ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.

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Monroeville, Pennsylvania 15146-3055
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Ref. Project No. 423

May 24, 1996

AP-42 Section 12.2
Reference
Report Sect. 4
Reference 175

Ms. Coleen M. Hart
Environmental Control Engineer
USS Clairton Works
400 State Street
Clairton, PA 15025

Dear Ms. Hart:

Re: Measurement of Respirable Dust Concentrations and Emission Rates from Coal Pulverizer Buildings - Letter Report

This letter, with attachments, constitutes the report for the respirable dust measurements performed by Advanced Technology Systems, Inc. (ATS) at the 1st Unit Primary Pulverizer, 1st Unit Secondary Pulverizer and 2nd Unit Primary Pulverizer at the USS Clairton Works facility located in Clairton, Pennsylvania. Ambient air sampling for respirable dust within the pulverizer buildings was performed on April 10, 1996 to quantify the respirable dust emission rates from these structures. Measurements were not performed at the 2nd Unit Secondary Pulverizer since this unit was not operating on the test day.

Respirable dust sampling was performed as part of a USS Clairton Works in-house engineering project in accordance with Allegheny County Health Department - Division of Air Quality (DAQ) Source Testing Manual, Chapter 53, "Determination of Inhalable Fugitive Particulate Emissions from Air Pollution Sources Within a Structure" (some procedures were slightly modified for this particular test program). A copy of this test method can be found in the attachment. Respirable dust measurements were conducted using a sampling train which consisted of a particle sizing cyclone, 37 mm filter, and a personnel sampling pump capable of sampling air at a flow rate between 1.615 and 1.785 liters per minute. Sample train air flow was monitored with the use of a primary gas flow standard (Buck Calibrator, Model M-5, manufactured by A.P. Buck, Inc.). Air velocity measurements were conducted with the use of a calibrated Sierra Instruments, Inc. air velocity measuring device (serial number 12161). Respirable dust and air velocity measurements were conducted at one (1) window or door opening per structure. The air flow at the test sites was outward from the structure during the 90 minute sampling period. This was confirmed by measuring the air velocity at the sampling site before and after each test period.

Emission rates of respirable dust from each pulverizer were calculated from the knowledge of the respirable dust concentration, outward air velocity from the pulverizer, and total open window or door area in which the air flow was outward during the testing period. A determination of whether the air flow at each open window or door was inward to the pulverizer or outward from the pulverizer was made immediately prior to and after the testing period. If the air flow was determined to be inward prior to and / or after the sampling period, then the air flow was considered to be inward during the sampling period. The air flow was considered to be outward during the sampling period if the air flow was determined to be outward prior to and after the sampling period.

Following the gravimetric analyses of the sample train filters, the filters were submitted to R.J. Lee Group for particle size analyses using computer-controlled scanning electron microscope techniques.

The results of the test effort are summarized in the table below. Measured respirable dust emission rates are listed in units of pounds per hour (lb/hr).

Pulverizer	Measured Respirable Dust Emission Rate (lb/hr)	Number Percentage of Particles with Diameter < = 2.5 um	Mass Percentage of Particles with Diameter < = 2.5 um
1st Unit Primary	0.030	99.2 %	13.9 %
1st Unit Secondary	0.017	97.7 %	36.9 %
2nd Unit Primary	0.003	98.8 %	52.9 %

Copies of the field data sheets, equipment calibration results, analytical results, and calculations can be found in the attachment.

ATS appreciates the opportunity to provide air quality engineering services to USS Clairton Works. If you have any questions regarding this letter report, please call me at (412) 829-2208.

Very truly yours,

John P. Shimshock

John P. Shimshock, Ph.D.
Senior Project Scientist

MEASUREMENT OF RESPIRABLE DUST CONCENTRATIONS AND EMISSION RATES FROM COAL PULVERIZER BUILDINGS

USS CLAIRTON WORKS
A DIVISION OF USX CORPORATION
CLAIRTON, PENNSYLVANIA

ATTACHMENT

ALLEGHENY COUNTY HEALTH DEPARTMENT - DIVISION OF AIR QUALITY REFERENCE TEST METHOD, FIELD DATA SHEETS, EQUIPMENT CALIBRATION RESULTS, ANALYTICAL RESULTS, CALCULATIONS

ATS
ADVANCED TECHNOLOGY SYSTEMS, INC.

CHAPTER 53

DETERMINATION OF INHALABLE FUGITIVE PARTICULATE EMISSIONS FROM AIR POLLUTION SOURCES WITHIN A STRUCTURE

Principle and Applicability and Limitations:

a. The method measures the mass concentration of respirable dust smaller than 10 micron particle size.

b. This method is applicable to respirable dust from the fugitive emission sources enclosed within a structure.

c. Depending on predominant wind direction during the sampling, air flow will be inward at some openings and outward at others. Only the openings with outward air flow will be responsible for fugitive emission and therefore, the area and air velocity through these openings will be taken into consideration for calculating emission rate.

d. Since the wind direction may change during sampling, the air flow which was outward may become inward at the same openings where the test is being carried out. Under this situation, the sampling must continue at the same opening.

If the air flow remains inward for more than 50 percent of sampling time, then the sample must be discarded and another opening should be selected for sampling.

A. Sample Points

By visual determination, select the openings with the most fugitive dust leakage out of the enclosed structure.

Each sampling area should be divided into 12 equal areas with the sample point at the centroid of each area.

B. Velocity and Temperature

The velocity of the air flowing through the sample point can be measured with a vane anemometer or Kurtz Model 441 or equivalent at the centroid of the sample point. The velocity should be measured at the beginning and end of the sampling period for each sample point. The total of 24 velocity measurements shall be made per two hour run.

