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AP-42 Section Number: 11.23

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Title: Results of the July 24-27, 1990 Air Emission Compliance Tests on the Nos. 11 and 12 Pelletizers and teh No. 2 Power Boiler at the Cyprus Northshore Mining Facility in Silver Bay, MN

Interpoll Laboratories, IncInterpoll Laboratories, Inc

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October 1990

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

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1.62 1.63 1.62 lb/

RESULTS OF THE JULY 24 - 27, 1990 AIR EMISSION COMPLIANCE TESTS ON THE NOS. 11 AND 12 PELLETIZERS AND THE NO. 2 POWER BOILER 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:

Perry Lönnes, Ph.D.
Director
Field Testing Division

Report Number 0-3095
October 21, 1990
PL/prp

PCF 82 4-42

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1.62 RESULTS OF THE JULY 24 - 27, 1990
AIR EMISSION COMPLIANCE TESTS ON
1.63 THE NOS. 11 AND 12 PELLETIZERS AND
1.62 lb/ THE NO. 2 POWER BOILER AT THE CYPRUS
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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 the Period July 24-27, 1990, Interpoll Laboratories personnel conducted particulate, sulfur dioxide and nitrogen oxides State emission compliance tests on the Nos. 11 and 12 Pelletizers (North and South Stacks) and sulfur dioxide and oxides of nitrogen emission compliance tests on the No. 2 Power Boiler at the Cyprus Northshore Mining Facility located in Silver Bay, Minnesota. On-site testing was performed by R. Rosenthal, S. Lonnes, 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 Jolayne Ingebritson of the Minnesota Pollution Control Agency.

Particulate emissions from the Nos. 11 and 12 Pelletizers Waste Gas Furances are controlled by individual Fluid Ionics wet electrostatic precipitators. Cleaned flue gas from each Pelletizer exhausts to the atmosphere via two (North and South) Stacks.

The No. 2 Power Boiler is a B&W utility class, bent tube water cooled wall, dry bottom, radiant boiler equipped with a superheater. It fires pulverized coal or natural gas. This boiler is equipped with both an economizer and air preheater and has a rated steaming capacity of 575,000 LB/HR. Particulate emissions from the No. 2 Boiler are controlled by an American Air Filter 12-section baghouse before the gas stream is exhausted to the atmosphere through a tile-lined stack which extends 216 feet above basement grade elevation. The diameter at the stack outlet is 10'-2". The rated thermal efficiency of the boiler is 88.8%.

Particulate and sulfur dioxide evaluations on the Pelletizer Stacks were performed in accordance with EPA Methods 1 - 6, CFR Title 40, Part 60, Appendix A (revised July 1, 1989). A preliminary determination of the gas linear velocity profile was made 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. Wet catch samples were collected in the back half of the Method 5 sampling train and analyzed per MN Rules Part 7005.0500. Sulfur dioxide sampling on the Pelletizer Stacks was conducted in accordance with the large impinger version of Method 6 without the isopropanol.

Oxides of nitrogen determinations on two of the four Pelletizer Stacks were performed using EPA Method 7A. The NO_x samples were collected in volume-calibrated 2L all-glass flasks. An aliquot of 25 cc of absorbing solution was added to each flask on-site; the flask was closed; inserted into the sampling train; and evacuated. The probe was then purged and the sample collected over a 15 second interval. The flask valve was then closed; the flask removed from the sampling train; shook for 2 minutes and then secured for transport to the laboratory.

Upon arrival at the laboratory, the NO_x samples are logged in, placed in a designated area and maintained at 72 $^{\circ}F$ for 24 hours to allow completion of the conversion of NO to NO_2 and absorption in the acidified peroxide reagent. The flasks are then attached to a mercury manometer and the static pressure and temperature recorded. The samples are then recovered and analyzed by ion chromatography.

Sulfur dioxide and oxides of nitrogen determinations on the No. 2 Power Boiler were conducted as per EPA Methods 6C and 7E. The NO_x determinations on the other two Pelletizer Stacks were also performed using Method 7E. A slip stream of exhaust gas was drawn from the exhaust gas stream using test port(s) provided by the Plant. The sample gas was extracted from the stack using a heated stainless steel-lined probe with an instack filter to remove interfering particulate material from the gas stream. The sample gas stream was then transported to a permeation tube dryer by means of a heated 0.25-inch Teflon line. The dry particulate-free sample gas stream was then introduced into the SO_2 and NO_x analyzers.

The analog outputs of each analyzer was monitored with a strip chart recorder. The analyzers were calibrated with EPA Protocol I gas standards.

An integrated flue gas sample was extracted simultaneously with each particulate and sulfur dioxide sample using a specially designed gas sampling system. Integrated flue gas samples were collected in 44-liter Tedlar bags housed in a protective aluminum container. After sampling was complete, the bags were sealed and returned to the laboratory for Orsat analysis. Prior to sampling, the Tedlar bags are leak checked at 15 IN.HG. vacuum with an in-line rotameter. Bags with any detectable inleakage are discarded.

Testing on the No. 12 Pelletizer Stacks was conducted from two test ports oriented at 90 degrees on the respective stacks. The test ports on the No. 12 North and South Stacks are located 3.21 stack diameters downstream of any flow disturbance and 1.69 diameters upstream of the stack exit. For each stack, a 24-point traverse was used to collect representative particulate and sulfur dioxide samples. Each traverse point was sampled 2.5 minutes to give a total sampling time of 60 minutes per run.

Testing on the No. 11 North and South Pelletizer Stacks was conducted from four test ports also oriented at 90 degrees and located 0.34 stack diameters downstream from any flow disturbance and 4.65 diameters upstream of the stack exit. For each stack, a 24-point traverse was used to collect representative particulate and sulfur dioxide samples. Each traverse point was sampled 2.5 minutes to give a total sampling time of 60 minutes per run.

Testing on the No. 2 Power Boiler was conducted from two test ports oriented at 90 degrees on the radial stack. The test ports are located 7.79 stack diameters downstream of any flow disturbance and >2 diameters upstream of the stack exit. A 16-point traverse was used to perform the

volumetric flow rate determination. A three point traverse was used for the SO_2 and NO_x samplings. Each test run was one hour in duration.

An attempt was also made to perform a visible emission determination on the No. 11 Pelletizer. Once again, due to intermingling plumes from various other sources, the opacity could not be read. A visible emissions determination could not be conducted on the No. 2 Power Boiler due to rain.

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, sulfur dioxide and oxides of nitrogen compliance tests are summarized in Tables 1 - 8. An overview of the average emission rates are given below:

	Emission Rate (LB/HR)		
Source	Particulate	SO_2	NO_x
No. 11 Pelletizer (N. Stack)	4.09	2.18	49.5
No. 11 Pelletizer (S. Stack)	3.91	1.99	41.2
No. 12 Pelletizer (N. Stack)	2.63	1.93	43.8
No. 12 Pelletizer (S. Stack)	3.50	2.14	34.2
No. 2 Power Boiler	N/A	328	172

The average emission factors for the No. 2 Power Boiler were 0.42 LB $SO_2/10^6$BTU and 0.22 LB $NO_x/10_6$BTU.

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 July 25, 1990 Particulate Emission Compliance Test on the Unit 11 Pellitizer (South Stack) at the Cyprus Northshore Mining Plant Located in Silver Bay, MN.

ITEM		Run 1	Run 2	Run 3
Date of test		07-25-90	07-25-90	07-25-90
Time runs were done	(HRS)	750/ 855	925/1028	1040/1142
Process rate				
Volumetric flow				
actual	(ACFM)	102131	99062	98477
standard	(DSCFM)	72117	69347	69306
Gas temperature	(DEG-F)	155	157	154
Moisture content	(%V/V)	16.75	17.27	17.20
Gas composition	(%V/V,dry)			
carbon dioxide		1.90	1.80	2.00
oxygen		17.40	17.60	17.40
nitrogen		80.70	80.60	80.60
Isokinetic variation	(%)	98.1	99.7	99.8
Particulate concentration				
actual	(GR/ACF)	.00471	.00400	.00498
standard	(GR/DSCF)	.00668	.00572	.00708
Part. emission rate	(LB/HR)	4.13	3.40	4.21

Note: Dry + Organic Wet Catch

Table 2. Summary of the Results of the July 24, 1990 Particulate Emission Compliance Test on the Unit 11 Pellitizer W.G.P. at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

ITEM		Run 1	Run 2	Run 3
Date of test		07-24-90	07-24-90	07-24-90
Time runs were done	(HRS)	935/1200	1230/1333	1350/1453
Process rate				
Volumetric flow				
actual	(ACFM)	102263	102520	102363
standard	(DSCFM)	74706	73199	72999
Gas temperature	(DEG-F)	144	144	145
Moisture content	(%V/V)	15.24	17.08	17.05
Gas composition	(%V/V,dry)			
carbon dioxide		1.90	1.90	1.90
oxygen		17.40	17.50	17.40
nitrogen		80.70	80.60	80.70
Isokinetic variation	(%)	95.4	100.2	99.3
Particulate concentration				
actual	(GR/ACF)	.00592	.00361	.00443
standard	(GR/DSCF)	.00810	.00506	.00621
Part. emission rate	(LB/HR)	5.19	3.18	3.89

Note: Dry + Organic Wet Catch

Table 3. Summary of the Results of the July 26, 1990 Particulate Emission Compliance Test on the Unit 12 Pellitizer (North Stack) at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

ITEM	Run 1	Run 2	Run 3
Date of test	07-26-90	07-26-90	07-26-90
Time runs were done (HRS)	800/1007	1035/1137	1200/1312
Process rate			
Volumetric flow			
actual (ACFM)	92962	88010	90819
standard (DSCFM)	67293	62421	63927
Gas temperature (DEG-F)	139	141	142
Moisture content (%V/V)	17.11	18.54	19.01
Gas composition (%V/V,dry)			
carbon dioxide	2.00	2.10	2.20
oxygen	17.30	17.20	17.00
nitrogen	80.70	80.70	80.80
Isokinetic variation (%)	101.5	101.1	100.6
Particulate concentration			
actual (GR/ACF)	.00365	.00331	.00320
standard (GR/DSCF)	.00505	.00466	.00454
Part. emission rate (LB/HR)	2.91	2.50	2.49

Note: Dry + Organic Wet Catch

Table 4. Summary of the Results of the July 26, 1990 Particulate Emission Compliance Test on the Unit 12 Pellitizer (South Stack) at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

ITEM	Run 1	Run 2	Run 3
Date of test	07-26-90	07-26-90	07-26-90
Time runs were done (HRS)	1405/1510	1535/1645	1705/1808
Process rate			
Volumetric flow			
actual (ACFM)	89676	89777	90456
standard (DSCFM)	61418	61391	61729
Gas temperature (DEG-F)	169	170	169
Moisture content (%V/V)	17.61	17.69	17.88
Gas composition (%V/V,dry)			
carbon dioxide	1.90	2.00	1.60
oxygen	17.42	17.24	17.95
nitrogen	80.68	80.76	80.45
Isokinetic variation (%)	97.2	100.2	99.9
Particulate concentration			
actual (GR/ACF)	.00446	.00427	.00486
standard (GR/DSCF)	.00652	.00625	.00713
Part. emission rate (LB/HR)	3.43	3.29	3.77

Note: Dry + Organic Wet Catch

Table 5 Summary of the Results of the July 24-26, 1990 Sulfur Dioxide Emission Compliance Tests on the Nos. 11 and 12 Pelletizers (North and South Stacks) at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

Test/Run	Date	Time	Emission Rate (LB/HR)
No. 11 PELLETIZER (NORTH STACK)			
2/1	7-24-90	1510-1610	2.24
2/2	7-24-90	1615-1715	2.24
2/3	7-24-90	1720-1820	2.06
Avg.			2.18
No. 11 PELLETIZER (SOUTH STACK)			
5/1	7-25-90	1155-1255	1.94
5/2	7-25-90	1320-1422	2.10
5/3	7-25-90	1435-1535	1.94
Avg.			1.99
No. 12 PELLETIZER (NORTH STACK)			
7/1	7-26-90	0800-1006	2.17
7/2	7-26-90	1036-1136	2.00
7/3	7-26-90	1200-1310	1.61
Avg.			1.93
No. 12 PELLETIZER (SOUTH STACK)			
10/1	7-26-90	1405-1505	2.00
10/2	7-26-90	1525-1635	2.16
10/3	7-26-90	1705-1805	2.27
Avg.			2.14

Table 6 Summary of the Results of the July 27, 1990 Sulfur Dioxide Emission Compliance Test on the No. 2 Power Boiler at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

Test/Run	Time	Emission Rate (LB/HR)	Emission Factor (LB/10^6BTU)
4/1	0840-0950	323	0.418
4/2	1010-1110	331	0.426
4/3	1130-1230	331	0.423
Avg.		328	0.421

Table 7 Summary of the Results of the July 24-26, 1990 Oxides of Nitrogen Emission Compliance Tests on the Nos. 11 and 12 Pelletizers (North and South Stacks) at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

Test/Run	Date	Time	Emission Rate (LB/HR)
No. 11 PELLETIZER (NORTH STACK)			
3/1	7-24-90	0935-1145	58.2
3/2	7-24-90	1230-1320	48.9
3/3	7-24-90	1350-1445	41.4
Avg.			49.5
No. 11 PELLETIZER (SOUTH STACK)			
1/1	7-25-90	0800-0912	41.2
1/2	7-25-90	0912-1112	41.8
1/3	7-25-90	1112-1257	40.7
Avg.			41.2
No. 12 PELLETIZER (NORTH STACK)			
8/1	7-26-90	0815-1000	51.9
8/2	7-26-90	1045-1130	37.4
8/3	7-26-90	1205-1250	42.2
Avg.			43.8
No. 12 PELLETIZER (SOUTH STACK)			
2/1	7-25-90	1517-1637	33.8
2/2	7-25-90	1637-1832	34.2
2/3	7-25-90	1832-2022	34.7
Avg.			34.2

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, sulfur dioxide and oxides of nitrogen and visible emissions results. 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.

Table 8 Summary of the Results of the July 27, 1990 Oxides of Nitrogen Emission Compliance Test on the No. 2 Power Boiler at the Cyprus Northshore Mining Plant Located in Silver Bay, Minnesota.

Test/Run	Time	Emission Rate (LB/HR)	Emission Factor (LB/10^6BTU)
4/1	0840-0950	179	0.231
4/2	1010-1110	167	0.215
4/3	1130-1230	171	0.218
Avg.		172	0.221

3.1 Results of Orsat and Moisture Analyses

Test No. 1
Unit 11 Pellitizer (North Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-24-90	07-24-90	07-24-90
Dry basis (orsat)			
carbon dioxide.....	1.90	1.90	1.90
oxygen.....	17.40	17.50	17.40
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.70	80.60	80.70
Wet basis (orsat)			
carbon dioxide.....	1.61	1.58	1.58
oxygen.....	14.75	14.51	14.43
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	68.40	66.83	66.94
water vapor.....	15.24	17.08	17.05
Dry molecular weight.....	29.00	29.00	29.00
Wet molecular weight.....	27.32	27.12	27.12
Specific gravity.....	0.944	0.937	0.937
Water mass flow.....(LB/HR)	37688	42294	42101
FO	1.842	1.789	1.842

Test No. 2
Unit 11 Pellitizer (North Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-24-90	07-24-90	07-24-90
Dry basis (orsat)			
carbon dioxide.....	1.80	1.90	1.90
oxygen.....	17.60	17.50	17.40
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.60	80.60	80.70
Wet basis (orsat)			
carbon dioxide.....	1.49	1.57	1.57
oxygen.....	14.59	14.49	14.40
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	66.84	66.72	66.78
water vapor.....	17.08	17.23	17.25
Dry molecular weight.....	28.99	29.00	29.00
Wet molecular weight.....	27.11	27.11	27.10
Specific gravity.....	0.937	0.936	0.936
Water mass flow.....(LB/HR)	42171	42617	42693
FO	1.833	1.789	1.842

Test No. 4
Unit 11 Pellitizer (South Stack)

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

Date of run	Run 1 07-25-90	Run 2 07-25-90	Run 3 07-25-90
Dry basis (orsat)			
carbon dioxide.....	1.90	1.80	2.00
oxygen.....	17.40	17.60	17.40
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.70	80.60	80.60
Wet basis (orsat)			
carbon dioxide.....	1.58	1.49	1.66
oxygen.....	14.49	14.56	14.41
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	67.18	66.68	66.74
water vapor.....	16.75	17.27	17.20
Dry molecular weight.....	29.00	28.99	29.02
Wet molecular weight.....	27.16	27.09	27.12
Specific gravity.....	0.938	0.936	0.937
Water mass flow.....(LB/HR)	40705	40598	40387
FO	1.842	1.833	1.750

Test No. 5
Unit 11 Pellitizer (South Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-25-90	07-25-90	07-25-90
Dry basis (orsat)			
carbon dioxide.....	2.00	1.90	1.80
oxygen.....	17.30	17.40	17.50
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.70	80.70	80.70
Wet basis (orsat)			
carbon dioxide.....	1.67	1.57	1.50
oxygen.....	14.40	14.39	14.54
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	67.19	66.75	67.05
water vapor.....	16.74	17.29	16.92
Dry molecular weight.....	29.01	29.00	28.99
Wet molecular weight.....	27.17	27.10	27.13
Specific gravity.....	0.938	0.936	0.937
Water mass flow.....(LB/HR)	39074	40636	39583
FO	1.800	1.842	1.889

Test No. 6
Unit 12 Pellitizer (North Stack)

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

Date of run	Run 1 07-26-90	Run 2 07-26-90	Run 3 07-26-90
Dry basis (orsat)			
carbon dioxide.....	2.00	2.10	2.20
oxygen.....	17.30	17.20	17.00
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.70	80.70	80.80
Wet basis (orsat)			
carbon dioxide.....	1.66	1.71	1.78
oxygen.....	14.34	14.01	13.77
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	66.90	65.74	65.44
water vapor.....	17.11	18.54	19.01
Dry molecular weight.....	29.01	29.02	29.03
Wet molecular weight.....	27.13	26.98	26.93
Specific gravity.....	0.937	0.932	0.930
Water mass flow.....(LB/HR)	38951	39859	42097
FO	1.800	1.762	1.773

Test No. 7
Unit 12 Pellitizer (North Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Dry basis (orsat)			
carbon dioxide.....	2.00	2.10	2.20
oxygen.....	17.30	17.20	17.00
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.70	80.70	80.80
Wet basis (orsat)			
carbon dioxide.....	1.65	1.72	1.79
oxygen.....	14.30	14.05	13.83
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	66.72	65.92	65.71
water vapor.....	17.32	18.32	18.67
Dry molecular weight.....	29.01	29.02	29.03
Wet molecular weight.....	27.10	27.00	26.97
Specific gravity.....	0.936	0.933	0.932
Water mass flow.....(LB/HR)	39542	39255	41148
FO	1.800	1.762	1.773

Test No. 9
Unit 12 Pellitizer (South Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Dry basis (orsat)			
carbon dioxide.....	1.90	2.00	1.60
oxygen.....	17.42	17.24	17.95
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.68	80.76	80.45
Wet basis (orsat)			
carbon dioxide.....	1.57	1.65	1.31
oxygen.....	14.35	14.19	14.74
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	66.47	66.47	66.06
water vapor.....	17.61	17.69	17.88
Dry molecular weight.....	29.00	29.01	28.97
Wet molecular weight.....	27.06	27.06	27.01
Specific gravity.....	0.935	0.935	0.933
Water mass flow.....(LB/HR)	36819	37007	37709
FO	1.832	1.830	1.844

Test No. 10
Unit 12 Pellitizer (South Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Dry basis (orsat)			
carbon dioxide.....	1.90	2.00	1.60
oxygen.....	17.40	17.20	17.90
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	80.70	80.80	80.50
Wet basis (orsat)			
carbon dioxide.....	1.57	1.66	1.31
oxygen.....	14.39	14.26	14.62
carbon monoxide.....	0.00	0.00	0.00
nitrogen.....	66.76	66.97	65.74
water vapor.....	17.27	17.12	18.34
Dry molecular weight.....	29.00	29.01	28.97
Wet molecular weight.....	27.10	27.12	26.96
Specific gravity.....	0.936	0.937	0.931
Water mass flow.....(LB/HR)	35954	35568	38863
FO	1.842	1.850	1.875

3.2 Results of Particulate Loading Determinations

Test No. 1
Unit 11 Pellitizer (North Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-24-90	07-24-90	07-24-90
Time run start/end.....(HRS)	935/1200	1230/1333	1350/1453
Static pressure.....(IN.WC)	-0.33	-0.33	-0.33
Cross sectional area (SQ.FT)	27.49	27.49	27.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	165.0	196.0	192.0
desiccant.....(GRAMS)	26.0	29.0	30.0
total.....(GRAMS)	191.0	225.0	222.0
Total particulate material..			
.....collected(grams)	0.0263	0.0169	0.0205
Gas meter coefficient.....	1.0031	1.0031	1.0031
Barometric pressure..(IN.HG)	29.50	29.50	29.50
Avg. orif.pres.drop..(IN.WC)	2.47	2.64	2.57
Avg. gas meter temp..(DEF-F)	106.5	115.8	112.4
Volume through gas meter....			
at meter conditions...(CF)	54.01	56.44	55.47
standard conditions.(DSCF)	50.07	51.50	50.91
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.243	.243	.243
Avg.stack gas temp ..(DEG-F)	144	144	145
Volumetric flow rate.....			
actual.....(ACFM)	102263	102520	102363
dry standard.....(DSCFM)	74706	73199	72999
Isokinetic variation.....(%)	95.4	100.2	99.3
Particulate concentration...			
actual.....(GR/ACF)	0.00592	0.00361	0.00443
dry standard.....(GR/DSCF)	0.00810	0.00506	0.00621
Particle mass rate...(LB/HR)	5.19	3.18	3.89

Test No. 4
Unit 11 Pellitizer (South Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-25-90	07-25-90	07-25-90
Time run start/end.....(HRS)	750/ 855	925/1028	1040/1142
Static pressure.....(IN.WC)	-0.30	-0.30	-0.30
Cross sectional area (SQ.FT)	27.49	27.49	27.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	188.0	187.0	193.0
desiccant.....(GRAMS)	24.0	28.0	21.0
total.....(GRAMS)	212.0	215.0	214.0
Total particulate material..			
.....collected(grams)	0.0215	0.0180	0.0223
Gas meter coefficient.....	1.0031	1.0031	1.0031
Barometric pressure..(IN.HG)	29.60	29.60	29.60
Avg. orif.pres.drop..(IN.WC)	2.37	2.29	2.29
Avg. gas meter temp..(DEF-F)	93.3	101.0	99.5
Volume through gas meter....			
at meter conditions...(CF)	52.17	51.73	51.59
standard conditions.(DSCF)	49.68	48.57	48.57
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.243	.243	.243
Avg.stack gas temp ..(DEG-F)	155	157	154
Volumetric flow rate.....			
actual.....(ACFM)	102131	99062	98477
dry standard.....(DSCFM)	72117	69347	69306
Isokinetic variation.....(%)	98.1	99.7	99.8
Particulate concentration...			
actual.....(GR/ACF)	0.00471	0.00400	0.00498
dry standard.....(GR/DSCF)	0.00668	0.00572	0.00708
Particle mass rate...(LB/HR)	4.13	3.40	4.21

Test No. 6
Unit 12 Pellitizer (North Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Time run start/end.....(HRS)	800/1007	1035/1137	1200/1312
Static pressure.....(IN.WC)	-0.15	-0.15	-0.15
Cross sectional area (SQ.FT)	27.49	27.49	27.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	163.0	195.0	202.0
desiccant.....(GRAMS)	47.0	19.0	23.0
total.....(GRAMS)	210.0	214.0	225.0
Total particulate material..			
.....collected(grams)	0.0157	0.0134	0.0133
Gas meter coefficient.....	1.0031	1.0031	1.0031
Barometric pressure..(IN.HG)	29.65	29.65	29.65
Avg. orif.pres.drop..(IN.WC)	2.15	1.86	1.93
Avg. gas meter temp..(DEF-F)	83.9	90.8	90.5
Volume through gas meter....			
at meter conditions...(CF)	49.48	46.32	47.19
standard conditions.(DSCF)	47.98	44.32	45.19
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.243	.243	.243
Avg.stack gas temp ..(DEG-F)	139	141	142
Volumetric flow rate.....			
actual.....(ACFM)	92962	88010	90819
dry standard.....(DSCFM)	67293	62421	63927
Isokinetic variation.....(%)	101.5	101.1	100.6
Particulate concentration...			
actual.....(GR/ACF)	0.00365	0.00331	0.00320
dry standard.....(GR/DSCF)	0.00505	0.00466	0.00454
Particle mass rate...(LB/HR)	2.91	2.50	2.49

90597

Test No. 9
Unit 12 Pellitizer (South Stack)

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

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Time run start/end.....(HRS)	1405/1510	1535/1645	1705/1808
Static pressure.....(IN.WC)	-0.10	-0.10	-0.10
Cross sectional area (SQ.FT)	27.49	27.49	27.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	166.0	182.0	184.0
desiccant.....(GRAMS)	24.0	15.0	16.0
total.....(GRAMS)	190.0	197.0	200.0
Total particulate material..			
.....collected(grams)	0.0177	0.0175	0.0200
Gas meter coefficient.....	1.0031	1.0031	1.0031
Barometric pressure..(IN.HG)	29.65	29.65	29.65
Avg. orif.pres.drop..(IN.WC)	1.65	1.76	1.77
Avg. gas meter temp..(DEF-F)	86.3	88.0	89.7
Volume through gas meter....			
at meter conditions...(CF)	43.47	44.95	45.17
standard conditions.(DSCF)	41.92	43.22	43.30
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.243	.243	.243
Avg.stack gas temp ..(DEG-F)	169	170	169
Volumetric flow rate.....			
actual.....(ACFM)	89676	89777	90456
dry standard.....(DSCFM)	61418	61391	61729
Isokinetic variation.....(%)	97.2	100.2	99.9
Particulate concentration...			
actual.....(GR/ACF)	0.00446	0.00427	0.00486
dry standard.....(GR/DSCF)	0.00652	0.00625	0.00713
Particle mass rate...(LB/HR)	3.43	3.29	3.77

29949

3.3 Results of Sulfur Dioxide Determinations

Test No. 2
Unit 11 Pellitizer (North Stack)

Results of Sulfur Dioxide Determinations----------Method 6

	Run 1	Run 2	Run 3
Date of run	07-24-90	07-24-90	07-24-90
Time run start/end.....(HRS)	1510/1610	1615/1715	1720/1820
Barometric pressure..(IN.HG)	29.50	29.50	29.50
Meter temperature....(DEG-F)	100.70	99.00	102.30
Meter correction coefficient	1.0031	1.0031	1.0031
Volume through gas meter....			
at meter conditions...(CF)	46.270	46.130	46.320
standard conditions..(SCF)	43.271	43.272	43.195
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	17.08	17.23	17.25
Volumetric flow rate (DSCFM)	73000	73000	73000
Oxygen content....(%V/V DRY)	17.60	17.50	17.40
Milliequivalents of SO4 in..			
gas sample.....	0.31	0.31	0.29
Sulfur dioxide concentration			
(GR/DSCF).....	0.0036	0.0036	0.0033
(MG/DSCM).....	8	8	8
(PPM-DRY).....	3	3	3
(PPM-WET).....	3	3	2
SO2 Emission rate....(LB/HR)	2.24	2.24	2.06
Sulfur dioxide emission.....			
.....factor (LB/MMBTU)*	0.028	0.027	0.025

* F = 8710 DSCF/MMBTU

Test No. 5
Unit 11 Pellitizer (South Stack)

Results of Sulfur Dioxide Determinations----------Method 6

	Run 1	Run 2	Run 3
Date of run	07-25-90	07-25-90	07-25-90
Time run start/end.....(HRS)	1155/1255	1320/1422	1435/1535
Barometric pressure..(IN.HG)	29.60	29.60	29.60
Meter temperature....(DEG-F)	96.40	96.10	96.20
Meter correction coefficient	1.0031	1.0031	1.0031
Volume through gas meter....			
at meter conditions...(CF)	46.140	46.250	46.020
standard conditions..(SCF)	43.630	43.757	43.532
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	16.74	17.29	16.92
Volumetric flow rate (DSCFM)	69300	69300	69300
Oxygen content....(%V/V DRY)	17.30	17.40	17.50
Milliequivalents of SO4 in..			
gas sample.....	0.29	0.31	0.29
Sulfur dioxide concentration			
(GR/DSCF).....	0.0033	0.0035	0.0033
(MG/DSCM).....	7	8	7
(PPM-DRY).....	3	3	3
(PPM-WET).....	2	3	2
SO2 Emission rate....(LB/HR)	1.94	2.10	1.94
Sulfur dioxide emission.....			
.....factor (LB/MMBTU)*	0.024	0.026	0.025

* F = 8710 DSCF/MMBTU

Test No. 7
Unit 12 Pellitizer (North Stack)

Results of Sulfur Dioxide Determinations----------Method 6

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Time run start/end.....(HRS) *	800/1006	1036/1136	1200/1310
Barometric pressure..(IN.HG)	29.65	29.65	29.65
Meter temperature....(DEG-F)	80.00	81.00	80.60
Meter correction coefficient	1.0065	1.0065	1.0065
Volume through gas meter....			
at meter conditions...(CF)	45.510	45.810	45.350
standard conditions..(SCF)	44.571	44.782	44.365
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	17.32	18.32	18.67
Volumetric flow rate (DSCFM)	67300	62400	63900
Oxygen content....(%V/V DRY)	17.30	17.20	17.00
Milliequivalents of SO4 in..			
gas sample.....	0.34	0.34	0.26
Sulfur dioxide concentration			
(GR/DSCF).....	0.0038	0.0037	0.0029
(MG/DSCM).....	9	9	7
(PPM-DRY).....	3	3	3
(PPM-WET).....	3	3	2
SO2 Emission rate....(LB/HR)	2.17	2.00	1.61
Sulfur dioxide emission.....			
.....factor (LB/MMBTU)*	0.027	0.026	0.020

*Plant down 0830-0936

* F = 8710 DSCF/MMBTU

Test No. 10
Unit 12 Pellitizer (South Stack)

Results of Sulfur Dioxide Determinations----------Method 6

	Run 1	Run 2	Run 3
Date of run	07-26-90	07-26-90	07-26-90
Time run start/end.....(HRS)	1405/1505	1535/1635	1705/1805
Barometric pressure..(IN.HG)	29.65	29.65	29.65
Meter temperature....(DEG-F)	78.30	81.20	83.80
Meter correction coefficient	1.0065	1.0065	1.0065
Volume through gas meter....			
at meter conditions...(CF)	44.830	44.860	45.990
standard conditions..(SCF)	44.043	43.837	44.726
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	17.27	17.12	18.34
Volumetric flow rate (DSCFM)	61400	61400	61700
Oxygen content....(%V/V DRY)	17.40	17.20	17.90
Milliequivalents of SO4 in..			
gas sample.....	0.34	0.36	0.39
Sulfur dioxide concentration			
(GR/DSCF).....	0.0038	0.0041	0.0043
(MG/DSCM).....	9	9	10
(PPM-DRY).....	3	4	4
(PPM-WET).....	3	3	3
SO2 Emission rate....(LB/HR)	2.00	2.16	2.27
Sulfur dioxide emission.....			
.....factor (LB/MMBTU)*	0.028	0.029	0.037

* F = 8710 DSCF/MMBTU

3.4 Results of Oxides of Nitrogen Determinations

Test No. 3
Unit 11 Pellitizer (North Stack)

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	* Run 1B	Run 1C	Run 1D
Date of run.....	07-24-90	07-24-90	07-24-90	07-24-90
Time of run.....(HRS)	935	950	1135	1145
Flask number.....	7	8	9	12
Volume of flask.....(ML)	2081	2088	2080	2111
Data: time of sampling				
flask temperature..(DEG-F)	99.00	99.00	96.00	96.00
bar. press.....(IN.HG)	29.50	29.50	29.50	29.50
flask vacuum.....(IN.HG)	26.80	27.20	27.20	27.30
flask abs. press...(IN.HG)	2.70	2.30	2.30	2.20
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	29.01	29.01	29.01	29.01
flask static press.(IN.HG)	-1.00	-3.10	-1.30	-3.10
flask abs. press...(IN.HG)	28.01	25.91	27.71	25.91
Volume gas sampled....(DSML)	1720	1609	1724	1633
Moisture content.....(%V/V)	15.24	15.24	15.24	15.24
Nitrate in gas sample...(uG)	520.0	1.0	473.0	431.0
NO2 in gas sample.....(uG)	385.8	0.7	351.0	319.8
NOx Concentration				
(GR/DSCF).....	0.0980	0.0002	0.0890	0.0856
(MG/DSCM).....	224	0	204	196
(PPM-DRY).....	117	0	106	102
(PPM-WET).....	99	0	90	87
NOX Emission rate....(LB/HR)	62.76	0.13	56.96	54.79

* Sample lost in the field. This result is not included in the average.

