AP-42 Section 11.10
Reference 18
Report Sect.
Reference

EPA- TEST NO. 72-CI-4
FINAL

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

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

REPORT

by

YORK RESEARCH CORPORATION

on

EMISSIONS FROM THE

FLORENCE MINING COMPANY

COAL PROCESSING PLANT

at

SEWARD, PENNSYLVANIA

By

Richard W. Kling
Project Engineer

February 18, 1972

REPORT NO. Y-7730-G

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I. INTRODUCTION

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I. INTRODUCTION

I. ABSTRACT

An Emission Test Program was conducted for the Engineering Branch of the Division of Abatement, Air Pollution Control Office, Environmental Protection Agency at the New Florence, Pennsylvania coal processing plant of the Florence Mining Company, from 19 January 1972 to 21 January 1972. Testing was performed in accordance with the EPA Test Methods on air table baghouse Number 17B at Florence Mining Company Plant. Source sampling was performed only at the outlet as per EPA request.

II. PURPOSE

The purpose of this program was to obtain by field source sampling, laboratory analysis and data evaluation the total particulate emission from air table baghouse Number 17B of the coal processing plant at New Florence, Pennsylvania.

III. SCOPE

The test was developed by the Emission Testing Branch of the Environmental Protection Agency, Office of Air Programs. It included a series of three test runs to be made on the outlet of the control device. The tests were to determine total particulate emissions. Also, a representative test was to be used to determine particle size distribution.

II. TEST RESULTS

TABLE I

SUMMARY OF RESULTS
Outlet of Bag House

	Run #1	Run #2	Run #3
Date	1/20/72	1/20/72	1/21/72
Stack Flow Rate-SCFM	32,900	33,600	35,500
% Water Vapor - Vol. %	0.87	1.42	0.97
% O_2 - Vol. % Dry	21.	21.	21.
% N_2 - Vol. % Dry	79.	79.	79.
Particulate Emission Filter, Cyclone & Probe			
Gr/CF @ Stack conditions	.08819	.01091	.00559
Gr/SCFD	.0867	.0109	.0052
Lb/hr	24.45	3.14	1.58
Particulate Emission Total			
Gr/CF @ Stack conditions	.09470	.01422	.01387
Gr/SCFD	.0931	.0142	.0129
Lb/hr	26.25	4.09	3.92

PARTICLE SIZE ANALYSIS

The following graph illustrates the particle distribution by size for test one on the outlet. The analysis was performed by Commercial Testing and Engineering Company of Chicago, Illinois.

The analysis was done on the Coulter Counter. The sample was dispersed with Aerosol OT and further dispersed using an ultrasonic bath. Isoton was the electrolyte used.