The temperature of the air can be measured with a mercury thermometer before and after each test run.

C. Moisture

The moisture in the sampled air will be the relative humidity of the ambient air. This can be determined with a sling psychrometer and should be measured at least once at each opening.

D. Area of Openings

The area of every opening shall be measured in square feet.

E. Sample for Inhalable Particulates:

1.0 Apparatus

1.1 Sampling train: The sample train consists of a 10 millimeter Dorr-Oliver cyclone connected to a filter holder (37 mm) loaded with a tared quartz filter and personal sampling pump

1.1.1 Personal sampling pump: A personal sampling pump capable of sampling air at 1.7 L/min ±5% with flexible tygon connecting tubing.

NOTE: Pulsation in the pump flowrate must be within ±20% of the mean flow.

1.1.2 Filter: Whatman type QM-A, 37 mm diameter quartz filter or equivalent supported with backup pad in a two-piece, 37 mm cassette filter holder held together by tape or cellulose shrink band.

1.1.3 Cyclone: 10 mm Dorr-Oliver nylon cyclone.

1.1.4 Sampling head holder: This holder must keep the cassette, cyclone and coupler together rigidly so that air enters only at the cyclone inlet.

2.0 Equipment for analysis:

2.1. Environmental chamber for balance. It shall be maintained at 20 degrees C ±0.3 degrees C and 50% ±5% relative humidity.

2.2. Vacuum desiccator.

3. Filter cassette preparation and pre-weighing before sampling.

3.1 Dry filters and backup pads under vacuum in the vacuum desiccator for at least 15 minutes. Release the vacuum, remove the desiccator cover, and equilibrate the filters in the environmental chamber for at least 1 hr. or,

3.2 Desiccate the filters and backup pads in the desiccator for 24 hrs.

3.3 Number the backup pads with a ballpoint pen and place one pad, the numbered side down, in the filter cassette bottom section.

3.4 Weigh the filters in the environmental chamber. Record the filter tare weight, W_1 (mg).

3.4.1 Zero the balance before each weighing.

3.4.2 Handle the filter with forceps (nylon forceps, if further analysis will be done).

3.5 Place a weighed filter on top of the backup pad in the filter cassette bottom section and allow to stand an additional 8 to 16 hours in the environmental chamber.

3.6 Reweigh the filters. If this tare weight differs by more than 0.01 mg from the first tare weight obtained in step 3.4 above, discard the filter.

NOTE: Insert a rod through the outlet hole of the filter cassette bottom section to raise the backup pad and filter so that the filter can be grasped with forceps.

3.7 Reassemble the filters in the filter cassettes and close firmly so that leakage around the filter will not occur. Place a plug in each opening of the filter cassette. Place a cellulose shrink band around the filter cassette, allow to dry, and mark with the same number as the backup pad.

3.8 Remove the cyclone's grit cap and vortex finder before use and inspect the cyclone interior. If the inside is visibly scored, discard this cyclone since the dust separation characteristics of the cyclone might be altered. Clean the interior of the cyclone to prevent reentrainment of large particles.

3.9 Assemble the sampler head. Check alignment of filter holder and cyclone in the sampling head to prevent leakage.

4. Procedure.

4.1 Calibration

4.1.1 Calibrate each personal sampling pump to 1.7 L/min. with a representative quartz filter in line.

4.2 Sampling procedure.

4.2.1 For door or window openings, sample at the centroid of each of 12 equal areas used during the velocity traverse for 10 minutes per point for a total of 120 minutes per run. The sample flow rate shall be 1.7 L/min. Three runs shall comprise a test, one each at three different window or door openings. The cyclone air intake shall face the window or door opening and shall be no more than 6 inches outside the plane of the door or the window.

NOTE: Do not allow the sampler assembly to be inverted at any time. Turning the cyclone to anything more than a horizontal orientation may deposit oversized material from the cyclone body onto the filter.

5. Sample preparation.

5.1 Wipe dust from the external surface of the filter cassette with a moist paper towel to minimize contamination. Discard the paper towel.

5.2 Remove the top and bottom plugs from the filter cassette. Place the filter cassettes in a vacuum desiccator for at least 15 min. followed by equilibration for at least 1 hr. in the environmental chamber, or desiccate the filter in desiccator for 24 hrs.

5.3 Remove the filter cassette band, pry open the filter cassette, and remove the filter by inserting a rod in the outlet hole of the filter cassette. Handle the filters very carefully by the edge to avoid loss of dust.

5.4 Zero the microbalance before all weighings. Use the same microbalance for weighing filters before and after sample collection. Calibrate the balance with National Bureau of Standards Class M weights.

5.5 Take two replicate blank filters for every batch of field samples for quality assurance on the sampling procedures. The set of replicate blank filters should be exposed to the same dust environment, either in a laboratory dust chamber or in the field. The quality control samples must be taken with the same equipment, procedures and personnel used in the routine field samples. Calculate precision from these replicates.

Take corrective action when the precision is out of control.

5.6 Weigh each filter, including field blanks. Record this post-sampling weight, W_2 (mg), beside its corresponding tare weight. Record anything remarkable about a filter (e.g., visible particles, overloaded, leaking, wet, torn, etc.).

6. Calculations.

6.1 Calculate the concentration of respirable dust, C (mg/m^3), in the air volume sampled, V (liters):

$$C = \frac{(W_2 - W_1) + B}{V} \cdot 10^3, \ mg/m^3 \qquad (1)$$

where: W_1 = tare weight of filter before sampling (mg).

W_2 = post-sampling weight of sample-containing filter (mg).

B = mean change in field blank filter weights between tare and post-sampling (mg) (+ or -).