Test No. 3
Unit 11 Pellitizer (North Stack)

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	07-24-90	07-24-90	07-24-90	07-24-90
Time of run.....(HRS)	1230	1245	1300	1320
Flask number.....	11	10	19	20
Volume of flask.....(ML)	2062	2063	2069	2060
Data: time of sampling				
flask temperature..(DEG-F)	95.00	96.00	98.00	98.00
bar. press.....(IN.HG)	29.50	29.50	29.50	29.50
flask vacuum.....(IN.HG)	27.30	27.20	27.20	27.20
flask abs. press...(IN.HG)	2.20	2.30	2.30	2.30
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	29.01	29.01	29.01	29.01
flask static press.(IN.HG)	-1.90	-2.10	-0.20	0.20
flask abs. press...(IN.HG)	27.11	26.91	28.81	29.21
Volume gas sampled....(DSML)	1675	1656	1789	1808
Moisture content.....(%V/V)	17.08	17.08	17.08	17.08
Nitrate in gas sample...(uG)	437.0	442.0	399.0	381.0
NO2 in gas sample.....(uG)	324.2	328.0	296.0	282.7
NOx Concentration				
(GR/DSCF).....	0.0846	0.0865	0.0723	0.0683
(MG/DSCM).....	194	198	165	156
(PPM-DRY).....	101	104	87	82
(PPM-WET).....	84	86	72	68
NOX Emission rate....(LB/HR)	53.08	54.30	45.36	42.86

Test No. 3
Unit 11 Pellitizer (North Stack)

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	07-24-90	07-24-90	07-24-90	07-24-90
Time of run.....(HRS)	1350	1420	1435	1445
Flask number.....	21	23	22	24
Volume of flask.....(ML)	2068	2056	2031	2031
Data: time of sampling				
flask temperature..(DEG-F)	97.00	97.00	100.00	98.00
bar. press.....(IN.HG)	29.50	29.50	29.50	29.50
flask vacuum.....(IN.HG)	27.20	27.20	27.20	27.20
flask abs. press...(IN.HG)	2.30	2.30	2.30	2.30
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	29.01	29.01	29.01	29.01
flask static press.(IN.HG)	-2.20	0.00	-0.40	-1.80
flask abs. press...(IN.HG)	26.81	29.01	28.61	27.21
Volume gas sampled....(DSML)	1654	1791	1743	1651
Moisture content.....(%V/V)	17.05	17.05	17.05	17.05
Nitrate in gas sample...(uG)	366.0	380.0	316.0	334.0
NO2 in gas sample.....(uG)	271.6	282.0	234.5	247.8
NOx Concentration				
(GR/DSCF).....	0.0718	0.0688	0.0588	0.0656
(MG/DSCM).....	164	157	134	150
(PPM-DRY).....	86	82	70	79
(PPM-WET).....	71	68	58	65
NOX Emission rate....(LB/HR)	44.90	43.04	36.77	41.06

Test No. 8
Unit 12 Pellitizer

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	07-26-90	07-26-90	07-26-90	07-26-90
Time of run.....(HRS)	815	825	945	1000
Flask number.....	64	65	38	40
Volume of flask.....(ML)	2087	2068	2056	2093
Data: time of sampling				
flask temperature..(DEG-F)	88.00	88.00	85.00	84.00
bar. press.....(IN.HG)	29.65	29.65	29.65	29.65
flask vacuum.....(IN.HG)	27.30	27.30	27.30	27.30
flask abs. press...(IN.HG)	2.35	2.35	2.35	2.35
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	29.01	29.01	29.01	29.01
flask static press.(IN.HG)	0.70	0.80	1.00	2.80
flask abs. press...(IN.HG)	29.71	29.81	30.01	31.81
Volume gas sampled....(DSML)	1860	1850	1851	2007
Moisture content.....(%V/V)	17.11	17.11	17.11	17.11
Nitrate in gas sample...(uG)	434.0	485.0	608.0	573.0
NO2 in gas sample.....(uG)	322.0	359.9	451.1	425.2
NOx Concentration				
(GR/DSCF).....	0.0757	0.0850	0.1065	0.0926
(MG/DSCM).....	173	195	244	212
(PPM-DRY).....	91	102	127	111
(PPM-WET).....	75	84	106	92
NOX Emission rate....(LB/HR)	43.64	49.04	61.43	53.39

Test No. 8
Unit 12 Pellitizer

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	07-26-90	07-26-90	07-26-90	07-26-90
Time of run.....(HRS)	1045	1100	1115	1130
Flask number.....	41	42	28	30
Volume of flask.....(ML)	2076	2094	2031	2071
Data: time of sampling				
flask temperature..(DEG-F)	84.00	84.00	84.00	85.00
bar. press.....(IN.HG)	29.65	29.65	29.65	29.65
flask vacuum.....(IN.HG)	27.30	27.30	27.30	27.30
flask abs. press...(IN.HG)	2.35	2.35	2.35	2.35
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	29.01	29.01	29.01	29.01
flask static press.(IN.HG)	4.00	2.70	1.40	1.30
flask abs. press...(IN.HG)	33.01	31.71	30.41	30.31
Volume gas sampled....(DSML)	2072	2002	1855	1885
Moisture content.....(%V/V)	19.06	19.06	19.06	19.06
Nitrate in gas sample...(uG)	418.0	446.0	433.0	387.0
NO2 in gas sample.....(uG)	310.1	330.9	321.3	287.1
NOx Concentration				
(GR/DSCF).....	0.0654	0.0723	0.0757	0.0666
(MG/DSCM).....	150	165	173	152
(PPM-DRY).....	78	86	91	80
(PPM-WET).....	63	70	73	64
NOX Emission rate....(LB/HR)	34.99	38.65	40.49	35.60

Test No. 8
Unit 12 Pellitizer

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	07-26-90	07-26-90	07-26-90	07-26-90
Time of run.....(HRS)	1205	1220	1235	1250
Flask number.....	32	34	35	63
Volume of flask.....(ML)	2092	2071	2089	2067
Data: time of sampling				
flask temperature..(DEG-F)	81.00	81.00	78.00	78.00
bar. press.....(IN.HG)	29.65	29.65	29.65	29.65
flask vacuum.....(IN.HG)	27.30	27.30	27.10	27.10
flask abs. press...(IN.HG)	2.35	2.35	2.55	2.55
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	29.01	29.01	29.01	29.01
flask static press.(IN.HG)	1.30	-1.00	-0.90	-0.90
flask abs. press...(IN.HG)	30.31	28.01	28.11	28.11
Volume gas sampled....(DSML)	1903	1729	1737	1718
Moisture content.....(%V/V)	19.01	19.01	19.01	19.01
Nitrate in gas sample...(uG)	407.0	438.0	406.0	430.0
NO2 in gas sample.....(uG)	302.0	325.0	301.2	319.1
NOx Concentration				
(GR/DSCF).....	0.0693	0.0821	0.0758	0.0811
(MG/DSCM).....	159	188	173	186
(PPM-DRY).....	83	98	91	97
(PPM-WET).....	67	80	73	79
NOX Emission rate....(LB/HR)	37.97	44.98	41.51	44.44

3.5 Results of Opacity Observations

Test No. 1

Results of Opacity Observations - EPA Method 9*

Percent Opacity	Optical Density	Relative Frequency(%)
0	.0000	
5	.0223	
10	.0458	
15	.0706	
20	.0969	
25	.1249	
30	.1549	
35	.1871	
40	.2219	
45	.2596	
50	.3010	
55	.3468	
60	.3979	
65	.4559	
70	.5229	
75	.6021	
80	.6990	
85	.8239	
90	1.0000	
95	1.3010	
99	2.0000	

Observer: R. Eidem
Cert. Date: 04-18-90
Date of Observation: 07-24-90
Time of Observation: 0945

* Unable to read due to mixing plumes from multiple sources.

APPENDIX A

VOLUMETRIC FLOW RATE DETERMINATIONS

Test No. 1
Unit 11 Pellitizer (North Stack)

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

Date of Determination.....	07-24-90
Time of Determination.....(HRS)	835
Barometric pressure.....(IN.HG)	29.5
Pitot tube coefficient.....	.84
Number of sampling ports.....	4
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	71
Duct area.....(SQ.FT)	27.49
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.33
Avg. gas temp.....(DEG-F)	146
Moisture content.....(% V/V)	15.24
Avg. linear velocity.....(FT/SEC)	60.1
Gas density.....(LB/ACF)	.06090
Molecular weight.....(LB/LBMOLE)	29.00
Mass flow of gas.....(LB/HR)	362438
Volumetric flow rate.....	
actual.....(ACFM)	99182
dry standard.....(DSCFM)	72156

Test No. 4
No. 2 Boiler Stack

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

Date of Determination.....	09-27-90
Time of Determination.....(HRS)	830
Barometric pressure.....(IN.HG)	29.53
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	16
Shape of duct.....	Round
Stack diameter.....(IN)	110
Duct area.....(SQ.FT)	66.00
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1
Avg. gas temp.....(DEG-F)	273
Moisture content.....(% V/V)	12.60
Avg. linear velocity.....(FT/SEC)	72.9
Gas density.....(LB/ACF)	.05060
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	875973
Volumetric flow rate.....	
actual.....(ACFM)	288537
dry standard.....(DSCFM)	178839

Test No. 4
No. 2 Boiler Stack

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

Date of Determination.....	09-27-90
Time of Determination.....(HRS)	1000
Barometric pressure.....(IN.HG)	29.53
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	16
Shape of duct.....	Round
Stack diameter.....(IN)	110
Duct area.....(SQ.FT)	66.00
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1
Avg. gas temp.....(DEG-F)	275
Moisture content.....(% V/V)	13.55
Avg. linear velocity.....(FT/SEC)	73.1
Gas density.....(LB/ACF)	.05027
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	873452
Volumetric flow rate.....	
actual.....(ACFM)	289577
dry standard.....(DSCFM)	177050

Test No. 4
No. 2 Boiler Stack

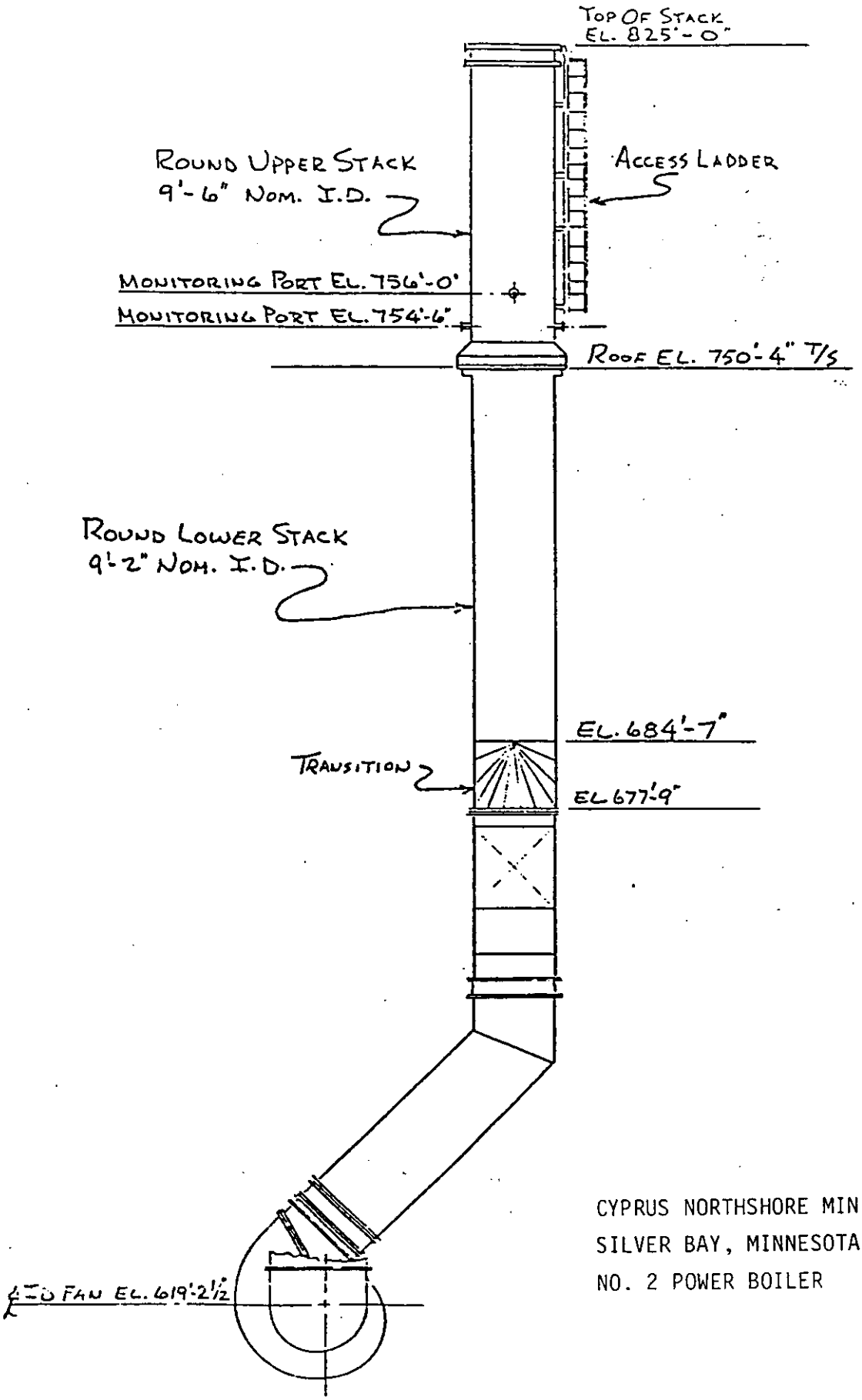
Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	09-27-90
Time of Determination.....(HRS)	1223
Barometric pressure.....(IN.HG)	29.53
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	16
Shape of duct.....	Round
Stack diameter.....(IN)	110
Duct area.....(SQ.FT)	66.00
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1
Avg. gas temp.....(DEG-F)	273
Moisture content.....(% V/V)	12.63
Avg. linear velocity.....(FT/SEC)	73.3
Gas density.....(LB/ACF)	.05059
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	880740
Volumetric flow rate.....	
actual.....(ACFM)	290142
dry standard.....(DSCFM)	179772

APPENDIX B

LOCATION OF TEST PORTS

(Test port locations for Pelletizer Stacks
not provided at time of report publication)



CYPRUS NORTHSHORE MINING
SILVER BAY, MINNESOTA
NO. 2 POWER BOILER

APPENDIX C

FIELD DATA SHEETS

TABLE OF CONTENTS

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING

Source UNITS 11 & 12 P.N.G.P. STACKS

Test ___ Run ___ Date ___

Stack dimen. 71 IN.

Dry bulb ___ °F Wet bulb ___ °F

Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure ___ in Hg

Static pressure ___ in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-6 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: 5 in.		Time start:	hrs
1	1/6	11.83	16.83		
2	3/6	35.50	40.50		
3	5/6	59.17	64.17		
		(NOx - SO2)			

Temp. meas. tool & S/N:	Time end: hrs

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

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job CYPRUS NORTH SHORE Date MINTEC 7-26-90 Bar. Pressure 29.65 IN.HG.
Test Location UNIT 12 P.W.G.P. Fuel Type GAS Sample Train No. 1
NORTH STACK Technician D. SMITH Pump No. 6

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	8-1-A	64	0815	27.30	88	☒ Yes ☐ No
2	8-1-B	65	0825	27.30	88	☒ Yes ☐ No
3	8-1-C	38	0945	27.30	85	☒ Yes ☐ No
4	8-1-D	40	1000	27.30	84	☒ Yes ☐ No
5	8-2-A	41	1045	27.30	84	☒ Yes ☐ No
6	8-2-B	42	1100	27.30	84	☒ Yes ☐ No
7	8-2-C	28	1115	27.30	84	☒ Yes ☐ No
8	8-2-D	30	1130	27.30	85	☒ Yes ☐ No
9	8-3-A	32	1205	27.30	81	☒ Yes ☐ No
10	8-3-B	34	1220	27.30	81	☒ Yes ☐ No
11	8-3-C	35	1235	27.10	78	☒ Yes ☐ No
12	8-3-D	63	1250	27.10	78	☒ Yes ☐ No
13	8-0-A	62	-BLANK-			☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

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Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job CYPRUS NORTHSHORE MINING Date 7-24-90 Bar. Pressure 29.50 IN.HG.

Test Location PELLITIZER Fuel Type GAS Sample Train No. 1

UNIT II W.G.P. NORTH STACK Technician D. SMITH Pump No. 4

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	3-1-A	7	0935	26.80	99	☒ Yes ☐ No
2	3-1-B	8	0950	27.20	99	☒ Yes ☐ No
3	3-1-C	9	1135	27.20	96	☒ Yes ☐ No
4	3-1-D	12	1145	27.30	96	☒ Yes ☐ No
5	3-2-A	17	1230	27.30	95	☒ Yes ☐ No
6	3-2-B	10	1245	27.20	96	☒ Yes ☐ No
7	3-2-C	19	1300	27.20	98	☒ Yes ☐ No
8	3-2-D	20	1320	27.20	98	☒ Yes ☐ No
9	3-3-A	21	1350	27.20	97	☒ Yes ☐ No
10	3-3-B	23	1420	27.20	97	☒ Yes ☐ No
11	3-3-C	22	1435	27.20	100	☒ Yes ☐ No
12	3-3-D	24	1445	27.20	98	☒ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

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INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING

Source PELLITIZER (UNIT 11 W.G.P. NORTH)

Test 1 Run 1-3 Date 7-24-90

Stack dimen. 71 IN.

Dry bulb 144 °F Wet bulb 137 °F

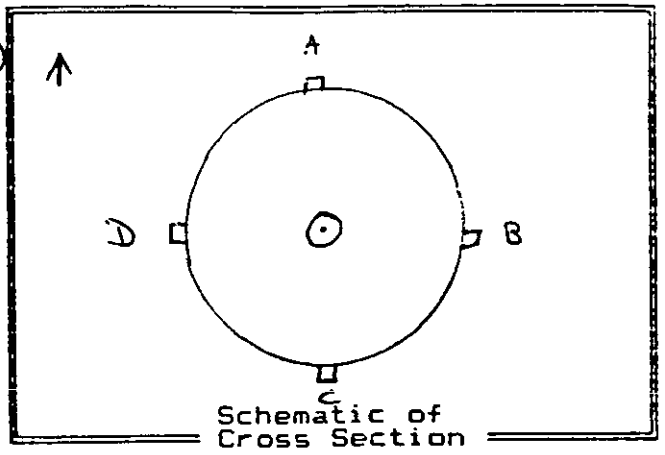
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.50 in Hg

Static pressure -.33 in WC

Operators D. SMITH & S. LONNES

Pitot No. 217-4 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: 5 in.		Time start: 0835 hrs	
A - 1	.021	1.49	6.49	.67	146
2	.067	4.76	9.76	1.00	
3	.118	8.38	13.38	1.06	
4	.177	12.57	17.57	1.05	
5	.252	17.75	22.75	1.05	
6	.356	25.28	30.28	1.07	
B - 1				.40	
2				.62	
3				.89	
4				1.04	
5				1.05	
6				1.07	
C - 1				.67	
2				.96	
3				1.00	
4				1.03	
5				1.02	
6				1.02	
D - 1				.72	
2				1.00	
3				1.04	
4				1.07	
5				1.06	
6				1.05	
			$\overline{\Delta p}$ =	.942	

Temp. meas. tool & S/N: PDT-1 DIGITAL T/C Time end: 0855 hrs

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

INTERFOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-24-90 Test 1 Run 1
Source UNIT 11 P.W.G.P. NORTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: (0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No.s of filters used: #2491

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	669	504	165
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1385	1359	26
Total			191

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 5 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 0935 (HRS) Time end: 1200 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

CF-D11

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. LONNES Pitot No. 214-4 Cp .840
Source UNIT 11 P.H.G.P. NORTH STACK Meter Box No. 6 ΔH 1.93 IN WC Bar. Press. 29.50 inHg H2O 1.9 x
Date 7-24-90 Test 1 Run 1 Counter coeff. 1.0037 Nozzle No. E-4 Nozzle Dia .243 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)
	(0935)	(102.70)											
B - 6	2.5	104.96	1.08	2.61	5.00	6.8	142	256	249	43	96	95	17.2
5	5	107.31	1.10	2.67	7.33	7.1	139			43	96	95	17.2
4	7.5	109.61	1.08	2.59	9.62	7.2	147			44	98	96	17.1
3	10	111.78	.95	2.28	1.78	6.4	148	258	254	44	99	97	17.1
2	12.5	113.64	.70	1.69	3.64	5.0	146			45	100	97	17.2
1	15	115.16	.45	1.09	5.14	3.8	145			45	100	98	17.2
A - 6	17.5	117.45	1.08	2.61	7.45	7.2	146	257	255	45	103	99	17.5
5	20	119.78	1.10	2.68	9.80	7.5	143			46	104	100	17.4
4	22.5	122.14	1.09	2.65	2.14	7.5	145			46	105	101	17.4
3	25	124.45	1.08	2.60	4.45	7.3	152	257	255	47	107	102	17.4
2	27.5	126.73	1.05	2.54	6.74	7.3	152			47	107	102	17.4
1	30	128.66	.70	1.69	8.62	5.0	152			47	107	102	17.4
1015 HRS. → D - 6	32.5	130.96	1.10	2.66	0.96	7.1	152	258	256	48	108	103	20.2
1130 → 5	35	133.45	1.20	2.95	3.43	7.3	142			45	112	110	17.5
4	37.5	135.89	1.16	2.89	5.89	7.3	140			45	113	110	17.5
3	40	138.28	1.10	2.74	8.28	7.3	140	260	258	46	114	110	17.3
2	42.5	140.63	1.06	2.64	0.64	7.2	140			46	115	111	17.3
1	45	142.68	.78	1.95	2.67	5.3	140			47	116	111	17.3
C - 6	47.5	145.12	1.15	2.87	5.12	7.3	142	259	257	48	116	112	17.4
5	50	147.58	1.15	2.93	7.60	7.8	130			48	116	112	17.4
4	52.5	150.04	1.12	2.85	0.05	7.6	130			49	117	112	17.3
3	55	152.40	1.08	2.69	2.43	7.4	143	258	257	49	117	113	17.4
2	57.5	154.72	1.00	2.50	4.72	7.0	143			50	118	113	17.4
1	60	156.71	.75	1.87	6.71	5.2	145	258	256	50	118	113	17.4
	(1200)												
	θ = 60	Vm = 54.01		ΔH = 2.47							Avg. = 106.5		

C-6

S-0037R

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 2-24-90 Test 1 Run 2
Source UNIT 11 P.W.G.P. NORTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No.s of filters used: # 2492

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	698	502	196
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1485	1456	29
Total			225

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 5 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1230 (HRS) Time end: 1333 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING
Source UNIT #11 W.G.P. NORTH STACK
Date 7-24-90 Test 1 Run 2

Operators D. SMITH & S. CONNES
Meter Box No. 6 ΔH 1.82 IN WC
Counter coeff. 1.0031

Pitot No. 214 Cp .840
Bar. Press. 29.50 inHg H2O 76 %
Nozzle No. S-4 Nozzle Dia. .253 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)
	(1230)	(157.00)											
C - 6	2.5	159.45	1.10	2.92	2.45	7.8	134	254	253	46	112	111	17.9
5	5	161.94	1.10	2.96	1.94	7.9	131			46	112	112	17.5
4	7.5	164.41	1.10	2.91	4.41	8.0	140			47	114	113	17.4
3	10	166.83	1.08	2.84	6.85	7.8	145	256	255	47	114	112	17.3
2	12.5	169.26	1.05	2.75	9.26	7.8	147			47	115	113	17.2
1	15	171.27	.73	1.92	1.27	5.2	147			48	115	113	17.2
D - 6	17.5	173.75	1.11	2.92	3.75	7.9	147	256	256	48	116	113	17.3
5	20	176.21	1.09	2.92	6.23	8.0	135			49	117	114	17.3
4	22.5	178.67	1.07	2.83	8.67	8.0	145			49	117	114	17.2
3	25	181.10	1.07	2.83	1.11	8.0	145	257	256	49	118	114	17.2
2	27.5	183.47	1.00	2.65	3.47	7.8	145			50	118	114	17.2
1	30	185.59	.80	2.12	5.59	6.0	145			50	118	115	17.3
A - 6	32.5	188.07	1.10	2.91	8.07	8.1	145	258	256	50	119	115	17.4
5	35	190.53	1.08	2.86	0.53	8.1	146			51	119	115	17.3
4	37.5	192.98	1.09	2.87	2.99	8.2	148			51	119	115	17.3
3	40	195.44	1.08	2.85	5.44	8.2	148	258	256	52	119	116	17.4
2	42.5	197.86	1.06	2.79	7.87	8.1	150			52	119	116	17.4
1	45	200.00	.81	2.14	0.00	6.0	149			53	119	116	17.4
B - 6	47.5	202.48	1.10	2.90	2.48	8.1	149	257	255	53	119	116	17.4
5	50	204.95	1.10	2.94	4.97	8.2	141			54	119	116	17.5
4	52.5	207.45	1.08	2.86	7.43	8.1	145			54	119	116	17.5
3	55	209.79	.98	2.60	9.78	7.1	145	258	256	55	119	116	17.6
2	57.5	211.72	.67	1.78	1.72	5.2	144			55	119	116	17.6
1	60	213.44	.52	1.39	3.44	4.8	143	258	256	55	119	116	17.5
	(1333)												
	θ = 60	Vs = 56.44		ΔH = 2.64							Avg. = 115.8		

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-24-90 Test 1 Run 3
Source UNIT 11 P.C.G.P. NORTH STACK No. of traverse points 24
Method 5 Filter holder: GCASS Filter type: 4" G.F. FILTER

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac)
Postest: 0.00 cfm at 10 in. Hg. (vac)

Particulate Catch Data:

No.s of filters used: #2493

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	695	503	192
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1415	1385	30
Total			222

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 5 Bag No. 3

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 15 in. Hg.

Time start: 1350 (HRS) Time end: 1453 (HRS)

Sampling rate: 400 cc/min Operator: D.S.

