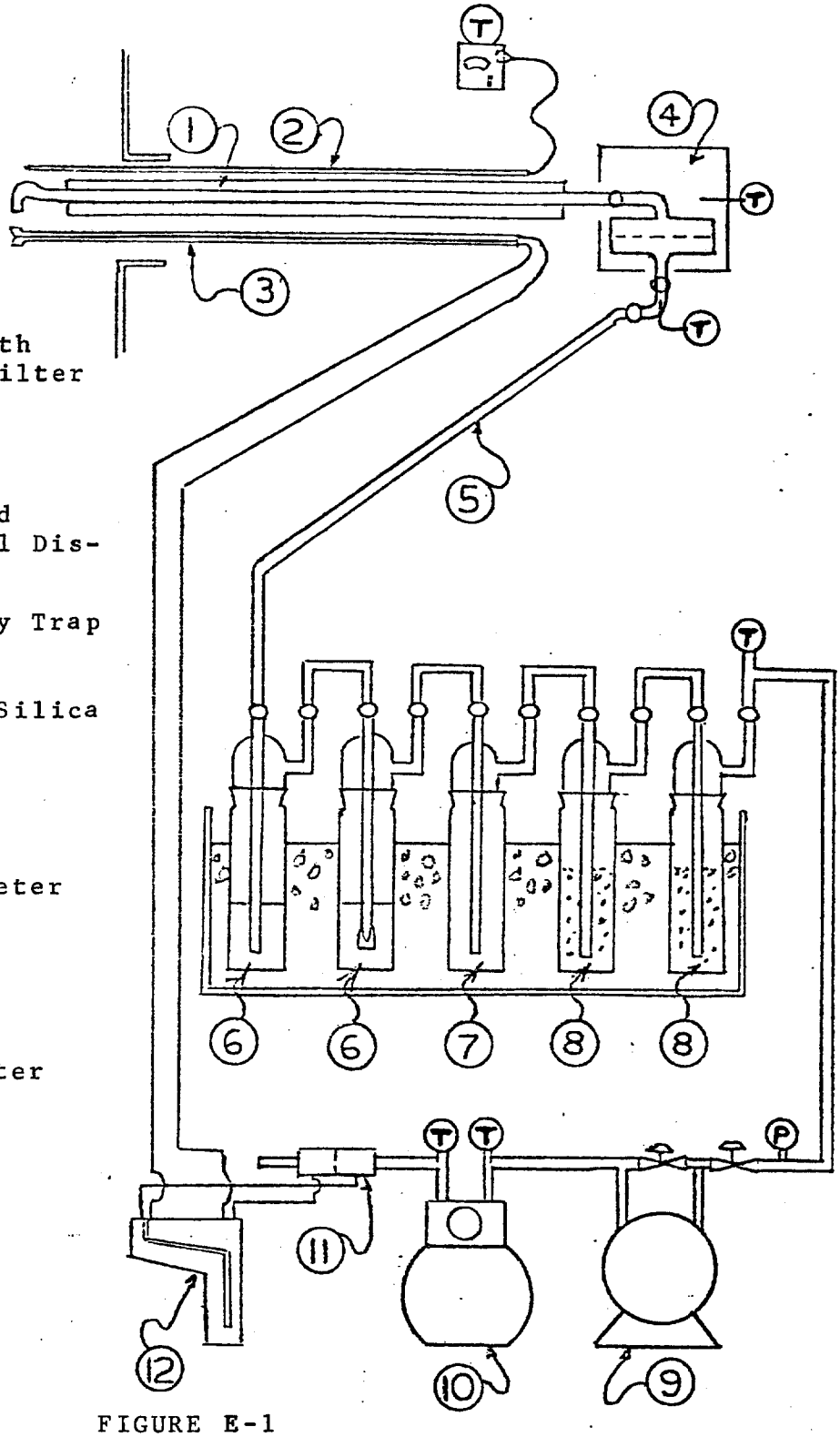
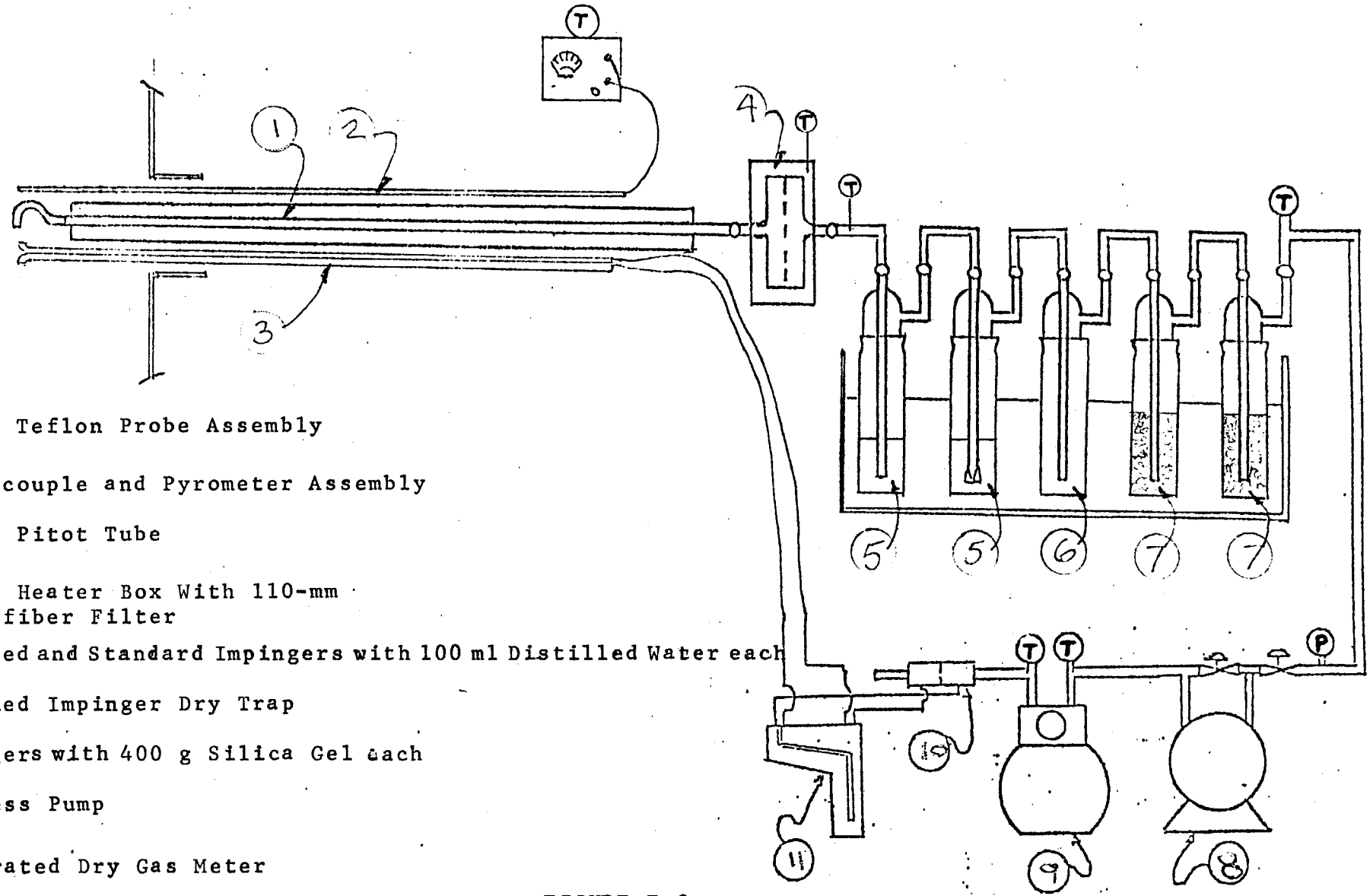


FIGURE E-1

WET ELECTROSTATIC PRECIPITATOR INLET SAMPLING TRAIN

Tests 1 and 2
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Clayton Environmental Consultants, Inc.



1. Heated Teflon Probe Assembly
2. Thermocouple and Pyrometer Assembly
3. S-Type Pitot Tube
4. Filter Heater Box With 110-mm Glass-fiber Filter
5. Modified and Standard Impingers with 100 ml Distilled Water each
6. Modified Impinger Dry Trap
7. Impingers with 400 g Silica Gel each
8. Leakless Pump
9. Calibrated Dry Gas Meter
10. Calibrated Orifice
11. Dual Inclined Manometer

T Temperature Monitor

P Pressure Monitor

FIGURE E-2

WET ELECTROSTATIC PRECIPITATOR OUTLET SAMPLING TRAIN

Tests 1 and 2
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Clayton Environmental Consultants, Inc.

1. Heated Teflon Probe Assembly
2. Thermocouple and Pyrometer Assembly
3. S-Type Pitot Tube
4. Filter Heater Box With 110-mm Glass-fiber Filter
5. Flexible Teflon Line
6. Impingers with 100 ml Distilled Water each
7. Impinger Dry Trap
8. Impingers with 400 g Silica Gel each
9. Leakless Pump
10. Calibrated Dry Gas Meter
11. Calibrated Orifice
12. Dual Inclined Manometer
13. XAD-2 Adsorbent Column Water Cooled and Light-Shielded

T Temperature Monitor

P Pressure Monitor

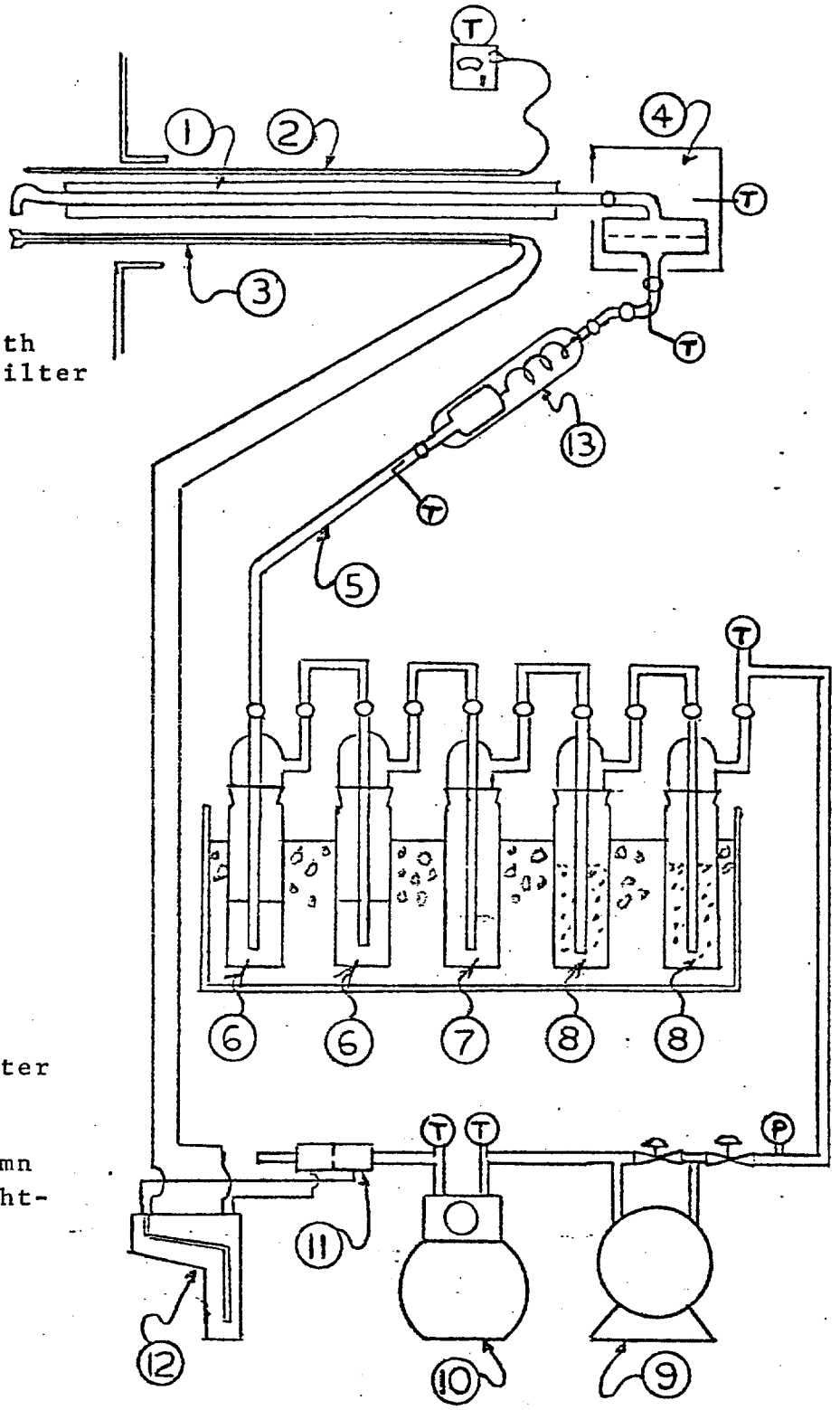
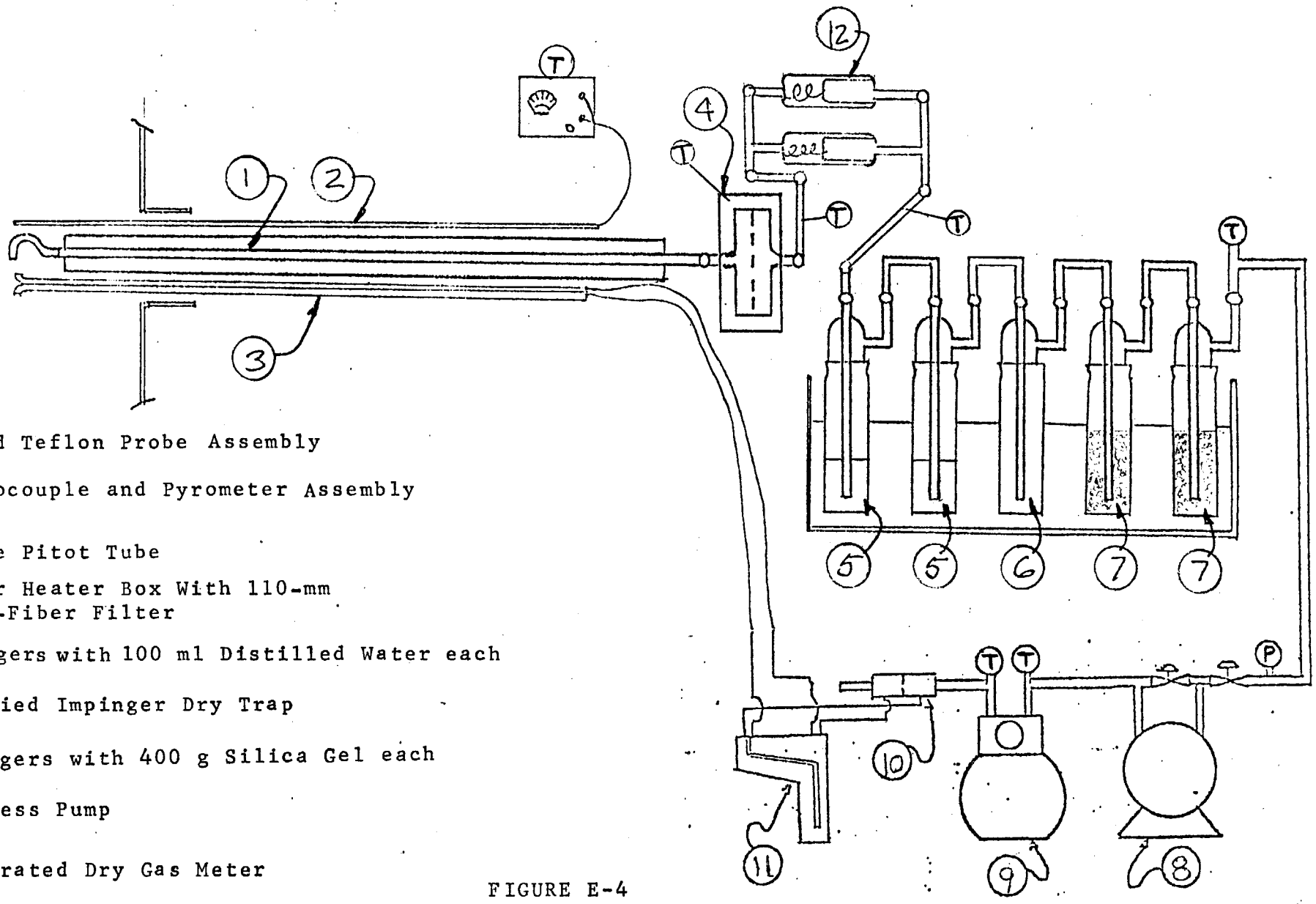


FIGURE E-3

WET ELECTROSTATIC PRECIPITATOR INLET SAMPLING TRAIN

Test 3
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Clayton Environmental Consultants, Inc.