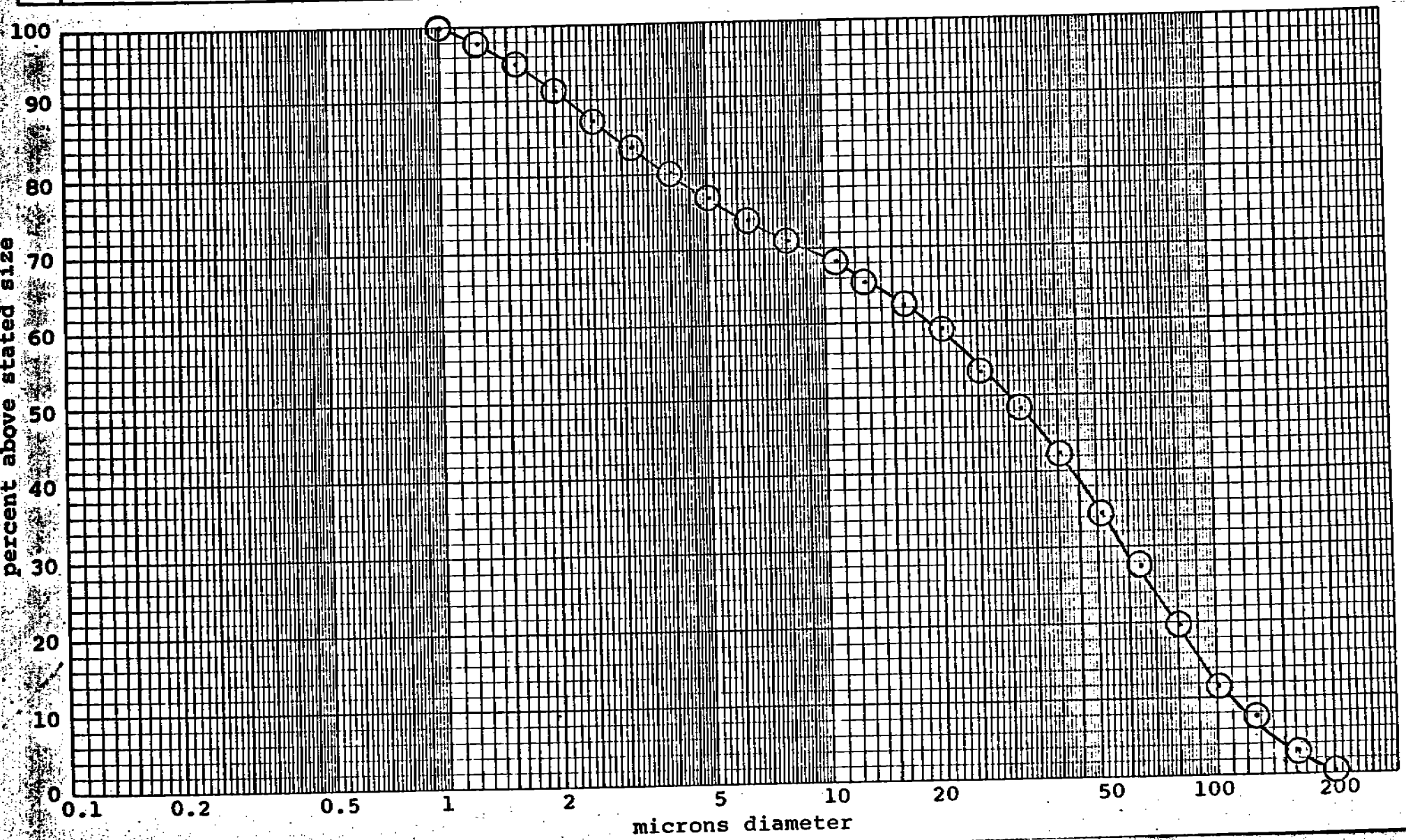
COULTER COUNTER®

PARTICLE SIZE ANALYSIS

CHICAGO, ILLINOIS 60601
228 NORTH LA SALLE STREET
312/726-8434

Source YORK RESEARCH CORPORATION Operator LSB Date 2-16-72

	material and sample no.	electrolyte & dispersant		aperture
⊙	Y-7730-G (out)	Isoton	Aerosol OT	400 μ
⊡			Ultrasonic	280 μ
△			bath	100 μ
◊				30 μ



III. THE PROCESS

The following four paragraphs were submitted to York Research Corporation for inclusion in Report No. Y-7730-G. This report contains all available data pertaining to the tests at the Florence Mining Company, coal preparation Plant in New Florence, Pennsylvania.

I. PURPOSE

The trip was made to monitor process conditions during the source test of an air table-baghouse coal cleaning process.

II. PLACE AND DATE

The test was conducted at Florence Mining Company, New Florence, Pennsylvania, January 19-21, 1972.

III. ATTENDEES

Name	Affiliation	Function
Dave Gregory	Florence Mining Co.	Plant Superintendent
Bob Browning	Florence Mining Co.	Industrial Engineer
John Jones	Carborundum, Inc.	Sales Application Engineer
Tom Ward	EPA/OAP/ETB	Test Engineer
Charles Sedman	EPA/OAP/ISB	Chemical Engineer
Joe Sableski	EPA/OAP/ISB	Chief, C&I Section
Dick Kling	York Research Corp.	Test Engineer
Erwin Theisz	York Research Corp.	Test Engineer

IV. DISCUSSION

The site was pre-surveyed on January 6, 1972. At that time it was decided to test Baghouse Number 17B. It uses polypropylene bags and is statistically the most reliable table available. Secondary consideration was the convenience of access to electricity, stairways, and toilet facilities.

The York Research test team arrived on site at 0800, 20 January 72. Ports and scaffolding were installed and ready for testing. The first test commenced shortly after noon. In order to prevent a bag shake-out during the testing, an attempt was made to increase the length of time between shake-outs. Unfortunately, a shake-out and shut-down did occur and

caused a delay in testing. This was due to abnormal functioning of the electrical timing device on the shaker mechanism. This first run ended at 1545.

The second run commenced at 1725 and ended at 2005. The test ran smoothly with the exception of a thirty (30) minute delay caused by a Plant shut-down.

The third run was begun at 0600 on 21 January 72. The test did not end until 1045 due to a Plant shut-down and shift change delay of some two (2) hours and forty (40) minutes.

Average Coal Feed
(Data from EPA)

Run No.	Tonnage	Total Tables	Time	Tons/Hr/Table
1	-	-	-	-
2	16	7	1:58	69.9
2	16	7	1:59	70.1
2	18	8	1:55	70.5
3	26	10	2:14	69.8
3	27	11	2:03	70.0
3	27	12	1:54	71.0

All tables were balanced for equal flow to enable per table flow to be calculated. The average flow during the times sampled was 70 tons per hour per table.

The Florence Mining Company, at the time of the test series, was processing two seams of coal - Lower Kittanning and Upper Freeport. The grindability index is 90.

IV. TEST PROCEDURES

SAMPLING METHODS

The particulate test series was performed as specified by Federal Register Volume 36, Number 247, Thursday, December 23, 1971. In addition the impinger catch was analyzed on the outlet of the air table baghouse. No other contaminants were sampled for.

A. Port Location

Ports were located as far downstream from obstructions, turns and constrictions (which would cause uneven flow distribution and turbulence) as practically possible. Two ports were located 90° apart on the duct. Twelve points were taken on each diameter for the preliminary traverse for nozzle selection and for sampling during the test. This gives six (6) equal sampling areas with four (4) sampling points in each area.

B. Velocity - Nozzle Size

The preliminary traverse was taken at all twenty-four (24) points using a reverse "S" type pitot tube and manometer, graduated in inches of water. This determined the velocity head at each point. A thermocouple/potentiometer system was used simultaneously to determine temperature at each point. An average duct static pressure was determined and recorded for future use in calculations at this time. The most suitable nozzle size was then selected for sampling by using the R.A.C. nomograph and the information obtained in the preliminary traverse.

C. Particulate Sampling

A schematic of the sampling train is shown in Figure 1. A cyclone was used with a fiber glass filter following it. The box containing the filter and cyclone was heated to approximately 250°F to maintain the stack gas above the dew point of H_2O. The four (4) impingers are kept in an ice bath to condense out any condensibles after the gas has passed through the heated filter. The first two impingers contain 100 milliliters of water each and the third impinger dry. The fourth impinger contained 300 grams of silica gel as a desicant to insure all moisture was removed from the gas for two purposes; to make a truly accurate calculation of the moisture in the gas and to protect the pump meter and control valves of the sampling train.