S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. CONNES Pitot No. 214-4 Cp .840
Source UNIT 11 P.W.G.P. NORTH STACK Meter Box No. 6 ΔH 1.82 IN WC Bar. Press. 29.50 inHg ΔH2O 67 X
Date 7-24-90 Test 1 Run 3 Counter coeff. 1.0031 Nozzle No. 8-4 Nozzle Dia .243 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)
	(1350)	213.70											
B - 6	2.5	216.15	1.10	2.87	6.15	7.2	142	252	254	48	114	113	17.4
5	5	218.61	1.12	2.93	8.63	7.6	137			48	115	113	17.3
4	7.5	221.06	1.10	2.84	1.08	7.8	146			49	115	114	17.3
3	10	223.35	.95	2.46	3.35	6.8	146	256	255	49	116	114	17.2
2	12.5	225.35	.72	1.87	5.34	5.2	145			49	116	114	17.3
1	15	226.96	.48	1.25	6.96	3.9	144			49	116	114	17.3
A - 6	17.5	229.41	1.10	2.85	9.41	7.9	145	256	256	50	115	113	17.5
5	20	231.86	1.10	2.85	1.86	8.0	144			50	115	113	17.8
4	22.5	234.30	1.10	2.83	4.30	8.0	148			51	115	113	17.8
3	25	236.73	1.08	2.77	6.71	7.9	150	258	256	51	115	112	17.7
2	27.5	239.11	1.07	2.74	9.11	7.9	150			51	114	112	17.6
1	30	241.32	.90	2.33	1.32	6.8	144			51	114	112	17.7
D - 6	32.5	243.75	1.09	2.81	3.75	8.0	145	258	255	52	113	111	17.8
5	35	246.19	1.09	2.83	6.19	8.0	140			52	113	111	17.8
4	37.5	248.57	1.07	2.76	8.59	8.0	145			52	113	110	17.8
3	40	250.99	1.05	2.70	0.97	8.0	146	257	255	53	113	110	17.8
2	42.5	253.23	.95	2.44	3.23	7.5	146			53	113	110	17.8
1	45	255.27	.77	1.98	5.27	6.0	145			53	113	110	17.8
C - 6	47.5	257.74	1.10	2.83	7.70	8.2	145	256	256	54	112	109	17.8
5	50	260.16	1.10	2.84	0.14	8.2	142			54	112	109	17.9
4	52.5	262.57	1.09	2.81	2.57	8.2	142			54	112	109	17.8
3	55	264.99	1.08	2.77	4.97	8.1	147	256	257	55	111	108	18.0
2	57.5	267.28	1.00	2.55	7.28	7.1	148			55	111	108	17.6
1	60	269.17	.67	1.71	9.17	5.0	148	257	257	55	111	108	17.5
	(1453)												
	θ = 60	Vm = 55.47		ΔH = 257							Avg. = 112.4		

INTERFOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-24-90 Test 2 Run 1
Source UNIT 11 P.W.G.P. NORTH STACK No. of traverse points 3
Method 6 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check: N/A

Pretest: ☒ 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: ____ cfm at ____ in. Hg. (vac) ☐

Particulate Catch Data: N/A

No.s of filters used: Recovery solvent(s)

☐ acetone
☐ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data: N/A

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
Total			

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1510 (HRS) Time end: 1610 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: Y

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INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CYPRUS NORTHSHORE MINING Operator(s) D. SMITH & S. LONNES
Source UNIT 11 P.N.G.P. NORTH STACK Meter Box No. 6 Gasmeter coef. 1.0031
Date 7-24-90 Test 2 Run 1 ΔH@ 1.82 in.WC Bar. press 29.50 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1510)	(269.40)								
C-3	5	273.25	1.82	5.0	256	255	48	101	101	17.7
3	10	277.16	1.82	5.1	257	255	48	102	101	17.8
3	15	280.96	1.82	5.2	257	256	49	103	100	17.9
3	20	284.87	1.82	5.2	258	256	49	103	100	17.6
2	25	288.72	1.82	5.2	258	257	50	104	100	17.7
2	30	292.49	1.82	5.2	257	257	51	103	100	17.6
2	35	296.35	1.82	5.3	257	256	51	103	99	17.7
2	40	300.26	1.82	5.3	258	256	51	102	99	17.7
1	45	304.10	1.82	5.3	258	257	52	102	98	17.8
1	50	307.95	1.82	5.3	257	256	52	101	98	17.7
1	55	311.80	1.82	5.3	257	256	53	101	98	17.8
1	60	315.67	1.82	5.3	257	256	53	101	97	17.7
	(1610)									
	θ= 60	V_m= 46.27	(ΔH)avg= 1.82					$(t_m)_{avg.}$ = 100.7		

Condensate Data:

Item	Weight(g) Final	Tare	Difference
Impingers	675	503	172
Condenser			
Desiccant	1502	1485	17
		Total	189

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-24-90 Test 2 Run 2
Source UNIT II P.W.G.P. NORTH STACK No. of traverse points 3
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check: N/A

Pretest: ☒ 0.02 cfm at 15 in. Hg. (vac) ☐
Postest: ____ cfm at ____ in. Hg. (vac) ☐

Particulate Catch Data: N/A

No.s of filters used: Recovery solvent(s)

_____ ☐ acetone _____
_____ ☐ other(s) _____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data: N/A

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
Total			

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1615 (HRS) Time end: 1715 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

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INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CYPRUS NORTH SHORE MINING Operator(s) D. SMITH & K. LOVNES
Source UNIT 11 P.U.G.P. NORTH STACK Meter Box No. 6 Gasmeter coef. 1.0031
Date 7-24-90 Test 2 Run 2 ^H@ 1.82 in.WC Bar. press 29.50 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	(1615)	(315.85)								
C-3	5	319.70	1.82	5.0	256	251	49	98	96	17.7
3	10	323.53	1.82	5.0	257	257	49	99	96	17.8
3	15	327.42	1.82	5.1	258	257	49	99	95	17.8
3	20	331.21	1.82	5.1	258	256	50	98	94	17.8
2	25	335.12	1.82	5.1	259	256	50	99	95	17.9
2	30	338.86	1.82	5.2	259	257	51	101	96	17.9
2	35	342.72	1.82	5.2	259	258	52	102	97	17.9
2	40	346.57	1.82	5.2	259	258	52	103	98	17.9
1	45	350.35	1.82	5.2	258	258	53	104	98	17.7
1	50	354.22	1.82	5.3	258	256	54	104	99	17.6
1	55	358.14	1.82	5.3	257	256	54	104	99	17.7
1	60	361.98	1.82	5.3	257	256	55	103	98	17.7
	(1715)									
	θ= 60	V_m= 46.13	$(\Delta H)_{avg}$= 1.82					$(t_m)_{avg.}$ = 99.0		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	663	496	167
Condenser			
Desiccant	1363	1339	24
		Total	191

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-24-90 Test 2 Run 3
Source UNIT 11 P.W.G.P. NORTH STACK No. of traverse points 3
Method 6 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check: N/A

Pretest: 0.02 cfm at 15 in. Hg. (vac) ☐
Postest: ____ cfm at ____ in. Hg. (vac) ☐

Particulate Catch Data: N/A

No.s of filters used: Recovery solvent(s)

_____ ☐ acetone _____
_____ ☐ other(s) _____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data: N/A

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
Total			

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1720 (HRS) Time end: 1820 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

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INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CYPRUS NORTHSHORE MINING Operator(s) D. SMITH & S. CONNES
Source UNIT 11 P.W.G.P. NORTH STACK Meter Box No. 6 Gasmeter coef. 1.0031
Date 7-24-90 Test 2 Run 3 ^H@ 1.82 in.WC Bar. press 29.50 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	(1720)	(362.15)								
C-3	5	366.00	1.82	5.1	256	257	50	101	98	17.7
3	10	369.91	1.82	5.1	258	257	51	103	99	17.6
3	15	373.74	1.82	5.1	258	256	51	103	99	17.5
3	20	377.60	1.82	5.2	259	256	52	104	100	17.5
2	25	381.50	1.82	5.2	260	257	52	104	100	17.4
2	30	385.34	1.82	5.2	259	258	53	105	100	17.4
2	35	389.20	1.82	5.2	259	258	53	105	100	17.4
2	40	393.07	1.82	5.2	258	258	54	105	100	17.3
1	45	396.94	1.82	5.2	258	257	54	105	101	17.3
1	50	400.83	1.82	5.2	258	256	55	106	102	17.3
1	55	404.62	1.82	5.2	257	256	55	106	102	17.4
1	60	408.47	1.82	5.2	257	256	55	105	101	17.3
	(1820)									
	θ= 60	V_m= 46.32	(^H)avg= 1.82					$(t_m)_{avg.}$ = 102.3		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	661	490	171
Condenser			
Desiccant	1440	1420	20
	Total		191

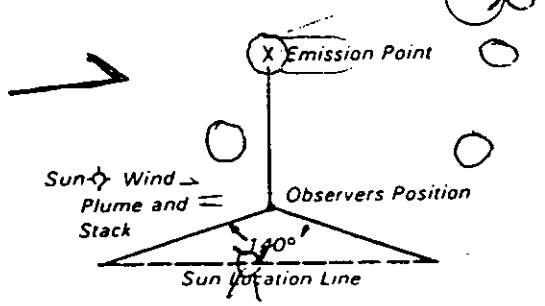
Preliminary results of SO_2 concentration determination		
V_{std}	=	DSCF
Moisture	=	%v/v
SO_2, dry	=	ppm
SO_2, wet	=	ppm
LB/MMBtu	=	

Interpoll Laboratories
(612)786-6020

Visible Emissions Form

SOURCE NAME: Cyprus North Shore Mining	OBSERVATION DATE: 7-24-90	START TIME: 0945
ADDRESS:		
CITY: Silver Bay / STATE: MN / ZIP: 55614		
PHONE: / SOURCE ID NUMBER:		
PROCESS EQUIPMENT: #11 WPG North / OPERATING MODE: 100%		
CONTROL EQUIPMENT: ESP & Scrubbers / OPERATING MODE: 100%		
DESCRIBE EMISSION POINT: START Round metal Stack STOP ✓		
HEIGHT ABOVE GROUND LEVEL: START 175' STOP ✓ / HEIGHT RELATIVE TO OBSERVER: START 175' STOP ✓		
DISTANCE FROM OBSERVER: START 525' STOP ✓ / DIRECTION FROM OBSERVER: START SW STOP ✓		
DESCRIBE EMISSIONS: START attached water vapor STOP ✓		
EMISSION COLOR: START white STOP ✓ / 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 / STOP		
DESCRIBE BACKGROUND: START Sky / STOP		
BACKGROUND COLOR: START blue STOP ✓ / SKY CONDITIONS: START clear STOP ✓		
WIND SPEED: START 1-5mph STOP ✓ / WIND DIRECTION: START S STOP ✓		
AMBIENT TEMP: START 66° STOP / WET BULB TEMP: 62° / RH percent: 80%		

Source Layout Sketch — Draw North Arrow



O - indicate other active emission sites

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

AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS: MINIMUM / MAXIMUM	
OBSERVER'S NAME (PRINT): RICHARD J. EIDEM	
OBSERVER'S SIGNATURE: Richard J. Eidem	DATE: 7-24-90
ORGANIZATION: INTERPOLL INC.	
CERTIFIED BY: ETA INC.	DATE: 4-18-90
VERIFIED BY	DATE

COMMENTS: Multiple Source Emission

9 sources mixing plumes together

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

S-0079R

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Ricky Eidem

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

Thomas Hose
President

Vice President

David Savage
Program Manager

226182
Certificate Number

St Paul
Location

April 18, 1990
Date of Issue

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING

Source UNIT 11 P.W.G.P. SOUTH STACK

Test 4 Run 1-3 Date 7-25-90

Stack dimen. 71 IN.

Dry bulb ____ °F Wet bulb ____ °F

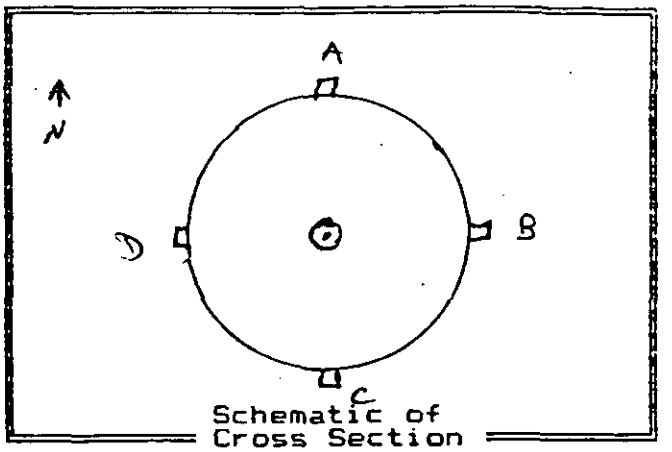
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.60 in Hg

Static pressure -.30 in WC

Operators D. SMITH & S. LONNES

Pitot No. 218-4 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: 5 in.		Time start:	hrs
A - 1	.021	1.49	6.49		
2	.067	4.76	9.76		
3	.118	8.38	13.38		
4	.177	12.57	17.57		
5	.250	17.75	22.75		
6	.356	25.28	30.28		
B - 1					
2					
3					
4					
5					
6					
C - 1				.43	
2				.50	
3				.67	
4				.70	
5				.85	
6				.91	
D - 1					
2					
3					
4					
5					
6					
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end:	hrs

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

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-25-90 Test 4 Run 1
Source UNIT 11 P.W.G.P. SOUTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ~~S~~
Postest: 0.00 cfm at 10 in. Hg. (vac) ~~S~~

Particulate Catch Data:

No.s of filters used: # 2495

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	680	492	188
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1360	1336	24
Total			212

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 5 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 0750 (HRS) Time end: 0855 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING
Source UNIT 11 P.W.G.P. SOUTH STACK
Date 7-25-90 Test 4 Run 1

Operators D. SMITH & S. LOWNES
Meter Box No. 6 - AHF 1.87 IN WC
Coefficient coeff. 1.0031

Pitot No. 214-4 Cp .840
Bar. Press. 29.60 inHg H2O 17 X
Nozzle No. 8-4 Nozzle Dia .243 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dev. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (x v/v)
	(0750)	(408.70)											
D - 6	2.5	411.04	1.15	2.80	1.05	7.9	152	254	252	45	85	82	17.4
5	5	413.36	1.10	2.68	3.35	7.8	152			45	88	84	17.5
4	7.5	415.60	1.02	2.51	5.59	7.2	150			45	88	84	17.4
3	10	417.66	.86	2.11	7.64	6.0	152	257	255	46	90	85	17.4
2	12.5	419.58	.75	1.84	9.57	5.2	152			46	91	85	17.4
1	15	421.36	.65	1.61	1.36	4.8	150			46	92	86	17.5
A - 6	17.5	423.68	1.10	2.71	3.69	7.2	151	258	256	46	93	87	17.7
5	20	425.95	1.06	2.61	5.98	7.2	153			47	94	88	17.7
4	22.5	428.35	1.15	2.84	8.37	8.0	152			47	95	89	17.7
3	25	430.53	.93	2.29	0.53	6.8	155	259	257	47	96	90	17.7
2	27.5	432.66	.91	2.24	2.66	6.6	156			48	96	90	17.8
1	30	434.46	.65	1.60	4.46	4.9	156			48	97	90	17.8
B - 6	32.5	436.90	1.20	2.96	6.90	8.2	156	258	257	48	98	91	17.8
5	35	439.34	1.20	2.95	9.35	8.4	158			48	99	92	17.6
4	37.5	441.66	1.08	2.67	1.67	7.8	158			49	99	92	17.7
3	40	443.87	.98	2.36	3.86	6.5	160	258	257	49	99	93	17.6
2	42.5	445.95	.86	2.12	5.94	6.0	159			49	100	93	17.6
1	45	447.66	.58	1.44	7.66	4.2	157			50	100	94	17.7
C - 6	47.5	450.12	1.20	2.98	0.12	8.2	158	257	258	50	100	94	17.7
5	50	452.50	1.15	2.84	2.52	8.1	158			51	102	95	17.7
4	52.5	454.80	1.05	2.60	4.82	7.4	159			51	102	95	17.6
3	55	457.02	.95	2.35	7.02	6.9	159	258	257	51	102	96	17.6
2	57.5	459.09	.85	2.11	9.09	6.1	159			52	103	96	17.6
1	60	460.87	.62	1.54	0.87	4.9	159	258	257	52	103	96	17.6
	(0855)												
	θ = 60	Vs = 52.17		^H = 2.37							Avg.	= 93.3	

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-25-90 Test 4 Run 2
Source UNIT 11 P.W.E.P. SOUTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No.s of filters used: #2496

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	682	495	187
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1475	1447	28
Total			215

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 5 Bag No. 2

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 15 in. Hg.

Time start: 0925 (HRS) Time end: 1028 (HRS)

Sampling rate: 400 cc/min Operator: D.S.

S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. LOWNES Pitot No. 21B-4 Cp .840
Source UNIT 11 P.W.G.P. SOUTH STACK Meter Box No. 6 ΔH 1.82 IN WC Bar. Press. 29.60 inHg H2O 12.6 X
Date 7-25-90 Test 4 Run 2 Calibrator coeff. 1.0031 Nozzle No. 5-4 Nozzle Dia .243 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 (x v/v)
	0925	461.05											
C - 6	2.5	463.29	1.00	2.47	3.28	6.8	155	254	255	47	96	94	17.7
5	5	465.42	.92	2.27	5.43	6.3	157			47	98	95	17.5
4	7.5	467.51	.86	2.12	7.51	6.1	160			47	100	95	17.4
3	10	469.51	.80	1.98	9.51	5.9	160	257	256	47	100	96	17.4
2	12.5	471.46	.75	1.85	1.46	5.6	161			48	101	96	17.4
1	15	473.20	.60	1.48	3.20	4.8	161			48	102	97	17.4
B - 6	17.5	475.67	1.22	3.02	5.69	8.8	160	258	256	48	102	97	17.5
5	20	478.10	1.18	2.93	8.13	8.8	158			49	103	98	17.6
4	22.5	480.47	1.10	2.73	0.49	8.5	161			49	104	98	17.5
3	25	482.71	.95	2.36	2.70	7.2	160	259	258	50	104	99	17.5
2	27.5	484.79	.84	2.09	4.77	6.1	160			50	105	99	17.6
1	30	486.65	.69	1.72	6.65	5.4	158			50	105	99	17.6
A - 6	32.5	489.10	1.20	2.99	9.13	8.5	159	258	258	51	104	99	17.6
5	35	491.48	1.10	2.75	1.50	8.4	156			51	105	100	17.6
4	37.5	493.86	1.08	2.71	3.86	8.4	155			51	105	100	17.5
3	40	496.09	.95	2.39	6.08	7.2	155	258	257	52	106	100	17.6
2	42.5	498.10	.79	1.98	8.10	6.0	156			52	106	100	17.6
1	45	499.90	.62	1.56	9.90	4.9	155			53	106	100	17.6
D - 6	47.5	502.33	1.15	2.88	2.33	8.2	156	259	257	53	105	100	17.6
5	50	504.72	1.10	2.77	4.71	8.1	154			53	105	100	17.5
4	52.5	506.96	.97	2.45	6.96	7.2	152			54	106	101	17.5
3	55	509.05	.85	2.15	9.06	6.5	152	259	257	54	106	101	17.6
2	57.5	511.01	.73	1.85	1.01	5.8	152			55	105	101	17.8
1	60	512.78	.60	1.52	2.78	5.0	152	259	257	55	106	101	17.8
	1028												
	θ = 60	Vm = 51.73		ΔH = 2.29							Avg. = 101.0		

S-0037R

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-25-90 Test 4 Run 3
Source UNIT 11 P.W.G.P. SOUTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: (0.02 cfm at 15 in. Hg. (vac)
Postest: 0.00 cfm at 10 in. Hg. (vac)

Particulate Catch Data:

No.s of filters used: # 2497

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	685	492	193
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1379	1358	21
Total			214

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 5 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1040 (HRS) Time end: 1142 (HRS)
Sampling rate: 400 cc/min Operator: DS.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING
Source UNIT 11 P.W.B.P. SOUTH STACK
Date 7-25-90 Test 4 Run 3

Operators D. SMITH & S. LONNES
Meter Box No. 6 ΔH 1.83 IN WC
Gas meter coeff. 1.0031

Pitot No. 210-4 Cp .840
Bar. Press. 29.60 inHg H2O 17 %
Nozzle No. S-4 Nozzle Dia .243 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Gas Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas In	Gas Out	Oxygen (xx/v)
	(1040	(512.95)											
D - 6	2.5	515.28	1.07	2.69	5.29	6.8	152	252	255	48	99	97	12.6
5	5	517.61	1.05	2.63	7.61	6.8	152			48	100	97	17.7
4	7.5	519.84	.98	2.46	9.85	6.4	150			48	100	97	17.6
3	10	521.84	.78	1.96	1.85	5.2	151	255	256	48	101	97	17.5
2	12.5	523.71	.67	1.69	3.71	4.7	150			49	101	97	17.5
1	15	525.40	.55	1.38	5.40	4.0	151			49	101	97	17.6
C - 6	17.5	527.72	1.05	2.64	7.72	7.0	150	258	257	50	102	97	17.6
5	20	529.96	1.00	2.51	9.98	6.9	152			50	102	98	17.7
4	22.5	532.13	.90	2.26	2.14	6.1	152			50	102	97	17.6
3	25	534.11	.76	1.91	4.11	5.3	152	259	257	50	102	97	17.5
2	27.5	535.96	.65	1.64	5.95	4.8	151			51	102	97	17.6
1	30	537.59	.52	1.31	7.59	3.9	151			51	102	97	17.6
A - 6	32.5	540.12	1.25	3.13	0.12	8.5	152	258	258	51	102	97	17.6
5	35	542.58	1.20	3.00	2.59	8.2	155			52	103	98	17.7
4	37.5	544.94	1.10	2.75	4.96	7.3	155			52	103	98	17.6
3	40	547.21	1.00	2.50	7.22	7.0	156	259	258	53	103	98	17.5
2	42.5	549.22	.78	1.95	9.22	5.2	156			53	102	97	17.4
1	45	551.02	.63	1.58	1.02	4.5	155			54	102	97	17.4
B - 6	47.5	553.48	1.20	2.99	3.49	8.0	156	259	258	54	101	97	17.4
5	50	555.93	1.20	2.98	5.96	8.0	158			54	102	97	17.4
4	52.5	558.31	1.10	2.72	8.32	7.4	160			55	102	98	17.4
3	55	560.57	1.00	2.48	0.57	7.0	160	258	257	55	102	98	17.5
2	57.5	562.65	.85	2.11	2.65	5.9	161			56	103	98	17.5
1	60	564.54	.70	1.74	4.54	5.0	160	258	257	56	103	98	17.5
	(1142												
	θ = 60	Vm = 51.59		ΔH = 2.29							Avg. = 99.5		

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-25-90 Test 5 Run 1
Source UNIT 11 P.W.G.P. SOUTH STACK No. of traverse points 3
Method 6 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check: N/A

Pretest: ☒ 0.02 cfm at 15 in. Hg. (vac) ☐
Postest: ____ cfm at ____ in. Hg. (vac) ☐

Particulate Catch Data: N/A

No.s of filters used: Recovery solvent(s)

____ ☐ acetone ____
____ ☐ other(s) ____

No. of probe wash bottles: ____
Sample recovered by: ____

Condensate Data: N/A

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
Total			

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1155 (HRS) Time end: 1255 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

S-0046RR

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CYPRUS NORTHSHORE MINING Operator(s) D. SMITH & S. LOWNES

Source UNIT 11 P.W.G.P. SOUTH STACK Meter Box No. 6 Gasmeter coef. 1.0031

Date 7-25-90 Test 5 Run 1 ΔH@ 1.82 in.WC Bar. press 29.60 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	(1155)	(564.75)								
B-3	5	568.58	1.82	5.0	256	255	48	95	94	17.7
3	10	572.42	1.82	5.1	257	255	48	96	95	17.7
3	15	576.25	1.82	5.2	257	256	49	97	95	17.7
3	20	580.07	1.82	5.2	258	257	49	97	95	17.7
2	25	583.91	1.82	5.4	258	257	49	97	95	17.8
2	30	587.76	1.82	5.4	259	258	49	98	95	17.8
2	35	591.61	1.82	5.5	258	258	50	98	95	17.8
2	40	595.47	1.82	5.5	258	258	50	98	95	17.7
1	45	599.31	1.82	5.5	259	257	49	98	95	17.8
1	50	603.15	1.82	5.5	259	257	50	99	96	17.8
1	55	607.01	1.82	5.5	259	258	50	100	96	17.6
1	60	610.89	1.82	5.6	259	258	50	99	96	17.6
	(1255)									
	θ= 60	V_m=46.14	(ΔH)avg=1.82					$(t_m)_{avg.}$ = 96.4		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	658	497	161
Condenser			
Desiccant	1430	1405	25
		Total	186

Preliminary results of SO_2 concentration determination		
V_{std}	=	DSCF
Moisture	=	%v/v
SO_2, dry	=	ppm
SO_2, wet	=	ppm
LB/MMBtu	=	

INTERFOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-25-90 Test 5 Run 2
Source UNIT 11 P.W.G.P. SOUTH STACK No. of traverse points 3
Method 6 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check: N/A

Pretest: ☐ 0.02 cfm at 15 in. Hg. (vac) ☐
Postest: ____ cfm at ____ in. Hg. (vac) ☐

Particulate Catch Data: N/A

No.s of filters used: Recovery solvent(s)

_____ ☐ acetone _____
_____ ☐ other(s) _____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data: N/A

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
Total			

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1320 (HRS) Time end: 1422 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CYPRUS NORTHSHORE MINING Operator(s) D. SMITH & S. LOVVES

Source UNIT 11 P.W.G.P. SOUTH STACK Meter Box No. 6 Gasmeter coef. 1.0031

Date 7-25-90 Test 5 Run 2 ^H@ 1.82 in.WC Bar. press 29.60 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen (%v/v)
					Probe	Oven	Impg.	Gas/In	Gas/Out	
	(1329)	(611.20)								
B-3	5	615.00	1.82	5.1	255	252	48	96	94	17.7
3	10	618.87	1.82	5.3	257	255	49	97	94	17.7
3	15	622.75	1.82	5.3	257	254	49	97	94	17.7
3	20	626.61	1.82	5.3	257	254	50	98	94	17.8
2	25	630.49	1.82	5.3	258	255	50	97	94	17.6
2	30	634.35	1.82	5.3	258	256	50	97	94	17.6
2	35	638.22	1.82	5.3	258	256	50	98	95	17.7
2	40	642.08	1.82	5.3	259	257	49	99	95	17.7
1	45	645.95	1.82	5.3	259	257	49	99	95	17.8
1	50	649.81	1.82	5.3	258	257	49	99	95	17.7
1	55	653.60	1.82	5.3	258	257	50	99	95	17.7
1	60	657.45	1.82	5.3	258	257	50	99	95	17.7
	(1422)									
	θ= 60	V_m= 46.25	(^H)avg=1.82					$(t_m)_{avg.}$ = 96.1		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	672	492	180
Condenser			
Desiccant	1394	1380	14
		Total	194

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-25-90 Test 5 Run 3
Source UNIT 11 P.W.G.P. SOUTH STACK No. of traverse points 3
Method 6 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check: N/A

Pretest: ☐ 0.02 cfm at 15 in. Hg. (vac) ☐
Postest: ____ cfm at ____ in. Hg. (vac) ☐

Particulate Catch Data: N/A

No.s of filters used: Recovery solvent(s)

_____ ☐ acetone _____
_____ ☐ other(s) _____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data: N/A

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
Total			

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 3

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 15 in. Hg.

Time start: 1435 (HRS) Time end: 1535 (HRS)

Sampling rate: 400 cc/min Operator: D.S.

S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERFULL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CYPRUS NORTHSHORE MINING Operator(s) D. SMITH & S. LOUNES

Source UNIT 11 P.W.C.P. SOUTH STACK Meter Box No. 6 Gasmeter coef. 1.0031

Date 7-25-90 Test 5 Run 3 ΔH@ 1.82 in.WC Bar. press 29.60 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen (%v/v)
					Probe	Oven	Impg.	Gas/In	Gas/Out	
	(1435)	(657.60)								
B-3	5	661.46	1.82	5.1	256	255	49	94	93	12.6
3	10	665.27	1.82	5.2	257	256	49	96	94	12.7
3	15	669.12	1.82	5.3	257	257	49	98	95	12.8
3	20	672.97	1.82	5.3	259	257	50	99	95	12.7
2	25	676.80	1.82	5.3	259	258	50	99	95	12.7
2	30	680.64	1.82	5.3	259	258	51	99	95	12.6
2	35	684.48	1.82	5.3	260	257	51	98	95	12.6
2	40	688.31	1.82	5.3	260	258	52	98	94	12.7
1	45	692.16	1.82	5.3	259	258	53	99	95	12.8
1	50	696.00	1.82	5.3	259	257	53	99	95	12.9
1	55	699.81	1.82	5.3	258	257	54	98	94	12.8
1	60	703.62	1.82	5.3	258	257	55	98	94	12.8
	(1535)									
	θ= 60	V_m=46.02	(ΔH)avg=1.82					$(t_m)_{avg.}$ = 96.2		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	674	504	170
Condenser			
Desiccant	1370	1352	18
		Total	188

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING

Source UNIT 12 P.W.G.P. NORTH STACK

Test 6 Run 1-3 Date 7-26-90

Stack dimen. 71 IN.