1. Heated Teflon Probe Assembly
2. Thermocouple and Pyrometer Assembly
3. S-Type Pitot Tube
4. Filter Heater Box With 110-mm Glass-Fiber Filter
5. Impingers with 100 ml Distilled Water each
6. Modified Impinger Dry Trap
7. Impingers with 400 g Silica Gel each
8. Leakless Pump
9. Calibrated Dry Gas Meter
10. Calibrated Orifice
11. Dual Inclined Manometer
12. XAD-2 Adsorbent Column Water Cooled and Light-Shielded

T Temperature Monitor

FIGURE E-4

WET ELECTROSTATIC PRECIPITATOR OUTLET SAMPLING TRAIN
Test 3
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Clayton Environmental Consultants, Inc.

1. Heated Teflon Probe Assembly
2. Thermocouple and Pyrometer Assembly
3. S-Type Pitot Tube
4. Filter Heater Box With 110-mm Glass-Fiber Filter
5. Flexible Teflon Line
6. Impingers with 100 ml Distilled Water each
7. Impinger Dry Trap
8. Impingers with 400 g Silica Gel each
9. Leakless Pump
10. Calibrated Dry Gas Meter
11. Calibrated Orifice
12. Dual Inclined Manometer
13. XAD-2 Adsorbent Column Water Water Cooled and Light-Shielded

T Temperature Monitor

P Pressure Monitor

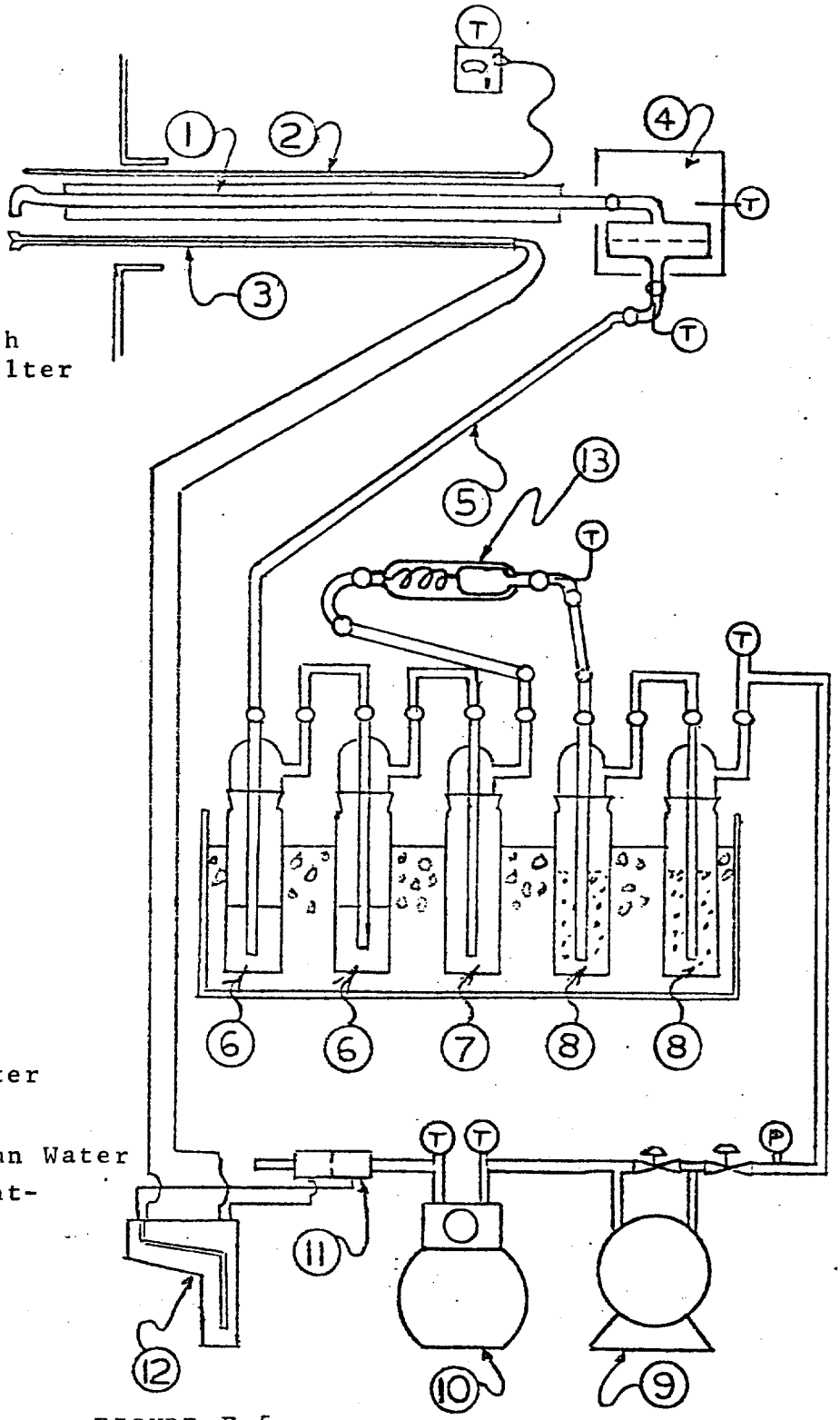
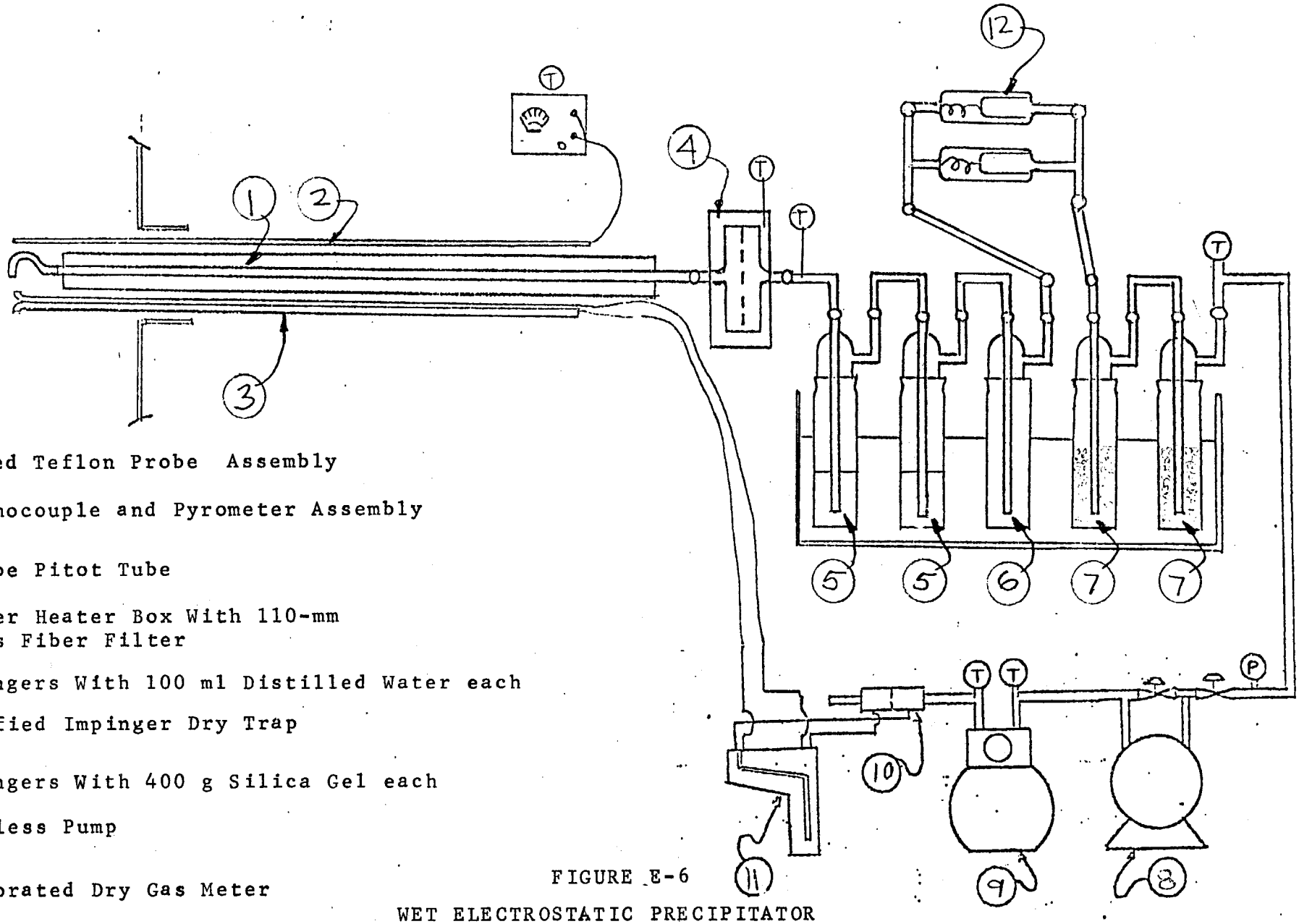


FIGURE E-5

WET ELECTROSTATIC PRECIPITATOR INLET SAMPLING TRAIN

Test 4
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Clayton Environmental Consultants, Inc.



1. Heated Teflon Probe Assembly
2. Thermocouple and Pyrometer Assembly
3. S-Type Pitot Tube
4. Filter Heater Box With 110-mm Glass Fiber Filter
5. Impingers With 100 ml Distilled Water each
6. Modified Impinger Dry Trap
7. Impingers With 400 g Silica Gel each
8. Leakless Pump
9. Calibrated Dry Gas Meter
10. Calibrated Orifice
11. Dual Inclined Manometer
12. XAD-2 Adsorbent Column Water Cooled and Light-Shielded

T Temperature Monitor

FIGURE E-6

WET ELECTROSTATIC PRECIPITATOR
OUTLET SAMPLING TRAIN
Test 4
Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Clayton Environmental Consultants, Inc.

APPENDIX E

SECTION II EPA FIELD AND LABORATORY DIRECTIONS

Field and Laboratory Directions for the Coke Oven Emission Test Program to be Conducted at the No. 4 Coke Battery Located at the Wisconsin Steel Plant, Chicago, Illinois

Project Officer: Clyde E. Riley
Process Engineer: Andrew Trenholm

Test Site Preparations

A. Inlet and outlet sampling locations

1. Particulate test equipment to be set up Sunday and Monday.

2. POM test equipment to be set up on Sunday and Monday.

3. Preliminary measurements for velocity, temperature, and moisture to be determined on Monday by Clayton.

4. Preliminary data for particulate and POM concentrations to be supplied by Battelle. Hopefully, from these data the length of test and volume of sample can be calculated. Because of the four additional port changes at the inlet site, the inlet test time will be less than the outlet.

5. Contractors shall place a XAD-2 POM adsorbent column between the 3rd (empty) and 4th (silica gel) impingers of the two particulate trains for one test. A second test shall be performed by placing the XAD-2 column after the glass fiber filter holder and before the first water-filled impinger. Column collections will be analyzed for benzene soluble organics. The XAD-2 column teperature shall be controlled at $70^{o}F \pm 10^{o}F$.

   The additional XAD-2 columns on the particulate collectors will only be used during two simultaneous inlet and outlet tests. The choice of runs during which the columns are to be used is left to the contractors.

6. Evacuated flash samples shall be collected by Battelle during the ~~one of the XAD-2~~ particulate tests. Three ~~Two~~ integrated grab samples shall be collected at each site 23 ~~12~~ per inlet, 3 ~~2~~ per outlet).

   It will be necessary to calculate the residence time of the gas stream between the inlet and outlet sampling locations for these samples. Simultaneous sampling is to be performed for the gas stream components and not for the identical clock times.

   NOTE: only one grab sample per run from each sampling location shall be analyzed as specified in the Contract Task Specification request.

7. Integrated bag samples (1 per inlet, 1 per outlet) shall be collected by Clayton during the first test. Based on the measured molecular weight the Project Officer shall decide whether or not additional molecular weight measurements will be necessary for the remaining test.

8. It will be necessary to record temperature data for the exiting gas stream of the (1) filter, and (2) column for each sampling point. A calibrated thermocouple would best accomodate this requirement.

9. The POM train's probe, filter, and Tenax adsorbent column will be operated at a temperature of 125°F, ± 5°F. The filter exit gas stream and the column temperature shall be monitored and recorded at each sampling point.

10. Initial preparation of the sample collector's parts, i.e., probe tip, probe liner, filter holder, impingers, and adsorbent column will require a blank cleanup operation. These particulate and POM train blank samples will later be analyzed in the same manner as the actual test samples. Thus, a routine, consistent procedure shall be used for the sample collector disassembly and cleanup. (Please refer to the EPA publication "Guidelines for Recovery of Particulate Samples Using EPA Method 5," April, 1975.)

11. Normal cleanup for the particulate train will require that the collector's probe and glassware be first rinsed with acetone. The back half section being first washed with water and then rinsed with acetone. After the acetone rinse of both sections, a benzene wash shall be performed (benzene wash for benzene soluble organics). A final rinse of acetone shall be performed and discarded.

12. All samples including blanks shall be assigned individual EPA identification numbers. Pre-numbered labels will be supplied by the project officer.

B. Water collection locations (3).

1. Clayton shall supply each site with a large 2-5 gallon container. Equal amounts of sample (400 mls) shall be collected every hour. Each 400 ml aliquot shall be divided equally into 2 quart size containers. This will yield 2 composite samples per test per site. One composite sample shall be collected by Clayton and analyzed for percent solids, dissolved and total. The second composite sample shall be collected by Battelle and analyzed for POM compounds as per the "Source Sampling and Analysis Schedule" contained in the task specifications.

