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

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

Background Report Reference

AP-42 Section Number: 11.23

Background Chapter: 4

Reference Number: 37

Title: Results of the April 17-19, 1990 Particulate Emission Compliance Tests on Four Sources at the Cyprus North shore Mining Facility in Silver Bay, MN

Interpoll Laboratories, IncInterpoll Laboratories, Inc

Interpoll Laboratories, IncInterpoll Laboratories, Inc

May 1990

AP-42 Section 11.23
Reference —
Report Sect. 4
Reference 37

Interpoll Laboratories, Inc.
4500 Ball Road N.E.
Circle Pines, Minnesota 55014-1819

TEL: (612) 786-6020
FAX: (612) 786-7854

RESULTS OF THE APRIL 17-19, 1990 PARTICULATE EMISSION COMPLIANCE TESTS ON FOUR SOURCES AT THE CYPRUS NORTHSHORE MINING FACILITY IN SILVER BAY, MINNESOTA

Submitted to:

CYPRUS NORTHSHORE MINING
10 Outer Drive
Silver Bay, Minnesota 55614

Attention:

Dennis Wagner

Approved by:

Kathleen Eickstadt
Senior Data Analyst
Field Testing Division

Report Number 0-3022
May 4, 1990
KE/prp

TABLE OF CONTENTS

	ABBREVIATIONS	iii
1	INTRODUCTION	1
2	SUMMARY AND DISCUSSION	3
3	RESULTS	8
	3.1 Results of Orsat and Moisture Analyses	9
	3.2 Results of Particulate Loading Determinations	14
	3.3 Results of Opacity Determinations	19

APPENDICES:

A - Results of Preliminary Volumetric Flow Rate Determinations
B - Location of Test Ports
C - Methods 2 - 5 Field Data Sheets - Dry Cobber Stack
D - Methods 2 - 5 Field Data Sheets - Multiclone Stack
E - Method 2 - 5 Field Data Sheets - Pelletizer Stack
F - Methods 2 - 5 Field Data Sheets - Fine Crusher Stack
G - Method 9 Field Data Sheets
H - Laboratory Data Sheets
I - MPCA Exhibit C
J - Process Data
K - Procedures
L - Calculation Equations
M - Sampling Train Calibration Data

ABBREVIATIONS

ACFM	actual cubic feet per minute
cc (ml)	cubic centimeter (milliliter)
DSCFM	standard cubic foot of dry gas per minute
DSML	dry standard milliliter
DEG-F (^{0}F)	degrees Fahrenheit
DIA.	diameter
FP	finished product for plant
FT/SEC	feet per second
g	gram
GPM	gallons per minute
GR/ACF	grains per actual cubic foot
GR/DSCF	grains per dry standard cubic foot
g/dscm	grams per dry standard cubic meter
HP	horsepower
HRS	hours
IN.	inches
IN.HG.	inches of mercury
IN.WC.	inches of water
LB	pound
LB/DSCF	pounds per dry standard cubic foot
LB/HR	pounds per hour
LB/10^6BTU	pounds per million British Thermal Units heat input
LB/MMBTU	pounds per million British Thermal Units heat input
LTPD	long tons per day
MW	megawatt
mg/Nm^3	milligrams per dry standard cubic meter
ug/Nm^3	micrograms per dry standard cubic meter
microns (um)	micrometer
MIN.	minutes
ng	nanograms
ohm-cm	ohm-centimeter
PM	particulate matter
PPH	pounds per hour
PPM	parts per million
ppmC	parts per million carbon
ppm,d	parts per million, dry
ppm,w	parts per million, wet
ppt	parts per trillion
PSI	pounds per square inch
SQ.FT.	square feet
TPD	tons per day
ug	micrograms
v/v	percent by volume
w/w	percent by weight
<	$\leq$ (when following a number)

Standard conditions are defined as 68 ^{0}F (20 ^{0}C) and 29.92 IN. of mercury pressure.

1 INTRODUCTION

During April 17-19, 1990, Interpoll Laboratories personnel conducted particulate emission compliance tests on the Dry Cobber, Multiclone, Pelletizer and Fine Crusher Stacks at the Cyprus Northshore Mining Facility located in Silver Bay, Minnesota. On-site testing was performed by D. Smith and M. Kaehler. Coordination between testing activities and plant operation was provided by Denny Wagner of Cyprus Northshore Mining. Portions of the testing was witnessed by Bob Beresford of the Minnesota Pollution Control Agency.

Evaluations were performed in accordance with EPA Methods 1 - 5 CFR Title 40, Part 60, Appendix A (revised July 1, 1988). A preliminary determination of the gas linear velocity profile was made at each test site before the first particulate determination to allow selection of the appropriate nozzle diameter required for isokinetic sample withdrawal. Interpoll Labs sampling trains which meet or exceed specifications in the above-cited reference were used to extract particulate samples by means of heated glass-lined probes.

Testing on each of the four sources was conducted from two test ports oriented at 90 degrees on the respective stacks. The test ports on the Dry Cobber Stack are located 2.73 stack diameters downstream of any flow disturbance and .81 diameters upstream of the stack exit. The test ports on the Multiclone Stack are located 3.62 stack diameters downstream of any flow disturbance and 9.06 diameters upstream of the stack exit. The test ports on the Pelletizer Stack are located 7.91 stack diameters downstream of any flow disturbance and 1.52 diameters upstream of the stack exit. The test ports on the Fine Crusher Stack are located 9.45 stack diameters downstream of any flow disturbance and 9.45 diameters upstream of the stack exit. In each case, a 24-point traverse was used to collect representative particulate samples. Each traverse point was sampled 2.5 minutes to give a total sampling time of 60 minutes per run.

Visible emission determinations were performed by B. Drake, an EPA certified reader.

The important results of the test are summarized in Section 2. Detailed results are presented in Section 3. Field data and all other supporting information are presented in the appendices.

2 SUMMARY AND DISCUSSION

The results of the particulate emission compliance tests are summarized in Tables 1, 2, 3 and 4. As will be noted, the average particulate emission rates and opacity were as follows:

Source	Particulate Emission Rate (LB/HR)	Opacity (%)
Dry Cobber	2.3	0
Multiclone	1.9	0
Pelletizer	2.5	2.2
Fine Crusher	0.62	0

No difficulties were encountered in the field or in the laboratory evaluation of the samples. On the basis of this fact and a complete review of the entire data and results, it is our opinion that the results reported herein are accurate and closely reflect the actual values which existed at the time the test was performed.

TABLE 1. Summary of the Results of the April 17, 1990 Particulate Emission Compliance Test on the Dry Cobber at the Cyprus Northshore Mining Corporation Plant located in Silver Bay, Minnesota.

ITEM	Run 1	Run 2	Run 3
Date of test	04-17-90	04-17-90	04-17-90
Time runs were done (HRS)	1100/1202	1220/1324	1340/1442
Process rate (TONS/HR)			
Volumetric flow			
actual (ACFM)	70541	69248	68856
standard (DSCFM)	68871	67476	67239
Gas temperature (DEG-F)	67	67	67
Moisture content (%V/V)	0.61	0.74	0.62
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	99.6	100.1	99.9
Particulate concentration			
actual (GR/ACF)	.00338	.00518	.00321
standard (GR/DSCF)	.00346	.00532	.00329
Part. emission rate (LB/HR)	2.04	3.08	1.90

Note: Dry Catch Only

TABLE 2. Summary of the Results of the April 18, 1990 Particulate Emission Compliance Test on the Multiclone at the Cuprus Northshore Mining Corporation Plant located in Silver Bay, Minnesota.

Process source 77.

ITEM	Run 1	Run 2	Run 3
Date of test	04-18-90	04-18-90	04-18-90
Time runs were done (HRS)	840/ 941	1000/1102	1115/1216
Process rate (TONS/HR)	102.4	137.2	137.1
Volumetric flow			
actual (ACFM)	29734	29653	29539
standard (DSCFM)	29360	29284	29177
Gas temperature (DEG-F)	59	60	61
Moisture content (%V/V)	1.09	0.85	0.73
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	103.5	99.8	99.8
Particulate concentration			
actual (GR/ACF)	.00607	.00952	.00634
standard (GR/DSCF)	.00615	.00965	.00642
Part. emission rate (LB/HR)	1.55	2.42	1.61

Note: Dry Catch Only

TABLE 3. Summary of the Results of the April 18, 1990 Particulate Emission Compliance Test on the Pelletizer at the Cyprus Northshore Mining Corporation Plant located in Silver Bay, Minnesota.

ITEM	Run 1	Run 2	Run 3
Date of test	04-18-90	04-18-90	04-18-90
Time runs were done (HRS)	1545/1650	1710/1812	1830/1931
Process rate (TONS/HR)			
Volumetric flow			
actual (ACFM)	49610	49014	48924
standard (DSCFM)	41080	43067	41071
Gas temperature (DEG-F)	124	100	120
Moisture content (%V/V)	6.60	4.87	5.92
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	98.8	98.2	100.1
Particulate concentration			
actual (GR/ACF)	.00867	.00486	.00453
standard (GR/DSCF)	.0105	.00554	.00539
Part. emission rate (LB/HR)	3.69	2.04	1.90

Note: Dry Catch Only

std is .03 Gr/DSCF

TABLE 4. Summary of the Results of the April 19, 1990 Particulate Emission Compliance Test on the Fine Crusher at the Cyprus Northshore Mining Corporation Plant located in Silver Bay, Minnesota.

ITEM	Run 1	Run 2	Run 3
Date of test	04-19-90	04-19-90	04-19-90
Time runs were done (HRS)	805/ 908	925/1025	1040/1141
Process rate (TONS/HR)			
Volumetric flow			
actual (ACFM)	14574	14777	14960
standard (DSCFM)	13972	14253	14370
Gas temperature (DEG-F)	66	65	66
Moisture content (%V/V)	1.60	1.23	1.39
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	100.5	99.7	100.1
Particulate concentration			
actual (GR/ACF)	.00566	.00501	.00396
standard (GR/DSCF)	.00591	.00520	.00412
Part. emission rate (LB/HR)	0.708	0.635	0.508

Note: Dry Catch Only

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition (Orsat and moisture) are presented first followed by the computer printout of the particulate and opacity results. An Orsat analysis was not performed on the exhaust gas, since only ambient air is exhausted from the process. The composition of the gas reported is the average geophysical composition of air. The moisture contents reported were measured as per EPA Method 4. Preliminary measurements including test port locations are given in the appendices.

The results have been calculated on a personal computer using programs written in Extended BASIC specifically for source testing calculations. EPA-published equations have been used as the basis of the calculation techniques in these programs. The particulate emission rate has been calculated using the product of the concentration times flow method.

3.1 Results of Orsat and Moisture Analyses

Test No. 1
Dry Cobber Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	04-17-90	04-17-90	04-17-90
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.77	20.74	20.77
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	78.59	78.48	78.58
water vapor.....	0.61	0.74	0.62
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.77	28.76	28.77
Specific gravity.....	0.994	0.993	0.994
Water mass flow.....(LB/HR)	1189	1419	1185

FO	0.000	0.000	0.000

Test No. 2
Multiclone Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	04-18-90	04-18-90	04-18-90
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.67	20.72	20.75
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	78.21	78.40	78.49
water vapor.....	1.09	0.85	0.73
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.72	28.75	28.76
Specific gravity.....	0.992	0.993	0.993
Water mass flow.....(LB/HR)	905	706	606

FO 0.000 0.000 0.000

Test No. 3
Pelletizer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	04-18-90	04-18-90	04-18-90
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	19.52	19.88	19.66
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	73.85	75.22	74.39
water vapor.....	6.60	4.87	5.92
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.13	28.31	28.20
Specific gravity.....	0.972	0.978	0.974
Water mass flow.....(LB/HR)	8147	6184	7251

FO	0.000	0.000	0.000

Test No. 4
Fine Crusher Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	04-19-90	04-19-90	04-19-90
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.57	20.64	20.61
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	77.81	78.09	77.97
water vapor.....	1.60	1.23	1.39
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.67	28.71	28.69
Specific gravity.....	0.990	0.992	0.991
Water mass flow.....(LB/HR)	637	500	568

FO 0.000 0.000 0.000

3.2 Results of Particulate Loading Determinations

Test No. 1
Dry Cobber Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	04-17-90	04-17-90	04-17-90
Time run start/end.....(HRS)	1100/1202	1220/1324	1340/1442
Static pressure.....(IN.WC)	-1.00	-1.00	-1.00
Cross sectional area (SQ.FT)	21.14	21.14	21.14
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	5.0	6.0	5.0
total.....(GRAMS)	5.0	6.0	5.0
Total particulate material..			
.....collected(grams)	0.0086	0.0130	0.0080
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.40	29.40	29.40
Avg. orif.pres.drop..(IN.WC)	1.37	1.34	1.31
Avg. gas meter temp..(DEF-F)	68.2	73.2	70.1
Volume through gas meter....			
at meter conditions...(CF)	38.86	38.63	38.21
standard conditions.(DSCF)	38.31	37.73	37.53
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.190	.190	.190
Avg.stack gas temp ..(DEG-F)	67	67	67
Volumetric flow rate.....			
actual.....(ACFM)	70541	69248	68856
dry standard.....(DSCFM)	68871	67476	67239
Isokinetic variation.....(%)	99.6	100.1	99.9
Particulate concentration...			
actual.....(GR/ACF)	0.00338	0.00518	0.00321
dry standard.....(GR/DSCF)	0.00346	0.00532	0.00329
Particle mass rate...(LB/HR)	2.04	3.08	1.90