V = Air volume sampled (liters)

6.2 Calculation of Air Volume rate through a door or window.

$$Vo_S = V_S \times A_S \qquad (2)$$

where: Vo_S = Volumetric flowrate from a single window or door opening of ft^3/min.

Vs = Average of 24 velocity measurements by anemometer (ft/min) for a single window or door opening.

A_S = Cross-sectional area of a single window or ft^2 door opening.

6.3 Calculation of Total Air Volume rate through the building.

$$Vo_t = V_A \times A_t \qquad (3)$$

where: Vo_t = total volumetric outward flowrate from all building openings (ft^3/min).

V_A = opening velocity averaged for 3 runs (ft/min).

A_t = cross-sectional area (ft^2) of all building openings where air flow was outwards.

6.4 Emission Rate Calculation (lb/hr)

$$C_t = 1.3216 \times 10^{-4} C_{avg} \times \frac{VO_t}{35.3} \qquad (4)$$

where: C_t = total concentration lb/hr. from all openings.

C_{avg} = average concentration mg/m^3 of 3 runs at 3 different openings.

$C_{avg} = (C_1 + C_2 + C_3)/3$

C_1 = concentration from run 1 mg/m^3

C_2 = concentration from run 2 mg/m^3

C_2 = concentration from run 3 mg/m^3

VO_t = total volumetric flowrate from all building openings $\frac{ft^3}{min.}$

35.3 = conversion factor for converting cubic feet to cubic meters.

chap53

USS Clairton Works – Clairton, PA
1st Unit – Primary Pulverizer
Date: April 10, 1996

Floor	Window/ Door	Dimensions	Area (ft^2)	Pre-Test Time	Pre-Test Flow	Post-Test Time	Post-Test Flow
Main	West Door #1	144"×126"	126	0950	In	1204	IN
	North Window #1	9.5"×48"	3.17	0950	In	1205	IN
	North Window #2	26.5"×51"	9.39	0950	In	1205	IN
	East Window #1	24"×51"	8.50	0952	out	1206	OUT
✓ ↓	✓ East Window #2	22.5"×47"	7.34	0952	out	1206	OUT
2nd	East Window #1	11"×51"	3.90	0954	out	1206	OUT
↓	North Window #1	26"×57"	9.21	0954	in	1207	IN
↓	West Window #1	26"×22"	3.97	0955	in	1208	IN
3rd	East Window #1	21.5"×51"	7.61	0956	out	1209	OUT
↓	West Window #1	9"×14"	0.88	0956	out	1209	OUT

total outward flow area = 28.23 ft

USS Clairton Works – Clairton, PA
1st Unit – Secondary Pulverizer
Date: April 10, 1996

Floor	Window/ Door	Dimensions	Area (ft^2)	Pre-Test Time	Pre-Test Flow	Post-Test Time	Post-Test Flow
Main	West Door #1	96"×80"	53.33	1029	in	1207	in
2nd	East Window #1	28.5"×42"	8.31	1030	out	1305	OUT
↓	East Window #2	36"×42"	10.50	1030	out	1305	OUT
↓	West Door #1	36"×84"	21.00	1033	in	1305	in
3rd	North Window #1	24"×46.5"	7.75	1035	in	1301	in
✓	✓ East Window #1	25.5"×46.5"	8.23	1035	out	1301	out
	East Window #2	31"×42"	9.04	1036	out	1301	out
	West Window #1	24"×47"	7.83	1038	in	1301	out
	West Door #1	73"×103"	52.22	1040	in	1301	in

total outward flow area = 36.08 ft^2

✓ = window tested

USS Clairton Works - Clairton, PA
2nd Unit - Primary Pulverizer
Date: April 10th, 1996

Floor	Window/ Door	Dimensions	Area (ft^2)	Pre-Test Time	Pre-Test Flow	Post-Test Time	Post-Test Flow
3rd	South Window #1	36" x 46"	11.25	1100	out	1511	out

total outward flow area = 11.25 ft^2

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CLIENT USS Clairton Works
TEST UNIT 1st Unit Primary Rlvacuer
PROJECT NO. 423
OPERATOR KELLY AJALA

DATE 4-10-96 (Wed.)
FILTER NO. 28
SITE NO. Main Floor - East Window #2
BAROMETRIC PRESS. 29.35

SAMPLE AREA #	CLOCK TIME EDT	BUCK READING (cc/min)	AMBIENT TEMP. (°F)	RELATIVE HUMIDITY (%)	COMMENTS
1	1021	1709, 1711, 1710	57		
2	1028·5	1704, 1697, 1709	57		
3	1036	1694, 1714, 1713	57		
4	1043·5	1707, 1702, 1709	57		
5	1051	1702, 1699, 1681	55		
6	1058·5	1698, 1702, 1706	55		
7	1106	1691, 1683, 1699	53		
8	1113·5	1690, 1699, 1693	53		
9	1121	1675, 1702, 1695	53		
10	1128·5	1712, 1709, 1713	52		
11	1136	1678, 1700, 1706	52		
12	1143·5	1706, 1704, 1697	52		
AVERAGE:	1151 END. 90 MIN.	1701			

total gas volume sampled = 153.09 L

Facility USS Clairton Works

Location 1st Unit Primary Pulverizer

Test Port East Window #2 Main Floor

Date 4-10-96 (Wed)

Operator PS, KA, JS

B.P. 29.35

Filter # 28

Pump # 2

Test Time 1015 / 1200 EDT

Relative Humidity

Sampling Point	Flow fpm Pre	Temp Pre °F	Flow fpm Post	Temp. Post	Area
#1	52	57°F	209	52°F	
#2	124		84		
#3	330		450		
#4	430		524		
#5	259		535		
#6	530		210		
#7	330		390		
#8	500		213		
#9	325		150		
#10	360		165		
#11	335		215		
#12	500		230		

