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.

AP42 Section:	11.18
Reference:	10
Title:	*Particulate, Sulfur Dioxide, And Fluoride Emissions From Mineral Wool Emission, With Varying Charge Compositions, American Rockwool, Inc. Spring Hope, NC, 27882,* J. V. Apicella, Alumina Company Of America, Alcoa Center, PA, June 1988.

6/

Emission Test Report Review Checklist

Reviewer: Brian Shrager
Review Date: April 22, 1992

A. Background Information

1. Facility name: American Rockwool, Inc.

   Location: Spring Hope, NC

2. Source category: Mineral Wool Production

3. Test date: May 17-19, 1988

4. Test sponsor: American Rockwool, Inc.

5. Testing contractor: ALCOA

6. Purpose of test: To determine emission rates for PM, SO_2, and Fluorides.

7. Pollutants measured

   (PM) PM-10 CO (SO_2) NO_x VOC Pb (CO_2)

   Others (list): Fluorides

8. Process overview: On an attached page provide a block diagram of the unit operations and associated air pollution control systems at the facility. Identify process tested with letters from the beginning of the alphabet (A, B, C, etc.) and APC systems with letters from end of alphabet (V, W, X, etc.). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from that sketch complete the table below that identifies processes or unit operations tested.

Test ID	Process	Process ID	Emissions tested		APCD (controlled emissions only)
			Uncontrolled	Controlled	
1	Cupola (Charge #1)	A	✓	✓	Baghouse
2	Cupola (Charge #2)	B	✓	✓	Baghouse
3	Cupola (Charge #3)	C	✓	✓	Baghouse

B. Process Information

1. Provide a brief narrative description of the process. With as much detail as possible, (e.g., if a furnace or conveyor system is used, identify the type of unit) describe the equipment used for those operations tested. (Note: If process description provided in test report is adequate, attach copy or reproduce here.)

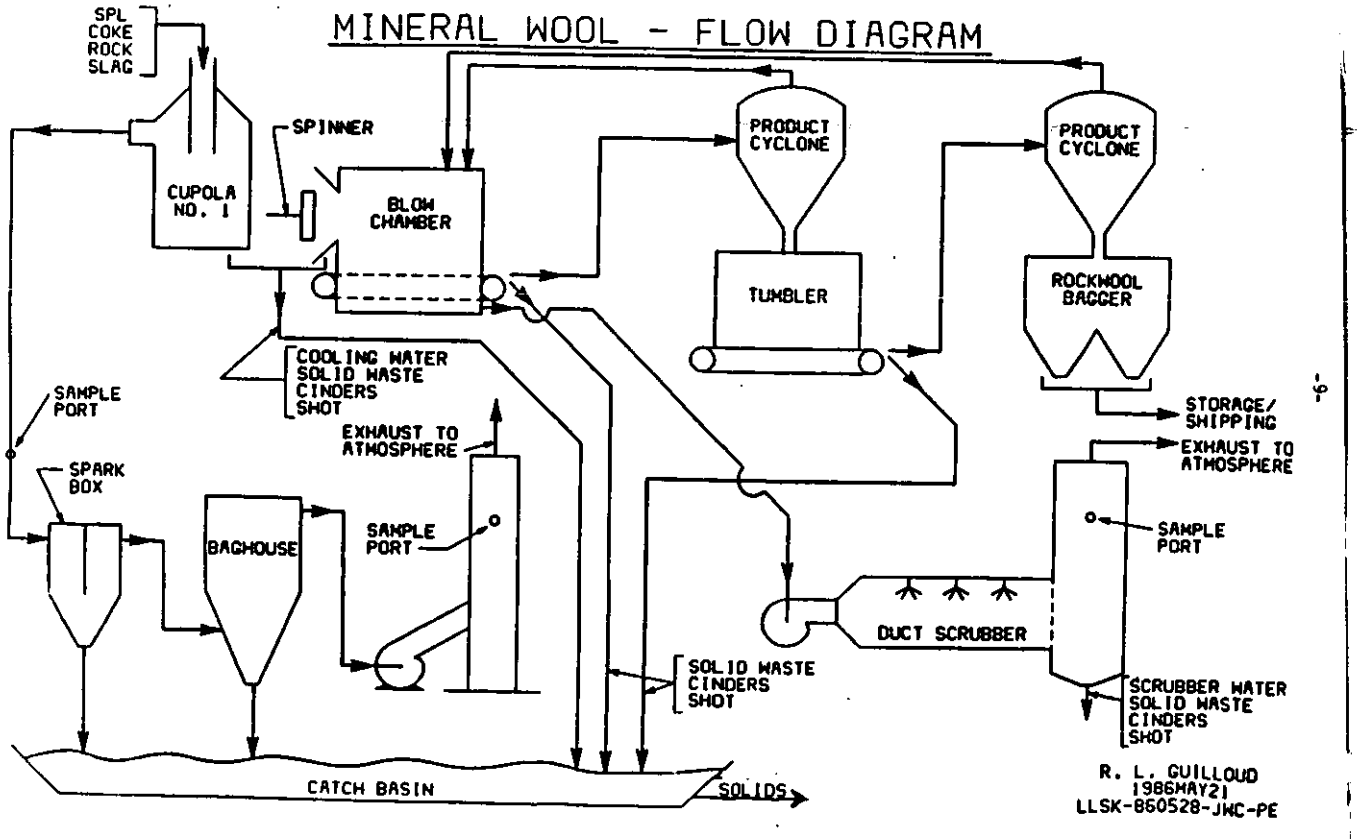
Figure 1 shows how mineral wool is produced at the Spring Hope plant of American Rockwool, Inc. A cupola is used to melt a combination of rock and slag. The molten product which exits the bottom of the cupola is directed onto a horizontal axis spinning disc. The resultant fibers are then collected in a blow chamber where oil is used to control dust. The fibers pass through a tumbler to remove unwanted particles, then to a bagger.