Test No. 2
Multiclone Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	04-18-90	04-18-90	04-18-90
Time run start/end.....(HRS)	840/ 941	1000/1102	1115/1216
Static pressure.....(IN.WC)	-0.52	-0.52	-0.52
Cross sectional area (SQ.FT)	8.62	8.62	8.62
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	9.0	7.0	6.0
total.....(GRAMS)	9.0	7.0	6.0
Total particulate material..			
.....collected(grams)	0.0154	0.0240	0.0159
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.40	29.40	29.40
Avg. orif.pres.drop..(IN.WC)	1.36	1.35	1.35
Avg. gas meter temp..(DEF-F)	59.3	62.7	66.3
Volume through gas meter....			
at meter conditions...(CF)	38.52	38.53	38.63
standard conditions.(DSCF)	38.63	38.38	38.22
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.183	.186	.186
Avg.stack gas temp ..(DEG-F)	59	60	61
Volumetric flow rate.....			
actual.....(ACFM)	29734	29653	29539
dry standard.....(DSCFM)	29360	29284	29177
Isokinetic variation.....(%)	103.5	99.8	99.8
Particulate concentration...			
actual.....(GR/ACF)	0.00607	0.00952	0.00634
dry standard.....(GR/DSCF)	0.00615	0.00965	0.00642
Particle mass rate...(LB/HR)	1.55	2.42	1.61

Test No. 3
Pelletizer Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	04-18-90	04-18-90	04-18-90
Time run start/end.....(HRS)	1545/1650	1710/1812	1830/1931
Static pressure.....(IN.WC)	-1.08	-1.08	-1.08
Cross sectional area (SQ.FT)	11.29	11.29	11.29
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	24.0	5.0	15.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	37.0	41.0	40.0
total.....(GRAMS)	61.0	46.0	55.0
Total particulate material..			
.....collected(grams)	0.0276	0.0152	0.0144
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.40	29.40	29.40
Avg. orif.pres.drop..(IN.WC)	1.53	1.66	1.56
Avg. gas meter temp..(DEF-F)	65.2	66.9	64.0
Volume through gas meter....			
at meter conditions...(CF)	41.01	42.84	41.44
standard conditions.(DSCF)	40.68	42.37	41.20
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.186	.186	.186
Avg.stack gas temp ..(DEG-F)	124	100	120
Volumetric flow rate.....			
actual.....(ACFM)	49610	49014	48924
dry standard.....(DSCFM)	41080	43067	41071
Isokinetic variation.....(%)	98.8	98.2	100.1
Particulate concentration...			
actual.....(GR/ACF)	0.00867	0.00486	0.00453
dry standard.....(GR/DSCF)	0.01047	0.00554	0.00539
Particle mass rate...(LB/HR)	3.69	2.04	1.90

Test No. 4
Fine Crusher Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	04-19-90	04-19-90	04-19-90
Time run start/end.....(HRS)	805/ 908	925/1025	1040/1141
Static pressure.....(IN.WC)	-0.36	-0.36	-0.36
Cross sectional area (SQ.FT)	5.50	5.50	5.50
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	18.0	14.0	16.0
total.....(GRAMS)	18.0	14.0	16.0
Total particulate material..			
.....collected(grams)	0.0200	0.0178	0.0143
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.08	29.08	29.08
Avg. orif.pres.drop..(IN.WC)	2.65	2.75	2.82
Avg. gas meter temp..(DEF-F)	88.8	94.1	95.3
Volume through gas meter....			
at meter conditions...(CF)	55.44	56.62	57.46
standard conditions.(DSCF)	52.20	52.82	53.50
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.250	.250	.250
Avg.stack gas temp ..(DEG-F)	66	65	66
Volumetric flow rate.....			
actual.....(ACFM)	14574	14777	14960
dry standard.....(DSCFM)	13972	14253	14370
Isokinetic variation.....(%)	100.5	99.7	100.1
Particulate concentration...			
actual.....(GR/ACF)	0.00566	0.00501	0.00396
dry standard.....(GR/DSCF)	0.00591	0.00520	0.00412
Particle mass rate...(LB/HR)	0.71	0.64	0.51

Test No. 1
Dry Cobber Stack

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	100.00
5	0.0223	0.00
10	0.0458	0.00
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00

Avg Opac 0.00 Avg OD 0.0000 Time average

Observer: W. Drake
Cert. Date: 10-18-89
Date of Observation: 4-18-90
Time of Observation: 0900/1000

Test No. 2
Multiclone Stack

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	100.00
5	0.0223	0.00
10	0.0458	0.00
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00

Avg Opac 0.00 Avg OD 0.0000 Time average

Observer: W. Drake
Cert. Date: 10-18-89
Date of Observation: 04-18-90
Time of Observation: 1100/1200

Test No. 3
Pelletizer Stack

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	56.25
5	0.0223	43.33
10	0.0458	0.00
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00

Avg Opac 2.17 Avg OD 0.0097 Time average

Observer: W. Drake
Cert. Date: 10-18-89
Date of Observation: 04-18-90
Time of Observation: 1400/1500

Test No. 4
Fine Crusher Stack

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	100.00
5	0.0223	0.00
10	0.0458	0.00
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00

Avg Opac 0.00 Avg OD 0.0000 Time average

Observer: W. Drake
Cert. Date: 10-18-89
Date of Observation: 04-18-90
Time of Observation: 1600/1700

APPENDIX A

RESULTS OF PRELIMINARY VOLUMETRIC FLOW RATE DETERMINATIONS

Test No. 1
Dry Cobber Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	04-17-90
Time of Determination.....(HRS)	1030
Barometric pressure.....(IN.HG)	29.4
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	62.25
Duct area.....(SQ.FT)	21.14
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1
Avg. gas temp.....(DEG-F)	67
Moisture content.....(% V/V)	0.61
Avg. linear velocity.....(FT/SEC)	56.6
Gas density.....(LB/ACF)	.07338
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	316129
Volumetric flow rate.....	
actual.....(ACFM)	71801
dry standard.....(DSCFM)	70079

Test No. 3
Pelletizer Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	04-18-90
Time of Determination.....(HRS)	1500
Barometric pressure.....(IN.HG)	29.4
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	45.5
Duct area.....(SQ.FT)	11.29
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.08
Avg. gas temp.....(DEG-F)	133
Moisture content.....(% V/V)	6.60
Avg. linear velocity.....(FT/SEC)	70.7
Gas density.....(LB/ACF)	.06373
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	183182
Volumetric flow rate.....	
actual.....(ACFM)	47906
dry standard.....(DSCFM)	39042

APPENDIX B

LOCATION OF TEST PORTS

Not provided at time of report

APPENDIX C

METHODS 2 - 5 FIELD DATA SHEETS - DRY COBBER STACK

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS / SILVER BAY

Source DRY COBBER

Test 1 Run 1 Date 4-17-90

Stack dimen. 62.25 IN.

Dry bulb _____ °F Wet bulb _____ °F

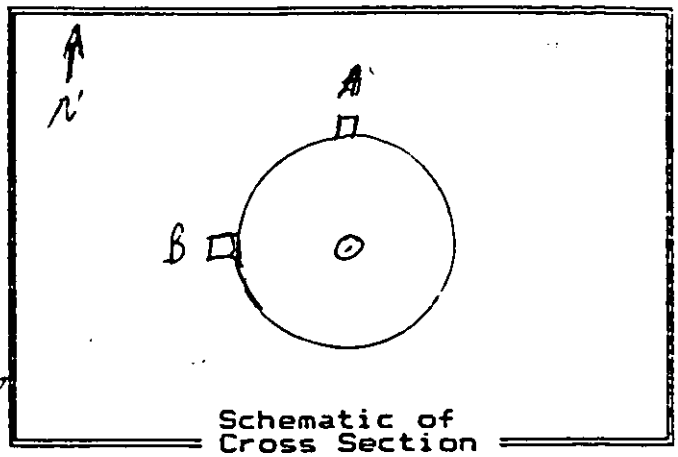
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.40 in Hg

Static pressure -1.00 in WC

Operators D. SMITH & M KASHER

Pitot No. 1846 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 3.25 in.		Time start: 1030 hrs	
A - 1	.021	1.31	4.56	.58	67
2	.067	4.17	7.42	.70	67
3	.118	7.35	10.60	.76	67
4	.177	11.02	14.27	.83	67
5	.250	15.56	18.81	.90	67
6	.356	22.16	25.41	.98	67
7	.644	40.09	43.34	1.05	67
8	.750	46.69	49.94	1.09	67
9	.823	51.23	54.48	1.20	67
10	.882	54.90	58.15	1.26	67
11	.933	58.08	61.33	1.30	67
12	.979	60.94	64.19	1.30	67
B - 1				.90	67
2				.98	67
3				1.05	67
4				1.09	67
5				1.08	67
6				1.08	67
7				1.03	67
8				1.02	67
9				1.03	67
10				1.01	67
11				.98	67
12				.88	67
				$\overline{\Delta P}$ = 1.00	

Temp. meas. tool & S/N: PDT - 3 DIGITAL T/C Time end: 1045 hrs

R or nothing= reg. manometer; S=1 expanded; E = electronic S-392.1

INTERPL LABORATORIES EPA METHOD 5 F. D DATA SHEET

Job CYPRUS / SILVER BAY
Source DRY COOLER
Date 4-17-90 Test 1 Run 1

Operators D. SMITH & M. KAEHLER
Meter Box No. 5 ΔH 1.85 IN WC
Calibrator coeff. 1.0007

Pitot No. PV-6 Cp .840
Bar. Press. 29.40 inHg H2O 1 x
Nozzle No. 2-3 Nozzle Dia .190 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xv/v)
	(1100)	(660.10)											
A - 12	2.5	661.85	1.16	1.62	1.84	2.9	67	← NO HEAT REQ'D →			63	61	20.9
11	5	663.59	1.15	1.61	3.60	2.9	67				65	62	20.9
10	7.5	665.31	1.10	1.55	5.31	2.9	66				66	62	20.9
9	10	667.02	1.08	1.52	7.02	2.9	66				67	63	20.9
8	12.5	668.72	1.05	1.48	8.71	2.9	66				67	63	20.9
7	15	670.37	1.00	1.41	0.35	2.8	66				68	64	20.9
6	17.5	672.01	1.02	1.44	2.01	2.8	67				68	64	20.9
5	20	673.65	.96	1.35	3.63	2.8	67				69	64	20.9
4	22.5	675.22	.90	1.27	5.19	2.6	67				69	65	20.9
3	25	676.69	.83	1.17	6.69	2.5	67				70	65	20.9
2	27.5	678.18	.82	1.16	8.19	2.4	67				70	65	20.9
1	30	679.62	.75	1.06	9.62	2.2	67				71	66	20.9
B - 12	32.5	681.03	.74	1.05	1.05	2.2	67				70	66	20.9
11	35	682.52	.82	1.16	2.54	2.4	67				71	66	20.9
10	37.5	684.04	.83	1.18	4.05	2.4	67				72	67	20.9
9	40	685.60	.88	1.25	5.61	2.5	67				73	68	20.9
8	42.5	687.18	.90	1.28	7.18	2.7	67				73	68	20.9
7	45	688.80	.95	1.35	8.80	2.8	67				73	68	20.9
6	47.5	690.50	1.06	1.51	0.51	2.9	67				74	69	20.9
5	50	692.23	1.08	1.54	2.24	2.9	67				74	69	20.9
4	52.5	693.97	1.08	1.54	3.97	2.9	67				74	69	20.9
3	55	695.68	1.06	1.51	5.68	2.9	67				75	70	20.9
2	57.5	697.35	1.00	1.43	7.35	2.8	67				75	70	20.9
1	60	698.96	.94	1.34	8.96	2.8	67				75	70	20.9
	(1202)												
	θ = 60	Vm = 38.86		ΔH = 1.37							Avg. = 68.2		

S-00370

INTERPL LABORATORIES EPA METHOD 5 F. D DATA SHEET

Job CYPRUS / SILVER BAY
Source DRY COBBER STACK
Date 4-17-90 Test 1 Run 2

Operators D.S., TH & M. KAEHLER
Meter Box No. 5 ΔH@ 1.85 IN WC
Gasmeter coeff. 1.0007