Dry bulb ____ °F Wet bulb ____ °F

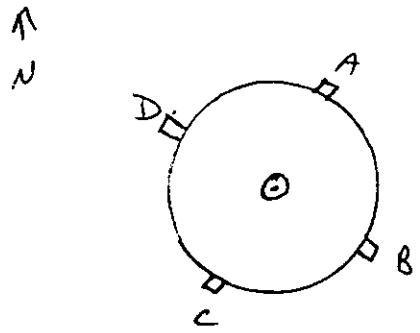
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.65 in Hg

Static pressure -.15 in WC

Operators D. SMITH & S. LENNES

Pitot No. 214-8 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: 5 in.		Time start:	hrs
B - 1	.021	1.49	6.49		
2	.067	4.76	9.76		
3	.118	8.38	13.38		
4	.177	12.57	17.57		
5	.250	17.75	22.75		
6	.356	25.28	30.28		
7	.644	45.72	50.72		
8	.750	53.25	58.25		
9	.823	58.43	63.43		
10	.882	62.62	67.62		
11	.933	66.24	71.24		
12	.979	69.51	74.51		
C - 1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end:	hrs

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

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-26-90 Test 6 Run 1
Source UNIT 12 P.W.G.P. NORTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No.s of filters used: #2482

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	655	492	163
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1466	1419	47
Total			210

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 0830 (HRS) Time end: 1007 (HRS)
Sampling rate: 400 cc/min Operator: D.S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

S-0046RR

CF-D11

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D.SMITH & S.LONNES Pitot No. 21V-8 Cp .840
Source UNIT 12 P.W.G.C. NORTH STACK Meter Box No. 6 ΔH@ 1.82 IN WC Bar. Press. 29.65 inHg H2O 15 %
Date 2-26-90 Test 6 Run 1 Coefficient 1.0031 Nozzle No. 8-4 Nozzle Dia .243 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 (x v/v)
	0800	703.80											
B - 12	2.5	705.77	.78	1.98	5.76	5.9	138	257	256	62	73	72	17.1
11	5	707.69	.76	1.94	7.70	6.0	138			58	74	73	17.2
10	7.5	709.72	.83	2.12	9.73	7.0	138			54	76	74	17.2
9	10	711.86	.92	2.32	1.86	8.0	146	258	256	49	77	74	17.2
8	12.5	713.98	.91	2.30	3.98	8.0	146			47	78	75	17.2
7	15	716.13	.91	2.33	6.12	8.2	139			46	80	76	17.3
6	17.5	718.29	.93	2.39	8.28	8.7	139	258	257	45	81	77	17.4
5	20	720.35	.85	2.18	0.35	7.7	142			46	82	78	17.0
4	22.5	722.27	.72	1.85	2.26	6.3	142			46	83	78	16.9
3	25	724.21	.73	1.90	4.20	6.4	135	258	257	46	84	79	19.1
2	27.5	725.99	.62	1.62	5.99	5.2	133			47	85	80	19.6
0830 / 0936 1	30	727.77	.61	1.60	7.77	5.1	131			47	86	80	20.0
C - 12	32.5	729.66	.69	1.79	9.65	5.2	140	259	258	46	88	85	16.5
11	35	731.73	.86	2.24	1.77	6.4	141			46	90	86	16.5
10	37.5	733.98	.94	2.45	3.98	7.1	140			46	91	86	16.5
9	40	736.13	.91	2.38	6.16	7.1	140	258	258	47	92	86	16.9
8	42.5	738.38	.95	2.50	8.40	7.5	137			47	93	87	17.1
7	45	740.63	.94	2.47	0.63	7.5	137			48	93	87	17.1
6	47.5	742.93	.98	2.59	2.90	7.8	135	258	258	48	93	87	17.2
5	50	745.12	.93	2.46	5.13	7.2	135			48	93	88	17.2
4	52.5	747.29	.88	2.37	7.29	7.0	135			49	94	88	17.2
3	55	749.41	.86	2.25	9.42	6.9	142	257	258	49	94	88	17.2
2	57.5	751.39	.75	1.96	1.40	6.0	143			49	94	88	17.2
1	60	753.28	.67	1.75	3.28	5.5	143	257	258	49	94	88	17.2
	1007												
	θ = 60	Vm = 49.48		ΔH = 2.15							Avg. = 83.9		

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S-0037R

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-26-90 Test 6 Run 2
Source UNIT 12 P.W.G.P. NORTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: 0.02 cfm at 15 in. Hg. (vac)
Postest: 0.00 cfm at 10 in. Hg. (vac)

Particulate Catch Data:

No.s of filters used: #2483

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	689	494	195
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1365	1346	19
Total			214

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1035 (HRS) Time end: 1137 (HRS)
Sampling rate: 400 cc/min Operator: DS.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

S-0046RR

CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING
Source UNIT 12 P.W.G.P. NORTH STACK
Date 7-26-90 Test 6 Run 2

Operators D.SMITH & S.LONNES
Meter Box No. 6 ΔH 1.82 IN WC
Coeffic. coeff. 1.0031

Pitot No. 214-8 Cp .840
Bar. Press. 29.65 inHg H2O 17 x
Nozzle No. 8-4 Nozzle Dia .243 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)
	(1035)	(753.45)											
C -12	2.5	755.24	.65	1.61	5.24	4.2	144	252	254	47	89	86	16.8
11	5	757.01	.62	1.56	7.00	4.2	140			47	90	87	16.8
10	7.5	758.90	.72	1.81	8.90	5.0	141			48	92	87	17.3
9	10	760.94	.84	2.11	0.96	6.0	142	256	256	48	92	88	17.3
8	12.5	763.10	.92	2.31	3.11	6.4	142			48	93	88	17.4
7	15	765.17	.85	2.15	5.19	6.1	138			49	93	88	17.4
6	17.5	767.38	.95	2.41	7.39	6.8	137	258	257	49	93	88	17.3
5	20	769.57	.92	2.33	9.56	6.6	137			49	93	88	17.5
4	22.5	771.65	.86	2.17	1.65	6.2	139			50	93	88	17.3
3	25	773.60	.75	1.89	3.60	5.5	142	257	257	50	94	88	17.4
2	27.5	775.34	.60	1.51	5.34	4.5	143			50	93	88	17.3
1	30	777.05	.58	1.46	7.05	4.4	143			51	93	89	17.4
B -12	32.5	778.73	.55	1.39	8.73	4.2	140	256	257	51	93	89	17.5
11	35	780.48	.61	1.54	0.49	4.6	140			51	93	89	17.4
10	37.5	782.36	.70	1.76	2.37	5.1	143			51	94	89	17.4
9	40	784.22	.67	1.69	4.22	5.0	143	257	256	51	94	89	17.4
8	42.5	786.08	.68	1.71	6.08	5.1	142			52	94	89	17.4
7	45	788.07	.78	1.96	8.07	5.9	142			52	94	89	17.5
6	47.5	790.00	.73	1.84	0.00	5.5	140	257	256	52	94	89	17.5
5	50	791.97	.76	1.93	1.97	5.8	138			53	94	89	17.4
4	52.5	794.00	.82	2.08	4.02	6.1	137			53	94	89	17.3
3	55	795.94	.73	1.84	5.94	5.8	142	258	256	54	94	90	17.4
2	57.5	797.83	.70	1.77	7.83	5.2	142			54	94	90	17.4
1	60	799.77	.74	1.87	9.77	5.9	140	258	256	54	94	90	17.5
	(1137)												
	θ = 60	Vm = 46.32		ΔH = 1.86							Avg. = 90.8		

S-0037R

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-26-90 Test 6 Run 3
Source UNIT 12 P.N.G.P. NORTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: 0.02 cfm at 15 in. Hg. (vac) ~~B~~
Postest: 0.00 cfm at 10 in. Hg. (vac) ~~B~~

Particulate Catch Data:

No.s of filters used: #2484

Recovery solvent(s)
~~B~~ acetone
B other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	665	463	202
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1388	1365	23
Total			225

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 8 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1200 (HRS) Time end: 1312 (HRS)
Sampling rate: 400 cc/min Operator: D. S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. LOWNES Pitot No. 214-8 Cp .840
Source UNIT 12 P.W.G.P. NORTH STACK Meter Box No. 6 ΔH 1.82 IN WC Bar. Press. 29.65 inHg H2O 18 x
Date 7-26-90 Test 6 Run 3 Calibrator coeff. 1.0031 Nozzle No. 8-4 Nozzle Dia .243 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 (xx/v)
	1200	799.95											
B - 12	2.5	801.93	.78	1.92	1.91	5.4	142	251	254	48	89	87	17.2
11	5	803.89	.80	1.96	3.89	5.7	143			48	91	88	17.2
10	7.5	806.05	.96	2.36	6.07	7.0	143			48	92	88	17.3
9	10	808.23	.97	2.38	8.25	7.1	144	256	256	49	93	88	17.3
8	12.5	810.36	.90	2.21	0.36	6.5	144			49	93	88	17.4
7	15	812.47	.92	2.26	2.49	6.8	143			49	93	88	17.3
6	17.5	814.56	.87	2.14	4.57	6.4	143	258	257	49	93	88	17.4
5	20	816.62	.89	2.17	6.66	6.4	140			50	93	89	17.4
4	22.5	818.72	.85	2.11	8.72	6.4	138			50	93	89	17.4
3	25	820.69	.75	1.85	0.65	5.3	142	257	256	49	90	88	17.3
2	27.5	822.43	.65	1.60	2.44	4.8	142			49	91	88	17.3
1	30	824.12	.57	1.40	4.12	4.4	141			50	92	88	17.2
C - 12	32.5	825.96	.68	1.67	5.96	5.0	142	256	257	50	92	88	17.2
11	35	827.78	.67	1.66	7.78	5.0	140			50	92	88	17.2
10	37.5	829.71	.76	1.86	9.72	5.8	144			51	93	88	17.1
9	40	831.72	.82	2.02	1.74	6.0	141	257	257	51	93	88	17.1
8	42.5	833.80	.87	2.14	3.81	6.2	142			51	94	89	17.1
7	45	835.90	.89	2.20	5.92	6.8	142			52	94	89	17.1
6	47.5	838.03	.89	2.21	8.03	6.8	138	257	258	52	94	89	17.1
5	50	840.05	.82	2.04	0.06	6.1	136			52	94	89	17.1
4	52.5	841.93	.70	1.73	1.93	5.7	140			53	94	89	17.0
3	55	843.79	.69	1.70	3.78	5.7	143	258	258	53	94	89	17.0
2	57.5	845.53	.62	1.53	5.53	4.9	144			53	94	89	16.8
1	60	847.14	.52	1.28	7.14	4.2	146	258	258	54	94	89	17.0
	(1312)												
	θ = 60	Vm = 47.19		ΔH = 1.93							Avg. = 90.5		

1232
1232

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S-0037R

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job Cyprus North Shore Mining
Source #12 PWGP North Stack
Date 7-26-90 Test 1 Run 1

Operator(s) D. SMITH & S. LOWNES
Meter Box No. 5 Gasmeter coef. 1.0065
ΔH@ 1.86 in.WC Bar. press 29.65 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	(0800)	372.70								
D-3	5	376.43	1.86	5.1	254	256	45	76	75	17.2
3	10	380.20	1.86	5.2	254	257	45	78	76	17.2
3	15	384.00	1.86	5.4	255	257	45	79	76	17.3
3	20	387.76	1.86	5.5	255	257	46	80	76	17.0
2	25	391.61	1.86	5.5	256	258	46	80	77	19.1
2	30	395.45	1.86	5.7	256	258	47	81	77	20.0
2	35	399.38	1.86	5.8	256	258	47	83	79	16.5
2	40	403.06	1.86	5.8	257	258	47	85	80	16.9
1	45	406.87	1.86	5.8	257	259	48	85	80	17.1
1	50	410.66	1.86	5.8	257	259	48	85	80	17.2
1	55	414.45	1.86	5.8	258	259	48	85	80	17.2
1	60	418.21	1.86	5.8	259	259	48	86	81	17.2
	(1006)									
	θ= 60	V_m= 45.51	(ΔH)avg= 1.86					(tm)avg.=	80.0	

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	675	495	180
Condenser			
Desiccant	1372	1354	18
		Total	198

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job Cypress North Shore Mining Operator(s) D. Smith & S. Connes
Source #12 PWCP North Stack Meter Box No. 3 Gasmeter coef. 1.0065
Date 7-26-90 Test 7 Run 2 ΔH@ 1.86 in.WC Bar. press 29.65 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen (%v/v)
					Probe	Oven	Impg.	Gas/In	Gas/Out	
	(1036)	418.37								
D-3	5	422.25	1.86	5.2	254	255	45	81	78	16.8
3	10	426.01	1.86	5.5	254	256	45	82	79	17.3
3	15	429.80	1.86	5.5	255	256	45	83	79	17.4
3	20	433.58	1.86	5.5	255	256	46	83	79	17.5
2	25	437.38	1.86	5.6	255	256	46	85	80	17.4
2	30	441.18	1.86	5.6	256	257	46	84	79	17.4
2	35	444.98	1.86	5.7	256	257	47	84	79	17.4
2	40	448.79	1.86	5.7	256	258	47	83	79	17.4
1	45	452.62	1.86	5.8	256	258	47	83	79	17.5
1	50	456.44	1.86	5.8	257	259	48	83	79	17.4
1	55	460.27	1.86	5.8	257	259	48	83	79	17.4
1	60	464.18	1.86	5.8	258	259	48	83	79	17.5
	(1136)									
	θ= 60	V_m=45.81	(ΔH)avg=1.86					$(t_m)_{avg.}$ = 81.0		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	692	499	193
Condenser			
Desiccant	1399	1372	20
		Total	213

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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INTERFACE LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Plant North Shore Mining
Fuel Dwgd North Stack
Date 7-26-90 Test 7 Run 3

Operator(s) D. Smith & S. Lownes
Meter Box No. 5 Gasmeter coef. 1.0065
ΔH@ 1.56 in.WC Bar. press 29.65 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 16 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1200)	464.22								
D-3	5	467.94	1.86	5.1	254	256	45	79	76	17.2
3	10	471.50	1.86	5.2	254	256	45	81	77	17.3
3	15	475.27	1.86	5.2	255	257	46	81	77	17.3
3	20	478.99	1.86	5.2	255	257	46	81	77	17.4
2	25	482.75	1.86	5.3	255	257	46	81	77	17.3
2	30	486.68	1.86	5.3	256	258	46	80	77	17.2
2	35	490.45	1.86	5.4	256	258	47	84	80	17.2
2	40	494.30	1.86	5.5	257	258	47	85	80	17.1
1	45	498.13	1.86	5.6	257	258	48	85	80	17.1
1	50	501.97	1.86	5.7	257	259	48	85	81	17.1
1	55	505.77	1.86	5.7	258	259	48	85	81	17.0
1	60	509.57	1.86	5.7	258	259	48	85	80	17.0
	(1310)									
	θ=60	V_m= 45.35	(ΔH)avg=1.86					$(t_m)_{avg.}$ = 80.6		

Condensate Data:

Item	Weight(g) Final	Tare	Difference
Impingers	661	463	198
Condenser			
Desiccant	1286	1268	18
		Total	216

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job Cyprus North Shore M.o.a.a. Operator(s) D. Smith & S. Lownes
Source #12 PWGP South Stack Meter Box No. 5 Gasmeter coef. 1.0065
Date 7-26-96 Test 1C Run 1 ΔH@ 1.86 in.WC Bar. press 29.65 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg. ☑
Posttest: 0.00 cfm at 10 in. Hg. ☑

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen (%v/v)
					Probe	Oven	Impg.	Gas/In	Gas/Out	
	(1405)	509.80								
C-3	5	513.53	1.86	5.2	256	252	46	76	73	17.2
3	10	517.20	1.86	5.2	256	253	46	78	74	17.2
3	15	520.91	1.86	5.3	257	255	47	78	74	17.4
3	20	524.70	1.86	5.4	257	258	47	81	76	17.0
2	25	528.38	1.86	5.5	257	258	47	82	76	17.5
2	30	532.14	1.86	5.6	257	258	47	82	76	17.4
2	35	535.88	1.86	5.7	257	258	48	82	76	17.5
2	40	539.62	1.86	5.7	257	258	48	82	76	17.4
1	45	543.34	1.86	5.7	258	259	48	82	77	17.5
1	50	547.10	1.86	5.6	258	259	48	82	77	17.4
1	55	550.87	1.86	5.6	258	259	48	82	77	17.6
1	60	554.63	1.86	5.6	258	259	49	82	77	17.6
	(1505)									
	θ=60	V_m= 44.83	$(\Delta H)_{avg}$=1.86					$(t_m)_{avg.}$ = 78.3		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	637	463	174
Condenser			
Desiccant	1307	1286	21
		Total	195

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job Cyprus North Shore Mining
Source #12 PWGP South Stack
Date 7-26-90 Test 10 Run 2

Operator(s) D. Smith & S. Lownes
Meter Box No. 5 Gasmeter coef. 1.0065
ΔH@ 1.56 in.WC Bar. press 29.65 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	(1535)	554.76								
C-3	5	558.50	1.86	5.2	254	255	45	79	75	17.4
3	10	562.25	1.86	5.4	254	255	45	79	75	17.5
3	15	566.00	1.86	5.5	255	256	46	82	77	17.4
3	20	569.77	1.86	5.5	255	256	46	84	78	17.6
2	25	573.54	1.86	5.5	256	257	46	87	80	17.7
2	30	577.29	1.86	5.5	256	257	46	87	81	17.5
2	35	581.06	1.86	5.5	256	258	47	87	81	17.2
2	40	584.82	1.86	5.6	257	258	47	85	80	17.3
1	45	588.55	1.86	5.5	257	258	47	84	79	17.3
1	50	592.22	1.86	5.4	257	258	48	84	79	17.3
1	55	595.89	1.86	5.3	258	259	48	84	79	17.2
1	60	599.62	1.86		258	259	48	83	79	17.2
	(1635)									
	θ = 60	V_m = 44.86	$(\Delta H)_{avg}$ = 1.86					$(t_m)_{avg.}$ = 81.2		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	667	489	178
Condenser			
Desiccant	1321	1307	14
		Total	192

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job Cyprus North Shore Mining
Source #12 PWGP South Stack
Date 7-26-90 Test 1C Run 3

Operator(s) D.SMITH & S. CONNES
Meter Box No. 5 Gasmeter coef. 1.0065
ΔH@ 1.86 in.WC Bar. press 29.65 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.00 cfm at 10 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen (%v/v)
					Probe	Oven	Impg.	Gas/In	Gas/Out	
	1705	599.76								
C-3	5	603.55	1.86	5.4	253	255	45	84	79	12.4
3	10	607.44	1.86	5.5	254	255	45	84	79	12.4
3	15	611.32	1.86	5.5	254	255	46	84	79	12.4
3	20	615.15	1.86	5.5	254	256	46	85	80	12.3
2	25	618.98	1.86	5.5	255	256	46	85	80	12.3
2	30	622.81	1.86	5.4	255	257	47	86	80	12.3
2	35	626.64	1.86	5.4	255	257	47	86	80	12.0
2	40	630.46	1.86	5.4	256	257	47	86	81	12.3
1	45	634.29	1.86	5.5	256	258	48	87	81	12.1
1	50	638.10	1.86	5.5	257	258	48	90	83	12.3
1	55	641.92	1.86	5.5	257	258	48	92	84	12.2
1	60	645.75	1.86	5.5	257	258	48	91	84	12.1
	(1805)									
	θ=60	V_m= 45.99	(ΔH)avg=1.86					(tm)avg.= 83.8		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers	675	483	192
Condenser			
Desiccant	1086	1065	21
		Total	213

Preliminary results of SO_2 concentration determination	
V_{std} =	DSCF
Moisture =	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job CYPRUS NORTH SHORE MINING

Source UNIT 12 P.W.G.P. SOUTH STACK

Test 9 Run 1-3 Date 7-26-90

Stack dimen. 71 IN.

Dry bulb ____ °F Wet bulb ____ °F

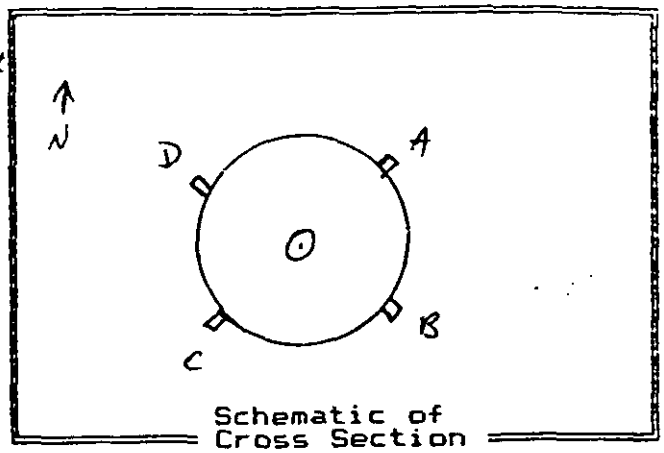
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.65 in Hg

Static pressure -.10 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-8 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: 5 in.		Time start:	hrs
A - 1	.021	1.49	6.49		
2	.067	4.76	9.76		
3	.118	8.38	13.38		
4	.177	12.57	17.57		
5	.250	17.75	22.75		
6	.356	25.28	30.28		
7	.644	45.72	50.72		
8	.750	53.25	58.25		
9	.823	58.43	63.43		
10	.892	62.62	67.62		
11	.933	66.24	71.24		
12	.979	69.51	74.51		
B - 1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Temp. meas. tool & S/N: PDT-1 DIGITAL T/C | Time end: hrs

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

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING Date 7-26-90 Test 9 Run 1
Source UNIT 12 P.W.G.P. SOUTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ~~0.02~~ cfm at 15 in. Hg. (vac) ~~8~~
Postest: 0.00 cfm at 10 in. Hg. (vac) ~~8~~

Particulate Catch Data:

No.s of filters used: #2485

Recovery solvent(s)
~~8~~ acetone
0 other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	629	463	166
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1448	1424	24
Total			190

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 16 Bag No. 1

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 15 in. Hg.

Time start: 1405 (HRS) Time end: 1510 (HRS)

Sampling rate: 400 cc/min Operator: D.S.

S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. LONNES Pitot No. 214-8 Cp .840
Source UNIT 12 P.W.G.P. SOUTH STACK Meter Box No. 6 ΔH 1.82 IN WC Bar. Press. 29.65 inHg H2O 20 x
Date 7-26-90 Test 9 Run 1 Gas meter coeff. 1.0031 Nozzle No. 8-4 Nozzle Dia .243 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 (xx/y)
	(1405	847.30											
A - 12	2.5	849.18	.74	1.68	9.14	4.8	168	25	258	47	82	81	17.2
11	5	850.99	.77	1.72	0.98	4.8	167			47	84	82	17.2
10	7.5	852.85	.75	1.68	2.81	4.8	167			48	85	82	17.3
9	10	854.70	.80	1.78	4.69	5.2	171	259	258	48	86	82	17.2
8	12.5	856.62	.84	1.87	6.62	5.6	172			48	86	83	17.2
7	15	858.57	.86	1.93	8.58	5.9	168			48	88	83	17.4
6	17.5	860.41	.75	1.69	0.41	5.1	168	259	257	49	88	83	17.5
5	20	862.30	.81	1.82	2.32	5.5	167			49	88	83	17.0
4	22.5	864.16	.76	1.71	4.16	5.2	169			49	89	84	17.5
3	25	865.86	.64	1.44	5.86	4.8	169	258	258	50	89	84	17.5
2	27.5	867.47	.57	1.28	7.46	4.0	168			50	89	84	17.5
1	30	869.01	.53	1.19	9.01	3.9	168			50	89	84	17.4
B - 12	32.5	870.71	.65	1.46	0.72	4.5	169	258	257	50	88	84	17.5
11	35	872.46	.69	1.54	2.48	4.8	171			51	89	84	17.5
10	37.5	874.30	.74	1.66	4.30	5.0	171			51	89	85	17.5
9	40	876.17	.79	1.77	6.18	5.2	172	259	256	52	90	85	17.4
8	42.5	878.10	.82	1.84	8.10	5.7	172			52	90	85	17.5
7	45	879.99	.80	1.79	9.99	5.4	172			52	91	85	17.5
6	47.5	881.95	.85	1.91	1.95	5.9	170	260	257	53	91	86	17.6
5	50	883.89	.83	1.87	3.89	5.9	169			53	91	86	17.4
4	52.5	885.73	.76	1.71	5.74	5.1	169			53	91	86	17.4
3	55	887.52	.70	1.58	7.52	5.0	170	259	258	53	91	86	17.6
2	57.5	889.19	.61	1.38	9.19	4.3	168			54	91	86	17.7
1	60	890.77	.55	1.24	0.77	4.0	168	259	258	54	91	86	17.6
	(1510)												
	θ = 60	Vm = 43.47		ΔH = 1.65							Avg. = 86.3		

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INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTHSHORE MINING CO. Date 7-26-90 Test 9 Run 2
Source UNIT 12 P.W.G.P. SOUTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No.s of filters used: #2486

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	642	460	182
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1463	1448	15
Total			197

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 16 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1535 (HRS) Time end: 1645 (HRS)
Sampling rate: 400 cc/min Operator: D S.
S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. LONNES Pitot No. 214-8 Cp .840
Source UNIT #2 P.W.G.P. SOUTH STACK Meter Box No. 6 ΔH@ 1.82 IN WC Bar. Press. 29.85 inHg H2O 77 x
Date 7-26-90 Test 9 Run 2 Orifice coeff. 1.0021 Nozzle No. B-4 Nozzle Dia. .243 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 (x v/v)
	(1535	890.90)											
B - 12	2.5	892.66	.65	1.55	2.66	4.6	169	253	258	48	86	84	17.4
11	5	894.48	.69	1.64	4.47	4.8	170			48	88	85	17.4
10	7.5	896.33	.73	1.74	6.33	5.0	171			48	90	85	17.4
9	10	898.25	.78	1.86	8.26	5.4	171	257	259	48	90	85	17.5
8	12.5	900.24	.82	1.96	0.24	5.8	171			48	90	85	17.5
7	15	902.22	.83	1.99	2.23	5.9	169			49	90	86	17.4
6	17.5	904.23	.83	1.99	4.23	5.9	168	258	258	49	90	86	17.7
5	20	906.18	.80	1.92	6.19	5.8	168			49	90	86	17.6
4	22.5	908.03	.70	1.68	8.03	5.0	169			49	91	86	17.7
3	25	909.78	.63	1.51	9.77	4.8	170	258	257	50	90	86	17.7
2	27.5	911.48	.61	1.46	1.48	4.6	170			50	90	86	17.7
1	30	913.06	.52	1.25	3.06	4.1	169			50	90	86	17.5
A - 12	32.5	915.05	.83	1.99	5.05	5.9	170	259	258	50	88	85	16.9
11	35	917.05	.85	2.03	7.07	6.0	170			51	90	86	17.2
10	37.5	919.05	.83	1.99	9.06	6.0	170			51	90	86	17.3
9	40	921.13	.90	2.15	1.13	6.3	172	260	259	52	91	86	17.3
8	42.5	923.17	.87	2.08	3.17	6.2	172			52	91	86	17.2
7	45	925.18	.83	1.99	5.17	6.0	169			52	91	86	17.3
6	47.5	927.15	.81	1.95	7.14	6.0	167	260	260	53	91	86	17.3
5	50	929.08	.78	1.87	9.08	5.9	168			53	91	86	17.3
4	52.5	930.90	.69	1.65	0.90	5.0	169			53	92	86	17.2
3	55	932.63	.62	1.49	2.63	4.8	170	259	260	54	92	87	17.2
2	57.5	934.28	.56	1.34	4.28	4.2	170			54	92	87	17.3
1	60	935.85	.51	1.22	5.85	4.0	170	259	259	55	92	87	17.2
	(1645												
	θ = 60	Vs = 44.95		ΔH = 1.76							Avg. = 88.0		

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job CYPRUS NORTH SHORE MINING Date 7-26-90 Test 9 Run 3
Source UNIT 12 P.W.G.P. SOUTH STACK No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ~~X~~
Postest: 0.00 cfm at 10 in. Hg. (vac) ~~X~~

Particulate Catch Data:

No.s of filters used: #2317

Recovery solvent(s)
~~X~~ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: D. SMITH

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1	646	462	184
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1479	1463	16
Total			200

Integrated Gas Sampling Data:

Bag Pump No. B2 Box No. 16 Bag No. 3

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 15 in. Hg.

Time start: 1705 (HRS) Time end: 1808 (HRS)

Sampling rate: 400 cc/min Operator: D.S.

S/N of O_2 Analyzer used to monitor train outlet: 4

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CYPRUS NORTHSHORE MINING Operators D. SMITH & S. LONNES Pitot No. 21V-8 Cp .840
Source UNIT 12 P.W.G.P. SOUTH STACK Meter Box No. 6 ΔH 1.82 IN WC Bar. Press. 29.65 inHg H2O 13.5 x
Date 7-26-90 Test 4 Run 3 Calibrator coeff. 1.0031 Nozzle No. S-7 Nozzle Dia .243 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 (x v/v)
	(1705)	(936.00)											
A - 12	2.5	937.90	.76	1.80	2.89	4.9	170	254	255	49	88	85	17.5
11	5	939.80	.78	1.84	9.81	5.0	170			49	90	86	17.4
10	7.5	941.84	.88	2.09	1.86	5.9	169			49	90	86	17.3
9	10	943.88	.86	2.04	3.88	5.9	169	256	257	49	91	86	17.4
8	12.5	945.90	.86	2.04	5.90	5.9	170			49	92	86	17.4
7	15	947.95	.88	2.09	7.94	6.0	170			50	92	87	17.4
6	17.5	949.93	.83	1.98	9.94	5.6	168	259	258	50	92	87	17.5
5	20	951.89	.80	1.91	1.89	5.2	168			50	92	87	17.3
4	22.5	953.74	.73	1.74	3.76	5.0	169			51	92	87	17.3
3	25	955.51	.64	1.52	5.51	4.5	169	258	257	51	92	87	17.3
2	27.5	957.15	.55	1.31	7.14	4.0	169			51	92	87	17.2
1	30	958.74	.54	1.28	8.74	3.9	169			51	92	87	17.3
B - 12	32.5	960.53	.66	1.57	0.52	4.7	169	258	257	52	92	87	17.1
11	35	962.35	.71	1.69	2.36	5.0	170			52	92	87	17.0
10	37.5	964.26	.76	1.80	4.26	5.2	171			52	92	87	17.3
9	40	966.20	.79	1.87	6.20	5.2	171	257	257	53	93	88	17.3
8	42.5	968.20	.83	1.97	8.20	5.8	171			53	93	88	17.2
7	45	970.18	.81	1.92	0.16	5.8	172			54	93	88	17.1
6	47.5	972.15	.82	1.95	2.14	5.8	170	257	256	54	93	88	17.2
5	50	974.04	.75	1.79	4.04	5.1	168			55	93	88	17.3
4	52.5	975.91	.73	1.74	5.91	5.0	168			55	94	88	17.2
3	55	977.68	.65	1.55	7.68	4.8	169	258	256	55	94	89	17.2
2	57.5	979.44	.64	1.53	9.44	4.8	169			56	94	89	17.2
1	60	981.17	.62	1.48	1.17	4.7	169	258	257	56	94	89	17.1
	(1808)												
	θ = 60	Vm = 45.17		ΔH = 1.77							Avg. = 89.7		

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job Cypress, Silver Bay

Source No. 2 Boiler Stack

Test 4 Run 1 Date 7-27-90

Stack dimen. 110 IN.

Dry bulb ____ °F Wet bulb ____ °F

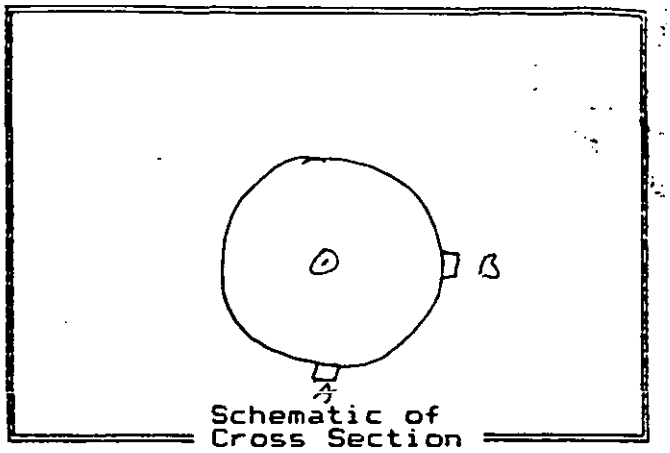
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.53 in Hg

Static pressure -1.00 in WC

Operators M. Kaehler, R. Rosenthal

Pitot No. ____ Cp 0.84



Schematic of Cross Section

MOISTURE ONLY

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: 15 in.		Time start:	hrs
A-1	.032	3.52	18.52	1.10	273
2	.105	11.55	26.55	1.15	
3	.194	21.34	36.34	1.15	
4	.323	35.53	50.53	1.10	
5	.677	74.47	89.47	1.20	
6	.806	88.66	103.66	1.20	
7	.895	98.45	113.45	1.15	
8	.968	106.48	121.48	1.20	
B-1				1.10	
2				1.05	
3				1.05	
4				1.05	
5				1.20	
6				1.20	
7				1.15	
8				1.15	
Temp. meas. tool & S/N:				Time end:	hrs

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

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job Cypress, Silver Bay — Date 7-27-90 Test 4 Run 1
Source No. 2 Boiler Stack — No. of traverse points _____
Method _____ Filter holder: NA — Filter type: NA

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☑
Postest: 0 cfm at 5 in. Hg. (vac) ☑

Particulate Catch Data: NA

No.s of filters used: _____ _____

Recovery solvent(s)
☐ acetone _____
☐ other(s) _____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser	219	100	119
Desiccant	1350	1334	16
Total			135

Integrated Gas Sampling Data: NA

Bag Pump No. _____ Box No. _____ Bag No. _____

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: _____ cc/min at _____ in. Hg.