Sampling

A. Inlet and outlet sampling locations.

1. Process sampling times shall be determined by the Process Engineer, Mr. Andrew Trenholm. It is questionable that sampling can be started before 11:00 a.m. each test day due to process operations. Sampling shall be discontinued when the pusher-ram begins to enter the coke oven. A timed five (5) minute delay period shall be instituted during this operation. After the 5 minute period sampling shall be resumed. It will not be necessary to remove the probes from the stack, however, they should be rotated 180° during this period to avoid impaction of undesired particles.

2. Visible emissions measurements will not be discontinued during the pushing operation. The observer shall not read for more than 2 1/2 hours without a rest interval. Total observation time per test is to be determined by the Project Officer. This is a change from the original Source Sampling and Analysis Schedule minimum sampling time of 8 hours.

3. Teflon hose shall be used at the inlet location to connect the probes to their respective impinger trains.

4. Sampling time (clock and elapsed time) logs are required for all sampling runs.

Cleanup

A. Particulate (Inlet and Outlet locations)

1. Normal EPA-5 cleanup, including impingers, is specified. This is to be followed by a benzene wash and finally by a second acetone wash that is to be discarded.

a. EPA-5 Cleanup fractions

Front half (1) probe acetone rinse, etc.

(2) glass fiber filter

Back half (3) teflon hose*, impinger contents and water wash

(4) impinger contents and water wash ether/chloroform extraction

(5) teflon hose*, impinger acetone wash

(6) silica gel impinger

b. Benzene cleanup fractions

Front half (1) probe rinse, etc.

Back half (2) teflon hose*, impingers

c. Final acetone cleanup

Front and back half (1) discard

B. POM (Inlet and Outlet Locations)

1. The sampling train will be washed with methylene chloride. All POM samples are to be stored in dark containers. Impinger contents are to be discarded.

a. POM cleanup fractions

Front half (1) probe rinse, etc.

(2) ~~glass fiber~~ tissue quartz filter media

Back half (3) tenax adsorbent column

(4) impinger contents to be discarded.

C. Integrated bag samples will be transfered to a grab flask after each test.

NOTE: Retain blank reagents, filters, and adsorbent columns for analysis.

---

*Teflon hose not used on outlet sampling train.

water - 8 samples
GCMS Pete
Joe - 16 total
TFPOM

Joe
Pete
Total 1 hour POM

POM 20 samples
divided into 3 fractions
hold all samples

Analyses

A. Particulates (Inlet and Outlet Samples)

1. Perform normal EPA-5 analysis including impingers, determine ether/chloroform extraction, water, and impinger acetone residues.

Keep separate F + B

2. Combine the above fractions for benzene extractions to determine benzene soluble organics.

Front half (a) probe and glass fiber filter

Back half (b) ether/chloroform extraction, water, and impinger acetone residues.

B. Benzene Soluble Organics (Inlet and Outlet samples benzene particulate cleanup)

1. Analyze the following fractions for benzene soluble organics.

Front half (a) probe rinse

Back half (b) impingers

C. Percent Solids (Inlet and Outlet samples)

1. Analyze for the above using ASTM method D1888-67 or its equivalent

2. D1888-67 - Particulate and dissolved Matter in water.

(a) dissolved solids

(b) total solids

D. XAD-2 adsorbent column (Inlet and Outlet Samples)

1. Perform benzene extraction to determine organic mass.

E. POM (Inlet and Outlet samples)

1. Analyzed for compounds listed on attachment, included with Contract Task Specification Request.

(a) extract the adsorbent sample using 'Distilled-in-Glass' pentane.

2. Flash sample analysis

APPENDIX F

SECTION I SUMMARY OF PARTICULATE WEIGHT FRACTIONS

TABLE F-1

SUMMARY OF PARTICULATE WEIGHT FRACTIONS (gms)
METHOD 5 EMISSION TEST

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

		Front half fractions			Back half fractions					
					Impingers					
		Probe Acetone Rinse	110 mm Filter	Total Filterable Mass	Water Catch	Chlor/ether Extraction	Acetone Rinse	Total Catch	Total Particulate Mass	
Run 1	Inlet	0.1112	0.0700	0.1812	0.0344	0.0089	0.0925	0.1358	0.3170	
	Outlet	0.0748	0.0012	0.0760	0.0033	0.0126	0.0085	0.0244	0.1004	
Run 2	Inlet	0.0894	0.0282	0.1176	0.0378	0.0151	0.0914	0.1443	0.2619	
	Outlet	0.0156	0.0008	0.0164	0.0043	0.0112	0.0115	0.0270	0.0434	
Run 3	Inlet	0.1183	0.1823	0.3006	0.0160*	0*	0.0147*	0.0307*	0.3313*	*XAD-2 column
	Outlet	0.0220	0.0004	0.0224	0	0	0.0070	0.0070	0.0294	between filter & first impinger
Run 4	Inlet	0.0915	0.0540	0.1455	0.0593	0	0.1081	0.1674	0.3129	XAD-2 column
	Outlet	0.0092	0.0021	0.0113	0.0123	0	0.0057	0.0180	0.0293	between third & fourth impinger

Particulate fractions corrected for blank values presented below -

Blank values of reagents used during tests

	Acetone	Filter	Water	Chlor/ether
Run 1	5.1×10^{-6}	$+1.2 \times 10^{-4}$	1.04×10^{-5}	3.6×10^{-6}
Run 2	$23. \times 10^{-6}$	$+2.0 \times 10^{-4}$	1.4×10^{-5}	$12. \times 10^{-6}$
Run 3	1.5×10^{-6}	-0.7×10^{-4}	1.0×10^{-5}	$20. \times 10^{-6}$
Run 4	6.4×10^{-6}	$+2.5 \times 10^{-4}$	0.92×10^{-5}	$26. \times 10^{-6}$

Liquid samples - gms/ml
filter - gms

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EPA - Task 29 — Benzene

(Value)(g)

LAB NO.	TARE WGT.	FINAL WGT.	SAMPLE
112030	93.6449	93.6449	165 mb 0.0000
112031	93.6177	93.6193	120 0.0016
112032	92.1860	92.2094	95 0.0234
112033	95.3154	95.3348	265 0.0194
112034	92.6580	92.6658	185 0.0078
112035	94.8879	94.9081	270 0.0202
112036	94.4373	94.4420	145 0.0047
112037	94.5163	94.5450	190 0.0287
112038	92.7700	92.7750	140 0.0050
112039	95.5585	95.6197	160 0.0612
112040	93.0924	93.0944	140 0.0020
112041	90.6280	90.7143	250 0.0863
112042	94.5754	94.5773	90 0.0019
112043	93.1850	93.2383	225 0.0533
112044	95.8269	95.8268	115 −0.0001
112045	92.4599	92.4604	110 ~~0.0001~~ .0005
112046	90.0527	90.0545	80 0.0018
112047	94.7944	94.8440	285 0.0496
112048	95.4879	95.4882	100 0.0003
112049	91.8800	91.8987	160 0.0187
112050	96.9502	96.9504	60 0.0002 XAD
112051	96.0527	96.0525	70 −0.0002 XAD

EPA TASK 24

LAB NO.	TARE WGT.	FINAL WGT.	Partic SAMPLE
112052	91.3993	91.4002	4.5 0.0009
112053	90.5952	90.6212	310 0.0260
112054	92.4517	92.4527	6.5 0.0010
11255	92.3250	92.3631	320 0.0381

EPA TASK 29 - 110mm A Filters

LAB NO.	TARE WGT.	FINAL WGT.	PARTIC SAMPLE
111976	0.51852	0.51864	0.00012 (g)
111977	0.53016	0.53036	0.00020
111978	0.51924	0.51917	-0.00007
111979	0.51947	0.51972	0.00025
111980	0.51953	0.52081	0.00128 1
111981	0.51574	0.58587	0.07013 1
111982	0.52000	0.52103	0.00103 2
111983	0.51753	0.54594	0.02841 2
111984	0.51417	0.51455	0.00038 3
111985	0.52280	0.70504	0.18224 3
111986	0.65720	0.65952	0.00232 4
111987	0.66818	0.72246	0.05428 4

EPA- TASK 29 — Acetone

LAB NO.	TARE WGT.	FINAL WGT.	PARTIC SAMPLE
112004	91.6774	91.6786	233 0.0012(g)
112005	94.1222	94.1249	115 0.0027
112006	95.1308	95.1604	65 0.0296
112007	93.2600	93.2703	200 0.0103
112008	95.7611	95.7637	75 0.0026
112009	96.0470	96.0529	365 0.0059
112010	89.4617	89.5377	235 0.0760
112011	93.7609	93.7706	230 0.0097
112012	94.0051	94.1187	470 0.1136
112013	94.3233	94.4173	300 0.0940
112014	94.6363	94.6555	155 0.0192
112015	93.1215	93.1386	245 0.0171
112016	93.4255	93.5218	300 0.0963
112017	96.3094	96.4083	325 0.0989
112018	93.5804	93.5806	133 0.0002
112019	96.9900	96.9907	110 0.0007
112020	95.1846	95.3033	290 0.1187
112021	95.9584	95.9735	300 0.0151
112022	93.2818	93.3040	160 0.0222
112023	93.6713	93.6786	180 0.0073
112024	92.1683	92.2613	230 0.0930
112025	93.7723	93.8834	465 0.1111

EPA - TASK 29

PARTIC

LAB NO.	TARE WGT.	FINAL WGT.	SAMPLE
112026	92.1933	92.2038	20.5 ~~0.0151~~ 0.0105
112027	94.4864	94.4939	27.5 0.0075
112028	94.9585	94.9587	74 0.0002
112029	92.5755	92.5762	65 0.0007

EPA-TASK 29 — Water (Aq)

LAB NO.	TARE WGT.	FINAL WGT.	PARTIC SAMPLE
111988	87.6546	87.6557	104 +0.0011 (g)
111989	91.2705	91.2716	120 +0.0011
111990	96.6057	96.6083	250 +0.0026
111991	92.1181	92.1197	114 +0.0016
111992	95.2860	95.2878	285 0.0018 ✓
111993	92.8335	92.8359	475 0.0024
111994	94.5741	94.5823	475 0.0082
111995	92.4709	92.5102	475 0.0393
111996	97.6048	97.6172	582 0.0124
111997	96.3111	96.3555	478 0.0444
111998	95.5996	95.6005	88 0.0009
111999	95.7748	95.7759	114 0.0011
112000	97.4335	97.4365	475 0.0030
112001	93.1195	93.1402	478 0.0207
112002	97.0427	97.0594	475 0.0167
[illegible]	100.1600	100.2137	475 0.0537

EPA-TASK-24 - Water (CE)

LAB NO.	TARE WGT.	FINAL WGT.	PARTIC SAMPLE
111988	95.0645	95.0666	164 +0.0021 (g)
111989	95.8898	95.8929	120 +0.0031
111990	92.7332	92.7341	250 +0.0009
111991	92.6979	93.6993	114 +0.0014
111992	92.0441	92.0465	285 0.0024
111993	95.9184	95.9223	475 0.0039
111994	92.2837	92.2980	475 0.0143
111995	94.1004	94.1110	475 0.0106
111996	95.3256	95.3438	582 0.0182
111997	95.2402	95.2609	470 0.0207
111998	92.7715	92.7729	88 0.0014
111999	93.6003	93.6008	116 0.0005
112000	92.0784	92.0807	475 0.0023
112001	94.7068	94.7082	470 0.0014
112002	95.9016	95.9137	475 0.0121
112003	95.0000	95.0016	475 0.0016

EPA- TASK 24 — E.P. Water (TSS)

LAB NO.	TARE WGT.	FINAL WGT.	PARTIC SAMPLE
111949	0.13826 0.13364	0.14473 0.14104	0.01337 (g)
111950	0.13892 0.12694	0.14875 0.14424	0.02713
111951	0.13871	0.15079	0.01208
111952	0.13758 0.13912	0.14201 0.14700	0.01231
111953	0.13471 0.13843	0.18036 0.16944	0.07666
111954	0.12565	0.13634	0.01069
111955	0.13342	0.14048	0.00706
111956	0.12658	0.13504	0.00846
111957	0.13892 0.13672	0.14100 0.15266	0.01802
111958	0.13318	0.13905	0.00587
111959	0.13333	0.14603	0.01270
111960	0.12744	0.21118	0.08374
111961	0.13772	0.14446	0.00674
111962	0.13791	0.14688	0.00897
111963	0.13946	0.16180	0.02234
Blank (lab)	0.13709	0.13696	-0.00013

TDS

LAB NO.	TARE WGT.	FINAL WGT.	PARTIC SAMPLE
111949	95.3116	95.6066	0.2950
111950	94.5080	94.8063	0.2983
111951	92.8104	92.9585	0.1481
111952	94.9548	95.1877	0.2329
111953	94.0079	94.2905	0.2826
111954	93.8896	94.0179	0.1283
111955	94.7713	94.9320	0.1607
111956	96.9922	97.1207	0.1285
111957	92.7962	93.0085	0.2122
111958	99.6190	99.7427	0.1237
111959	93.5584	93.7011	0.1427
111960	95.8069	95.9378	0.1309
111961	94.8842	95.0617	0.1775
111962	100.6473	100.8100	0.1627
111963	97.0809	97.2444	0.1635
Blank (LAB)	99.2418	99.2416	-0.0002

APPENDIX F

SECTION II SAMPLE IDENTIFICATION LOG

SAMPLE LOG

Task No. 29 Job No. 5085 Recorded by: [illegible]

EPA Sample Number	Date	Source		Run No.	Fraction Identificatio
S-77-002-701	5-9-77	OUTLET	112006	PRELIM. CLEAN.	ACETONE FRONT ½
S-77-002-702	5-9-77	OUTLET	112032	PRELIM. CLEAN	BENZENE FRONT ½
S-77-002-703	5-9-77	OUTLET	111992	PRELIM. CLEAN	H_2O BACK ½
S-77-002-704	5-9-77	OUTLET	112007	PRELIM. CLEAN	ACETONE BACK ½
S-77-002-705	5-9-77	OUTLET	112033	PRELIM. CLEAN	BENZENE BACK ½
S-77-002-706	5-9-77	INLET	112008	PRELIM. CLEAN	ACETONE FRONT ½
S-77-002-707	5-9-77	INLET	112034	PRELIM. CLEAN	BENZENE FRONT ½
S-77-002-708	5-9-77	INLET	111993	PRELIM. CLEAN	H_2O BACK ½
S-77-002-709	5-9-77	INLET	112009	PRELIM. CLEAN	ACETONE BACK ½
S-77-002-710	5-9-77	INLET	112035	PRELIM. CLEAN	BENZENE BACK ½
S-77-002-711	5-10-77	OUTLET	112010	P-1	ACETONE FRONT ½
S-77-002-712	5-10-77	OUTLET	112036	P-1	BENZENE FRONT ½
S-77-002-713	5-10-77	OUTLET	111980	P-1	FILTER # A-102-14
S-77-002-714	5-10-77	OUTLET	111994	P-1	H_2O BACK ½
S-77-002-715	5-10-77	OUTLET	111994	P-1	CHLOROFORM-ETHER EXTRACT FROM H_2O BACK ½
S-77-002-716	5-10-77	OUTLET	112011	P-1	ACETONE BACK ½
S-77-002-717	5-10-77	OUTLET ~~INLET~~	112037	P-1	BENZENE BACK ½
S-77-002-718	5-10-77	OUTLET	112012	P-1	ACETONE FRONT ½
S-77-002-719	5-10-77	OUTLET	112038	P-1	BENZENE FRONT ½
S-77-002-720	5-10-77	OUTLET	111981	P-1	FILTER A-102-13
S-77-002-721	5-10-77	INLET	111995	P-1	H_2O BACK ½
S-77-002-722	5-10-77	INLET	111995	P-1	CHLOROFORM-ETHER-EXTRACT H_2O BACK ½
S-77-002-723	5-10-77	INLET	112013	P-1	ACETONE BACK ½
S-77-002-724	5-10-77	INLET	112039	P-1	BENZENE BACK ½
S-77-002-725	5-10-77		112004	P-1	ACETONE BLANK
S-77-002-726	5-10-77		111976	P-1	FILTER BLANK A-102-19