Large, spherical particles (shot), produced by the spinning head, are conveyed to a pit under the cupola using a small flow of water. Occasionally unwanted slag is tapped from the bottom of the cupola directly into the pit containing the "shot".

Emissions from the cupola are controlled by a spark box and baghouse. All air from the material collection and handling portions of the operation is scrubbed by a water spray system.

The plant utilizes two cupolas each equipped with its own fume control system. After being collected by the fume control system, the gases are passed through their respective spark box and baghouse. After exiting the baghouse the gas streams are combined into a common stack before being emitted to the atmosphere.

FIGURE 1



2. For each process tested list feedstock materials and products. Indicate if activity factors are for feed (F) rate or product (P) rate.

Process ID	Feedstock materials	Products	Basis for activity factor	F/P
A	Coke, Slag, Rock	Mineral Wool	Feed	F
B	SPL, Coke, Slag, Rock	Mineral Wool	Feed	F
C	SPL, Lime, Coke, Slag, Rock	Mineral Wool	Feed	F

Basis for data: Pg. 2
(Indicate page/table Nos. in test report)

3. For each process or operation tested and each test run note process capacity and operating rate during test.

Process ID	Capacity	Units	Test run	Process rate	Units
A			1	12.54	tons feed/hr
			2		
			3		
			4		
B			1	12.48	tons feed/hr
			2		
			3		
			4		
C			1	11.52	tons feed/hr
			2		
			3		
			4		
			1		
			2		
			3		
			4		

Basis for data: Pg. 2

C. Air Pollution Control Systems Tested

1. For each air pollution control system pollution control system identified in A.8, note the following

ID	Type of APCD	Manufacturer	Model No.
2	Baghouse		

Note: Be as specific as possible in identifying APCD. For example, indicate "pulse jet fabric filter" rather than simply "fabric filter."

2. For each system identified above, provide a narrative description. For fugitive systems describe capture techniques as well as the removal techniques (use a separate page if necessary)

3. Using the attached parameter list for guidance complete the table below. (Use additional pages as needed.)

APCD ID	Parameter	Units	Readings			
			Run 1	Run 2	Run 3	Run 4
Z						
Type of APCD: Baghouse						
Type of APCD:						
Type of APCD:						

D. Sampling and Analysis Methods

1. Complete the following table

Test location	Pollutant	S & A method	Reference/ conditional method	Deviations noted
1,2,3	Fluorides	ALCOA Method 4075A	Y/N	Y/N
	PM	" " 4075A	Y/N	Y/N
	SO_2	Gas chromatography	Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
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			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N

2. If a method used was not a reference or conditional method, provide a narrative discussion including any data manipulation needed to make results correspond to reference or conditional method results.