Pitot No. 17V-6 Cp .840
Bar. Press. 29.40 inHg H2O .6 %
Nozzle No. 2-3 Nozzle Dia .190 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1220)	(699.10)											
B - 12	2.5	700.51	.70	1.00	0.48	2.6	67	← NO HEAT REQ →			69	68	20.4
11	5	702.01	.83	1.18	2.00	2.9	67		↑		70	69	20.4
10	7.5	703.55	.85	1.22	3.53	3.0	67				72	69	20.9
9	10	705.07	.85	1.22	5.07	3.0	67				73	69	20.9
8	12.5	706.62	.87	1.25	6.62	3.0	68				73	70	20.9
7	15	708.25	.95	1.36	8.25	3.1	68				74	70	20.9
6	17.5	709.96	1.06	1.52	9.97	3.2	68				75	70	20.9
5	20	711.68	1.07	1.54	1.69	3.2	68				75	71	20.9
4	22.5	713.42	1.07	1.54	3.42	3.2	68				76	71	20.9
3	25	715.13	1.05	1.51	5.14	3.2	68				76	71	20.9
2	27.5	716.80	1.00	1.44	6.81	3.2	68				76	72	20.9
1	30	718.36	.85	1.22	8.36	2.9	68				76	72	20.9
A - 12	32.5	719.96	.90	1.30	9.95	3.0	68				75	72	20.9
11	35	721.67	1.05	1.51	1.66	3.2	68				76	72	20.9
10	37.5	723.28	.92	1.33	3.27	3.1	67				76	72	20.9
9	40	724.92	.95	1.37	4.91	3.1	66				76	72	20.9
8	42.5	726.51	.93	1.34	6.52	3.0	66				77	72	20.9
7	45	728.15	.95	1.37	8.16	3.0	66				77	73	20.9
6	47.5	729.90	1.08	1.56	9.91	3.3	66				77	73	20.9
5	50	731.63	1.05	1.52	1.63	3.3	66				77	72	20.9
4	52.5	733.30	.98	1.41	3.29	3.1	67				77	73	20.9
3	55	734.89	.88	1.27	4.87	3.0	67				77	73	20.9
2	57.5	736.35	.77	1.11	6.35	2.8	67				77	73	20.9
1	60	737.73	.68	0.98	7.73	2.5	66		↓		76	73	20.9
	(1324)												
	θ = 60	Vm = 38.63		ΔH = 1.34							Avg. = 73.2		

S-0037P

INTERPL LABORATORIES EPA METHOD 5 F D DATA SHEET

Job: CYPRUS / SILVER BAY
Source: DRY COBBER STACK
Date: 9-17-90 Test: 1 Run: 3

Operators: D. SMITH & M. KAEHLER
Meter Box No.: 5 ΔH: 1.55 IN WC
Gasmeter coeff.: 1.0007

Pitot No.: 17V-6 Cp: .840
Bar. Press.: 29.40 inHg H2O x
Nozzle No.: 2-3 Nozzle Dia: .190 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xv/v)
	(1340)	(737.85)											
A - 12	2.5	739.40	.88	1.26	9.41	2.6	67	← NO HEAT REQ'D →			69	68	20.9
11	5	740.96	.91	1.29	0.99	2.7	68				70	68	20.9
10	7.5	742.57	.90	1.28	2.57	2.8	68				70	68	20.9
9	10	744.18	.92	1.31	4.16	2.8	68				71	69	20.9
8	12.5	745.76	.93	1.33	5.76	2.8	68				72	70	20.9
7	15	747.37	.95	1.36	7.38	2.8	67				72	70	20.9
6	17.5	749.12	1.07	1.53	9.11	2.9	67				72	69	20.9
5	20	750.82	1.06	1.51	0.82	2.9	67				73	69	20.9
4	22.5	752.49	1.00	1.43	2.48	2.8	67				73	69	20.9
3	25	754.06	.90	1.29	4.06	2.6	67				73	69	20.9
2	27.5	755.58	.82	1.17	5.57	2.4	67				73	69	20.9
1	30	757.02	.75	1.07	7.02	2.2	67				72	68	20.9
B - 12	32.5	758.52	.82	1.17	8.52	2.4	67				71	68	20.9
11	35	760.05	.82	1.17	0.03	2.4	67				72	68	20.9
10	37.5	761.59	.88	1.26	1.59	2.6	67				72	68	20.9
9	40	763.18	.90	1.28	3.17	2.6	67				72	68	20.9
8	42.5	764.76	.93	1.33	4.77	2.7	67				72	68	20.9
7	45	766.42	.98	1.40	6.42	2.8	66				72	68	20.9
6	47.5	768.07	.97	1.39	8.06	2.8	66				72	68	20.9
5	50	769.65	.92	1.32	9.65	2.7	66				72	68	20.9
4	52.5	771.28	.96	1.38	1.28	2.8	65				72	68	20.9
3	55	772.92	.98	1.40	2.93	2.8	65				72	68	20.9
2	57.5	774.52	.91	1.30	4.52	2.6	65				72	68	20.9
1	60	776.06	.85	1.22	6.06	2.5	64				72	68	20.9
	(1442)												
	θ = 60	Vm = 38.21		ΔH = 1.31							Avg. = 70.1		

C-7

S-0037P

APPENDIX D

METHODS 2 - 5 FIELD DATA SHEETS - MULTICLONE STACK

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS / SILVER BAY

Source MULTICLONE STACK

Test 2 Run 1 Date 4-18-90

Stack dimen. 39.75 IN.

Dry bulb ____ °F Wet bulb ____ °F

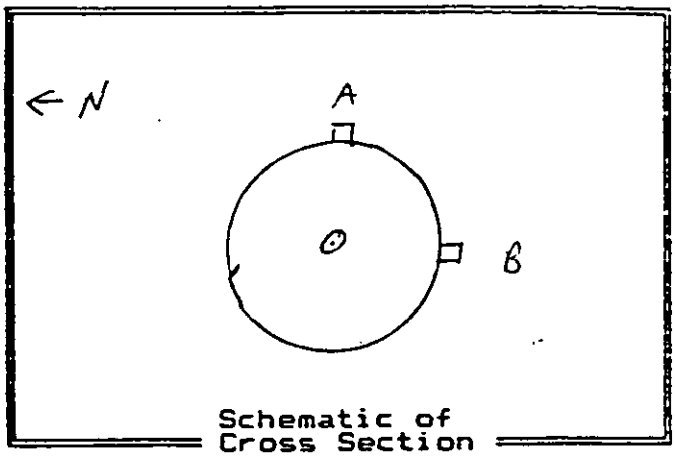
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.40 in Hg

Static pressure -.52 in WC

Operators D. SMITH & M. KAEHLER

Pitot No. 174-4 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length:	4.50 in.	Time start:	0745 hrs
B - 1	.021	1.00	5.50	.85	58
2	.067	2.66	7.16	.99	58
3	.118	4.69	9.19	1.06	58
4	.177	7.04	11.54	1.06	58
5	.250	9.94	14.44	1.05	58
6	.356	14.15	18.65	1.07	58
7	.644	25.60	30.10	1.07	58
8	.750	29.81	34.31	1.06	58
9	.823	32.71	37.21	1.07	58
10	.882	35.06	39.56	1.08	58
11	.933	37.09	41.59	1.09	58
12	.979	38.75	43.25	1.05	58
A - 1				.95	58
2				1.06	58
3				1.10	58
4				1.15	58
5				1.12	58
6				1.08	58
7				1.08	58
8				1.08	58
9				1.07	58
10				1.07	58
11				1.03	58
12				1.00	58

Temp. meas. tool & S/N: PDT-3 DIGITAL T/C Time end: 0800 hrs

R or nothing = reg. manometer; S = expanded; E = electronic

S-392.1

INTERP LABORATORIES EPA METHOD 5 F D DATA SHEET

Job CYPRUS / SILVER BAY
Source MULTICLONE STACK
Date 9-18-90 Test 2 Run 1

Operators D. SMITH & M. KAEHLER
Meter Box No. 5 ΔH@ 1.85 IN WC
Gasmeter coeff. 1.0007

Pitot No. 17V-4 Cp .840
Bar. Press. 29.40 inHg H2O .75 %
Nozzle No. 6-3 Nozzle Dia .186 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(0840)	(776.50)											
A - 12	2.5	777.98	.92	1.18	2.98	3.0	58	← NO HEAT REQ'D →			53	51	20.9
11	5	779.54	1.00	1.29	9.53	3.1	58				55	52	20.9
10	7.5	781.13	1.05	1.36	1.13	3.1	58				57	53	20.9
9	10	782.75	1.07	1.39	2.75	3.2	58				58	54	20.9
8	12.5	784.37	1.08	1.40	4.37	3.2	58				59	54	20.9
7	15	786.01	1.08	1.40	6.00	3.2	58				60	55	20.9
6	17.5	787.65	1.08	1.41	7.63	3.2	58				60	55	20.9
5	20	789.26	1.07	1.40	9.26	3.2	58				61	56	20.9
4	22.5	790.89	1.09	1.42	0.90	3.2	58				62	56	20.9
3	25	792.55	1.10	1.44	2.55	3.3	58				62	57	20.9
2	27.5	794.19	1.10	1.44	4.20	3.3	58				62	57	20.9
1	30	795.83	1.07	1.40	5.83	3.3	59				63	58	20.9
B - 12	32.5	797.40	.98	1.28	7.39	3.0	59				62	58	20.9
11	35	799.01	1.08	1.41	9.03	3.2	59				62	58	20.9
10	37.5	800.65	1.08	1.41	0.67	3.2	59				63	58	20.9
9	40	802.30	1.07	1.40	2.30	3.2	59				64	59	20.9
8	42.5	803.94	1.07	1.40	3.94	3.2	59				64	59	20.9
7	45	805.57	1.07	1.40	5.57	3.2	60				64	59	20.9
6	47.5	807.22	1.07	1.40	7.21	3.2	60				64	59	20.9
5	50	808.82	1.05	1.37	8.82	3.2	60				65	60	20.9
4	52.5	810.44	1.06	1.39	0.45	3.2	61				65	60	20.9
3	55	812.06	1.05	1.37	2.07	3.2	61				65	60	20.9
2	57.5	813.65	1.00	1.31	3.65	3.1	61				65	60	20.9
1	60	815.02	.75	0.98	5.02	2.7	61				65	60	20.9
	(0941)												
	θ = 60	Vm = 38.52		ΔH = 1.36							Avg. = 59.3		

S-00370

INTERPD LABORATORIES EPA METHOD 5 FI J DATA SHEET

Job CYPRUS / SILVER BAY
Source MULTICLONE STACK
Date 4-18-90 Test 2 Run 2

Operators D. SMITH & M. KAEHLER
Meter Box No. 5 ΔH@ 1.85 IN WC
Barometer coeff. 1.0007

Pitot No. PV-4 Cp .840
Bar. Press. 29.40 inHg H2O / x
Nozzle No. 6-5 Nozzle Dia .186 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xv/v)
	(1000)	(815.15)											
B - 12	2.5	816.75	1.05	1.36	6.75	2.8	61	← NO	HEAT	REQ'D →	61	59	20.9
11	5	818.40	1.10	1.42	8.40	2.9	62				62	59	20.9
10	7.5	820.04	1.09	1.41	0.04	2.9	62				62	59	20.9
9	10	821.66	1.07	1.39	1.66	2.9	62				63	59	20.9
8	12.5	823.30	1.07	1.39	3.28	2.9	62				63	59	20.9
7	15	824.93	1.08	1.40	4.92	2.9	62				63	59	20.9
6	17.5	826.54	1.07	1.39	6.54	2.9	62				64	59	20.9
5	20	828.17	1.07	1.39	8.17	2.9	62				64	59	20.9
4	22.5	829.80	1.07	1.40	9.80	2.9	60				64	59	20.9
3	25	831.43	1.07	1.40	1.43	2.9	60				64	59	20.9
2	27.5	832.99	.98	1.28	2.99	2.8	60				64	60	20.9
1	30	834.38	.77	1.00	4.38	2.2	60				64	60	20.9
A - 12	32.5	835.93	.95	1.24	5.91	2.6	60				63	59	20.9
11	35	837.49	1.00	1.30	7.49	2.7	60				64	60	20.9
10	37.5	839.12	1.07	1.40	9.12	2.8	59				65	60	20.9
9	40	840.75	1.07	1.40	0.76	2.8	59				66	61	20.9
8	42.5	842.39	1.08	1.42	2.40	2.9	59				67	62	20.9
7	45	844.05	1.08	1.42	4.05	2.9	59				68	62	20.9
6	47.5	845.72	1.10	1.45	5.72	2.9	59				68	62	20.9
5	50	847.37	1.09	1.43	7.37	2.9	59				68	62	20.9
4	52.5	849.02	1.09	1.43	9.03	2.9	59				68	63	20.9
3	55	850.69	1.09	1.43	0.69	2.9	59				69	63	20.9
2	57.5	852.30	1.03	1.36	2.30	2.8	59				69	63	20.9
1	60	853.68	.75	0.99	3.68	2.2	59		↓		69	64	20.9
	(1102)												
	θ = 60	Vm = 38.53		ΔH = 1.35							Avg. = 62.7		

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS / SILVER BAY

Source PELLITIZER STACK

Test 3 Run 1 Date 4-18-90

Stack dimen. 45.5 IN.