SAMPLE LOG

Task No. 29 Job No. 5085 Recorded by: [illegible]

EPA Sample Number	Date	Source	Run No.	Fraction Identification
S-77-002-727	5-10-77	111990	P-1	H_2O BLANK
S-77-002-728	5-10-77	111990	P-1	CHLOROFORM-ETHER EXTRACT OF H_2O BLANK
S-77-002-729	5-10-77	112030	P-1	BENZENE BLANK
S-77-002-730	5-10-77	SYSTEM H_2O 111949	P-1	ESP INLET H_2O
S-77-002-731	5-10-77	SYSTEM H_2O 111950	P-1	ESP OUTLET H_2O
S-77-002-732	5-10-77	SYSTEM H_2O 111951	P-1	ESP BLOW DOWN H_2O
S-77-002-733	5-11-77	INLET 112016	P-2	ACETONE FRONT ½
S-77-002-734	5-11-77	INLET 112042	P-2	BENZENE FRONT ½
S-77-002-735	5-11-77	INLET 111983	P-2	FILTER # A-102-15 CRACK
S-77-002-736	5-11-77	INLET 111997	P-2	H_2O BACK ½
S-77-002-737	5-11-77	INLET 112017	P-2	ACETONE BACK ½
S-77-002-738	5-11-77	INLET 112043	P-2	C_6H_6 BACK ½
S-77-002-739	5-11-77	OUTLET 112014	P-2	ACETONE FRONT ½
S-77-002-740	5-11-77	OUTLET 112040	P-2	C_6H_6 FRONT ½
S-77-002-741	5-11-77	OUTLET 111996	P-2	H_2O BACK ½ 2 BOTTLES ASB
S-77-002-742	5-11-77	OUTLET 111996	P-2	CHLOROFORM ETHER EXT. OF H_2O BACK ½
S-77-002-743	5-11-77	OUTLET 112015	P-2	ACETONE BACK ½
S-77-002-744	5-11-77	OUTLET 112041	P-2	C_6H_6 BACK ½
S-77-002-745	5-11-77	OUTLET 111982	P-2	FILTER A-102-18
S-77-002-746	5-11-77	INLET 111997	P-2	CHLOROFORM ETHER EXT. OF H_2O BACK ½
S-77-002-747	5-11-77	111991	P-2	H_2O BLANK
S-77-002-748	5-11-77	111991	P-2	CHLOROFORM ETHER EXT. OF H_2O BLANK
S-77-002-749	5-11-77	112005	P-2	ACETONE BLANK
S-77-002-750	5-11-77	112031	P-2	C_6H_6 BLANK
S-77-002-751	5-11-77	111977	P-2	FILTER BLANK A-102-2
S-77-002-752	5-11-77	System H_2O 111952	P-2	ESP INLET H_2O

SAMPLE LOG

Task No. 29 Job No. 5085 Recorded by: [illegible]

EPA Sample Number	Date	Source	Run No.	Fraction Identification
S-77-002-753	5-11-77	SYSTEM H_2O 111953	P-2	ESP OUTLET H_2O
S-77-002-754	5-11-77	SYSTEM H_2O 111954	P-2	ESP BLOWDOWN H_2O
-77-002-755	5-12-77	OUTLET 112051	PRELIM. CLEAN	C_6H_6 BACK ½ XAD GLASSWARE
S-77-002-756	5-12-77	OUTLET 112029	PRELIM. CLEAN	ACETONE BACK ½ OF XAD GLASSWARE
S-77-002-757	5-12-77	OUTLET 111998	PRELIM. CLEAN	H_2O BACK ½ OF XAD GLASSWARE
-77-002-758	5-12-77	OUTLET 111998	PRELIM. CLEAN	CHLOROFORM-ETHER EXTRACT OF H_2O BACK ½
S-77-002-759	5-12-77	OUTLET 112022	P-3	ACETONE FRONT ½
-77-002-760	5-12-77	OUTLET 112048	P-3	C_6H_6 FRONT ½
-77-002-761	5-12-77	OUTLET 111984	P-3	FILTER # A-102-20
S-77-002-762	5-12-77	OUTLET 112000	P-3	H_2O BACK ½
-77-002-763	5-12-77	OUTLET 112000	P-3	CHLOROFORM ETHER EXT. OF H_2O BACK ½
S-77-002-764	5-12-77	OUTLET 112023	P-3	ACETONE BACK ½
-77-002-765	5-12-77	OUTLET 112049	P-3	C_6H_6 BACK ½
-77-002-766	5-12-77	111988	P-3	H_2O BLANK
S-77-002-767	5-12-77	111988	P-3	CHLOROFORM ETHER EXT OF H_2O BLANK
-77-002-768	5-12-77	112018	P-3	ACETONE BLANK
-77-002-769	5-12-77	112044	P-3	C_6H_6 BLANK
S-77-002-770	5-12-77	111978	P-3	FILTER BLANK A-102-16
-77-002-771	5-12-77	INLET 112020	P-3	ACETONE FRONT ½
S-77-002-772	5-12-77	INLET 112046	P-3	C_6H_6 FRONT ½
-77-002-773	5-12-77	INLET 111985	P-3	FILTER A-102-17
-77-002-774	5-12-77	INLET 112001	P-3	H_2O BACK ½
S-77-002-775	5-12-77	INLET 112001	P-3	CHLOROFORM ETHER EXT. OF H_2O BACK ½
-77-002-776	5-12-77	INLET 112021	P-3	ACETONE BACK ½
S-77-002-777	5-12-77	INLET 112047	P-3	C_6H_6 BACK ½
-77-002-778	5-12-77	INLET 111999	PRELIM. CLEAN	H_2O BACK ½ OF XAD GLASSWARE

SAMPLE LOG

Task No. 29 Job No. 50 85 Recorded by: [illegible]

EPA Sample Number	Date	Source	Run No.	Fraction Identification
S-77-002-779	5-12-77	111999	PRELIMIN. CLEAN	CHLOROFORM ETHER EXT H2O BACK ½
S-77-002-780	5-12-77	112028	PRELIM. CLEAN	ACETONE BACK ½ OF XAD GLASSW
S-77-002-781	5-12-77	112050	PRELCLEAN	C6H6 BACK ½ OF XAD GLASSW
S-77-002-782	5-14-77	SYSTEM H2O 111955	P-3	ESP INLET H2O NON PUSH P-
S-77-002-783	5-14-77	SYSTEM H2O 111956	P-3	ESP OUTLET H2O NON PUSH P-3
S-77-002-784	5-14-77	SYSTEM H2O 111957	P-3	ESP BLOWDOWN H2O NON PUSH P-3
S-77-002-785	5-14-77	SYSTEM H2O 111958	P-3	ESP INLET H2O PUSH AND P-3
S-77-002-786	5-14-77	SYSTEM H2O 111959	P-3	ESP OUTLET H2O PUSH ONLY P-3
S-77-002-787	5-14-77	SYSTEM H2O 111960	P-3	ESP BLOWDOWN H2O PUSH ONLY P-3
S-77-002-788	5-14-77	INLET 112024	P-4.	ACETONE FRONT ½
S-77-002-789	5-14-77	INLET 112052	P-4.	C6H6 FRONT ½
S-77-002-790	5-14-77	INLET 111987	P-4	FILTER # A-102-23
S-77-002-791	5-14-77	INLET 112003	P-4	H2O BACK ½
S-77-002-792	5-14-77	INLET 112003	P-4	CHLOROFORM ETHER EXT OF H2O BACK ½
S-77-002-793	5-14-77	INLET 112025	P-4	ACETONE BACK ½
S-77-002-794	5-14-77	INLET 112053	P-4	C6H6 BACK ½
S-77-002-795	5-14-77	OUTLET 112026	P-4	ACETONE FRONT ½
S-77-002-796	5-14-77	OUTLET 112054	P-4	C6H6 FRONT ½
S-77-002-797	5-14-77	OUTLET 111986	P-4	FILTER # A-102-24
S-77-002-798	5-14-77	OUTLET 112002	P-4	H2O BACK ½
S-77-002-799	5-14-77	OUTLET 112002	P-4	CHLOROFORM ETHER EXT OF H2O BACK ½
S-77-002-800	5-14-77	OUTLET 112027	P-4	ACETONE BACK ½
S-77-002-801	5-14-77	OUTLET 112055	P-4	C6H6 BACK ½
S-77-002-802	5-14-77	112019	P-4	ACETONE BLANK
S-77-002-803	5-14-77	111999	P-4	H2O BLANK
S-77-002-804	5-14-77	112045	P-4	C6H6 BLANK

SAMPLE LOG

Task No. 29 Job No. 5085 Recorded by: [illegible]

EPA Sample Number	Date	Source	Run No.	Fraction Identification
-77-002-805	5-14-77	111979	P-4	FILTER BLANK A-102-[illegible]
S-77-002-806	5-14-77	SYSTEM H_2O 111961	P-4	ESP INLET H_2O
-77-002-807	5-14-77	SYSTEM H_2O 111962	P-4	ESP OUTLET H_2O
S-77-002-808	5-14-77	SYSTEM H_2O 111963	P-4	ESP BLOWDOWN H_2O
S-77-002-809	5-14-77	~~BL~~ 111989	P-4	CHLOROFORM ETHER ETHANOL H_2O BLANK P-4
-77-002-810				
S-77-002-811				
-77-002-812				
-77-002-813				
S-77-002-814				
-77-002-815				
-77-002-816				
S-77-002-817				
-77-002-818				
S-77-002-819				
-77-002-820				
-77-002-821				
S-77-002-822				
-77-002-823				
S-77-002-824				
S-77-002-825				
-77-002-826				
S-77-002-827				
-77-002-828				
-77-002-829				
S-77-002-830				

APPENDIX F

SECTION III PRE-WASH OF SAMPLE COLLECTORS DATA SUMMARY

PARTICULATE WEIGHTS - PRE/POST TEST RINSE SUMMARY
BY-PRODUCT COKE-OVEN BATTERY NO. 4
EMISSION TEST - WET ELECTROSTATIC PRECIPITATOR

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

Sampling Location	1977 Date	Front Half		Back Half			
		Acetone (gm)	Benzene (gm)	Acetone (gm)	Benzene (gm)	Water (gm) (Aqueous)	Water (gm) (Organic)
Inlet	5/10 - Prior to Particulate Test No. 1	0.0022	0.0078	0.0040	0.0202	<0.0001	0.0022
	5/11 - Between Particulate Test No. 2 and Particulate Test No. 3					<0.0001*	<0.0001*
	5/12 - Between Particulate Test No. 3 and Particulate Test No. 4				0.0002*		
	5/14 - After Particulate Test No. 4	<0.0001*					
Outlet	5/10 - Prior to Particulate Test No. 1	0.0293	0.0234	0.0093	0.0194	<0.0001	0.0014
	5/11 - Between Particulate Test No. 2 and Particulate Test No. 3					<0.0001*	0.0003*
	5/12 - Between Particulate Test No. 3 and Particulate Test No. 4				<0.0001*		
	5/14 - After Particulate Test No. 4			0.0003*			

* XAD Glassware

APPENDIX F

SECTION IV BENZENE SOLUBLE ORGANIC DATA

BSO Method 5 fractions less blanks

		Run 1 Inlet	Run 1 Outlet	Run 2 Inlet	Run 2 Outlet	Run 3 Inlet	Run 3 Outlet	Run 4 Inlet	Run 4 Outlet		Pre Inc Inlet	Pre Out Outlet
Front (mg)	Probe + Filter	98.2	59.5	69.0	12.8	115.1	13.6	88.7	5.1		1.6	26.0
	Filter blank	-1	-1	-1	-1	-1	-1	-1	-1		-1.0	1.0
		97.2	58.5	68.0	11.8	114.1	12.6	87.7	4.1	✓	0.6	25.0
	Acetone blank	2.2 ✓	1.1 ✓	.5 ✓	.3 ✓	1.1 ✓	.6 ✓	1.5 ✓	1.3 ✓		0.3	.3
		95.0	57.4	67.5	11.5	113.0	12.0	86.2	2.8		0.3	24.7
Back (mg)	Water	0.8	0.6	1.2	1.5	0.3	0	1.1	0.9	✓	1.7	1.6
	C/E and acetone	79.2	10.8	88.5	19.0	18.4	6.6	92.2	9.3	✓	6.5	11.1
		80.0	11.4	89.7	20.5	18.7	6.6	93.3	10.2		8.2	12.7
						19.4	0.9	93.1	10.4			
	Acetone blank	1.4	1.1	.6	.4	1.1	.7	3.0	1.8	✓	1.7	0.9
	C/E, water blank	78.6	10.3	89.1	20.1	17.6	5.9	90.3	8.4	✓	6.5	11.8
		3.6	3.6	9.8 ✓	12.2	14.0 ✓	14.1 ✓	6.8 ✓	6.8 ✓	✓	3.6	2.2
		75.0	6.7	79.2	7.9	3.6	0	83.5	1.6		2.9	9.6
		74.9	6.6	79.2	7.8							
						0	0.3	0.9	1.1			
						15.7	6.6	92.4	9.3			
						15.7	6.9	93.1	10.4	✓		
						17.3	6.2	90.1	8.6		1.7	1.6
						14.2	14.1	6.8	6.8			
						3.3	0	83.3	1.8			

Blanks

		(1mg)	mls	mg/ml	mg/ml 0.1 mol WSCL
Filter	1 111976	1.0 mg			
	2 111977	0.7 mg			
	3 111978	1.2 mg			
	4 111979	0.8 mg			
Acetone	1 112004	1.1	233	.0047	
	2 112005	0.2	115	.0017	
	3 112018	0.5	133	.0038	
	4 112019	0.7	110	.0064	
Water	3 111988	0.7	104	.0067	
	4 111989	0.4	120	.0033	
	1 111990	0.4	250	.0016	
	2 111991	0.8	114	.0070	
C/E	3 111988	2.4	104	0.023	.0297
	4 111989	1.3	120	.011	.0143
	1 111990	1.5	250	.006	.0076
	2 111991	1.6	114	.014	.0210

BSO Data as received from Clayton 12-20-77 (David Homeberg)

			mg
Filter blanks	Run 1	111976	1.0
Benzene ext.	Run 2	111977	0.7
(Use 1.0 mg)	Run 3	111978	1.2
	Run 4	111979	0.8
Acetone blanks	Run 1	112004 (233)	1.1
Benzene ext.	Run 2	112005 (115)	0.2
	Run 3	112018 (133)	0.5
	Run 4	112019 (110)	0.7
Water blanks	Run 1	111990 (250)	0.4
Benzene ext. evap. water residue at 105°C	Run 2	111991 (114)	0.8
	Run 3	111988 (104)	0.7
	Run 4	111989 (120)	0.4
Chl/ether blanks	Run 1	111990 (250)	1.5
Benzene ext.	Run 2	111991 (114)	1.6
	Run 3	111988 (104)	2.4
	Run 4	111989 (120)	1.3