Time start: _____ (HRS) Time end: _____ (HRS)

Sampling rate: _____ cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: ___

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job Cypress, Silver Bay
Source No. 2 Baker Stack
Date 7-27-90 Test 4 Run 1

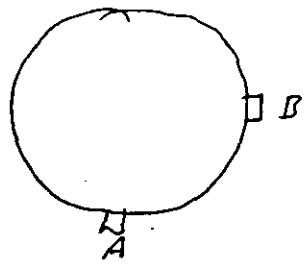
Operators Mark Kaehler
Meter Box No. 2 ΔH 1.78 IN WC
Cosmeter coeff. 1.0047

Pitot No. NA Cp NA
Bar. Press. 29.53 inHg H2O NA x
Nozzle No. NA Nozzle Dia NA 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	Cond Temp.	Gas In	Gas Out	Oxygen (x v/v)
	(0840)	542.70											
3	5	546.48	2	1.78		2		243		39	65	63	8.0
3	10	550.13		1.78		2					67	63	8.1
3	15	553.85		1.78		2					71	64	7.9
3	20	557.55		1.78		2		246		39	74	64	7.7
2	25	561.25		1.78		2					75	65	7.9
2	30	564.98		1.78		2					77	65	8.1
2	35	568.71		1.78		2		245		39	78	66	7.8
2	40	572.43		1.78		2					79	66	8.0
1	45	576.15		1.78		2					79	67	7.9
1	50	579.86		1.78		2		248		40	80	68	7.9
1	55	583.57		1.78		2					81	68	7.8
1	60	587.27		1.78		2					81	69	7.7
	(0940)												
	θ = 60	Vs = 44.57		ΔH = 1.78							Avg. = 70.6		

INTERFOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job Cypress, Silver Bay
Source No. 2 Boiler Stack
Test 4 Run 2 Date 7-27-90
Stack dimen. 110 IN.
Dry bulb ____ °F Wet bulb ____ °F
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.
Barometric pressure 29.53 in Hg
Static pressure -1.00 in WC
Operators M. Kaechler, R. Rosenthal
Pitot No. ____ Cp 0.84



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: 15 in.		Time start:	hrs
A-1	.032	3.52	18.52	1.15	275
2	.105	11.55	26.55	1.15	
3	.194	21.34	26.34	1.10	
4	.323	35.53	50.53	1.10	
5	.677	74.47	89.47	1.15	
6	.806	88.66	103.66	1.20	
7	.895	98.45	113.45	1.15	
8	.968	106.48	121.48	1.15	
B-1				1.15	
2				1.10	
3				1.05	
4				1.05	
5				1.20	
6				1.15	
7				1.20	
8				1.15	
Temp. meas. tool & S/N:				Time end:	hrs

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

INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job Cypress, Silver Bay Date 7-27-90 Test 4 Run 2
Source No. 2 Boiler Stack No. of traverse points ____
Method ____ Filter holder: NA Filter type: NA

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☑
Postest: 0 cfm at 5 in. Hg. (vac) ☑

Particulate Catch Data: NA

No.s of filters used: ____ ____

Recovery solvent(s)
☐ acetone ____
☐ other(s) ____

No. of probe wash bottles: ____
Sample recovered by: ____

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser	233	100	133
Desiccant	1364	1350	14
Total			147

Integrated Gas Sampling Data: NA

Bag Pump No. ____ Box No. ____ Bag No. ____

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: ____ cc/min at ____ in. Hg.

Time start: ____ (HRS) Time end: ____ (HRS)

Sampling rate: ____ cc/min Operator: ____

S/N of O_2 Analyzer used to monitor train outlet: ____

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job Cypress Silver Barge
Source No. 2 Sailor Stack Test 4 Run 2
Date 7-27-90

Operators M. Kaehler
Meter Box No. 2 ΔH 1.78 IN WC
Counter coeff. 1.0047

Pitot No. NA Cp NA
Bar. Press. 24.53 inHg H2O NA x
Nozzle No. NA Nozzle Dia NA 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	Exit.	Gas In	Gas Out	Oxygen (x v/v)
	(1010)	587.42		1.78		2		245		40	69	68	8.8
3	5	591.17		1.78		2					74	68	7.7
3	10	594.86		1.78		2					77	69	7.6
3	15	598.55		1.78		2		247		40	79	69	7.7
3	20	602.99		1.78		2					80	70	7.7
2	25	606.11		1.78		2					82	70	7.7
2	30	609.87		1.78		2		246		41	82	71	7.6
2	35	613.63		1.78		2					82	71	7.5
2	40	617.39		1.78		2					83	71	7.7
1	45	621.15		1.78		2					83	72	7.9
1	50	624.90		1.78		2		248		41	83	72	7.9
1	55	628.67		1.78		2					83	72	7.9
1	60	632.42		1.78		2							
	(1110)												
	θ = 60	Vm = 45.00		ΔH = 1.78							Avg. = 75.0		

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job Cypress, Silver Bay

Source No. 2 Boiler Stack

Test 4 Run 3 Date 2-27-90

Stack dimen. 110 IN.

Dry bulb ____ °F Wet bulb ____ °F

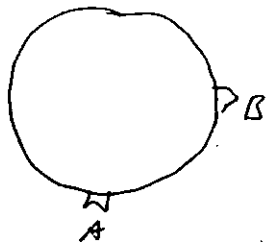
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 29.53 in Hg

Static pressure ~1.00 in WC

Operators M. Kaechler, R. Rosenthal

Pitot No. ____ Cp 0.84



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: 15 in.		Time start:	hrs
A-1	.032	3.52	18.52	1.05	223
2	.105	11.55	26.55	1.15	
3	.194	21.34	36.34	1.15	
4	.323	35.53	50.53	1.15	
5	.677	74.47	89.47	1.25	
6	.806	88.66	103.66	1.20	
7	.895	98.45	113.45	1.20	
8	.968	106.48	121.48	1.15	
B-1				1.15	
2				1.10	
3				1.10	
4				1.05	
5				1.15	
6				1.20	
7				1.20	
8				1.15	
Temp. meas. tool & S/N:				Time end:	hrs

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

INTERFOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job Cypress, Silver Bay
Source No. 2 Boiler Stack
Method _____ Filter holder: NA

Date 2-22-90 Test 4 Run 3
No. of traverse points _____
Filter type: NA

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☑
Postest: 0 cfm at 5 in. Hg. (vac) ☑

Particulate Catch Data: NA

No.s of filters used: _____ _____

Recovery solvent(s)
☐ acetone _____
☐ other(s) _____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data:

Item	Weight(g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser	208	100	108
Desiccant	1379	1364	15
Total			133

Integrated Gas Sampling Data: NA

Bag Pump No. _____ Box No. _____ Bag No. _____

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: _____ cc/min at _____ in. Hg.

Time start: _____ (HRS) Time end: _____ (HRS)

Sampling rate: _____ cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: ___

CF-023

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job Cypress Silver Bay
Source No. 2 Boiler Stack
Date 7-27-90 Test 4 Run 3

Operators M. Kachler
Meter Box No. 2 ΔH 1.78 IN WC
Coeff. 1.0047

Pitot No. NA Cp NA
Bar. Press. 29.53 inHg H2O NA %
Nozzle No. NA Nozzle Dia .401 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	Cond. Exit	Cool In	Cool Out	Oxygen (x v/v)
	(1130)	632.55											
3	5	636.37		1.78		2		246		40	74	72	8.0
3	10	640.19		1.78		2					77	72	8.0
3	15	643.74		1.78		2					80	72	7.9
3	20	647.28		1.78		2		248		41	82	72	8.0
2	25	650.84		1.78		2					82	72	7.9
2	30	654.45		1.78		2					83	73	7.9
2	35	658.02		1.78		2		248		41	84	73	7.7
2	40	661.82		1.78		2					84	73	7.9
1	45	665.60		1.78		2					85	74	7.7
1	50	669.36		1.78		2		247		41	85	74	7.8
1	55	673.11		1.78		2					85	74	7.7
1	60	676.90		1.78		2					85	75	7.9
	(1230)												
	θ = 60	Vm = 44.35		ΔH = 1.78							Avg. = 77.6		

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S-0037R

APPENDIX D

INTERPOLL LABORATORIES ANALYTICAL DATA

TABLE OF CONTENTS

Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job Cyprus North Shore Mining
Team Leader DS
Date Submitted 7-24-90
Test No. 1
Date of Analysis 7-24-90

Source Unit #11 PWG
Test Site North Stack
Date of Test 7-24-90
No. of Runs Completed 3
Technician R. Gilson

Test/Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
1/1	1043	1	0.00	1.90	19.30	1.90	17.40	1.84
	-04	2	0.00	1.90	19.30	1.90	17.40	1.84
	☑ B ☐ F	Avg				1.90	17.40	
1/2		1	0.00	1.90	19.40	1.90	17.50	1.79
	-08	2	0.00	1.90	19.40	1.90	17.50	1.79
	☑ B ☐ F	Avg				1.90	17.50	
1/3		1	0.00	1.90	19.30	1.90	17.40	1.84
	-12	2	0.00	1.90	19.30	1.90	17.40	1.84
	☑ B ☐ F	Avg				1.90	17.40	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☑ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: Cyprus North Shore Mining
Team Leader: D.S.
Date Submitted: 7-24-90
Test No.: 2
Date of Analysis: 7-25-90

Source: Unit #11 DWG
Test Site: North Stack
Date of Test: 7-24-90
No. of Runs Completed: 3
Technician: R. Gillen

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
2/1	1043-16	1	0.00	1.80	19.40	1.80	17.60	1.83
		2	0.00	1.80	19.40	1.80	17.60	1.83
	☒ B ☐ F	Avg				1.80	17.60	
2/2	-17	1	0.00	1.90	19.40	1.90	17.50	1.79
		2	0.00	1.90	19.40	1.90	17.50	1.79
	☒ B ☐ F	Avg				1.90	17.50	
2/3	-18	1	0.00	1.90	19.30	1.90	17.40	1.84
		2	0.00	1.90	19.30	1.90	17.40	1.84
	☒ B ☐ F	Avg				1.90	17.40	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☐ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☒ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: Cyprus North Shore Mining
Team Leader: D.J.
Date Submitted: 7-25-90
Test No.: 4
Date of Analysis: 7-25-90

Source: Unit # 11 [illegible] South
Test Site: South Stack
Date of Test: 7-25-90
No. of Runs Completed: 3
Technician: [illegible]

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
4/1	1043	1	0.00	1.90	19.30	1.90	17.40	1.84
	-34	2	0.00	1.90	19.30	1.90	17.40	1.84
	☑ B ☐ F	Avg				1.90	17.40	
4/2		1	0.00	1.80	19.40	1.80	17.60	1.83
	-38	2	0.00	1.80	19.40	1.80	17.60	1.83
	☑ B ☐ F	Avg				1.80	17.60	
4/3		1	0.00	2.00	19.40	2.00	17.40	1.75
	-42	2	0.00	2.00	19.40	2.00	17.40	1.75
	☑ B ☐ F	Avg				2.00	17.40	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☑ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job Cyprus North Shore Mining
Team Leader DS
Date Submitted 7-25-90
Test No. 5
Date of Analysis 7-25-90

Source Unit #11 DWG
Test Site South Stack
Date of Test 7-25-90
No. of Runs Completed 3
Technician R. Adam

Test/Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
5/1	1043-46	1	0.00	2.00	19.30	2.00	17.30	1.80
		2	0.00	2.00	19.30	2.00	17.30	1.80
	☑ B ☐ F	Avg				2.00	17.30	
5/2	-47	1	0.00	1.90	19.30	1.90	17.40	1.84
		2	0.00	1.90	19.30	1.90	17.40	1.84
	☑ B ☐ F	Avg				1.90	17.40	
5/3	-48	1	0.00	1.80	19.30	1.80	17.50	1.89
		2	0.00	1.80	19.30	1.80	17.50	1.89
	☑ B ☐ F	Avg				1.80	17.50	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☑ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job Cyprus North Shore Mining
Team Leader D.S.
Date Submitted 7-27-80
Test No. 6-7
Date of Analysis 7-30-80

Source Unit #12 AWGP
Test Site North Stack
Date of Test 7-26-80
No. of Runs Completed 3
Technician R.G.

Test/Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
6-7/1	1043	1	0.00	2.00	19.30	2.00	17.30	1.80
	-52	2	0.00	2.00	19.30	2.00	17.30	1.80
	☑ B ☐ F	Avg				2.00	17.30	
6-7/2		1	0.00	2.10	19.30	2.10	17.20	1.76
	-56	2	0.00	2.10	19.30	2.10	17.20	1.76
	☑ B ☐ F	Avg				2.10	17.20	
6-7/3		1	0.00	2.20	19.20	2.20	17.00	1.77
	-60	2	0.00	2.20	19.20	2.20	17.00	1.77
	☑ B ☐ F	Avg				2.20	17.00	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☐ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

LSC-04-BR

(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: Cyprus North Shore Mining
Team Leader: D.S.
Date Submitted: 7-27-90
Test No.: 9-10
Date of Analysis: 7-30-90

Source: Unit #12 PWGP
Test Site: South Stack
Date of Test: 7-26-90
No. of Runs Completed: 3
Technician: R. [illegible]

Test/Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
9-10/1	1043	1	0.00	1.90	19.32	1.90	17.42	1.831
	-83	2	0.00	1.90	19.32	1.90	17.42	1.831
	☑ B ☐ F	Avg				1.90	17.42	
9-10/2		1	0.00	2.00	19.24	2.00	17.24	1.84
	-87	2	0.00	2.00	19.24	2.00	17.24	1.84
	☑ B ☐ F	Avg				2.00	17.24	
9-10/3		1	0.00	1.60	19.55	1.60	17.95	1.844
	-90	2	0.00	1.60	19.55	1.60	17.95	1.844
	☑ B ☐ F	Avg				1.60	17.95	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☑ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

LSC-04-BR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Impinger Catch/Minnesota Protocol

Job Cyprus N. Shore Mining
Team Leader DS
Date Submitted 7-27-90
Test No. 1
Date of Analysis 8-1-90

Source Pellitizer
Test Site Stack
Date of Test 7-24-90
No. of Runs Completed 3
Technician R. Eubanks

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 1 Run 1 Log Number 1043 -03 Comments ____	Dish No. 14 Dish Tare Wt. 49.7358 g Dish+Sample Wt. 49.7442 g Sample Wt. 0.0084 g
2	Test 1 Run 2 Log Number -07 Comments ____	Dish No. 59 Dish Tare Wt. 50.1562 g Dish+Sample Wt. 50.1623 g Sample Wt. 0.0061 g
3	Test 1 Run 3 Log Number -11 Comments ____	Dish No. 200 Dish Tare Wt. 52.1220 g Dish+Sample Wt. 52.1294 g Sample Wt. 0.0074 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Blank Solvent Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
0.0005	0.0079	0.0056	0.0069	D-7	

LSC-03.GR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus North Shore Mining
Team Leader D.S.
Date Submitted 7-26-90
Test No. 1
Date of Analysis 7-31-90
Transport Leakage ☒ None ☐ _____ ml

Source UNIT #11 DWGP
Test Site North Stack
Date of Test 7-24-90
No. of Runs Completed 3
Technician R. Eden
Solvent acetone

0	Test ____ Run 0 Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 1 Run 1 Vol. of Solvent 140 ml Log Number 1043-01 Comments ____	Dish No. 20 Dish Tare Wt. 48.4160 g Dish+Sample Wt. 48.4326 g Sample Wt. 0.0166 g
2	Test 1 Run 2 Vol. of Solvent 115 ml Log Number -05 Comments ____	Dish No. 118 Dish Tare Wt. 44.1959 g Dish+Sample Wt. 44.2069 g Sample Wt. 0.0110 g
3	Test 1 Run 3 Vol. of Solvent 140 ml Log Number -09 Comments ____	Dish No. 119 Dish Tare Wt. 47.7652 g Dish+Sample Wt. 47.7767 g Sample Wt. 0.0115 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
0.0002	0.0163	0.0108	0.0112	D-8	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job Cyprus N. Shore Mining
Team Leader DS
Date Submitted 7-27-90
Test No. 1
Date of Analysis 7-27-90

Source Unit 11 P.W.G.P.
Test Site North Stack
Date of Test 7-24-90
No. of Runs Completed 3
Technician Dobar

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 1 Run 1 Log Number 1043-02 Comments ____	Filter No. 2491 Filter Type 4" GF Filter Tare Wt. 0.9084 g Filter+Sample Wt. 0.9105 g Sample Wt. 0.0021 g
2	Test 1 Run 2 Log Number -06 Comments ____	Filter No. 2492 Filter Type 4" GF Filter Tare Wt. 0.9047 g Filter+Sample Wt. 0.9052 g Sample Wt. 0.0005 g
3	Test 1 Run 3 Log Number -10 Comments ____	Filter No. 2493 Filter Type 4" GF Filter Tare Wt. 0.9147 g Filter+Sample Wt. 0.9171 g Sample Wt. 0.0024 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
	0.0021	0.0005	0.0024		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0263	0.0169	0.0205		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Minnesota Protocol

Job Cyprus N. Shore Mining
Team Leader DS
Date Submitted 7-27-90
Test No. 7
Date of Analysis 8-1-90

Source unit #11 PWEP
Test Site South Stack
Date of Test 7-25-90
No. of Runs Completed 3
Technician R. Gillum

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 4 Run 1 Log Number 1043-33 Comments ____	Dish No. 110 Dish Tare Wt. 49.7376 g Dish+Sample Wt. 49.7417 g Sample Wt. 0.0047 g
2	Test 4 Run 2 Log Number -37 Comments ____	Dish No. 111 Dish Tare Wt. 42.7809 g Dish+Sample Wt. 42.7866 g Sample Wt. 0.0057 g
3	Test 4 Run 3 Log Number -41 Comments ____	Dish No. 117 Dish Tare Wt. 47.3824 g Dish+Sample Wt. 47.3889 g Sample Wt. 0.0065 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Blank Solvent Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
0.0005	0.0042	0.0052	0.0060	D-10	

LSC-03.GR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus North Shore Mining
Team Leader D.S.
Date Submitted 7-27-90
Test No. 4
Date of Analysis 7-31-90
Transport Leakage [X] None [ ] _____ ml

Source Unit #11 PWEP
Test Site South Stack
Date of Test 7-25-90
No. of Runs Completed 3
Technician R. Gilson
Solvent acetone

0	Test ____ Run 0 Field Blank Log Number _____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. _____ Dish Tare Wt. _____ g Dish+Sample Wt. _____ g Sample Wt. _____ g
1	Test 4 Run 1 Vol. of Solvent 130 ml Log Number 1043 -31 Comments _____	Dish No. 61A Dish Tare Wt. 51.4738 g Dish+Sample Wt. 51.4907 g Sample Wt. 0.0169 g
2	Test 4 Run 2 Vol. of Solvent 120 ml Log Number -34 Comments _____	Dish No. 65 Dish Tare Wt. 46.9761 g Dish+Sample Wt. 46.9878 g Sample Wt. 0.0117 g
3	Test 4 Run 3 Vol. of Solvent 110 ml Log Number -38 Comments _____	Dish No. 93 Dish Tare Wt. 53.9841 g Dish+Sample Wt. 53.9997 g Sample Wt. 0.0156 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
0.0002	0.0166	0.0115	0.0154	D-11	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job: Cyprus N. Shore Mining
Team Leader: DS
Date Submitted:
Test No.: 4
Date of Analysis: 7-27-90

Source: Unit 11 P.W.G.P.
Test Site: South Stack
Date of Test: 7-25-90
No. of Runs Completed: 3
Technician: D Olson

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 4 Run 1
Log Number: 1043-32
Comments:
Filter No.: 2495
Filter Type: 4" GF
Filter Tare Wt.: 0.9250 g
Filter+Sample Wt.: 0.9257 g
Sample Wt.: 0.0007 g

2
Test 4 Run 2
Log Number: -36
Comments:
Filter No.: 2496
Filter Type: 4" GF
Filter Tare Wt.: 0.9297 g
Filter+Sample Wt.: 0.9310 g
Sample Wt.: 0.0013 g

3
Test 4 Run 3
Log Number: -40
Comments:
Filter No.: 2497
Filter Type: 4" GF
Filter Tare Wt.: 0.9043 g
Filter+Sample Wt.: 0.9052 g
Sample Wt.: 0.0009 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
	0.0007	0.0013	0.0009		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0215	0.0180	0.0223		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Minnesota Protocol

Job Cyprus N. Shore Mining
Team Leader D.S.
Date Submitted 7-27-90
Test No. 6
Date of Analysis 8-1-90

Source Unit #12 PW GP
Test Site North Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician R. Gulsrud

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 6 Run 1 Log Number 1043-51 Comments ____	Dish No. 3 Dish Tare Wt. 57.8087 g Dish+Sample Wt. 57.8129 g Sample Wt. 0.0042 g
2	Test 6 Run 2 Log Number -55 Comments ____	Dish No. 8 Dish Tare Wt. 48.7008 g Dish+Sample Wt. 48.7028 g Sample Wt. 0.0020 g
3	Test 6 Run 3 Log Number -57 Comments ____	Dish No. 25 Dish Tare Wt. 44.3452 g Dish+Sample Wt. 44.3476 g Sample Wt. 0.0024 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Blank Solvent Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
0.0005	0.0037	0.0015	0.0019	D-13	

LSC-03.GR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus North Shore Mining
Team Leader D.S.
Date Submitted 7-27-90
Test No. 6
Date of Analysis 7-31-90
Transport Leakage ☒ None ☐ _____ ml

Source Unit #12 PWGP
Test Site North Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician R. Gustin
Solvent acetone

0	Test ____ Run 0 Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 6 Run 1 Vol. of Solvent 95 ml Log Number 1042-49 Comments ____	Dish No. 46 Dish Tare Wt. 46.2234 g Dish+Sample Wt. 46.2338 g Sample Wt. 0.0104 g
2	Test 6 Run 2 Vol. of Solvent 100 ml Log Number -53 Comments ____	Dish No. 47 Dish Tare Wt. 48.0837 g Dish+Sample Wt. 48.0943 g Sample Wt. 0.0106 g
3	Test 6 Run 3 Vol. of Solvent 100 ml Log Number -57 Comments ____	Dish No. 95 Dish Tare Wt. 47.9129 g Dish+Sample Wt. 47.9237 g Sample Wt. 0.0108 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	Run 3	Run 4	Run 5
0.0002	0.0102	0.0104	0.0106	D-14	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job Cyprus N Shore Mining
Team Leader DS
Date Submitted
Test No. 6
Date of Analysis 7-27-90

Source Unit 12 P.W.G.P.
Test Site North Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician D Olson

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 6 Run 1
Log Number 1043-50
Comments
Filter No. 2482
Filter Type 4" GF
Filter Tare Wt. 0.9326 g
Filter+Sample Wt. 0.9344 g
Sample Wt. 0.0018 g

2
Test 6 Run 2
Log Number -54
Comments
Filter No. 2483
Filter Type 4" GF
Filter Tare Wt. 0.9261 g
Filter+Sample Wt. 0.9276 g
Sample Wt. 0.0015 g

3
Test 6 Run 3
Log Number -58
Comments
Filter No. 2484
Filter Type 4" GF
Filter Tare Wt. 0.9111 g
Filter+Sample Wt. 0.9119 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
	0.0018	0.0015	0.0008		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0157	0.0134	0.0133		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Minnesota Protocol

Job Cyprus N. Shore Mining
Team Leader DS
Date Submitted 7-27-90
Test No. 9
Date of Analysis 8-1-90

Source Unit #12 PW GP
Test Site South Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician R. Cullum

0	Test 9 Run 0 Field Blank Log Number 1043 -79 Comments	Dish No. 96 Dish Tare Wt. 44.7139 g Dish+Sample Wt. 44.7144 g Sample Wt. 0.0005 g
1	Test 9 Run 1 Log Number -82 Comments	Dish No. 101 Dish Tare Wt. 44.7971 g Dish+Sample Wt. 44.7999 g Sample Wt. 0.0028 g
2	Test 9 Run 2 Log Number -86 Comments	Dish No. 102 Dish Tare Wt. 44.3262 g Dish+Sample Wt. 44.3287 g Sample Wt. 0.0025 g
3	Test 9 Run 3 Log Number -90 Comments	Dish No. 104 Dish Tare Wt. 44.7886 g Dish+Sample Wt. 44.7904 g Sample Wt. 0.0018 g
4	Test ____ Run ____ Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g
5	Test ____ Run ____ Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g

Blank Solvent Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
0.0005	0.0023	0.0020	0.0013	D-16	

LSC-03.GR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job Cyprus North Shore Mining
Team Leader D.S.
Date Submitted 7-27-90
Test No. 9
Date of Analysis 7-31-90
Transport Leakage [X] None [ ] _____ ml

Source Unit #12 PWCP
Test Site South Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician R. Cullum
Solvent acetone

0	Test 9 Run 0 Field Blank Log Number 1043 - 77 Vol. of Solvent 100 ml *Solvent Residue 2.0 ug/ml	Dish No. 22 Dish Tare Wt. 51.3654 g Dish+Sample Wt. 51.3656 g Sample Wt. 0.0002 g
1	Test 9 Run 1 Vol. of Solvent 100 ml Log Number - 80 Comments	Dish No. 23 Dish Tare Wt. 50.8079 g Dish+Sample Wt. 50.8227 g Sample Wt. 0.0148 g
2	Test 9 Run 2 Vol. of Solvent 120 ml Log Number - 84 Comments	Dish No. 24 Dish Tare Wt. 56.8234 g Dish+Sample Wt. 56.8385 g Sample Wt. 0.0151 g
3	Test 9 Run 3 Vol. of Solvent 120 ml Log Number - 88 Comments	Dish No. 28 Dish Tare Wt. 51.0632 g Dish+Sample Wt. 51.0803 g Sample Wt. 0.0171 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 2.0 ug/ml = [(Sample Wt. 0.0002 g)(10^6)]/Vol. of Sol. 100 ml
EPA-M5 Acetone Residue Blank Spec. < 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
0.0002	0.0146	0.0149	0.0169	D-17	

LSC-01

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job Cyprus NShore Mining
Team Leader PS
Date Submitted
Test No. 9
Date of Analysis 7-27-90

Source Unit 12 P.W.G.P.
Test Site South Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician Dohm

0
Test 9 Run 0
Field Blank
Log Number 1043 -78
Comments
Filter No. 2318
Filter Type 4" GF
Filter Tare Wt. 0.9300 g
Filter+Sample Wt. 0.9304 g
Sample Wt. 0.0004 g

1
Test 9 Run 1
Log Number -81
Comments
Filter No. 2485
Filter Type 4" GF
Filter Tare Wt. 0.9191 g
Filter+Sample Wt. 0.9199 g
Sample Wt. 0.0008 g

2
Test 9 Run 2
Log Number -85
Comments
Filter No. 2486
Filter Type 4" GF
Filter Tare Wt. 0.9090 g
Filter+Sample Wt. 0.9096 g
Sample Wt. 0.0006 g

3
Test 9 Run 3
Log Number -89
Comments
Filter No. 2317
Filter Type 4" GF
Filter Tare Wt. 0.9254 g
Filter+Sample Wt. 0.9272 g
Sample Wt. 0.0018 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
	0.0008	0.0006	0.0018		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0177	0.0175	0.0200		

LSC-02PR

EPA Method 6 Sulfur Dioxide Titration Data Sheet

ob Cyprus North Shore Mining
eam Leader DS
ate Submitted 7-27-90
est No. 2
ate of Analysis 7-31-90

Source Unit P 11 PWEP
Test Site North Stack
Date of Test 7-24-90
No. of Runs Completed 3
Technician R. Cullen

Test/ Run	Sample Log Number	pH of Original Sample *	Final Vol. (V_{soln})	Dilution Factor (DF)	Aliquot Titrated (V_a)	No. of An.	Start Vol. Buret (ml)	Final Vol. Buret (ml)	Volume of Tit. (V_t) (ml)
Field Blank		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			V_b
2/1	1043 -13	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	1.00	2.40	1.40
						2	2.50	3.90	1.40
						Avg			1.40
2/2	-14	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	4.00	5.40	1.40
						2	5.50	6.90	1.40
						Avg			1.40
2/3	-15	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	7.00	8.30	1.30
						2	8.50	9.80	1.30
						Avg			1.30
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			

Normality of Titrant(N): .01003 N

Vol. Titrant for Field blank(V_b): 0.15 ml
Vol. Titrant for Method Blank: 0.15 ml

☐ Ion Exchange
☐ EPA Audit(s)
Audit No. ____
Audit No. ____

* If pH >3.5 Adjust with conc. perchloric acid to pH~2.0

S-421

EPA Method 6 Sulfur Dioxide
Titration Data Sheet

Job Cyprus North Shore Mining
Team Leader DS
Date Submitted 7-27-90
Test No. 5
Date of Analysis 7-31-90

Source Unit #11 PUGP
Test Site South Stack
Date of Test 7-25-90
No. of Runs Completed 3
Technician D. Gilm

Test/ Run	Sample Log Number	pH of Original Sample *	Final Vol. (V_{soln})	Dilution Factor (DF)	Aliquot Titrated (V_a)	No. of An.	Start Vol. Buret (ml)	Final Vol. Buret (ml)	Volume of Tit. (V_t) (ml)
Field Blank		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			V_b
5/1	1043 -43	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	10.00	11.30	1.30
						2	11.50	12.80	1.30
						Avg			1.30
5/2	-44	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	13.00	14.40	1.40
						2	14.50	15.90	1.40
						Avg			1.40
5/3	-45	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	16.00	17.30	1.30
						2	17.50	18.80	1.30
						Avg			1.30
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			

Normality of Titrant (N): .01003 N
Vol. Titrant for Field blank (V_{tb}): 0.15 ml
Vol. Titrant for Method Blank: 0.15 ml

☐ Ion Exchange
☐ EPA Audit(s)
Audit No. ____
Audit No. ____

* If pH >3.5 Adjust with conc. perchloric acid to pH~2.0

S-421

Interpoll Laboratories
(612) 786-6020

EPA Method 6 Sulfur Dioxide
Titration Data Sheet

Job Cyprus N. Shore Mining
Team Leader D.S.
Date Submitted 7-27-96
Test No. 7
Date of Analysis 7-31-96

Source Unit #12 PWGD
Test Site South Stack
Date of Test 7-26-96
No. of Runs Completed 3
Technician A. Collins

Test/Run	Sample Log Number	pH of Original Sample *	Final Vol. (V_{soln})	Dilution Factor (DF)	Aliquot Titrated (V_a)	No. of An.	Start Vol. Buret (ml)	Final Vol. Buret (ml)	Volume of Tit. (V_t) (ml)
Field Blank		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			V_b
7/1	1043-61	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ ml	1	10.00	11.50	1.50
						2	11.50	13.00	1.50
						Avg			1.50
7/2	-62	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ ml	1	13.00	14.00	1.00
						2	14.00	15.00	1.00
						Avg			1.00
7/3	-63	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ ml	1	15.00	16.20	1.20
						2	16.50	17.70	1.20
						Avg			1.20
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____ DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ ml	1			
						2			
						Avg			

Normality of Titrant (N): .01003 N

☐ Ion Exchange
☐ EPA Audit(s)
Audit No. ____
Audit No. ____

Vol. Titrant for Field blank (V_b): 0.15 ml
Vol. Titrant for Method Blank: 0.15 ml

* If pH >3.5 Adjust with conc. perchloric acid to pH~2.0

S-421

(612) 786-6020

EPA Method 6 Sulfur Dioxide
Titration Data Sheet

Cyprus N. Shore Mining
m Leader DS
e Submitted 7-27-90
est No. 16
ate of Analysis 7-30-90

Source Unit #12 AUGP
Test Site South Stack
Date of Test 7-26-90
No. of Runs Completed 3
Technician R.C.