The sampling time was five (5) minutes per point, making the net sampling time of a complete test 120 minutes. Actual or gross test times varied due to time lapse in changing ports or interrupted sampling due to Plant and process malfunction.

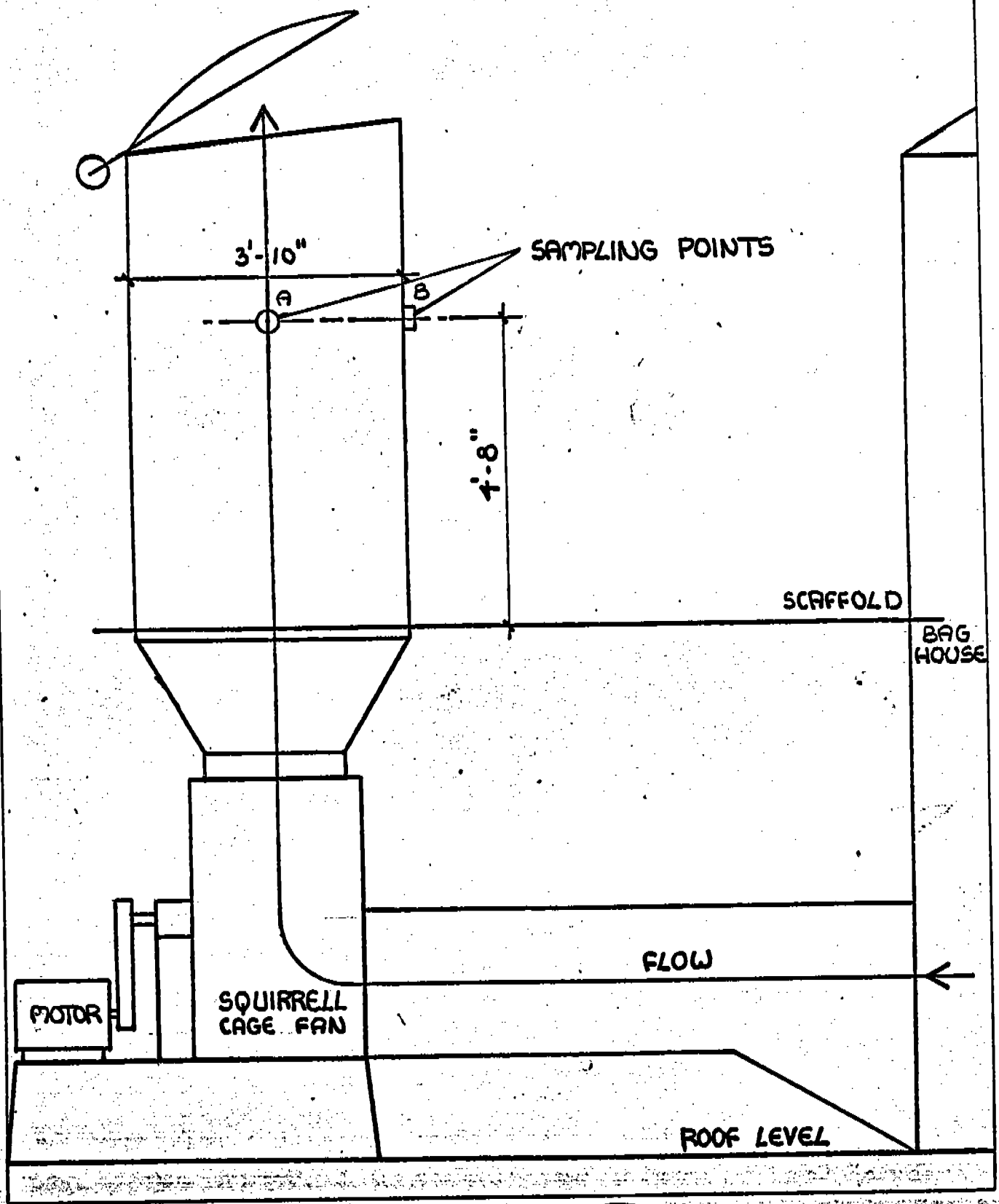
BASIC LABORATORY PROCEDURE

The following paragraphs briefly describe the methods used in the laboratory to obtain the raw data used in the calculations of our results as reported in Section II of this report.

