AP-42 Section 12.2
Reference
Report Sect. 4
Reference 50

Reviewed
KS

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STATIONARY SOURCE SAMPLING REPORT

EEI REF. NO. 2632

MOUNTAINEER CARBON COMPANY

MOUNDSVILLE, WEST VIRGINIA

PARTICULATE EMISSIONS COMPLIANCE TESTING

#1 AND 2 INCINERATOR OUTLET STACKS

SEPTEMBER 24-27, 1984

ATTACHMENT III

COMPLIANCE TESTING REPORT

Submitted by:

ENTROPY ENVIRONMENTALISTS, INC.

REPORT CERTIFICATION

The sampling and analysis performed for this report was carried out under my direction and supervision.

Date October 19, 1984

Signature Neill M. Harden

Neill M. Harden

I have reviewed all testing details and results in this test report and hereby certify that the test report is authentic and accurate.

Date October 19, 1984

Signature D. James Grove

D. James Grove, P.E.

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1. INTRODUCTION

1.1 Source. Mountaineer Carbon Company (MOCAR) in Moundsville, West Virginia, uses incinerators to combust emissions from the coke production processes; this report covers stationary source sampling performed at the outlet stacks exhausting the #1 and 2 incinerators.

1.2 Testing Program. Stationary source sampling was performed for MOCAR on September 24 through 27, 1984. Table 1-1 is a sampling log which gives the sampling locations, test dates, operating conditions, sampling objectives and methods used, and the run numbers.

TABLE 1-1

SAMPLING LOG

Sampling Location	Test Date	Operating Condition	Sampling Objective	Sampling Method	Run Number
#2 Incinerator	9/24	Normal Rate	Particulate	EPA 5	1 to 3
	9/25	Maximum Rate	Particulate	EPA 5	4 to 6
#1 Incinerator	9/26	Normal Rate	Particulate	EPA 5	7 to 9
	9/27	Maximum Rate	Particulate	EPA 5	10 to 12

1.3 Test Participants. Table 1-2 lists the personnel present during the testing program.

TABLE 1-2

TEST PARTICIPANTS

Jonathan Greenburg	Standard Oil Company of Ohio	Test Coordinator
Neill M. Harden	Entropy	Project Director
Steve Terll	Entropy	Engineering Technician
G. Dale Farley	West Virginia Air Pollution Control Commission	Test Observer

2. SUMMARY OF RESULTS

Table 2-1 summarizes the particulate emission rates and concentrations from the testing performed on the outlet stacks of incinerators #1 and 2. Run-by-run summaries of the results are presented in Tables 2-2 through 2-5; refer to the list of tables below for a cross-reference. Detailed results are provided in Appendix 5.1, while the field and analytical data can be found in Appendix 5.2

LIST OF TABLES

TABLE 2-1

PARTICULATE EMISSION RATES & CONCENTRATIONS SUMMARY

#2 Incinerator Outlet Stack

	Run Number 1	2	3	Average
Normal Rate:	1	2	3	Average
Emission Rate, lb/hr	8.18	11.4	6.25	8.61
Concentration, gr/DSCF	0.0145	0.0203	0.0110	0.0153
Maximum Rate:	4	5	6	Average
Emission Rate, lb/hr	23.8	26.7	19.1	23.2
Concentration, gr/DSCF	0.0318	0.0357	0.0243	0.0306

#1 Incinerator Outlet Stack

	Run Number			
Normal Rate:	7	8	9	Average
Emission Rate, lb/hr	29.9	19.5	19.6	23.0
Concentration, gr/DSCF	0.0516	0.0340	0.0329	0.0395
Maximum Rate:	10	11	12	Average
Emission Rate, lb/hr	13.3	10.5	26.1	16.6
Concentration, gr/DSCF	0.0153	0.0126	0.0323	0.0201

TABLE 2-2

#2 INCINERATOR PARTICULATE TESTS SUMMARY

Normal Rate

	1	2	3
Run Date	09/24/84	09/24/84	09/24/84
Test Train Parameters:			
Volume of Dry Gas Sampled, SCF*	44.882	45.540	45.277
Percent Isokinetic	104.2	106.3	105.3
Flue Gas Parameters:			
Temperature, Deg. F	1,826	1,841	1,838
Flue Gas Flow Rates SCFM*, Dry	65,592	65,723	65,978
ACFM, Wet	340,150	347,487	347,130
Percent Excess Air	74.2	62.4	60.1
Method 5 Particulate:			
Concentration, Grains/DSCF*	0.0145	0.0203	0.0110
Emission Rate, Lbs per Hour	8.18	11.4	6.25

* 68 Deg. F. - 29.92 in. Hg.

TABLE 2-3

#2 INCINERATOR PARTICULATE TESTS SUMMARY

Maximum Rate

	4	5	6
Run Date	09/25/84	09/25/84	09/25/84
Test Train Parameters:			
Volume of Dry Gas Sampled, SCF*	34.723	35.176	36.787
Percent Isokinetic	108.6	110.1	109.7
Flue Gas Parameters:			
Temperature, Deg. F	1,892	1,913	1,915
Flue Gas Flow Rates SCFM*, Dry	87,476	87,411	91,753
ACFM, Wet	464,522	469,073	490,558
Percent Excess Air	62.9	60.2	59.0
Method 5 Particulate:			
Concentration, Grains/DSCF*	0.0318	0.0357	0.0243
Emission Rate, Lbs per Hour	23.8	26.7	19.1

* 68 Deg. F. - 29.92 in. Hg.

TABLE 2-4

#1 INCINERATOR PARTICULATE TESTS SUMMARY

Normal Rate

	7	8	9
Run Date	09/26/84	09/26/84	09/26/84
Test Train Parameters:			
Volume of Dry Gas Sampled, SCF*	45.237	45.597	46.901
Percent Isokinetic	102.0	104.5	102.4
Flue Gas Parameters:			
Temperature, Deg. F	1,808	1,814	1,826
Flue Gas Flow Rates SCFM*, Dry	67,504	66,956	69,710
ACFM, Wet	343,850	344,413	363,210
Percent Excess Air	73.6	65.4	65.4
Method 5 Particulate:			
Concentration, Grains/DSCF*	0.0516	0.0340	0.0329
Emission Rate, Lbs per Hour	29.9	19.5	19.6

* 68 Deg. F. - 29.92 in. Hg.

TABLE 2-5

#1 INCINERATOR PARTICULATE TESTS SUMMARY

Maximum Rate

	10	11	12
Run Date	09/27/84	09/27/84	09/27/84
Test Train Parameters:			
Volume of Dry Gas Sampled, SCF*	40.881	39.204	37.741
Percent Isokinetic	109.6	110.2	109.3
Flue Gas Parameters:			
Temperature, Deg. F	1,843	1,879	1,832
Flue Gas Flow Rates SCFM*, Dry	102,042	97,283	94,480
ACFM, Wet	524,543	508,353	484,176
Percent Excess Air	70.0	78.8	71.5
Method 5 Particulate:			
Concentration, Grains/DSCF*	0.0153	0.0126	0.0323
Emission Rate, Lbs per Hour	13.3	10.5	26.1

* 68 Deg. F. - 29.92 in. Hg.

3. PROCESS DESCRIPTION AND OPERATION

3.1 Process Description. The Mountaineer Carbon Company in Moundsville, West Virginia operates two rotary calciners for the production of calcined coke. The emissions control system serving each calciner includes an incinerator for the destruction of volatile materials. The testing covered in this report was performed on the #1 and 2 incinerators.

Green coke is fed into the elevated end of each inclined rotary calciner and flows counter-currently to the hot gases introduced through a natural gas-fired burner. As the coke is heated to the calciner temperature of approximately 2,700 degrees Fahrenheit, volatile hydrocarbons and water are removed and introduced into the gas stream along with entrained coke particles. When necessary, the incinerator is fired with natural gas to maintain the desired temperature.

3.2 Source Air Flow Description. As shown schematically in Figure 3-1, the off gases pass through a spill hopper and a primary hopper where raw coke and heavy particles are removed and recycled back to the calciner. The gases then pass to an incinerator where the volatile matter is reduced to carbon dioxide and water. From the incinerator, the gases are vented directly to the atmosphere through the stack.

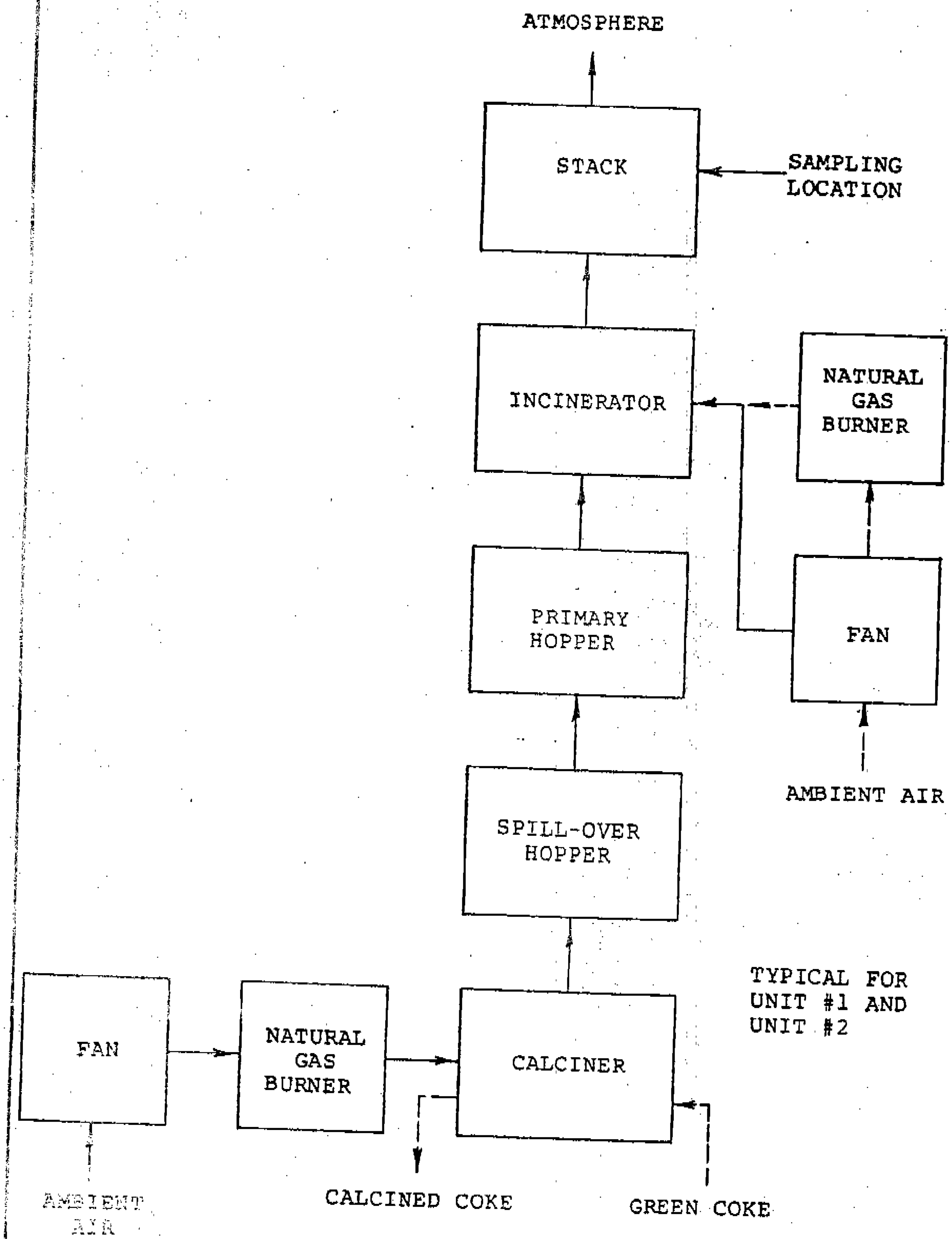

FIGURE 3-1. AIR FLOW SCHEMATIC SHOWING SAMPLING LOCATION

4. SAMPLING AND ANALYTICAL PROCEDURES

4.1 General. All sampling and analytical procedures used were those generally recommended by the United States Environmental Protection Agency and the West Virginia Air Pollution Control Commission. Details of the sampling equipment and procedures used are described in Appendix 5.3, which is extracted from 40 CFR (Code of the Federal Regulations) Part 60.

4.2 Sampling Points. The number and location of the sampling points were determined following the procedures outlined in EPA Method 1 as promulgated September 30, 1983. The #1 and 2 incinerator outlet stack cross sections were divided into 20 equal areas, i.e., five sampling points on each of four half-axes (labled A through D) as shown in Figure 4-1.

4.3 Flue Gas Velocity and Molecular Weight. Flue gas velocity and volumetric air flow rates were determined according to EPA Method 2. The composition and molecular weight of the flue gases were determined using EPA Method 3.

4.4 Particulate Emissions. EPA Method 5 sampling and analytical procedures were used to determine the particulate emissions. The centroid of each of the 20 equal areas was sampled for three minutes, resulting in a net run time of 60 minutes.

4.5 Sampling Equipment. All sampling equipment was manufactured by Nutech Corporation or by Entropy. Pertinent calibration data is provided in Appendix 5.4

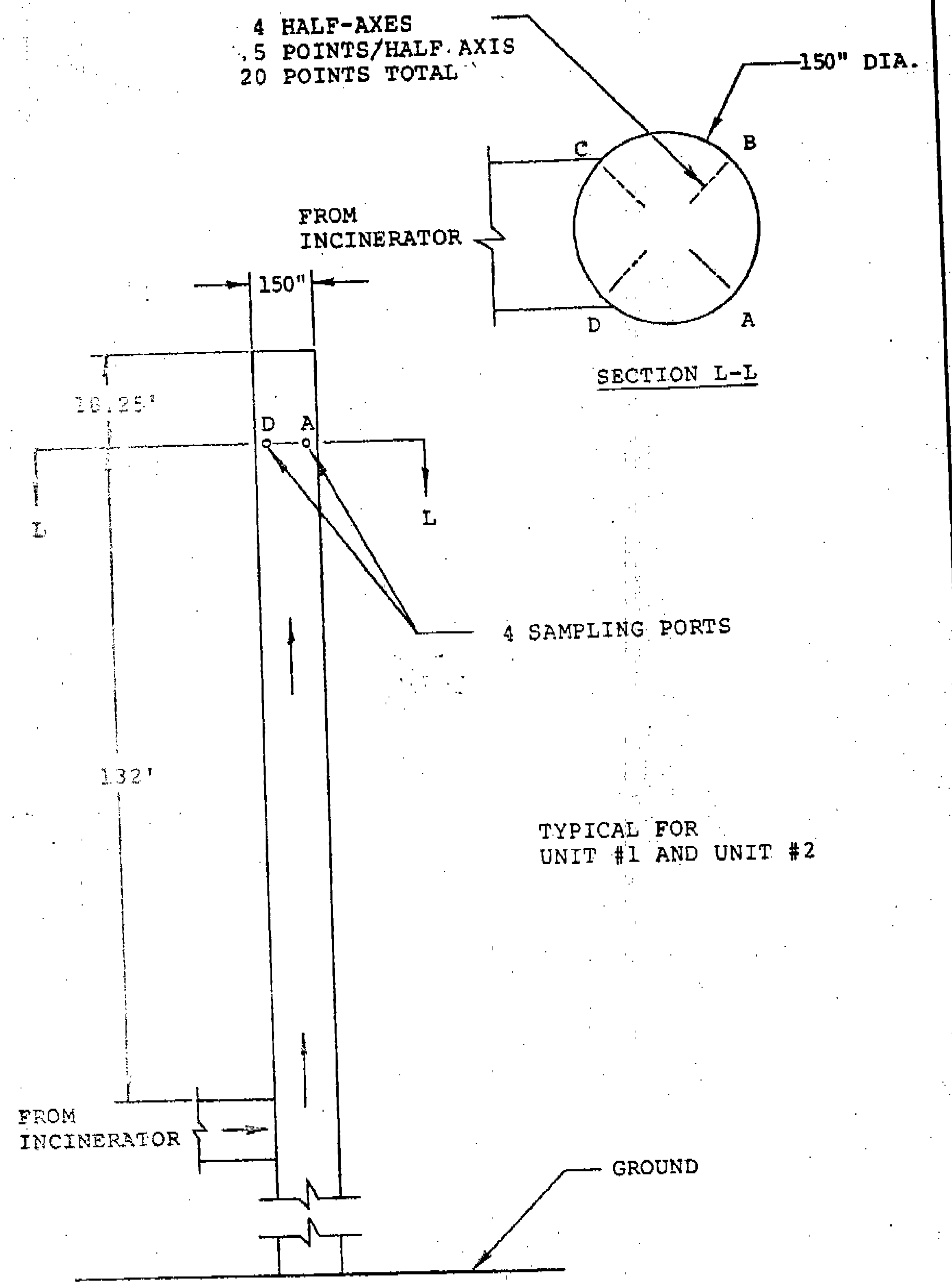

FIGURE 4-1. STACK DIMENSIONS WITH SAMPLING PORT AND POINT LOCATIONS

5. APPENDICES

TESTING RESULTS AND EXAMPLE CALCULATIONS

#2 INCINERATOR OUTLET STACK

NORMAL LOAD

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT: Mountaineer Carbon Company, Moundsville, West Virginia

RUN	SAMPLING LOCATION	TEST TEAM LEADER
1	Unit #2 Incinerator Stack	Neill M. Harden
2	Unit #2 Incinerator Stack	Neill M. Harden
3	Unit #2 Incinerator Stack	Neill M. Harden

		1	2	3
	RUN DATE	09/24/84	09/24/84	09/24/84
	RUN START TIME	751	943	1140
	RUN FINISH TIME	905	1055	1252
	NET SAMPLING POINTS	20	20	20
Theta	NET RUN TIME, MINUTES	60.00	60.00	60.00
Dia	NOZZLE DIAMETER, INCHES	0.496	0.494	0.494
Cp	PITOT TUBE COEFFICIENT	0.840	0.840	0.840
Y	DRY GAS METER CAL. FACTOR	1.005	1.005	1.005
Pbar	BAROMETRIC PRESSURE, IN. HG.	29.30	29.30	29.30
Delta H	AVG. PRESS. DIFFERENTIAL OF ORIFICE METER, IN. H2O	1.956	2.010	2.015
Vm	VOLUME OF METERED GAS SAMPLE DRY ACTUAL CUBIC FEET	48.065	48.763	48.567
tm	DRY GAS METER TEMP., DEG. F	99	99	100
Vm(std)	VOLUME OF METERED GAS SAMPLE @ DRY STD. COND., DSCF*	44.882	45.540	45.277
Vlc	VOLUME OF WATER CATCH IN IMPINGERS & SIL. GEL.,ML	163.5	180.5	175.5
Vw(std)	VOLUME OF WATER VAPOR, SCF*	7.696	8.496	8.261
%H2O	MOISTURE, PERCENT BY VOLUME	14.6	15.7	15.4
Mfd	DRY MOLE FRACTION	0.854	0.843	0.846

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		1	2	3
%CO2	PERCENT CO2 BY VOLUME, DRY	6.0	6.6	6.8
%O2	PERCENT O2 BY VOLUME, DRY	9.5	8.6	8.4
%CO+N2	PERCENT CO + N2 BY VOLUME, DRY	84.5	84.8	84.8
Md	DRY MOLECULAR WT, LB/LB-MOLE	29.34	29.40	29.42
Ms	WET MOLECULAR WT, LB/LB-MOLE	27.68	27.61	27.66
Ps	GAS STATIC PRESS., IN H2O	-0.35	-0.35	-0.30
Ps	ABSOLUTE GAS PRESS., IN HG	29.27	29.27	29.28
ts	FLUE GAS TEMPERATURE, DEG. F	1,826	1,841	1,838
Delta p	AVG VELOCITY HEAD, IN. H2O	0.1467	0.1517	0.1519
vs	FLUE GAS VELOCITY, FT/SEC	46.2	47.2	47.1
A	STACK/DUCT AREA, SQUARE IN.	17,671	17,671	17,671
Qsd	GAS FLOW RATE, DRY SCFM*	65,592	65,723	65,978
Qaw	GAS FLOW RATE, WET ACFM	340,150	347,487	347,130
%I	PERCENT ISOKINETIC	104.2	106.3	105.3
%EA	PERCENT EXCESS AIR	74.2	62.4	60.1
	METHOD 5 PARTICULATE:			
ms	CATCH, MILLIGRAMS	42.3	59.9	32.4
Gr/DSCF	CONCEN., GRAINS PER DSCF*	0.0145	0.0203	0.0110
Lb/Hr	EMISSION RATE, LBS/HOUR	8.19	11.4	6.25

* 68 Deg. F - 29.92 in. Hg.