Fluoride Emissions

Fluoride Emissions were determined using Alcoa Method 4075A (approved by the State of North Carolina and Federal EPA) in conjunction with the necessary Federal Methods (1 through 4) to obtain isokinetic sampling for total particulate and gaseous fluoride. The method requires a cellulose thimble to remove particulate fluoride and ice cooled impingers of 1.0N sodium hydroxide for scrubbing gaseous fluoride (see Figure 3).

Particulate Emissions

Particulate emissions were determined from the front half of the Method 4075A sampling train. Total particulate was collected by the cellulose thimble which had been tared before use.

Sulfur Dioxide Emissions

Sulfur dioxide emissions were determined by gas chromatography and flame photometric detection (GC-FPD). The sampling method paralleled EPA Method 15. The stack gas was drawn through a teflon probe into a glass sample bulb. They were heated or insulated as necessary to prevent condensation in the sample line and bulb. After drawing ten times the bulb's volume through the bulb (a purge to insure only the stack gas is present) it was immediately taken to the GC-FPD for analysis.

3. Describe any deviations identified above.

E. Emission Data Documentation

1. Tabulate the following stack gas data from the test report. (Use additional pages as needed.)

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	°F	103	111	111	
	Moisture	% BY VOL	2.8	2.9	3.3	
	Oxygen	% BY VOL	18	18	18	
	Volumetric flow, actual	ACFM	41500	43516	44541	
	Volumetric flow, standard	DSCFM	30019	38947	39723	
	Percent isokinetic		101.4	101.1	102.5	
	Pollutant concentration:					
	CO_2	% BY VOL	2	1.5	1.5	
2	Stack temperature	°F	93	101	106	107
	Moisture	% BY VOL	2.6	2.8	3.0	2.5
	Oxygen	% BY VOL	18	18	18.5	19.5
	Volumetric flow, actual	ACFM	38,859	41,536	39,927	43,313
	Volumetric flow, standard	DSCFM	35,997	37,813	35,985	39,161
	Percent isokinetic		100.3	100.7	101.5	99.8
	Pollutant concentration:					
	CO_2	% BY VOL	1	1	1	1.5
3	Stack temperature	°F	95	94		
	Moisture	% BY VOL	2.5	2.8		
	Oxygen	% BY VOL	19	18		
	Volumetric flow, actual	ACFM	41117	39,717		
	Volumetric flow, standard	DSCFM	38,129	36,781		
	Percent isokinetic		99.8	100.7		
	Pollutant concentration:					
	CO_2	% BY VOL.	1.5	1		

2. Tabulate pollutant mass flux rates

Test ID	Pollutant	Units	Mass flux rates			
			Run 1	Run 2	Run 3	Run 4
1	PM	lb/hr	1.44	1.38	0.87	
	Gaseous Fluoride	lb/hr	0.16	0.63	0.64	
	Part. Fluoride	lb/hr	0.24	0.26	0.26	
	Total Fluoride	lb/hr	0.39	0.90	0.90	
	SO_2	lb/hr	111.8	109.9	92.3	
	*CO_2	lb/hr	4215	4101	4183	
2	PM	lb/hr	0.98	1.89	2.09	2.37
	Gaseous Fluoride	lb/hr	1.70	6.20	11.44	8.80
	Part. Fluoride	lb/hr	0.66	0.85	0.80	0.91
	Total Fluoride	lb/hr	2.36	7.05	12.25	9.71
	SO_2	lb/hr	89.3	101.4	96.9	93.0
	*CO_2	lb/hr	2527	2654	2526	4124
3	PM	lb/hr	1.74	1.82		
	Gaseous Fluoride	lb/hr	3.47	4.96		
	Part. Fluoride	lb/hr	0.84	0.93		
	Total Fluoride	lb/hr	4.31	5.88		
	SO_2	lb/hr	47.1	67.1		
	*CO_2	lb/hr	4015	2582		