22.5"

dc-180.cht

#4	#8	#12
#3	#7	#11
#2	#6	#10
#1	#5	#9

47"

AVG = 340 fpm

AVG = 281 fpm

overall test average = 311 fpm

ATS

CLIENT USS Clairton Works
TEST UNIT 1st Unit Secondary Pulverizer
PROJECT NO. 423
OPERATOR PS, KA, JB

DATE 4-10-96 (Wed.)
FILTER NO. 32
SITE NO. 3rd Floor, East Window #1
BAROMETRIC PRESS. 29.35

SAMPLE AREA #	CLOCK TIME EDT	BUCK READING (cc/min)	AMBIENT TEMP. (°F)	RELATIVE HUMIDITY (%)	COMMENTS
1	1131	1696, 1693, 1695	50		
2	1138:30	1718, 1733, 1727			
3	1146	1711, 1707, 1711			
4	1153:30	1693, 1703, 1710			
5	1201	1710, 1703, 1703			
6	1208:30	1699, 1704, 1709			
7	1216	1693, 1688, 1689			
8	1223:30	1689, 1693, 1683			
9	1231	1678, 1695, 1680			
10	1238:30	1685, 1694, 1707			
11	1246	1681, 1695, 1678			
12	1253:30	1680, 1692, 1682			
AVERAGE:	1301 - end	1698			

Total gas volume sampled = 152.82 L

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CLIENT USS Clairton Works
TEST UNIT 2nd Unit Primary Pulverizer
PROJECT NO. 423
OPERATOR PS, KA, JS

DATE 4-10-96 (Wed)
FILTER NO. 30
SITE NO. 3rd floor, South Window #1
BAROMETRIC PRESS. 29.35

SAMPLE AREA #	CLOCK TIME EDT	BUCK READING (cc/min)	AMBIENT TEMP. (°F)	RELATIVE HUMIDITY (%)	COMMENTS
1	1336	1728, 1728, 1740	68 °F		
2	1343:30	1761, 1757, 1760	68		
3	1351	1740, 1728, 1738	68		
4	1358:30	1742, 1732, 1729	66		
5	1406	1737, 1734, 1736	66		
6	1413:30	1743, 1746, 1740	54		
7	1421	1728, 1732, 1728	54		
8	1428:30	1731, 1724, 1726	54		
9	1436	1726, 1720, 1728	54		
10	1443:30	1691, 1704, 1717	54		
11	1451	1729, 1725, 1727	54		
12	1458:30	1709, 1718, 1704	54 °F		
AVERAGE:	1506 end	1730			

total gas volume sampled = 155.7 L

WINDOW #1 - OUT AT 1511

Facility USS Clairton Works B.P. 29.35

Location 2nd Unit Primary Pulverizer Filter # 30

Test Port 3rd floor, South Window #1 Pump # 2

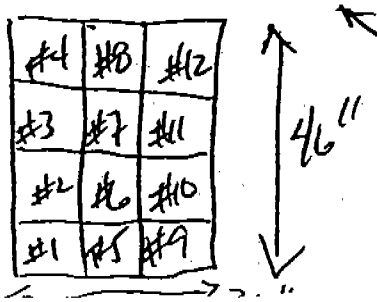
Date 4-10-96 (Wed) Test Time 1330 / EDT

Operator BS, KA, JB Relative Humidity

Sampling Point	Flow fpm Pre	Temp Pre °F	Flow fpm Post	Temp. Post	Area
#1	35	68	106	54 °F	
#2	103		75		
#3	90		99		
#4	121		216		
#5	49		150		
#6	40		103		
#7	44		154		
#8	92		195		
#9	38		160		
#10	30		140		
#11	52		23		
#12	83		136		

dc-180.cht

AVG = 65 fpm



AVG = 130

Overall test average = 97 fpm

SIERRA INSTRUMENTS, INC.

5 Harris Court
Monterey, CA 93940

Outside CA (800) 866-0200
Inside CA (408) 373-0200

Telex: 337795 CVBS CARV
FAX (408) 373-4402

CERTIFICATE OF CALIBRATION
VELOCITY/TEMPERATURE

(Calibrated in Sierra Instruments' Calibration Lab)

I HEREBY CERTIFY THAT SIERRA INSTRUMENTS, PART NUMBER 631-HT2,

SERIAL NUMBER(S) 12161 SUPPLIED TO ADVANCED TECHNOLOGY SYSTEMS

ON PURCHASE ORDER NUMBER 1046 WAS MANUFACTURED IN ACCORDANCE WITH ALL THE TERMS AND SPECIFICATIONS OF THE PURCHASE ORDER REFERENCED TO THE ABOVE. I FURTHER CERTIFY THAT THIS INSTRUMENT HAS AN ACCURACY OF ±2.5OF READING & ±2%, FULL SCALE AND THAT ALL STANDARDS USED TO CALIBRATE VELOCITY METERS OR SYSTEMS BY SIERRA INSTRUMENTS ARE TRACEABLE TO NATIONAL BUREAU OF STANDARDS TESTS AND CALIBRATIONS. TEMPERATURE IS TRACEABLE TO ASTM #50F. THE ACURACY OF THIS INSTRUMENT IS WITHIN STATED SPECIFICATIONS.

JAIME PEREZ

CAL. LAB. MGR. SIGNATURE

MARCH 06, 1995
DATE

APPLICABLE NBS TEST NUMBER FOR AIR VELOCITY: TN235890
7750608

APPLICABLE ASTM #50F FOR TEMPERATURE

BUCK

A. P. BUCK, INC.

Unit #1

CERTIFICATE OF CALIBRATION
for

MINI-BUCK™ CALIBRATOR

DATE 4-3-98

Model No. M-5 S.N. 051098

This is to certify that this unit was calibrated against National Institute of Standards & Technology (NIST) test no. IR-74-461 utilizing a 1,000 ml buret, Kimble No. 17801 or 4,000 ml buret, Kimble No. 001 with an electronic digital stop watch S.N. 0996605 or 0996607 which is also NIST traceable in compliance to MIL-STD-45662-A.