Test/Run	Sample Log Number	pH of Original Sample *	Final Vol. (V_{soln})	Dilution Factor (DF)	Aliquot Titrated (V_a)	No. of An.	Start Vol. Buret (ml)	Final Vol. Buret (ml)	Volume of Tit. (V_t) (ml)
Field Blank 10/0	1043 -92	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☑ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1	22.00	22.15	.15
						2	22.20	22.35	.15
						Avg			.15 V_b
10/1	-93	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	22.50	24.00	1.50
						2	24.00	25.50	1.50
						Avg			1.50
10/2	-94	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	25.50	27.10	1.60
						2	27.50	29.10	1.60
						Avg			1.60
/3	-95	☑ pH<3.5 ☐ pH____	☑ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☑ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☑ 20 ml ☐ ____ml	1	29.50	31.20	1.70
						2	31.50	33.20	1.70
						Avg			1.70
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			
		☐ pH<3.5 ☐ pH____	☐ 500 ml ☐ 250 ml ☐ 100 ml ☐ ____ml	☐ 1 DF ☐ 10 DF ☐ 25 DF ☐ 50 DF ☐ ____DF	☐ 1 ml ☐ 5 ml ☐ 10 ml ☐ 20 ml ☐ ____ml	1			
						2			
						Avg			

ormality of Titrant (N): 0.0103 N

Vol. Titrant for Field blank (V_b): 0.15 ml

Vol. Titrant for Method Blank: 0.15 ml

☐ Ion Exchange
☐ EPA Audit(s)
Audit No. ________
Audit No. ________

* If pH >3.5 Adjust with conc. perchloric acid to pH~2.0

S-421

Interpoll Laboratories
(612)786-6020

EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job Cyprus NorthShore Mining	Date of Recovery 7-28-90	Date of Analysis SMS 8/31/90
Source Unit 12 P.W.G.P. North Stack	Recovered by Rick Drake	Analyst SMS
Date of Sampling 7-26-90	Recovery volume 500 ml	Eluent AS4A
Test No(s) 8	Barometric at time 29.01 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \bar{C}_B)V_R \qquad \bar{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where:

C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

S-340(1)

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(612)786-6020

EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - C_B$)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	1043-64	64	8-1-A	76		✓	0.70			0.903	0.868	434
2	-65	65	8-1-B	|		✓	0.80			0.865	0.770	385
3	-66	38	8-1-C	|		✓	1.00			1.31	1.21	608
4	-67	40	8-1-D	|		✓	2.80			1.24	1.15	573
5	-68	41	8-2-A	|		✓	4.00			0.931	0.836	418
6	-69	42	8-2-B	|		✓	2.70			0.986	0.891	446
7	-70	28	8-2-C	|		✓	1.40			0.921	0.865	433
8	-71	30	8-2-D	|		✓	1.30			0.869	0.774	387
9	-72	32	8-3-A	|		✓	1.30			0.909	0.814	407
10	-73	34	8-3-B	|		✓	1.00			0.971	0.876	438
11	-74	35	8-3-C	|		✓	0.90			0.906	0.811	406
12	-75	63	8-3-D	+		✓	0.90			0.854	0.859	430
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
Blank 1	1043-76	62	8-0-A		✓		0.20		1	CB1 0.0953		
Blank 2									1	CB2		$\bar{C}_B$ = 0.096
Blank 3									1	CB3		

S-340(2) R-9/85

Interpoll Laboratories
(612)786-6020

EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job Cyprus Northshore Mining	Date of Recovery 7-28-90	Date of Analysis 8/2/90
Source Unit 11 P.W. G.P. North Stack	Recovered by Bill Drake	Analyst SMS
Date of Sampling 7-24-90	Recovery volume 500 ml	Eluent AS4A
Test No(s) 3	Barometric at time 29.01 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \bar{C}_B)V_R \qquad \bar{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where:

C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

Interpoll Laboratories
(612)786-6020

EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - C_B$)	Total nitrate in Sample (ug) (M_{NO_3})
1	1043-19	7	3-1-A	76		✓	1.00			1.13	1.04	520
2	-20	8	3-1-B			✓	3.10			0.097	0.002	1
3	-21	9	3-1-C			✓	1.30			1.043	0.945	473
4	-22	12	3-1-D			✓	3.10			0.957	0.862	431
5	-23	11	3-2-A			✓	1.90			0.919	0.824	413
6	-24	10	3-2-B			✓	2.10			0.978	0.883	443
7	-25	14	3-2-C			✓	0.20			0.854	0.798	399
8	-26	20	3-2-D		✓		0.20			0.856	0.761	381
9	-27	21	3-3-A			✓	2.20			0.826	0.731	366
10	-28	23	3-3-B				0.00			0.854	0.759	380
11	-29	22	3-3-C			✓	0.40			0.726	0.631	316
12	-30	24	3-3-D			✓	1.80			0.763	0.668	334
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
Blank 1									1	CB1		
Blank 2									1	CB2		
Blank 3									1	CB3		

$\bar{C}_B$ = 0.095

S-340(2) R-9/85

Interpoll Laboratories
(612) 786-6020

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 1 of 3

Source UNIT II PELLITIZER WGP.
Test Site STACK (NORTH)
Date of Test 7-24-90
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 _____	
3	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 _____	RUN #2 HAS A PIECE OF GLASS IN IT
3	Integrated Gas sample	☒ As per EPA M-3 ☐ As per EPA M-10 ☐ Other _____	ANALYZED IN FIELD BY RICK EIDEM
12	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 FURNACE
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-27BRRRR

Interpoll Laboratories
(612) 786-6020

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 2

Source UNIT 11 P.W.G.P.
Test Site NORTH STACK
Date of Test 7-24-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
—	Probe Wash: ☐Acetone ☐D.I. Water	☐As per EPA M-5 ☐Other _____	
—	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 _____	
3	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 _____	
3	Integrated Gas sample	☒As per EPA M-3 ☐As per EPA M-10 ☐Other _____	ANALYZED IN FIELD BY RICK ELDEM
—	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 FURNACE
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

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 4

Source UNIT 11 P.W.G.P.
Test Site ~~NER~~ SOUTH STACK
Date of Test 7-25-90
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 _____	
3	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 _____	
3	Integrated Gas sample	☒ As per EPA M-3 ☐ As per EPA M-10 ☐ Other _____	DONE IN FIELD BY RICK EIDEM
—	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
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

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING Source UNIT 11 P.W.G.P.
Team Leader DWAYNE A. SMITH Test Site SOUTH STACK
Date Submitted 7-27-90 Date of Test 7-25-90
Test No. 5 No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
—	Probe Wash: ☐Acetone ☐D.I. Water	☐As per EPA M-5 ☐Other _____	
—	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 _____	
3	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 _____	
3	Integrated Gas sample	☒As per EPA M-3 ☐As per EPA M-10 ☐Other _____	DONE BY RICK ELDEM IN FIELD
—	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 FURNACE
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

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 628

Source UNIT 12 P.W.G.P.
Test Site NORTH STACK
Date of Test 7-26-90
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	
3	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	
3	Integrated Gas sample	☒ As per EPA M-3 ☐ As per EPA M-10 ☐ Other	
13	Oxides of Nitrogen (NO_x)	☒ As per EPA M-7A ☐ Other	Date 7-26-90 Time (HRS) 2330
—	☐ 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 PELLETIZER FURNACE
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

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 7

Source UNIT 12 P.W.G.P.
Test Site NORTH STACK
Date of Test 7-26-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
—	Probe Wash: ☐Acetone ☐D.I. Water	☐As per EPA M-5 ☐Other _____	
—	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 _____	
3	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 _____	
0	Integrated Gas sample	☐As per EPA M-3 ☐As per EPA M-10 ☐Other _____	BAG SAMPLE COLLECTED SIMULTANEOUS WITH TEST #6
—	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 FURNACE
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

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 9

Source UNIT 12 P.W.G.P.
Test Site SOUTH STACK
Date of Test 7-26-90
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 # 2318
4	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	1 BLANK
3	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 PELLITIZER FURNACE
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

Chain of Custody
Sample Deposition Sheet

Job CYPRUS NORTHSHORE MINING
Team Leader DWAYNE A. SMITH
Date Submitted 7-27-90
Test No. 10

Source UNIT 12 P.W.G.P.
Test Site SOUTH STACK
Date of Test 7-26-90
No. of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Comments
—	Probe Wash: ☐Acetone ☐D.I. Water	☐As per EPA M-5 ☐Other _____	
—	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 _____	
4	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 _____	1 BLANK
0	Integrated Gas sample	☐As per EPA M-3 ☐As per EPA M-10 ☐Other _____	DONE SIMULTANEOUS WITH TEST #9
—	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 _____
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

APPENDIX E

MPCA EXHIBIT C

Interpoll Laboratories
(612)786-6020

MPCA Exhibit C for Combustion Sources

JOB CYPRUS NORTHSHORE
SOURCE POWER HOUSE - Unit #2
DATE July 27, 1990

C. Fuel Input

1. Itemize all fuels and materials that are added to the combustion process during the test period. Attach ultimate analysis of the fuel.

FUEL DESCRIPTION Coal: State, City, Mine Oil: Specify Grade	INPUT (LBS/HR) (GAL/HR)	% MOISTURE AS REC'D	AS REC'D (BTU/LB) (BTU/GAL)	HEAT INPUT (BTU/HR)
No. 1 Coal Gillette, Wyoming Black Thunder Mine	33416	27.2	8826	
No. 2 Natural Gas at 48 MCF/HR.				
No. 3				
		TOTAL		

2. Are the above fuels substantially the same as those normally burned Yes. If not explain _____.

3. Are the above fuels normally burned in the proportions shown above Yes. If not, explain _____.

4. Describe any changes anticipated for procurement of fuels within the next twelve (12) months. No _____.

D. Equipment & Operating Data

1. Furnace No. N.A.
2. Furnace Mfg. N.A.
3. Type of Firing N.A.
4. Furnace operating under normal operating conditions: No ____; Yes X.

Interpoll Laboratories
(612)786-6020

MPCA Exhibit C for Combustion Sources (Continued)

5. Specify normal soot blowing frequency:
   a) source operating time blowing soot: 4 HRS ~~minutes~~/shift
   b) number of shifts per day 3
6. Specify soot blowing time during the test:
   start N.A. end N.A. — VARIABLE
7. Specify normal ash pulling frequency:
   a) source operating time pulling ashes: 2 1/2 HRS ~~minutes~~/shift
   b) number of shifts per day 3
8. Specify ash pulling time during the test:
   start VARIABLE end _____
   _____ per shift; _____ per day.

E. Instrument Data

1. Include a copy of chart records during test for the comustion efficiency indices (CO, O_2, CO_2, combustibles, steam flow, air flow, etc.)

F. Air Pollution Control Equipment Model 18-180 AMERTHERM

1. Type/model control equipment Bag House - AMERICAN AIR
2. Air pressure drop across the control equipment _____.
3. Air flow through the control equipment RATED 380,000 ACFM
4. Was the control equipment operating normally? Yes.
5. Data of last major maintenance/cleaning of control equipment During plant REACTIVATION IN the Fall/Winter of 1989.

G. 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 Dennis M Wagner. Position Environmental Engineer

S-350R(2)

Interpoll Laboratories
(612)786-6020

MPCA Exhibit C for Process Emissions

JOB Cyprus Northshore Mining
SOURCE Pelletizer - Furnace 11 and 12 Waste Gas
DATE July 24-26, 1990

C. Equipment & Operating Data

1. Process Equip. No./Ident. Emission Sources 10?-10?,
2. Process Equip. Description Pelletizing Furnaces 11, 12.
3. Process equipment operating under normal operating conditions:
   No ___. Yes X.

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 Fluid Ionics

1. Type/model control equipment Wet Electrostatic Precipitators
2. Air pressure drop across the control equipment Not Applicable
3. Air flow through the control equipment 93,000 ACFM Rated
4. Was the control equipment operating normally? Yes.
5. Data of last major maintenance/cleaning of control equipment December, 1989 and January 1990 prior to plant reactivation.

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 Dennis M Wagner, Position Environmental Engineer

S-349R

APPENDIX F

BOILER INFORMATION SHEET

INTERPOLL LABORATORIES
BOILER INFORMATION SHEET

Company: CYPRUS NORTHSHORE MINING
Location: SILVER BAY, MINNESOTA
Boiler No.: NO. 2
Manufacturer: BABCOCK & WILCOX
Class and Type: RADIANT REHEAT
Year Built: 1962
Firing Equipment: PULVERIZERS - GAS

☒ Economizer — Gas Temp. In NA °F Gas Temp. Out 650 °F
☒ Air Preheater — Gas Temp. In 100 °F Gas Temp. Out 590 °F

Fuel (State, County, Mine): Black Thunder, Gillette WY BTU/LB:
Steaming Capacity: 575, 000 LB/HR
Design Steam Pressure: 2075
Design Steam Temperature: 1005
Normal Steam Load: VARIABLE, DEPENDING ON LOAD

Steam Data:

☒ Saturated — Normal Steam Pressure 185 PSIG Feedwater Temp. 530 °F
☒ Superheated — Normal Steam Temp. 1005 °F (if superheated)

Pollution Control Equipment:

☐ Mechanical Collector
- No. of tubes
- Tube Dia.
- Manuf.
- Press. Drop
- Rated Eff.

☐ ESP
- No. of sections
- Hotside ☐ Coldside ☐
- Voltage KV
- Manuf.
- Press. Drop IN.WC

☐ Scrubber
- Type
- Liquid flow GPM
- Manuf.
- Press. Drop IN.WC

☒ Baghouse
- No. of Sections 12
- Cleaning mechanism SNAP BLOWER
- No. of Bags
- Cloth area/bag SQ.FT.
- Manuf. AMERICAN AIR FILTER
- Press. Drop IN.WC

Type of Stack: STEEL - BRICK LINED
Stack Height: 216'
Stack Diameter: 10'-2" ID
Units Emitting through Stack: ONE
Rated Boiler Efficiency: 88.78%

Form #S-0075RRR

APPENDIX G

GAS ANALYZER SPECIFICATIONS

Thermo Electron CORPORATION

MODEL 10A
RACK-MOUNTED
CHEMILUMINESCENT
NO-NO_x GAS ANALYZER
SPECIFICATIONS

Sensitivity

Each instrument is equipped with the folling ranges:

0 -	2.5	ppm
0 -	10	ppm
0 -	25	ppm
0 -	100	ppm
0 -	250	ppm
0 -	1000	ppm
0 -	2500	ppm
0 -	10000	ppm

Accuracy

Derived from the NO or NO_2 calibration gas, ±1% of fullscale.

Response time (0-90%) Typical

1.5 seconds - NO Mode
1.7 seconds - NO_x Mode

Output

0 - 10mV and 0 - 10V standard. Other outputs available upon request.

Zero Drift

Negligible after 1/2-hour warm-up.

Linearity

±1% of full scale.

Input Power Requirements

Standard: 115v/50Hz; 115v/60Hz
Optional: 220v/50Hz; 220v/60Hz

Thermo Electron Corporation
Instruments Division
8 West Forge Parkway
Franklin, Massachusetts 02038
(617) 520-0430

Interpoll Laboratories, Inc.
(612) 786-6020

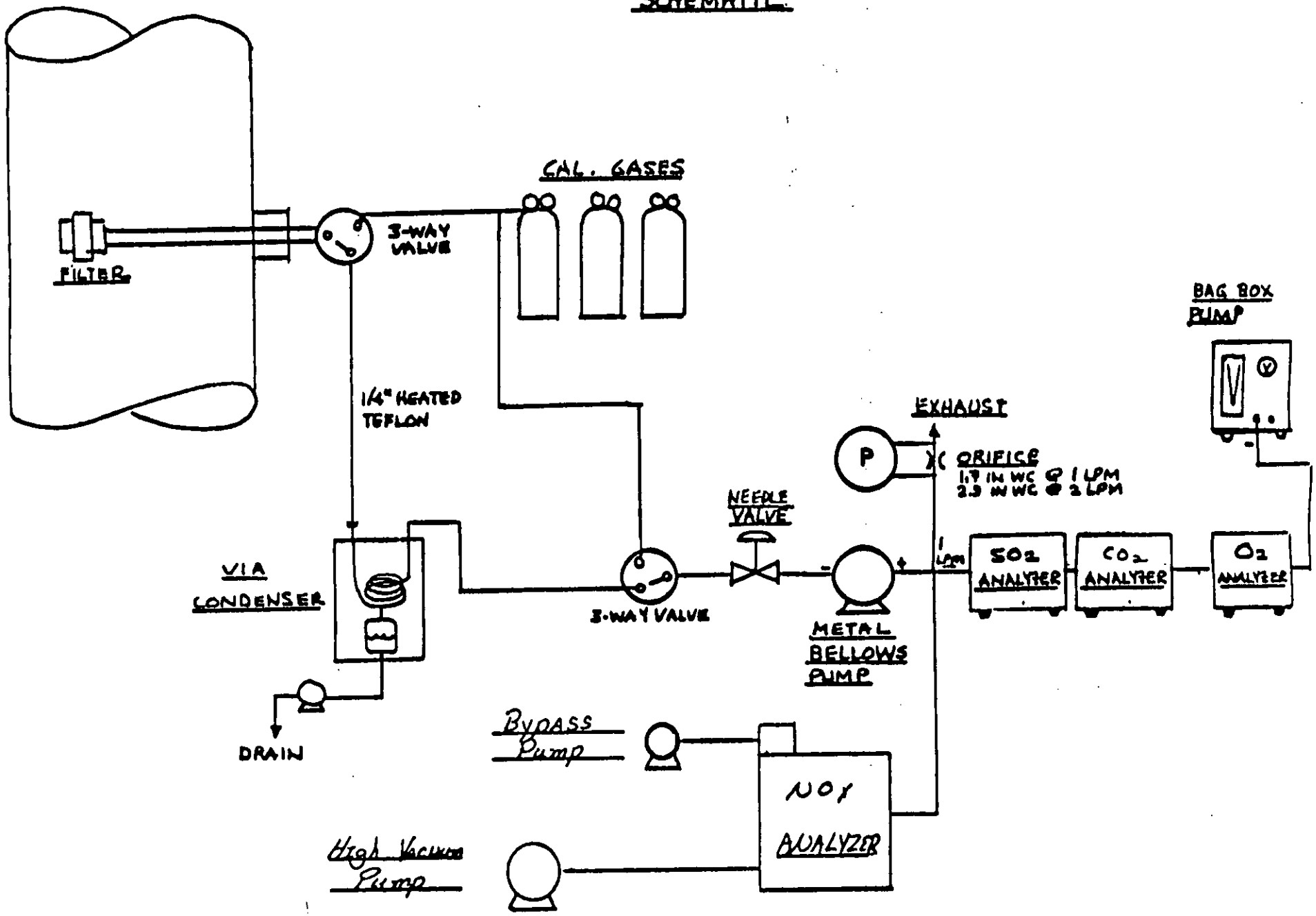
Western Research Model 721ATZ SO_2 Analyzer

SPECIFICATIONS

1)	Measuring Principle:	NDUV double beam method which uses 285 nm UV light for SO_2 measurement and 585 nm visible light to compensate for contamination of all windows, detector drift or changes in the intensity of the radiation source
2)	Range:	SO_2: 0 - 500 ppm and 0 - 1000 ppm; but low range may be reduced to 0 - 100 ppm with full scale analog output; total dynamic range of 0 - 5000 ppm with 1 ppm readability
3)	Accuracy:	$\pm$ 2% f.s., worstcase. Typically better than $\pm$ 1% f.s.
4)	Temperature drift:	$\leq$ 0.5% f.s./^{0}C
5)	Noise:	0.5% of full scale, worstcase
6)	Ambient temp:	0 to 40 ^{0}C
7)	Ambient humid:	Less than 100% RH
8)	Response time: (90% of final reading)	< 5 seconds
9)	Optical cell length:	35 cm.
10)	Output signal:	Panel display is digital - direct reading in ppm,v; output signal: 7 field-selectable potentiometric outputs of 1V, 2V, 5V, 10V DC and 100, 200, 500 mV DC. Two outputs per range are provided at the rear of the instrument, standard. Unit equipped also with 4 - 20 mA.
11)	Interferences:	No known interferences from O_2, CO_2, CO or hydrocarbons; internally compensated for NO interference
12)	Linearity:	$\pm$ 1.5% of full scale
13)	Power supply:	AC 115 V $\pm$ 10%, 60 Hz
14)	Power consmp:	Less than 575 watts

METHOD 3A, 6C + 7E FLOW SCHEMATIC

4/3/89 PL



APPENDIX H

CALIBRATION GAS CERTIFICATION SHEETS

GS# 16

LINDE

Linde Gases
and Equipment
21725 Groesbeck Highway
Warren, MI 48089
313-445-3350

Oxygen Service Company
1111 Pierce Butler Rte
St. Paul, MN 55704

May 2, 1990
Customer P.O.: 1397-SA

RECEIVED
MAY 08 1990
INTERPOLL LABORATORIES

EPA PROTOCOL DATA:

CYLINDER: LL33957
REQUESTED COMPOSITION: 150ppm Nitric Oxide/Nitrogen

ANALYTICAL DATA

MEAN CONCENTRATION: 151ppm Nitric Oxide/Nitrogen

REPLICATE ANALYSIS:

A) 151ppm Nitric Oxide/Nitrogen
B) 151ppm Nitric Oxide/Nitrogen
C) 151ppm Nitric Oxide/Nitrogen

CYLINDER PRESSURE: 2200 psig @ 70F
DATE OF CERTIFICATION: 5-02-90
EXPIRATION DATE OF CERTIFICATION: 11-02-91

NBS/SRM NUMBER: 1684B
CERTIFIED NBS/SRM CONCENTRATION: 97.2ppm Nitric Oxide/Nitrogen
+/-1.1ppm
NBS/SRM SERIAL NUMBER: CAL12816

GAS ANALYZER:

MAKE	MODEL:	SERIAL#:
Thermo Electron	10AR	10AR 6028-71

ANALYTICAL PRINCIPLE: Chemiluminscence
DATE OF LAST MULTIPOINT CALIBRATION: 4/25/90

ANALYSIS PERFORMED BY: Robert Lerchenfeld

The above certification was performed in accordance with EPA Protocol, Section 3.04 6/9/87.

Lab Superintendent

GS# 162

LINDE

Linde Gases
and Equipment
21725 Groesbeck Highway
Warren, MI 48089
313-445-3350

Oxygen Service Company
1111 Pierce Butler Rte
St. Paul, MN 55704

May 2, 1990
Customer P.O.: 1397-SA

RECEIVED
MAY 08 1990
INTERPOLL LABORATORIES

EPA PROTOCOL DATA:

CYLINDER: LL25477
REQUESTED COMPOSITION: 250ppm Nitric Oxide/Nitrogen

ANALYTICAL DATA

MEAN CONCENTRATION: 250ppm Nitric Oxide/Nitrogen

REPLICATE ANALYSIS:

A) 250ppm Nitric Oxide/Nitrogen
B) 249ppm Nitric Oxide/Nitrogen
C) 250ppm Nitric Oxide/Nitrogen

CYLINDER PRESSURE: 2200 psig @ 70F
DATE OF CERTIFICATION: 4-30-90
EXPIRATION DATE OF CERTIFICATION: 10-30-91

NBS/SRM NUMBER: 1685A
CERTIFIED NBS/SRM CONCENTRATION: 243ppm Nitric Oxide/Nitrogen +/-3ppm
NBS/SRM SERIAL NUMBER: FF4006

GAS ANALYZER:

MAKE	MODEL:	SERIAL#:
Thermo Electron	10AR	10AR 6028-71

ANALYTICAL PRINCIPLE: Chemiluminscence
DATE OF LAST MULTIPOINT CALIBRATION: 4/16/90

ANALYSIS PERFORMED BY: Robert Lerchenfeld

The above certification was performed in accordance with EPA Protocol, Section 3.04 6/9/87.

Lab Superintendent

LINDE

Union Carbide Industrial Gases, Inc.
Linde Division
4550 Kennedy Avenue
East Chicago, IN 46312

DATE : JANUARY 10, 1990

TO: OXYGEN SERVICE COMPANY
1111 PIERCE BUTLER ROUTE
ST PAUL MN 55104

LINDE ORDER NUMBER : 005.015.01
CUSTOMER PO NUMBER : 9724SA
CUSTOMER REL NUMBER:

DEAR SIR/MADAM:

THIS IS YOUR CERTIFICATE OF ANALYSIS FOR:

CYLINDER NUMBER	MIXTURE COMPONENTS	REQUESTED COMPOSITION	CERTIFIED COMPOSITION
HA 6511	SULFUR DIOXIDE NITROGEN	95 PPM BALANCE	97.5 PPM BALANCE

RECEIVED
JAN 18 1990
INTERPOLL LABORATORIES

E.J. Bustek
APPROVED BY

COA-6MC

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Date Shipped : 12/ /3/89
Our Project # : 0507716
Your P.O. # : 10929KE
Page ____ of ____
Expiration Date : 6-28-90

Customer : OXYGEN SERVICE
C/O INTERPOLL
4500 BALL RD. N.E.
CIRCLE PINES, MN. 55014

RECEIVED
DEC 19 1989
INTERPOLL LABORATORIES

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

Certified Per Traceability Protocol # 1
Procedure # G1
File # P02065
Certified Accuracy 1 % NBS Traceable

Cylinder Number ALM033066
Cylinder Pressure 2000 psig

COMPONENT	CERTIFIED CONC.	REFERENCE STD: SRM # (CRM #)	REFERENCE STD: CYLINDER NUMBER	REFERENCE STD: CONC.	GAS ANALYZER: MAKE/MODEL/SERIAL #	GAS ANALYZER: LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
SULFUR DIOXIDE	249.5 PPM	1661	AAL-19060	464.1 PPM	HORIBA	10-24-88	NON-DISPERSIVE INFRARED
		GMIS#	AAL-3592	502.1 PPM			

BALANCE GAS : NITROGEN

H-4

FIRST ANALYSIS — DATE : 12-19-88

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	57.90	249.2	464.1 PPM	100.00	464.1
0.00	57.90	249.2		100.00	464.1
0.00	57.90	249.2		100.00	464.1
CALCULATED RESULTS		249.2			
		249.2			
		249.2			
AVERAGE :		249.2 PPM			

SECOND ANALYSIS — DATE : 12-28-88

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	58.00	249.7	464.1 PPM	100.00	464.1
0.00	58.00	249.7		100.00	464.1
0.00	58.00	249.7		100.00	464.1
CALCULATED RESULTS		249.7			
		249.7			
		249.7			
AVERAGE :		249.7 PPM			

CALIBRATION CURVE — 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1661	464.1	100	100.00	464.1	.00
	371.3	80	82.80	372.9	0.43
	278.5	60	64.00	278.6	0.05
	185.6	40	44.30	185.9	0.15
	92.82	20	22.90	92.33	-0.53
	0.0000	0	0.00	0.0000	0.00
	0.00			0.00	0.00
1694	95.10	LOW	23.70	95.70	0.63
GMIS	502.1		106.50	499.8	-0.45