* CO_2 % BY VOL × DSCFM × .1170 $lb/_{CF}$ × 60 MIN/HR = LB/HR

REF. Pg. 7,8

3. **Present example emission factor calculations below.**

Process C

CO_2 $\frac{(4015+2582)}{2}$ lb/hr ÷ 5.76 tons/hr = 572.7 lb/ton feed

4. Tabulate emission factors

Process	Pollutant	Units	Average emission factor	
			Uncontrolled	Controlled
A	PM	lb/ton feed		0.098*
	Gaseous Fluoride	lb/ton feed	0.038	
	Part. Fluoride	lb/ton feed		0.202
	Total Fluoride	lb/ton feed	0.058	
	SO_2	lb/ton feed	8.35	
	CO_2	lb/ton feed	332.3	
B	PM	lb/ton feed		0.147*
	Gaseous Fluoride	lb/ton feed	0.565	
	Part. Fluoride	lb/ton feed		0.0645
	Total Fluoride	lb/ton feed	0.63	
	SO_2	lb/ton feed	7.63	
	CO_2	lb/ton feed	237.0	
C	PM	lb/ton feed		0.155*
	Gaseous Fluoride	lb/ton feed	0.366	
	Part. Fluoride	lb/ton feed		0.077
	Total Fluoride	lb/ton feed	0.443	
	SO_2	lb/ton feed	4.96	
	CO_2	lb/ton feed	286.4	

* PARTICULATE TEST IS INSUFFICIENT TO DETERMINE COMPLIANCE.

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RECEIVED
JUN 20 1988
RALEIGH REGIONAL OFFICE

PARTICULATE, SULFUR DIOXIDE, AND FLUORIDE EMISSIONS FROM MINERAL WOOL PRODUCTION WITH VARYING CHARGE COMPOSITIONS

RECEIVED
JUL 1 1988
AIR QUALITY PERMITS

AMERICAN ROCKWOOL, INC.
SPRING HOPE, NC 27882

TEST PERIOD: 1988 MAY 17-19
PERMIT NO. 3578R7, 1988 MAY 13

BY

JAMES V. APICELLA
ENVIRONMENTAL SCIENTIST
ENVIRONMENTAL CONTROL LABORATORY
ALUMINUM COMPANY OF AMERICA
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REPORT NO. 93-88-005
1988 JUNE 14

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SUMMARY

Report Summary
Permit 3578R7 - May 13, 1988

Company: American Rockwool, Inc.
P.O. Box 880
Spring Hope, NC 27882

Source Tested and Date:
Common Baghouse Stack for Cupolas 1 and 2
1988 May 17-19

Test Crew: Aluminum Company of America's
Environmental Control Laboratory

Test Crew and Observers:

Testers	Observer
J. E. Gibb Sr. Environmental Scientist	Ken Schuster State of North Carolina Dept. of Natural Resources
L. C. Blayden Manager	Ernie Fuller State of North Carolina Dept. of Natural Resources
J. V. Apicella Environmental Scientist	
L. D. Penix Environmental Technician	

Analytical Facilities:

Particulate Analysis
Environmental Control Laboratory
Alcoa Technical Center
Alcoa Center, PA
L. D. Penix, Analyst

Method 4076A Analysis
Analytical Chemistry Division
Alcoa Technical Center
Alcoa Center, PA
S. Deiseroth, Analyst

GC-FPD Analysis
Environmental Control Laboratory
Alcoa Technical Center
Alcoa Center, PA
L. C. Blayden, Analyst

Test Objective

The emission rates for particulate matter, sulfur dioxide and fluorides were determined for the common stack serving American Rockwool's two cupolas and their baghouses. Emissions were determined for three different charges or conditions. The conditions correspond to Item 16 of Air Permit No. 3578R7. The approximate consist of each charge is listed in Table 1.