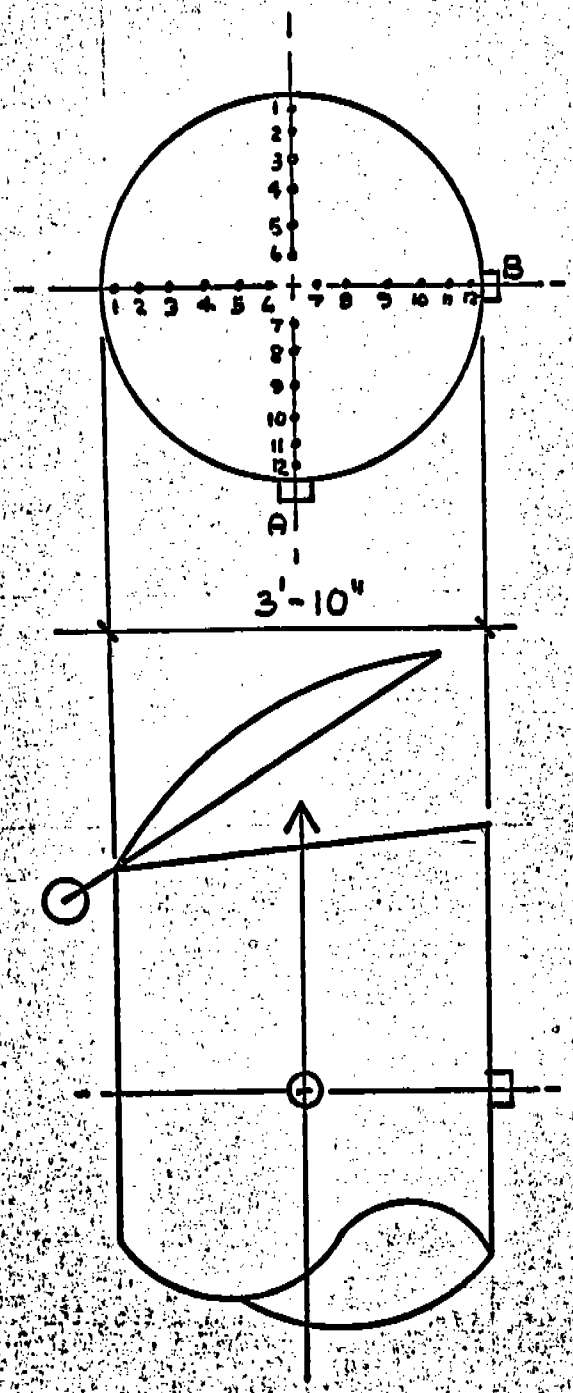
A. Particulate

The tests are run in the field using a Research Appliance Corporation "Staksampler" particulate train. The clean up is done in the field according to EPA Test Procedures. The filters were previously tare weighed and recorded at the laboratory. Upon return they are first dried in an oven, cooled in a desicator, then weighed on an analytical balance and the amount of particulate collected is the difference in the two weights. The particulate wash solution (taken from the train in front of the filter) is placed in a tared beaker, the wash solution is evaporated under an Infra-Red Heat Lamp and the beaker weighed again. The difference in weights is the weight of the particulate in the wash. This is combined with the filter catch as the weight of the sample. Examples of the laboratory report (particulate clean up sheet) can be found in the Appendix.

SAMPLING LOCATION @ FLORENCE MINING CO.



FLORENCE MINING COMPANY
POINT LOCATIONS ON TRAVERSE



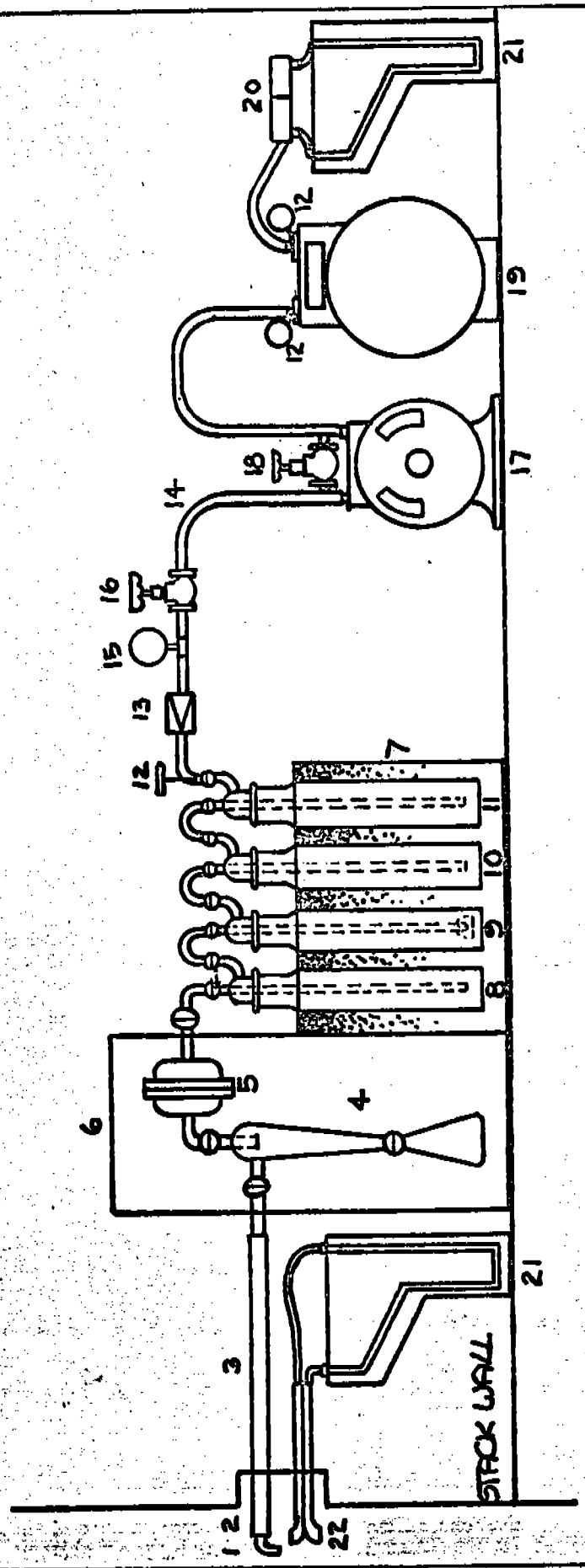

PARTICULATE SAMPLING TRAIN
STACK WALL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

FIGURE #1

Gregory Pantchenko
Chief Chemist

Abraham J. Kurtz
Vice President

Richard W. Kling
Project Engineer

Louis A. Terracciano
Project Director, Field Testing

V. APPENDIX - DATA SHEETS

PRELIMINARY VELOCITY/TEMPERATURE TRAVERSE

at The Florence Mining Company
Coal Preparation Plant
Seward, Pennsylvania

Port A			Port B		
Point	Δ P	T	Point	Δ P	T
1	.44	45	1	.28	45
2	.55	45	2	.47	45
3	.80	45	3	.35	45
4	1.10	45	4	.30	45
5	1.35	45	5	.40	45
6	1.50	45	6	.77	45
7	1.40	45	7	1.35	45
8	1.10	45	8	1.15	45
9	.80	45	9	1.25	45
10	.60	45	10	1.10	45
11	.45	45	11	.83	45
12	.38	45	12	.75	45

PARTICULATE CALCULATIONS

The following are the basic equations used in calculating final data as found in the final summary.