SAMPLE PARTICULATE TEST CALCULATIONS NO. 1

Unit #2 Incinerator Stack

VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS

$$Vm(std) = 17.64 * Y * Vm * \frac{(Pbar + Delta\ H/13.6)}{(460 + tm)}$$

$$Vm(std) = 17.64 * 1.005 * 48.065 * \frac{(29.30 + 1.956/13.6)}{(460 + 99)} = 44.882 \text{ DSCF}$$

VOLUME OF WATER VAPOR AT STANDARD CONDITIONS

$$Vw(std) = 0.04707 * Vlc$$

$$Vw(std) = 0.04707 * 163.5 = 7.696 \text{ SCF}$$

PERCENT MOISTURE, BY VOLUME, AS MEASURED IN FLUE GAS

$$\%H2O = 100 * Vw(std) / (Vw(std) + Vm(std))$$

$$\%H2O = \frac{7.696}{7.696 + 44.882} * 100 = 14.6\ \%$$

DRY MOLE FRACTION OF FLUE GAS

$$Mfd = 1 - \%H2O/100$$

$$Mfd = 1 - 14.6/100 = 0.854$$

DRY MOLECULAR WEIGHT OF FLUE GAS

$$Md = \%CO2 * 0.44 + \%O2 * 0.32 + \%CO{+}N2 * 0.28$$

$$Md = 6.0*0.44 + 9.5*0.32 + 84.5*0.28 = 29.34 \text{ LB/LB-MOLE}$$

WET MOLECULAR WEIGHT OF FLUE GAS

$$Ms = (Md * Mfd) + (0.18 * \%H2O)$$

$$Ms = 29.34 * 0.854 + (0.18 * 14.6) = 27.68 \text{ LB/LB-MOLE}$$

ENTROPY

ABSOLUTE FLUE GAS PRESSURE

$$Ps = Pbar + Pg / 13.6$$

$$Ps = 29.30 + (-0.3 / 13.6) = 29.27 \text{ IN. HG.}$$

AVERAGE FLUE GAS VELOCITY [Note: (Delta p)avg is square of avg sq. root]

$$vs = 85.49 * Cp * SQRT\left[\frac{(\text{Delta } p)avg * (460 + ts)}{Ps * Ms}\right]$$

$$vs = 85.49 * 0.840 * SQRT\left[\frac{0.1467 * (460 + 1826)}{29.27 * 27.68}\right] = 46.2 \text{ FT/SEC}$$

DRY VOLUMETRIC FLUE GAS FLOW RATE @ STANDARD CONDITIONS

$$Qsd = \frac{60}{144} * Mfd * vs * A * \frac{Tstd}{ts + 460} * \frac{Ps}{Pstd}$$

$$Qsd = \frac{60}{144} * 0.854 * 46.2 * 17,671.0 * \frac{528}{1826 + 460} * \frac{29.27}{29.92}$$

$$Qsd = 65,592 \text{ SCFM}$$

WET VOLUMETRIC STACK GAS FLOW RATE @ FLUE GAS CONDITIONS

$$Qaw = 60 / 144 * vs * A$$

$$Qaw = 60 / 144 * 46.2 * 17,671.0 = 340,150 \text{ ACFM}$$

PERCENT ISOKINETIC OF SAMPLING RATE

$$\%I = \frac{Pstd}{Tstd} * \frac{100}{60} * \frac{(ts + 460) * Vm(std)}{Ps * vs * Mfd * Theta * Area\text{-}nozzle, sq.ft.}$$

$$\%I = \frac{29.92}{528} * \frac{100}{60} * \frac{(1826 + 460) * 44.882}{29.27 * 46.2 * 0.854 * 60.00 * 0.0013418}$$

$$\%I = 104.2 \%$$

GRAINS PER DRY STANDARD CUBIC FOOT

$$gr/DSCF = \frac{7000}{453.592} * \frac{mgs}{Vm(std)}$$

$$gr/DSCF = \frac{7000}{453.592} * \frac{42.3}{44.882} = 0.0145 \quad gr/DSCF$$

POUNDS PER HOUR

Lb/Hr = 60 / 7000 * gr/DSCF * Qsd

Lb/Hr = 60/7000 * 0.0145 * 65,592 = 8.18 LB/HR

PERCENT EXCESS AIR

$$\%EA = \frac{\%O2 - (0.5 * \%CO)}{(0.264 * \%N2) - (\%O2 - (0.5*\%CO))} * 100$$

$$\%EA = \frac{9.5 - (0.5 * 0.0)}{0.264 * 84.5 - (9.5 - (0.5 * 0.0))} * 100 = 74.2 \ \%$$

MAXIMUM LOAD

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT: Mountaineer Carbon Company, Moundsville, West Virginia

RUN	SAMPLING LOCATION	TEST TEAM LEADER
4	Unit #2 Incinerator Stack	Neill M. Harden
5	Unit #2 Incinerator Stack	Neill M. Harden
6	Unit #2 Incinerator Stack	Neill M. Harden

		4	5	6
	RUN DATE	09/25/84	09/25/84	09/25/84
	RUN START TIME	1030	1239	1415
	RUN FINISH TIME	1202	1351	1524
	NET SAMPLING POINTS	20	20	20
Theta	NET RUN TIME, MINUTES	60.00	60.00	60.00
Dia	NOZZLE DIAMETER, INCHES	0.370	0.370	0.370
Cp	PITOT TUBE COEFFICIENT	0.840	0.840	0.840
Y	DRY GAS METER CAL. FACTOR	1.005	1.005	1.005
Pbar	BAROMETRIC PRESSURE, IN. HG.	29.30	29.30	29.30
Delta H	AVG. PRESS. DIFFERENTIAL OF ORIFICE METER, IN. H2O	1.134	1.157	1.273
Vm	VOLUME OF METERED GAS SAMPLE DRY ACTUAL CUBIC FEET	36.995	37.543	39.392
tm	DRY GAS METER TEMP., DEG. F	95	96	98
Vm(std)	VOLUME OF METERED GAS SAMPLE @ DRY STD. COND., DSCF*	34.723	35.176	36.787
Vlc	VOLUME OF WATER CATCH IN IMPINGERS & SIL. GEL., ML	122.5	125.5	127.0
Vw(std)	VOLUME OF WATER VAPOR, SCF*	5.766	5.907	5.978
%H2O	MOISTURE, PERCENT BY VOLUME	14.2	14.4	14.0
Mfd	DRY MOLE FRACTION	0.858	0.856	0.860

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		4	5	6
%CO2	PERCENT CO2 BY VOLUME, DRY	7.0	6.9	7.0
%O2	PERCENT O2 BY VOLUME, DRY	8.6	8.4	8.3
%CO+N2	PERCENT CO + N2 BY VOLUME, DRY	84.4	84.7	84.7
Md	DRY MOLECULAR WT, LB/LB-MOLE	29.46	29.44	29.45
Ms	WET MOLECULAR WT, LB/LB-MOLE	27.83	27.80	27.85
Pg	GAS STATIC PRESS., IN H2O	-0.30	-0.30	-0.35
Ps	ABSOLUTE GAS PRESS., IN HG	29.28	29.28	29.27
ts	FLUE GAS TEMPERATURE, DEG. F	1,892	1,913	1,915
Delta P	AVG VELOCITY HEAD, IN. H2O	0.2674	0.2699	0.2955
vs	FLUE GAS VELOCITY, FT/SEC	63.1	63.7	66.6
A	STACK/DUCT AREA, SQUARE IN.	17,671	17,671	17,671
Qsd	GAS FLOW RATE, DRY SCFM*	87,476	87,411	91,753
Qaw	GAS FLOW RATE, WET ACFM	464,522	469,073	490,558
%I	PERCENT ISOKINETIC	108.6	110.1	109.7
%EA	PERCENT EXCESS AIR	62.9	60.2	59.0
	METHOD 5 PARTICULATE:			
mg	CATCH, MILLIGRAMS	71.5	81.3	57.9
Gr/DSCF	CONCEN., GRAINS PER DSCF*	0.0318	0.0357	0.0243
Lb/Hr	EMISSION RATE, LBS/HOUR	23.8	26.7	19.1

* 68 Deg. F - 29.92 in. Hg.

#1 INCINERATOR OUTLET STACK

NORMAL LOAD

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT: Mountaineer Carbon Company, Moundsville, West Virginia

RUN	SAMPLING LOCATION	TEST TEAM LEADER
7	Unit #1 Incinerator Stack	Neill M. Harden
8	Unit #1 Incinerator Stack	Neill M. Harden
9	Unit #1 Incinerator Stack	Neill M. Harden

		7	8	9
	RUN DATE	09/26/84	09/26/84	09/26/84
	RUN START TIME	1014	1141	1315
	RUN FINISH TIME	1120	1248	1423
	NET SAMPLING POINTS	20	20	20
Theta	NET RUN TIME, MINUTES	60.00	60.00	60.00
Dia	NOZZLE DIAMETER, INCHES	0.496	0.494	0.496
Cp	PITOT TUBE COEFFICIENT	0.840	0.840	0.840
Y	DRY GAS METER CAL. FACTOR	1.005	1.005	1.005
Pbar	BAROMETRIC PRESSURE, IN. HG.	29.30	29.30	29.30
Delta H	AVG. PRESS. DIFFERENTIAL OF ORIFICE METER, IN. H2O	2.069	2.109	2.333
Vm	VOLUME OF METERED GAS SAMPLE DRY ACTUAL CUBIC FEET	49.124	49.597	51.795
tm	DRY GAS METER TEMP., DEG. F	107	108	117
Vm(std)	VOLUME OF METERED GAS SAMPLE @ DRY STD. COND., DSCF*	45.237	45.597	46.901
Vlc	VOLUME OF WATER CATCH IN IMPINGERS & SIL. GEL.,ML	154.0	163.0	176.5
Vw(std)	VOLUME OF WATER VAPOR, SCF*	7.249	7.672	8.308
%H2O	MOISTURE, PERCENT BY VOLUME	13.8	14.4	15.0
Mfd	DRY MOLE FRACTION	0.862	0.856	0.850

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		7	8	9
%CO2	PERCENT CO2 BY VOLUME, DRY	6.6	6.9	6.9
%O2	PERCENT O2 BY VOLUME, DRY	9.4	8.8	8.8
%CO+N2	PERCENT CO + N2 BY VOLUME, DRY	84.0	84.3	84.3
Md	DRY MOLECULAR WT, LB/LB-MOLE	29.43	29.46	29.46
Ms	WET MOLECULAR WT, LB/LB-MOLE	27.85	27.81	27.73
Pg	GAS STATIC PRESS., IN H2O	-0.20	-0.30	-0.30
Ps	ABSOLUTE GAS PRESS., IN HG	29.29	29.28	29.28
ts	FLUE GAS TEMPERATURE, DEG. F	1,808	1,814	1,826
Delta p	AVG VELOCITY HEAD, IN. H2O	0.1521	0.1519	0.1676
vs	FLUE GAS VELOCITY, FT/SEC	46.7	46.8	49.3
A	STACK/DUCT AREA, SQUARE IN.	17,671	17,671	17,671
Qsd	GAS FLOW RATE, DRY SCFM*	67,504	66,956	69,710
Qaw	GAS FLOW RATE, WET ACFM	343,850	344,413	363,210
%I	PERCENT ISOKINETIC	102.0	104.5	102.4
%EA	PERCENT EXCESS AIR	73.6	65.4	65.4
	METHOD 5 PARTICULATE:			
mn	CATCH, MILLIGRAMS	151.3	100.5	99.9
Gr/DSCF	CONCEN., GRAINS PER DSCF*	0.0516	0.0340	0.0329
Lb/Hr	EMISSION RATE, LBS/HOUR	29.9	19.5	19.6

* 68 Deg. F - 29.92 in. Hg.

MAXIMUM LOAD

PARTICULATE FIELD DATA & RESULTS TABULATION

PLANT: Mountaineer Carbon Company, Moundsville, West Virginia

RUN	SAMPLING LOCATION	TEST TEAM LEADER
10	Unit #1 Incinerator Stack	Neill M. Harden
11	Unit #1 Incinerator Stack	Neill M. Harden
12	Unit #1 Incinerator Stack	Neill M. Harden

		10	11	12
	RUN DATE	09/27/84	09/27/84	09/27/84
	RUN START TIME	1023	1158	1410
	RUN FINISH TIME	1134	1306	1518
	NET SAMPLING POINTS	20	20	20
Theta	NET RUN TIME, MINUTES	60.00	60.00	60.00
Dia	NOZZLE DIAMETER, INCHES	0.370	0.370	0.370
Cp	PITOT TUBE COEFFICIENT	0.840	0.840	0.840
Y	DRY GAS METER CAL. FACTOR	1.005	1.005	1.005
Pbar	BAROMETRIC PRESSURE, IN. HG.	29.70	29.70	29.70
Delta H	AVG. PRESS. DIFFERENTIAL OF ORIFICE METER, IN. H2O	1.528	1.384	1.280
Vm	VOLUME OF METERED GAS SAMPLE DRY ACTUAL CUBIC FEET	42.775	41.109	39.656
tm	DRY GAS METER TEMP., DEG. F	93	94	95
Vm(std)	VOLUME OF METERED GAS SAMPLE @ DRY STD. COND., DSCF*	40.381	39.204	37.741
Vlc	VOLUME OF WATER CATCH IN IMPINGERS & SIL. GEL.,ML	146.0	141.0	136.5
Vw(std)	VOLUME OF WATER VAPOR, SCF*	6.872	6.637	6.425
%H2O	MOISTURE, PERCENT BY VOLUME	14.4	14.5	14.5
Mfd	DRY MOLE FRACTION	0.856	0.855	0.855

(continued next page)

		10	11	12
%CO2	PERCENT CO2 BY VOLUME, DRY	6.2	6.0	6.2
%O2	PERCENT O2 BY VOLUME, DRY	9.2	9.8	9.3
%CO+N2	PERCENT CO + N2 BY VOLUME, DRY	84.6	84.2	84.5
Md	DRY MOLECULAR WT, LB/LB-MOLE	29.36	29.35	29.36
Ms	WET MOLECULAR WT, LB/LB-MOLE	27.73	27.71	27.71
Ps	GAS STATIC PRESS., IN H2O	-0.45	-0.40	-0.40
Ps	ABSOLUTE GAS PRESS., IN HG	29.67	29.67	29.67
ts	FLUE GAS TEMPERATURE, DEG. F	1,843	1,879	1,832
Delta P	AVG VELOCITY HEAD, IN. H2O	0.3515	0.3249	0.3008
vs	FLUE GAS VELOCITY, FT/SEC	71.2	69.0	65.8
A	STACK/DUCT AREA, SQUARE IN.	17,671	17,671	17,671
Qsd	GAS FLOW RATE, DRY SCFM*	102,042	97,283	94,480
Qaw	GAS FLOW RATE, WET ACFM	524,543	508,353	484,176
%I	PERCENT ISOKINETIC	109.6	110.2	109.3
%EA	PERCENT EXCESS AIR	70.0	78.8	71.5
	METHOD 5 PARTICULATE:			
ms	CATCH, MILLIGRAMS	40.4	32.0	78.9
Gr/DSCF	CONCEN., GRAINS PER DSCF*	0.0153	0.0126	0.0323
Lb/Hr	EMISSION RATE, LBS/HOUR	13.3	10.5	26.1

* 68 Deg. F - 29.92 in. Hg.

APPENDIX 5.2

FIELD AND ANALYTICAL DATA

#2 INCINERATOR OUTLET STACK

NORMAL LOAD

Preliminary Field Data

PLANT NAME [illegible]
LOCATION [illegible]SVILLE, W. VA.
SAMPLING LOCATION UNITS 1&2 INCINERATOR STACK

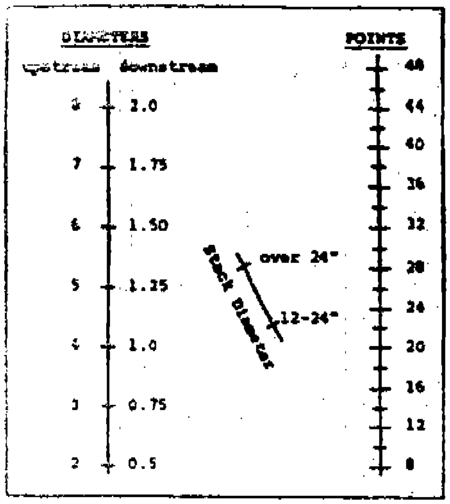
DUCT DEPTH
FROM INSIDE FAR WALL TO OUTSIDE OF PORT 168"
NIPPLE LENGTH 18
DEPTH OF DUCT 150
WIDTH (RECTANGULAR DUCT) ______

EQUIVALENT DIAMETER
$D_E = \frac{2 \text{(DEPTH)(WIDTH)}}{\text{DEPTH + WIDTH}} = \frac{2(\quad X \quad)}{(\quad + \quad)} = $ ______

DISTANCE FROM PORTS TO NEAREST FLOW DISTURBANCE:

	UPSTREAM	DOWNSTREAM
FEET	132	18.25
STACK DIAMETERS	11	1.46

STACK AREA = $\pi \left(\frac{150}{24}\right)^2$ = 17,671 ft^2



Point	% OF DIAMETER	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	2.6	4"	22"
2	8.2	12¼	30¼
3	14.6	22	40
4	22.6	34	52
5	34.2	51¼	69¼
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14	16	18	20	22	24
1	6.7	[illegible]	[illegible]	[illegible]	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	[illegible]	[illegible]	[illegible]	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	[illegible]	[illegible]	[illegible]	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	[illegible]	[illegible]	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		[illegible]	47.7	[illegible]	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		[illegible]	[illegible]	[illegible]	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			[illegible]	77.6	[illegible]	36.6	28.3	23.6	20.4	18.0	16.1
8			[illegible]	[illegible]	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.6	62.3	73.1	62.5	38.2	30.6	26.2	23.0
10				[illegible]	[illegible]	79.9	71.7	61.8	38.8	31.5	27.2
11					[illegible]	[illegible]	78.0	70.4	61.2	39.3	32.3
12					[illegible]	[illegible]	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						[illegible]	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	[illegible]	[illegible]
18								98.6	93.3	88.4	[illegible]
19									96.1	91.3	[illegible]
20									98.7	94.0	[illegible]
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.5

LOCATION OF TRAVERSE POINTS IN RECTANGULAR STACKS

	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8	9	10	11	12
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.6	5.0	[illegible]	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		[illegible]	[illegible]	[illegible]	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	38.9	35.0	31.8	29.2
5				[illegible]	[illegible]	[illegible]	[illegible]	50.0	45.0	40.9	37.5
6					[illegible]	[illegible]	[illegible]	61.1	55.0	50.0	45.8
7						[illegible]	[illegible]	72.2	65.0	59.1	54.2
8							[illegible]	83.3	75.0	68.2	[illegible]
9								94.4	85.0	77.3	[illegible]
10									95.0	86.4	[illegible]
11										95.5	87.5
12											95.8

ENTROPY ENVIRONMENTALISTS, INC.

ORSAT FIELD DATA

Plant Name ADCAR

Sampling Location UNIT 2 INCINERATOR STACK Fuel Type COKE

Run and/or Sample No. 1 Leak Test? ✓ Date 9-26-84 Operator MJ

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
0950	1415	5.9	15.4	—	9.5		
TO		6.0	15.4		9.4		
0905		6.0	15.5		9.5		
	Avg.	6.0		Avg.	9.5		84.5

Run and/or Sample No. 2 Leak Test? ✓ Date 9-26 Operator MJ

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
0943	1435	6.6	15.1	—	8.5	—	
TO		6.6	15.2		8.6		
1055		6.5	15.1		8.6		
	Avg.	6.6		Avg.	8.6		84.8

Run and/or Sample No. 3 Leak Test? ✓ Date 9-26 Operator MJ

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
1140	1450	6.8	15.2	—	8.4	—	
TO		6.8	15.2		8.4		
1252		6.7	15.0		8.3		
	Avg.	6.8		Avg.	8.4		84.8

PARTICULATE FIELD DATA

COMPANY NAME [illegible]
ADDRESS [illegible]
SAMPLING LOCATION [illegible] STACK
DATE [illegible]
TEAM LEADER [illegible]
BAROMETRIC PRESSURE, IN. HG [illegible]
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 [illegible]
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.012 [illegible] 0.017

RUN NUMBER 1
TIME START 0756
TIME FINISH 0905
TECHNICIANS ST
STATIC PRESSURE, IN. H_2O -.35

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ 1850 °F

IDENTIFICATION NUMBERS

REAGENT BOX 219 NOZZLE 214 DIAMETER .496
METER BOX N2 T/C READOUT RED BOX 2002
UMBILICAL
T/C PROBE 6-1
SAMPLE BOX
ORSAT PUMP 04
PROBE WC 6
TEDLAR BAG 01

FILTER #	TARE
E2329	[illegible]

NOMOGRAPH SET-UP — NOMOGRAPH # [illegible]

$\Delta H_@$ 1.92
C FACTOR .89
METER TEMP 110
STACK TEMP 1850
% MOISTURE 9
REF. ΔP .14

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A [illegible]	0	[illegible]	.19	2.50	2.50	98	2	250	65	1858	
[illegible]	[illegible]	[illegible]	.18	2.35	2.35	99	2	250	65	1867	
[illegible]	[illegible]	[illegible]	.16	2.10	2.10	99	2	260	65	1852	
[illegible]	[illegible]	[illegible]	.13	1.70	1.70	98	2	260	65	1832	
[illegible]	[illegible]	[illegible]	.09	1.18	1.18	98	2	260	65	[illegible]	
D [illegible]	[illegible]	[illegible]	.18	2.35	2.35	99	2	265	65	1857	
[illegible]	[illegible]	[illegible]	.17	2.23	2.23	98	2	265	65	1859	
[illegible]	[illegible]	[illegible]	.13	1.70	1.70	99	2	265	65	1848	
[illegible]	[illegible]	[illegible]	.12	1.58	1.56	99	2	265	65	1835	
[illegible]	[illegible]	[illegible]	.09	1.17	1.17	99	2	265	65	1750	LT ①
C [illegible]	[illegible]	[illegible]	.19	2.50	2.50	99	2	260	65	1851	837.310
[illegible]	[illegible]	[illegible]	.18	2.35	2.35	100	2	260	65	1858	837.262 / .048
[illegible]	[illegible]	[illegible]	.15	1.98	1.98	100	2	265	60	1844	
[illegible]	[illegible]	[illegible]	.12	1.58	1.58	100	2	265	60	1835	
[illegible]	[illegible]	[illegible]	.09	1.19	1.19	100	1	265	60	1735	
B [illegible]	[illegible]	[illegible]	.20	2.67	2.67	98	1	260	60	1858	
[illegible]	[illegible]	[illegible]	.19	2.50	2.50	98	2	260	60	1859	
[illegible]	[illegible]	[illegible]	.17	2.23	2.23	99	2	260	60	1845	
[illegible]	[illegible]	[illegible]	.14	1.84	1.84	98	2	260	60	1866	
[illegible]	[illegible]	[illegible]	.11	1.45	1.45	98	2	260	60	1737	
	[illegible]	[illegible]									

AVERAGE [illegible] 1.956 99 1826

ΔH T_m T_s

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME [illegible]
ADDRESS [illegible]
SAMPLING LOCATION Unit 2 Incinerator Stack
DATE 9-2[illegible]
TEAM LEADER AMF
TECHNICIANS ST
BAROMETRIC PRESSURE, IN. HG 25.3
STATIC PRESSURE, IN. H_2O -.35
RUN NUMBER 2
TIME START 0943
TIME FINISH 1055
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 6(I) 5(F)
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.010 0.007 0.007

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE [illegible]

IDENTIFICATION NUMBERS

REAGENT BOX 219 NOZZLE 313 DIAMETER .494
METER BOX N2 T/C READOUT RED BOX 2002
UMBILICAL T/C PROBE HI TEMP 6
SAMPLE BOX ORSAT PUMP 04
PROBE WC 6 TEDLAR BAG 13

FILTER #	TARE
E 2235	.4459

NOMOGRAPH SET-UP NOMOGRAPH # AMF

$\Delta H_@$ 1.72 C FACTOR .87
METER TEMP 100 STACK TEMP 1850
% MOISTURE 14 REF. ΔP .14

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
B 5	0	[illegible]	[illegible]	2.67	2.67	100	2	260	65	1848	
4	3	[illegible]	.19	2.50	2.50	102	2	260	65	1845	
3	6	[illegible]	.17	2.20	2.20	103	2	260	65	1837	
2	9	[illegible]	.13	1.70	1.70	104	2	260	65	1835	
1	12	872.10	.12	1.58	1.58	104	2	260	65	1832	
C 5	15/0	[illegible]	.18	2.30	2.30	100	2	250	65	1847	
4	3	877.84	.18	2.30	2.30	100	2	250	65	1858	
3	6	880.65	.15	1.96	1.96	99	2	250	65	1845	
2	9	[illegible]	.13	1.70	1.70	98	2	250	65	1837	
1	12	[illegible]	.09	[illegible]	1.47	98	1	250	65	1834	LT 1
D 5	30/0	[illegible]	.19	2.50	2.50	94	2	250	65	1845	887.128
4	[illegible]	[illegible]	.17	2.20	2.20	94	2	250	65	1843	887.072
3	[illegible]	[illegible]	.15	1.96	1.96	95	2	250	65	1841	.056
2	9	[illegible]	.11	1.42	1.42	95	2	250	65	1835	
1	12	896.84	.10	1.30	1.30	95	2	250	65	1830	
A 5	45/0	[illegible]	.21	2.78	2.78	96	3	250	65	1850	
4	3	902.70	.20	2.67	2.67	97	3	250	65	1848	
3	6	[illegible]	.17	2.20	2.20	98	3	250	65	1844	
2	9	907.04	.14	1.84	1.84	99	3	250	65	1841	
1	12	[illegible]	.10	1.30	1.30	100	2	250	65	1837	
	60/[illegible]	[illegible]									

V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M	T_S
[illegible]	0.1[illegible]	2.010	99	1841

PARTICULATE FIELD DATA

COMPANY NAME [illegible]CAR
ADDRESS [illegible], W. VA.
SAMPLING LOCATION UNIT 2 INCINERATOR STACK
DATE [illegible]
TEAM LEADER AMF
TECHNICIANS ST
BAROMETRIC PRESSURE, IN. HG [illegible]
STATIC PRESSURE, IN. H_2O -.30
SAMPLING [illegible] LEAK TEST VACUUM, IN. HG 15 5(I) 5(F)
SAMPLING [illegible] RATE, CU. FT./MIN. 0.010 [illegible] 0.004

RUN NUMBER 3
TIME START 1140
TIME FINISH 1252

EQUIPMENT [illegible]