TABLE 1

Average Charge Makeup Per Cupola

Charge (lb)	1988 May 17 Condition A	1988 May 18 Condition B	1988 May 19 Condition D
SPL*	0	210	450
Lime	0	0	50
Coke	385	260	140
Duquesne Slag	1300	1300	1300
Trap Rock	1100	1100	1100
Steel Slag	400	400	400
Tennessee Slag	400	400	400
Avg. # charges/hr	3.5	3.4	3.0

*SPL is an aluminum smelting cell byproduct (SCB) which is substituted for coke on a lb carbon/lb carbon basis.

Summary of Test Results

Results from the test program are summarized in Table 2.

TABLE 2

Average Total Emissions for Two Cupola Operation
Cupola/Baghouse Common Stack

Condition	Particulate Matter lb/hr Front Half*	Fluoride lb/hr	Sulfur Dioxide lb/hr
A	1.2	0.73	104.7
B	1.8	7.84	95.2
D	1.8	5.10	57.1

*Method 4075A does not account for particulate matter captured in the back half of the impinger train.

PROCESS DESCRIPTION

Figure 1 shows how mineral wool is produced at the Spring Hope plant of American Rockwool, Inc. A cupola is used to melt a combination of rock and slag. The molten product which exits the bottom of the cupola is directed onto a horizontal axis spinning disc. The resultant fibers are then collected in a blow chamber where oil is used to control dust. The fibers pass through a tumbler to remove unwanted particles, then to a bagger.

Large, spherical particles (shot), produced by the spinning head, are conveyed to a pit under the cupola using a small flow of water. Occasionally unwanted slag is tapped from the bottom of the cupola directly into the pit containing the "shot".

Emissions from the cupola are controlled by a spark box and baghouse. All air from the material collection and handling portions of the operation is scrubbed by a water spray system.

The plant utilizes two cupolas each equipped with its own fume control system. After being collected by the fume control system, the gases are passed through their respective spark box and baghouse. After exiting the baghouse the gas streams are combined into a common stack before being emitted to the atmosphere.

SAMPLING PROCEDURES

The testing procedures followed were essentially those proposed by J. E. Gibb on 1988 January 05, reference Dr. Weeter's 1988 May 02 letter to Ken Schuster.

Sampling Location

The stack sampling location was designed 8 diameters downstream and 6 diameters upstream from the nearest disturbance. At this point in the 6 ft I.D. stack there are two 4 in. ports 90° apart. This is illustrated in Figure 2. For isokinetic sampling, six points were sampled per port at five minutes per point. For gas chromatography, a teflon probe was inserted at a point of average velocity. There was no cyclonic flow at this location.

Fluoride Emissions

Fluoride Emissions were determined using Alcoa Method 4075A (approved by the State of North Carolina and Federal EPA) in conjunction with the necessary Federal Methods (1 through 4) to obtain isokinetic sampling for total particulate and gaseous fluoride. The method requires a cellulose thimble to remove particulate fluoride and ice cooled impingers of 1.0N sodium hydroxide for scrubbing gaseous fluoride (see Figure 3).

Particulate Emissions

Particulate emissions were determined from the front half of the Method 4075A sampling train. Total particulate was collected by the cellulose thimble which had been tared before use.

Sulfur Dioxide Emissions

Sulfur dioxide emissions were determined by gas chromatography and flame photometric detection (GC-FPD). The sampling method paralleled EPA Method 15. The stack gas was drawn through a teflon probe into a glass sample bulb. They were heated or insulated as necessary to prevent condensation in the sample line and bulb. After drawing ten times the bulb's volume through the bulb (a purge to insure only the stack gas is present) it was immediately taken to the GC-FPD for analysis.

Raw Materials

Samples of Duquesne Slag, Tennessee Slag and Spent Potlining (SCB) were taken from each charge. They were accumulated in separate 55 gallon drums over the three day test period. Different types of raw materials were not stored in the same drums, nor were they allowed to mix at any time during size reduction and/or analysis. This sampling procedure yielded four drums of each type of slag and three drums of SCB. These drums were then shipped to Kennedy Van Saun for size reduction. Each drum of SCB was reduced individually according to the description below but the slags were first composited as follows: One quarter of the contents for each drum of Duquesne Slag was placed into a new drum after the contents of the original drums were thoroughly mixed. After the four drums were used to create this new composite drum, the composite drum was treated the same as the SCB. This procedure was also followed for the Tennessee Slag.