1. Volume of dry gas sampled at standard conditions - 70°F, 29.92" Hg, ft.^{3}

$$V_{m_{std}} = \frac{17.7 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)} = \text{Ft.}^3$$

2. Volume of water vapor at 70°F and 29.92" Hg, Ft.^{3}

$$V_{w_{gas}} = 0.0474 \times V_w = \text{Ft.}^3$$

3. % Moisture in stack gas

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

4. Mole fraction of dry gas

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

5. Average molecular weight of dry stack gas

$$M\,W_d = \left(\%\,CO_2 \times \frac{44}{100}\right) + \left(\%O_2 \times \frac{32}{100}\right) + \left(\%N_2 \times \frac{28}{100}\right)$$

6. Molecular weight of stack gas

$$M\,W = M\,W_d \times M_d + 18\,(1 - M_d)$$

7. Stack velocity at stack conditions, fpm

$$V_s = 4350 \times \sqrt{\Delta P_s \times (T_s + 460)} \left(\frac{1}{P_s \times M\,W}\right)^{1/2} = \text{fpm}$$

8. Stack gas volume at standard conditions, SCFM

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

9. Percent isokinetic

$$\%I = \frac{1032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2} = \%$$

10. Particulate - probe, cyclone and filter, gr/SCF

$$C_{an} = 0.0154 \times \frac{M_f}{V_{m\ std}} = \text{gr/SCF}$$

11. Particulate total, gr/SCF

$$C_{ao} = \frac{0.0154 \times M_t}{V_{m\ std}} = \text{gr/SCF}$$

12. Particulate - probe, cyclone and filter, gr/CF at stack conditions

$$C_{at} = \frac{17.7 \times C_{an} \times P_s \times M_d}{(T_s + 460)} = \text{gr/CF}$$

13. Particulate - total, gr/CF at stack conditions

$$C_{au} = \frac{17.7 \times C_{ao} \times P_s \times M_d}{(T_s + 460)} = \text{gr/CF}$$

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

$C_{aw} = 0.00857 \times C_{an} \times Q_s =$ lb/hr.

15. Particulate - total, lb/hr.

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

16. % Excess air at sampling point

$$\% \text{ EA} = \frac{100 \times \% \text{ } O_2}{0.264 \times \% \text{ } N_2 - \% \text{ } O_2} = \%$$

SOURCE TESTING CALCULATION FORMS

Test No. 1 No. Runs 3

Name of Firm Florence Mining Co

Location of Plant Seward, Penna

Type of Plant Coal Preparation

Control Equipment Bag House

Sampling Point Locations Outlet

Pollutants Sampled Particulate

Time of Particulate Test:

Run No. 1 Date 20 JAN 72 Begin 1315 End 1534

Run No. 2 Date 20 JAN 72 Begin 1725 End 2007

Run No. 3 Date 21 JAN 72 Begin 0602 End 1020

PARTICULATE EMISSION DATA

Run No.	1	2	3	
P_b barometric pressure, "Hg Absolute	29.85	29.85	30.13	
P_m orifice pressure drop, "H_2O	.76	.89	.85	
V_m volume of dry gas sampled @ meter conditions, ft.^{3}	61.210	57.953	61.299	
T_m Average Gas Meter Temperature, °F	67	65	56	
V_m Volume of Dry Gas Sampled @ Standard std. conditions, ft.^{3}	61.48	58.45	63.49	
V_w Total H_2O collected, ml., Impingers & Silica Gel.	11.4	17.7	13.1	
$V_{w\,gas}$ Volume of Water Vapor Collected ft.^{3} @ Standard Conditions*	0.54	0.84	0.62	

* 70°F, 29.92" Hg.

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PARTICULATE EMISSION DATA (cont'd)

Run No.	1	2	3	
%M - % Moisture in the stack gas by volume	0.87	1.42	0.97	
M_d - Mole fraction of dry gas	.99	.98	.99	
% CO_2	—	—	—	
% O_2	21	21	21	
% N_2	79	79	79	
M W $_d$ - Molecular weight of dry stack gas	28.84	28.84	28.84	
M W - Molecular weight of stack gas	28.73	28.69	28.73	
Δ Ps - Velocity Head of stack gas, In. H_2O	—	—	—	
T_s - Stack Temperature, °F	53	56	30	
$\sqrt{\Delta P_s X (T_s+460)}$	18.83	19.53	19.29	
P_s - Stack Pressure, "Hg. Absolute	29.78	29.78	30.06	
V_s - Stack Velocity @ stack conditions, fpm	2800	2910	2860	
A_s - Stack Area, in.^{2}	1661	1661	1661	
Q_s - Stack Gas Volume @ Standard Conditions, *SCFM	32,700	33,600	35,500	
T_t - Net Time of Test, min.	123	115	120	
D_n - Sampling Nozzle Diameter, in.	.1875	.1875	.1875	
%I - Percent isokinetic	91.2	90.7	89.4	
m_f - Particulate - probe, cyclone and filter, mg.	346.3	41.3	21.4	
m_t - Particulate - total, mg.	371.7	53.9	53.1	
C_{an} - Particulate - probe, cyclone, and filter, gr/SCF	.0867	.0109	.0052	
C_{ao} - Particulate - total, gr/SCF	.0931	.0142	.0129	
C_{at} - Particulate - probe, cyclone, and filter gr/cf @ stack conditions	.08819	.01091	.00559	

PARTICULATE EMISSION DATA (cont'd)

Run No.	1	2	3	
C_{au} - Particulate, total, gr/cf @ stack cond.	.09470	.01422	.01387	
C_{aw} - Particulate, probe, cyclone, and filter, lb/hr.	24.45	3.14	1.58	
C_{ax} - Particulate - total, lb/hr.	26.25	4.09	3.92	
%EA - % Excess air @ sampling point	—	—	—	

* 70°F. 29.92" Hg.