Dry bulb 128 °F Wet bulb 105 °F

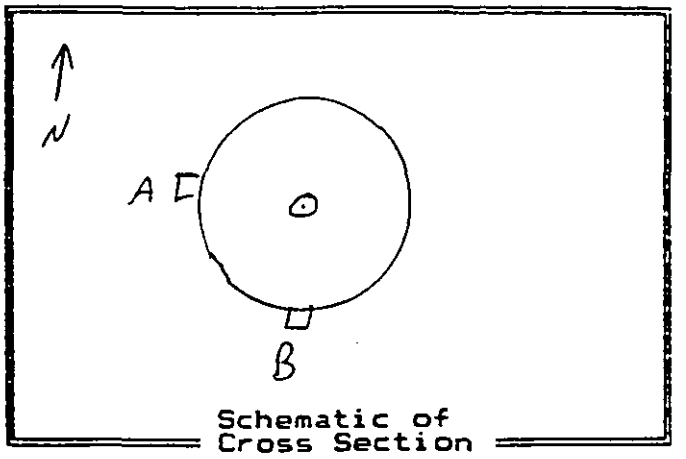
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.40 in Hg

Static pressure -1.08 in WC

Operators D. SMITH & M. KAEHLER

Pitot No. 17V-5 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 3.5 in.		Time start: 1530 hrs	
B - 1	.021	1.00	4.500	1.20	137
2	.067	3.05	6.55	1.30	137
3	.118	5.37	8.87	1.45	136
4	.177	8.05	11.55	1.45	136
5	.250	11.38	14.88	1.45	136
6	.356	16.20	19.70	1.45	135
7	.644	29.30	32.80	1.55	133
8	.750	34.13	37.63	1.55	134
9	.823	37.45	40.95	1.50	134
10	.882	40.13	43.63	1.45	132
11	.933	42.45	45.95	1.30	132
12	.979	44.50	48.00	1.10	132
A - 1				1.20	133
2				1.40	131
3				1.45	131
4				1.50	132
5				1.50	132
6				1.55	130
7				1.60	130
8				1.60	129
9				1.55	128
10				1.45	127
11				1.40	128
12				1.25	128

Temp. meas. tool & S/N: PDT-3 DIGITAL T/C | Time end: hrs

R or nothing= reg. manometer; S=1 expanded; E = electronic S-392.1

F-0

INTERPL LABORATORIES EPA METHOD 5 F D DATA SHEET

Job CYPRUS / SILVER BAY
Source BELLITIZER STACK
Date 4-18-90 Test 3 Run 1

Operators D SMITH & M. KAEHLER
Meter Box No. 5 ^H@ 1.85 IN WC
Gasmeter coeff. 1.0007

Pitot No. 174-5 Cp .840
Bar. Press. 29.40 inHg H2O 8 x
Nozzle No. 6-3 Nozzle Dia .186 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Des. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xv/v)
	(1545)	(892.65)											
B - 12	2.5	894.18	1.20	1.21	4.17	2.8	135	← NO	HEAT	REQ'D →	61	61	20.9
11	5	895.80	1.40	1.43	5.81	3.0	128				63	62	20.9
10	7.5	897.46	1.45	1.48	7.50	3.0	129				64	62	20.9
9	10	899.18	1.50	1.52	9.20	3.0	134				64	62	20.9
8	12.5	900.96	1.60	1.62	0.96	3.0	136				65	62	20.9
7	15	902.74	1.60	1.63	2.72	3.1	133				65	63	20.9
6	17.5	904.46	1.55	1.58	4.46	3.0	131				66	63	20.9
5	20	906.19	1.50	1.53	6.17	3.0	134				66	63	20.9
4	22.5	907.86	1.45	1.47	7.84	3.0	137				67	64	20.9
3	25	909.49	1.40	1.42	9.49	2.9	137				67	64	20.9
2	27.5	911.06	1.25	1.28	1.06	2.8	131				67	64	20.9
1	30	912.45	.97	1.00	2.45	2.4	128				67	64	20.9
A - 12	32.5	914.03	1.30	1.33	4.04	3.0	132				67	64	20.9
11	35	915.74	1.45	1.46	5.72	3.0	140				67	64	20.9
10	37.5	917.45	1.50	1.51	7.42	3.0	140				68	64	20.9
9	40	919.11	1.45	1.47	9.10	3.0	139				68	64	20.9
8	42.5	920.81	1.50	1.53	0.81	3.0	134				68	65	20.9
7	45	922.59	1.60	1.66	2.60	3.1	123				68	65	20.9
6	47.5	924.46	1.75	1.84	4.48	3.4	115				68	65	20.9
5	50	926.41	1.80	1.96	6.42	3.6	96				69	65	20.9
4	52.5	928.36	1.80	1.97	8.37	3.7	93				69	65	20.9
3	55	930.27	1.70	1.88	0.27	3.5	90				69	65	20.9
2	57.5	932.06	1.50	1.66	2.06	3.2	87				69	66	20.9
1	60	933.66	1.20	1.34	3.66	2.9	85				69	66	20.9
	(1650)												
	θ = 60	Vm = 41.01		^H = 1.53							Avg. = 65.2		

S-0037P

INTERF L LABORATORIES EPA METHOD 5 I LD DATA SHEET

Job CYPRUS / SILVER BAY
Source PELLITIZER STACK
Date 4-18-90 Test 3 Run 2

Operators D. SMITH & M. KAEHLER
Meter Box No. 5 ΔH@ 1.85 IN WC
Gasmeter coeff. 1.0007

Pitot No. 174-5 Cp .840
Bar. Press. 29.40 inHg H2O 7 %
Nozzle No. 6-3 Nozzle Dia .186 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1710)	(933.80)											
A - 12	2.5	935.57	1.50	1.67	5.58	3.8	93				65	64	20.9
11	5	937.36	1.55	1.68	7.38	3.8	106				66	64	20.9
10	7.5	939.17	1.55	1.67	9.17	3.9	110				66	64	20.9
9	10	940.97	1.55	1.70	0.97	4.0	102				67	65	20.9
8	12.5	942.79	1.55	1.72	2.79	4.0	96				68	65	20.9
7	15	944.63	1.60	1.78	4.63	4.0	95				68	65	20.9
6	17.5	946.53	1.70	1.89	6.54	4.1	95				68	65	20.9
5	20	948.41	1.65	1.82	8.41	4.0	98				69	65	20.9
4	22.5	950.30	1.65	1.81	0.28	4.0	102				69	66	20.9
3	25	952.13	1.60	1.78	2.13	4.0	95				69	66	20.9
2	27.5	953.87	1.40	1.56	3.86	3.8	94				69	66	20.9
1	30	955.47	1.20	1.34	5.47	3.6	94				69	66	20.9
B - 12	32.5	957.11	1.25	1.39	7.11	3.6	95				68	66	20.9
11	35	958.85	1.40	1.56	8.84	3.8	95				69	66	20.9
10	37.5	960.65	1.50	1.67	0.63	3.9	96				69	66	20.9
9	40	962.46	1.60	1.78	2.48	4.0	96				69	66	20.9
8	42.5	964.33	1.65	1.83	4.36	4.1	96				70	66	20.9
7	45	966.25	1.65	1.84	6.24	4.1	96				70	66	20.9
6	47.5	968.10	1.65	1.83	8.11	4.1	97				69	66	20.9
5	50	969.94	1.60	1.72	9.94	4.0	114				69	66	20.9
4	52.5	971.70	1.55	1.67	1.73	4.0	114				69	66	20.9
3	55	973.46	1.45	1.56	3.46	3.9	113				69	66	20.9
2	57.5	975.13	1.30	1.42	5.12	3.6	106				69	66	20.9
1	60	976.64	1.10	1.20	6.64	3.2	107				69	66	20.9
	(1812)												
	θ = 60	Vm = 42.84		ΔH = 1.66							Avg. = 66.9		

S-0037R

INTERPL . LABORATORIES EPA METHOD 5 F. .D DATA SHEET

Job CYPRUS / SILVER BAY
Source FELLITIZER STACK
Date 4-18-90 Test 3 Run 3

Operators D.SMITH & M. KAEHLER
Meter Box No. 5 ΔH@ 1.85 IN WC
Gasmeter coeff. 1.0007

Pitot No. 174-5 Cp .840
Bar. Press. 29.40 inHg H2O 5 %
Nozzle No. 6-3 Nozzle Dia .186 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1830)	976.70											
A - 12	2.5	978.32	1.20	1.37	8.32	2.8	100				62	62	20.9
11	5	980.03	1.40	1.55	0.04	3.0	113				63	62	20.9
10	7.5	981.78	1.45	1.60	1.78	3.0	116				64	62	20.9
9	10	983.55	1.55	1.70	3.58	3.0	119				65	63	20.9
8	12.5	985.35	1.55	1.68	5.37	3.0	118				65	63	20.9
7	15	987.18	1.60	1.72	7.19	3.1	120				65	63	20.9
6	17.5	988.96	1.55	1.66	8.97	3.1	124				66	63	20.9
5	20	990.74	1.55	1.65	0.74	3.1	127				66	63	20.9
4	22.5	992.50	1.50	1.60	2.50	3.0	126				66	63	20.9
3	25	994.19	1.40	1.50	4.19	3.0	125				66	63	20.9
2	27.5	995.85	1.30	1.41	5.83	3.0	118				66	63	20.9
1	30	997.35	1.10	1.20	7.35	2.8	113				66	63	20.9
B - 12	32.5	999.01	1.35	1.45	9.01	3.0	123				65	62	20.9
11	35	1000.73	1.45	1.54	0.73	3.0	127				66	63	20.9
10	37.5	1002.48	1.50	1.60	2.48	3.0	127				66	63	20.9
9	40	1004.23	1.50	1.60	4.23	3.0	126				66	63	20.9
8	42.5	1005.95	1.45	1.55	5.95	3.0	126				66	63	20.9
7	45	1007.70	1.50	1.60	7.70	3.0	128				66	63	20.9
6	47.5	1009.51	1.60	1.71	9.51	3.1	126				66	63	20.9
5	50	1011.34	1.65	1.76	1.34	3.2	125				67	63	20.9
4	52.5	1013.17	1.60	1.72	3.16	3.1	123				66	63	20.9
3	55	1014.93	1.50	1.62	4.92	3.0	118				66	62	20.9
2	57.5	1016.62	1.35	1.50	6.62	3.0	101				65	62	20.9
1	60	1018.14	1.10	1.21	8.14		108				65	62	20.9
	(1931)												
	θ = 60	Vm = 41.44		ΔH = 1.56							Avg. = 64.0		

S-0037R

APPENDIX F

METHODS 2 - 5 FIELD DATA SHEETS - FINE CRUSHER STACK

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS / SILVER BAY

Source FINE CRUSHER STACK

Test 4 Run 1 Date 4-19-90

Stack dimen. 31.75 IN.

Dry bulb ____ °F Wet bulb ____ °F

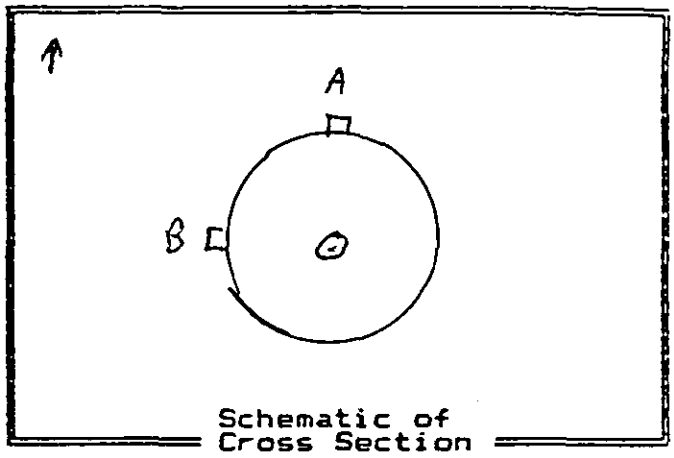
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.08 in Hg

Static pressure -.36 in WC

Operators D. SMITH & M. KAEHLER

Pitot No. 12V-5 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 3.25 in.		Time start: 0725 hrs	
A - 1	.044	1.40	6.65	.52	80
2	.146	4.64	7.89	.69	80
3	.296	9.40	12.65	.74	80
4	.704	22.35	25.60	.65	80
5	.854	27.11	30.36	.62	80
6	.956	30.35	33.60	.60	80
B - 1				.46	80
2				.64	80
3				.68	80
4				.67	80
5				.67	80
6				.65	80
Temp. meas. tool & S/N: PDT-3 DIGITAL T/C				Time end: 0735 hrs	

R or nothing= reg. manometer; S=1 expanded; E = electronic S-392.1

INTERF . LABORATORIES EPA METHOD 5 F LD DATA SHEET

Job CYPRUS / SILVER BAY
Source FINE CRUSHER STACK
Date 4-19-90 Test 4 Run 1

Operators D. SMITH & M. KAEHLER
Meter Box No. 5 ΔH@ 1.85 IN WC
Gasmeter coeff. 1.0007

Pitot No. 17V-5 Cp .840
Bar. Press. 29.08 inHg H2O 1 %
Nozzle No. 1-4 Nozzle Dia .250 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xv/v)
	(0805)	(18.85)											
B - 6	5	23.50	.65	2.80	3.54	4.9	68	← NO HEAT REQ'D →			83	79	20.9
5	10	28.31	.66	2.86	8.31	5.0	68				87	80	20.9
4	15	33.02	.64	2.80	3.03	5.0	67				90	82	20.9
3	20	37.72	.62	2.73	7.71	5.0	66				91	83	20.9
2	25	42.29	.58	2.56	2.25	4.8	66				93	84	20.9
1	30	46.31	.45	1.99	6.26	4.0	66				94	85	20.9
A - 6	35	50.88	.60	2.66	0.89	4.9	66				94	86	20.9
5	40	55.53	.59	2.61	5.49	4.9	66				95	87	20.9
4	45	60.13	.60	2.66	0.13	4.9	66				96	87	20.9
3	50	65.00	.67	2.98	5.04	5.1	65				96	88	20.9
2	55	69.88	.65	2.90	9.89	5.1	65				97	89	20.9
1	60	74.29	.50	2.23	4.15	4.2	66				97	89	20.9
	(0908)												
	θ = 60	Vm = 55.44		ΔH = 2.65							Avg. = 88.8		