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ [illegible] °F

IDENTIFICATION NUMBERS

REAGENT BOX 219 NOZZLE S13 DIAMETER .494
METER BOX N2 T/C READOUT RED BOX 7002
UMBILICAL
T/C PROBE 6-1
SAMPLE BOX
ORSAT PUMP 04
PROBE WC 6
TEDLAR BAG 05

FILTER # [illegible]
E7231 [illegible]

NOMOGRAPH SET-UP NOMOGRAPH # AMF

$\Delta H_@$ 1.72 C FACTOR .87
METER TEMP 100 STACK TEMP 1850
% MOISTURE 14 REF. ΔP .14

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
B 5	0	912.017	.22	2.89	2.89	98	2	250	65	1847	
4	3	915.02	.21	2.72	2.72	99	2	250	65	1846	
3	6	[illegible]	.17	2.25	2.26	100	2	260	65	1839	
2	9	[illegible]	.15	1.95	1.95	100	2	260	65	1836	
1	[illegible]	[illegible]	.11	1.40	1.40	100	1	260	65	1832	
C 5	15/0	[illegible]	[illegible]	2.35	2.36	99	2	260	65	1845	
4	[illegible]	[illegible]	[illegible]	2.25	2.25	99	2	260	65	1842	
3	6	[illegible]	.14	1.84	1.84	100	2	260	65	1838	
2	9	[illegible]	.13	1.69	1.69	100	2	260	65	1835	
1	12	[illegible]	.09	1.17	1.17	100	1	260	65	1830	LT ①
D 5	30/0	976.525	.21	2.72	2.72	98	2	270	65	1844	976.574 976.525
4	3	[illegible]	.18	2.35	2.35	99	2	270	65	1842	.049
3	6	[illegible]	.15	1.95	1.95	100	2	270	65	1838	
2	9	[illegible]	.12	1.57	1.57	100	2	270	65	1836	
1	12	[illegible]	.10	1.27	1.27	100	2	270	65	1831	
A 5	45/0	[illegible]	.20	2.67	2.67	99	3	270	65	1842	
4	3	[illegible]	[illegible]	2.35	2.35	100	3	270	65	1840	
3	6	[illegible]	.16	2.05	2.05	100	3	270	65	1837	
2	9	[illegible]	.13	1.69	1.69	101	3	270	65	1833	
1	12	[illegible]	.09	1.17	1.17	101	3	270	65	1830	
	60/[illegible]	[illegible]									

[illegible] 0.1919 2.015 100 1838

V_m $(\Delta P)^{1/2}$ ΔH T_m T_s

ENTROPY

ARTICULATE SAMPLING LABORATORY SULTS

Plant Name: [illegible] EEI Ref. # 2632

Sampling Location: Unit #2 Incinerator Stack

Date Received 10/1/84 Date Analyzed 10/4/84 Reagent Box(es) 0219

Run Number	1	2	3
Run Date	9/24	9/24	9/24

SUMMARY OF PARTICULATE ANALYSES

	1	2	3
Sum of Particulate, mg.	490.7	506.2	481.5
Total Filter Tare mg.	448.1	445.9	448.8
Blank Residue, mg.	(125 ml) 0.3	(175 ml) 0.4	(125 ml) 0.3
TOTAL PARTICULATE CATCH, mg.	42.3	59.9	32.4

ANALYSIS OF MOISTURE CATCH

	1	2	3
Reagent 1 (H_2O):			
Final Weight, g.	345.0	360.0	353.0
Tared Weight, g.	200.0	200.0	200.0
Water Catch, g.	145.0	160.0	153.0
Reagent 2 ( ):			
Final Weight, g.	–	–	–
Tared Weight, g.	–	–	–
Total Catch, g.	–	–	–
CONDENSED WATER, g.	145.0	160.0	153.0
Silica Gel:			
Final Weight, g.	218.5	220.5	222.5
Tared Weight, g.	200.0	200.0	200.0
ABSORBED WATER, g.	18.5	20.5	22.5
TOTAL WATER COLLECTED, g.	163.5	180.5	175.5

Blank Beaker #	[illegible]
Final wt. mg.	73912.3
Tare wt. mg.	73911.9
Residue, mg.	0.4
Volume, ml.	200
Concen., mg/ml.	.002

--- Legend ---

√ = Final Weight
L = Loose Particulate
F = Filter D = Dish
R = Rinse P = Pan

Notes and Comments

LABORATORY SAMPLE WEIGHT CALCULATIONS

Plant Name MOSER EEI Ref. # 2632

Run Number	1	2	3
Run Date	9/24	9/24	9/24
Sample ID/Container #	FIR-219	FIR-223	FIR-224
	148.8188	136.2892	152.8999
	✓148.8181	✓136.2890	✓152.8999
	148.8184	136.2899	152.4184
Tare Wt., g.	148.3274	135.7828	
SAMPLE WT., g.	.4907	.5062	.4815

Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

CUSTODY SHEET FOR REAGENT BOX # 0219

Date of Makeup 9/20/84 Initials MG Locked? ✓

Individual Tare of Reagent: 200 mls. of H_2O

Individual Tare of Reagent: ______ mls. of ______

Individual Silica Gel Tare Weight 200 gms.

PLANT NAME MOCAR

SAMPLING LOCATION Unit #2 Incinerator stack

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
1	[illegible]	ST	yes	9-24-84	70%	ST	yes
2	[illegible]	ST	–	9-24-84	80%	ST	yes
3	9-24-[illegible]	ST	–	9-24-84	80%	ST	yes

	Date	Initials	Locked?
Received in Lab	9/28/84	MG	✓

Sampling Method: M 5

Remarks:

Zero & Span Balance Initials MG

Filter #	Tare Weight (mgms)	Used on Test
E2229	.4481	1
E 2235	.4459	2
E 2231	.4488	3

ENTROPY ENVIRONMENTALISTS, INC.

MAXIMUM LOAD

ORSAT FIELD DATA

Plant Name CDCAR

Sampling Location UNIT = INCINERATOR STACK Fuel Type COKE

Run and/or Sample No. 4 Leak Test? ✓ Date 9-25 Operator MH

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
[illegible]	[illegible]	7.0	15.5	—	8.5	—	
[illegible]		6.9	15.5		8.6		
[illegible]		7.0	15.6		8.6		
	Avg.	7.0		Avg.	8.6		84.4

Run and/or Sample No. 5 Leak Test? ✓ Date 9-25 Operator MH

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
1234	1835	6.9	15.2	—	8.3	—	
TO		6.8	15.2		8.4		
1351		6.9	15.3		8.4		
	Avg.	6.9		Avg.	8.4		84.7

Run and/or Sample No. 6 Leak Test? ✓ Date 9-25 Operator MH

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
[illegible]	1955	7.0	15.2	—	8.2	—	
[illegible]		6.9	15.2		8.3		
[illegible]		7.0	15.3		8.3		
	Avg.	7.0		Avg.	8.3		84.7

PARTICULATE FIELD DATA

COMPANY NAME [illegible]
ADDRESS [illegible] W. VA.
SAMPLING LOCATION UNIT 2 INCINERATOR STACK
DATE [illegible]
TEAM LEADER [illegible]
BAROMETRIC PRESSURE, IN. HG 29.?
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 20 20
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.010 0.017 0.005

RUN NUMBER 4
TIME START 1030
TIME FINISH 1202
TECHNICIANS ST
STATIC PRESSURE, IN. H_2O -.30

EQUIPMENT CHECKS
- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE [illegible]

FILTER # [illegible]
[illegible]

IDENTIFICATION NUMBERS

REAGENT BOX 203 NOZZLE 810 DIAMETER .310
METER BOX N2 T/C READOUT RED BOX 2002
UMBILICAL T/C PROBE 6-1
SAMPLE BOX ORSAT PUMP 04
PROBE WC6 TEDLAR BAG 13

NOMOGRAPH # 14

NOMOGRAPH SET-UP

$\Delta H_@$ 1.72 C FACTOR .87
METER TEMP 95 STACK TEMP 1900
% MOISTURE 14 REF. ΔP .44

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ORIFICE SETTING (ΔH), IN. H_2O ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 5	0	[illegible]	.37	1.53	1.53	93	1	260	65	1945	
4	3	[illegible]	.37	1.53	1.53	94	1	260	65	1937	
3	[illegible]	[illegible]	.36	1.51	1.51	95	1	260	65	1900	
2	[illegible]	[illegible]	.33	1.40	1.40	96	1	260	65	1885	
1	[illegible]	[illegible]	[illegible]	1.12	1.12	96	1	260	65	1896	
D 5	10/0	[illegible]	.33	1.40	1.40	95	1	260	65	1925	
4	3	[illegible]	.35	1.48	1.48	97	1	250	65	1920	STOPPED 1103 STARTED 1130
3	6	[illegible]	.30	1.25	1.25	97	1	250	65	1890	
2	9	[illegible]	.27	1.12	1.12	97	1	250	65	1885	
1	12	[illegible]	.25	1.04	1.04	98	1	250	66	1895	LTD
C 5	20/0	[illegible]	.30	1.25	1.25	98	1	250	65	1890	981.384 981.323 .061
4	3	[illegible]	.29	1.22	1.22	96	1	250	65	1884	
3	[illegible]	[illegible]	.22	.93	.93	95	1	250	65	1860	
2	9	[illegible]	.17	.69	.69	94	1	250	65	1833	
1	[illegible]	[illegible]	.13	.53	.53	94	1	250	65	1815	
B 5	[illegible]	[illegible]	.22	[illegible]	.94	94	1	250	65	1940	
4	[illegible]	[illegible]	.26	1.10	1.10	94	1	250	65	1918	
3	[illegible]	[illegible]	.25	1.04	1.04	95	1	250	65	1905	
2	9	[illegible]	.23	.94	.94	95	1	250	65	1889	
1	[illegible]	[illegible]	.16	.65	.65	95	1	250	65	1895	
	[illegible]	[illegible]									

[illegible] 1.134 95 1892

$\sqrt{\Delta P}$ ΔH T_m T_s

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME [illegible]
ADDRESS [illegible], W. VA.
SAMPLING LOCATION [illegible] INCINERATOR STACK
DATE [illegible]
TEAM LEADER MHt
BAROMETRIC PRESSURE, IN. HG [illegible]
STATIC PRESSURE, IN. H_2O -.30
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 (i) 5 (f)
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.008 0.00[illegible] 0.010

RUN NUMBER 5
TIME START 1239
TIME FINISH 1351
TECHNICIANS ST

EQUIPMENT CHECK
✓ PITOTS, PRE-TEST
✓ PITOTS, POST-TEST
✓ ORSAT SAMPLING SYSTEM
✓ TEDLAR BAG
✓ THERMOCOUPLE @ [illegible] °F

IDENTIFICATION NUMBERS
REAGENT BOX 203 NOZZLE 811 DIAMETER .370
METER BOX A12 T/C READOUT RED BOX 2002
UMBILICAL ____ T/C PROBE HI TEMP 6
SAMPLE BOX ____ ORSAT PUMP 04
PROBE WC 6 TEDLAR BAG 05

FILTER # [illegible]
E[illegible]

NOMOGRAPH SET-UP NOMOGRAPH # MHt
$\Delta H_@$ 1.72 C FACTOR .87
METER TEMP 95 STACK TEMP 1900
% MOISTURE 17 REF. ΔP .44

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
B 5	0	[illegible]	.31	1.32	1.32	93	1	250	65	1930	
4	3	[illegible]	.29	1.22	1.22	94	1	250	65	1932	
3	6	[illegible]	.26	1.10	1.10	95	1	250	65	1933	
2	9	[illegible]	.21	.88	.88	95	1	250	65	1922	
1	12	[illegible]	.20	.84	.84	95	1	250	65	1878	
C 5	[illegible]	[illegible]	.33	1.40	1.40	95	1	250	65	1925	
4	[illegible]	[illegible]	.27	1.14	1.14	96	1	250	65	1927	
3	[illegible]	[illegible]	.23	.96	.96	96	1	250	65	1928	
2	[illegible]	[illegible]	.19	.80	.80	97	1	250	65	1924	
1	[illegible]	[illegible]	.20	.84	.84	97	1	250	65	1883	LT①
D 5	30/0	[illegible]	.33	1.40	1.40	96	1	250	65	1922	16.493
4	3	[illegible]	.35	1.50	1.50	97	2	250	65	1930	16.435 / .058
3	6	[illegible]	.32	1.36	1.36	97	2	250	65	1918	
2	9	[illegible]	.25	1.05	1.05	97	1	250	65	1903	
1	12	[illegible]	[illegible]	.88	.88	97	1	250	65	1848	
A 5	[illegible]	[illegible]	[illegible]	1.56	1.56	96	2	250	65	1918	
4	[illegible]	[illegible]	[illegible]	1.55	1.55	96	2	250	65	1925	
3	[illegible]	[illegible]	[illegible]	1.32	1.32	95	2	250	65	1926	
2	[illegible]	[illegible]	[illegible]	1.14	1.14	95	2	250	65	1906	
1	[illegible]	[illegible]	.21	.88	.88	95	2	250	65	1848	
	[illegible]	[illegible]									

[illegible] 1.57 [illegible] 1913
ΔH T_m T_S

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME [illegible] — RUN NUMBER 6
ADDRESS [illegible] — TIME START 1415
SAMPLING LOCATION [illegible] INCINERATOR STACK — TIME FINISH 1524
DATE [illegible] — TEST LEADER MIT — TECHNICIANS ST
BAROMETRIC PRESSURE, IN. HG [illegible] — STATIC PRESSURE, IN. H_2O -.35
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 20 30
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.007 0.005 0.006

EQUIPMENT CHECKS
- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE [illegible] °F

IDENTIFICATION NUMBERS
REAGENT BOX 203 NOZZLE 810 DIAMETER .370
METER BOX N2 T/C READOUT RED BOX 2002
UMBILICAL T/C PROBE 6-1
SAMPLE BOX ORSAT PUMP 04
PROBE WC 6 TEDLAR BAG 01

FILTER # [illegible]
[illegible]

NOMOGRAPH SET-UP — NOMOGRAPH # AMF
ΔH@ 1.72 — C FACTOR .89
METER TEMP 95 — STACK TEMP 1900
% MOISTURE 14 — REF. ΔP .44

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 5	0	[illegible]	.37	1.59	1.59	98	2	250	65	1925	
4	[illegible]	[illegible]	.34	1.47	1.47	99	2	250	65	1927	
3	6	[illegible]	.34	1.47	1.47	100	2	250	65	1912	
2	[illegible]	[illegible]	[illegible]	1.39	1.39	100	2	250	65	1889	
1	[illegible]	[illegible]	[illegible]	1.15	1.15	100	2	250	65	1832	
D 5	[illegible]	[illegible]	.32	1.38	1.38	99	2	250	65	1933	
4	[illegible]	[illegible]	.34	1.47	1.47	97	2	250	65	1935	
3	[illegible]	[illegible]	.31	1.33	1.33	97	2	250	65	1920	
2	9	[illegible]	.29	1.23	1.23	96	2	250	65	1923	
1	[illegible]	[illegible]	[illegible]	.97	.97	97	1	250	65	1906	LT(1)
C 5	[illegible]	[illegible]	[illegible]	1.15	1.15	97	1	250	65	1943	57.207
4	[illegible]	[illegible]	[illegible]	1.15	1.15	98	1	250	65	1925	57.157 / .050
3	6	[illegible]	[illegible]	1.12	1.12	98	1	250	65	1905	
2	[illegible]	[illegible]	[illegible]	[illegible]	.97	[illegible]	1	250	65	1900	
1	[illegible]	[illegible]	[illegible]	[illegible]	.94	[illegible]	1	250	65	1882	
B 5	[illegible]	[illegible]	[illegible]	1.38	1.38	96	1	250	65	1965	
4	[illegible]	[illegible]	[illegible]	1.40	1.40	96	1	250	65	1961	
3	[illegible]	[illegible]	[illegible]	1.47	1.47	97	1	250	65	1930	
2	9	[illegible]	.30	1.28	1.28	97	1	250	65	1908	
1	[illegible]	[illegible]	[illegible]	1.15	1.15	96	1	250	65	1891	
	[illegible]	[illegible]									

[illegible] 0.3955 — 1.273 — 98 — 1915
$(\sqrt{\Delta P})^2$ — ΔH — T_m — T_s

ENTROPY

PARTICULATE SAMPLING LABORATORY . JLTS

EEI Ref. # 2632

Plant Name MOCAR

Sampling Location Unit #2 Incinerator Stack

Date Received 10/1/84 Date Analyzed 10/4/84 Reagent Box(es) 0203

Run Number	4	5	6
Run Date	9/25	9/25	9/25

SUMMARY OF PARTICULATE ANALYSES

Sum of Particulate, mg.	600.8	607.0	512.1
Total Filter Tare mg.	528.9	525.6	454.0
Blank Residue, mg.	(175 ml) 0.4	(50 ml) 0.1	(100 ml) 0.2
TOTAL PARTICULATE CATCH, mg.	$\boxed{71.5}$	$\boxed{81.3}$	$\boxed{57.9}$

ANALYSIS OF MOISTURE CATCH

Impinger (H_2O):			
Final Weight, g.	305.0	309.0	306.0
Tared Weight, g.	200.0	200.0	200.0
Water Catch, g.	105.0	109.0	106.0
Reagent # ( ):	–	–	–
Final Weight, g.	–	–	–
Tare Weight, g.	–	–	–
Water Catch, g.	–	–	–
CONDENSED WATER, g.	105.0	109.0	106.0
Silica Gel:			
Final Weight, g.	217.5	216.5	221.0
Tared Weight, g.	200.0	200.0	200.0
ABSORBED WATER, g.	17.5	16.5	21.0
TOTAL WATER COLLECTED, g.	$\boxed{122.5}$	$\boxed{125.5}$	$\boxed{127.0}$

Blank Beaker # 1

Final Wt. mg. 73912.3

Tare Wt. mg. 73911.9

Residue, mg. 0.4

Volume, ml. 200

Concen., mg/ml. $\boxed{.002}$

--- Legend ---

✓ = Final Weight

L = Loose Particulate

F = Filter D = Dish

R = Rinse P = Pan

Notes and Comments

LABORATORY SAMPLE WEIGHT CALCULATIONS

Plant Name Mocar EEI Ref. # 2632

Run Number	4	5	6
Run Date	9/25	9/25	9/25
Sample ID/Container #	FIR-233	FIR-235	FIR-236
	148.0886 148.0884 148.0897	134.2571 134.2567	149.8229 149.8228 149.8239
Tare Wt., g.	147.4876	133.6497	149.3107
SAMPLE WT., g.	.6008	.6070	.5121

Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

CUSTODY SHEET FOR REAGENT BOX # 0203

Date of Makeup 9/20/84 Initials MG Locked? ✓

Individual Tare of Reagent: 200 mls. of H_2O

Individual Tare of Reagent: ______ mls. of ______

Individual Silica Gel Tare Weight 200 gms.

PLANT NAME MIXAR

SAMPLING LOCATION UNIT 2 INCINERATOR STACK

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
4	9-25	MW	✓	9-25	60%	ST	yes
5	9-25	MW	✓	9-25	70%	ST	—
6	9-25	MW	✓	9-25	70%	ST	—

Received in Lab Date 9/20/84 Initials MG Locked? ✓

Sampling Method: M-5

Remarks:

Zero & Span Balance Initials MG

Filter #	Tare Weight (mgms)	Used on Test
E 1163	.5289	4
E 1162	.5256	5
E 2232	.4540	6

ENTROPY ENVIRONMENTALISTS, INC.

#1 INCINERATOR OUTLET STACK

NORMAL LOAD

ORSAT FIELD DATA

Plant Name MOCAR

Sampling Location UNIT 1 INCINERATOR STACK Fuel Type COKE (NAT. GAS)

Run and/or Sample No. 7 Leak Test? ✓ Date 9-26 Operator MT

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	%O_2 B-A	%CO C-B	%N_2 100-C
1014	1530	6.5	16.0	—	9.5	—	
TO		6.6	15.9		9.3		
[illegible]		6.6	15.9		9.3		
	Avg.	6.6		Avg.	9.4		84.0

Run and/or Sample No. 8 Leak Test? ✓ Date 9-26 Operator MT

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	%O_2 B-A	%CO C-B	%N_2 100-C
[illegible]	1550	6.9	15.7	—	8.8	—	
TO		6.9	15.8		8.9		
[illegible]		6.9	15.7		8.8		
	Avg.	6.9		Avg.	8.8		84.3

Run and/or Sample No. 9 Leak Test? ✓ Date 9-26 Operator MT

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	%O_2 B-A	%CO C-B	%N_2 100-C
1315	1610	6.9	15.7	—	8.8	—	
TO		6.8	15.7		8.9		
1423		6.9	15.7		8.8		
	Avg.	6.9		Avg.	8.8		84.3

PARTICULATE FIELD DATA

COMPANY NAME ARCAA [illegible]

ADDRESS [illegible]

SAMPLING LOCATION [illegible]

DATE [illegible]

BAROMETRIC PRESSURE, IN. HG 29.3

SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 5(i) 3(f)

SAMPLING TRAIN LEAK RATE, CU. FT./MIN. .012 [illegible] .003

TEAM LEADER MK

RUN NUMBER 7

TIME START 1014

TIME FINISH 1120

TECHNICIANS ST

STATIC PRESSURE, IN. H_2O -.20

EQUIPMENT CHECK

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ 1800 °F

FILTER # [illegible]

IDENTIFICATION NUMBERS

REAGENT BOX 222 NOZZLE 814 DIAMETER .496

METER BOX A2 T/C READOUT RED BOX 2002

UMBILICAL T/C PROBE 6-1

SAMPLE BOX 15 ORSAT PUMP 04

PROBE WC 6-6 TEDLAR BAG 05

NOMOGRAPH # [illegible]

NOMOGRAPH SET-UP

ΔH@ 1.4 C FACTOR .85

METER TEMP 100 STACK TEMP 1800

% MOISTURE 12 REF. ΔP .14

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
				2.57	2.57	[illegible]	2	250	65	1823	
B 5	[illegible]	97.213	.19	2.57	2.57	104	2	250	65	1825	
4	[illegible]	[illegible]	.19	2.40	2.40	[illegible]	2	250	65	1822	
3	[illegible]	[illegible]	.18	1.84	1.84	[illegible]	2	250	65	1819	
2	[illegible]	[illegible]	[illegible]	1.48	1.48	[illegible]	1	250	65	1790	
1	[illegible]	[illegible]	[illegible]	2.40	2.40	[illegible]	2	250	65	1823	
C 5	[illegible]	[illegible]	.18	2.40	2.40	107	2	250	65	1813	
4	[illegible]	[illegible]	.18	2.05	2.05	[illegible]	2	250	65	1804	
3	[illegible]	[illegible]	.15	1.60	1.60	[illegible]	2	250	65	1789	
2	[illegible]	[illegible]	.12	1.48	1.48	108	2	250	65	1777	LT①
1	[illegible]	[illegible]	.11	2.57	2.57	106	2	250	65	1818	101.982
D 5	[illegible]	[illegible]	.10	2.40	2.40	107	2	250	65	1817	101.857 / .045
4	[illegible]	[illegible]	.18	2.05	2.05	107	2	250	65	1811	
3	[illegible]	[illegible]	.15	1.48	1.44	108	2	250	65	1808	
2	[illegible]	[illegible]	.11	1.23	1.23	[illegible]	2	250	65	1756	
1	[illegible]	[illegible]	.10	2.57	2.57	[illegible]	2	240	60	1828	
A 5	[illegible]	[illegible]	[illegible]	2.57	2.67	[illegible]	2	240	60	1830	
4	[illegible]	[illegible]	[illegible]	2.30	2.30	109	2	240	60	1821	
3	[illegible]	[illegible]	[illegible]	1.84	1.84	110	2	240	60	1802	
2	[illegible]	[illegible]	.14	1.48	1.48	[illegible]	2	240	60	1780	
1	[illegible]	[illegible]	.11								
	[illegible]	[illegible]									