First the entire contents of the barrel are crushed to minus 3/8 inch and homogenized. From this mix forty pounds are split out and reduced to minus 40 mesh. After homogenization, thirty-five pounds are split out, reduced to minus 4 mesh and again homogenized. From this sample five pounds are split out, reduced to minus 10 mesh, once again homogenized and one quarter of a pound is reduced to minus 60 mesh. This thoroughly mixed, finely ground sample is submitted for analysis by Alcoa's Analytical Chemistry Division.

ANALYTICAL PROCEDURES

Fluoride Emissions

Alcoa's Analytical Chemistry Division (ACD) used Alcoa Method 4076A (a combination of ashing, fusion, sulfuric acid distillation and selective ion electrode) to measure particulate and gaseous fluoride.

Particulate Emissions

Particulate emissions were determined gravimetrically. Prior to testing, the Method 4075A thimbles were heated, desiccated and tared. The tare weights were recorded. After testing, the thimbles were once again heated, desiccated and weighed before being turned in for particulate fluoride analysis. Particulate emissions were determined from the net weight gain of the thimbles.

Sulfur Dioxide Emissions

Sulfur dioxide emissions were determined by injecting gas samples from the sampling bulb into the GC-FPD and comparing the results to that of known standards also injected into the GC-FPD. The calibration gas standards used covered the range in which the gas samples fell.

QUALITY CONTROL PROCEDURES

Quality control procedures were followed for all aspects of field sampling including sample preservation and holding time; reagent quality; analytical method; analyst training; and instrument cleaning, calibration and safety. These procedures are consistent with EPA guidelines documented in "Quality Assurance Manuals for Air Pollution Measurement Systems," Vol. 3, "Stationary Source Specific Methods" (EPA-600/4-77-027b).

RESULTS

An overview of the conditions for each run is shown in Table 3. Specific results for each test are shown in Table 4. Complete results, production data, raw data, calibration data and laboratory results are given in the appendices.

DISCUSSION

Item 16 Condition C of the revised permit was not evaluated as field measurements indicated fluoride emissions had already exceeded 6.0 lb/hr during Condition B.

Process

The only problem with the process during the test program was on May 19. After the second test run was complete and preparations were being made for the third, one of the cupolas began operating poorly and had to be shut down. Therefore only two test runs were completed for Condition B.

Testing

There were no testing problems or deviations to report here. All sample trains passed post-test leak checks and all tests were run isokinetically. But after completing quick field checks of the fluoride concentration (Specific Ion Electrode) for the first three test runs at Condition B, a high degree of variability in fluoride emissions was found. It was then decided to complete a fourth run at this condition to better understand the data.

Analytical

The fluoride laboratory data shows excellent spike recovery and a low blank value. The sulfur dioxide sample values were compared to values obtained from certified gas cylinders onsite. The only area where analytical uncertainty could be present is in the particulate data. The Method 4075A train uses a cellulose thimble with a very high capture efficiency.

Therefore, the back half of the train will contain insignificant amounts of particulate. But, because the thimble is made of cellulose, it has a high affinity for moisture and even under controlled conditions there will be some uncertainty in the gravimetric weight. This does not present problems when the grain loading is high but in a case like this, when the particulate weight is very small compared to the thimble weight, the net weight obtained can be in a range ±10-15% from the actual value.

Solids

There isn't any information from the solids available yet. Due to the size of the samples, extra handling and analytical work required, their analyses haven't been completed at this time. An addendum to this report will be issued in the near future as soon as all of the required data is obtained.