S-0037R

INTERNAL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: CYPRUS / SILVER BAY
Source: FINE CRUSHER STACK
Date: 4-19-90 Test: 4 Run: 2

Operators: D. SMITH & M. KAEHLER
Meter Box No.: 5 ΔH@: 1.85 IN WC
Computer coeff.: 1.0007

Pitot No.: 174-5 Cp: .840
Bar. Press.: 29.08 inHg H2O: 1.5 %
Nozzle No.: 7-4 Nozzle Dia: .250 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(0925)	(74.45)											
A - 6	5	79.03	.59	2.59	9.02	3.1	65	← NO	HEAT	REQ'D →	91	87	20.9
5	10	83.58	.58	2.55	3.56	3.1	65				94	88	20.9
4	15	88.24	.61	2.69	8.22	3.2	65				96	89	20.9
3	20	93.13	.68	3.01	3.16	3.5	65				97	89	20.9
2	25	97.98	.65	2.88	7.99	3.3	65				98	90	20.9
1	30	102.32	.52	2.31	2.33	3.0	65				99	91	20.9
B - 6	35	107.21	.66	2.93	7.22	3.2	65				99	91	20.9
5	40	112.15	.68	3.02	2.18	3.4	65				99	91	20.9
4	45	117.12	.67	2.98	7.10	3.4	65				100	92	20.9
3	50	122.10	.68	3.02	2.07	3.4	65				100	92	20.9
2	55	126.93	.65	2.89	6.93	3.2	65				100	93	20.9
1	60	131.07	.47	2.10	1.08	2.9	65				100	93	20.9
	(1025)												
	θ = 60	Vm = 56.62		ΔH = 2.75							Avg. = 94.1		

S-0037R

INTERP LABORATORIES EPA METHOD 5 F LD DATA SHEET

Job: CYPRUS / SILVER BAY
Source: FINE CRUSHER STACK
Date: 4-19-90 Test: 4 Run: 3

Operators: D. SMITH & M. KAEHLER
Meter Box No.: 5 ΔH: 1.85 IN WC
Counter coeff.: 1.0007

Pitot No.: 17V-5 Cp: .840
Bar. Press.: 29.08 inHg H2O: 1.25
Nozzle No.: 2-4 Nozzle Dia: .250 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Obs. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1040)	(131.20)											
B - 6	5	136.09	.67	2.98	6.12	4.5	65	← NO	HEAT	REQ'D →	92	90	20.9
5	10	141.09	.69	3.05	1.09	4.8	66				95	90	20.9
4	15	145.96	.67	2.97	5.99	4.6	66				98	91	20.9
3	20	150.96	.68	3.02	0.96	4.8	66				98	92	20.9
2	25	155.68	.62	2.76	5.70	4.2	66				99	92	20.9
1	30	159.92	.48	2.14	9.88	3.8	66				99	92	20.9
A - 6	35	164.52	.60	2.67	4.56	4.1	66				98	92	20.9
5	40	169.18	.59	2.62	9.18	4.1	67				100	93	20.9
4	45	173.98	.63	2.81	3.97	4.2	67				100	93	20.9
3	50	179.02	.71	3.16	9.05	4.8	67				101	93	20.9
2	55	184.10	.70	3.12	4.10	4.8	67				101	94	20.9
1	60	188.66	.56	2.50	8.63	4.0	67				102	94	20.9
	(1141)												
	θ = 60	Vm = 57.46		ΔH = 2.82							Avg. = 95.3		

APPENDIX G

METHOD 9 FIELD DATA SHEETS

Interpoll Inc.
(612)786-6020

Visible Emissions Form

SOURCE NAME	Cyprus Northshore Mining
ADDRESS	
CITY	Silver Bay
STATE	MN.
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Dry Cobber
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT START	Stack outlet
DESCRIBE EMISSION POINT STOP	Stack outlet
HEIGHT ABOVE GROUND LEVEL START	140'
HEIGHT ABOVE GROUND LEVEL STOP	140'
HEIGHT RELATIVE TO OBSERVER START	25'
HEIGHT RELATIVE TO OBSERVER STOP	25'
DISTANCE FROM OBSERVER START	75'
DISTANCE FROM OBSERVER STOP	75'
DIRECTION FROM OBSERVER START	NW
DIRECTION FROM OBSERVER STOP	NW
DESCRIBE EMISSIONS START	None
DESCRIBE EMISSIONS STOP	None
EMISSION COLOR START	Clear
EMISSION COLOR STOP	Clear
PLUME TYPE. CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☒ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	One diameter above stack outlet
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	one diameter above stack outlet
DESCRIBE BACKGROUND START	Blue Sky
DESCRIBE BACKGROUND STOP	Blue Sky
BACKGROUND COLOR START	Blue
BACKGROUND COLOR STOP	Blue
SKY CONDITIONS START	Clear
SKY CONDITIONS STOP	Clear
WIND SPEED START	15
WIND SPEED STOP	15
WIND DIRECTION START	SSW
WIND DIRECTION STOP	SSW
AMBIENT TEMP. START	45
AMBIENT TEMP. STOP	48
WET BULB TEMP.	
RH,percent	

OBSERVATION DATE 4-18-90 START TIME 0900 STOP TIME 1000

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD

NUMBER OF READINGS ABOVE % WERE

RANGE OF OPACITY READINGS MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT) William J. Drake

OBSERVER'S SIGNATURE William J. Drake DATE 4-18-90

ORGANIZATION Interpoll Laboratories

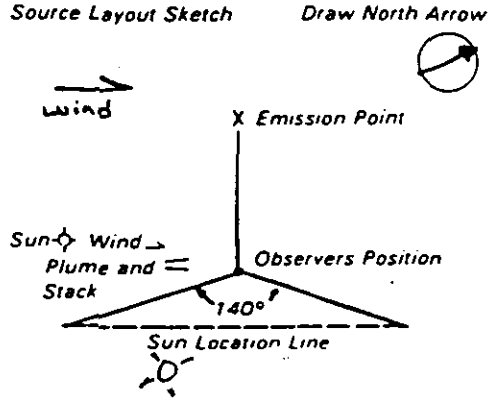
CERTIFIED BY MPCA DATE 10-18-89

VERIFIED BY DATE

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE DATE

Source Layout Sketch



S-0079R

Interpoll Laboratories
(612)786-6020

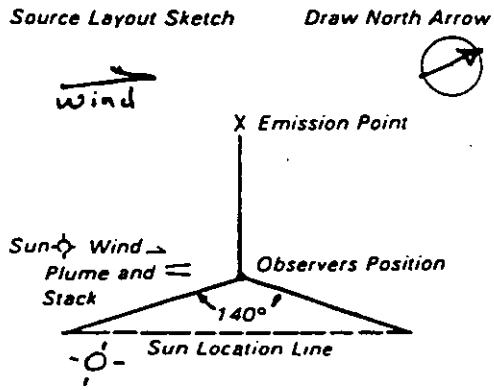
Visible Emissions Form

SOURCE NAME	Cyprus Northshore Mining
ADDRESS	
CITY	Silver Bay
STATE	MIN.
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Concentrator
OPERATING MODE	
CONTROL EQUIPMENT	Multiclone
OPERATING MODE	
DESCRIBE EMISSION POINT START	Stack outlet
DESCRIBE EMISSION POINT STOP	Stack outlet
HEIGHT ABOVE GROUND LEVEL START	120'
HEIGHT ABOVE GROUND LEVEL STOP	120'
HEIGHT RELATIVE TO OBSERVER START	30'
HEIGHT RELATIVE TO OBSERVER STOP	30'
DISTANCE FROM OBSERVER START	90'
DISTANCE FROM OBSERVER STOP	90'
DIRECTION FROM OBSERVER START	NW
DIRECTION FROM OBSERVER STOP	NW
DESCRIBE EMISSIONS START	None
DESCRIBE EMISSIONS STOP	None
EMISSION COLOR START	clear
EMISSION COLOR STOP	clear
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☒ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	one diameter above stack outlet
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	one diameter above stack outlet
DESCRIBE BACKGROUND START	Blue Sky
DESCRIBE BACKGROUND STOP	Blue Sky
BACKGROUND COLOR START	Blue
BACKGROUND COLOR STOP	Blue
SKY CONDITIONS START	Clear
SKY CONDITIONS STOP	Clear
WIND SPEED START	10-15
WIND SPEED STOP	10-15
WIND DIRECTION START	SSW
WIND DIRECTION STOP	SSW
AMBIENT TEMP. START	50
AMBIENT TEMP. STOP	53
WET BULB TEMP.	
RH, percent	

OBSERVATION DATE	START TIME	STOP TIME
4-18-90	1100	1200

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

Source Layout Sketch — Draw North Arrow



AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT)	William J. Drake
OBSERVER'S SIGNATURE	William J. Drake
DATE	4-18-90
ORGANIZATION	Interpoll Laboratories
CERTIFIED BY	MPCA
DATE	10-18-89
VERIFIED BY	
DATE	
COMMENTS	
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE	
TITLE	
DATE	

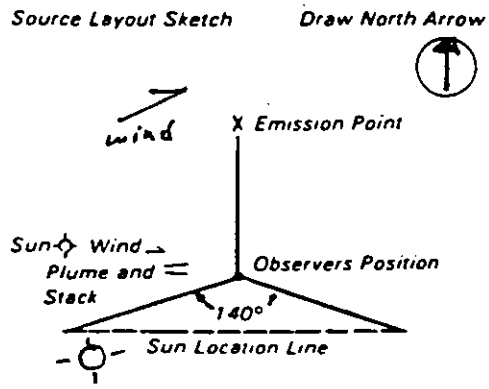
S-0079R

Interpoll Laboratories
(612)786-6020

Visible Emissions Form

SOURCE NAME	Cyprus Northshore Mining
ADDRESS	
CITY	Silver Bay
STATE	MN
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Pelletizer
OPERATING MODE	
CONTROL EQUIPMENT	Wet Scrubber
OPERATING MODE	
DESCRIBE EMISSION POINT START	stack outlet
DESCRIBE EMISSION POINT STOP	stack outlet
HEIGHT ABOVE GROUND LEVEL START	200'
HEIGHT ABOVE GROUND LEVEL STOP	200'
HEIGHT RELATIVE TO OBSERVER START	15'
HEIGHT RELATIVE TO OBSERVER STOP	15'
DISTANCE FROM OBSERVER START	50'
DISTANCE FROM OBSERVER STOP	50'
DIRECTION FROM OBSERVER START	N
DIRECTION FROM OBSERVER STOP	N
DESCRIBE EMISSIONS START	None
DESCRIBE EMISSIONS STOP	Lt Grey
EMISSION COLOR START	Clear
EMISSION COLOR STOP	Lt Grey
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☒ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	one diameter above stack outlet
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	one diameter above stack outlet
DESCRIBE BACKGROUND START	Blue Sky
DESCRIBE BACKGROUND STOP	Blue Sky
BACKGROUND COLOR START	Blue
BACKGROUND COLOR STOP	Blue
SKY CONDITIONS START	Clear
SKY CONDITIONS STOP	Clear
WIND SPEED START	15
WIND SPEED STOP	15
WIND DIRECTION START	SW
WIND DIRECTION STOP	SW
AMBIENT TEMP START	52
AMBIENT TEMP STOP	52
WET BULB TEMP	
RH.percent	

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
4-18-90	1400	1500

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	5	0	31	5	0	0	5
2	5	5	0	5	32	0	0	0	0
3	5	5	0	5	33	0	0	5	0
4	0	0	0	5	34	5	0	0	0
5	0	0	5	5	35	5	5	5	0
6	5	5	5	5	36	0	5	5	0
7	5	0	0	5	37	0	0	5	0
8	5	0	5	0	38	5	5	0	5
9	0	0	5	5	39	0	0	5	5
10	5	5	0	0	40	5	5	0	0
11	0	0	0	0	41	0	0	0	0
12	5	5	0	5	42	5	5	0	5
13	0	5	0	5	43	0	0	5	0
14	5	5	0	0	44	5	0	5	5
15	0	0	5	0	45	0	0	0	5
16	0	0	0	5	46	0	5	0	0
17	5	5	0	5	47	0	5	5	0
18	0	0	5	0	48	0	0	0	0
19	5	0	0	5	49	0	5	0	0
20	0	0	0	0	50	0	0	5	5
21	5	5	0	5	51	0	5	0	0
22	0	5	5	0	52	5	5	5	0
23	0	5	0	0	53	0	0	5	5
24	5	5	5	0	54	0	0	0	0
25	0	5	0	0	55	5	0	0	5
26	0	0	0	0	56	0	0	5	5
27	5	0	5	0	57	5	5	0	0
28	5	5	0	5	58	5	0	0	0
29	5	5	5	5	59	0	5	0	0
30	5	0	5	0	60	5	0	0	5

AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT)	William J. Drake
OBSERVER'S SIGNATURE	William J. Drake
DATE	4-18-90
ORGANIZATION	Interpoll Laboratories
CERTIFIED BY	MPCA
DATE	10-18-89
VERIFIED BY	
DATE	