[illegible] [illegible] 2.069 107 1808

$(\Delta P)^{1/2}$ ΔH T_m T_s

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME [illegible]
ADDRESS [illegible], VA.
SAMPLING LOCATION Unit 1 Incinerator Stack
DATE 9-26-[illegible]
BAROMETRIC PRESSURE, IN. HG 29.3
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 (I) 4 (F)
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.003 RATE: 0.001

RUN NUMBER 8
TIME START 1141
TIME FINISH 1248
TEAM LEADER AMK
TECHNICIANS ST
STATIC PRESSURE, IN. H_2O -.30

EQUIPMENT CHECKS
✓ PITOTS, PRE-TEST
✓ PITOTS, POST-TEST
✓ ORSAT SAMPLING SYSTEM
✓ TEDLAR BAG
✓ THERMOCOUPLE @ ____ °F

IDENTIFICATION NUMBERS
REAGENT BOX 222 NOZZLE 213 DIAMETER .494
METER BOX A2 T/C READOUT RED BOX 3002
UMBILICAL ____ T/C PROBE #1 TEMP 6
SAMPLE BOX 08 ORSAT PUMP 04
PROBE WC 6-1 TEDLAR BAG 13
NOMOGRAPH # AMK

NOMOGRAPH SET-UP
$\Delta H_@$ 1.72[illegible] C FACTOR .87
METER TEMP 110 STACK TEMP 1800
% MOISTURE 14 REF. ΔP .17

FILTER #	TARE
E7220	[illegible]

SAMPLE POINT	CLOCK TIME, MIN.	GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM, IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 5	[illegible]	[illegible]	.16	2.67	2.67	107	2	250	65	1820	
4	[illegible]	[illegible]	.19	2.50	2.50	109	2	250	65	1821	
3	[illegible]	[illegible]	.17	2.32	2.32	108	2	250	65	1819	
2	[illegible]	[illegible]	.14	1.94	1.94	108	2	270	65	1811	
1	[illegible]	[illegible]	.11	1.50	1.50	109	1	270	65	1779	
D 5	[illegible]	[illegible]	[illegible]	2.27	2.27	109	2	350	65	1818	
4	[illegible]	[illegible]	.17	2.32	2.32	110	2	250	66	1817	
3	[illegible]	[illegible]	[illegible]	2.08	2.08	110	2	265	65	1807	
2	[illegible]	[illegible]	.13	1.60	1.60	[illegible]	2	260	65	1808	
1	[illegible]	[illegible]	.10	1.40	1.40	108	2	270	65	1794	LTO
C 5	[illegible]	[illegible]	.18	2.50	2.50	106	2	250	65	1826	61.583 61.542 .041
4	[illegible]	[illegible]	.16	2.20	2.20	106	2	250	65	1824	
3	[illegible]	[illegible]	[illegible]	2.08	2.08	106	2	250	65	1819	
2	[illegible]	164.26	.13	1.60	1.60	106	2	250	65	1820	
1	[illegible]	[illegible]	.10	1.38	1.38	107	2	265	65	1802	
B 5	[illegible]	[illegible].578	.19	2.67	2.67	107	2	260	67	1828	
4	[illegible]	[illegible]	.19	2.67	2.67	107	2	260	67	1826	
3	[illegible]	[illegible]	.17	2.32	2.32	107	2	250	67	1825	
2	[illegible]	[illegible]	[illegible]	2.08	2.08	[illegible]	2	260	67	1819	
1	[illegible]	[illegible]	[illegible]	[illegible]	1.67	[illegible]	2	250	67	1802	

[illegible] 0.1519 2.109 108 1814

$(\sqrt{\Delta P})^2$ ΔH T_m T_s

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME [illegible]
ADDRESS [illegible]
SAMPLING LOCATION [illegible] INCINERATOR STACK
DATE [illegible] TEAM LEADER AW
BAROMETRIC PRESSURE, IN. HG 29.?
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 [illegible] [illegible]
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.012 0.??7 0.??

RUN NUMBER 9
TIME START 1215
TIME FINISH 1423
TECHNICIANS ST
STATIC PRESSURE, IN. H_2O -.30

[illegible]
✓ PITOT, [illegible]
✓ PITOT, [illegible]
✓ ORSAT SAMPLING [illegible]
✓ TEDLAR BAG [illegible]
THERMOCOUPLE [illegible] °F

IDENTIFICATION NUMBERS

REAGENT BOX 222 NOZZLE 21? DIAMETER .496
METER BOX W2 T/C READOUT RED BOX 2002
UMBILICAL T/C PROBE 6-1
SAMPLE BOX 15 ORSAT PUMP 04
PROBE NC 6-6 TEDLAR BAG 01

FILTER #	TARE
E1164	.5290

NOMOGRAPH SET-UP NOMOGRAPH # AW

$\Delta H_@$ 1.72 C FACTOR .87
METER TEMP 110 STACK TEMP 1800
% MOISTURE 14 REF. ΔP .17

SAMPLE POINT	SAMPLE TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ORIFICE SETTING (ΔH), IN. H_2O ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
B 5	[illegible]	[illegible]	.21	2.90	2.90	109	2	250	65	1842	
4	[illegible]	[illegible]	.21	2.90	2.90	111	2	265	65	1846	
3	[illegible]	[illegible]	.18	2.45	2.45	113	2	240	65	1830	
2	[illegible]	[illegible]	.15	2.07	2.07	113	2	240	65	1812	
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	240	65	1870	
C 5	[illegible]	[illegible]	.20	2.20	2.20	114	2	260	65	1845	
4	[illegible]	[illegible]	.19	2.66	2.16	115	2	250	65	1847	
3	[illegible]	[illegible]	[illegible]	2.18	2.18	[illegible]	2	250	65	1852	
2	[illegible]	[illegible]	[illegible]	1.90	1.90	116	2	250	65	1844	
1	[illegible]	[illegible]	[illegible]	1.52	1.52	116	2	250	65	1829	LT(1)
D 5	[illegible]	[illegible]	.21	2.90	2.90	117	2	240	65	1842	202.930 202.886
4	[illegible]	202.802	.19	2.66	2.64	119	2	230	65	1844	.044
3	[illegible]	[illegible]	.18	2.45	2.45	120	2	250	65	1840	
2	[illegible]	[illegible]	[illegible]	1.90	1.90	120	2	265	65	1831	
1	[illegible]	[illegible]	.12	1.66	1.65	120	2	250	65	1793	
A 5	[illegible]	[illegible]	.21	2.90	2.90	120	2	250	65	1828	
4	[illegible]	[illegible]	.22	2.00	2.20	121	2	255	65	1822	
3	[illegible]	[illegible]	[illegible]	2.45	2.45	[illegible]	2	250	65	1819	
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	250	65	1810	
1	[illegible]	[illegible]	[illegible]	1.66	1.65	122	2	250	65	1776	

[illegible] 3.1096 2.333 117 1826

T_s

ENTROPY

.RTICULATE SAMPLING LABORATORY ULTS

Plant Name HOGAR EEI Ref. # 2632

Sampling Location Unit #1 Incinerator Stack

Date Received [illegible]/84 Date Analyzed 10/[illegible]/84 Reagent Box(es) 0222

Run Number	7	8	9
Run Date	9/26	9/26	9/26

SUMMARY OF PARTICULATE ANALYSES

Sum of Particulate, mg.	674.3	543.8	627.1
Total Filter Tare mg.	522.6	442.7	527.0
Blank Residue, mg.	(200 ml) 0.4	(300 ml) 0.6	(100 ml) 0.2
TOTAL PARTICULATE CATCH, mg.	151.3	100.5	99.9

ANALYSIS OF MOISTURE CATCH

Reagent : (H_2O):			
Final Weight, g.	328.0	348.0	355.0
Tared Weight, g.	200.0	200.0	200.0
Water Catch, g.	128.0	148.0	155.0
Reagent : ______ :			
Final Weight, g.	–	–	–
Tared Weight, g.	–	–	–
Water Catch, g.	–	–	–
CONDENSED WATER, g.	128.0	148.0	155.0
Silica Gel:			
Final Weight, g.	226.0	215.0	221.5
Tared Weight, g.	200.0	200.0	200.0
ABSORBED WATER, g.	26.0	15.0	21.5
TOTAL WATER COLLECTED, g.	154.0	163.0	176.5

Blank Beaker # 11

Final Wt. mg. 73912.3

Tare Wt. mg. [illegible]

Residue, mg. 0.4

Volume, ml. 200

Concen., mg/ml. .002

--- Legend ---

✓ = Final Weight

L = Loose Particulate

F = Filter D = Dish

R = Rinse P - Pan

Notes and Comments

LABORATORY SAMPLE WEIGHT CALCULATIONS

EEI Ref. # 2632

Plant Name MOSAR

Run Number	7	8	9
Run Date	9/26	9/26	9/26
Sample ID/Container #	AR-238	AR-241	AR-251
	134.8945 134.8942 134.8944	147.7872 147.7865	134.6601 134.6600 134.6605
Tare Wt., g.	134.2199	147.2427	134.0329
SAMPLE WT., g.	.6743	.5438	.6271
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

CUSTODY SHEET FOR REAGENT BOX # 0222

Date of Makeup 8/20/84 Initials MG Locked? ✓

Individual Tare of Reagent: 200 mls of H_2O

Individual Tare of Reagent: ______ mls. of ______

Individual Silica Gel Tare Weight 200 gms.

PLANT NAME [illegible]

SAMPLING LOCATION Unit # 1 Incinerator Stack

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
7	9-[illegible]	ST	yes	9-[illegible]-84	55 %	ST	yes
8	9-[illegible]	ST	yes	9-[illegible]-84	60 %	ST	yes
9	9-[illegible]	ST	Yes	9-[illegible]-84	20 %	ST	yes

Received in Lab Date 8/20/84 Initials MG Locked? ✓

Sampling Method: [illegible]

Remarks:

Zero & Span Balance Initials MG

Filter #	Tare Weight (mgms)	Used on Test
E 1165	.5226	7
E 2230	.4427	8
E 1164	.5270	9

ENTROPY ENVIRONMENTALISTS, INC.

MAXIMUM LOAD

ORSAT FIELD DATA

Plant Name MOCAR

Sampling Location UNIT 1 INCINERATOR STACK   Fuel Type COKE (NAT. GAS)

Run and/or Sample No. 10   Leak Test? ✓   Date 9-27   Operator MH

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
1023	1630	6.2	15.4	—	9.2	—	
TO		6.3	15.4		9.1		
[illegible]		6.2	15.4		9.2		
Avg.		6.2		Avg.	9.2		84.6

Run and/or Sample No. 11   Leak Test? ✓   Date 9-27   Operator MH

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
[illegible]	[illegible]	6.0	15.7	—	9.7	—	
TO		5.9	15.7		9.8		
1306		6.0	15.8		9.8		
Avg.		6.0		Avg.	9.8		84.2

Run and/or Sample No. 12   Leak Test? ✓   Date 9-27   Operator MH

Time of Sample Collection	Time of Analysis	CO_2 Reading A	O_2 Reading B	CO Reading C	$\%O_2$ B-A	%CO C-B	$\%N_2$ 100-C
1410	1700	6.2	15.5	—	9.3	—	
TO		6.2	15.4		9.2		
[illegible]		6.2	15.5		9.3		
Avg.		6.2		Avg.	9.3		84.5

PARTICULATE FIELD DATA

COMPANY NAME [illegible]	RUN NUMBER 10
ADDRESS [illegible]	TIME START 1023
SAMPLING LOCATION [illegible] STACK	TIME FINISH 1134
DATE [illegible] TEAM LEADER [illegible]	TECHNICIANS ST
BAROMETRIC PRESSURE, IN. HG [illegible]	STATIC PRESSURE, IN. H_2O −.45
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 [illegible]	
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. .014 [illegible]	

IDENTIFICATION NUMBERS

✓ PITOT, [illegible]	VELOCITY BOX 201 NOZZLE [illegible] DIAMETER .370
✓ PITOT, [illegible]	METER BOX 12 T/C READOUT RSD BOX 2002
✓ ORSAT SAMPLING SYSTEM	CYCLONE — T/C PROBE 6-1
✓ TEDLAR BAG	SAMPLE BOX 08 ORSAT PUMP 09
✓ THERMOCOUPLE @ ___ °F	PROBE WC 5-1 TEDLAR BAG 43

NOMOGRAPH SET-UP — NOMOGRAPH # [illegible]

FILTER #	TARE				
E 2233	.4508	$\Delta H_@$ 1.72	C FACTOR .85		
		METER TEMP 95	STACK TEMP 1800		
		% MOISTURE 14	REF. ΔP .48		

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H2O	ORIFICE SETTING (ΔH), IN. H2O IDEAL	ORIFICE SETTING (ΔH), IN. H2O ACTUAL	DRY GAS METER TEMP. °F	PUMP VACUUM, IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 5	[illegible]	[illegible]	.39	1.67	1.67	87	2	250	65	1872	
4	[illegible]	[illegible]	.38	1.62	1.62	[illegible]	2	250	65	1876	
3	[illegible]	[illegible]	[illegible]	1.48	1.48	[illegible]	2	250	65	1862	
2	[illegible]	[illegible]	.30	1.36	1.36	[illegible]	2	250	65	1782	
1	[illegible]	[illegible]	.22	.94	.94	[illegible]	2	250	65	1886	
D 5	15/0	229.200	.40	1.73	1.73	87	3	250	65	1885	
4	[illegible]	[illegible]	.40	1.73	1.73	[illegible]	3	250	65	1860	
3	[illegible]	[illegible]	.37	1.60	1.60	[illegible]	3	250	65	1850	
2	[illegible]	[illegible]	[illegible]	1.50	1.50	[illegible]	3	250	65	1783	LTO
1	[illegible]	[illegible]	[illegible]	1.27	1.27	[illegible]	2	250	65	1880	.523 .475 .048
C 5	30/0	261.475	.44	1.90	1.90	91	2	250	65	1872	
4	[illegible]	[illegible]	.45	1.56	1.56	[illegible]	3	250	65	1836	
3	[illegible]	[illegible]	.35	1.51	1.51	[illegible]	3	250	65	1828	
2	[illegible]	[illegible]	.28	1.18	1.18	[illegible]	2	250	65	1778	
1	12	265.61	.27	1.17	1.17	[illegible]	2	250	65	1870	
B 5	45/0	[illegible]	.42	1.82	1.82	[illegible]	3	250	65	1862	
4	[illegible]	[illegible]	[illegible]	1.90	1.90	[illegible]	3	250	65	1858	
3	[illegible]	[illegible]	[illegible]	1.62	1.62	[illegible]	3	250	65	1828	
2	[illegible]	[illegible]	[illegible]	1.26	1.26	[illegible]	3	250	65	1769	
1	[illegible]	[illegible]	.22	1.07	1.07	100	2	250	65		
	[illegible]	[illegible]									

[illegible] 0.3815 1.528 [illegible] 1843

T_s

COMPANY NAME [illegible]
ADDRESS [illegible], VA.
RUN NUMBER 11
TIME START 1158
TIME FINISH 1306
SAMPLING LOCATION [illegible]
DATE [illegible]
TEAM LEADER [illegible]
TECHNICIANS ST
BAROMETRIC PRESSURE, IN. HG [illegible]
STATIC PRESSURE, IN. H_2O -.40
IN. HG 15
CU. FT./MIN. [illegible]

IMP. EXIT TEMP. °F	STACK TEMP. °F	I.R. CHECK READINGS
[illegible]	[illegible]	
65	[illegible]	
[illegible]	[illegible]	
65	[illegible]	
65	[illegible]	
65	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
65	[illegible]	
[illegible]	[illegible]	TID
65	[illegible]	302657
		302618
[illegible]	[illegible]	[illegible]

PARTICULATE FIELD DATA

COMPANY NAME MOCAR   RUN NUMBER 11
ADDRESS MOUNDSVILLE, W. VA.   TIME START 1158
SAMPLING LOCATION UNIT 1 INCINERATOR STACK   TIME FINISH 1306
DATE 9-27-84   TEAM LEADER MT   TECHNICIANS ST
BAROMETRIC PRESSURE, IN. HG 29.7   STATIC PRESSURE, IN. H_2O -.40
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 5 4
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.014 0.003 0.014

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ___ THERMOCOUPLE @ ___ °F

IDENTIFICATION NUMBERS

REAGENT BOX 201 NOZZLE 511 DIAMETER .370
METER BOX N2 T/C READOUT RED BOX 2002
UMBILICAL ___ T/C PROBE HI TEMP 6
SAMPLE BOX 15 ORSAT PUMP 04
PROBE WC 6-6 TEDLAR BAG 05

FILTER #	TARE
E 2234	.4499

NOMOGRAPH SET-UP   NOMOGRAPH # MT

$\Delta H_@$ 1.72 C FACTOR .85
METER TEMP 95 STACK TEMP 1850
% MOISTURE 14 REF. ΔP .44

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
B 5	0	282.744	.35	1.50	1.50	93	2	250	65	1884	
4	3	285.07	.35	1.50	1.50	95	2	250	65	1886	
3	6	287.09	.33	1.40	1.40	96	2	250	65	1890	
2	9	289.22	.28	1.18	1.18	97	2	250	65	1887	
1	12	291.13	.22	.92	.92	97	2	250	65	1879	
C 6	15/0	292.762	.40	1.70	1.70	96	2	250	65	1892	
4	3	295.15	.42	1.77	1.77	97	2	250	65	1892	
3	6	297.38	.40	1.70	1.70	98	2	250	65	1894	
2	9	299.59	.35	1.50	1.50	98	2	250	65	1888	
1	12	301.65	.24	1.00	1.00	97	1	250	65	1888	LT
D 6	30/0	303.618	.38	1.60	1.60	94	2	250	65	1881	303.657 303.618 .039
4	3	305.87	.37	1.55	1.55	93	2	250	65	1878	
3	6	307.69	.37	1.55	1.55	93	2	250	65	1875	
2	9	310.21	.32	1.35	1.35	92	2	250	65	1868	
1	12	312.27	.27	1.12	1.12	92	2	250	65	1860	
A 5	45/0	314.062	.33	1.40	1.40	90	2	250	65	1880	
4	3	316.20	.34	1.45	1.45	90	2	250	65	1879	
3	6	318.20	.32	1.35	1.35	90	2	250	65	1878	
2	9	320.35	.28	1.18	1.18	89	2	250	65	1874	
1	12	322.10	.23	.95	.95	89	2	250	65	1851	
	60/off	323.892									

41.109 (V_M)   0.3249 ($(\sqrt{\Delta P})^2$)   1.384 (ΔH)   94 (T_M)   1879 (T_S)

ENTROPY

PARTICULATE FIELD DATA

COMPANY NAME MOCAR — RUN NUMBER 1
ADDRESS MOUNDSVILLE, W. VA. — TIME START [illegible]
SAMPLING LOCATION UNIT 1 INCINERATOR STACK — TIME FINISH 1518
DATE 9-27-84 TEAM LEADER [illegible] TECHNICIANS [illegible]
BAROMETRIC PRESSURE, IN. HG 29.7 STATIC PRESSURE, IN. H_2O -.40
SAMPLING TRAIN LEAK TEST VACUUM, IN. HG 15 5(1) 4(F)
SAMPLING TRAIN LEAK RATE, CU. FT./MIN. 0.007 0.002 0.002

EQUIPMENT CHECKS

- ✓ PITOTS, PRE-TEST
- ✓ PITOTS, POST-TEST
- ✓ ORSAT SAMPLING SYSTEM
- ✓ TEDLAR BAG
- ✓ THERMOCOUPLE @ ____ °F

IDENTIFICATION NUMBERS

REAGENT BOX 201 NOZZLE 810 DIAMETER .370
METER BOX N2 T/C READOUT RED BOX [illegible]
UMBILICAL ____ T/C PROBE 6-1
SAMPLE BOX ____ ORSAT PUMP 04
PROBE WC 6-1 TEDLAR BAG 01

FILTER #	TARE
E 1161	.5209

NOMOGRAPH SET-UP NOMOGRAPH # [illegible]

$\Delta H_@$ 1.72 C FACTOR .85
METER TEMP 95 STACK TEMP 1850
% MOISTURE 14 REF. ΔP .44

SAMPLE POINT	CLOCK TIME, MIN.	DRY GAS METER READING, CU. FT.	PITOT READING (ΔP), IN. H_2O	ORIFICE SETTING (ΔH), IN. H_2O IDEAL	ACTUAL	GAS METER TEMP. °F	PUMP VACUUM IN. HG GAUGE	FILTER BOX TEMP. °F	IMP. EXIT TEMP. °F	STACK TEMP. °F	LK. CHECK READINGS
A 5	0	326.713	.35	1.48	1.48	97	2	250	65	1860	
4	3	329.02	.34	1.45	1.45	98	2	250	65	1862	
3	6	331.00	.32	1.36	1.36	99	2	250	65	1836	
2	9	333.34	.30	1.27	1.27	99	2	250	65	1809	
1	12	335.00	.21	.88	.88	99	2	250	65	1774	
D 5	15/0	336.728	.33	1.40	1.40	99	2	250	65	1844	
4	3	339.01	.40	1.70	1.70	99	2	250	65	1853	
3	6	340.98	.39	1.65	1.65	99	2	250	65	1840	
2	9	343.25	.32	1.36	1.36	99	2	250	65	1841	
1	12	345.40	.29	1.21	1.21	98	2	250	65	1794	LT(1)
C 5	30/0	347.232	.34	1.45	1.45	97	2	250	65	1845	347.266
4	3	349.45	.30	1.27	1.27	97	2	250	65	1847	347.232 .034
3	6	351.60	.30	1.27	1.27	97	2	250	65	1835	
2	9	353.31	.28	1.18	1.18	95	2	250	65	1823	
1	12	355.26	.24	1.00	1.00	93	2	250	65	1785	
B 5	45/0	357.030	.32	1.36	1.36	91	2	250	65	1869	
4	3	359.00	.31	1.30	1.30	90	2	250	65	1872	
3	6	361.06	.28	1.18	1.18	89	2	250	65	1842	
2	9	363.02	.23	.95	.95	87	2	250	65	1825	
1	12	364.73	.21	.88	.88	86	2	250	65	1791	
	60/OFF	366.403									

39.656	0.3008	1.280	95	1832
V_M	$(\sqrt{\Delta P})^2$	ΔH	T_M	T_S

ENTROPY

ARTICULATE SAMPLING LABORATORY SULTS

Plant Name MOCAR EEI Ref. # 2632

Sampling Location Unit #1 Incinerator Stack

Date Received 10/1/84 Date Analyzed 10/4/84 Reagent Box(es) 0201

Run Number	10	11	12
Run Date	9/26	9/26	9/26

SUMMARY OF PARTICULATE ANALYSES

Sum of Particulate, mg.	491.5	482.2	600.1
Total Filter Tare mg.	450.8	449.9	520.9
Blank Residue, mg.	(150 ml) 0.3	(150 ml) 0.3	(125 ml) 0.3
TOTAL PARTICULATE CATCH, mg.	40.4	32.0	78.9

ANALYSIS OF MOISTURE CATCH

Reagent 1 (H_2O):			
Final Weight, g.	327.0	323.0	315.0
Tared Weight, g.	200.0	200.0	200.0
Water Catch, g.	127.0	123.0	115.0
Reagent 2 ( ):			
Final Weight, g.	-	-	-
Tared Weight, g.	-	-	-
Water Catch, g.	-	-	-
CONDENSED WATER, g.	127.0	123.0	115.0
Silica Gel:			
Final Weight, g.	219.0	218.0	221.5
Tared Weight, g.	200.0	200.0	200.0
ABSORBED WATER, g.	19.0	18.0	21.5
TOTAL WATER COLLECTED, g.	146.0	141.0	136.5

Blank Beaker #	11
Final wt. mg.	73912.3
Tare wt. mg.	73911.9
Residue, mg.	0.4
Volume, ml.	200
Concen., mg/ml.	.002

--- Legend ---

✓ = Final Weight

L = Loose Particulate

F = Filter D = Dish

R = Rinse P = Pan

Notes and Comments

LABORATORY SAMPLE WEIGHT CALCULATIONS

Plant Name MOCAR EEI Ref. # 2632

Run Number	10	11	12
Run Date	9/26	9/26	9/26
Sample ID/Container #	F&R-253	F&R-254	F&R-255
Tare Wt., g.	142.4493 142.4487 141.9572	144.0813 144.0813 143.5991	135.3472 135.3471 134.7470
SAMPLE WT., g.	.4915	.4822	.6001
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			
Sample ID/Container #			
Tare Wt., g.			
SAMPLE WT., g.			