TABLE 3

AMERICAN ROCKWOOL
4075-A & PARTICULATE

UNIT	BOTH	BOTH	BOTH	BOTH	BOTH	BOTH	BOTH	BOTH	BOTH
DATE	88-05-17	88-05-17	88-05-17	88-05-18	88-05-18	88-05-18	88-05-18	88-05-19	88-05-19
RUN NUMBER	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9
START TIME	9:25 AM	11:30 AM	2:32 PM	9:01 AM	11:01 AM	12:52 PM	3:30 PM	9:20 AM	11:09 AM
FINISH TIME	10:28 AM	12:33 PM	3:33 PM	10:03 AM	12:02 PM	1:53 PM	4:31 PM	10:12 AM	12:09 PM
OPERATING CONDITIONS	A	A	A	B	B	B	B	D	D
GAS CONDITIONS (AVG)									
TEMPERATURE °F	103	111	111	93	101	106	107	95	94
MOISTURE (VOLUME %)	2.8	2.9	3.3	2.6	2.8	3.0	2.5	2.5	2.8
% O2 (DRY VOLUME %)	18	18	18	18	18	18.5	19.5	19	18
% CO2 (DRY VOLUME %)	2	1.5	1.5	1	1	1	1.5	1.5	1
VOLUMETRIC FLOW RATE									
ACFM	41500	43516	44541	38859	41536	39927	43313	41117	39717
DSCFM	38019	38947	39723	35997	37813	35985	39161	38129	36781
EMISSION RATES									
PARTICULATE LB/HR	1.44	1.38	0.87	0.98	1.09	2.09	2.37	1.74	1.82
GASEOUS FLUORIDE LB/HR	0.16	0.63	0.64	1.70	6.20	11.44	8.80	3.47	4.96
PART. FLUORIDE LB/HR	0.24	0.26	0.26	0.66	0.85	0.80	0.91	0.84	0.93
TOTAL FLUORIDE LB/HR	0.39	0.90	0.90	2.36	7.05	12.25	9.71	4.31	5.88
SULFER DIOXIDE LB/HR	111.8	109.9	92.3	89.3	101.4	96.9	93.0	47.1	67.1

TABLE 4

TEST RESULTS									
DATE OF TEST	88-05-17	88-05-17	88-05-17	88-05-18	88-05-18	88-05-18	88-05-18	88-05-19	88-05-19
RUN NUMBER	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9
TEST METHOD	4075-A	4075-A	4075-A	4075-A	4075-A	4075-A	4075-A	4075-A	4075-A
Vmstd	38.28	39.09	40.45	35.85	37.84	36.27	38.83	37.78	36.80
Vwstd	0.79	1.10	1.37	0.94	1.11	1.11	0.99	0.97	1.06
Bwo	0.020	0.029	0.033	0.026	0.028	0.030	0.025	0.025	0.028
Md	29.04	28.96	28.96	28.88	28.88	28.90	29.02	29.00	28.88
Ms	28.82	28.64	28.60	28.60	28.57	28.58	28.75	28.73	28.58
Vs	24.47	25.66	26.26	22.91	24.49	23.54	25.54	24.24	23.42
%ISOKINETIC	101.4	101.1	102.5	100.3	100.7	101.5	99.8	99.8	100.7
ACFM	41500	43516	44541	38859	41536	39927	43313	41117	39717
DSCFM	38019	38947	39723	35997	37813	35985	39161	38129	36781
gr/dscf	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
PARTICULATE LB/HR	1.44	1.38	0.87	0.98	1.99	2.09	2.37	1.74	1.82
GASEOUS FLUORIDE LB/HR	0.16	0.63	0.64	1.70	6.20	11.44	8.80	3.47	4.96
PART FLUORIDE LB/HR	0.24	0.26	0.26	0.66	0.85	0.80	0.91	0.84	0.93
TOTAL FLUORIDE LB/HR	0.39	0.90	0.90	2.36	7.05	12.25	9.71	4.31	5.88