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Rohit C. Patel

Approved By : J. Shapiro

APPENDIX I

METHODS 6C AND 7E DATA

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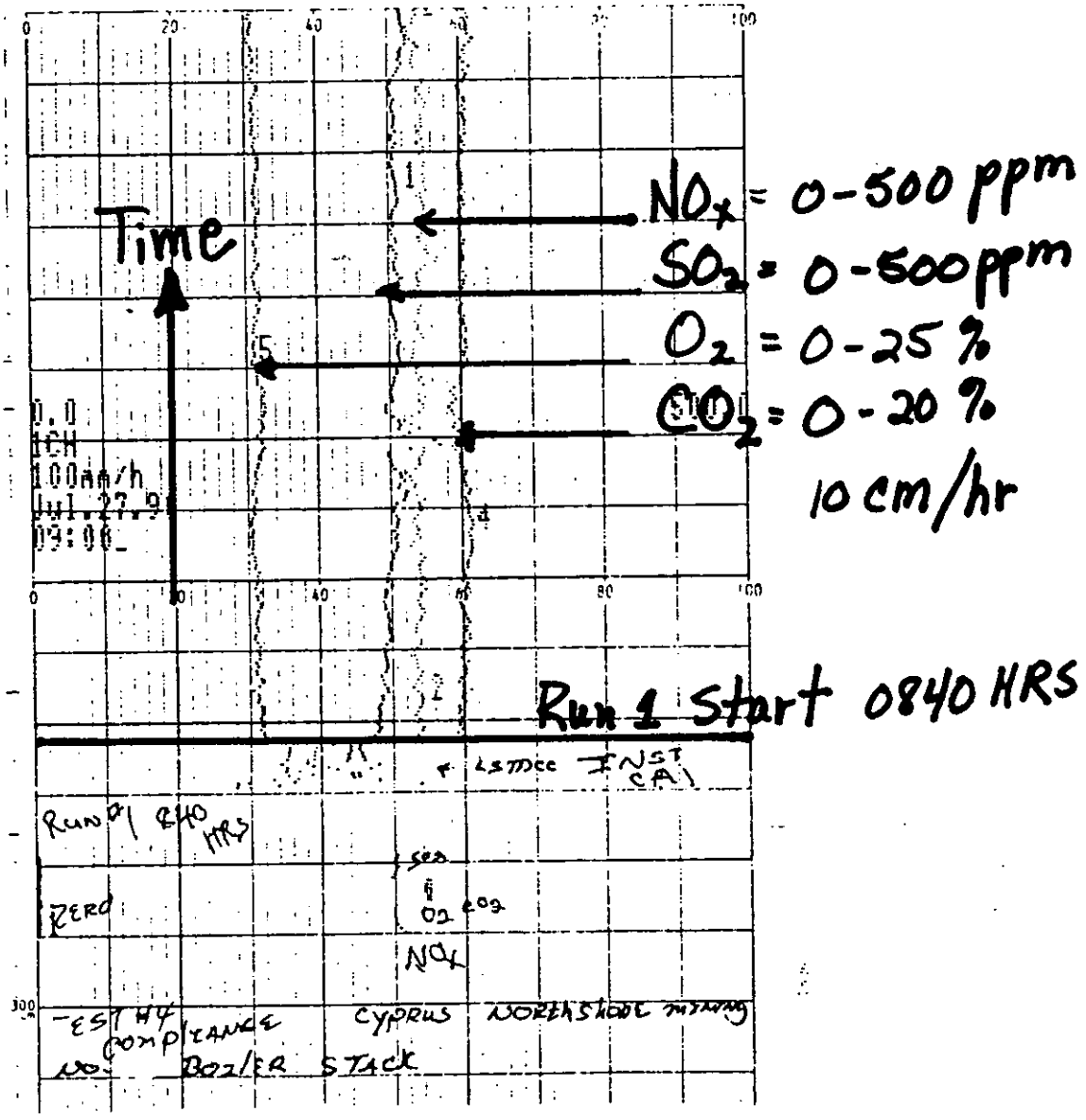
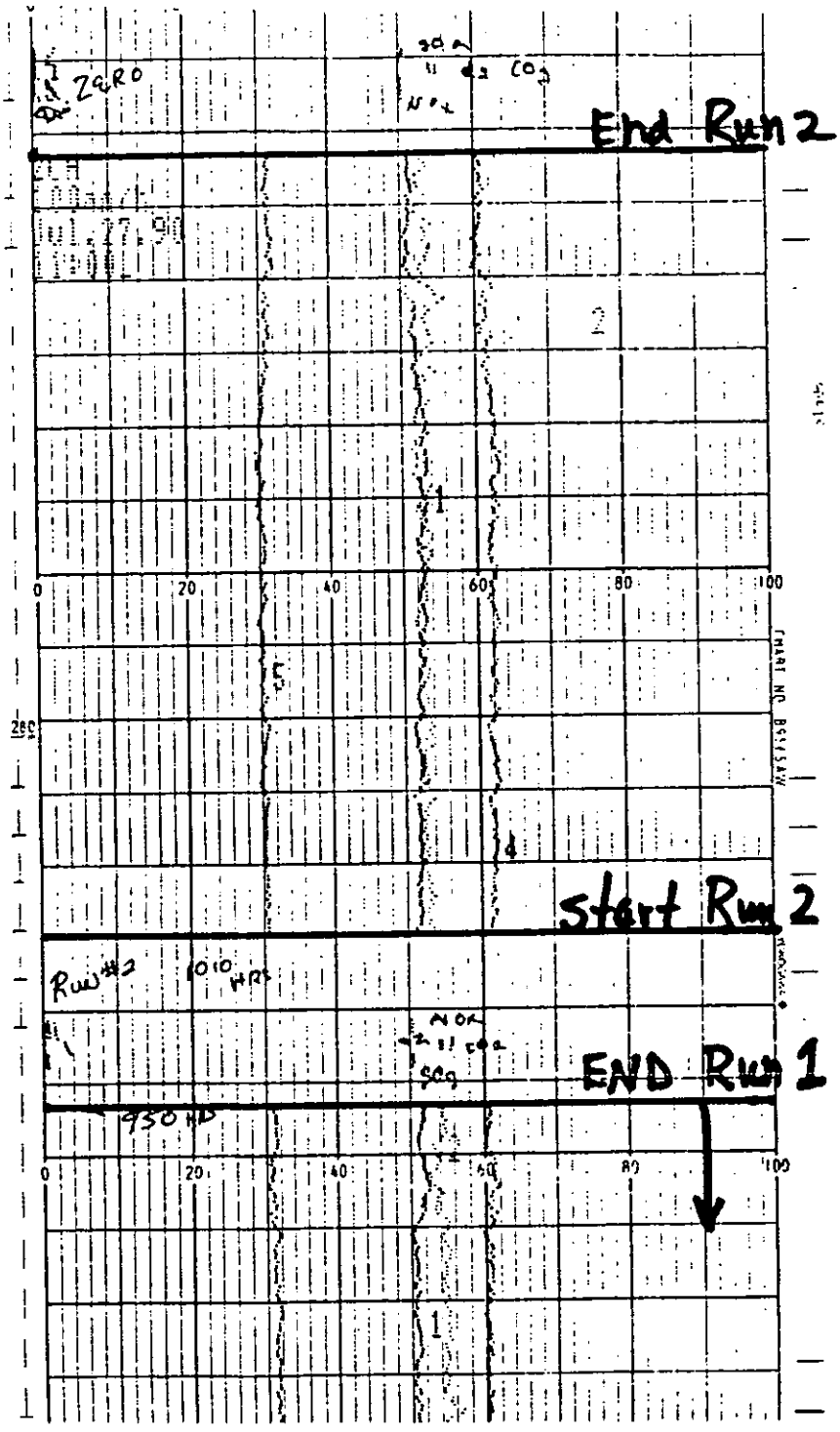

Time
NO_x = 0-500 ppm
SO_2 = 0-500 ppm
O_2 = 0-25 %
CO_2 = 0-20 %
10 cm/hr
Run 1 Start 0840 HRS
Run #1 0840 HRS
CYPRUS NORTHSHORE MINING
EST HY COMPLIANCE
BOILER STACK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start Run 2 1010 HRS
END Run 1 0950 HRS
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950 HRS
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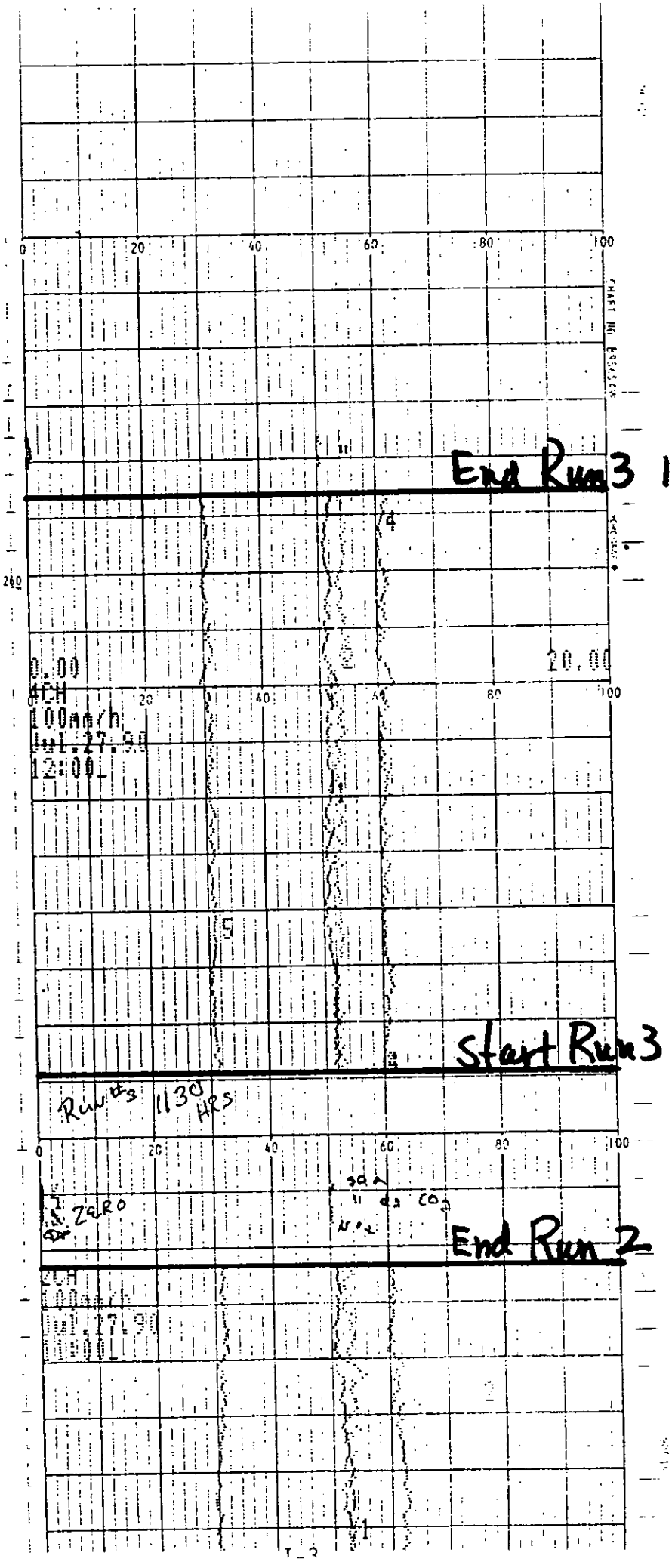
20
40
60
80
100


End Run 3 1230 HRS
Start Run 3 1130 HRS
Run #3 1130 HRS
End Run 2

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Comp'

SO_2 System Bias Check

Job CYPRUS NORTHSHORE MINING Source No. 2 BOILER S
Test 4 Run 0-12 Date 7-27-90 Site STACK
Operator R. ROSENTHAL

Run	Time (HRS)	***	Cylinder Value (ppm)	Analyzer Resp (ppm)		Diff. CE-SB (ppm)	Span Val (PPM)	% of span	
				Cal Err	Sys Bias				
1	815	Zero gas	0	.1	.3	.2	500	.04	840
		Upscale	249.5	250.4	249.4	1.0	500	.20	950
2	950	Zero gas	0	.1	.6	.5	500	.10	1010
		Upscale	249.5	250.4	251.3	.7	500	.18	1110
3	1110	Zero gas	0	.1	1.8	1.7	500	.34	1130
		Upscale	249.5	250.4	249.0	1.4	500	.28	1230
4	1230	Zero gas	0	.1	1.0	.7	500	.18	
		Upscale	249.5	250.4	250.8	.4	500	.08	
5		Zero gas	0						
		Upscale							
6		Zero gas	0						
		Upscale							
7		Zero gas	0						
		Upscale							
8		Zero gas	0						
		Upscale							
9		Zero gas	0						
		Upscale							
10		Zero gas	0						
		Upscale							
11		Zero gas	0						
		Upscale							
12		Zero gas	0						
		Upscale							

Must be within 5% of the span for the zero or upscale cal. gas.

S420-11R

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NO_x System Bias Check

Job CYPRUS NORTHSHORE MINING Source No. 2 BOILER
Test 4 Run 0-4 Date 7-27-90 Site STACK
Operator R. ROSENTHAL

Run	Time (HRS)	***	Cylinder Value (ppm)	Analyzer Resp (ppm)		Diff. CE-SB (ppm)	Span Val (PPM)	% of span
				Cal Err	Sys Bias			
1	815	Zero gas	0	.3	.5	.2	500	.04
		Upscale	250	250.8	250.1	.7	500	.14
2	950	Zero gas	0	.3	1.5	1.2	500	.24
		Upscale	250	250.8	251.9	1.1	500	.22
3	1110	Zero gas	0	.3	1.2	.9	500	.18
		Upscale	250	250.8	251.7	.9	500	.18
4	1230	Zero gas	0	.3	.7	.4	500	.08
		Upscale	250	250.8	251.7	.9	500	.18
5		Zero gas	0					
		Upscale						
6		Zero gas	0					
		Upscale						
7		Zero gas	0					
		Upscale						
8		Zero gas	0					
		Upscale						
9		Zero gas	0					
		Upscale						
10		Zero gas	0					
		Upscale						
11		Zero gas	0					
		Upscale						
12		Zero gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

S420-11R

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CO_2 System Bias Check

Job CYPRUS NORTHSHORE MINE Source No. 2 BOILER
Test 4 Runs 1-4 Date 7-27-90 Site STACK
Operator R. ROSENTHAL

Run	Time (HRS)	***	Cylinder Value (ppm)	Analyzer Resp (ppm)		Diff. CE-SB (ppm)	Span Val (PPM)	% of span
				Cal Err	Sys Bias			
1	815	Zero gas	0	.03	.00	.03	20	.15
		Upscale	11.00	10.94	11.00	.06	20	.30
2	950	Zero gas	0	.03	.10	.07	20	.35
		Upscale	11.00	10.94	11.08	.10	20	.50
3	1110	Zero gas	0	.03	.05	.02	20	.10
		Upscale	11.00	10.94	11.03	.09	20	.45
4	1230	Zero gas	0	.03	.05	.02	20	.10
		Upscale	11.00	10.94	11.00	.06	20	.30
5		Zero gas	0					
		Upscale						
6		Zero gas	0					
		Upscale						
7		Zero gas	0					
		Upscale						
8		Zero gas	0					
		Upscale						
9		Zero gas	0					
		Upscale						
10		Zero gas	0					
		Upscale						
11		Zero gas	0					
		Upscale						
12		Zero gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

S420-11R

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O_2 System Bias Check

Job CYPRUS NORTHSHORE MINING Source No. 2 BOILER
Test 4 Run 0-4 Date 7-27-90 Site STACK
Operator R. ROSENTHAL

Run	Time (HRS)	***	Cylinder Value (ppm)	Analyzer Resp (ppm)		Diff. CE-SB (ppm)	Span Val (PPM)	% of span
				Cal Err	Sys Bias			
1	815	Zero gas	0	.02	.09	.07	25	.28
		Upscale	13.50	13.49	13.60	.11	25	.44
2	950	Zero gas	0	.02	.04	.02	25	.08
		Upscale	13.50	13.49	13.56	.07	25	.28
3	1110	Zero gas	0	.02	.03	.01	25	.04
		Upscale	13.50	13.49	13.57	.08	25	.24
4	1230	Zero gas	0	.02	0	.02	25	.08
		Upscale	13.50	13.49	13.56	.07	25	.28
5		Zero gas	0					
		Upscale						
6		Zero gas	0					
		Upscale						
7		Zero gas	0					
		Upscale						
8		Zero gas	0					
		Upscale						
9		Zero gas	0					
		Upscale						
10		Zero gas	0					
		Upscale						
11		Zero gas	0					
		Upscale						
12		Zero gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

S420-11R

APPENDIX J

PROCESS DATA

(Not provided at time of report)

APPENDIX K

PROCEDURES

Particulate Loading 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. The sampling module also houses the impinger case and a Drierite filled column. The sampling module is connected by means of an umbilical cord to the control module. The control module houses the dry test gas meter, the calibrated orifice, a leakless pump, two inclined manometers, and all controls required for operating the sampling train.

Particulate samples are collected as follows: The sample gas is drawn through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter where particulates are removed. The sample gas is then passed through an ice-cooled impinger train and a desiccant-packed column which absorbs remaining moisture. The sample gas then passes through a vacuum pump followed by a dry test gas meter. The gas meter integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gasmeter provides real time 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 test point maintaining isokinetic sampling conditions. Nomographs are used for rapid determination of the sampling rate.

3a P1(1-5)

When sampling is complete the filter is removed with tweezers and placed in a clean container. The nozzle, pitot tube and inlet side of the filter holder are quantitatively washed with acetone and the washings are stored in a second container. A brush is often used in the cleaning step to help dislodge deposits. The samples are returned to the laboratory where they are logged in and analyzed. The volume of the acetone rinse ("probe wash") is noted and the rinse is transferred to a tared 120 cc porcelain evaporating dish. The acetone is then evaporated off at 97 - 105 ^{0}F. At this elevated temperature condensation of atmospheric moisture is prevented. The acetone-free sample is then dried at 105 ^{0}C for 30 minutes, cooled in a desiccator over Drierite, and weighed to the nearest 0.01 mg. The filter sample is transferred to a 6 inch watch glass and dried at 105 ^{0}C for two hours. The filter and watch glass are then cooled in a desiccator and the filter weighed to the nearest 0.01 mg. All weighings are performed in a balance room where the relative humidity is maintained at less than 50%. Microscopic examination of the samples is performed if any unusual characteristics are observed. The weight of the acetone rinse blank is subtracted from the samples. The Drierite column is weighed on-site and the water absorbed by the Drierite is added to the condensate to give the total amount of absorbed water.

Integrated flue gas samples for Orsat analysis were collected simultaneously with each particulate sample. The samples were collected in 44-liter Tedlar gas sampling bags at a constant flow rate throughout each particulate run. The bags were then returned to the laboratory for analysis. Gas composition was determined by Orsat analysis. Standard commercially prepared solutions were used in the Orsat analyzer (saturated potassium hydroxide for carbon dioxide and reduced methylene blue for oxygen). The oxygen content of the flue gas was also measured at each test point during the particulate determinations using a Teledyne Model 320P-4 Portable Oxygen Analyzer sampling the effluent from the Method 5 train.

3aP2(7)

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Condensible Organic Compounds Analysis

(State of Minnesota - MPCA Exhibit C)

Method II-8672-MN

Equipment: Separatory funnel - 500 cc with Teflon stopcock

Powder funnel - 75 mm ID with a 17 mm stem

Evaporating dish(es) - 200 cc or 250 cc beaker

Reagents: Diethyl ether - reagent grade

Chloroform - reagent grade

Sodium sulfate - (ACS) granular anhydrous

Toluene - (if 3% hydrogen peroxide is used to collect the samples)

Glass wool (Pyrex microfiber)

PREPARATION

1. Place 1 kg of granular anhydrous sodium sulfate in a shallow tray and heat to 200 ^{o}C for at least four hours. Store in a tightly sealed glass container.

2. Place a plug of clean glass wool in the stem of the powder funnel. The plug must be of sufficient size so that it is held snuggly in place by its own pressure. Add a one-inch layer of dry sodium sulfate.

SAMPLING

An all-glass impinger assembly is used in the back half of the EPA Method 5 sampling train when an organic wet catch is to be collected. The impinger assembly consists of a modified impinger, a Greenburg Smith impinger followed by another modified impinger. The third impinger should have a temperature measuring device at the outlet upstream of a final impinger or desiccant column to monitor the temperature of the outlet gas stream. Prior to the start of the test, each of the first two impingers should be charged with 100 g of Class 1 water. The Method 5 train should be operated as provided for in EPA Method 5. Ice should be added to the impinger bath to keep the temperature of the gas at the outlet at or less than 68 ^{o}F. After the post test leak check, the impinger train is removed and impinger contents poured into a tared all-glass sample bottle and closed with a Teflon-lined cap. The sample bottle is then weighed and the total condensate calculated by subtraction of the bottle tare weight and the weight of initial water added to the impingers (200 g). A label is affixed and the sample is returned to the laboratory for analysis. The sample should be stored at 4 ^{o}C if the analysis is not conducted within 48 hours.

ANALYSIS

1. Organics

Caution! Work in vented hood!!!

A. Organic Blank Determination

1. Pour 125 mL of ethyl ether and 125 mL of chloroform into a tared beaker.
2. Evaporate solvent in hood at 70 ^{o}F or less until no solvent remains.
3. Desiccate the sample in dish for two hours.
4. Weigh the sample to nearest 0.1 mg, record and report on Form LSC-036.

B. Organic Sample Determination

1. Test for peroxide in sample ether using KI strips. (If KI strip shows positive, contact your supervisor before proceeding.)
2. Transfer the sample solution quantitatively to a 500 mL separatory funnel. Use the first of three 25 mL chloroform aliquots to rinse the sample container.
3. Extract with three 25 mL portions of chloroform. (Shake and vent to release pressure about 4 to 5 times each.) Allow the phases to separate. (Bottom layer is chloroform.) Draw off the bottom layer, transferring the solvent with a funnel containing a plug of sodium sulfate into a tared beaker. (Do not draw off any of the aqueous layer.)

4. After the three chloroform extractions, use two 25 mL portions of chloroform to rinse the sodium sulfate, collecting the rinses in the same tared beaker as the extracts.

5. Next extract the sample three times with 25 mL aliquots of ethyl ether. (Shake and vent to release pressure about 4 to 5 times each.) Allow the phases to separate. (Top layer is ethyl ether.) Draw off the bottom layer (aqueous) into another separatory funnel taking less than 1 mL of the ethyl ether layer with. Decant the ethyl ether, passing it through sodium sulfate and collecting the ethyl ether in the same tared dish as the chloroform.

6. After the three ethyl ether extractions, take two 25 mL portions of ethyl ether and rinse the sodium sulfate collecting the rinses in the same tared beaker as the extracts.

7. Evaporate the solvents (chloroform and ethyl ether) in the tared beaker in the hood at 70 ^{o}F or less until no solvent remains. (Use no heat and have no sources of ignition in the hood when doing this procedure.) Do not evaporate so quickly as to allow evaporative cooling to lower the temperature of the container below the dew point of water, otherwise, water will be condensed out in the container.

8. Desiccate to constant weight (two hours). Record and report the final weight to the nearest 0.1 mg on Form LSC-036.

II. Inorganics

If inorganic residue information is required, the following procedure should be conducted:

A. Inorganic Blank Determination

1. Vent the remaining aqueous phase from the organic extraction in the hood to remove residual organic solvents (usually overnight).
2. Decant the impinger catch into a tared evaporating dish.
3. Evaporate all of the water in the sample in an oven at 100 ^{o}C. Take care not to boil to prevent bumping and loss of sample.
4. Cool the dried sample in the desiccator and desiccate until a constant weight is obtained.
5. Report the results to the nearest 0.1 mg on Form LSC-036.

B. Inorganic Sample Determination

Follow steps 1-5 in Section A above.

NOTES

1. For the organics determination, in the rare event that the impinger catch resulted from a Modified Method 6 determination (SO_2), whereby the solution contains dilute hydrogen peroxide ($\geq$ 3%), do not use ether as an extraction solvent. Substitute toluene for ethyl ether in Section I. (Ether in the presence of peroxide forms explosive hydroperoxide.)

2. In the organics determination, more than three extractions may be required to extract all of the organics. Additional extractions should be performed if the aqueous phase is still cloudy.

3. Special state requirements:

   Michigan - Total sample evaporated in tared evaporating dish on steam bath.

   Iowa - Organics and inorganics separately, as required.

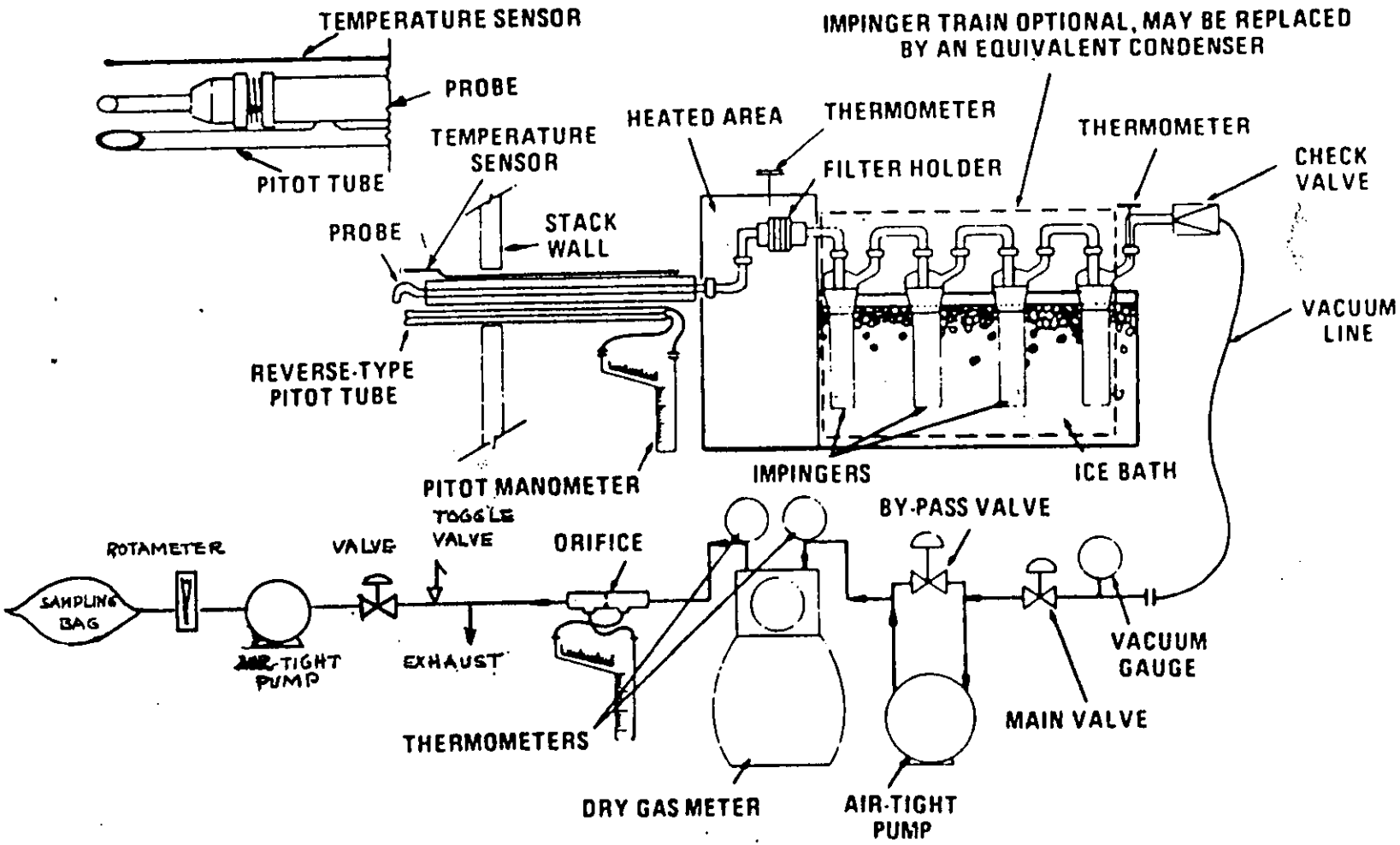
   Wisconsin - Use Method II-8672-WI.

   Rest of states - Organics only.

REFERENCES

Proposed Standards of Performance for New Stationary Sources, Federal Register 36(159) Part II, August 1, 1979.

Minnesota Pollution Control Agency, Exhibit C.



Particulate-sampling train.

Sulfur Dioxide Emissions

The sulfur dioxide concentrations were determined per Method 6, CFR Title 40, Part 60, Appendix A (Revised July 1, 1988). In the procedure employed, the back half of the Method 5 sampling train was used to collect SO_2 samples during the particulate determinations. Each of the first two impingers was filled with 100 cc of freshly prepared 3% hydrogen peroxide. The samples were quantitatively recovered in the field and returned to the laboratory for sulfate analysis by a barium-thorin titration method.

Method 7A—Determination of Nitrogen Oxide Emissions From Stationary Sources—Ion Chromatographic Method

1. *Applicability and Principle.*

1.1 Applicability. This method applies to the measurement of nitrogen oxides emitted from stationary sources; it may be used as an alternative to Method 7 (as defined in 40 CFR Part 60.8(b)) to determine compliance if the stack concentration is within the analytical range. The analytical range of the method is from 125 to 1,250 mg NO_x/m^3 as NO_2 (65 to 655 ppm), and higher concentrations may be analyzed by diluting the sample. The lower detection limit is approximately 19 mg/m^3 (10 ppm), but may vary among instruments.

1.2 Principle. A grab sample is collected in an evacuated flask containing a diluted sulfuric acid-hydrogen peroxide absorbing solution. The nitrogen oxides, except nitrous oxide, are oxidized to nitrate and measured by ion chromatography.

2. *Apparatus.*

2.1 Sampling. Same as in Method 7, Section 2.1.

2.2 Sampling Recovery. Same as in Method 7, Section 2.2, except the stirring rod and pH paper are not needed.

2.3 Analysis. For the analysis, the following equipment is needed. Alternative instru-

mentation and procedures will be allowed provided the calibration precision in Section 5.2 and acceptable audit accuracy can be met.

2.3.1 Volumetric Pipets. Class A; 1-, 2-, 4-, 5-ml (two for the set of standards and one per sample), 6-, 10-, and graduated 5-ml sizes.

2.3.2 Volumetric Flasks. 50-ml (two per sample and one per standard), 200-ml, and 1-liter sizes.

2.3.3 Analytical Balance. To measure to within 0.1 mg.

2.3.4 Ion Chromatograph. The ion chromatograph should have at least the following components:

2.3.4.1 Columns. An anion separation or other column capable of resolving the nitrate ion from sulfate and other species present and a standard anion suppressor column (optional). Suppressor columns are produced as proprietary items; however, one can be produced in the laboratory using the resin available from BioRad Company, 32nd and Griffin Streets, Richmond, California.

2.3.4.2 Pump. Capable of maintaining a steady flow as required by the system.

2.3.4.3 Flow Gauges. Capable of measuring the specified system flow rate.

2.3.4.4 Conductivity Detector.

2.3.4.5 Recorder. Compatible with the output voltage range of the detector.

3. *Reagents.*

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

3.1 Sampling. An absorbing solution consisting of sulfuric acid (H_2SO_4) and hydrogen peroxide (H_2O_2) is required for sampling. To prepare the absorbing solution, cautiously add 2.8 ml concentrated H_2SO_4 to a 100-ml flask containing water (same as Section 3.2), and dilute to volume with mixing. Add 10 ml of this solution, along with 6 ml of 3 percent H_2O_2 that has been freshly prepared from 30 percent solution, to a 1-liter flask. Dilute to volume with water and mix well. This absorbing solution should be used within 1 week of its preparation. Do not expose to extreme heat or direct sunlight.

3.2 Sample Recovery. Deionized distilled water that conforms to American Society for Testing and Materials specification D 1193-74, Type 3, is required for sample recovery. At the option of the analyst, the $KMnO_4$ test for oxidizable organic matter may be omitted when high concentrations of organic matter are not expected to be present.

3.3 Analysis. For the analysis, the following reagents are required:

3.3.1 Water. Same as in Section 3.2.

3.3.2 Stock Standard Solution, 1 mg NO_3/ml. Dry an adequate amount of sodium nitrate ($NaNO_3$) at 105 to 110°C for a minimum of 2 hours just before preparing the standard solution. Then dissolve exactly 1.847 g of dried $NaNO_3$ in water, and dilute to 1 liter in a volumetric flask. Mix well. This solution is stable for 1 month and should not be used beyond this time.

3.3.3 Working Standard Solution, 25 μg/ml. Dilute 5 ml of the standard solution to 200 ml with water in a volumetric flask, and mix well.