Benzene blank – 0

Filter and probe acetone extraction – mg

		Filter	Probe	Combined mg
Run 1	Inlet	111981	112012	98.2
	Outlet	111980	112010	59.5
Run 2	Inlet	111983	112016	69.0
	Outlet	111982	112014	12.8
Run 3	Inlet	111985	112020	115.1
	Outlet	111984	112022	13.6
Run 4	Inlet	111987	112024	88.7
	Outlet	111986	112026	5.1

Precleanup Sampler – mg

112006	26.0	acetone F	out	
112007	8.3	acetone B	out	
112008	1.6	acet. F	in	3.3
112009	3.3	acetone B	in	3.1
112028	0.6			6.4
112029	0.6	XAD glassware	acetone out	

	water	C/F		volume
111992	1.6	2.8	out	295
111993	1.7	3.2	in	475
111998	0	1.6	out	
111999	0.1	0.7		

Impingers

		Water residue BSO			(C/F acetone)			
Run 1	Inlet	111995 (475)	0.8 ✓ 0.8 ✓		111995	112013 (300) ✓	99.2 ✓ 4.3 ✓	2.9 ± 1.4
	Outlet	111994 (475)	0.6 ✓ 0.8 ✓		111994	112011 (230)	10.8 ✓ 4.0 ✓	2.9 ± 1.1
Run 2	Inlet	111997 (470)	1.2 ✓ 3.3 ✓		111997	112017 (325) ✓	88.5 ✓ 7.2 ✓	6.6 ± 0.6
	Outlet	111996 (582)	1.5 ✓ 4.0 4.1 ✓		111996	112015 (245) ✓	19.0 ✓ 8.5 8.6	8.7 ± 0.4
Run 3	Inlet	112001 (470)	0 ✓ 0		112001	112021 (300)	18.4 ✓ 11.9 ✓	10.8 ± 1.1
	Outlet	112000 (475)	0.3 ✓ 3.0		112000	112023 (180)	6.6 ✓ 11.6 ✓	10.9 ± 0.7
Run 4	Inlet	112003 (475)	1.1 1.6	0.9 1.0	112003	112025 (465)	92.2 ✓ 8.2 ✓	5.2 ± 3.0
	Outlet	112002 (475)	0.9 ✓ 1.6	1.1 1.6	112002	112027 (275)	9.3 ✓ 7.0 ✓	5.2 ± 1.8

APPENDIX G

ANALYTICAL DATA SHEETS
AS RECEIVED FROM
BATTELLE COLUMBUS LABORATORIES

Battelle
Columbus Laboratories

Project Number G-2872-5018

Internal Distribution
A. Levy
RE Barrett
EJ Schulz
PR Webb
W. Baytos
P. Jones
P. Strup
R. Iden
Sample box
Files

Date May 19, 1977

To Distribution

From Richard E. Barrett

Subject Analysis of Coke Oven Samples

Battelle conducted an emission sampling task on a coke oven in Chicago during the week of May 9-14. This memo will serve to identify the samples that were collected and to describe the analyses to be conducted.

POM Runs. POM runs were made using the EPA Method 5 sampling train and a Tenax column. Inlet and outlet samples were conducted during each of four runs. In addition, two pre-cleanup samples were collected. Methylene chloride was used as the probe wash, followed by acetone to remove residual moisture. The acetone washes were kept separately. Additionally, the impinger water samples were preserved. Blanks for the Tenax column, methylene chloride, filter, acetone, and water were collected. (Total runs: 10, plus blanks.)

Analyses should be conducted separately for:

- Total of Methylene chloride probe wash, acetone probe wash, plus filter. (When recovering the filter, the petri dish should be washed with a solvent.)
- Tenax column (for one run (B-1), two columns were used -- they should be combined for analysis).

(Total analyses: 11 each [including blank] of probe wash-plus-filter [combine equivalent proportions of methylene chloride and acetone with one filter for blank], and Tenax column.)

Impinger water will be preserved but will not be analyzed.

Analyses should include the POM compounds listed in Attachment A and total POM fluorescence (TPF). Beta naphthylamine and naphthalene will be analyzed for samples from one run (two samples -- one inlet and one outlet). I suggest Run 3 be used for this analysis.

Aliquots of each sample should be (1) sent to Joe Baumgartner (EPA), and (2) preserved for TPF analysis at a later date. Preserve any sample material remaining after the analysis.

Water Samples. Water samples were collected at each of three locations (inlet, outlet, and blowdown) for each of the four runs. (Total samples: 12.)

Each inlet and outlet water sample will be analyzed for the POM compounds listed in Attachment A. (Total analyses: 8.) Blowdown water samples will not be analyzed.

Preserve any sample material remaining after the analysis.

XAD-2 Columns. XAD-2 columns were included in the particulate trains (inlet and outlet) for each of two runs by Clayton. The purpose of the XAD-2 columns was to collect organics that might not be collected by the filter and impingers.

For one run (Run B-3), condensate was observed ahead of the column. The condensate was washed into a separate bottle with water and should be considered as a part of the column sample.

A blank XAD-2 column was provided. (Total samples: 5.)

The columns are to be analyzed for benzene soluble organics (BSO) on a gravimetric basis and for total POM fluorescence (TPF). The BSO analysis will include extracting the column with benzene and drying and weighing the sample. Aliquots of the samples should be (1) sent to Joe Baumgartner, and (2) preserved for repeat total POM fluorescence analysis at a later date. (Total analyses: 5 BSO, 5 TPF.)

There may be stopcock grease on/in these XAD-2 columns. Clayton's people like to use a lot of grease.

Flask Samples of Gases. Gas samples were collected at the inlet and outlet during Runs 1, 2, and 3. Gas was sampled into Tedlar bags during an extended period. At the conclusion of the run, a flask sample was taken from the bag. (Total samples: 6.)

All six flasks (three inlet and three outlet) are to be analyzed for benzene and ethyne (acetylene). Concentrations of these gases are expected to be low in the samples. One unused flask should be exposed to clean filtered air and analyzed to provide a blank. (Total analyses: 7.)

REB:ld

TABLE

(Aliquot) Analyses (POM)[a]	(TPF)[a]	(BN-N)[a]	Sample Number	Sample Information	(Aliquot) Sample for EPA	Sample for Future (TPF)
				(Inlet Preclean-up)		
1	1	--	S77-002-301	Methylene chloride		
			S77-002-302	#91 filter	1	1
1	1	--	S77-002-303	#221 tenax column	1	1
				(Outlet Preclean-up)		
1	1	--	S77-002-304	Methylene chloride		
			S77-002-305	#92 filter	1	1
1	1	--	S77-002-306	#226 tenax column	1	1
				(Run 1 Inlet)		
1	1	--	S77-002-307	Methylene chloride		
			S77-002-307A	Acetone		
			S77-002-308	#93 filter	1	1
1	1	--	S77-002-309	#200 tenax column	1	1
				(Run 1 Outlet)		
1	1	--	S77-002-310	Methylene chloride		
			S77-002-310A	Acetone		
			S77-002-311	#94 filter	1	1
1	1	--	S77-002-312	#199 #201 tenax column	1	1
				(Run 2 Inlet)		
1	1	--	S77-002-318	Methylene chloride		
			S77-002-318A	Acetone		
			S77-002-319	#95 filter	1	1
1	1	--	S77-002-320	#202 tenax column	1	1
				Run 2 Outlet		
1	1	--	S77-002-321	Methylene chloride		
			S77-002-321A	Acetone		
			S77-002-322	#96 filter	1	1
1	1	--	S77-002-323	#203 tenax column	1	1
				(Run 3 Inlet)		
1	1	1	S77-002-329	Methylene chloride		
			S77-002-329A	Acetone		
			S77-002-330	#97 filter	1	1
1	1	1	S77-002-331	#218 tenax column	1	1
				(Run 3 Outlet)		
1	1	1	S77-002-332	Methylene chloride		
			S77-002-332A1	Acetone		
			S77-002-333	#98 filter	1	1
1	1	1	S77-002-334	#205 tenax column	1	1
				(Run 4 Inlet)		
1	1	--	S77-002-340	Methylene chloride		
			S77-002-340A	Acetone		
			S77-002-341	#99 filter	1	1
1	1	--	S77-002-342	#204 tenax column	1	1
				(Run 4 Outlet)		
1	1	--	S77-002-343	Methylene chloride		
			S77-002-343A	Acetone		
			S77-002-344	#100 filter	1	1
1	1	--	S77-002-345	#206 tenax column	1	1

(Aliquot) Analyses (POM)[a]	(TPF)[b]	(BN-N)[c]	Sample Number	Sample Information	(Aliquot) Sample for EPA	Sample for Future (TPF)
				Water Samples		
1	--	--	S77-002-313	Run 1 WESP Inlet	1	1
1	--	--	S77-002-314	Run 1 WESP Outlet	1	1
1	--	--	S77-002-324	Run 2 WESP Inlet	1	1
1	--	--	S77-002-325	Run 2 WESP Outlet	1	1
1	--	--	S77-002-335	Run 3 WESP Inlet	1	1
1	--	--	S77-002-336	Run 3 WESP Outlet	1	1
1	--	--	S77-002-346	Run 4 WESP Inlet	1	1
1	--	--	S77-002-347	Run 4 WESP Outlet	1	1
				Blanks		
1	1	--	S77-002-351	#101 filter (quartz)	1 (#102)	1 (#103)
1	1	--	S77-002-352	Methylene chloride (200 ml)	1	1
1	1	--	S77-002-353	Acetone (200 ml)	1	1
1	1	--	S77-002-354	Distilled water (200 ml)	1	1
1	1	--	S77-002-355	#220 tenax column	1	1

(Aliquot) Analyses (BSO)[d]	(TPF)[b]	Sample Number	Sample Information	(Aliquot) Sample for EPA	Sample for Future (TPF)
1	1	S77-002-356	#215 XAD-2 column, Run 3 Inlet	1	1
1	1	S77-002-357	#216 #217 Dual XAD-2 columns, Run 3 Outlet	1	1
		S77-002-358	H_2O flush of column, Run 3 Outlet		
1	1	S77-002-359	H_2O blank of H_2O flush	1	1
1	1	S77-002-360	#207 XAD-2 column, Run 4 Inlet	1	1
1	1	S77-002-361	#208 #210 Dual XAD-2 columns, Run 4 Outlet	1	1
1	1	S77-002-362	#212 XAD-2 column blank	1	1

(a) POM Compounds -- Analyse for all listed in (Attachment A).

(b) TPF -- Total POM Fluoresence.

(c) BN-N = Betz naphthylamine and naphthalene.

(d) BSO = Benzene soluable organics.

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
Telephone (614) 424-6424
Telex 24-5454

June 6, 1977

No. 1. Flask 361 357 360 356
4.514 8.950 out 7.407 out 10.924 in 15.795 in
Did called 8-1-77

Mr. Clyde E. Riley
Emission Measurement Branch-MD-13
Office of Air Quality Planning & Standards
U.S. Environmental Protection Agency
Research Triangle Park
North Carolina 27711

Dear Gene:

The analysis for benzene, C_6H_6, and ethyne (acetylene), C_2H_2, for the Task 50 at the coke oven in Chicago produced results as follows:

Run	Location	Sampling Period	Sample Number	Volume concentration, ppm C_2H_2	C_6H_6
1	Inlet	5/10/77, 1200-1930	S77-002-316	10	3
1	Outlet	5/10/77, 1200-1930	S77-002-317	10	3
2	Inlet	5/11/77, 1030-1900	S77-112-~~327~~ 324	5	2
2	Outlet	5/11/77, 1030-1900	S77-002-~~328~~ 325	9	2
3	Inlet	5/12/77,	S77-002-338	10	4
3	Outlet	5/12/77,	S77-002-339	15	1
Blank, filtered air				<0.05	<0.05

These final values are different slightly from the earlier estimates.

The accuracy of these analyses is estimated to be ± 20 percent.

Respectfully,

Richard E. Barrett
Program Manager

REB:ps

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
Telephone (614) 424-6424
Telex 24-5454

August 5, 1977

Mr. Victor Hanson
Clayton Environmental Consultants
25711 Southfield Road
Southfield, Michigan 48075

Dear Vic:

This letter is in reference to the combined efforts of Battelle Columbus Laboratories and Clayton Environmental Consultants to determine various effluent concentrations at the Wisconsin Steel Coke Oven Plant, Chicago, Illinois.

Relative to the emission measurements, Clayton was contracted by the U.S. Environmental Protection Agency to conduct Method 5 type particulate sampling. In addition, an XAD-2 column was to be incorporated into the sampling train to collect organic matter not collected by the filter. For one run, the XAD-2 column was located immediately after the filter; for the other run, the column followed the third impinger. Battelle Columbus supplied the XAD-2 columns and analyzed the column catch for benzene soluble organics (BSO). Table 1 is a tabulation of the results of the BSO analysis of these columns.

TABLE 1. BENZENE SOLUBLE ORGANIC RESULTS, WISCONSIN STEEL COKE OVEN PLANT CHICAGO, ILLINOIS

Sample Identification	BSO Mass, mg		
Blank	4.514		
Run 4 361 (outlet) (a)	8.950	4.436	.00444
Run 4 360 (inlet) (a)	10.925	6.411	.00641
Run 3 357 (outlet) (b)	7.407	2.893	.00289
Run 3 356 (inlet) (b)	15.795	11.281	.01128

(a) Parallel organic collectors located between numbers 3 and 4 impingers

(b) Parallel organic collectors located between filter and Number 1 impinger

The procedure used to obtain the BSO mass was as follows:

(1) Soxhlet extraction for 24 hours with 3 rinses of approximately 80 ml benzene per rinse. The solvent was distilled-in-glass benzene.

(2) Kurderna-Danish evaporation of the extract to 0.5 ml; this required approximately 6 hours.

(3) Heat lamp evaporation on micro weighing pans

(4) Weighing on a Mettler ME 22 automatic balance with a sensitivity of 10^{-7} grams.