Calibration was conducted with A.P. Buck Calibration Procedure APB-1 rev. 5.0 at 25°C with a constant flow pump using the soap film technique. This calibration was found to meet the accuracy and repeatability of ± 0.5% of any display reading as described under the instruction manual "Principles of Operation", and guaranteed by A.P. Buck, Inc.

An annual verification of calibration is recommended.

Chandrika Panchal
Calibrated By

Al Buck
Approved By

7101 Presidents Drive • Suite 110 • Orlando, Florida 32809

BUCK

A. P. BUCK, INC.

Unit #2

VERIFICATION OF CALIBRATION

FOR

MINI-BUCK™ CALIBRATOR

DATE: August 17, 95

MODEL NO. M-5 S.N. 4094B

This is to certify that this unit was calibrated against National Institute of Standards & Technology (NIST) test no. IR-74-461 utilizing a 1,000 ml buret, Kimble No. 17801 or 4,000 ml buret, Kimble No. 001 with an electronic digital stop watch S.N. 084150 or 072283 which is also NIST traceable in compliance to MIL-STD-45662-A.

Calibration was conducted with A.P. Buck Calibration Procedure APB-1 Rev. 5.0 at 25°C with a constant flow pump using the soap film technique.

This calibrator as received at A.P. Buck, Inc.'s facility is *in* ~~*not in**~~ specification.
(circle one)

*Out of specification by *High* 1 % *Low* — %

As returned to User this date, the Calibrator meets the original Specification of ± 0.5% of any display as described in the instruction manual "Principles of Operation".

An annual verification of calibration is recommended.

Tony V. Gibbs, SR
Calibrated by

Al Buck
Al Buck, CIH (retired)

ADVANCED TECHNOLOGY SYSTEMS, INC.
AIR QUALITY ENGINEERING
ANALYTICAL REPORTING FORM

CLIENT USS - Clairton Works
PLANT LOCATION Clairton, PA
PROJECT NUMBER 423
UNIT TESTED 1ST AND 2ND Unit - Pulverizer Buildings

TEST DATE 4/10/96
DATE RECEIVED 4/10/96
DATE ANALYZED 4/11/96
ANALYTICAL METHOD Gravimetric Method

Test Number	Filter ID Number	Component	Cyclone Weight Units ( )	Filter Weight Units (g)	Soluble Portion of Front Half H20 Rinse Units ( )	Soluble Portion of Front Half Acetone Rinse Units ( )	Soluble Portion of Back Half H20 Rinse Units ( )	Soluble Portion of Back Half Acetone Rinse Units ( )	0.22 μm Filter Insoluble Portion of Back Half H20 Rinse Units ( )
1ST Unit Primary Pulv.	28	Particulate		0.00014					
1ST Unit Secondary Pulv.	32	Particulate		0.00012					
2ND Unit Primary Pulv.	30	Particulate		0.00011					

Analyst's Signature Patricia J. Stockton
Date 4/11/96
Comments

AQEFORM.95

USS CLAIRTON WORKS - CLAIRTON, PENNSYLVANIA
MEASUREMENT OF RESPIRABLE DUST CONCENTRATIONS AND EMISSION RATES
FROM THE COAL PULVERIZER BUILDINGS

1st UNIT - PRIMARY PULVERIZER
TEST DATE: APRIL 10, 1996
TEST TIMES: 1021 - 1151 EDT

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONCENTRATION (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sq ft)	VOLUMETRIC FLOW RATE (cf/min)	RESPIRABLE DUST EMISSION RATE (lb/hr)
MAIN FLOOR EAST WINDOW #2	0.00014	153.1	0.91	311			
TOTAL					28.23	8779.5	0.030

1st UNIT - SECONDARY PULVERIZER
TEST DATE: APRIL 10, 1996
TEST TIMES: 1131 - 1301 EDT

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONCENTRATION (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sq ft)	VOLUMETRIC FLOW RATE (cf/min)	RESPIRABLE DUST EMISSION RATE (lb/hr)
THIRD FLOOR SOUTH WINDOW #1	0.00012	152.8	0.79	159			
TOTAL					36.08	5736.7	0.017

USS CLAIRTON WORKS - CLAIRTON, PENNSYLVANIA
MEASUREMENT OF RESPIRABLE DUST CONCENTRATIONS AND EMISSION RATES
FROM THE COAL PULVERIZER BUILDINGS

2nd UNIT - PRIMARY PULVERIZER
TEST DATE: APRIL 10, 1996
TEST TIMES: 1336 - 1506 EDT

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONCENTRATION (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sq ft)	VOLUMETRIC FLOW RATE (cf/min)	RESPIRABLE DUST EMISSION RATE (lb/hr)
THIRD FLOOR SOUTH WINDOW #1	0.00011	155.7	0.71	97			
TOTAL					11.25	1091.3	0.003

2nd UNIT - SECONDARY PULVERIZER
TEST DATE: NOT TESTED
TEST TIMES:

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONCENTRATION (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sq ft)	VOLUMETRIC FLOW RATE (cf/min)	RESPIRABLE DUST EMISSION RATE (lb/hr)
TOP FLOOR WEST WINDOW	NA	NA	NA	NA			
TOTAL					NA	NA	NA

RJ LeeGroup, Inc.