ENTROPY ENVIRONMENTALISTS, INC.

CUSTODY SHEET FOR REAGENT BOX # 0201

Date of Makeup 9/20/84 Initials MG Locked? ✓

Individual Tare of Reagent: 200 mls. of H_2O

Individual Tare of Reagent: ______ mls. of ______

Individual Silica Gel Tare Weight 200 gms.

PLANT NAME [illegible]

SAMPLING LOCATION Unit 1 [illegible] [illegible]

Run Number	Date Used	Initials	Locked?	Date Cleanup	% S. Gel Spent	Initials	Locked?
[illegible]	[illegible]	[illegible]	✓	[illegible]	[illegible]	[illegible]	✓
[illegible]	[illegible]	[illegible]	✓	[illegible]	[illegible]	[illegible]	✓
[illegible]	[illegible]	[illegible]	✓	[illegible]	[illegible]	[illegible]	✓
Bl.							

Received in Lab — Date: 9/28/84 — Initials: MG — Locked? ✓

Sampling Method: M-5

Remarks:

Zero & Span Balance Initials MG

Filter #	Tare Weight (mgms)	Used on Test
E 2233	.4508	10
E 2234	.4499	11
E 1161	.5209	12

ENTROPY ENVIRONMENTALISTS, INC.

SAMPLING AND ANALYTICAL PROCEDURES

METHOD 1—SAMPLE AND VELOCITY TRAVERSES FOR STATIONARY SOURCES

1. *Principle and Applicability*

1.1 Principle. To aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. A traverse point is then located within each of these equal areas.

1.2 Applicability. This method is applicable to flowing gas streams in ducts, stacks, and flues. The method cannot be used when: (1) flow is cyclonic or swirling (see Section 2.4), (2) a stack is smaller than about 0.30 meter (12 in.) in diameter, or 0.071 m² (113 in.²) in cross-sectional area, or (3) the measurement site is less than two stack or duct diameters downstream or less than a half diameter upstream from a flow disturbance.

The requirements of this method must be considered before construction of a new facility from which emissions will be measured; failure to do so may require subsequent alterations to the stack or deviation from the standard procedure. Cases involving variants are subject to approval by the Administrator, U.S. Environmental Protection Agency.

2. *Procedure*

2.1 Selection of Measurement Site. Sampling or velocity measurement is performed at a site located at least eight stack or duct diameters downstream and two diameters upstream from any flow disturbance such as a bend, expansion, or contraction in the stack, or from a visible flame. If necessary, an alternative location may be selected, at a position at least two stack or duct diameters downstream and a half diameter upstream from any flow disturbance. For a rectangular cross section, an equivalent diameter (D_e) shall be calculated from the following equation, to determine the upstream and downstream distances:

$$D_e = \frac{2LW}{L+W}$$

where L=length and W=width.

2.2 Determining the Number of Traverse Points.

2.2.1 Particulate Traverses. When the eight- and two-diameter criterion can be met, the minimum number of traverse points shall be: (1) twelve, for circular or rectangular stacks with diameters (or equivalent diameters) greater than 0.61 meter (24 in.); (2) eight, for circular stacks with diameters between 0.30 and 0.61 meter (12-24 in.); (3) nine, for rectangular stacks with equivalent diameters between 0.30 and 0.61 meter (12-24 in.).

When the eight- and two-diameter criterion cannot be met, the minimum number of traverse points is determined from Figure 1-1. Before referring to the figure, however, determine the distances from the chosen measurement site to the nearest upstream and downstream disturbances, and divide each distance by the stack diameter or equivalent diameter, to determine the distance in terms of the number of duct diameters. Then, determine from Figure 1-1 the minimum number of traverse points that corresponds: (1) to the number of duct diameters upstream; and (2) to the number of diameters downstream. Select the higher of the two minimum numbers of traverse points, or a greater value, so that for circular stacks the number is a multiple of 4, and for rectangular stacks, the number is one of those shown in Table 1-1.

TABLE 1-1. *Cross-sectional layout for rectangular stacks*

Number of traverse points	*Matrix layout*
9	3x3
12	4x3
16	4x4
20	5x4
25	5x5
30	6x5
36	6x6
42	7x6
49	7x7

2.2.2 Velocity (Non-Particulate) Traverses. When velocity or volumetric flow rate is to be determined (but not particulate matter), the same procedure as that for particulate traverses (Section 2.2.1) is followed, except that Figure 1-2 may be used instead of Figure 1-1.

2.3 Cross-Sectional Layout and Location of Traverse Points.

2.3.1 Circular Stacks. Locate the traverse points on two perpendicular diameters according to Table 1-2 and the example shown in Figure 1-3. Any equation (for examples, see Citations 2 and 3 in the Bibliography) that gives the same values as those in Table 1-2 may be used in lieu of Table 1-2.

For particulate traverses, one of the diameters must be in a plane containing the greatest expected concentration variation, e.g., after bends, one diameter shall be in the plane of the bend. This requirement becomes less critical as the distance from the disturbance increases; therefore, other diameter locations may be used, subject to approval of the Administrator.

In addition, for stacks having diameters greater than 0.61 m (24 in.) no traverse points shall be located within 2.5 centimeters (1.00 in.) of the stack walls; and for stack diameters equal to or less than 0.61 m (24 in.), no traverse points shall be located within 1.3 cm (0.50 in.) of the stack walls. To meet these criteria, observe the procedures given below.

2.3.1.1 Stacks With Diameters Greater Than 0.61 m (24 in.). When any of the traverse points as located in Section 2.3.1 fall within 2.5 cm (1.00 in.) of the stack walls, relocate them away from the stack walls to: (1) a distance of 2.5 cm (1.00 in.); or (2) a distance equal to the nozzle inside diameter, whichever is larger. These relocated traverse points (on each end of a diameter) shall be the "adjusted" traverse points.

Whenever two successive traverse points are combined to form a single adjusted traverse point, treat the adjusted point as two separate traverse points, both in the sampling (or velocity measurement) procedure, and in recording the data.

2.3.1.2 Stacks With Diameters Equal to or Less Than 0.61 m (24 in.). Follow the procedure in Section 2.3.1.1, noting only that any "adjusted" points should be relocated away from the stack walls to: (1) a distance of 1.3 cm (0.50 in.); or (2) a distance equal to the nozzle inside diameter, whichever is larger.

2.3.2 Rectangular Stacks. Determine the number of traverse points as explained in Sections 2.1 and 2.2 of this method. From Table 1-1, determine the grid configuration. Divide the stack cross-section into as many equal rectangular elemental areas as traverse points, and then locate a traverse point at the centroid of each equal area according to the example in Figure 1-4.

If the tester desires to use more than the minimum number of traverse points, expand the "minimum number of traverse points" matrix (see Table 1-1) by adding the extra traverse points along one or the other or both legs of the matrix; the final matrix need not be balanced. For example, if a 4x3 "minimum number of points" matrix were expanded to 36 points, the final matrix could be 9x4 or 12x3, and would not necessarily have to be 6x6. After constructing the final matrix, divide the stack cross-section into as many equal rectangular, elemental areas as traverse points, and locate a traverse point at the centroid of each equal area.

The situation of traverse points being too close to the stack walls is not expected to arise with rectangular stacks. If this problem should ever arise, the Administrator must be contacted for resolution of the matter.

2.4 Verification of Absence of Cyclonic Flow. In most stationary sources, the direction of stack gas flow is essentially parallel to the stack walls. However, cyclonic flow may exist (1) after such devices as cyclones and inertial demisters following venturi scrubbers, or (2) in stacks having tangential inlets or other duct configurations which tend to induce swirling; in these instances, the presence or absence of cyclonic flow at the sampling location must be determined. The following techniques are acceptable for this determination.

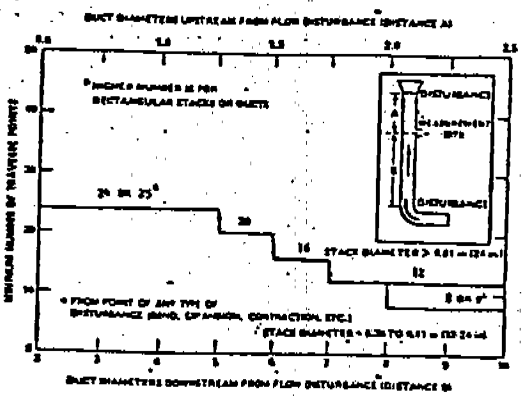


Figure 1-1. Minimum number of traverse points for particulate traverses.

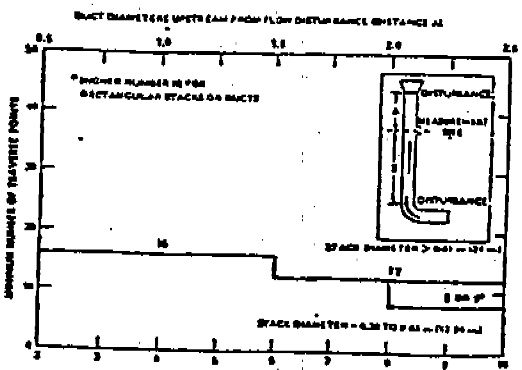


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

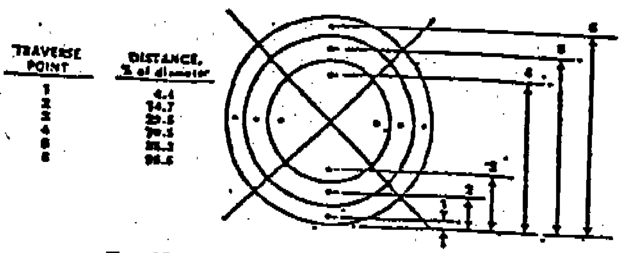


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

Table 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS
(Percent of stack diameter from inside wall to traverse point)

Traverse point number on a diameter	Number of traverse points on a diameter											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.0	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

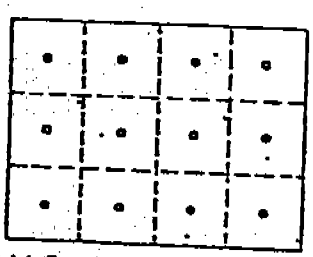


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

Level and zero the manometer. Connect a Type S pitot tube to the manometer. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "0° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at 0° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at 0° reference, rotate the pitot tube (up to $\pm 90°$ yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of 0° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 20°, the overall flow condition in the stack is unacceptable and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

2. Bibliography

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4. Standard Method for Sampling Stacks for Particulate Matter. In: 1971 Book of ASTM Standards, Part 23. ASTM Designation D-2928-71. Philadelphia, Pa. 1971.

5. Hanson, H. A., et al. Particulate Sampling Strategies for Large Power Plants Including Nonuniform Flow. USEPA, ORD, ESRL, Research Triangle Park, N.C. EPA-600/2-76-170. June 1976.

6. Entropy Environmentalists, Inc. Determination of the Optimum Number of Sampling Points: An Analysis of Method 1 Criteria. Environmental Protection Agency. Research Triangle Park, N.C. EPA Contract No. 68-01-3172, Task 7.

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12. Knapp, K.T. The Number of Sampling Points Needed for Representative Source Sampling. In: Proceedings of the Fourth National Conference on Energy and the Environment. Theodore, L., et al. (ed.). Dayton, Dayton Section of the American Institute of Chemical Engineers. October 3–7, 1976. p. 563–568.

METHOD 2—DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE (TYPE S PITOT TUBE)

1. *Principle and Applicability*

1.1 Principle. The average gas velocity in a stack is determined from the gas density and from measurement of the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube.

1.2 Applicability. This method is applicable for measurement of the average velocity of a gas stream and for quantifying gas flow.

This procedure is not applicable at measurement sites which fail to meet the criteria of Method 1, Section 2.1. Also, the method cannot be used for direct measurement in cyclonic or swirling gas streams; Section 2.4 of Method 1 shows how to determine cyclonic or swirling flow conditions. When unacceptable conditions exist, alternative procedures, subject to the approval of the Administrator, U.S. Environmental Protection Agency, must be employed to make accurate flow rate determinations; examples of such alternative procedures are: (1) to install straightening vanes; (2) to calculate the total volumetric flow rate stoichiometrically, or (3) to move to another measurement site at which the flow is acceptable.

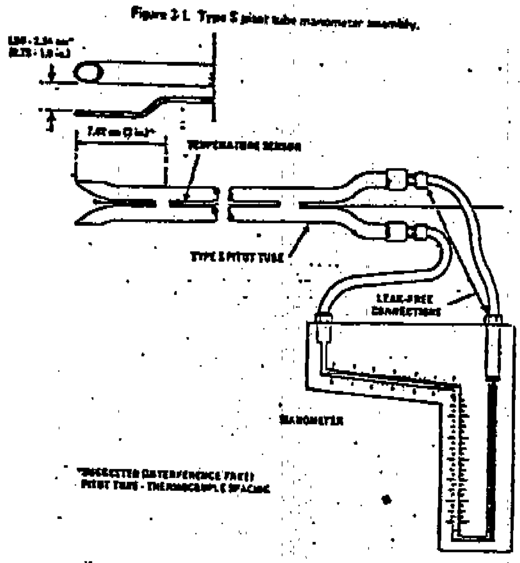
2. *Apparatus*

Specifications for the apparatus are given below. Any other apparatus that has been demonstrated (subject to approval of the Administrator) to be capable of meeting the specifications will be considered acceptable.

2.1 Type S Pitot Tube. The Type S pitot tube (Figure 2-1) shall be made of metal tubing (e.g., stainless steel). It is recommended that the external tubing diameter (dimension D_t, Figure 2-2b) be between 0.48 and 0.95 centimeters (3/16 and 3/8 inch). There shall be an equal distance from the base of each leg of the pitot tube to its face-opening plane (dimensions P_A and P_B, Figure 2-2b); it is recommended that this distance be between 1.05 and 1.50 times the external tubing diameter. The face openings of the pitot tube shall, preferably, be aligned as shown in Figure 2-2; however, slight misalignments of the openings are permissible (see Figure 2-3).

The Type S pitot tube shall have a known coefficient, determined as outlined in Section 4. An identification number shall be assigned to the pitot tube; this number shall be permanently marked or engraved on the body of the tube.

Figure 2-1. Type S pitot tube manometer assembly.



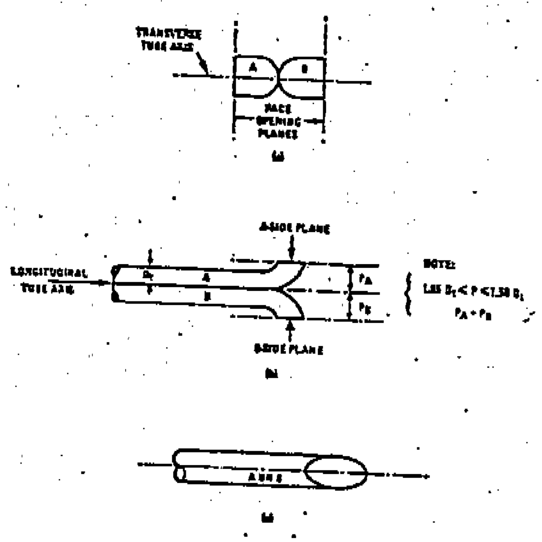


Figure 2-2. Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

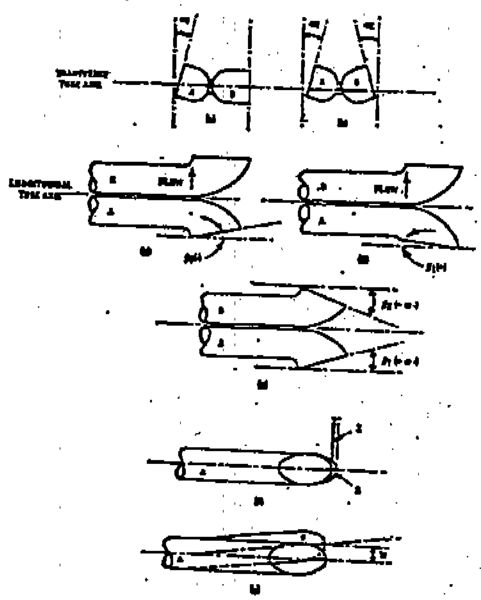


Figure 2-3. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect the baseline value of $C_{p(s)}$ so long as α_1 and $\alpha_2 < 10°$, β_1 and $\beta_2 < 5°$, $z < 0.32$ cm (1/8 in.) and $w < 0.08$ cm (1/32 in.) (citation 11 in Section 6).

CALIBRATION DATA

CALIBRATIONS

GENERAL

All measuring equipment Entropy uses is initially calibrated before use. Equipment which can change calibration is both checked upon return from each field use and is also periodically recalibrated in full. When an instrument is found out of calibration, it is so noted in the report and appropriate adjustments are made to the final results. The equipment is then repaired and recalibrated or retired as needed. Specific equipment is handled as follows:

PITOT TUBE

All pitot tubes used by Entropy, whether separate or attached to a sampling probe, are constructed in-house or by Nutech Corporation. Prior to their initial usage, they are calibrated using EPA geometry standards. In general, if a type "S" pitot tube is assembled correctly, and positioned properly in relation to the probe nozzle, it will have an average Cp of 0.84. As long as it is not damaged, it should not change its calibration. The recalibration schedule for pitot tubes is related to the physical condition and usage of the pitot tube, not a fixed time schedule. Each pitot tube is inspected upon return to the laboratory from each field use.

DRY GAS METER AND ORIFICE METER

All Entropy meter boxes are calibrated upon purchase and at least once every six months against a secondary test meter (one calibrated against a wet test meter) according to their usage history. Basic procedures are outlined in the EPA Publication No. APTD-0576. The only differences are in the choice of flow rates used and the volumes metered at each flow rate. After each field use, quick checks are performed to insure delta H@ changes of less than 5%. These checks compare the orifice against the dry gas meter. If greater than 5% changes occur, recalibration and repair are instituted.

NOZZLES

Each nozzle is calibrated upon purchase, and thereafter whenever it becomes apparent that the nozzle has become damaged. Each nozzle is inspected upon return to laboratory from each field use. The diameter is measured on five different axes, with the high and low readings differing by no more than 0.004 inches as a tolerance.

TEMPERATURE MEASURING INSTRUMENTS

After each field use, the thermocouples or thermometers are calibrated against an ASTM precision mercury-in-glass thermometer across a wide range of temperatures. If the initial reading is not within $\pm$ 1.5% of the absolute temperature reading of the standard thermometer, the instrument is adjusted until it is in the acceptable range.

MAGNEHELIC GAUGES

After each field use, each magnehelic gauge is calibrated against an inclined manometer at three different settings (low, medium, high) over the range of the individual gauges. If the readings differ more than $\pm$ 5% from the manometer readings, the magnehelics are recalibrated.

BAROMETER

After each field use, each barometer is checked against a mercury barometer.

Dry Gas Meter Identification: 1017057 Calibration by: Bruce Hawks

Date: 8/10/84 Barometric Pressure (P_b): 29.70 in. Hg

*Date: ______ *Barometric Pressure (P_b): ______ in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer #2502 Gas Volume (V_s) ft^3	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft^3	Dry Gas Meter Temp. (t_{ds}) °F	Pressure (Δp) in. H_2O	Time (θ) min.	Flow Rate (Q) cfm	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
0.25	2.550	73.4	2.554	76	-0.23	9.657	0.2594	1.0039	
	2.368	73.4	2.371	76	-0.22	9.170	0.2536	1.0041	
	2.468	77	2.486	77	-0.20	10.008	0.2406	0.9933	
0.40	3.962	73.4	3.999	75	-0.43	9.958	0.3908	0.9948	
	4.071	73.4	4.104	75	-0.43	10.033	0.3985	0.9960	
	4.089	73.4	4.118	76	-0.43	10.099	0.3977	0.9989	
0.60	5.993	75.2	6.090	77	-0.90	9.995	0.5869	0.9896	
	6.330	75.2	6.438	77	-0.95	10.001	0.6196	0.9889	
	6.330	75.2	6.435	77	-1.00	10.005	0.6193	0.9894	
0.80	7.933	73.4	8.046	76	-1.5	10.000	0.7792	0.9945	
	8.151	73.4	8.260	76	-1.6	10.001	0.8005	0.9956	
	8.188	73.4	8.302	76	-1.5	10.055	0.7998	0.9948	
1.00	9.153	75.2	9.298	76	-2.0	9.436	0.9495	0.9908	
	9.171	75.2	9.326	76	-2.0	9.460	0.9490	0.9898	
	9.126	75.2	9.304	76	-2.1	9.435	0.9468	0.9875	

$$Y_{ds} = \frac{(V_s)(t_{ds} + 460)(P_b)}{(V_{ds})(t_s + 460)(P_b + (p / 13.6))}$$

$$Q = (17.64)\frac{(P_b)(V_s)}{(t_s + 460)(\theta)}$$

Dry Gas Meter Identification: 1017057 Calibration by: Bruce Hawks

Date: 8/10/84 Barometric Pressure (P_b): 29.70 in. Hg

*Date: ______ *Barometric Pressure (P_b): ______ in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Approx. Flow Rate (Q) cfm	Spirometer Gas Volume (V_s) ft³	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft³	Dry Gas Meter Temp. (t_{ds}) °F	Pressure (Δp) in. H_2O	Time (θ) min.	Flow Rate (Q) cfm	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
1.20	9.281	77	9.446	78	-2.7	8.239	1.0990	0.9910	
	9.608	77	9.807	78	-2.9	8.085	1.1594	0.9886	
	9.144	77	9.344	78	-3.1	7.636	1.1683	0.9880	
1.40	9.098	73.4	9.228	76	-3.7	6.831	1.3082	0.9999	
	9.135	73.4	9.267	76	-3.8	6.775	1.3243	1.0000	
	9.126	73.4	9.277	76	-3.9	6.776	1.3228	0.9982	

$\bar{Y}_{DS} = 0.9942$

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_b)}{(V_{ds})\ (t_s + 460)\ (P_b + (\ p\ /\ 13.6))}$$

$$Q = (17.64)\ \frac{(P_b)\ (V_s)}{(t_s + 460)\ (\theta)}$$

Meter Box Number: N-2

Standard Meter Number: 1017057

Calibration by: DR

Date: 3-29-84

Barometric Pressure (P_b): 28.70 in. Hg

*Date: ______

*Barometric Pressure (P_b): ______ in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

Standard Dry Gas Meter					Meter Box Metering System						
Gas Volume (V_{ds}) ft^3	Temp. (t_{ds}) °F	Flow Rate (Q_{ds}) cfm	Coeff. at Q_{ds} (Y_{ds})	Time (θ) min.	Orifice Setting (ΔH) in. H_2O	Gas Volume (V_d) ft^3	Temp. (t_d) °F	Flow Rate (Q_d) cfm	Orifice Factor (OF)	Coeff. (Y_d)	$\Delta H@$ in. H_2O
4.188	67°	0.402	.9984	10.0	0.50	4.235	76°	.4107	3.056	1.0029	1.637
4.171	67°	0.401	.9985	10.0	0.50	4.229	78°	.4001	3.062	1.0040	1.644
8.361	67°	0.803	.9922	10.0	2.10	8.379	80°	.7970	6.286	1.0091	1.733
8.332	67°	0.800	.9923	10.0	2.10	8.372	82°	.7942	6.298	1.0102	1.739
12.447	67°	1.196	.9861	10.0	4.80	12.432	85°	1.1791	9.547	1.0086	1.793
12.462	67°	1.197	.9861	10.0	4.80	12.443	85°	1.1805	9.547	1.0089	1.789
								AVERAGE		1.009	1.72

$$\Delta H@ = \frac{0.0317 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \theta}{Y_{ds} * V_{ds}}\right]^2$$

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \Delta H/13.6)}$$

CALIBRATION BY: DR

METER BOX NUMBER: N-2

DATE: 10-1-84

BAROMETRIC PRESSURE (P_B): 29.44 IN. HG

*DATE: ______

*BAROMETRIC PRESSURE (P_B): ______ IN. HG

STANDARD METER NUMBER: 1017057

COEFFICIENT (Y_{DS}): 0.9942

NOMINAL FLOW RATE ($\tilde{Q}$) CFM	STANDARD DRY GAS METER			METER BOX METERING SYSTEM		
	GAS VOLUME (V_{DS}) FT³	TEMP. (T_{DS}) °F	TIME (θ) MIN.	ORIFICE SETTING (ΔH) IN. H_2O	GAS VOLUME (V_D) FT³	TEMP. (T_D) °F
0.4	4.105	70°	10.0	0.50	4.200	83°
	4.093	76°	10.0	0.50	4.181	84°
0.8	8.215	70°	10.0	2.10	8.331	86°
	8.199	70°	10.0	2.10	8.341	88°
1.2	12.265	69°	10.0	4.80	12.376	90°
	12.230	69°	10.0	4.80	12.377	92°

NOMINAL FLOW RATE ($\tilde{Q}$) CFM	METER BOX METERING SYSTEM			
	FLOW RATE (Q_D) CFM	ORIFICE FACTOR (OF)	COEFF. (Y_D)	$\Delta H@$ IN. H_2O
0.4	0.3999	3.037	0.9943	1.672
	0.3987	3.040	0.9977	1.679
0.8	0.8003	6.241	1.0047	1.744
	0.7987	6.252	1.0052	1.744
1.2	1.1971	9.470	1.0123	1.769
	1.1937	9.487	1.0130	1.772
	AVERAGE		1.005	1.73

$$\Delta H_@ = \frac{0.0317 \cdot \Delta H}{P_b \cdot (t_d + 460)} \cdot \left[\frac{(t_{ds} + 460) \cdot \theta}{Y_{ds} \cdot V_{ds}}\right]^2$$

$$Y_d = \frac{Y_{ds} \cdot V_{ds} \cdot (t_d + 460) \cdot P_b}{V_d \cdot (t_{ds} + 460) \cdot (P_b + \Delta H/13.6)}$$

ENTROPY

NOZZLE NUMBER: 810

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
12-2-83	BDR	.365	.366	.365	.366	.366	0.366
2/27/84	PLO	.365	.366	.367	.366	.365	0.366
8/10/84	GMC	.370	.368	.372	.372	.370	0.370

NOTE: All diameters measured in inches.