QUALITY CONTROLLED YORK RESEARCH CORPORATION

JOB NO. Y-7730-G

PARTICULATE FIELD DATA

Plant Florence Mining Co.

Run No. 1

Location Outlet

Date 20 JAN 72

Operator RWK / E.T.

Sample Box No.

Meter Box No.

Meter H 1.89

C' Factor 1.0

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

PATHOLOGICAL INCINERATORS- read and record every 5 minutes.

Filter FL-36 196 cc gross - 4 cc Net

Net Silica Jel 15.4 mg

Ambient Temp °F 45

Bar. Press. "Hg

Assumed Moisture % 5

Heater Box Setting, °F 300

Probe Tip Dia., In. 3/16"

Probe Length 5 ft

Probe Heater Setting 60

Avg. ΔP Avg. ΔH .76

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Press in. Hg	Stack Temp °F
B-1	1315	404.000	.25	.27	.27	42	42	0.5	250	50	—	45°
Stop	1318	404.973	Process Fans Stopped				—	—	—	—	—	—
Start	1328	—	.3	.33	.33	42	43	0.5	250	50		45
2	1333	406.41	.3	.33	.33	50	45	0.5	245	50		45
3	1338	408.10	.3	.33	.33	55	48	0.5	245	50		45
4	1343	409.77	.35	.38	.38	60	50	0.5	260	55		55
5	1348	411.40	.43	.50	.50	65	50	0.5	260	55		55
6	1253	413.35	.75	.81	.81	70	52	0.5	240	55		55
7	1458	415.85	1.30	1.4	1.4	75	55	1.0	240	60		55
8	1403	419.10	1.20	1.3	1.3	80	55	1.0	240	60		55
9	1408	422.35	1.1	1.2	1.2	81	60	1.0	225	55		55
10	1413	425.55	.97	1.05	1.05	83	60	1.0	240	55		55
11	1418	428.50	.63	.99	.99	83	61	1.0	250	60		55
12	1423	431.35	.69	.75	.75	83	64	1.0	255	60		55
final	1428	433.90	—	—	—	84	64	—	250	60		55

JOB NO. Y-7720-G

Point	Clock Time	Dry Gas Meter, CF	Pitot in.H_2O ΔP	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Press in.Hg	Stack Temp. °F
A-1	1434	433.90	.47	.51	.51	72	63	0.5	225	50		55
2	1439	435.94	.55	.61	.61	72	65	0.5	220	50		55
3	1444	438.15	.64	.73	.73	74	64	0.5	220	50		58
4	1449	440.70	.55	.91	.91	77	64	0.5	240	50		58
5	1454	443.15	1.1	1.2	1.2	81	64	0.5	245	55		58
6	1459	446.40	1.3	1.4	1.4	84	66	0.5	250	55		58
7	1504	449.70	1.3	1.4	1.4	88	68	1.0	250	55		59
8	1509	452.90	1.2	1.3	1.3	88	68	1.0	245	55		59
9	1514	456.30	.75	.83	.83	83	69	0.5	225	55		59
10	1519	458.90	.60	.66	.66	83	72	0.5	240	55		59
11	1524	461.30	.51	.51	.51	81	70	0.5	250	55		59
12	1529	463.40	.43	.43	.43	79	70	0.5	240	55		59
final	1534	465.210	—	—	—	77	69	—	240	55		
			(.73)	.76	.76	74	60					58
		61.210 Net feet³				67						
	Net time	123 min		$\sqrt{\Delta P(T_s + 460)}$ =		18.83						

YORK RESEARCH CORPORATION

JOB NO. Y-7730-G

PARTICULATE FIELD DATA

Plant Florence Mining Co.

Run No. 2

Location Outlet

Date 20 JAN 72

Operator

Sample Box No.

Meter Box No.

Meter H 1.89

C Factor 1.0

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

PATHOLOGICAL INCINERATORS- read and record every 5 minutes.

Filter FL-9

196 cc - gross
-4 cc - net

Net Silica Gel 21.7 mg

Ambient Temp °F 45

Bar.Press. "Hg

Assumed Moisture % 5

Heater Box Setting, °F 300

Probe Tip Dia., In. 3/16"

Probe Length 5'

Probe Heater Setting 60

Avg. ΔP Avg. ΔH .89

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP	Orifice Δ H in H_2O Desired	Orifice Δ H in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Press in.Hg	Stack Temp °F
A-1	1725	465.407	.54	.57	.57	54	51	0.5	170	50		50
2	1730	467.51	.63	.69	.69	58	51	0.5	170	50		50
3	1735	469.81	.87	.94	.94	62	52	1.5	200	50		50
4	1740	472.52	1.1	1.20	1.20	68	55	2.5	225	50		50
5	1745	475.61	1.4	1.50	1.50	71	58	4.0	225	55		50
6	1750	478.95	1.5	1.60	1.60	72	59	5.0	225	55		50
7	1755	482.30	1.3	1.40	1.40	78	60	4.0	230	55		50
8	1800	485.21	.97	1.05	1.05	85	62	3.5	235	55		57
9	1805	489.21	.99	1.05	1.05	76	62	3.5	230	55		57
10	1810	491.90	.55	.60	.60	76	62	1.0	230	70		57
11	1815	494.10	.45	.49	.49	74	62	1.0	230	70		57
12	1820	496.12	—	—	—	72	65	—	230			57