350 Hochberg Road • Monroeville, PA 15146
412/325-1776 • FAX 412/733-1799

April 30, 1996

Mr. Patrick J. Stockton
Advanced Technology Systems, Inc.
3000 Tech Center Drive
Monroeville, PA 15146

RE: Results from CCSEM Analysis
RJ Lee Group Project No. ESH604065
ATS Purchase Order No.1799; ATS Project No. CLR 423

Dear Pat:

Enclosed you will find the analytical results for the three 37 mm polyvinyl chloride (PVC) filters that we received on April 11, 1996. The samples were identified as Filter #28, Filter #30 and Filter #32 and were assigned RJ Lee Group Sample Nos. 608850, 608851 and 608852, respectively.

The samples were prepared by liberating the particulate matter from the PVC filter utilizing ultrasonic techniques. The particles were then deposited onto a polycarbonate (PC) filter using our standard techniques and analyzed by CCSEM (computer-controlled scanning electron microscopy).

Attached to this report are four tables for each sample. The first table reports the relative abundance of the various particle species detected during the analysis. Tables II through IV summarize the size (number), mass and aerodynamic mass distributions. The size and mass distributions are based on the average measured physical diameter whereas the aerodynamic mass distribution is based on calculated aerodynamic equivalent diameter.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples associated with this report, RJ Lee Group will store them for a period of thirty (30) days before discarding.

If you have any questions or feel that I may be of further assistance, please do not hesitate to contact me.

Sincerely,

Steve Schlaegle

Steven F. Schlaegle
Project Manager
Environmental Services

SFS:dls
Attachments

lient_Name ATS
lient_Number #28
oject_Number ESH604065
mple_Number 608850

g	Fields	Grid
0	32.9904	3.473
0	4.9504	0.579

asses	#	Number %	Wt %
-rich	437	88.35	64.09
/S-rich	43	4.57	15.98
-rich	17	1.58	4.32
-rich	41	1.61	6.46
i/Al-rich	34	2.82	3.84
i/Mg-rich	5	0.27	1.29
-rich	9	0.53	0.74
isc.	8	0.01	2.06
/Ca-rich	3	0.00	0.77
e/Cr-rich	3	0.26	0.45
otals	600	100.00	100.00

Table I

ize Distribution by Average Diameter (microns)

		0.2 -	1.0 -	2.5 -	5.0 -	10.0 -	20.0 -	50.0 -
asses	Number %	1.0	2.5	5.0	10.0	20.0	50.0	100.0
-rich	88.3	75.8	21.3	2.1	0.7	0.1	0.0	0.0
/S-rich	4.6	99.2	0.0	0.0	0.2	0.5	0.1	0.0
-rich	1.6	0.0	66.2	33.1	0.6	0.1	0.0	0.0
-rich	1.6	16.3	65.1	16.3	1.7	0.7	0.0	0.0
i/Al-rich	2.8	61.9	37.1	0.0	0.4	0.5	0.0	0.0
i/Mg-rich	0.3	0.0	0.0	98.4	0.8	0.8	0.0	0.0
-rich	0.5	0.0	98.6	0.0	1.2	0.2	0.0	0.0
isc.	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0
/Ca-rich	0.0	0.0	0.0	0.0	66.7	0.0	33.3	0.0
e/Cr-rich	0.3	0.0	99.2	0.0	0.4	0.4	0.0	0.0
otals	100.0	73.5	22.8	2.9	0.7	0.1	0.0	0.0

Table II

ass Distribution by Average Diameter (microns)

		0.2 -	1.0 -	2.5 -	5.0 -	10.0 -	20.0 -	50.0 -
lasses	Mass %	1.0	2.5	5.0	10.0	20.0	50.0	100.0
-rich	64.1	1.5	6.9	4.8	11.4	18.4	39.1	17.8
/S-rich	16.0	0.2	0.0	0.0	2.4	38.6	58.7	0.0
-rich	4.3	0.0	20.4	52.3	14.0	13.3	0.0	0.0
-rich	6.5	0.1	6.5	4.1	43.6	45.7	0.0	0.0
i/Al-rich	3.8	1.8	9.8	0.0	20.6	67.8	0.0	0.0
i/Mg-rich	1.3	0.0	0.0	60.9	11.3	27.8	0.0	0.0
-rich	0.7	0.0	25.5	0.0	44.7	29.9	0.0	0.0
isc.	2.1	0.0	0.0	0.0	22.2	77.8	0.0	0.0
/Ca-rich	0.8	0.0	0.0	0.0	15.3	0.0	84.7	0.0
e/Cr-rich	0.5	0.0	20.8	0.0	21.4	57.9	0.0	0.0
otals	100.0	1.1	6.4	6.4	13.0	26.5	35.1	11.4

Table III

erodynamic Mass Distribution by Aerodynamic Diameter (microns)

		0.2 -	1.0 -	2.5 -	5.0 -	10.0 -	20.0 -	50.0 -
lasses	Mass %	1.0	2.5	5.0	10.0	20.0	50.0	100.0
-rich	64.1	1.2	6.2	6.0	9.6	16.0	34.7	26.4
/S-rich	16.0	0.2	0.0	0.0	1.1	27.9	70.7	0.0
a-rich	4.3	0.0	4.7	67.9	1.2	26.1	0.0	0.0
e-rich	6.5	0.1	6.5	4.1	0.0	69.3	20.0	0.0
Si/Al-rich	3.8	0.3	6.6	4.8	1.2	71.6	15.6	0.0
Si/Mg-rich	1.3	0.0	0.0	60.9	0.0	39.1	0.0	0.0
i-rich	0.7	0.0	25.5	0.0	11.1	63.4	0.0	0.0
isc.	2.1	0.0	0.0	0.0	0.0	72.7	27.3	0.0
s/Ca-rich	0.8	0.0	0.0	0.0	0.0	15.3	84.7	0.0
Fe/Cr-rich	0.5	0.0	20.8	0.0	0.0	79.2	0.0	0.0
Totals	100.0	0.8	5.1	8.0	6.5	26.0	36.6	16.9