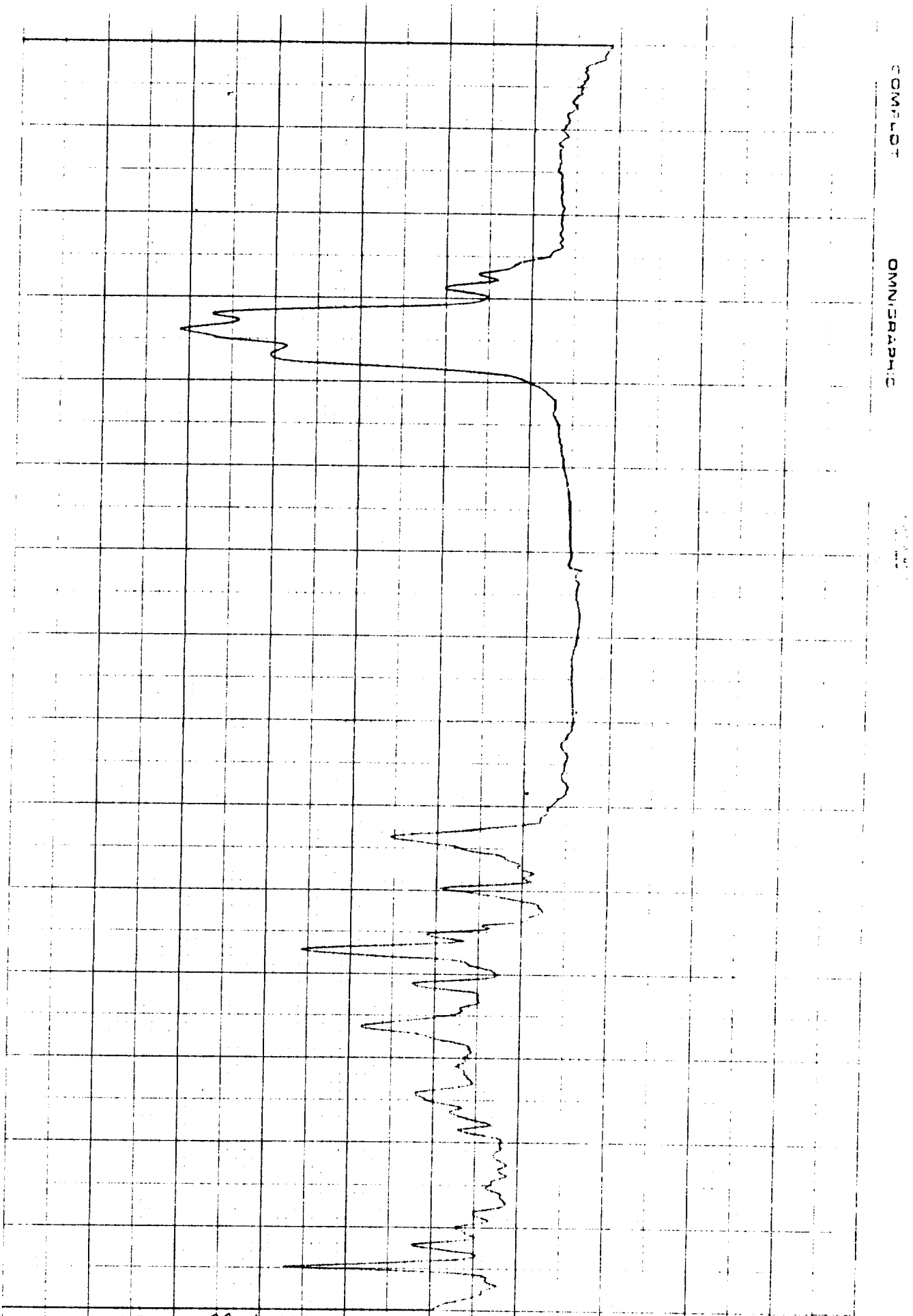
Any questions regarding the above analysis procedures may be directed to Paul Strup, telephone number (614) 424-5641.

Very truly yours,

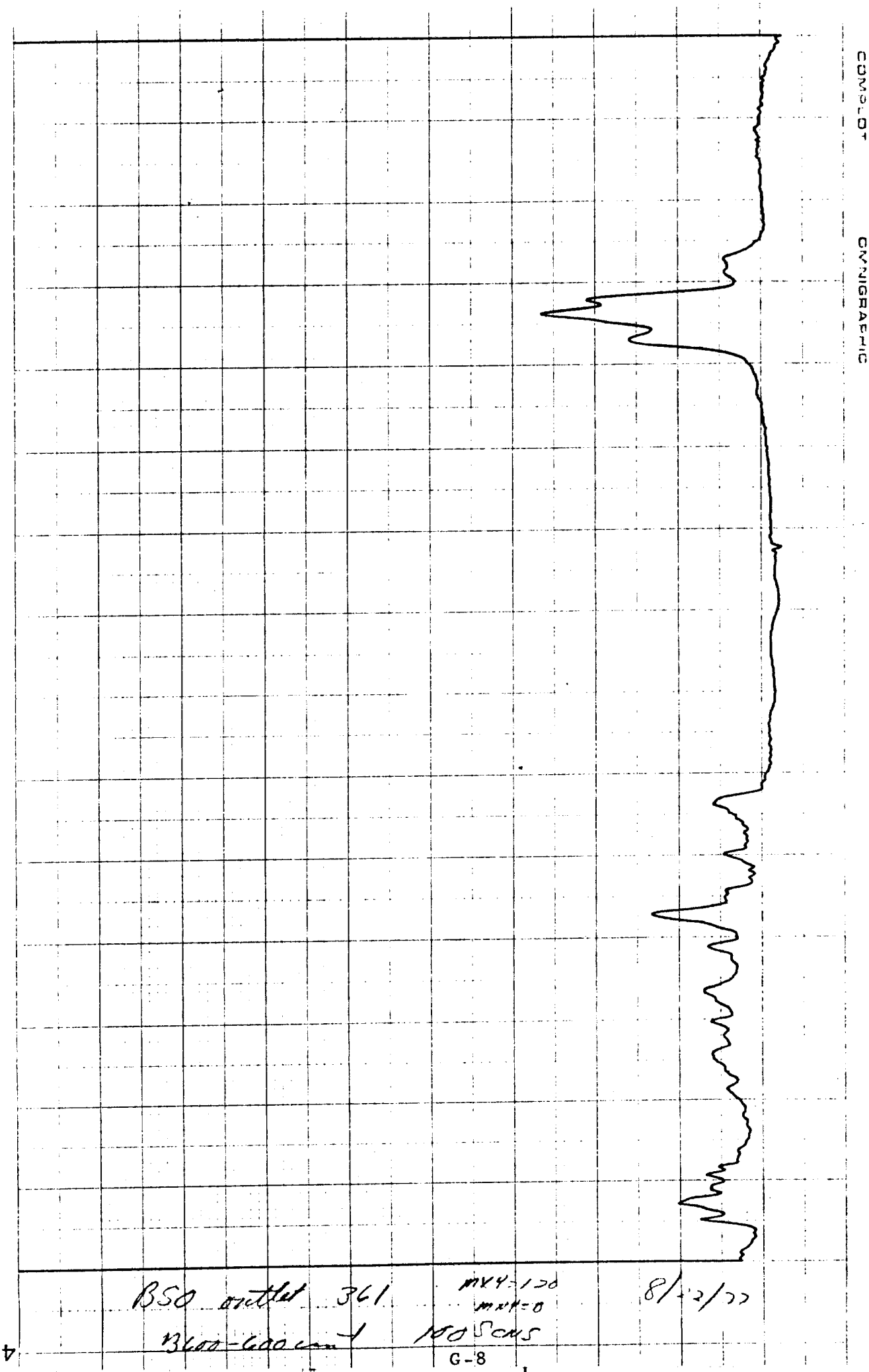
Paul R. Webb
Combustion Systems Section

PRW:kae

xc: Clyde E. Riley

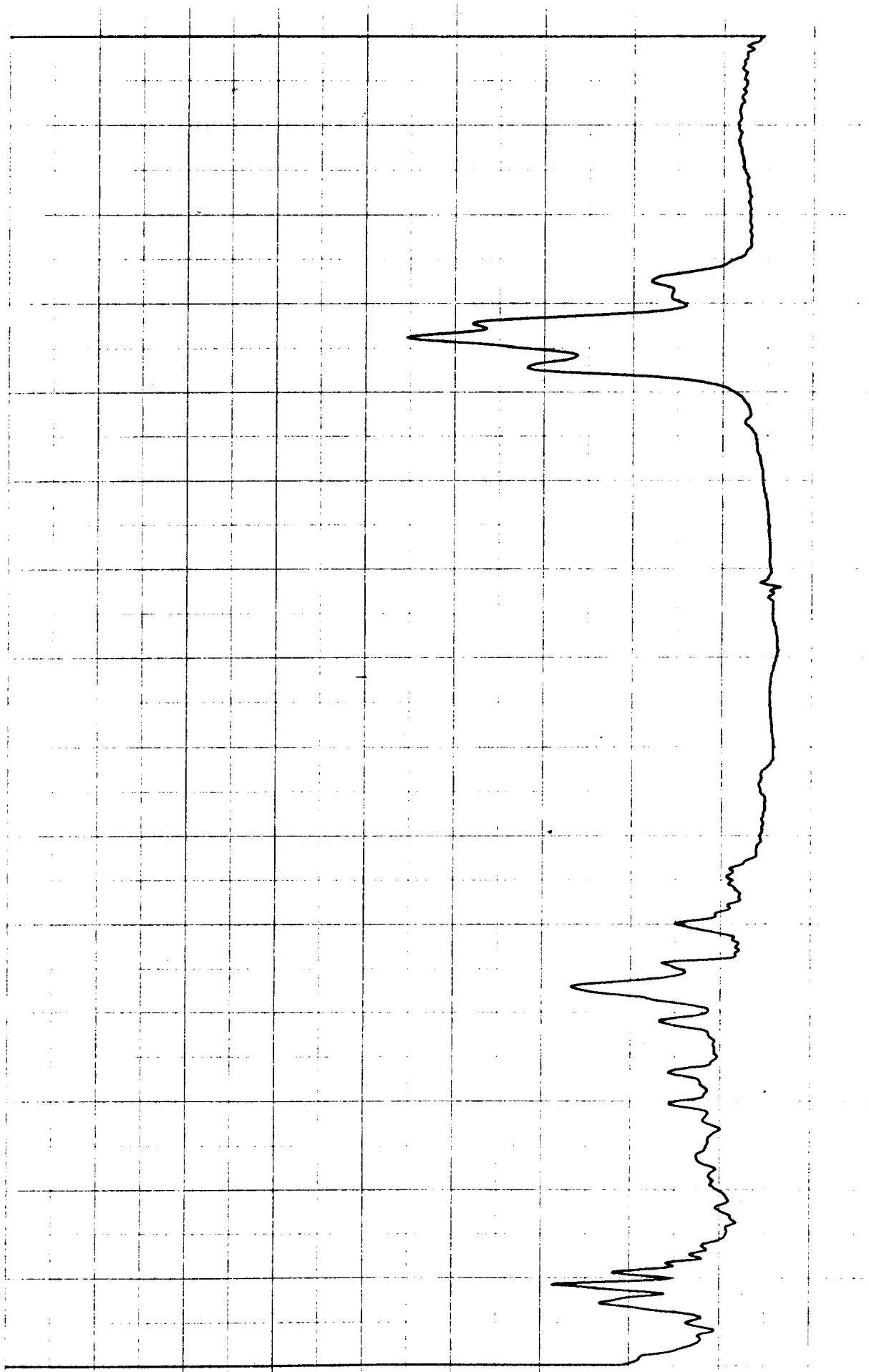

COMPLOT
OMNIGRAPHIC
XAD-2 Blank BSD
film from Benzene on KBR 100μm
3600 - 600 cm⁻¹
8/22/77