JOB NO. Y-7730-G

Point	Clock Time	Dry Gas Meter, CF	Pitot in.H_2O ΔP	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Press in.Hg	Stack Temp. °F
B-1	1825	496.12	.22	.22	.22	66	65	0.0	220	65		57
2	1830	497.54	.34	.24	.24	66	62	1.0	230	65		59
3	1835	494.21	.34	.37	.37	70	65		230	65		59
	plant shut down			@ 1837	.30							
	restart			@ 1924	.30							
4		500.27	.34	.37	.37	62	62	1.0	295	60		61
5	1927	501.10	.32	.35	.35	62	62	1.0	295	60		60
6	1932	502.82	.33	.36	.36	62	62	1.0	300	60		60
7	1937	504.62	.80	.85	.85	64	62	1.0	300	60		60
8	1942	507.12	1.04	1.30	1.30	72	62	1.0	250	60		60
9	1947	510.20	1.02	1.30	1.30	78	62	4.0	275	60		60
10	1952	513.40	1.04	1.60	1.60	78	62	4.0	300	60		59
11	1957	516.02	1.03	1.40	1.40	76	62	4.0	300	60		59
12	2002	519.42	1.03	1.03	1.03	76	62	4.0	275	60		59
final	2007	523.360	—	—	—	76	62	4.0	275	60		54
												$\overline{56}$
		57.953	.79	.89	.89	70	60					
						$\overline{65}$						
	Net time 115 mins											
				$\sqrt{\Delta P(T_s+460)}$		=	19.53					

JOB NO. Y-7730-G

PARTICULATE FIELD DATA

Plant Florence Mining Co.

Run No. 3

Location Outlet

Date 21 JAN 72

Operator RWK/ET

Sample Box No.

Meter Box No.

Meter H 1.89

C Factor 1.0

VERY IMPORTANT - FILL IN ALL BLANKS

Read and record at the start of each test point.

PATHOLOGICAL INCINERATORS- read and record every 5 minutes.

Filter FL-34

194 cc gross
-6 cc Net

Net Silica Jel 19.1 mg

Ambient Temp °F 45

Bar. Press. "Hg

Assumed Moisture % 5

Heater Box Setting, °F 30

Probe Tip Dia., In. 3/16

Probe Length 5 ft

Probe Heater Setting 60

Avg. ΔP Avg. ΔH .88

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP	Orifice Δ H in H_2O Desired	Orifice Δ H in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Press in.Hg	Stack Temp °F
B-1	0602	523.493	.35	.42	.42	38	39	0.5	200	50		45
	0603	524.45	Shut	Down	For	Rapping	cycle					
	0610	Restart										
2	0614	525.87	.26	.29	.29	45	40	0.5	230	50		35
3	0619	527.40	.24	.27	.27	51	41	0.5	240	50		30
4	0624	528.90	.27	.29	.29	55	43	0.5	250	55		30
5	0629	530.45	.31	.34	.34	57	45	0.5	255	55		30
6	0634	532.12	.74	.80	.80	64	48	0.5	250	55		30
7	0639	534.63	1.40	1.5	1.5	68	50	0.5	250	55		30
8	0644	538.00	1.6	1.7	1.7	75	52	0.5	250	55		30
9	0649	541.51	1.2	1.3	1.3	75	52	0.5	250	55		30
10	0654	544.65	1.1	1.2	1.2	75	56	0.5	250	55		30
11	0659	547.76	.99	1.05	1.05	78	56	0.5	250	55		30
12	0704	550.08	.67	.74	.74	78	56	0.5	255	55		30
final	0709	553.144	—	—	—	78	56	0.5				30

JOB NO. Y-7730-G

Point	Clock Time	Dry Gas Meter, CF	Pitot in.H_2O ΔP	Orifice ΔH in H_2O Desired	Orifice ΔH in H_2O Actual	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Pump Vacuum In. Hg Gauge	Box Temp. °F	Impinger Temp °F	Stack Press in.Hg	Stack Temp. °F
A-1	0905	553.147	.51	.55	.55	40	42	0.5	250	50		25
2	0910	555.18	.61	.66	.66	44	42	0.5	250	50		30
3	0915	557.40	.72	.76	.76	52	42	0.5	265	50		30
4	0920	559.80	.96	1.00	1.00	50	48	0.5	265	50		30
5	0924	shut down - Plant moved equipment across coal conveyor										—
	0939	Restart										—
5	0940	562.49	1.2	1.3	1.3	51	46	0.5	255	50		30
6	0945	565.65	1.4	1.5	1.5	60	48	0.5	260	50		30
7	0950	568.92	1.5	1.6	1.6	66	49	0.5	255	50		30
8	0955	572.41	1.2	1.3	1.3	72	50	0.5	255	50		30
9	1000	575.67	0.80	.84	.84	74	52	0.5	230	50		30
10	1005	578.20	.62	.66	.66	74	54	0.5	250	55		30
11	1010	580.55	.55	.59	.59	72	55	0.5	270	50		25
12	1015	582.76	.40	.43	.43	72	58	0.5	240	50		25
final	1020	584.792	—	—	—	70	56	—	240	55		25
												—
												30
		61.299	.82	.88	.86	63.	49					
		Net ft^3				56						
	Net time 120 min											
				$\sqrt{\Delta P(T_s+460)}$ =		18.29						

PARTICULATE CLEANUP SHEET

Date: 1/20/72

Plant: FLORENCE MINING CO.