Table IV

lient_Name ATS
lient_Number #32
oject_Number ESH604065
ample_Number 608852

ag	Fields	Grid
00	6.5083	3.473
00	1.0593	0.579

lasses	#	Number %	Wt %
-rich	557	96.51	90.88
i/Al-rich	15	1.27	3.19
/S-rich	17	0.65	4.82
e-rich	5	1.25	0.30
/Ca-rich	2	0.00	0.42
i-rich	1	0.31	0.02
a-rich	1	0.00	0.17
i/Mg-rich	1	0.00	0.09
e/Cr-rich	1	0.00	0.10
otals	600	100.00	100.00

Table I

ize Distribution by Average Diameter (microns)

lasses	Number %	0.2 - 1.0	1.0 - 2.5	2.5 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 50.0	50.0 - 100.0
-rich	96.5	46.0	42.9	8.8	2.3	0.1	0.0	0.0
i/Al-rich	1.3	0.0	74.1	24.7	1.0	0.2	0.0	0.0
/S-rich	0.6	48.4	0.0	48.4	1.1	1.7	0.4	0.0
e-rich	1.3	49.9	49.9	0.0	0.1	0.0	0.0	0.0
/Ca-rich	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0
i-rich	0.3	0.0	100.0	0.0	0.0	0.0	0.0	0.0
a-rich	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
i/Mg-rich	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
e/Cr-rich	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
otals	100.0	45.4	43.2	9.1	2.2	0.1	0.0	0.0

Table II

ass Distribution by Average Diameter (microns)

lasses	Mass %	0.2 - 1.0	1.0 - 2.5	2.5 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 50.0	50.0 - 100.0
-rich	90.9	0.8	13.2	23.5	49.6	9.5	3.4	0.0
i/Al-rich	3.2	0.0	5.4	59.6	24.6	10.4	0.0	0.0
/S-rich	4.8	0.6	0.0	7.9	6.9	44.6	40.1	0.0
e-rich	0.3	7.8	57.0	0.0	35.2	0.0	0.0	0.0
/Ca-rich	0.4	0.0	0.0	0.0	1.7	98.3	0.0	0.0
i-rich	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
a-rich	0.2	0.0	0.0	0.0	0.0	100.0	0.0	0.0
i/Mg-rich	0.1	0.0	0.0	0.0	100.0	0.0	0.0	0.0
e/Cr-rich	0.1	0.0	0.0	0.0	100.0	0.0	0.0	0.0
otals	100.0	0.8	12.4	23.7	46.5	11.7	5.1	0.0

Table III

erodynamic Mass Distribution by Aerodynamic Diameter (microns)

lasses	Mass %	0.2 - 1.0	1.0 - 2.5	2.5 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 50.0	50.0 - 100.0
-rich	90.9	0.6	10.4	26.5	46.4	12.1	4.0	0.0
i/Al-rich	3.2	0.0	5.4	0.0	62.5	32.1	0.0	0.0
/S-rich	4.8	0.0	0.6	7.9	3.4	23.0	65.1	0.0
e-rich	0.3	2.2	62.6	0.0	0.0	35.2	0.0	0.0
/Ca-rich	0.4	0.0	0.0	0.0	1.7	98.3	0.0	0.0
i-rich	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
a-rich	0.2	0.0	0.0	0.0	0.0	100.0	0.0	0.0
i/Mg-rich	0.1	0.0	0.0	0.0	0.0	100.0	0.0	0.0
e/Cr-rich	0.1	0.0	0.0	0.0	0.0	100.0	0.0	0.0
otals	100.0	0.6	9.8	24.5	44.4	14.0	6.8	0.0

Table IV

.ient_Name ATS
.ient_Number #30
-oject_Number ESH604065
ample_Number 608851

ag	Fields	Grid
)0	9.4059	3.473
)0	1.1260	0.579

.asses	#	Number %	Wt %
-rich	562	99.05	92.09
i/Al-rich	16	0.63	1.55
/S-rich	13	0.01	2.73
i-rich	3	0.00	2.93
e-rich	1	0.31	0.02
isc.	4	0.00	0.20
a-rich	1	0.00	0.48
otals	600	100.00	100.00

Table I

ize Distribution by Average Diameter (microns)

		0.2 -	1.0 -	2.5 -	5.0 -	10.0 -	20.0 -	50.0 -
lasses	Number %	1.0	2.5	5.0	10.0	20.0	50.0	100.0
-rich	99.0	56.2	31.5	11.1	1.1	0.1	0.0	0.0
i/Al-rich	0.6	48.9	48.9	0.0	1.5	0.8	0.0	0.0
/S-rich	0.0	0.0	0.0	0.0	23.1	69.2	7.7	0.0
i-rich	0.0	0.0	0.0	0.0	33.3	33.3	33.3	0.0
e-rich	0.3	0.0	100.0	0.0	0.0	0.0	0.0	0.0
isc.	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0
a-rich	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
otals	100.0	56.0	31.8	11.0	1.1	0.1	0.0	0.0

Table II

.ass Distribution by Average Diameter (microns)