3.3.4 Eluent Solution. Weight 1.018 g of sodium carbonate (Na_2CO_3) and 1.008 g of sodium bicarbonate ($NaHCO_3$), and dissolve in 4 liters of water. This solution is 0.0024 M Na_2CO_3/0.003 M $NaHCO_3$. Other eluents appropriate to the column type and capable of resolving nitrate ion from sulfate and other species present may be used.

3.35 Quality Assurance Audit Samples. Same as required in Method 7.

4. *Procedure.*

4.1 Sampling. Same as in Method 7, Section 4.1.

4.2 Sample. Recovery. Same as in Method 7, Section 4.2, except delete the steps on adjusting and checking the pH of the sample. Do not store the samples more than 4 days between collection and analysis.

4.3 Sample. Preparation. Note the level of the liquid in the container and confirm whether any sample was lost during shipment; note this on the analytical data sheet. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Immediately before analysis, transfer the contents of the shipping container to a 50-ml volumetric flask, and rinse the container twice with 5-ml portions of water. Add the rinse water to the flask, and dilute to the mark with water. Mix thoroughly.

Pipet a 5-ml aliquot of the sample into a 50-ml volumetric flask, and dilute to the mark with water. Mix thoroughly. For each set of determinations, prepare a reagent blank by diluting 5 ml of absorbing solution to 50 ml with water. (Alternatively, eluent solution may be used in all sample, standard, and blank dilutions.)

4.4 Analysis. Prepare a standard calibration curve according to Section 5.2. Analyze the set of standards followed by the set of samples using the same injection volume for both standards and samples. Repeat this analysis sequence followed by a final analysis of the standard set. Average the results. The two sample values must agree within 5 percent of their mean for the anlaysis to be valid. Perform this duplicate analysis sequence on the same day. Dilute any sample and the blank with equal volumes of water

if the concentration exceeds that of the highest standard.

Document each sample chromatogram by listing the following analytical parameters: injection point, injection volume, nitrate and sulfate retention times, flow rate, detector sensitivity setting, and recorder chart speed.

4.5 Audit Analysis. Same as required in Method 7.

5. *Calibration.*

5.1 Flask Volume. Same as in Method 7, Section 5.1.

5.2 Standard Calibration Curve. Prepare a series of five standards by adding 1.0, 2.0, 4.0, 6.0, and 10.0 ml of working standard solution (25 μg/ml) to a series of five 50-ml volumetric flasks. (The standard masses will equal 25, 50, 100, 150, and 250 μg.) Dilute each flask to volume with water, and mix well. Analyze with the samples as described in Section 4.4 and subtract the blank from each value. Prepare or calculate a linear regression plot to the standard masses in μg (x-axis) versus their peak height responses in millimeters (y-axis). (Take peak height measurements with symmetrical peaks; in all other cases, calculate peak areas.) From this curve, or equation, determine the slope, and calculate its reciprocal to denote as the calibration factor, S. If any point deviates from the line by more than 7 percent of the concentration at that point, remake and reanalyze that standard. This deviation can be determined by multiplying S times the peak height response for each standard. The resultant concentrations must not differ by more than 7 percent from each known standard mass (i.e., 25, 50, 100, 150, and 250 μg).

5.3 Conductivity Detector. Calibrate according to manufacturer's specifications prior to initial use.

5.4 Barometer. Calibrate against a mercury barometer.

5.5 Temperature Gauge. Calibrate dial thermometers against mercury-in-glass thermometers.

5.6 Vacuum Gauge. Calibrate mechanical gauges, if used, against a mercury manometer such as that specified in Section 2.1.6 of Method 7.

5.7 Analytical Balance. Calibrate against standard weights.

6. *Calculations.*

Carry out the calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculations.

6.1 Sample Volume. Calculate the sample volume V_m (in ml) on a dry basis, corrected to standard conditions, using Equation 7-2 of Method 7.

6.2 Sample Concentration of NO_x as NO_2. Calculate the sample concentration C (in mg/dscm) as follows:

$$C = \frac{HSF \times 10^4}{V_m} \qquad \text{Eq. 7A-1}$$

Where:

H = Sample peak height, mm

S = Calibration factor, μg/mm

F = Dilution factor (required only if sample dilution was needed to reduce the concentration into the range of calibration)

10^4 = 1:10 dilution times conversion factor of

$$\frac{mg}{10^3\,\mu g} \times \frac{10^6\,ml}{m^3}$$

If desired, the concentration of NO_x may be calculated as ppm NO_2 at standard conditions as follows:

$$ppm\ NO_2 = 0.5228\ C \qquad \text{Eq. 7A-2}$$

Where:

0.5228 = ml/mg NO_2.

7. *Bibliography.*

1. Mulik, J. D. and E. Sawicki. Ion Chromatographic Analysis of Environmental Pollutants. Ann Arbor, Ann Arbor Science Publishers, Inc. Vol. 2, 1979.

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APPENDIX L

CALCULATION EQUATIONS

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 3

$$\%EA = \frac{100(\%O_2 -).5\%\ CO)}{0.264\%\ N_2 - \%O_2 + 0.5\%\ CO}$$

$$M_d = 0.44(\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

$$M_s = M_d\ (I - B_{ws}) + 0.18\ B_{ws}$$

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

CALCULATION EQUATIONS

METHOD 5

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

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

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

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

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

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

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

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

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

SYMBOLS

A = Cross sectional area of stack, SQ. FT.

A_n = Cross sectional area of nozzle, SQ. FT.

B_{ws} = Water vapor in gas stream, proportion by volume

C_p = Pitot tube coefficient, dimensionless

C_a = Concentration of particulate matter in stack gas, wet basis, GR/ACF

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, GR/DSCF

EA = Excess air, percent by volume

γ = Dry test meter correction factor, dimensionless

G_d = Specific gravity (relative to air), dimensionless

I = Isokinetic variation, percent by volume

M_d = Molecular weight of stack gas, dry basis, g/g - mole.

$\dot{m}_g$ = Mass flow of wet flue gas, LB/HR

$\dot{m}_p$ = Particulate mass flow, LB/HR

M_s = Molecular weight of stack gas, wet basis, g/g, mole.

M_p = Total amount of particulate matter collected, g

P_{bar} = Atmospheric pressure, IN. HG. (uncompensated)

P_g = Stack static gas pressure, IN. WC.

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, ^{o}F

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

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

$T_s(avg)$ = Absolute average stack temperature, ^{o}F

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

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.

vp_{twb} = Vapor pressure at T_{wb}, IN. HG

$\overline{\Delta H}$ = Average pressure differential across the orifice meter, IN. WC.

ΔP = Velocity pressure of stack gas, IN. WC.

γ = Dry test meter correction coefficient, dimensionless

ρ = Actual gas density, LB/ACF

CALCULATION EQUATIONS

METHOD 6

$$V_{std} = 17.64 \frac{V_m P_b \gamma}{T_m} \quad \text{(MIDGET IMPINGER VERSION)}$$

$$V_{std} = \frac{17.64\ V_m\ (P_b + \frac{\overline{\Delta H}}{13.6})\gamma}{T_m} \quad \text{(LARGE IMPINGER VERSION)}$$

$$MEQ = (V_t - V_{tb})\ N\ (\frac{V_{soln}}{V_a})\ DF$$

$$C_s = \frac{7.06 \times 10^{-5}\ MEQ}{V_{std}}$$

$$E = \frac{20.90\ C_s F_d}{20.90 - \overline{B}'_{O_2}} = \frac{F_c C_s}{\overline{B}'_{CO_2}}$$

$$C_s\ (MG/DSCM) = 1.60186 \times 10^7\ C_s$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (ppm, dry) = 6.02119 \times 10^6\ C_s$$

$$C_s\ (ppm, wet) = 6.02119 \times 10^6\ C_s\ (1 - \frac{MC}{100})$$

SYMBOLS

$\overline{B}'O_2$	=	Average oxygen content in flue gas, % v/v, dry
$\overline{B}'CO_2$	=	Average carbon dioxide content in flue gas, % v/v, dry
C_s	=	Concentration of sulfur dioxide in flue gas, dry basis, corrected to standard conditions, LB/DSCF
C_s (GR/DSCF)	=	Concentration of sulfur dioxide in flue gas, dry basis, corrected to standard conditions, GR/DSCF
C_s (MG/DSCM)	=	Concentration of sulfur dioxide in flue gas, dry basis, corrected to standard conditions, MG/DSCM
DF	=	Dilution Factor
E	=	Emission factor, LB of $SO_2/10^6$BTU
F_d	=	Dry oxygen F-Factor for given fuel type, DSCF/10^6BTU
F_c	=	Carbon dioxide F-Factor for given fuel type, DSCF/10^6BTU
ΔH	=	Average pressure drop across calibrated orifice, IN. W.C.
γ	=	Dry test meter correction factor, dimensionless
MC	=	Moisture content of flue gas, % v/v
MEQ	=	Total milliequivalents of SO_2 in gas sample
N	=	Normality of barium perchlorate titrant
P_b	=	Barometric pressure at the dry gas meter, IN. HG.

C_s (ppm-dry) = Concentration of sulfur dioxide in flue gas, dry basis, (v/v), ppm

C_s (ppm-wet) = Concentration of sulfur dioxide in flue gas, wet basis, (v/v), ppm

T_m = Absolute average dry gas meter temperature, ^{o}R

V_a = Volume of sample aliquot titrated, cc

V_m = Dry gas volume as measured by the dry gas meter, DCF

V_{std} = Dry gas volume as measured by the dry gas meter, corrected to standard conditions (at 68 ^{o}F and 1 atmosphere), DSCF

V_{soln} = Total volume of the solution in which the sulfur dioxide sample is contained, cc

V_t = Volume of barium perchlorate titrant used for the sample, cc (average of replicate titrations)

V_{tb} = Volume of barium perchlorate titrant used for the blank, cc

CALCULATION EQUATIONS

METHOD 7

$$V_{m(std)} = 17.64\ (V_f - 25)\ \left[\frac{P_f}{T_f} - \frac{P_i}{T_i}\right]$$

$$C_s = 6.243 \times 10^{-5}\ \frac{M}{V_{m(std)}}$$

$$E = \frac{2090\ C_s F}{20.9 - \bar{B}'_{O_2}}$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (MG/DSCM) = 1.60186 \times 10^{7}\ C_s$$

$$C_s\ (ppm\text{-}dry) = 8.37552 \times 10^{6}\ C_s$$

$$C_s\ (ppm\text{-}3\%\ O_2) = 8.37552 \times 10^{6}\ C_s \left\{1 + \left[\frac{\bar{B}'_{O_2} - 3}{20.9 - \bar{B}'_{O_2}}\right]\right\}$$

$$C_s\ (ppm\text{-}wet) = 8.37552 \times 10^{6}\ C_s \left(1 - \frac{MC}{100}\right)$$

CE6-1

SYMBOLS

$\bar{B}'_{O_2}$ = Average oxygen content in flue gas, % v/v

C_s = Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, LB/DSCF

C_s (GR/DSCF) = Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, GR/DSCF

C_s (MG/DSCM) = Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, MG/DSCM

E = Emission factor, LB/10^6BTU

F = F-Factor for given fuel type, DSCF/10^4BTU

M = Mass of nitrogen oxides as nitrogen dioxide in gas sample, µg

MC = Moisture content of flue gas, %

P_f = Final absolute pressure in flask, IN. HG

P_i = Initial absolute pressure in flask, IN. HG

C_s (ppm-dry) = Concentration of nitrogen oxides in flue gas, dry basis, (v/v), ppm

C_s (ppm-3% O_2) = Concentration of nitrogen oxides in flue gas, dry basis, corrected to 3% O_2 , (v/v) ppm

C_s (ppm-wet) = Concentration of nitrogen oxides in flue gas, wet basis, (v/v), ppm

T_f = Final absolute temperature in flask, ^{o}R

T_i = Initial absolute temperature in flask, ^{o}R

V_f = Volume of flask and valve, cc

$V_{m(std)}$ = Sample volume at standard conditions, dry basis, cc

APPENDIX M

SAMPLING TRAIN CALIBRATION DATA

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 26, 1990

Meter Box No. : 2 (Rockwell Dry Test Meter Serial No. 949231)

Date of Last Calibration: June 25, 1990
Calibration Technician: D. Van Hoever
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.)
July 17-19, 1990	0-3088	150.90	1055.20	904.30	904.30
July 25-26, 1990	0-3095	56.00	541.75	485.75	1390.05

* Total volume through meter since last calibration.

M-1

Date 6/25/90

Bar. Press. 28.97 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 2
Serial No. DTM 949231
Wet Test Meter No. AL-20
Technician D. VanHoever

ΔH (in. WC)		Gas Volume Wet Test Meter (ft^3)	* Cal. Index Φ (%)	* Diff. Wet Test Meter ΔP_w (in.WC)	Gas Volume Dry test meter (ft^3)		Gas temperatures			Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔHθ	C_f
							Wet Test	Dry Test					
nominal	actual				V_{d1}	V_{df}	t_w (°F)	t_{d1} (°F)	t_{do} (°F)				
0.5	.5	2	99.70	0.01	142.10	144.13	79.7	101	88	4/50.95	1.0079	1.70	
1.2	1.2	3	99.77	0.03	143.53	146.60	79.5	104	88	4/46.26	1.0026	1.75	
2.0	2.0	5	99.87	0.05	126.37	131.86	79.5	98	86	6/50.92	1.0002	1.79	
3.3	3.3	5	100.00	0.08	132.37	137.45	79.5	104	87	4/54.55	1.0048	1.82	
4.7	4.7	5	100.20	0.11	137.96	143.02	79.3	107	88	4/8.61	1.0092	1.84	
											1.0047	1.78	

Positive leak check performed by EV

Meter was in tolerance ☒

Meter was not in tolerance ☐; readjusted linkage

Meter was not in tolerance ☐; changed dry test meters

Approved by Perry Lonnes Date 7-9-90

* Based on AL-20 wet test meter calibration in August 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 5/90

M-2

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 26, 1990

Meter Box No. : 2 (Rockwell Dry Test Meter Serial No. 949231)

Date of Last Calibration: June 25, 1990
Calibration Technician: D. Van Hoever
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.)
July 17-19, 1990	0-3088	150.90	1055.20	904.30	904.30
July 25-26, 1990	0-3095	56.00	541.75	485.75	1390.05

* Total volume through meter since last calib.

M-1

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 2
Serial No. DTM 949231
Wet Test Meter No. AL-20
Technician D. Van Hoever

Date 6/25/90
Bar. Press. 28.97 in. Hg

ΔH (in. WC)	Gas Volume Wet Test*	Cal. Index	Diff. Wet Test Meter ΔP_w	Gas Volume Dry test meter (ft³) V_{dl}	V_{df}	Gas temperatures Wet Test t_w (°F)	Dry Test t_{dl} (°F)	Dry Test t_{do} (°F)	Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔHθ	C_f
						79.7	101	88	4/50.95	1.0079	1.72	
								88	4/46.26	1.0076	1.75	
											1.79	

Date 6/25/90

Bar. Press. 28.97 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 2
Serial No. DTM 94923/
Wet Test Meter No. AL-20
Technician D. VanHeuer

ΔH (in. WC)		Gas Volume Wet Test Meter (ft^3)	* Cal. Index Φ (%)	* Diff. Wet Test Meter ΔP_w (in.WC)	Gas Volume Dry test meter (ft^3)		Gas temperatures			Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔHθ	C_f
							Wet Test	Dry Test					
nominal	actual				V_{d1}	V_{df}	t_w (°F)	t_{d1} (°F)	t_{do} (°F)				
0.5	.5	2	99.70	0.01	147.10	149.13	79.7	101	88	4/50.95	1.0079	1.70	
1.2	1.2	3	99.77	0.03	143.53	146.60	79.5	104	88	4/46.26	1.0026	1.75	
2.0	2.0	5.5	99.87	0.05	126.27	131.86	79.5	98	86	6/50.92	1.0002	1.79	
3.3	3.3	5	100.00	0.08	132.37	137.45	79.5	104	87	4/54.55	1.0048	1.82	
4.7	4.7	5	100.20	0.11	137.96	143.02	79.3	107	88	4/8.61	1.0092	1.84	
											1.0047	1.78	

Positive leak check performed by EV

Meter was in tolerance ☒

Meter was not in tolerance ☐; readjusted linkage

Meter was not in tolerance ☐; changed dry test meters

Approved by Perry Lonnes Date 7-9-90

* Based on AL-20 wet test meter calibration in August 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 5/90

M-2

Interpoll Laboratories, Inc.
(612) 786-6060

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job Cypress, Silver Bay Date 7-24-90

Operator Mark Kaehler Module No. 2

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 29.50 in. Hg. γ = 1.0047 ^H@ 1.78 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(56.00)	[redacted]	
2.5	57.99	104	103
5.0	59.98	106	104
7.5	61.96	108	104
10	63.93	109	105
[redacted]	V_m = 7.93	Avg(t_m) = 105.4	°F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(1.0047)(7.93)}\left[\frac{(105.4) + 460}{(29.50)}\right]^{0.5}$$

$$Y_{cn} = .981$$

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

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job Cypress, Silver Bay Date 7-25-90

Operator Mark Koehler Module No. 2

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 29.45 in. Hg. γ = 1.0047 ^H@ 1.78 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(232.90)	[redacted]	
2.5	234.87	89	87
5.0	236.84	91	87
7.5	238.80	92	87
10	240.76	92	86
[redacted]	V_m = 7.86	Avg (t_m) = 88.5	°F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(1.0047)(7.86)}\left[\frac{(88.9) + 460}{(29.45)}\right]^{0.5}$$

Y_{cn} = .976

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) 786-6060

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job Cypress, Silver Bay Date 2-26-90

Operator Mark Gaebler Module No. 2

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 29.58 in. Hg. γ = 1.0047 ^H@ 1.78 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	374.60	[redacted]	
2.5	376.44	73	70
5.0	378.38	74	70
7.5	380.28	75	70
10	382.22	76	71
[redacted]	V_m = 7.72	Avg(t_m) = 72.38 °F	

Calculate Y_{en} as follows:

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

$$Y_{en} = \frac{1.786}{(1.0047)(7.72)}\left[\frac{(72.38) + 460}{(29.58}\right]^{0.5}$$

Y_{en} = .977

If Y_{en} 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: July 26, 1990

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

Date of Last Calibration: April 22, 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.)
May 30-31, 1990	0-3057	258.00	403.80	145.80	145.80
June 14, 1990	0-3069	408.00	633.65	225.65	371.45
June 21, 1990	0-3071	634.20	773.00	138.80	510.25
July 2, 1990	0-3081	773.70	872.80	99.10	609.35
July 12, 1990	0-3082	873.00	981.19	108.19	717.54
July 17, 1990	0-3086	982.90	1168.18	185.28	902.82
July 20, 1990	0-3092	168.50	372.40	203.90	1106.72
July 26, 1990	0-3095	372.70	645.75	273.05	1379.77

* Total volume through meter since last calibration.

Date 4/22/90

Bar. Press. 29.00 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 5
Serial No. DTM 676477
Wet Test Meter No. AL-20
Technician Duane Thompson

ΔH (in. WC)		Gas Volume Wet Test Meter (ft^3)	* Cal. Index θ (%)	* Diff. Wet Test Meter ΔP_w (in.WC)	Gas Volume Dry test meter (ft^3)		Gas temperatures			Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔHθ	C_f
							Wet Test	Dry Test					
nominal	actual				V_{d1}	V_{df}	t_w (°F)	t_{d1} (°F)	t_{do} (°F)				
0.5	.5	2	99.70	0.01	254.45	256.49	69.7	87	82	5/3.97	1.0034	1.82	
1.2	1.2	2.5	99.77	0.03	251.40	253.94	69.8	89	82	4/8.10	1.0079	1.85	
2.0	2.0	3	99.87	0.05	236.20	239.24	70	88	80	3/50.07	1.0063	1.85	
3.3	3.3	5	100.00	0.08	239.75	244.81	70	90	81	5/1.13	1.0083	1.87	
4.7	4.2	5	100.20	0.11	245.31	250.39	69.6	91	82	4/30.83	1.0068	1.91	
2	3	4	5	6	7	8	9	10	11/12		1.0065	1.86	

Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by Jerry Lonnes Date 4-24-90

* Based on AL-20 wet test meter calibration in August 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102R 8/89

M-7

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 26, 1990

Meter Box No. : 6 (Rockwell Dry Test Meter Serial No. 64711)

Date of Last Calibration: June 14, 1990
Calibration Technician: D. Van Hoever
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.)
June 20-22, 1990	0-3074	988.20	1555.00	566.80	566.80
June 26-27, 1990	0-3076	555.40	834.83	279.43	846.23
July 19, 1990	0-3087	835.40	947.67	112.27	958.50
July 20, 1990	0-3092	947.80	1094.79	146.99	1105.49
July 23-26, 1990	0-3095	95.00	991.17	866.17	1991.66

* Total volume through meter since last calibration.

Date 6/14/90

Bar. Press. 29.00 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 6
Serial No. DTM 64710
Wet Test Meter No. AL-20
Technician [signature]

ΔH (in. WC)		Gas Volume Wet Test Meter (ft^3)	* Cal. Index θ (x)	* Diff. Wet Test Meter ΔP_w (in.WC)	Gas Volume Dry test meter (ft^3)		Gas temperatures			Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔH@	C_f
							Wet Test	Dry Test					
nominal	actual				V_{d1}	V_{df}	t_w (°F)	t_{d1} (°F)	t_{do} (°F)				
0.5	.5	2	99.70	0.01	984.474	986.488	73.5	80	77	4/59.22	.9980	1.81	
1.2	1.2	3	99.77	0.03	980.95	983.97	73.5	82	78	4/50.08	1.0080	1.80	
2.0	2.0	3	99.87	0.05	965.99	968.98	74	80	77	3/44.47	1.0052	1.80	
3.3	3.3	5	100.00	0.08	969.48	974.47	73.6	82	77	4/55.44	1.0044	1.85	
4.7	4.7	5	100.20	0.11	975.47	980.45	73.5	84	78	4/09.66	1.0078	1.84	
											1.0031	1.82	

Positive leak check performed by [signature]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by Perry Lonnes Date 6-20-90

* Based on AL-20 wet test meter calibration in August 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 5/90

Interpoll Laboratories, Inc.
(612) 786-6060

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job CYPRUS NORTHSHORE MINING Date 7-23-90

Operator DWAYNE A. SMITH Module No. 6

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 29.43 in. Hg. γ = 1.0031 ^H@ 1.82 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(95.00)	[redacted]	
2.5	96.91	75	75
5.0	98.80	76	75
7.5	100.74	77	75
10	102.60	78	76
[redacted]	V_m= 7.60	Avg(t_m)= 75.9	°F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(1.0031)(7.60)}\left[\frac{(75.9) + 460}{(29.43)}\right]^{0.5}$$

7.6236

$$Y_{cn} = .9997$$

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

Nozzle Calibration

Data Sheet

Date of Calibration: July 25, 1990 Nozzle Number 8-4

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	0.244
2	0.243
3	0.243
Average:	0.243

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: July 26, 1990 Nozzle Number 8-4
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	0.244
2	0.243
3	0.242
Average:	0.243

Interpoll Laboratories
(612)786-6020

S-Type Pitot Tube Inspection Sheet

Pitobe No. 4-21

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 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" .12

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .768 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) .761 IN.

Date of Inspection: 12-8-89

Inspected by: E Frankfort

S-348(1)

Interpoll Laboratories
(612)786-6020

S-Type Pitot Tube Inspection Sheet

Pitobe No. 8-21

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 IN.
3. Base to Side B opening plane (P_B) .461 IN.

Alignment:

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

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

8. Z <.125" .02
9. W <.0625" .01

Distance from Pitot to Probe Components:

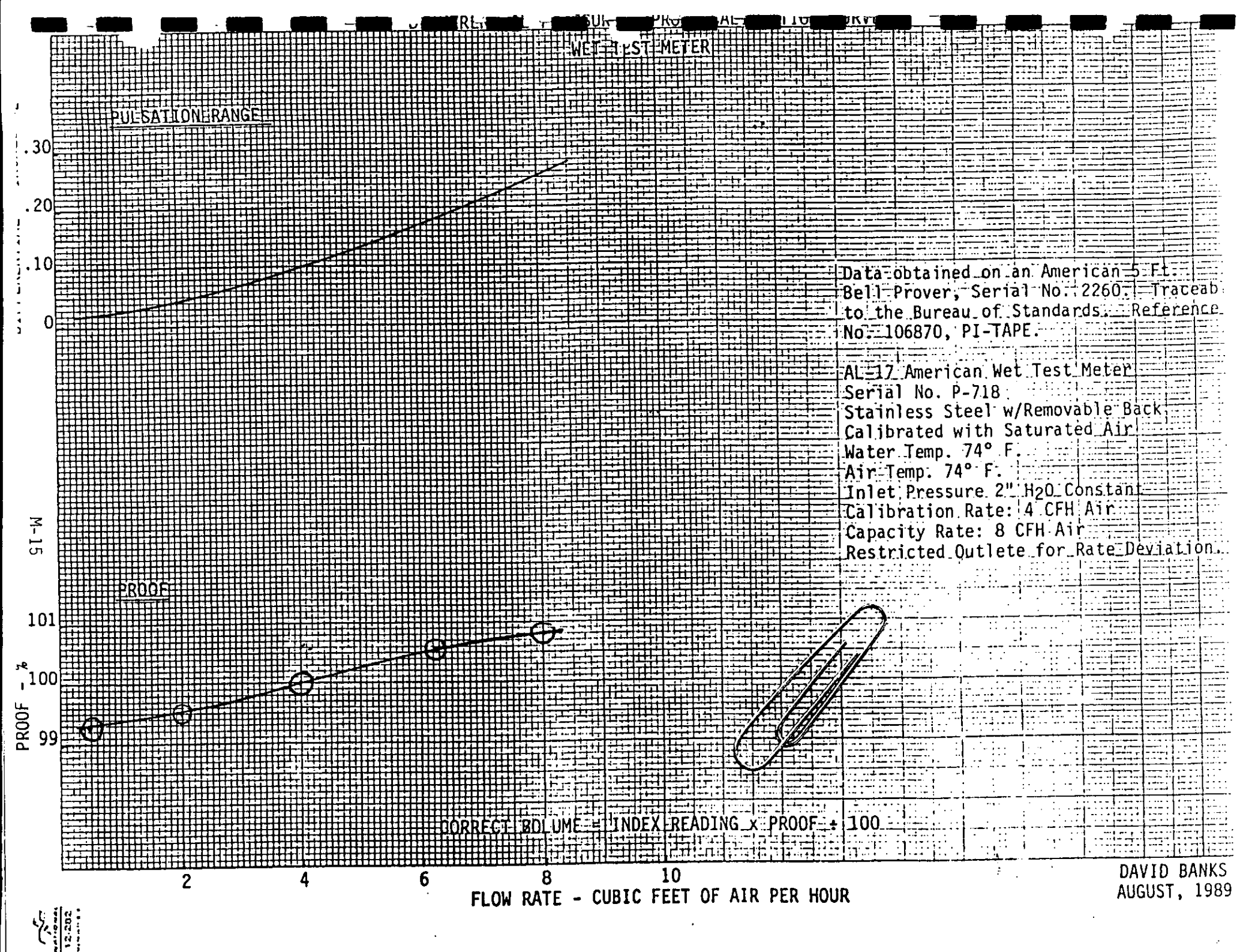
10. Pitot to 0.500 IN. nozzle .762 IN.
11. Pitot to probe sheath 3.00 IN.
12. Pitot to thermocouple (parallel to probe) 3.00 IN.
13. Pitot to thermocouple (perpendicular to probe) .762 IN.

Date of Inspection: 12-8-89

Inspected by: E. Faulkner

S-348(1)

WET TEST METER



Data obtained on an American 5 Ft. Bell Prover, Serial No. 2260. Traceab to the Bureau of Standards. Reference No. 106870, PI-TAPE.

AL-17 American Wet Test Meter
Serial No. P-718
Stainless Steel w/Removable Back
Calibrated with Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H_2O Constant
Calibration Rate: 4 CFH Air
Capacity Rate: 8 CFH Air
Restricted Outlete for Rate Deviation.

CORRECT VOLUME = INDEX READING x PROOF ÷ 100

M-15

DAVID BANKS
AUGUST, 1989

Interpoll Laboratories, Inc.

Temperature Measurement Device Calibration Sheet

Unit under test:

Vendor ATKINS

Model 39658 Serial Number PDT-3

Range -112 To 1999 °F Thermocouple Type K

Date of Calibration 5-18-90 Technician Ted Hogan

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation Δt (°F)	Deviation (%)
0	0	2.3	2.3	.5
100	100	99	1	.17
200	200	202	2	.30
300	300	300	0	0
400	400	397	3	.34
500	500	495	5	.52
600	600	597	3	.28
700	700	697	3	.25
800	800	801	1	.07
900	900	902	2	.14
1000	1000	1006	6	.41
1100	1100	1108	8	.51
1200	1200	1213	13	.78
1300	1300	1312	12	.68
1400	1400	1415	15	.80
1500	1500	1511	11	.56
1600	1600	1610	10	.48
1700	1700	1703	3	.13
1800	1800	1800	0	0
1900	1900	1890	10	.42
2000	2000	1983	17	.69
2100	2100	OF	—	—
		Averages:	6.06	.38

OF = off scale response by unit under test (°F)

% dev = 100 Δt / (460 + t)

☒ Unit in tolerance

☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

APPENDIX N

RESULTS OF COAL ANALYSES

(Provided by Client)

Western Atlas International

CORE LABORATORIES

13-JUL 90

THUNDER BASIN COAL

CORRECTED REPORT

JOB NO.:16303-902005
LOCATION:CASPER, WY
CHEMIST:

221402 DRY

01 TS 948

PROXIMATE ANALYSIS (%)

	AS RECD	DRY
MOISTURE	27.20	
ASH	4.90	6.73
SULFUR	0.34	0.47
BTU/LB	8826	12123
MAF BTU		12998

ULTIMATE ANALYSIS (%)

	AS RECD	DRY
MOISTURE	27.20	
ASH	4.90	6.73
SULFUR	0.34	0.47
NITROGEN	0.68	0.93
CARBON	51.28	70.44
HYDROGEN	3.61	4.96
OXYGEN	11.99	16.47
TOTAL	100.00	100.00
CHLORINE	<0.01	<0.01

MINERAL ANALYSIS OF ASH (%

EQUILIBRIUM MOISTURE (%)

FORMS OF SULFUR (%)

FUSION TEMPERATURE OF ASH (F)

ADDITIONAL DATA

LBS H2O/MM BTU	30.82
LBS ASH/MM BTU	5.55
LBS SULFUR/MM BTU	0.39

GRINDABILITY (HGI)

WATER SOLUBLE ALKALIES (%)