ENTROPY ENVIRONMENTALISTS, INC.

NOZZLE NUMBER: 811

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
12-2-83	BDR	.368	.368	.368	.368	.368	0.368
2/27/84	PLO	.369	.370	.371	.372	.370	0.370
4/5/84	JNC	.370	.370	.369	.371	.370	0.370

NOTE: All diameters measured in inches.

ENTROPY ENVIRONMENTALISTS, INC.

NOZZLE NUMBER: 813

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
2/27/84	PLO	.494	.497	.497	.497	.496	0.496
4/5/84	JNC	.495	.497	.494	.495	.496	0.495
8/10/84	GMC	.495	.496	.494	.493	.493	0.494
9/21/84	BDR	.495	.493	.492	.493	.496	0.494

NOTE: All diameters measured in inches.

ENTROPY ENVIRONMENTALISTS, INC.

NOZZLE NUMBER: 814

Date	Initials	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Dia. 5	Average
2/27/84	PLD	.494	.497	.497	.495	.497	0.496
4/5/84	JNC	.496	.493	.496	.494	.496	0.495
8/10/84	GMC	.494	.492	.491	.492	.494	0.493
9/21/84	BDR	.495	.496	.496	.497	.498	0.496

NOTE: All diameters measured in inches.

ENTROPY ENVIRONMENTALISTS, INC.

TEMPERATURE SENSING EQUIPMENT CALIBRATION DATA

BAROMETRIC PRESSURE: 29.44 DATE: 10-1-84 CALIBRATED BY: BDR

MERCURY-IN-GLASS REFERENCE NUMBER: 1962175 AMBIENT TEMP.: 68

CALIBRATION SYSTEM USED	POTENTIOMETER I.D. NUMBER	THERMOCOUPLE/ THERMOMETER I.D. NUMBER	REFERENCE THERMOMETER TEMPERATURE		MEAN TEMPERATURE OF Hg COLUMN	THERMOCOUPLE/ THERMOMETER TEMPERATURE	ΔT^B $\leq 1.5\%$
			T_o (°F)	T_c (°F)	T_m (°F)	T_t (°F)	
hot water	Red 10V7802	WC-6-1	212	214	121	213	0.1

CORRECTED TEMPERATURE = $T_c = T_o + .00009\ (T_o - 20)(T_o - T_m)$

TEMPERATURE DIFFERENCE = $\Delta T = \frac{[(T_c, °F + 460) - (T_t, °F + 460)]}{T_c, °F + 460} \times 100 \leq 1.5\%$

ENTROPY

TEMPERATURE SENSING EQUIPMENT CALIBRATION DATA

BAROMETRIC PRESSURE: 30.06 DATE: 1-13-84 CALIBRATED BY: DJC

MERCURY-IN-GLASS REFERENCE NUMBER: 1962175-ASTM3F AMBIENT TEMP.: 64

CALIBRATION SYSTEM USED	POTENTIOMETER I.D. NUMBER	THERMOCOUPLE/ THERMOMETER I.D. NUMBER	REFERENCE THERMOMETER TEMPERATURE T_o (°F)	T_c (°F)	MEAN TEMPERATURE OF Hg COLUMN T_m (°F)	THERMOCOUPLE/ THERMOMETER TEMPERATURE T_t (°F)	ΔT^B $\leq 1.5\%$
Ice water	DS-1	WC-6-1	32	32	51	31	0.2
	"	WC-6-2	32	32	51	31	0.2
	"	WC-10-1	32	32	51	31	0.2
	"	WC-10-2	32	32	51	30	0.4
	"	WC-10-3	32	32	51	32	0.0
Ambient air	"	WC-6-1	64	64	64	62	0.4
	"	WC-6-2	64	64	64	61	0.6
	"	WC-10-1	64	64	64	63	0.2
	"	WC-10-2	64	64	64	65	-0.2
	"	WC-10-3	64	64	64	64	0.0
hot water	"	WC-6-1	212	214	120	214	0.0
	"	WC-6-2	212	214	120	213	0.1
	"	WC-10-1	212	214	120	213	0.1
	"	WC-10-2	212	214	120	214	0.0
	"	WC-10-3	212	214	120	214	0.0
hot oil	"	WC-6-1	364	371	138	368	0.4
	"	WC-6-2	364	371	138	370	0.1
	"	WC-10-1	364	371	138	371	0.0
	"	WC-10-2	364	371	138	369	0.2
	"	WC-10-3	364	371	138	370	0.1

CORRECTED TEMPERATURE $= T_c = T_o + .00009\ (T_o - 20)(T_o - T_m)$

TEMPERATURE DIFFERENCE $= \Delta T = \dfrac{[(T_c, {}^\circ F + 460) - (T_t, {}^\circ F + 460)]}{T_c, {}^\circ F + 460} \times 100 \leq 1.5\%$

ENTROPY

TEMPERATURE SENSING EQUIPMENT CALIBRATION DATA

BAROMETRIC PRESSURE: 29.72 DATE: 1-16-84 CALIBRATED BY: GJC

MERCURY-IN-GLASS REFERENCE NUMBER: 196275-ASTM3F AMBIENT TEMP.: 63

CALIBRATION SYSTEM USED	POTENTIOMETER I.D. NUMBER	THERMOCOUPLE/ THERMOMETER I.D. NUMBER	REFERENCE THERMOMETER TEMPERATURE		MEAN TEMPERATURE OF Hg COLUMN	THERMOCOUPLE/ THERMOMETER TEMPERATURE	ΔT^B $\leq 1.5\%$
			T_o (°F)	T_c (°F)	T_m (°F)	T_t (°F)	
ice water	01	4-3	33	33	51	32	0.2
	04	"	33	33	51	32	0.2
	05	"	33	33	51	31	0.4
	07	"	33	33	51	32	0.2
	09	"	33	33	51	32	0.2
	10	"	33	33	51	31	0.4
	Blue box	"	33	33	51	31	0.4
	Red box-1	"	33	33	51	31	0.4
	Red box-2	"	33	33	51	32	0.2
ambient air	01	"	63	63	63	61	0.4
	04	"	63	63	63	61	0.4
	05	"	63	63	63	61	0.4
	07	"	63	63	63	61	0.4
	09	"	63	63	63	61	0.4
	10	"	63	63	63	61	0.4
	Blue box	"	63	63	63	62	0.2
	Red box-1	"	63	63	63	61	0.4
	Red box-2	"	63	63	63	62	0.2
hot water	01	"	212	213	127	213	0.0
	04	"	212	213	127	213	0.0
	05	"	212	213	127	212	0.1
	07	"	212	213	127	213	0.0
	09	"	212	213	127	213	0.0
	10	"	212	213	127	212	0.1
	Blue box	"	212	213	127	212	0.1
	Red box-1	"	212	213	127	213	0.0
	Red box-2	"	212	213	127	213	0.0

CORRECTED TEMPERATURE = $T_c = T_o + .00009 (T_o - 20)(T_o - T_m)$

TEMPERATURE DIFFERENCE = $\Delta T = \frac{[(T_c, {}^{\circ}F + 460) - (T_t, {}^{\circ}F + 460)]}{T_c, {}^{\circ}F + 460} \times 100 \leq 1.5\%$

ENTROPY

TEMPERATURE SENSING EQUIPMENT CALIBRATION DATA

OMETRIC PRESSURE: 29.72 DATE: 1-16-84 CALIBRATED BY: DJC

MERCURY-IN-GLASS REFERENCE NUMBER: 1962175-ASTM3F AMBIENT TEMP.: 63

CALIBRATION SYSTEM USED	POTENTIOMETER I.D. NUMBER	THERMOCOUPLE/ THERMOMETER I.D. NUMBER	REFERENCE THERMOMETER TEMPERATURE		MEAN TEMPERATURE OF Hg COLUMN	THERMOCOUPLE/ THERMOMETER TEMPERATURE	ΔT^B $\leq 1.5\%$
			T_o (°F)	T_c (°F)	T_m (°F)	T_t (°F)	
hot oil	01	4-3	429	441	115	440	0.1
	04	"	429	441	115	439	0.2
	05	"	429	441	115	439	0.2
	07	"	429	441	115	441	0.0
	09	"	429	441	115	438	0.3
	10	"	429	441	115	440	0.1
	Blue box	"	429	441	115	440	0.1
	Red box-1	"	429	441	115	439	0.2
	Red box-2	"	429	441	115	439	0.2

CORRECTED TEMPERATURE = $T_c = T_o + -.00009\ (T_o - 20)(T_o - T_m)$

TEMPERATURE DIFFERENCE = $\Delta T = \frac{[(T_c, {}^\circ F + 460) - (T_t, {}^\circ F + 460)]}{T_c, {}^\circ F + 460} \times 100 \leq 1.5\%$

ENTROPY

MOCAR MOUNTAINEER CARBON COMPANY

Dale Farley
your comments

P.O. BOX 577, MOUNDSVILLE, WV 26041
PHONE 304 845-1380

November 20, 1984

Mr. Carl Beard, II, Director
West Virginia Air Pollution Control Commission
1558 Washington Street, East
Charleston, West Virginia 25311

Re: Incinerator Compliance Testing
for Regular Coke

Dear Mr. Beard:

Pursuant to West Virginia TP-4 Compliance Test Procedures for Regulation VII, Mountaineer Carbon Company is hereby submitting the attached compliance testing report (Attachment III). The report summarizes information for regular coke testing conducted on both kiln-incinerator trains during the period of September 24-27, 1984. Similar testing for graphite coke will be performed at a later date and you will be so notified of these plans under separate cover.

Attachment I summarizes the results of stack testing with incinerator operating conditions. Attachment II discusses the data acquisition system and calibration procedures. In addition, a narrative of incinerator start-up procedures is provided.

In regard to a request by Dale Farley for submittal of kiln temperature data, we are of the opinion that such information is proprietary and does not provide any further insight to the performance of the incinerators beyond what is included herein. If WVAPCC still feels that these data should be submitted with our report, I would be happy to discuss the matter and our position with you further.

If this or any other questions arise during your review of these materials, please contact me at (304) 845-1380.

Yours truly,

J A Holmquist

J. A. Holmquist
Manager-Operations

JAH/GWM/lsm/2278

Attachments

ATTACHMENT I

MOUNTAINEER CARBON COMPANY

EMISSION TESTING RESULTS SUMMARY

Table I summarizes the results of the regular coke stack testing along with pertinent operations data. The associated production data sheets are included as Tables 4 through 7. Each process value in Table I is taken from the production data sheets based on the predominant hour of testing for the respective run. For example, run number 1 was performed from 7:51 to 9:05 on September 24. Therefore, the process values given in Table I for run number 1 are those in the hour one (8:00 to 9:00) column in Table 4. Table 2 provides the date and time of each run while Table 3 compares actual versus allowable emission rates.

JAH/GWM/lsm/2279
11-20-84

TABLE I

MOUNTAINEER CARBON COMPANY

EMISSION RATE AND PROCESS DATA SUMMARY

Run No.	Kiln Feed (Tons/Hr)	Emission Rate (Lbs/Hr)	Incinerator Temperatures (^{o}F)							Draft Incin. (In H_2O)	Draft Stack (In H_2O)	Combustion Air (SCFM)	
			Zone 1	Zone 2	Zone 3	Zone 4	Bustle	Stack	Wt'd.Avg.(a)			Bustle	Burner
1	35.8	8.18	2356	2095	2140	2098	1980	1790	2105	-0.67	-1.87	15,186	1694
2	36.7	11.4	2322	2094	2146	2101	1987	1795	2104	-0.64	-1.86	16,608	1697
3	36.1	6.25	2330	2095	2145	2100	1987	1794	2104	-0.64	-1.83	16,098	1686
4	49.0	23.8	2362	2174	2239	2178	2059	1875	2179	-0.80	-1.82	19,766	1904
5	49.3	26.7	2329	2169	2238	2180	2064	1879	2174	-0.78	-1.79	19,705	1906
6	47.9	19.1	2315	2178	2251	2190	2074	1885	2181	-0.79	-1.80	21,660	1903
7	34.1	29.9	2359	2216	2179	2063	1880	1792	2111	-0.81	-2.00	16,472	1823
8	35.2	19.5	2344	2213	2178	2062	1880	1793	2108	-0.82	-2.00	16,537	1835
9	34.5	19.6	2357	2226	2191	2073	1892	1799	2120	-0.79	-2.00	16,512	1838
10	52.3	13.3	2390	2232	2209	2094	1896	1869	2139	-0.79	-1.93	30,950	1950
11	50.2	10.5	2375	2218	2196	2084	1870	1858	2125	-0.81	-1.92	30,322	1977
12	48.9	26.1	2386	2216	2190	2076	1892	1853	2126	-0.82	-1.95	26,384	1982

(a) The weighted average temperature was defined in the testing protocol as a means to conveniately describe several operating temperatures of the new control system. Avg. Temp = 0.14 (Zone 1) + 0.18 (Zone 2) + 0.21 (Zone 3) + 0.25 (Zone 4) + 0.16 (Breeching) + 0.06 (Stack)

JAH/GWM/lsm/2280
11-20-84

TABLE 2

MOUNTAINEER CARBON COMPANY

TIMING OF TESTING RUNS

Run No.	Test Date	Clock Start	Hour Stop	Shift Hour Reported	Kiln No.
1	9/24	751	905	1	2
2	9/24	943	1055	3	2
3	9/24	1140	1252	5	2
4	9/25	1030	1202	3[b]	2
5	9/25	1239	1351	6	2
6	9/25	1415	1524	7	2
7	9/26	1014	1120	4	1
8	9/26	1141	1248	5	1
9	9/26	1315	1423	6	1
10	9/27	1023	1134	3	1
11	9/27	1158	1306	5	1
12	9/27	1410	1518	7	1

(b) Due to a conveyor problem, kiln feed was stopped for approximately twenty (20) minutes beginning at 11:05. Sampling was interrupted until the problem was corrected and incinerator combustion air flow stabilized. Process data reported are for hour 10:00 to 11:00.

JAH/GWM/lsm/2281
11-20-84

TABLE 3

MOUNTAINEER CARBON COMPANY

ACTUAL AND ALLOWANCE EMISSION RATE SUMMARIES

Kiln No.	Date	Three-Run Average Throughput (Tons/Hr)	Three-Run Average Emission Rate (Lb/Hr)	Allowable Emission Rate (Lb/Hr)(c)
2	9/24	36.2	8.61	40.3
2	9/25	48.7	23.2	49.2
1	9/26	34.6	23.0	39.1
1	9/27	50.5	16.6	50.0

(c) $E = 3.64\ P^{0.67}$
Where E = Allowable Emission Rate (Lb/Hr)
P = Process Weight Rate (Tons/Hr)
E is not to exceed 50 Lb/Hr.

JAH/GWM/1sm/2282
11-20-84

TABLE 4

PRODUCTION DATA SHEET FOR SEPTEMBER 24

MOUNTAINEER CARBON COMPANY
NO. 2 UNIT PRODUCTION ANALYSIS (SHIFT)

LEAD OPERATOR: JDW
LINE OPERATOR: BEH
OPERATOR HELPER: MVN
SUPERVISOR: JLB/RFY

DATE: 9-24-84
SHIFT: 2
TIME: 16117155
PAGE NO.: 1

			HOUR ONE	HOUR TWO	HOUR THREE	HOUR FOUR	HOUR FIVE	HOUR SIX	HOUR SEVEN	HOUR EIGHT	SHIFT AVERAGE
RAW MATERIALS											
SILO SCS-1	TPH	W52012	16.80	14.68	14.59	14.94	14.14	.0	.0	.0	9.38
SILO SCS-1	PCT	Y52012	45.27	39.74	39.24	40.14	38.09	.0	.0	.0	25.31
SILO SCS-2	TPH	W52022	19.71	22.00	22.06	21.99	21.87	18.96	19.24	19.76	20.70
SILO SCS-2	PCT	Y52022	54.73	60.26	60.74	59.86	60.54	50.93	50.62	50.32	54.00
SILO SCS-3	TPH	W52032	.0	.0	.0	.0	.47	18.36	18.89	19.54	7.16
SILO SCS-3	PCT	Y52032	.0	.0	.0	.0	1.37	49.07	49.38	49.68	18.69
SILO SCS-4	TPH	W52042	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-4	PCT	Y52042	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-5	TPH	W52052	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-5	PCT	Y52052	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-6	TPH	W52062	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-6	PCT	Y52062	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	TPH	W53200	35.81	35.90	36.64	36.93	36.07	36.93	38.13	38.00	36.81
INCINERATOR											
DRAFT INCINERATOR	IN H2O	P2182	-.670	-.643	-.640	-.620	-.636	-.622	-.651	-.710	-.649
DRAFT STACK	IN H2O	P2183	-1.873	-1.861	-1.859	-1.838	-1.834	-1.809	-1.802	-1.810	-1.836
TEMPERATURE SETTLING CHAMBER	DEG F	T2187	1716	1697	1685	1699	1694	1703	1711	1738	1706
TEMPERATURE DUCT	DEG F	T2188	2081	2035	2034	2049	2043	2046	2046	2059	2049
TEMPERATURE ZONE 1	DEG F	T2174	2356	2318	2322	2317	2330	2310	2311	2284	2318
TEMPERATURE ZONE 2	DEG F	T2170	2095	2088	2094	2091	2095	2087	2096	2089	2092
TEMPERATURE ZONE 3	DEG F	T2139	2140	2140	2146	2144	2143	2141	2148	2150	2144
TEMPERATURE ZONE 4	DEG F	T2177	2098	2097	2101	2099	2100	2097	2104	2105	2100
TEMPERATURE BREECHING	DEG F	T2192	1980	1983	1987	1988	1987	1986	1991	1994	1987
TEMPERATURE STACK	DEG F	T2193	1790	1793	1795	1796	1794	1794	1795	1801	1795
OXYGEN	PCT O2	A2175	.0*	.0*	.0*	.0*	.0*	.0*	.0*	.0*	.0
CARBON MONOXIDE	PCT CO	A2176	.0*	.0*	.0*	.0*	.0*	.0*	.0*	.0*	.0
DAMPER POSITION	PCT OP	Z2185	39.8	39.6	39.8	39.6	39.5	39.5	39.8	41.7	39.9
NATURAL GAS (BUSTLE)	SCFM	F2142	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (BUSTLE)	SCFM	F2170	15186	16053	16608	17409	16098	15860	15115	16393	16090
NATURAL GAS (START-UP)	SCFM	F2102	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (START-UP)	SCFM	FW2137	1694	1709	1697	1686	1686	1693	1683	1737	1698

TABLE 5

PRODUCTION DATA SHEET FOR SEPTEMBER 25

MOUNTAINEER CARBON COMPANY
NO. 2 UNIT PRODUCTION ANALYSIS (SHIFT)