14



BSO outlet 361 MX4=120 MX4=0 8/22/77

3600-600 cm⁻¹ 100 SCNS

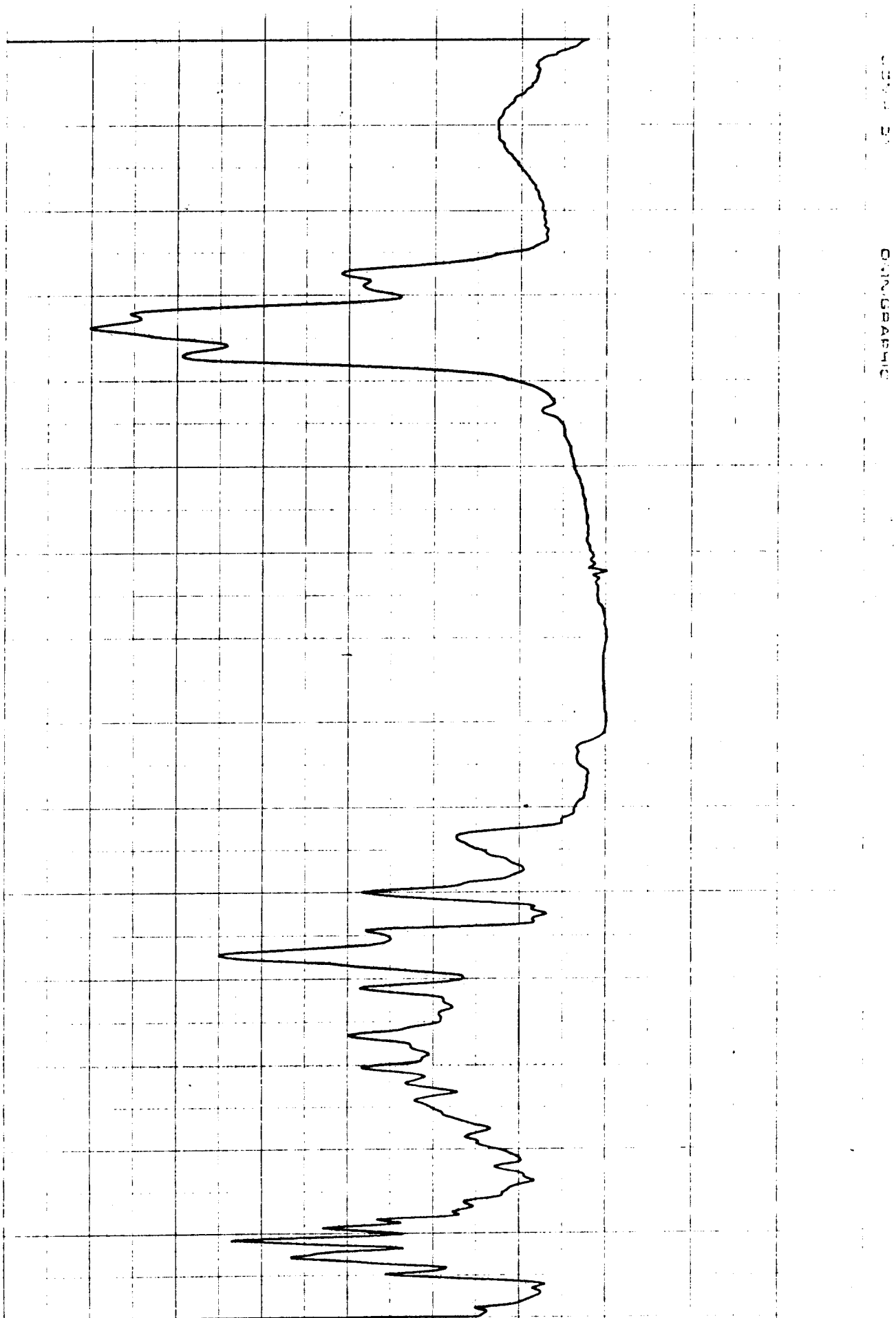


XAD-2 Inlet BSO 36C

MXY=120
MNY=0

3600-600 cm⁻¹

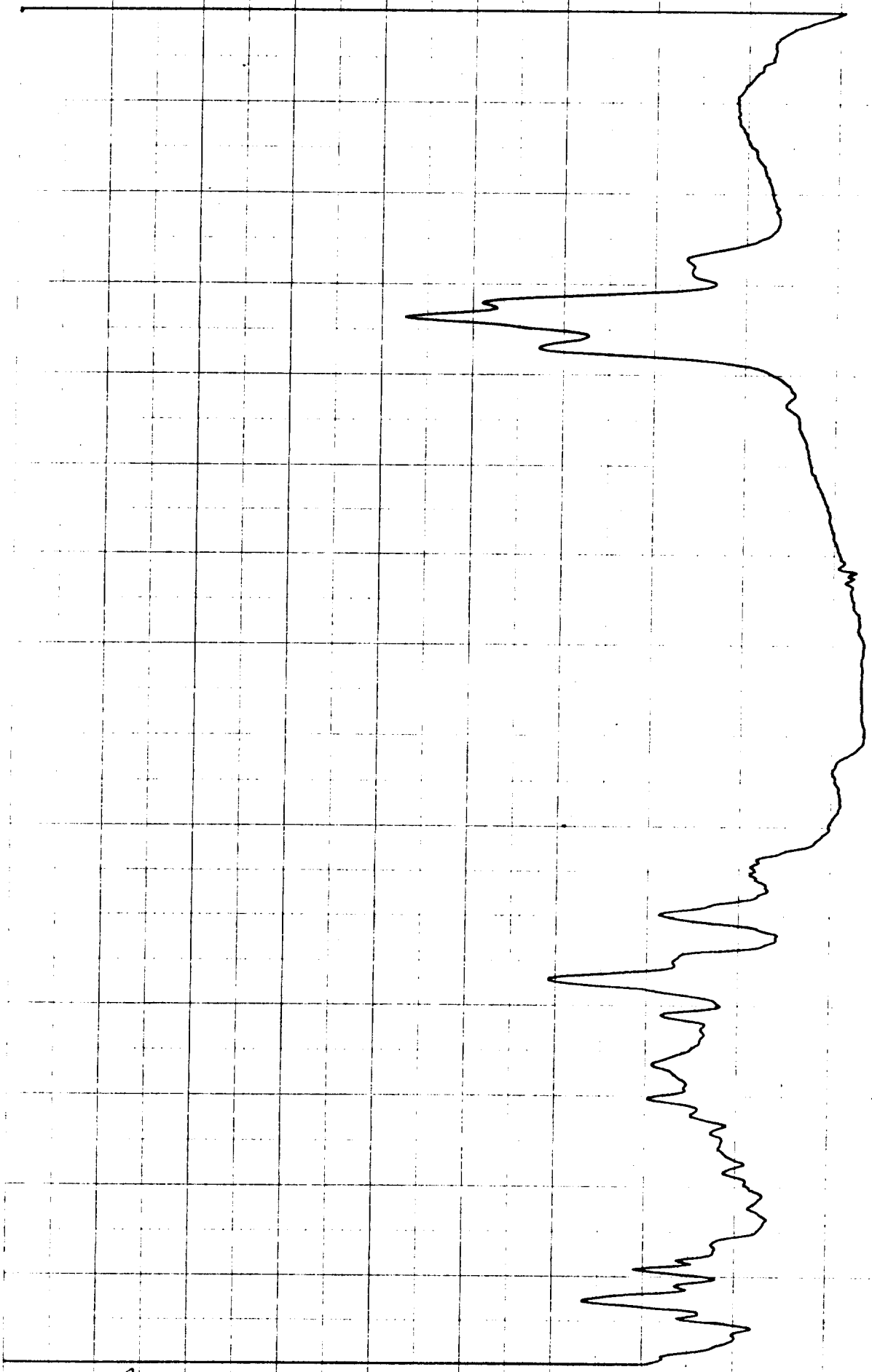
G-9



BSQ outlet 357

MAX = 120
MIN = 0

8/23/77


B50 Inlet 356
3600-600cm-1
MAX=120
MIN=0
8/23/77

APPENDIX H

CALIBRATION DATA

VISIBLE EMISSIONS OBSERVER'S CERTIFICATION

Wisconsin Steel Division
International Harvester
Chicago, Illinois
May 10-13, 1977

CERTIFICATION: QUALIFIED OBSERVER OF VISIBLE EMISSIONS

George M. Santorilla
NAME

Clayton Environmental
TITLE

Consultants, Inc.
AFFILIATION

HAS COMPLETED A VISIBLE EMISSIONS EVALUATION TRAINING PROGRAM AND IS CERTIFIED AS A QUALIFIED OBSERVER FOR BOTH OPACITY AND RINGELMANN READINGS.

WAYNE COUNTY
HEALTH DEPARTMENT
AIR POLLUTION
CONTROL DIVISION

AUTHORIZED SIGNATURE AND DATE

Clayton Environmental Consultants, Inc.

PITOT TUBE CALIBRATION

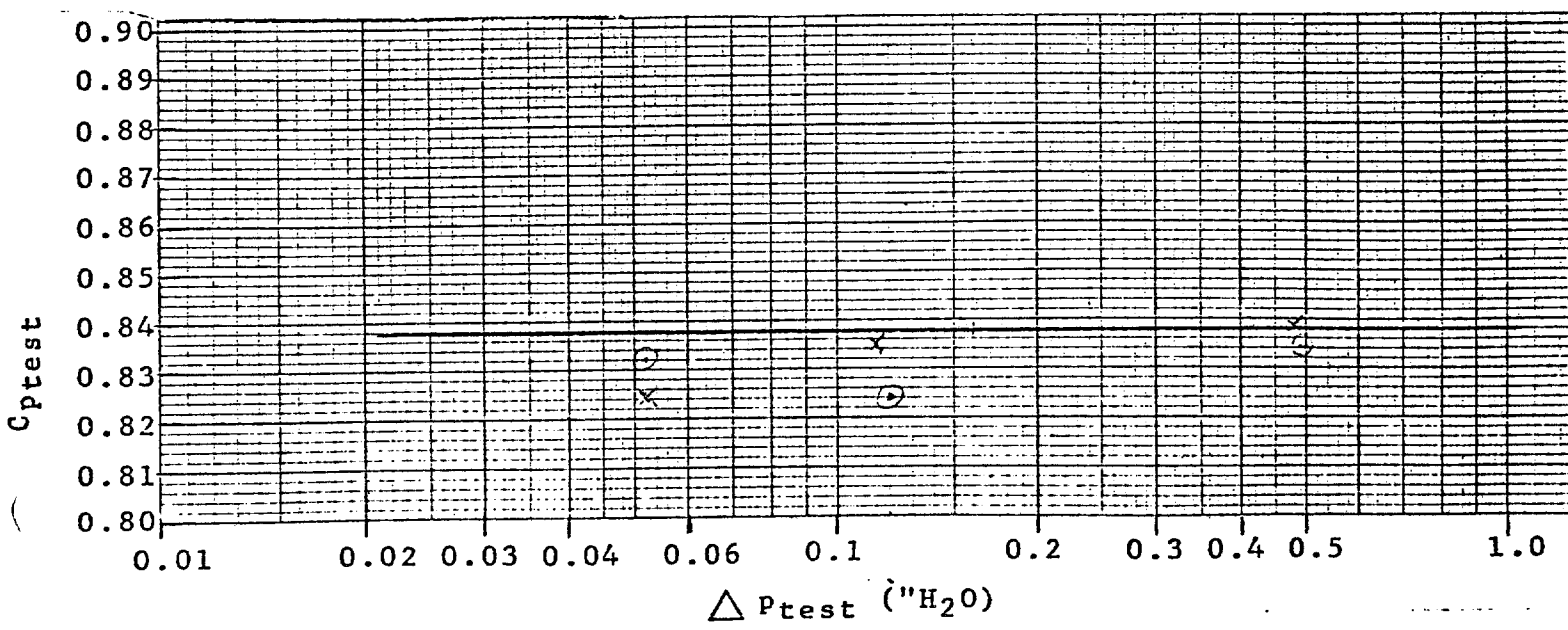
$$C_{Ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$$

Pitot Tube Type ~~SS~~ Pitot Tube No. 18

Standard Pitot Tube No. _____

Calibrator: TVM Date: 4/18/77 Client: [redacted]

Anticipated ΔP_{std}	ΔP_{std}	A ×		B ⊙	
		ΔP_{test}	ΔC_{Ptest}	ΔP_{test}	ΔC_{Ptest}
0.02	0.____	0.____	0.____	0.____	0.____
0.04	0.____	0.____	0.____	0.____	0.____
0.06 .036	0.~~.002~~ .036	0.052	0.824 ✓	0.051	0.832 ✓
0.08 ~~.083~~	0.0825	0.116	0.835	0.119	0.824
0.10	0.____	0.____	0.____	0.____	0.____
0.12	0.____	0.____	0.____	0.____	0.____
0.16	0.____	0.____	0.____	0.____	0.____
0.20	0.____	0.____	0.____	0.____	0.____
0.30 ~~.346~~	0.3465	0.482	~~0.840~~ 0.839	0.489	0.834 ✓
0.50	0.____	0.____	0.____	0.____	0.____
0.70	0.____	0.____	0.____	0.____	0.____
0.80 ~~1.01~~	0.1.01	1.33	0.863	1.36	0.853



Clayton Environmental Consultan

PITOT TUBE CALIBRATION

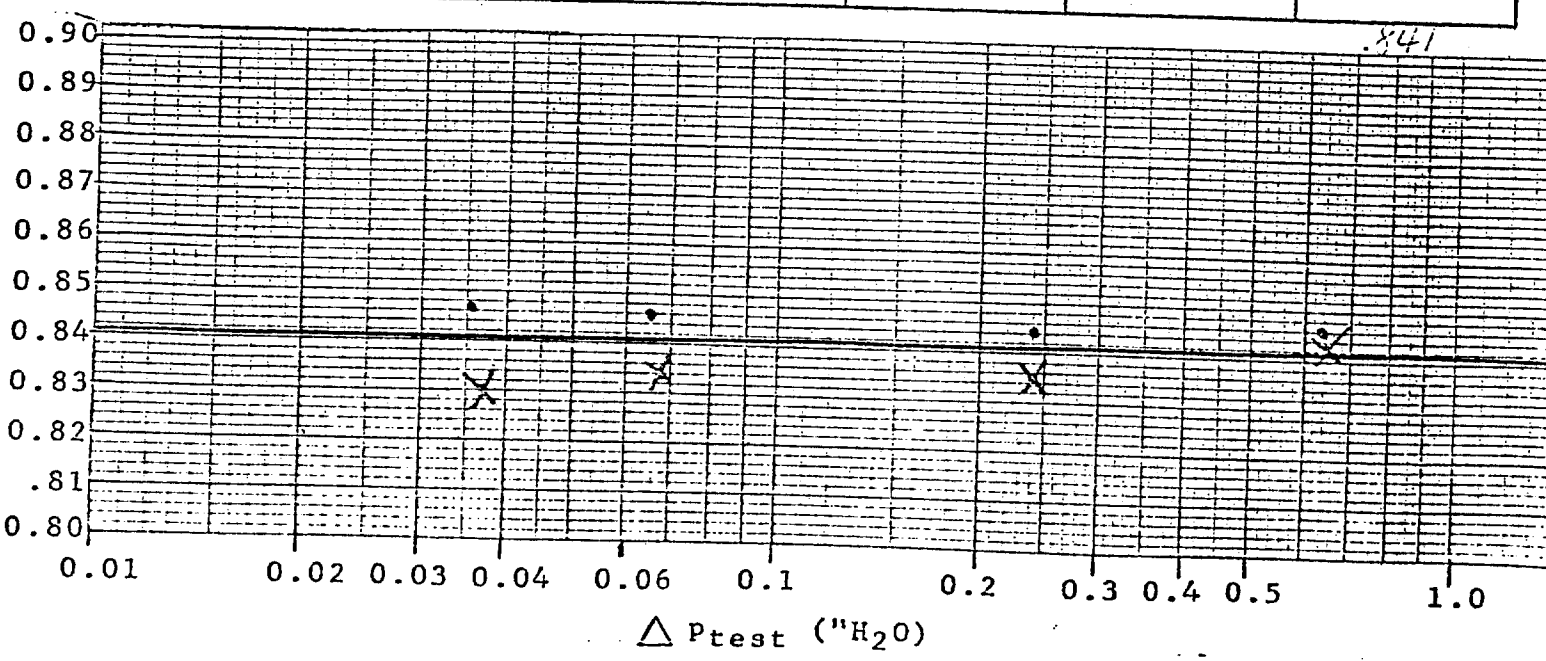
$C_{Ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type 5 Pitot Tube No. 18

Standard Pitot Tube No. _____

Calibrator: TVM Date: 5-26-77 Client: EPA Task 29

Anticipated ΔP_{std}	ΔP_{std}	A		B	
		ΔP_{test}	ΔC_{Ptest}	ΔP_{test}	ΔC_{Ptest}
0.02	0.026	0.0355	0.847	0.037	0.830
0.04	0.0475	0.065	0.846	0.067	0.834
0.06	0.	0.	0.	0.	0.
0.08	0.	0.	0.	0.	0.
0.10	0.	0.	0.	0.	0.
0.12	0.	0.	0.	0.	0.
0.16	0.173	0.238	0.844	0.243	0.835
0.20	0.	0.	0.	0.	0.
0.30	0.	0.	0.	0.	0.
0.50	0.4670	0.640	0.846	0.644	0.843
0.70	0.	0.	0.	0.	0.
0.80	0.	0.	0.	0.	0.



PITOT TUBE CALIBRATION

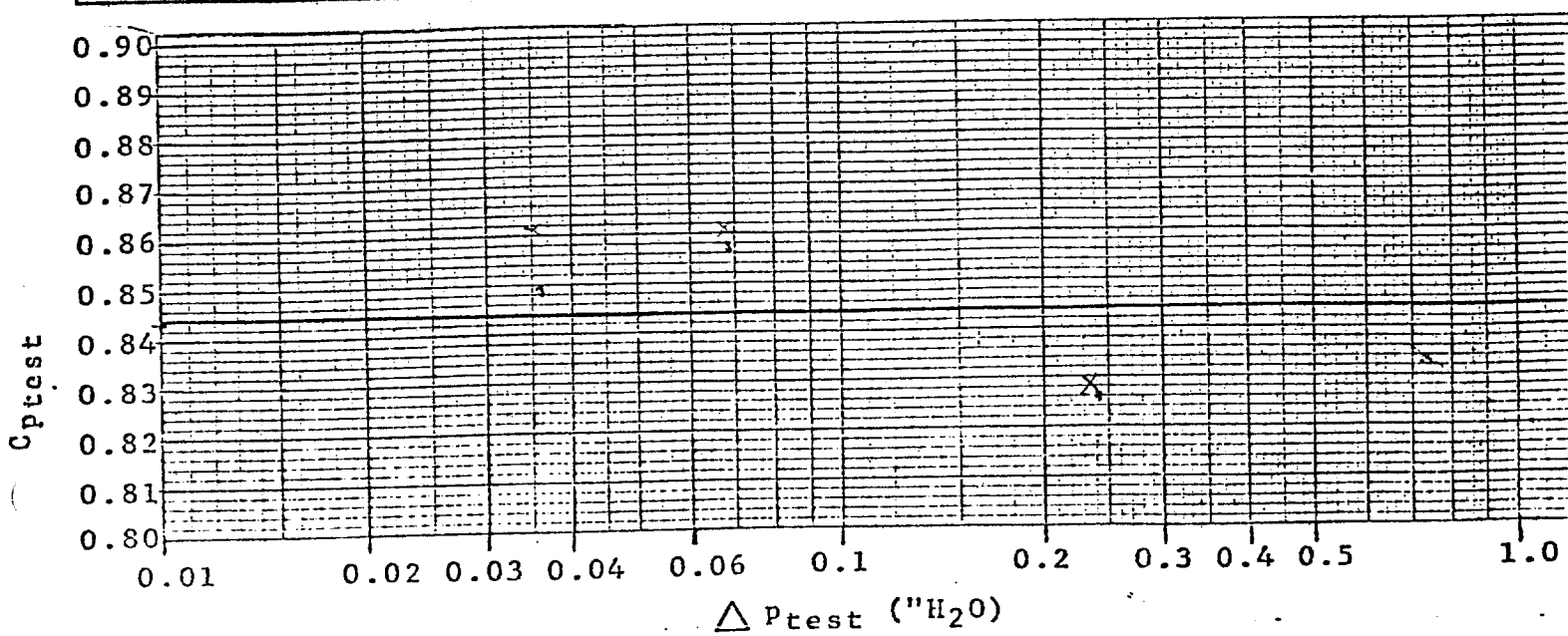
$$C_{ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$$

Pitot Tube Type S Pitot Tube No. 23

Standard Pitot Tube No. _____

Calibrator: TVM Date: 5-6-77 Client: _____

Anticipated ΔP_{std}	ΔP_{std}	A		B	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.0265	0.036	0.849	0.035	0.861
0.04	0.	0.	0.	0.	0.
0.06	0.051	0.068	0.857	0.0675	0.861
0.08	0.	0.	0.	0.	0.
0.10	0.	0.	0.	0.	0.
0.12	0.	0.	0.	0.	0.
0.16	0.167	0.240	0.826	0.239	0.828
0.20	0.	0.	0.	0.	0.
0.30	0.	0.	0.	0.	0.
0.50	0.513	0.724	0.833	0.724	0.833
0.70	0.	0.	0.	0.	0.
0.80	0.	0.	0.	0.	0.