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE
DATE

S-0079R

Interpoll Laboratories
(612)786-6020

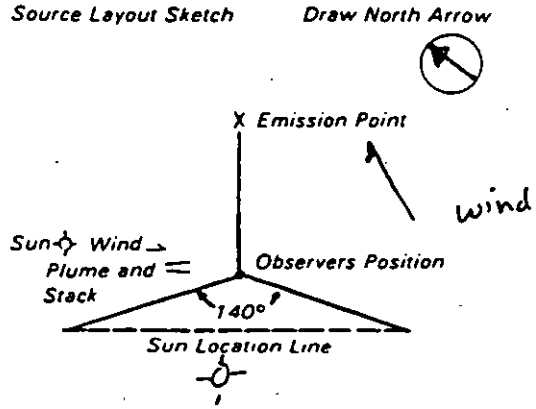
Visible Emissions Form

SOURCE NAME	Cyprus Northshore Mining
ADDRESS	
CITY	Silver Bay
STATE	MN.
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Fine Crusher
OPERATING MODE	
CONTROL EQUIPMENT	Baghouse
OPERATING MODE	
DESCRIBE EMISSION POINT START	Stack outlet
DESCRIBE EMISSION POINT STOP	Stack Outlet
HEIGHT ABOVE GROUND LEVEL START	150'
HEIGHT ABOVE GROUND LEVEL STOP	150'
HEIGHT RELATIVE TO OBSERVER START	10'
HEIGHT RELATIVE TO OBSERVER STOP	10'
DISTANCE FROM OBSERVER START	30'
DISTANCE FROM OBSERVER STOP	30'
DIRECTION FROM OBSERVER START	NE
DIRECTION FROM OBSERVER STOP	NE
DESCRIBE EMISSIONS START	None
DESCRIBE EMISSIONS STOP	None
EMISSION COLOR START	Clear
EMISSION COLOR STOP	clear
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☒ YES ☐	
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	one diameter above stack outlet
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	one diameter above stack outlet
DESCRIBE BACKGROUND START	Blue sky
DESCRIBE BACKGROUND STOP	Blue sky
BACKGROUND COLOR START	Blue
BACKGROUND COLOR STOP	Blue
SKY CONDITIONS START	Clear
SKY CONDITIONS STOP	clear
WIND SPEED START	15
WIND SPEED STOP	15
WIND DIRECTION START	SSW
WIND DIRECTION STOP	SSW
AMBIENT TEMP. START	50
AMBIENT TEMP. STOP	50
WET BULB TEMP.	
RH.percent	

OBSERVATION DATE 4-18-90 START TIME 1600 STOP TIME 1700

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

Source Layout Sketch — Draw North Arrow



AVERAGE OPACITY FOR HIGHEST PERIOD

NUMBER OF READINGS ABOVE % WERE

RANGE OF OPACITY READINGS MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT) William J. Drake

COMMENTS

OBSERVER'S SIGNATURE William J. Drake DATE 4-18-90

ORGANIZATION Interpoll Laboratories

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE

CERTIFIED BY MPCA DATE 10-18-89

TITLE DATE

VERIFIED BY DATE

S-0079R

MINNESOTA POLLUTION CONTROL AGENCY

AIR POLLUTION CONTROL ASSOCIATION

APCA The Association Dedicated to Air Pollution Control and Hazardous Waste Management FOUNDED IN 1907

This is to certify that,

Bill Drake

attended and fulfilled the requirements of the

Visible Emission Evaluation Re-Certification Course

offered by

The Air & Waste Management Association
Upper Midwest Section

In conjunction with the

The Minnesota Pollution Control Agency
Division of Air Quality

on

October 18, 1989

During the course of the test an average deviation of less than 7.5% for a set of 25 white smoke and a set of 25 black smoke was maintained and none of the readings deviated by 20% or more.

By achieving the above accuracy, certification as a "Smoke Reader" is granted for a period of six months from the date of the test.

Scott E. Parr

SCOTT E. PARR
Instructor
Visible Emissions Program
MPCA, DAQ

Certificate Number 65-31

Interpoll Laboratories
(612) 786-6020

Chain of Custody
Sample Deposition Sheet

Job CYPRUS / SILVER BAY
Team Leader DWAYNE A. SMITH
Date Submitted 4-19-90
Test No. 1

Source DRY COBBER
Test Site STACK
Date of Test 4-17-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
4	Probe Wash: ☒ Acetone ☐ D.I. Water	☒ As per EPA M-5 ☐ Other	1 BLANK
4	Filter: ☒ 4" G.F. ☐ S.S. Thimble ☐ 2.5" G.F. ☐ 47 mm G.F.	☒ As per EPA M-5 ☐ As per EPA M-17 ☐ Other	1 BLANK
—	Impinger Catch: ☐ D.I. Water ☐ 3% H_2O_2 ☐ 4M5 Hg Only ☐ 4M5 Metals ☐ 1.0 N NaOH ☐ Other	☐ MN Protocol ☐ WI Protocol ☐ EPA M-6 or 8 ☐ Acid Gases ☐ Formaldehyde ☐ Metals ☐ Other	
—	Integrated Gas sample	☐ As per EPA M-3 ☐ As per EPA M-10 ☐ Other	AMBIENT AIR
—	Oxides of Nitrogen (NO_x)	☐ As per EPA M-7A ☐ Other	Date Time (HRS)
—	☐ Fuel Sample ☐ Aggregate	☐ Attached fuel Form #S-0163RRR	
—	Particle Size	☐ X-Ray Sedigraph ☐ Bahco Method ☐ Other	
—	Audit Samples ☐ Sulfur Dioxide ☐ Oxides of Nit. ☐ Other	☐ As per EPA M-6 ☐ As per EPA M-7A ☐ Other	

Source Information

1) Type of Source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☐ Dryer ☒ Other DRY COBBER VENT BAGHOUSE OUTLET
2) Fuel: ☐ Coal ☐ Wood ☐ Gas ☐ Oil ☐ RDF ☒ Other AMBIENT AIR
3) Is sample combustible? ☒ No ☐ Yes
4) Does sample need special handling? ☒ No ☐ Yes If yes, explain

S-278RRRR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: Cyprus
Team Leader: D S
Date Submitted: 4-19-90
Test No.: 1
Date of Analysis: 4-20-90
Transport Leakage: [X] None [ ] _____ ml

Source: Dry Cobber
Test Site: Stack
Date of Test: 4-17-90
No. of Runs Completed: 3
Technician: R. Colon
Solvent: acetone

0	Test 1 Run 0 Field Blank Log Number 9385 -01 Vol. of Solvent 80 ml *Solvent Residue 1.25 ug/ml	Dish No. 10 Dish Tare Wt. 48.2554 g Dish+Sample Wt. 48.2555 g Sample Wt. 0.0001 g
1	Test 1 Run 1 Vol. of Solvent 90 ml Log Number -03 Comments	Dish No. 11 Dish Tare Wt. 47.7598 g Dish+Sample Wt. 47.7682 g Sample Wt. 0.0084 g
2	Test 1 Run 2 Vol. of Solvent 140 ml Log Number -05 Comments	Dish No. 12 Dish Tare Wt. 51.6287 g Dish+Sample Wt. 51.6417 g Sample Wt. 0.0130 g
3	Test 1 Run 3 Vol. of Solvent 150 ml Log Number -07 Comments	Dish No. 38 Dish Tare Wt. 45.0110 g Dish+Sample Wt. 45.0188 g Sample Wt. 0.0078 g
4	Test ____ Run ____ Vol. of Solvent ____ ml Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g
5	Test ____ Run ____ Vol. of Solvent ____ ml Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g

*Solvent Residue 1.25 ug/ml = [(Sample Wt. 0.0001 g)(10^6)]/Vol. of Sol. 80 ml
EPA-M5 Acetone Residue Blank Spec. < 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0083	0.0128	0.0076		

H-2

LSC-01YR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job Cyprus
Team Leader D.S.
Date Submitted 4-18-90
Test No. 1
Date of Analysis 4-20-90

Source Dry Cobber
Test Site Stack
Date of Test 4-17-90
No. of Runs Completed 3
Technician R. Gulum

0	Test 1 Run 0 Field Blank Log Number 9335-02 Comments	Filter No. 2011 Filter Type 4"GF Filter Tare Wt. .9370 g Filter+Sample Wt. .9370 g Sample Wt. 0.000 g
1	Test 1 Run 1 Log Number -04 Comments	Filter No. 1981 Filter Type 4"GF Filter Tare Wt. .9691 g Filter+Sample Wt. .9694 g Sample Wt. 0.0003 g
2	Test 1 Run 2 Log Number -06 Comments	Filter No. 1982 Filter Type 4"GF Filter Tare Wt. .9620 g Filter+Sample Wt. .9622 g Sample Wt. 0.0002 g
3	Test 1 Run 3 Log Number -08 Comments	Filter No. 1983 Filter Type 4"GF Filter Tare Wt. .9510 g Filter+Sample Wt. .9514 g Sample Wt. 0.0004 g
4	Test ____ Run ____ Log Number Comments	Filter No. Filter Type Filter Tare Wt. g Filter+Sample Wt. g Sample Wt. g
5	Test ____ Run ____ Log Number Comments	Filter No. Filter Type Filter Tare Wt. g Filter+Sample Wt. g Sample Wt. g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0003	0.0002	0.0004		

Field Blk.	Run 1	Run 2 H-3	Run 3	Run 4	Run 5
	0.0086	0.0130	0.0080		

LSC-02PR

Interpoll Laboratories
(612) 786-6020

Chain of Custody
Sample Deposition Sheet

Job CYPRUS / SILVER BAY
Team Leader DWAYNE A. SMITH
Date Submitted 4-19-90
Test No. 2

Source MULTICLONE
Test Site STACK
Date of Test 4-18-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
3	Probe Wash: ☒ Acetone ☐ D.I. Water	☒ As per EPA M-5 ☐ Other	BLANKS COMB. WITH TEST #1
3	Filter: ☒ 4" G.F. ☐ S.S. Thimble ☐ 2.5" G.F. ☐ 47 mm G.F.	☒ As per EPA M-5 ☐ As per EPA M-17 ☐ Other	" "
—	Impinger Catch: ☐ D.I. Water ☐ 3% H_2O_2 ☐ 4M5 Hg Only ☐ 4M5 Metals ☐ 1.0 N NaOH ☐ Other	☐ MN Protocol ☐ WI Protocol ☐ EPA M-6 or 8 ☐ Acid Gases ☐ Formaldehyde ☐ Metals ☐ Other	
—	Integrated Gas sample	☐ As per EPA M-3 ☐ As per EPA M-10 ☐ Other	AMBIENT AIR
—	Oxides of Nitrogen (NO_x)	☐ As per EPA M-7A ☐ Other	Date Time (HRS)
—	☐ Fuel Sample ☐ Aggregate	☐ Attached fuel Form #S-0163RRR	
—	Particle Size	☐ X-Ray Sedigraph ☐ Bahco Method ☐ Other	
—	Audit Samples ☐ Sulfur Dioxide ☐ Oxides of Nit. ☐ Other	☐ As per EPA M-6 ☐ As per EPA M-7A ☐ Other	

Source Information

1) Type of Source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☐ Dryer ☒ Other MULTICLONE
2) Fuel: ☐ Coal ☐ Wood ☐ Gas ☐ Oil ☐ RDF ☒ Other AMB. AIR
3) Is sample combustible? ☒ No ☐ Yes
4) Does sample need special handling? ☒ No ☐ Yes If yes, explain

S-278RRRR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus
Team Leader D.S.
Date Submitted 4-19-90
Test No. 2
Date of Analysis 4-20-90
Transport Leakage ☒ None ☐ _____ ml

Source Multiclone
Test Site Stack
Date of Test 4-18-90
No. of Runs Completed 3
Technician R. Gulin
Solvent acetone

0	Test ____ Run 0 Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue 1.20 ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
2	Test 2 Run 1 Vol. of Solvent 100 ml Log Number 9395-09 Comments ____	Dish No. 20 Dish Tare Wt. 48.4155 g Dish+Sample Wt. 48.4276 g Sample Wt. 0.0121 g
3	Test 2 Run 2 Vol. of Solvent 120 ml Log Number -11 Comments ____	Dish No. 21 Dish Tare Wt. 49.6087 g Dish+Sample Wt. 49.6292 g Sample Wt. 0.0205 g
4	Test 2 Run 3 Vol. of Solvent 145 ml Log Number -13 Comments ____	Dish No. 30 Dish Tare Wt. 47.2611 g Dish+Sample Wt. 47.2764 g Sample Wt. 0.0153 g
5	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

*Solvent Residue ___ ug/ml=[(Sample Wt. ____ g)(10^6)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2 H-5	Run 3	Run 4	Run 5
	0.0120	0.0204	0.0151		

LSC-01YR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job Cyprus
Team Leader D.S.
Date Submitted 4-19-90
Test No. 2
Date of Analysis 4-20-90

Source Multiclone
Test Site Stack
Date of Test 4-18-90
No. of Runs Completed 3
Technician R. Eilem

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
	Test 2 Run 1 Log Number 9335-10 Comments ____	Filter No. 2116 Filter Type 4" GF Filter Tare Wt. .9347 g Filter+Sample Wt. .9381 g Sample Wt. 0.0034 g
2	Test 2 Run 2 Log Number -12 Comments ____	Filter No. 2117 Filter Type 4" GF Filter Tare Wt. .9220 g Filter+Sample Wt. .9256 g Sample Wt. 0.0036 g
3	Test 2 Run 3 Log Number -14 Comments ____	Filter No. 2118 Filter Type 4" GF Filter Tare Wt. .9291 g Filter+Sample Wt. .9299 g Sample Wt. 0.0008 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0034	0.0036	0.0008		