LEAD OPERATOR: JHW
LINE OPERATOR: DEH
OPERATOR HELPER: MVM
SUPERVISOR: JLB/RFY

DATE: 9-25-84
SHIFT: 2
TIME: 16:18:55
PAGE NO.: 1

			HOUR ONE	HOUR TWO	HOUR THREE	HOUR FOUR	HOUR FIVE	HOUR SIX	HOUR SEVEN	HOUR EIGHT	SHIFT AVERAGE
RAW MATERIALS											
SILO SCS-1	TPH	W52012	.0	.0	.0	.0	.0	.0	.0	.02	.07
SILO SCS-1	PCT	Y52012	.0	.0	.0	.0	.0	.0	.0	1.32	.17
SILO SCS-2	TPH	W52022	23.27	24.46	25.16	20.58	25.04	24.82	24.42	20.94	23.61
SILO SCS-2	PCT	Y52022	49.96	50.65	51.51	45.51	52.03	50.56	51.73	50.30	50.01
SILO SCS-3	TPH	W52032	23.32	23.99	23.85	19.87	23.38	24.46	23.28	20.18	22.79
SILO SCS-3	PCT	Y52032	50.04	49.35	48.49	56.69	47.97	49.44	48.27	48.38	49.83
SILO SCS-4	TPH	W52042	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-4	PCT	Y52042	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-5	TPH	W52052	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-5	PCT	Y52052	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-6	TPH	W52062	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-6	PCT	Y52062	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	TPH	W85200	46.60	48.45	49.01	40.44	47.61	49.27	47.70	41.64	46.84
INCINERATOR											
DRAFT INCINERATOR	IN H2O	P2182	-.841	-.846	-.800	-.843	-.572	-.783	-.788	-.779	-.784
DRAFT STACK	IN H2O	P2183	-1.844	-1.848	-1.819	-1.828	-1.740	-1.789	-1.804	-1.762	-1.806
TEMPERATURE SETTLING CHAMBER	DEG F	T2187	1851	1835	1834	1848	1807	1803	1758	1736	1809
TEMPERATURE DUCT	DEG F	T2188	2124	2109	2129	2106	2077	2108	2028	2071	2074
TEMPERATURE ZONE 1	DEG F	T2174	2334	2352	2362	2333	2347	2329	2315	2281	2332
TEMPERATURE ZONE 2	DEG F	T2170	2168	2174	2174	2146	2174	2169	2178	2145	2166
TEMPERATURE ZONE 3	DEG F	T2139	2232	2237	2239	2203	2243	2238	2251	2227	2234
TEMPERATURE ZONE 4	DEG F	T2177	2174	2177	2178	2149	2184	2180	2190	2175	2176
TEMPERATURE BREECHING	DEG F	T2192	2055	2057	2059	2030	2072	2064	2074	2064	2059
TEMPERATURE STACK	DEG F	T2193	1868	1868	1875	1850	1883	1879	1886	1884	1874
OXYGEN	PCT O2	A2175	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0
CARBON MONOXIDE	PCT CO	A2176	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0
DAMPER POSITION	PCT OP	Z2185	57.9	57.9	57.9	[illegible]	58.8	[illegible]	[illegible]	[illegible]	57.2
NATURAL GAS (BUSTLE)	SCFM	F2142	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (BUSTLE)	SCFM	F2170	17122	17955	19766	13809	22753	19705	21660	22410	19397
NATURAL GAS (START-UP)	SCFM	F2102	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (START-UP)	SCFM	FW2137	1906	1903	1904	1894	1897	1906	1903	1907	1902

TABLE 6

PRODUCTION DATA SHEET FOR SEPTEMBER 26

MOUNTAINEER CARBON COMPANY
NO. 1 UNIT PRODUCTION ANALYSIS (SHIFT)

LEAD OPERATOR: JHW
LINE OPERATOR: JDW
OPERATOR HELPER: MVM
SUPERVISOR: JLB/RFY

DATE: 9-26-84
SHIFT: 2
TIME: 18:17:56
PAGE NO.: 1

			HOUR ONE	HOUR TWO	HOUR THREE	HOUR FOUR	HOUR FIVE	HOUR SIX	HOUR SEVEN	HOUR EIGHT	SHIFT AVERAGE
RAW MATERIALS											
SILO GCS-1	TPH	W52011	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-1	PCT	Y52011	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-2	TPH	W52021	17.42	16.13	16.34	16.10	16.87	16.38	17.24	17.56	16.72
SILO GCS-2	PCT	Y52021	48.11	46.13	45.75	46.17	46.37	45.46	47.88	48.49	46.55
SILO GCS-3	TPH	W52031	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-3	PCT	Y52031	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-4	TPH	W52041	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-4	PCT	Y52041	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-5	TPH	W52051	18.41	18.46	18.21	18.42	18.44	18.44	18.47	18.47	18.42
SILO GCS-5	PCT	Y52051	52.11	54.85	53.88	54.84	52.94	54.84	51.96	51.41	53.34
SILO GCS-6	TPH	W52061	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO GCS-6	PCT	Y52061	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	TPH	WA5200	34.98	34.89	34.70	34.10	35.14	34.45	35.44	34.31	35.00
INCINERATOR											
DRAFT INCINERATOR	IN H2O	P1182	-.796	-.816	-.822	-.810	-.816	-.790	-.808	-.799	-.807
DRAFT STACK	IN H2O	P1183	-1.998*	-1.998*	-1.999*	-1.998*	-1.999*	-1.997*	-2.000*	-1.997*	-1.998
TEMPERATURE SETTLING CHAMBER	DEG F	T1187	1719	1737	1758	1761	1775	1798	1754	1724	1753
TEMPERATURE DUCT	DEG F	T1188	1740	1762	1783	1791	1803	1829	1784	1753	1781
TEMPERATURE ZONE 1	DEG F	T1174	2413	2348	2355	2359	2344	2357	2360	2370	2363
TEMPERATURE ZONE 2	DEG F	T1170	2240	2210	2210	2216	2213	2226	2223	2225	2220
TEMPERATURE ZONE 3	DEG F	T1139	2200	2176	2173	2179	2178	2191	2187	2188	2184
TEMPERATURE ZONE 4	DEG F	T1177	2079	2062	2057	2063	2062	2073	2072	2073	2068
TEMPERATURE BREECHING	DEG F	T1192	1896	1884	1874	1880	1880	1892	1892	1892	1884
TEMPERATURE STACK	DEG F	T1193	1799	1797	1790	1792	1793	1799	1799	1797	1796
OXYGEN	PCT O2	A1173	10.00*	10.00*	10.00*	10.00*	10.00*	10.00*	10.00*	10.00*	10.00
CARBON MONOXIDE	PCT CO	A1176	.0	.0	.0	.0	.0	.0	.0	.0	.0
DAMPER POSITION	PCT OP	Z1185	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.1	34.2
NATURAL GAS (BUSTLE)	SCFM	F1142	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (BUSTLE)	SCFM	F1170	16475	16508	16496	16472	16537	16512	16567	16590	16519
NATURAL GAS (START-UP)	SCFM	F1102	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (START-UP)	SCFM	FW1137	1799	1806	1816	1823	1835	1838	1829	1831	1822

TABLE 7

PRODUCTION DATA SHEET FOR SEPTEMBER 27

MOUNTAINEER CARBON COMPANY
NO. 1 UNIT PRODUCTION ANALYSIS (SHIFT)

LEAD OPERATOR: JHW
LINE OPERATOR: KEB
OPERATOR HELPER: MVH
SUPERVISOR: JNR/CFV

DATE: 9-27-84
SHIFT: 2
TIME: 16:20: 0
PAGE NO.: 1

			HOUR ONE	HOUR TWO	HOUR THREE	HOUR FOUR	HOUR FIVE	HOUR SIX	HOUR SEVEN	HOUR EIGHT	SHIFT AVERAGE
RAW MATERIALS											
SILO SCS-1	TPH	W52011	.0	.0	.0	.0	.0	.0	.0	.29	.04
SILO SCS-1	PCT	Y52011	.0	.0	.0	.0	.0	.0	.0	.84	.11
SILO SCS-2	TPH	W52021	24.23	24.66	26.31	24.47	25.96	26.24	24.91	21.52	24.79
SILO SCS-2	PCT	Y52021	47.11	48.50	50.22	47.31	51.64	50.67	48.38	48.26	49.24
SILO SCS-3	TPH	W52031	24.77	25.58	26.04	24.82	24.70	25.61	23.91	22.10	24.68
SILO SCS-3	PCT	Y52031	50.89	51.52	49.78	52.70	48.36	49.33	51.61	50.90	50.64
SILO SCS-4	TPH	W52041	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-4	PCT	Y52041	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-5	TPH	W52051	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-5	PCT	Y52051	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-6	TPH	W52061	.0	.0	.0	.0	.0	.0	.0	.0	.0
SILO SCS-6	PCT	Y52061	.0	.0	.0	.0	.0	.0	.0	.0	.0
TOTAL	TPH	WA5200	48.04	50.21	52.31	47.48	50.18	52.07	48.92	43.97	49.15
INCINERATOR											
DRAFT INCINERATOR	IN H2O	P1182	-.860	-.834	-.784	-.827	-.806	-.798	-.824	-.847	-.822
DRAFT STACK	IN H2O	P1183	-1.994*	-1.979	-1.934	-1.929	-1.918	-1.938	-1.951	-1.966	-1.951
TEMPERATURE SETTLING CHAMBER	DEG F	T1187	1868	1857	1859	1864	1859	1853	1867	1848	1859
TEMPERATURE DUST	DEG F	T1188	1932	1921	1920	1925	1922	1924	1943	1926	1927
TEMPERATURE ZONE 1	DEG F	T1174	2398	2392	2390	2368	2375	2386	2386	2396	2384
TEMPERATURE ZONE 2	DEG F	T1170	2221	2226	2232	2209	2218	2224	2216	2213	2220
TEMPERATURE ZONE 3	DEG F	T1139	2192	2200	2209	2188	2196	2201	2190	2184	2195
TEMPERATURE ZONE 4	DEG F	T1177	2075	2081	2094	2078	2084	2083	2076	2069	2080
TEMPERATURE BREECHING	DEG F	T1192	1893	1897	1896	1858	1870	1896	1892	1890	1886
TEMPERATURE STACK	DEG F	T1193	1842	1853	1869	1854	1858	1862	1853	1846	1855
OXYGEN	PCT O2	A1175	10.00*	10.00*	9.80*	2.99	5.99*	6.83*	10.00*	10.00*	8.20
CARBON MONOXIDE	PCT CO	A1176	.0	.0	.0*	.06*	.51*	.25	.0*	.0*	.10
DAMPER POSITION	PCT OP	Z1185	52.4	52.4	52.4	52.4	52.3	52.3	52.4	52.3	52.4
NATURAL GAS (BUSTLE)	SCFH	F1142	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (BUSTLE)	SCFH	F1170	25120	27740	30950	29527	30322	29101	26384	25522	28083
NATURAL GAS (START-UP)	SCFH	F1102	.0	.0	.0	.0	.0	.0	.0	.0	.0
COMBUSTION AIR (START-UP)	SCFH	FW1137	1901	1923	1950	1952	1977	1979	1982	1989	1956

ATTACHMENT II

MOUNTAINEER CARBON COMPANY

INCINERATOR PROCESS DESCRIPTION

START-UP

Operation of an incinerator is commenced by lighting each of the three (3) gas burners individually. The burners are operated at minimum fire for four (4) hours before the kiln burner is lit. The incinerator burners firing rate is then increased so that the Zone 3 temperature increases $50^{o}F/Hr$. Once the Zone 3 temperature reaches $1000^{o}F$, the burners firing rate is increased so that said temperature increases $100^{o}F/Hr$.

Eventually, it becomes necessary to begin calcining operations to bring the incinerator up to full temperature. This is done about twenty-four (24) hours after the incinerator gas burners are first lit. The attached figures are based on actual start-up data and show that the temperature in all four (4) incinerator zones reaches $1600^{o}F$ within about two (2) hours after kiln start-up.

DATA ACQUISITION SYSTEM AND EQUIPMENT CALIBRATION

The process data sheets given in Tables 4 through 7 are shift summaries of various operating parameters. The data acquisition system incorporates a computer to read the instantaneous value of each parameter every eight (8) seconds. The values are then averaged by hour and the information is summarized in the process data sheets. Since the system incorporates only solid state hardware, calibrations need to be done infrequently.

For each incinerator zone, a voltage transmitter connected to the respective thermocouple sends a signal to an associated circuit board. Visual inspections of this system are made during every shutdown. A calibration check is done only if a thermocouple burns out or is otherwise determined to need replacement. This is done by shorting across the circuit board of the new thermocouple. The computer screen readout for that thermocouple, in response, should indicate ambient temperature. A screw adjustment on the transmitter voltage output allows for zeroing of this reading, if necessary. Upscale span checks can be made by outputting specific voltages from the transmitter which correspond to known temperature readings. Corrections are made with a similar adjustment screw.

DATA ACQUISITION SYSTEM AND EQUIPMENT CALIBRATION (Continued)

Kiln feed is determined with a moving feed belt running over a scale. By measuring the belt speed and reading the scale, the feed rate can be determined. The scale is calibrated, first by taring the unloaded belt, then checking the upscale by weighing a chain of known weight per unit length. Corrections are made with coarse and fine adjustments. This calibration is done with every shutdown or every six (6) months. The accuracy of the scale is reported by the manufacturer (Merrick) to be 0.25 percent over a range of one-third to full scale.

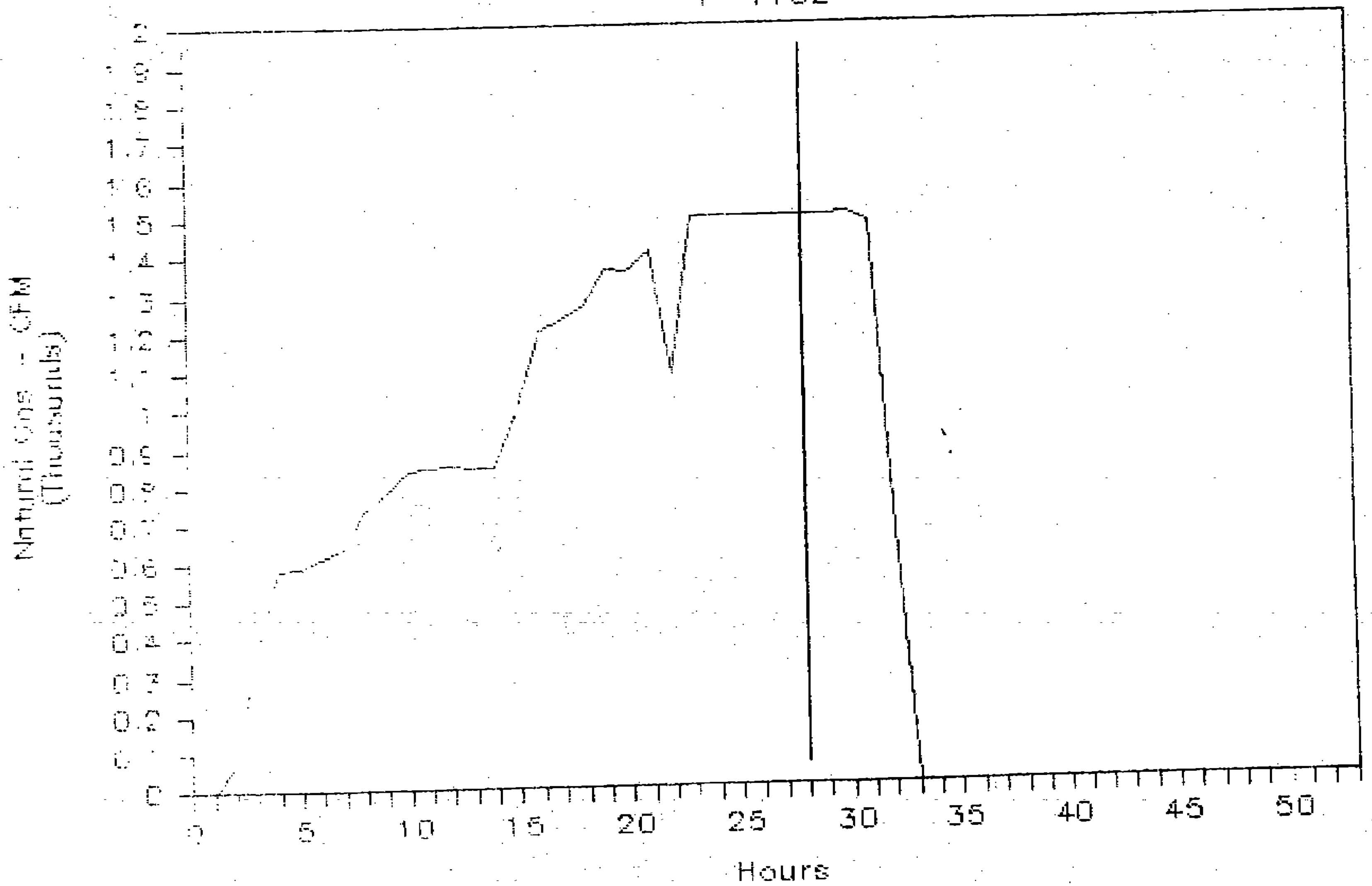
A single ambient air intake for combustion air serves each incinerator. Air flow is determined with insert-type venturi meters. One set of meters measures velocity-pressure differential for the entire incinerator air flow while another set measures only incinerator burner air flow. Bustle air flow is determined by taking the difference between these two (2) readings. The process data sheets report burner air and bustle air.

A calibration check on these instruments is done with every shutdown or every six (6) months at zero and full scale. As with the systems mentioned before, screw adjustments are used to correct the transmitter output and calibrate the unit.