		0.2 -	1.0 -	2.5 -	5.0 -	10.0 -	20.0 -	50.0 -
lasses	Mass %	1.0	2.5	5.0	10.0	20.0	50.0	100.0
-rich	92.1	1.2	9.5	46.6	23.9	11.6	7.3	0.0
i/Al-rich	1.6	0.6	9.4	0.0	39.1	50.9	0.0	0.0
/S-rich	2.7	0.0	0.0	0.0	5.1	53.7	41.2	0.0
i-rich	2.9	0.0	0.0	0.0	2.1	4.5	93.4	0.0
e-rich	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
.isc.	0.2	0.0	0.0	0.0	43.1	56.9	0.0	0.0
a-rich	0.5	0.0	0.0	0.0	0.0	100.0	0.0	0.0
otals	100.0	1.1	8.9	42.9	22.9	13.7	10.6	0.0

Table III

erodynamic Mass Distribution by Aerodynamic Diameter (microns)

		0.2 -	1.0 -	2.5 -	5.0 -	10.0 -	20.0 -	50.0 -
lasses	Mass %	1.0	2.5	5.0	10.0	20.0	50.0	100.0
-rich	92.1	0.9	8.7	36.6	33.2	12.4	8.3	0.0
i/Al-rich	1.6	0.6	9.4	0.0	9.6	80.4	0.0	0.0
/S-rich	2.7	0.0	0.0	0.0	2.7	48.3	49.0	0.0
i-rich	2.9	0.0	0.0	0.0	0.0	6.6	93.4	0.0
Fe-rich	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Misc.	0.2	0.0	0.0	0.0	0.0	100.0	0.0	0.0
a-rich	0.5	0.0	0.0	0.0	0.0	0.0	100.0	0.0
otals	100.0	0.8	8.1	33.7	30.8	14.4	12.2	0.0

Table IV

ATS

ADVANCED TECHNOLOGY SYSTEMS, INC.
3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146-3055
(412) 829-2208

CHAIN OF CUSTODY RECORD

PROJECT NUMBER 423
PROJECT NAME CLR
ANALYTICAL LAB R.J. LEE GROUP, INC.
DELIVER TO STEVE Schaegle
COMMENTS

ANALYSES TO BE CONDUCTED: CCSEM Analysis

SAMPLE IDENTIFICATION NUMBER	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	NUMBER OF CONTAINERS	COMPOSITE OR GRAB	REMARKS OR OBSERVATIONS
Filter #28	4/10/96		1	C	1st Unit Primary Pulverizer
Filter #32	↓		1	C	1st Unit Secondary Pulverizer
Filter #30	↓		1	C	2nd Unit Primary Pulverizer
					JPB/

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
Patricia J. Stratton	4/11/96	1415			

ICE CHEST #
CHEST TEMP.
TAG #

PAGE 1 OF 1

ATS 1/95

1994 Test

USS-CLAIRTON WORKS
PM-10
COAL HANDLING

FIRST UNIT PRIMARY PULVERIZER

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONC. (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sqft)	VOLUMETRIC FLOW RATE (cf/min)	EMISSION RATE (lb/hr)	Standard* Limit (lb/hr)
THIRD FLOOR N.E. WINDOW	0.00098	307.5	3.19	149.0				
FOURTH FLOOR WEST WINDOW	0.00083	310.4	2.67	331.9				
FOURTH FLOOR EAST WINDOW	0.00120	312.0	3.85	207.0				
AVERAGE			3.24	229.3				
TOTAL					38	8713.4	0.11	0.26

* based on 8439 ton coal/day pulverized

USS-CLAIRTON WORKS
PM-10
COAL HANDLING

FIRST UNIT SECONDARY PULVERIZER

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONC. (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sqft)	VOLUMETRIC FLOW RATE (cf/min)	EMISSION RATE (lb/hr)	Standard* Limit (lb/hr)
THIRD FLOOR S.W. WINDOW	0	301.7	0.00	111.5				
FOURTH FLOOR NORTH WINDOW	0.0004	304.1	1.32	139.3				
FOURTH FLOOR WEST WINDOW #1 (SOUTH TO NORTH)	0.00035	303.9	1.15	118.8				
AVERAGE			0.82	123.2				
TOTAL					68.9	8488.48	0.03	0.17

*based on ~~2366~~ ~~3366~~ 3480 ton coal/day pulverized

USS-CLAIRTON WORKS
PM-10
COAL HANDLING

SECOND UNIT PRIMARY PULVERIZER

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONC. (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sqft)	VOLUMETRIC FLOW RATE (cf/min)	EMISSION RATE (lb/hr)	Standard* Limit (lb/hr)
SECOND FLOOR S.W. WINDOW	0.00003	311.7	0.10	104				
THIRD FLOOR S.E. WINDOW	0.00012	305.8	0.39	148.3				
THIRD FLOOR S.W. WINDOW	0.00013	304.2	0.43	101.1				
AVERAGE			0.31	117.8				
TOTAL					178.7	21050.86	0.02	0.25

* based on 5064 ton coal/day pulverized

USS-CLAIRTON WORKS
PM-10
COAL HANDLING

SECOND UNIT SECONDARY PULVERIZER

SITE NAME	RESPIRABLE DUST COLLECTED (g)	AIR VOLUME SAMPLED (L)	RESPIRABLE DUST CONC. (mg/m3)	AVERAGE AIR VELOCITY (fpm)	OPENING AREA FOR OUTWARD AIR FLOW (sqft)	VOLUMETRIC FLOW RATE (cf/min)	EMISSION RATE (lb/hr)	Standard* Limit (lb/hr)
SECOND FLOOR S.E. WINDOW	0.00007	308.9	0.23	151.2				
SECOND FLOOR S.W. WINDOW	0.00009	306	0.29	191.7				
FOURTH FLOOR EAST WINDOW	0.00018	306.3	0.59	168				
AVERAGE			0.37	170.3				
TOTAL					37.6	6403.28	0.01	0.51

* based on 7791 ton coal/day pulverized