Clayton Environmental Consulta

PITOT TUBE CALIBRATION

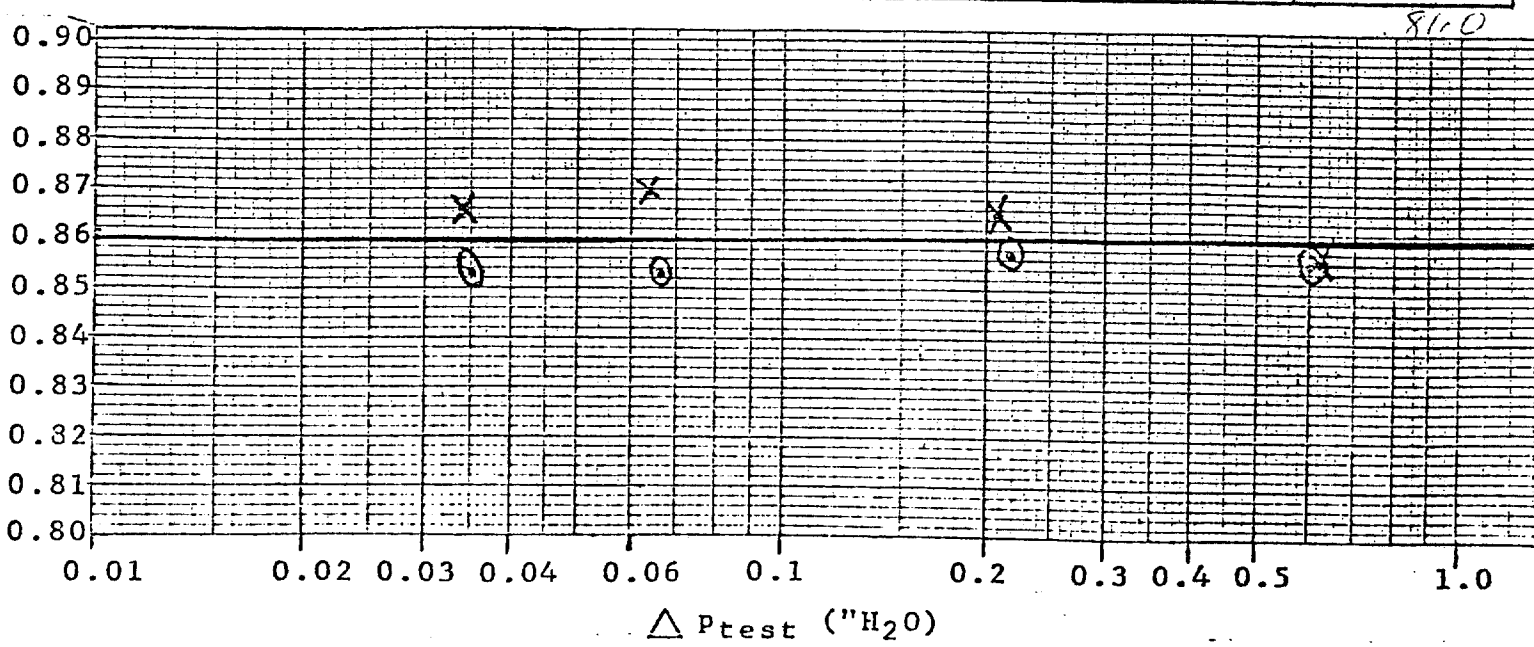
$$C_{Ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$$

Pitot Tube Type S Pitot Tube No. 23

Standard Pitot Tube No. _____

Calibrator: TVM Date: 17 May, 77 Client: EPA Task 29

Anticipated ΔP_{std}	ΔP_{std}	A		B	
		ΔP_{test}	ΔC_{Ptest}	ΔP_{test}	ΔC_{Ptest}
0.02	0.026	0.035	0.853	0.034	0.866
0.04	0.049	0.066	0.853	0.0635	0.870
0.06	0.____	0.____	0.____	0.____	0.____
0.08	0.____	0.____	0.____	0.____	0.____
0.10	0.____	0.____	0.____	0.____	0.____
0.12	0.____	0.____	0.____	0.____	0.____
0.16	0.164	0.219	0.857	0.215	0.865
0.20	0.____	0.____	0.____	0.____	0.____
0.30	0.____	0.____	0.____	0.____	0.____
0.50	0.449	0.600	0.856	0.601	0.856
0.70	0.____	0.____	0.____	0.____	0.____
0.80	0.____	0.____	0.____	0.____	0.____



Clayton Environmental Consultant

METER AND ORIFICE CALIBRATION

Date 27 April, 1977 Client _____ Meter Box Number RAC 3

Barometric Pressure Pb ("Hg) 29.15" Calibrator TVM Gas Meter Number _____

	Orifice Manometer Setting, Δm (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 t_d (°F)	Vacuum Wet Test Meter p_w (in. H_2O)	Time θ (min)	γ	K_m
Stop	0.5	8020.00	706.735	71	80	71	75.5				
Start		8015.00	701.655	70	67	66	66.5	0.00	11:49		.140
Average	29.19	(5) 5.00	5.0	70.5	73.5	68.5	71	29.15	11.82	.987	
Stop	1.0	8025.00	711.861	71.5	85	75	80				
Start		8020.00	706.735	71	80	71	75.5	0.00	9:05		.129
Average	29.22	(5) 5.00	5.126	71.3	82.5	73	77.8	29.15	9.02	.982	
Stop	2.0	8035.00	722.175	71.5	92	80	86				
Start		8025.00	711.861	71.5	85	75	80	0.00	13:06		.126
Average	29.30	(10) 10.00	10.314	71.5	88.5	77.5	83	29.15	13.10	[illegible]	
Stop	3.0	8045.00	732.546	72.5	95	83	89				
Start		8035.00	722.175	71.5	92	80	86	0.00	10:48		.125
Average	29.27	(10) 10.00	10.371	72	93.5	81.5	87.5	29.15	10.[illegible]	[illegible]	
Stop	4.0	8055.00	742.934	72.5	96	84	90				
Start		8045.00	732.546	72.5	95	83	89	0.10	9:28		.124
Average	29.44	(10) 10.00	10.388	72.5	95.5	83.5	89.5	29.14	9.41	[illegible]	
Stop	5.0	8065.00	753.321	74	101	86	93.5				
Start		8055.00	742.934	72.5	96	84	90	0.10	8:30		.123
Average	29.52	(10) 10.00	10.387	73.3	98.5	85	91.8	29.14	8.50	.983	
									AVERAGE	.984	.125

$$P_w = P_b - \frac{p_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{P_w}{T_w\,\Delta m}}$$

$$\gamma = \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

Factor in isokinetic equation $= \frac{27.40}{(\overline{K}_m)^2} = \frac{27.40}{(\quad)^2} =$ 1672

METER AND ORIFICE CALIBRATION

Date 16 May, 1977 Client EPA Task 29 Wisconsin Steel Meter Box Number RAC 3

Barometric Pressure Pb ("Hg) 29.54" Calibrator TVM Gas Meter Number

	Orifice Manometer Setting, Δm (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 t_d (°F)	Vacuum Wet Test Meter p_w (in. H_2O)	Time θ (min)	γ	K_m
Stop	0.5	8285.00	475.942	72.0	80	70	75				
Start		8280.00	470.814	71.5	70	66	68	0.00	12:58		
Average	29.58	(5) 5.00	5.128	72	~~70~~ 80	~~70~~ 68	72	29.54	12.97	.974	.128
Stop	1.0	8300.00	491.555	73.5	91	82	87	0.00			
Start		8285.00	475.942	72.0	80	70	75		28:04		
Average	29.61	(5) 15.00	15.613	73	86	76	81	29.54	28.07	.973	.126
Stop	2.0	8315.00	507.282	74.0	96	87	92				
Start		8300.00	491.555	73.5	91	82	87	0.05	20:06		
Average	29.61	(10) 15.00	15.727	74	94	85	90	29.54	20.10	.977	.124
Stop	3.0	8330.00	523.046	74.5	97	88	93				
Start		8315.00	507.282	74.0	96	87	92	0.05	17:29		
Average	29.76	(10) 15.00	15.764	74	97	88	93	29.54	17.48	.978	.117
Stop	4.0	8365.00	559.882	75.5	102	91	97				
Start		8330.00	523.046	74.5	97	88	93	0.08	33:33		
Average	29.88	(10) 35.00	36.836	75	100	90	95	29.53	33.55	.976	.123
Stop	5.0	8380.00	575.651	75.5	103	92	98				
Start		8365.00	559.882	75.5	102	91	97	0.10	12:55		
Average	29.91	(10) 15.00	15.769	76	103	92	98	29.53	12.92	.978	.122
									AVERAGE	.976	.123

$$P_w = P_b - \frac{p_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{p_w}{T_w\,\Delta m}}$$

$$\gamma = \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

Factor in isokinetic equation $= \frac{27.40}{(\overline{K}_m)^2} = \frac{27.40}{(\quad)^2} =$ 1861

METER AND ORIFICE CALIBRATION

Date 5-6-77 Client J. E. Baker Meter Box Number RAC 4

Barometric Pressure Pb ("Hg) 29.20" Calibrator TVM Gas Meter Number

	Orifice Manometer Setting, Δm (in. H_2O) P_d	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 t_d (°F)	Vacuum Wet Test Meter P_w (in. H_2O)	Time θ (min)	γ	K_m
Stop	0.5	8145.00	586.821	73.0	82	75	78.5				
Start		8140.00	581.813	72.5	78	73	75.5	0.00	12:37		
Average	29.24	(5) 5.0	5.008	72.8	80	74	77	29.20	12.62	1.005	.131
Stop	1.0	8150.00	591.845	73.5	87	79	83				
Start		8145.00	586.821	73.0	82	75	78.5	0.05	9:06		
Average	29.27	(5) 5.0	5.024	73.3	84.5	77	80.8	29.20	9.10	1.007	.129
Stop	2.0	8160.00	601.911	73.5	92	82	87				
Start		8150.00	591.845	73.5	87	79	83	0.05	13:04		
Average	29.35	(10) 10.00	10.066	73.5	89.5	80.5	85	29.20	13.07	1.010	.127
Stop	3.0	8170.00	612.009	74.0	94	84	89				
Start		8160.00	601.911	73.5	92	82	87	0.10	10:47		
Average	29.42	(10) 10.00	10.098	73.8	93	83	88	29.19	10.78	1.009	.125
Stop	4.0	8180.00	622.131	74.0	96	85	90.5				
Start		8170.00	612.009	74.0	94	84	89	0.10	9:26		
Average	29.49	(10) 10.00	10.122	74.0	95	84.5	89.8	29.19	9.43	1.007	.124
Stop	5.0	8190.00	632.268	74.0	97	86	91.5				
Start		8180.00	622.131	74.0	96	85	90.5	0.10	8:27		
Average	29.51	(10) 10.00	10.137	74.0	96.5	85.5	91	29.19	8.45	1.005	.124
									AVERAGE	1.007	.127

$$P_w = P_b - \frac{P_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{P_w}{T_w\,\Delta m}}$$

$$\gamma = \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

Factor in isokinetic equation $= \frac{27.40}{(\overline{K}_m)^2} = \frac{27.40}{(\quad)^2} = 1699$

METER AND ORIFICE CALIBRATION

Date 17 May, 1977 Client EPA Task 29 Wisconsin Steel Meter Box Number RAC 4

Barometric Pressure Pb ("Hg) 29.50" Calibrator TVM Gas Meter Number

	Orifice Manometer Setting, Δm (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 t_d (°F)	Vacuum Wet Test Meter p_w (in. H_2O)	Time θ (min)	γ	K_m
Stop	0.5	8590.00	189.281	73.5	86	81	84				
Start		8575.00	174.333	72.5	73	71	72	0.00	37:45		
Average	29.54	(5) 15.00	14.948	73	80	76	78	29.50	37.75	1.012	.132
Stop	1.0	8600.00	199.309	74.5	89	83	86				
Start		8590.00	189.281	73.5	86	81	83.5	0.05	18:15		
Average	29.57	(5) 10.00	10.028	74	87.5	82	85	29.50	18.25	1.015	.129
Stop	2.0	8615.00	214.393	75.0	95	86	90.5				
Start		8600.00	199.309	74.5	89	83	86	0.05	19:45		
Average	29.65	(10) 15.00	15.084	75	[illegible]	84.5	88	29.50	19.75	1.013	.126
Stop	3.0	8635.00	234.551	75.5	97	87	92				
Start		8615.00	214.393	75.0	95	86	90.5	0.10	21:45		
Average	29.72	(10) 20.00	20.158	75	96	86.5	91	29.49	21.75	1.014	.125
Stop	4.0	8650.00	249.695	76.0	99	89	94				
Start		8635.00	234.551	75.5	97	87	92	0.10	14:17		
Average	29.79	(10) 15.00	15.144	76	98	88	93	29.49	14.28	1.012	.123
Stop	5.0	8665.00	264.835	76.0	100	89	94.5				
Start		8650.00	249.695	76.0	99	89	94	0.10	12:47		
Average	29.87	(10) 15.00	15.140	76.0	99.5	89	94	29.49	12.78	1.011	.123
									AVERAGE	1.013	.126

$$P_w = P_b - \frac{p_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{p_w}{T_w\,\Delta m}}$$

$$\gamma = \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

Factor in isokinetic equation $= \frac{27.40}{(K_m)^2} = \frac{27.40}{(\quad)^2} =$ 1726

APPENDIX I

PROJECT PARTICIPANTS

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Clayton Environmental Consultants, Inc.

Victor W. Hanson	Project Leader
N. Steve Walsh	Assistant Project Leader
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Timothy V. Mattson	Source Sampling Specialist
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