JAH/GWM/lsm/2283
11-20-84

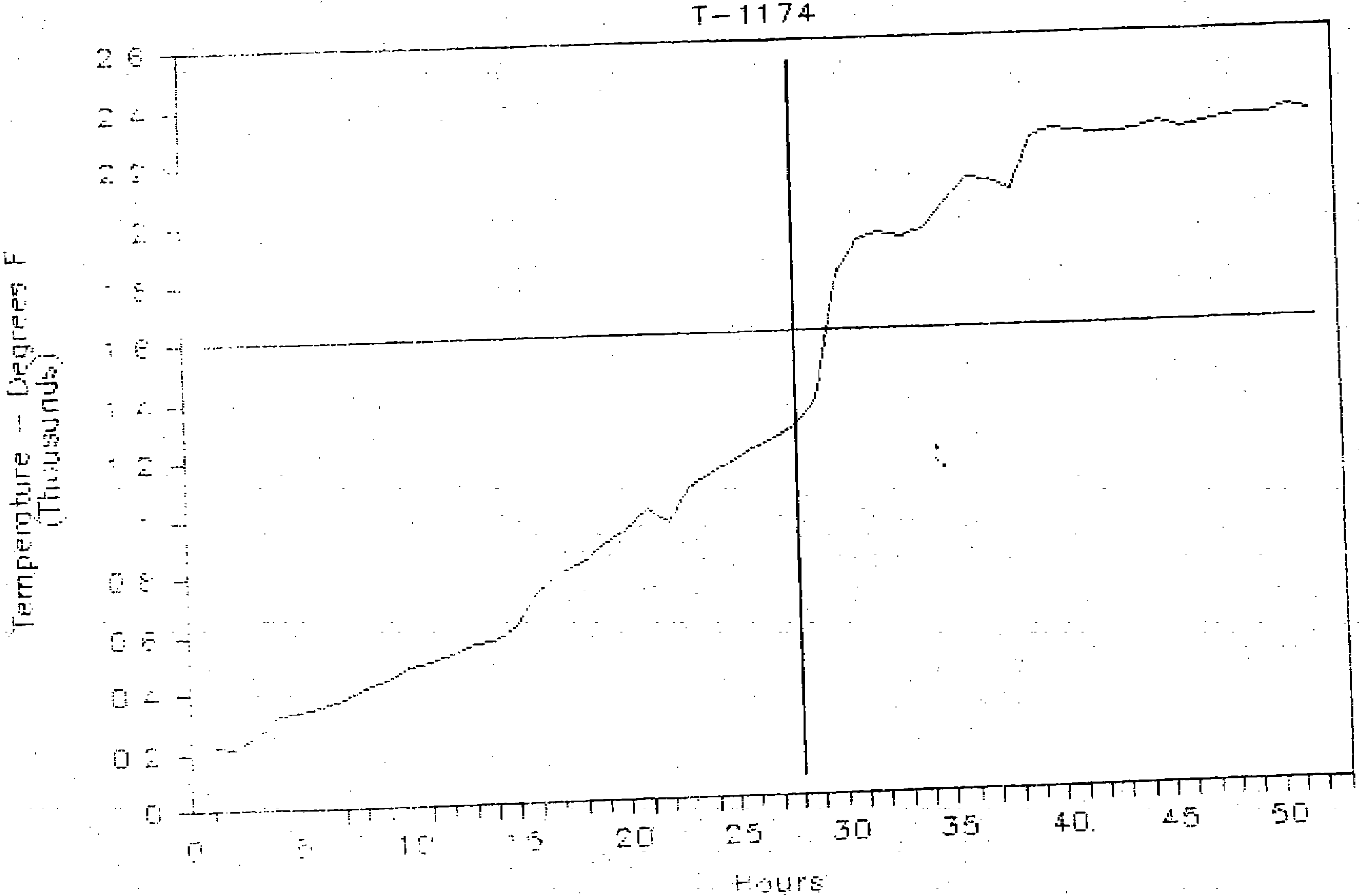
1 INCINERATOR — NATURAL GAS

F-1102



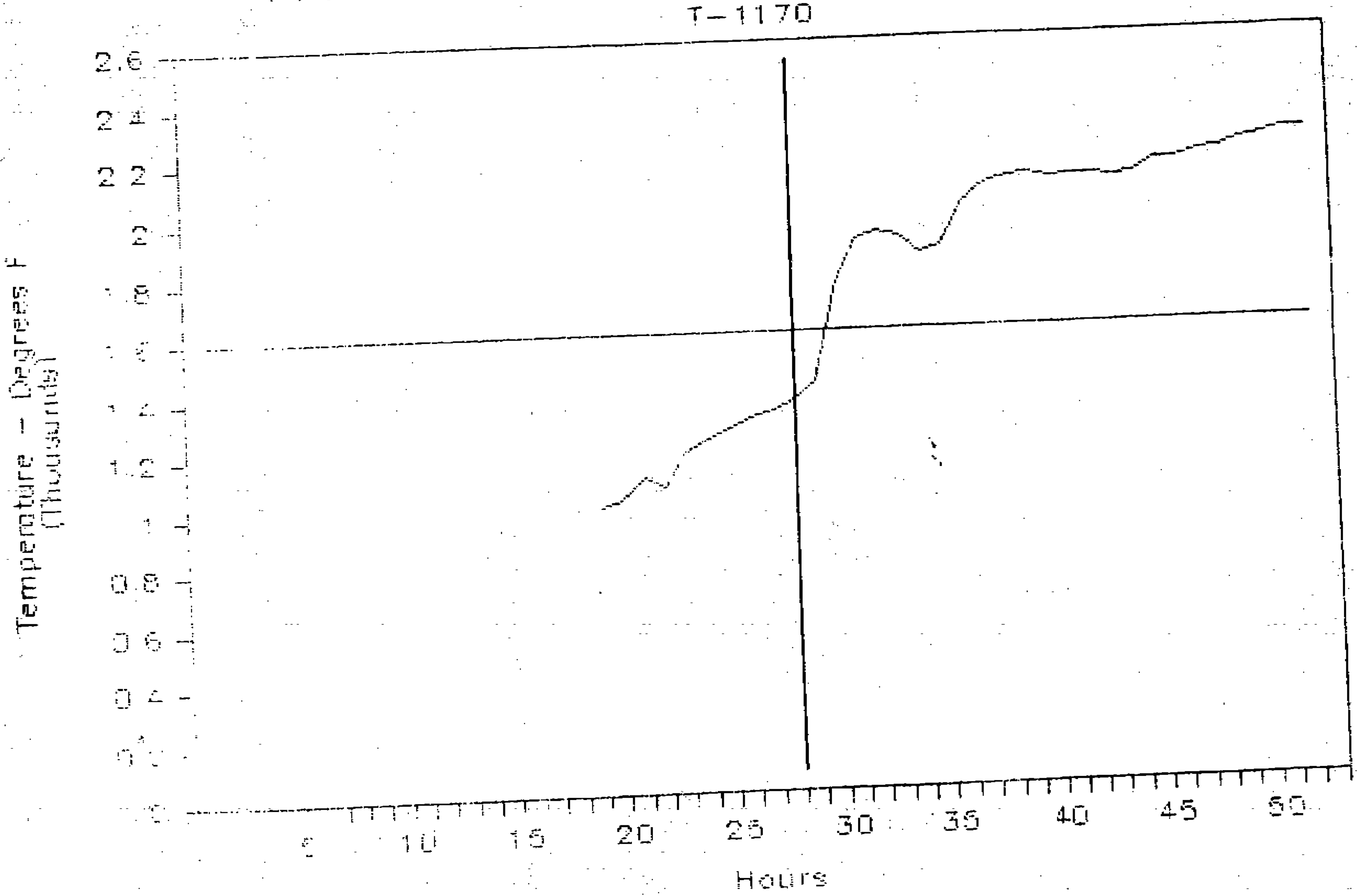
NO 1 INCINERATOR — ZONE 1

T–1174



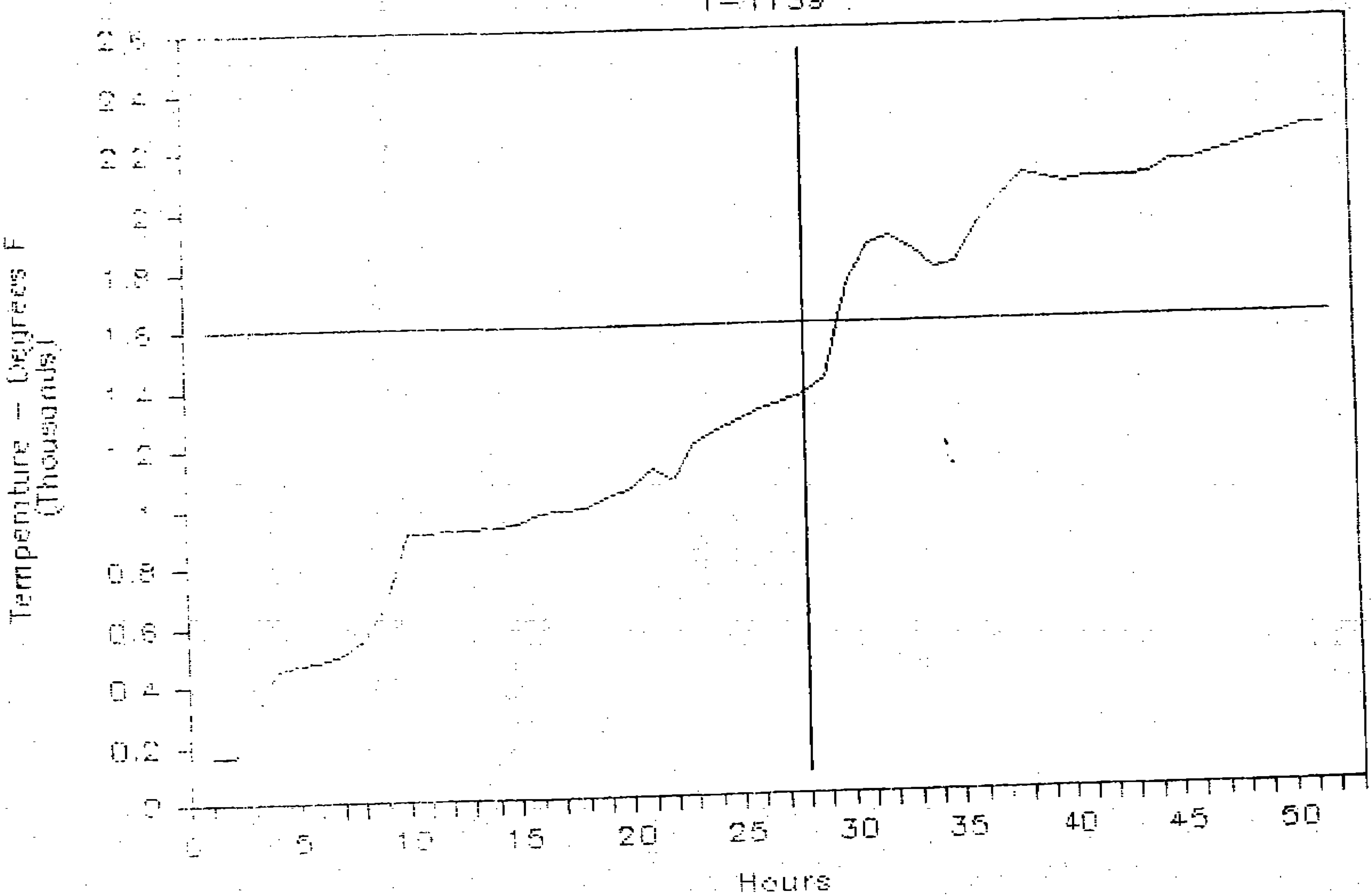
NO 1 INCINERATOR — ZONE 2

T-1170



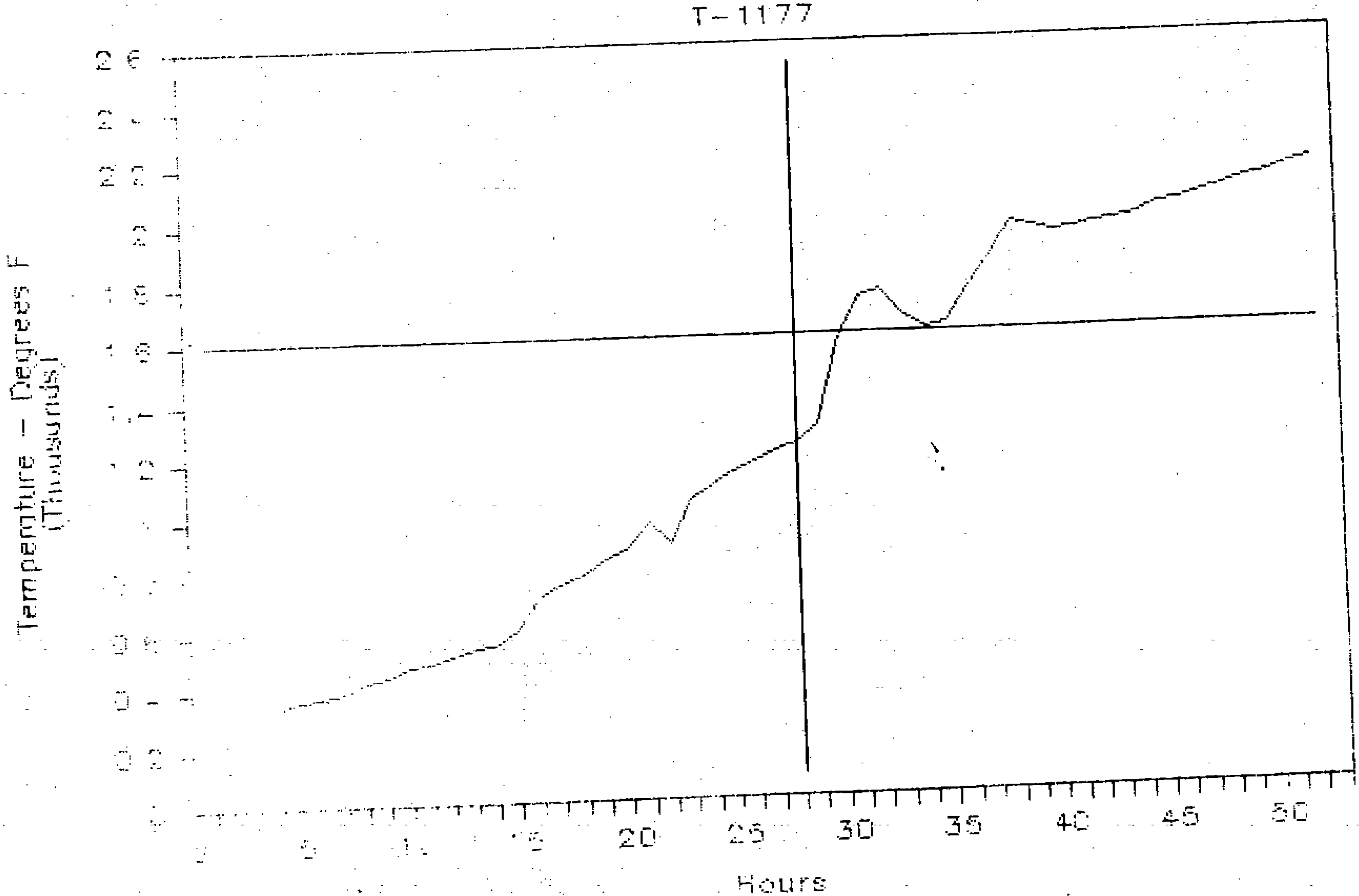
NO. 1 INCINERATOR — ZONE 3

T-1139



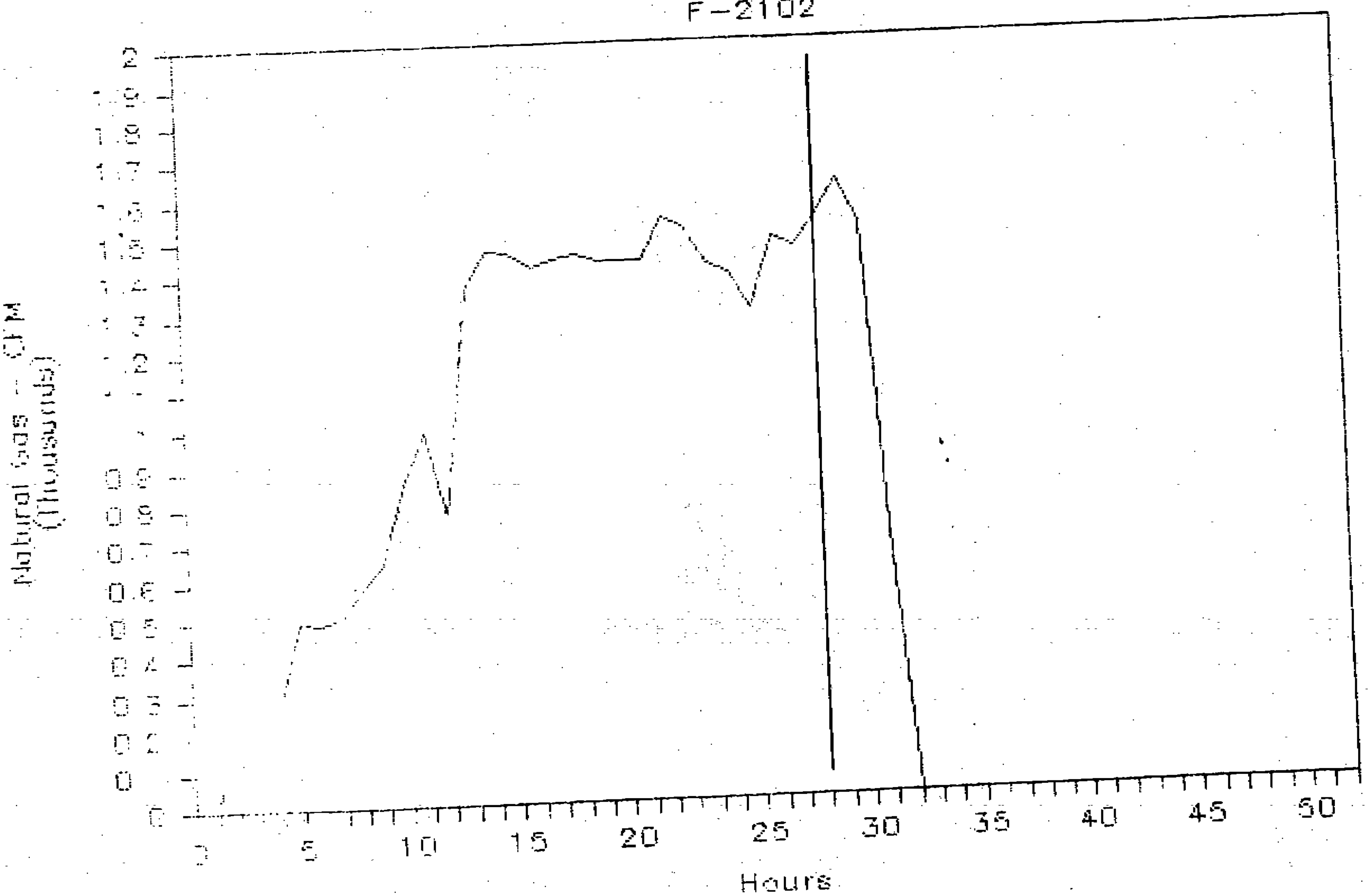
NO 1 INCINERATOR — ZONE 4

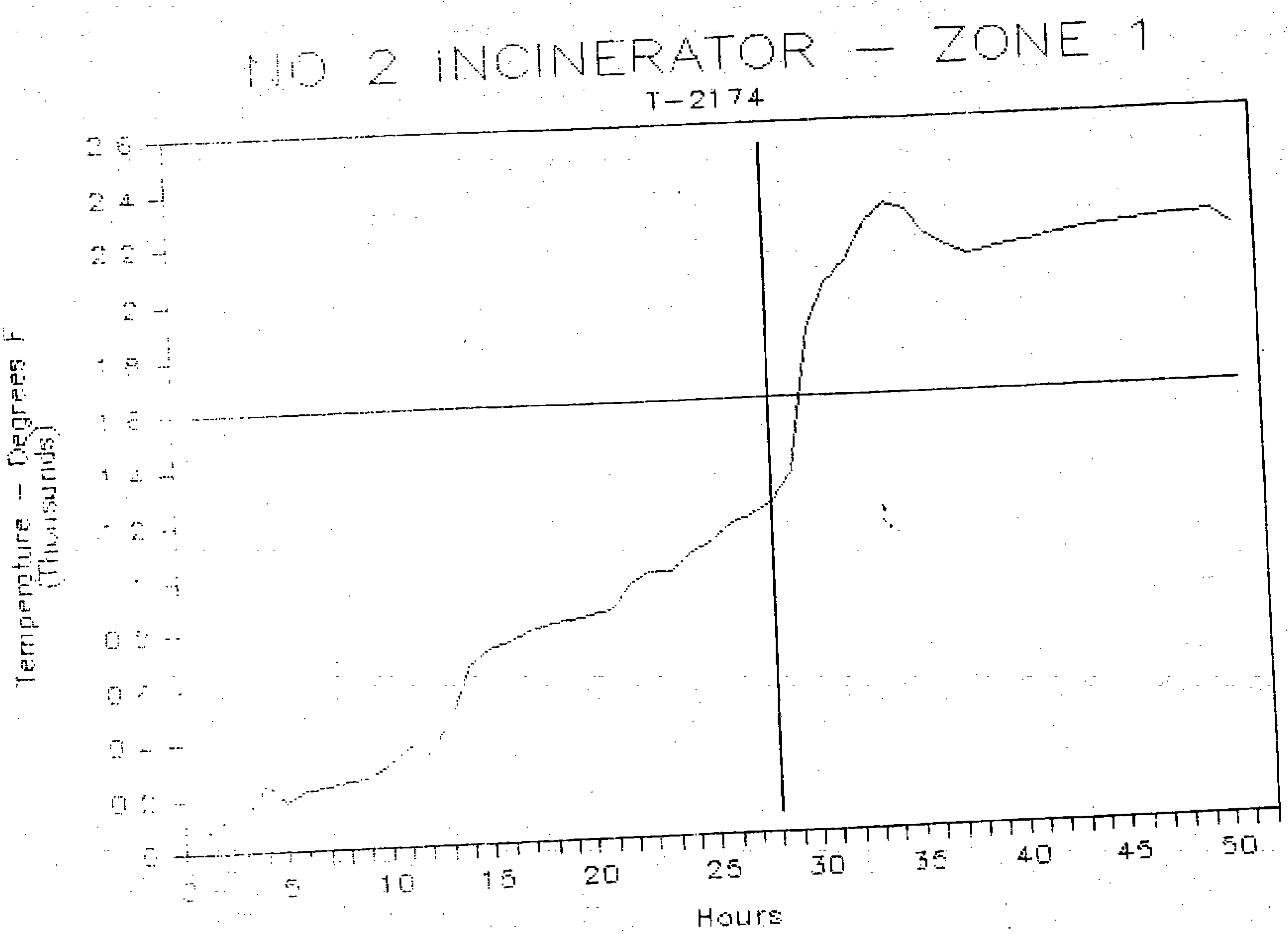
T-1177



NO. 2 INCINERATOR — NATURAL GAS

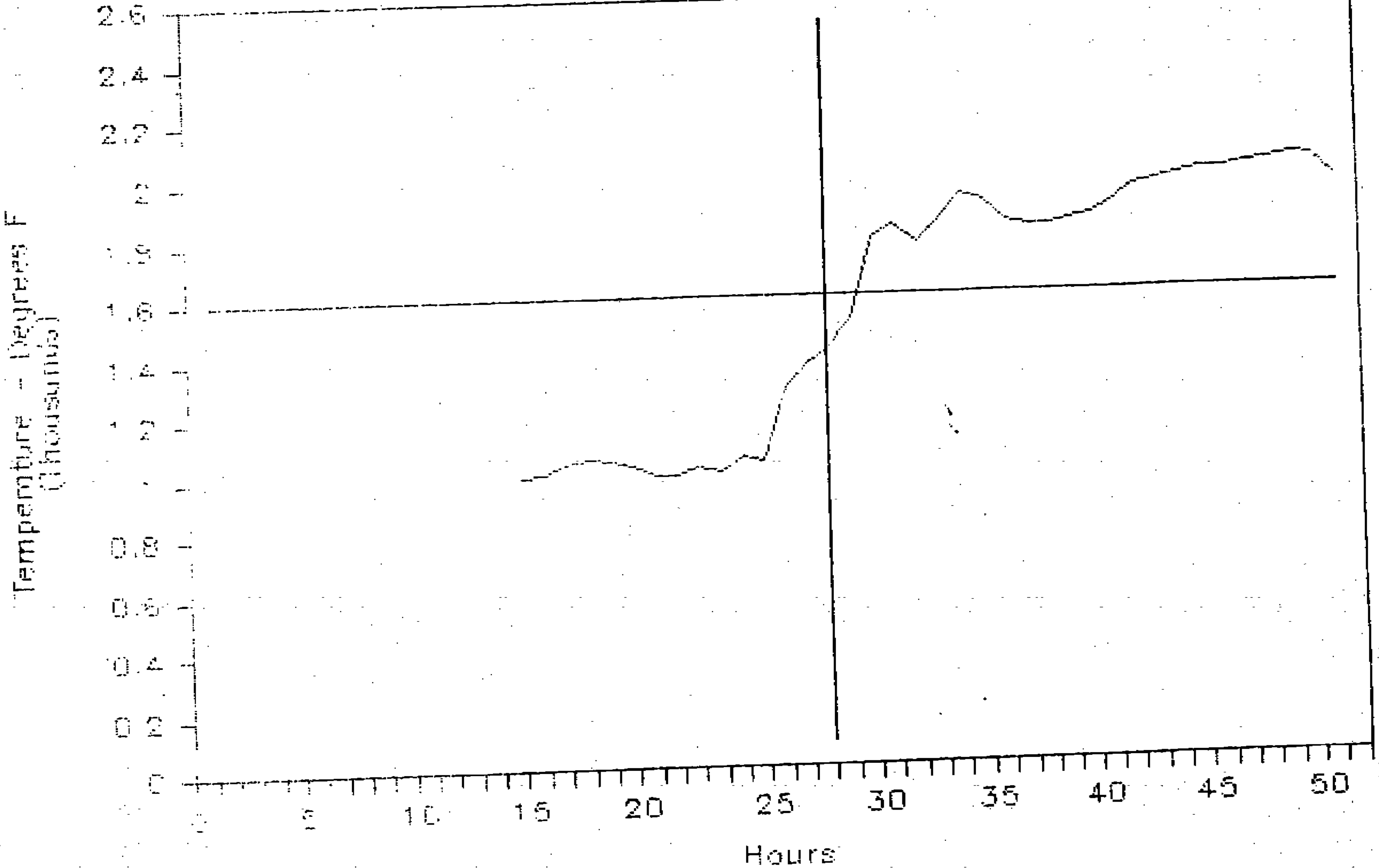
F-2102




NO 2 INCINERATOR — ZONE 1
T-2174
Temperature — Degrees F
(Thousands)
Hours
5
10
15
20
25
30
35
40
45
50

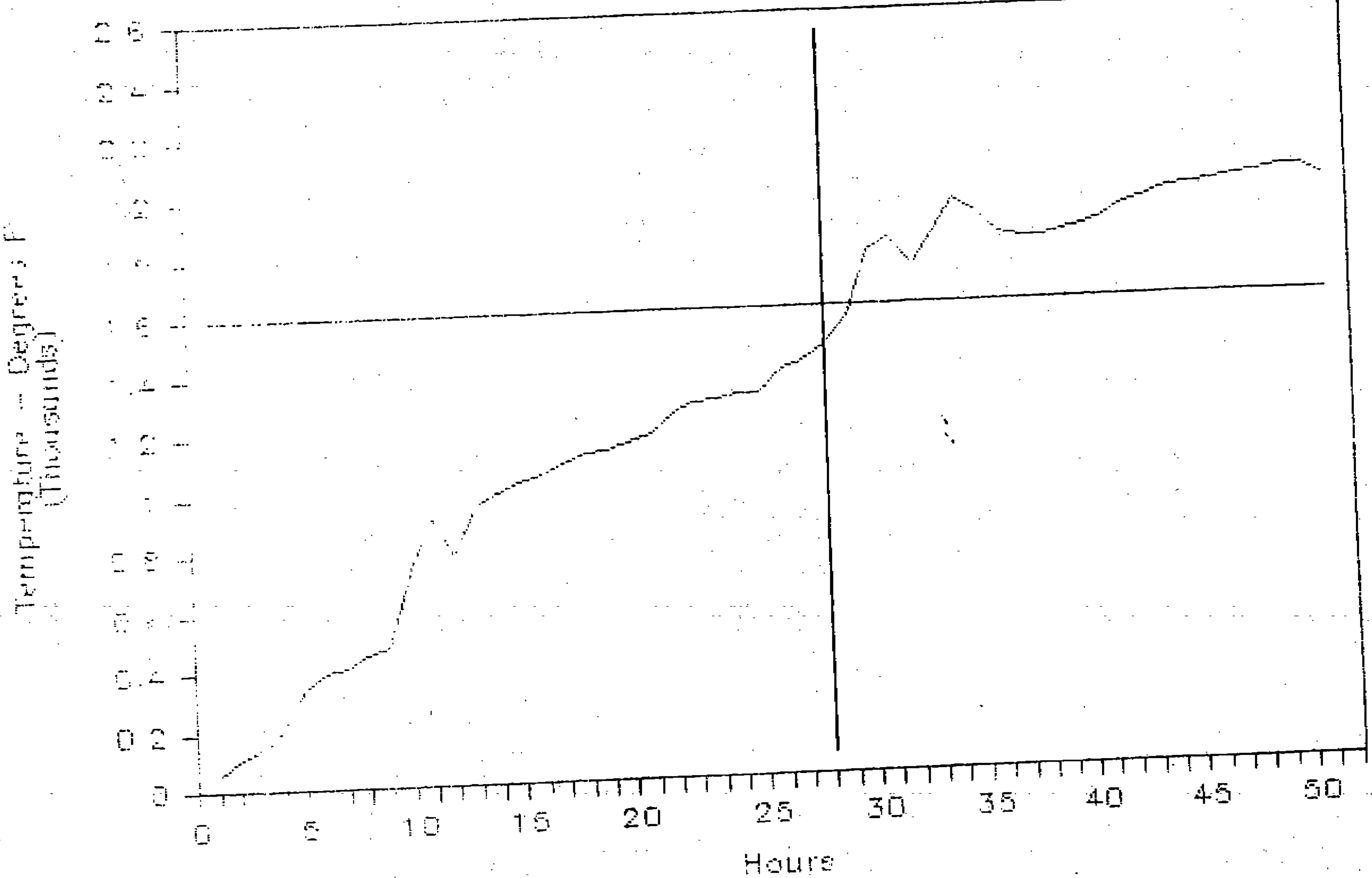
NO 2 INCINERATOR — ZONE 2

T-2170



NO 2 INCINERATOR — ZONE 3

T-2139



NO 2 INCINERATOR — ZONE 4

T-2177