Run Number: 1

Location of sample port: OUTLET

Operator: _____

Barometric Pressure: _____

Sample Box Number: _____

Ambient Temperature: _____

Impinger H_2O

Volume after sampling ____ ml Container No. ____

Ether-chloroform extraction of impinger water ____ mg

Impinger prefilled with ____ ml Extra No. ____

Impinger water residue ____ mg

Volume Collected ____ ml

Impingers and back half of filter, acetone wash: Container No. 3.5

Extra No. ____

Weight results .0254 mg

49.5665
50.5732
.0133

49.1088
49.0967
.0121

Dry probe and cyclone catch: Container No. ____

Extra No. ____

Weight results ____ mg

Probe, cyclone, flask, and front half of filter, acetone wash: Container No. 2.

Extra No. ____

Weight results .3442 mg

48.9427
48.5985

Filter Papers and Dry Filter Particulate

Filter Number	Container No.	Filter Number	Container No.
FL-9	1		

.5172
.5151

Filter particulate weight .0021 mg

Total particulate weight ____ mg

Silica Gel

Weight after test: 314.8

Weight before test: 300.0

Moisture weight collected: 14.8

Moisture Total ____ gm

Container Number: 1. 4 2. ____ 3. ____ 4. ____

Sample Number: _____ Analyze for: _____

Method determination: _____

Comments: _____

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PARTICULATE CLEANUP SHEET

Date: 1/20/72

Plant: FLORENCE MINING CO.

Run Number: 2

Location of sample port: OUTLET

Operator: _____

Barometric Pressure: _____

Sample Box Number: _____

Ambient Temperature: _____

Impinger H_2O

Volume after sampling ____ ml Container No. ____

Ether-chloroform extraction of impinger water ____ mg

Impinger prefilled with ____ ml Extra No. ____

Impinger water residue ____ mg

Volume Collected ____ ml

Impingers and back half of filter, acetone wash: Container No. [illegible]

Extra No. ____

50.0956
50.0896
.0060

Weight results .0126 mg

49.1157
49.1091
.0066

Dry probe and cyclone catch: Container No. ____

Extra No. ____

Weight results ____ mg

Probe, cyclone, flask, and front half of filter, acetone wash: Container No. 2

Extra No. ____

49.3830
49.3427
.0403

Weight results ____ mg

Filter Papers and Dry Filter Particulate

Filter Number	Container No.	Filter Number	Container No.
FL-36	1		

.5258
.5248

Filter particulate weight .0010 mg

Total particulate weight ____ mg

Silica Gel

Weight after test: 321.5

Weight before test: 300.0

Moisture weight collected: 21.5

Moisture Total ____ gm

Container Number: 1. 4 2. ____ 3. ____ 4. ____

Sample Number: _____ Analyze for: _____

Method determination: _____

Comments: _____

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PARTICULATE CLEANUP SHEET

REPORT NO. Y-7730-G

Date: 1/27/72 Plant: FLORENCE MINING CO.

Run Number: 3 Location of sample port: OUTLET

Operator: Barometric Pressure:

Sample Box Number: Ambient Temperature:

Impinger H_2O

Volume after sampling ____ ml Container No. ____ Ether-chloroform extraction of impinger water ____ mg

Impinger prefilled with ____ ml Extra No. ____ Impinger water residue ____ mg

Volume Collected ____ ml

Impingers and back half of filter, acetone wash: Container No. 3,5 Extra No. ____ Weight results .0317 mg (50.4526 − 50.4722 = .0104; 48.4286 − 48.4673 = .0213)

Dry probe and cyclone catch: Container No. ____ Extra No. ____ Weight results ____ mg

Probe, cyclone, flask, and front half of filter, acetone wash: Container No. 2 Extra No. ____ Weight results .0197 mg (49.7677 − 49.7478)

Filter Papers and Dry Filter Particulate

Filter Number	Container No.	Filter Number	Container No.
FL-34	1		

Filter particulate weight .0015 mg (.5213 − .5198)

Total particulate weight ____ mg

Silica Gel

Weight after test:	318.6			
Weight before test:	300.0			
Moisture weight collected:	18.6			
Container Number:	1. 4	2.	3.	4.

Moisture Total ____ gm

Sample Number: ____ Analyze for: ____

Method determination: ____

Comments: ____

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PERSONNEL LIST

Richard W. Kling	Project Engineer	York Research Corp.
Erwin Theisz	Field Chemist	York Research Corp.
Thomas E. Ward	Project Officer	E.P.A.
Joseph J. Sableski	Industrial Studies	E.P.A.
Charles Sedman	Industrial Studies	E.P.A.

LOG OF EVENTS ON TEST NUMBER Y-7730-G

Wednesday - 19 January 72

1200 - E. Theisz and R. Kling leave York Research Corporation office in Stamford, Connecticut.

2100 - Arrive at Motel for meeting with Tom Ward and Charles Sedman.

Thursday - 20 January 72

0800 - Arrive at Plant and set up for test.

1300-1530 - Testing Run Number 1.

1530-1730 - Clean up train and set up for test.

1730-2000 - Testing Run Number 2.

2000-2300 - Clean up and preparations for next run.

Friday - 21 January 72

0600 - Arrive at Plant and set up for testing.

0630 - 1030 - Testing Run Number 3.

1030 - 1230 - Clean up and pack truck.

1300 - 2200 - Driving to Virginia - E. Theisz and R. Kling