Field Blk.	Run 1	Run 2 H-6	Run 3	Run 4	Run 5
	0.0154	0.0240	0.0159		

LSC-02PR

Interpoll Laboratories
(612) 786-6020

Chain of Custody
Sample Deposition Sheet

Job CYPRUS / SILVER BAY
Team Leader DWAYNE A. SMITH
Date Submitted 4-19-90
Test No. 3

Source PELLETIZER
Test Site STACK
Date of Test 4-18-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
3	Probe Wash: ☒ Acetone ☐ D.I. Water	☒ As per EPA M-5 ☐ Other	
3	Filter: ☒ 4" G.F. ☐ S.S. Thimble ☐ 2.5" G.F. ☐ 47 mm G.F.	☒ As per EPA M-5 ☐ As per EPA M-17 ☐ Other	
—	Impinger Catch: ☐ D.I. Water ☐ 3% H_2O_2 ☐ 4M5 Hg Only ☐ 4M5 Metals ☐ 1.0 N NaOH ☐ Other	☐ MN Protocol ☐ WI Protocol ☐ EPA M-6 or 8 ☐ Acid Gases ☐ Formaldehyde ☐ Metals ☐ Other	
—	Integrated Gas sample	☐ As per EPA M-3 ☐ As per EPA M-10 ☐ Other	AMBIENT AIR
—	Oxides of Nitrogen (NO_x)	☐ As per EPA M-7A ☐ Other	Date Time (HRS)
—	☐ Fuel Sample ☐ Aggregate	☐ Attached fuel Form #S-0163RRR	
—	Particle Size	☐ X-Ray Sedigraph ☐ Bahco Method ☐ Other	
—	Audit Samples ☐ Sulfur Dioxide ☐ Oxides of Nit. ☐ Other	☐ As per EPA M-6 ☐ As per EPA M-7A ☐ Other	

Source Information

1) Type of Source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☐ Dryer ☒ Other PELLITIZER WET SCRUBBER
2) Fuel: ☐ Coal ☐ Wood ☐ Gas ☐ Oil ☐ RDF ☐ Other
3) Is sample combustible? ☒ No ☐ Yes
4) Does sample need special handling? ☒ No ☐ Yes If yes, explain

S-278RRRR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job: Cyprus
Team Leader: D.S.
Date Submitted: 4-19-90
Test No.: 3
Date of Analysis: 4-20-90

Source: Pellitizer
Test Site: Stack
Date of Test: 4-18-90
No. of Runs Completed: 3
Technician: R. Eden

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 3 Run 1 Log Number 5385-16 Comments ____	Filter No. 2119 Filter Type 4" GF Filter Tare Wt. .9341 g Filter+Sample Wt. .9374 g Sample Wt. 0.0033 g
2	Test 3 Run 2 Log Number -18 Comments ____	Filter No. 2120 Filter Type 4" GF Filter Tare Wt. .9435 g Filter+Sample Wt. .9456 g Sample Wt. 0.0021 g
3	Test 3 Run 3 Log Number -20 Comments ____	Filter No. 2121 Filter Type 4" GF Filter Tare Wt. .9421 g Filter+Sample Wt. .9458 g Sample Wt. 0.0037 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0033	0.0021	0.0037		

Field Blk.	Run 1	Run 2 H-9	Run 3	Run 4	Run 5
	0.0276	0.0152	0.0144		

LSC-02PR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus
Team Leader D.S.
Date Submitted 4-19-90
Test No. 3
Date of Analysis 4-20-90
Transport Leakage ☒ None ☐ _____ ml

Source Pellitizer
Test Site Stack
Date of Test 4-18-90
No. of Runs Completed 3
Technician R. Eden
Solvent acetone

0	Test ____ Run 0 Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue 1.25 ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 3 Run 1 Vol. of Solvent 120 ml Log Number 9385-15 Comments ____	Dish No. 115 Dish Tare Wt. 45.0682 g Dish+Sample Wt. 45.0926 g Sample Wt. 0.0244 g
2	Test 3 Run 2 Vol. of Solvent 150 ml Log Number -17 Comments ____	Dish No. 117 Dish Tare Wt. 47.3736 g Dish+Sample Wt. 47.3869 g Sample Wt. 0.0133 g
3	Test 3 Run 3 Vol. of Solvent 140 ml Log Number -19 Comments ____	Dish No. 119 Dish Tare Wt. 47.7658 g Dish+Sample Wt. 47.7767 g Sample Wt. 0.0109 g
4	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

*Solvent Residue ___ ug/ml=[(Sample Wt. ____ g)(10^6)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0243	0.0131	0.0107		

H-8

LSC-01YR

Interpoll Laboratories
(612) 786-6020

Chain of Custody
Sample Deposition Sheet

Job CYPRUS / SILVER BAY
Team Leader DWAYNE A. SMITH
Date Submitted 4-19-90
Test No. 4

Source FINE CRUSHER
Test Site STACK
Date of Test 4-19-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
3	Probe Wash: ☒ Acetone ☐ D.I. Water	☒ As per EPA M-5 ☐ Other	BLANKS COMB. WITH TEST #1 4-17-90
3	Filter: ☒ 4" G.F. ☐ S.S. Thimble ☐ 2.5" G.F. ☐ 47 mm G.F.	☒ As per EPA M-5 ☐ As per EPA M-17 ☐ Other	" "
—	Impinger Catch: ☐ D.I. Water ☐ 3% H_2O_2 ☐ 4M5 Hg Only ☐ 4M5 Metals ☐ 1.0 N NaOH ☐ Other	☐ MN Protocol ☐ WI Protocol ☐ EPA M-6 or 8 ☐ Acid Gases ☐ Formaldehyde ☐ Metals ☐ Other	AMBIENT AIR
—	Integrated Gas sample	☐ As per EPA M-3 ☐ As per EPA M-10 ☐ Other	
—	Oxides of Nitrogen (NO_x)	☐ As per EPA M-7A ☐ Other	Date Time (HRS)
—	☐ Fuel Sample ☐ Aggregate	☐ Attached fuel Form #S-0163RRR	
—	Particle Size	☐ X-Ray Sedigraph ☐ Bahco Method ☐ Other	
—	Audit Samples ☐ Sulfur Dioxide ☐ Oxides of Nit. ☐ Other	☐ As per EPA M-6 ☐ As per EPA M-7A ☐ Other	

Source Information

1) Type of Source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☐ Dryer ☒ Other FINE CRUSHER
2) Fuel: ☐ Coal ☐ Wood ☐ Gas ☐ Oil ☐ RDF ☐ Other
3) Is sample combustible? ☒ No ☐ Yes
4) Does sample need special handling? ☒ No ☐ Yes If yes, explain

S-278RRRR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus
Team Leader D.S
Date Submitted 4-19-90
Test No. 4
Date of Analysis 4-20-90
Transport Leakage ☒ None ☐ _____ ml

Source Fine Crusher
Test Site Stack
Date of Test 4-19-90
No. of Runs Completed 3
Technician R. Gulem
Solvent acetone

0	Test ____ Run 0 Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue 1.25 ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 4 Run 1 Vol. of Solvent 125 ml Log Number 9325-21 Comments ____	Dish No. 97 Dish Tare Wt. 46.3622 g Dish+Sample Wt. 46.3767 g Sample Wt. 0.0145 g
2	Test 4 Run 2 Vol. of Solvent 160 ml Log Number -23 Comments ____	Dish No. 99 Dish Tare Wt. 44.5319 g Dish+Sample Wt. 44.5486 g Sample Wt. 0.0167 g
3	Test 4 Run 3 Vol. of Solvent 130 ml Log Number -25 Comments ____	Dish No. 100 Dish Tare Wt. 45.9697 g Dish+Sample Wt. 45.9832 g Sample Wt. 0.0135 g
4	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

*Solvent Residue ___ ug/ml=[(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2 H-11	Run 3	Run 4	Run 5
	0.0143	0.0145	0.0133		

LSC-01YR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job Cyprus
Team Leader D.S
Date Submitted 4-19-90
Test No. 4
Date of Analysis 4-20-90

Source Fine Crusher
Test Site Stack
Date of Test 4-19-90
No. of Runs Completed 3
Technician R. Eidem

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
	Test 4 Run 1 Log Number 9385-22 Comments ____	Filter No. 2025 Filter Type 4" GF Filter Tare Wt. .9192 g Filter+Sample Wt. .9249 g Sample Wt. 0.0057 g
2	Test 4 Run 2 Log Number -24 Comments ____	Filter No. 2026 Filter Type 4" GF Filter Tare Wt. .9175 g Filter+Sample Wt. .9188 g Sample Wt. 0.0013 g
3	Test 4 Run 3 Log Number -26 Comments ____	Filter No. 2027 Filter Type 4" GF Filter Tare Wt. .9156 g Filter+Sample Wt. .9166 g Sample Wt. 0.0010 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0057	0.0013	0.0010		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0200	0.0178	0.0143		

H-12

LSC-02PR

Interpoll Laboratories
(612)786-6020

MPCA Exhibit C for Process Emissions

JOB_____

SOURCE_____

DATE_____

C. Equipment & Operating Data

1. Process Equip. No./Ident._____.
2. Process Equip. Description_____
_____.
3. Process equipment operating under normal operating conditions:
No____. Yes_____.

D. Instrument Data on Process Equipment

1. Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, lbs. per hour, pressure, air flow, etc.

E. Air Pollution Control Equipment

1. Type/model control equipment_____.
2. Air pressure drop across the control equipment_____.
3. Air flow through the control equipment_____.
4. Was the control equipment operating normally?_____.
5. Data of last major maintenance/cleaning of control equipment
_____
_____.

F. Plant Manager's Certification

I certify that the information submitted herein is accurate and correct and that no information requested was withheld from MPCA, Division of Air Quality.

By_____, Position_____

S-349R

APPENDIX J

PROCESS DATA
(Provided by Cyprus Northshore Mining)

Process Data for the Pellitizer and Fine Crusher not provided at the time of the report publication.

GRP-119 E BELT TONNAGE TRENDS

06:00	0	232	14	0	72	1.46
07:00	0	247	12	1	76	1.27
08:00	0	5	0	25	0	0.49
09:00	121	9	0	23	0	0.78
10:00	575	7	0	21	0	0.78
11:00	407	9	0	23	0	1.17
12:00	826	12	0	25	0	1.07
13:00	536	12	0	26	0	1.27
14:00	615	14	0	23	1	1.27
15:00	693	702	79	19	191	4.40

	D2WTR30A CONV 106 TONNAGE	D2WTR28A CONV 175 TONNAGE	D2WTR29A CONV 181 TONNAGE	D1WTR29A CONV 81 TONNAGE	D2NTR26 CONV 175 MAG TONS	D2NTR27 CONV 181 MAG TONS	D2ZU131 ALARM CONV 106	U DETD04CP DELAY ENDBIN
SP/Y	2000	1920	350	350	500	50.01		0
PV/X	- 109	- 30	- 12	20	- 12	0.11		0

OUT %

CYPRUS NORTHSHORE MINING

SILVER BAY, MN.

DRY COBBER STACK

TEST #1 RUNS 1-2 MS

4-17-90

DUAYNE A. SMITH

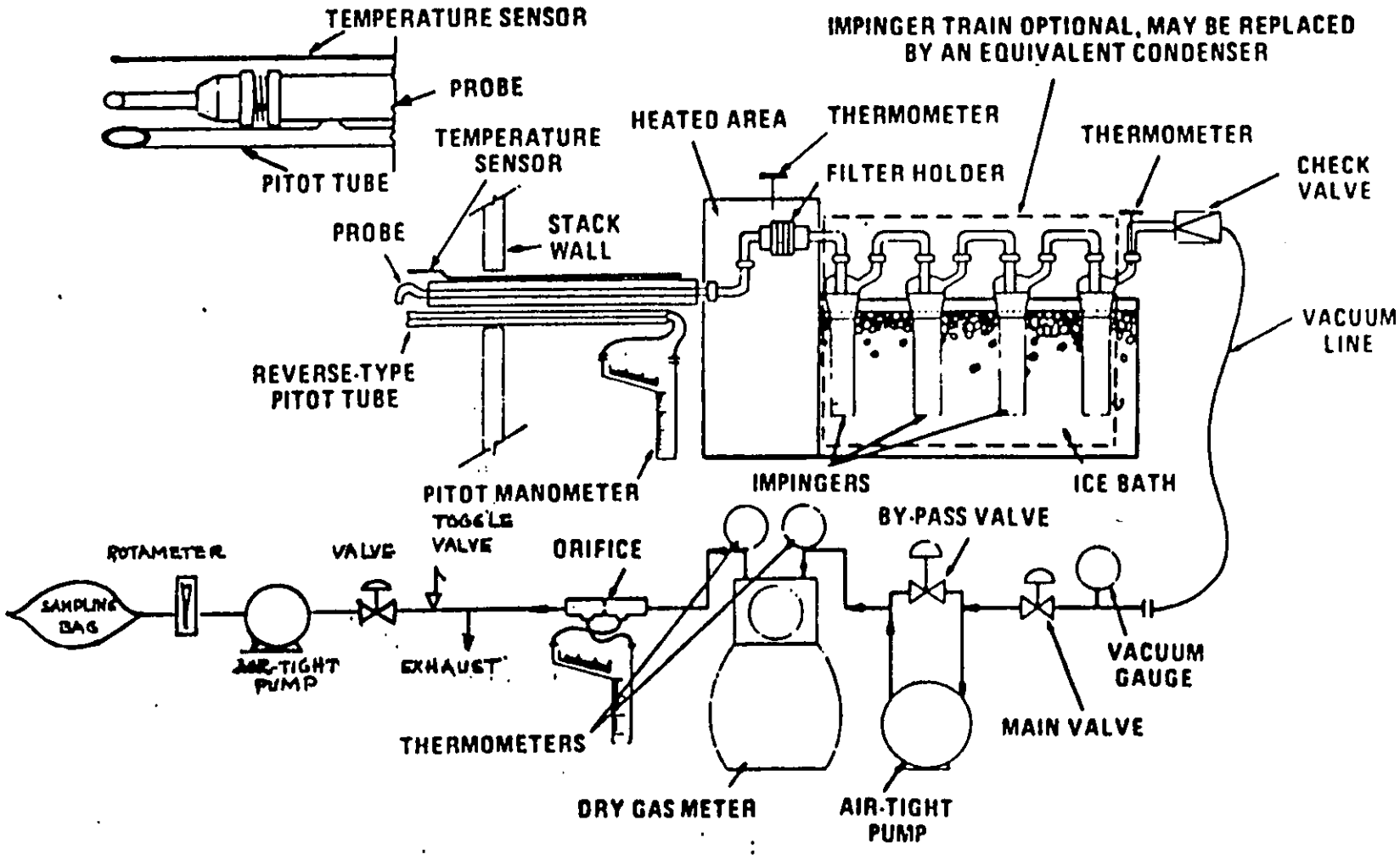
Particulate Loadings and Emission Rates

The particulate emission rates were determined per EPA Methods 1-5, CFR title 40, Part 60, Appendix A (revised July 1, 1988). In this procedure, a preliminary velocity profile of the gases in the flue is obtained by means of a temperature and velocity traverse. On the basis of these values, sampling nozzles of appropriate diameter are selected to allow isokinetic sampling, a necessary prerequisite for obtaining a representative sample.

The sampling train consists of a heated glass-lined sampling probe equipped with a Type S pitot and a thermocouple. The probe is attached to a sampling module which houses the all-glass in line filter holder in a temperature controlled oven. In addition, the sampling module also houses the impinger case and a Drierite drying column. The sampling module is connected by means of an umbilical cord to the control module which houses the dry test gasmeter, the calibrated orifice, a leakless pump, two inclined manometers, and all controls required for operating the sampling train.

Particulate samples were collected as follows: The sample gas was drawn in through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter. The particulates were removed at this point and collected on the filter. The gases then passed through an ice-cooled impinger train and a desiccant-packed drying column which quantitatively absorb all moisture from the sample gas stream after which the sample gas passes through the pump and the dry test gasmeter which integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gasmeter provides instantaneous flow rate data.

A representative particulate sample was acquired by sampling for equal periods of time at the centroid of a number of equal area regions in the duct. The sampling rate is adjusted at each site such that an isokinetic sampling condition prevails. Nomographs are used to aid in the rapid determination of the sampling rate.



Particulate-sampling train.

CALCULATION EQUATIONS

METHOD 2

$$\bar{V}_s = 85.48\ C_p\ (\sqrt{\Delta p})_{avg}\ \sqrt{\frac{T_{s(avg)}}{P_s\ M_s}}$$

$$Q_{s,d} = 60(1 - B_{ws})\ \bar{V}_s\ A\ \left(\frac{528}{T_{s(avg)}}\right)\ \left(\frac{P_s}{29.92}\right)$$

$$Q_a = 60\ \bar{V}_s\ A$$

$$\dot{m}_g = \frac{4.995\ Q_{s,d}\ G_d}{1 - B_{ws}}$$

$$RH^* = 100\ (vp_{twb}\ 0.0003641\ P_s\ (T_{db} - T_{wb}))/vp_{tdb}$$

$$B^*_{ws} = RH(vp_{tdb})/P_s$$

$$= \frac{4.585 \times 10^{-2}\ P_s M_s}{T_s\ (avg)}$$

*Alternate equations for calculating moisture content from wet bulb and dry buld data.

CALCULATION EQUATIONS

METHOD 5

$$V_{m(std)} = 17.65\ V_m\ \gamma\ \left(\frac{P_{bar} + \overline{\Delta H}/13.6}{T_{m(avg)}}\right)$$

$$V_{w(std)} = 0.0472\ V_{Is}$$

$$B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

$$I = 0.0944\ \left(\frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1 - B_{ws})}\right)$$

$$C_s = \frac{15.43\ M_p}{V_{m(std)}}$$

$$C_a = \frac{272.3\ M_p\ P_s}{T_{s(avg)}\ (V_{w(std)} + V_{m(std)})}$$

$$(\dot{m}_p)_1 = 8.5714 \times 10^{-3}\ C_s\ Q_{s,d}$$

$$(\dot{m}_p)_2 = \frac{1.3228 \times 10^{-1}\ M_p\ A}{\theta\ A_n}$$

$$\dot{m}_p = \frac{(\dot{m}_p)_1 + (\dot{m}_p)_2}{2}$$

P_s = Absolute pressure of stack gas, IN.HG.

P_{std} = Standard absolute pressure, 29.92 IN. HG.

A_a = Actual volumetric stack gas flow rate, ACFM

$Q_{s,d}$ = Dry volumetric stack gas flow rate corrected to standard conditions, DSCFM

RH = Relative humidity, %

T_{db} = Dry bulb temperature of stack gas, ^oF

T_{wb} = Wet bulb temperature of stack gas, ^oF

$T_{m(avg)}$ = Absolute average dry gas meter temperature, ^oR

$T_s(avg)$ = Absolute average stack temperature, ^oF

T_{std} = Standard absolute temperature, 528 ^oF (68 ^oF)

θ = Total sampling time, min.

V_{lc} = Total volume of liquid collected in impingers and silica gel, ml

V_m = Volume of gas sample as measured by dry gas meter, CF

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter corrected to standard conditions, DSCF

$V_{w(std)}$ = Volume of water vapor in the gas sample corrected to standard conditions, SCF

$\bar{V}_s$ = Average actual stack gas velocity, FT/SEC

vp_{tdb} = Vapor pressure at T_{db}, IN. HG.

APPENDIX M

SAMPLING TRAIN CALIBRATION DATA

Interpoll Laboratories, Inc.
(612) 786-6060

EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job CYPRUS / SILVER BAY Date 4-17-90

Operator DWAYNE A. SMITH Module No. 5

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 29.40 in. Hg. τ = 1.0007 ^H@ 1.85 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(652.60)	[redacted]	
2.5	654.44	58	57
5.0	656.30	59	58
7.5	658.14	59	58
10	660.00	60	58
[redacted]	V_m= 7.40	Avg(t_m)= 58.4 °F	

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\tau \; V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{7.40518\,(1.0007)\,(7.40)}\left[\frac{(58.4) + 460}{(29.40)}\right]^{0.5}$$

Y_{cn} = 1.013

If Y_{cn} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432R

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: May 4, 1990

Meter Box No.: 5 (Rockwell Dry Test Meter Serial No. 649078)

Date of Last Calibration: April 6, 1990
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
April 10-12, 1990	0-3018	859.78	1621.25	761.47	761.47
April 17-19, 1990	0-3022	652.60	1188.66	536.06	1297.53

Interpoll Laboratories
(612)786-6020

S-Type Pitot Tube Inspection Sheet

Pitobe No. 4-17

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .461 IN.
3. Base to Side B opening plane (P_B) .462 IN.

Alignment:

4. $\alpha_1 < 10^0$ 0
5. $\alpha_2 < 10^0$ 0

6. $B_1 < 5^0$ 1
7. $B_2 < 5^0$ 1

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .760 IN.
11. Pitot to probe sheath 3.00 IN.
12. Pitot to thermocouple (parallel to probe) 3.00 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

Date of Inspection: 12-8-89

Inspected by: [signature]

S-348(1)

Interpoll Laboratories, Inc.

(612) 786-6020

Nozzle Calibration

Data Sheet

Date of Calibration: April 18, 1990 Nozzle Number 6-3

Technician: D. Smith

Nozzle rotated by 60 degree increments and diameter measured to nearest 0.001 inch. Observed readings and average:

Position	Diameter (inches)
1	0.185
2	0.185
3	0.187
Average:	0.186

Interpoll Laboratories
(612)786-6020

S-Type Pitot Tube Inspection Sheet

Pitobe No. 6-17

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .464 IN.
3. Base to Side B opening plane (P_B) .465 IN.

Alignment:

4. $\alpha_1 < 10^0$ 0
5. $\alpha_2 < 10^0$ 0

6. $B_1 < 5^0$ 1
7. $B_2 < 5^0$ 2

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .759 IN.
11. Pitot to probe sheath 3.00 IN.
12. Pitot to thermocouple (parallel to probe) 3.00 IN.
13. Pitot to thermocouple (perpendicular to probe) .762 IN.

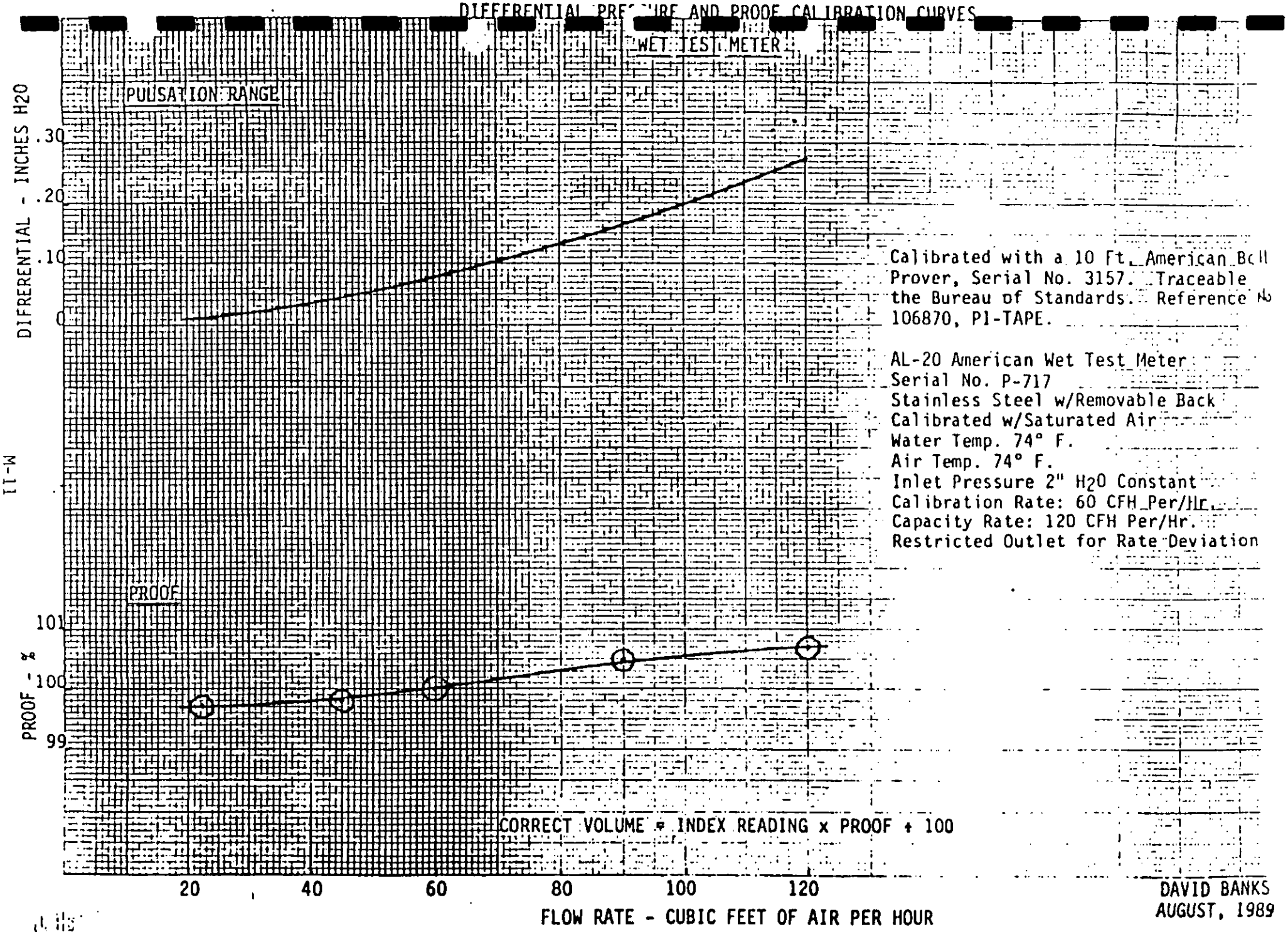
Date of Inspection: 12-8-89

Inspected by: [signature]

S-348(1)

DIFFERENTIAL PRESSURE AND PROOF CALIBRATION CURVES

WET TEST METER



Calibrated with a 10 Ft. American Bell Prover, Serial No. 3157. Traceable the Bureau of Standards. Reference No 106870, PI-TAPE.

AL-20 American Wet Test Meter
Serial No. P-717
Stainless Steel w/Removable Back
Calibrated w/Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H_2O Constant
Calibration Rate: 60 CFH Per/Hr.
Capacity Rate: 120 CFH Per/Hr.
Restricted Outlet for Rate Deviation

DAVID BANKS
AUGUST, 1989