FIGURE 1

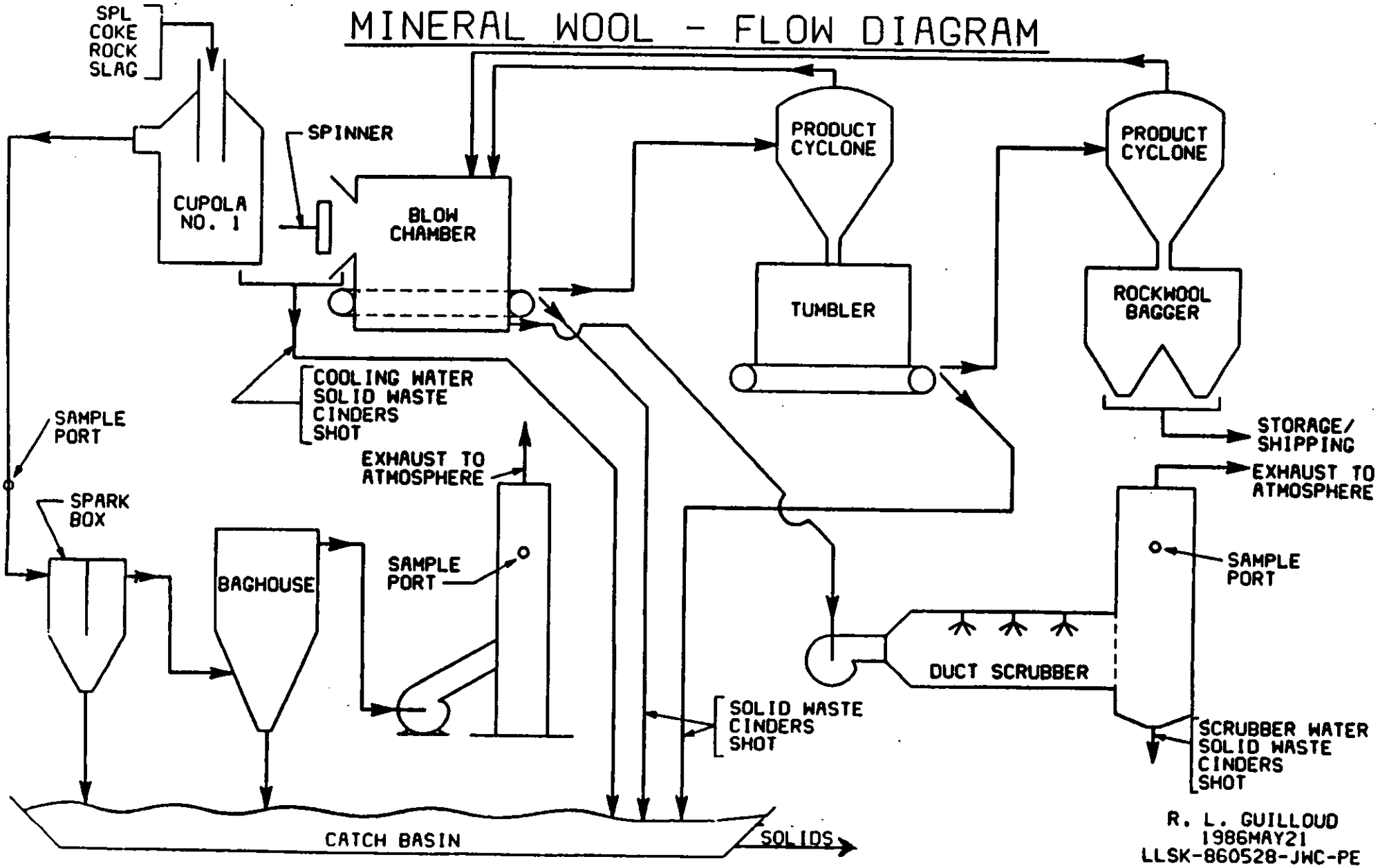
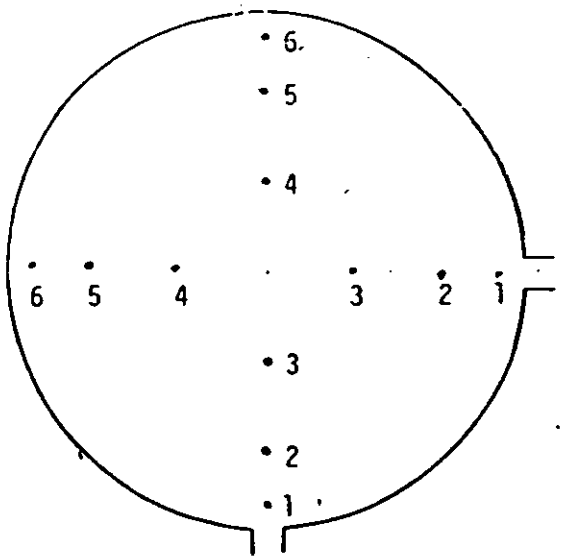
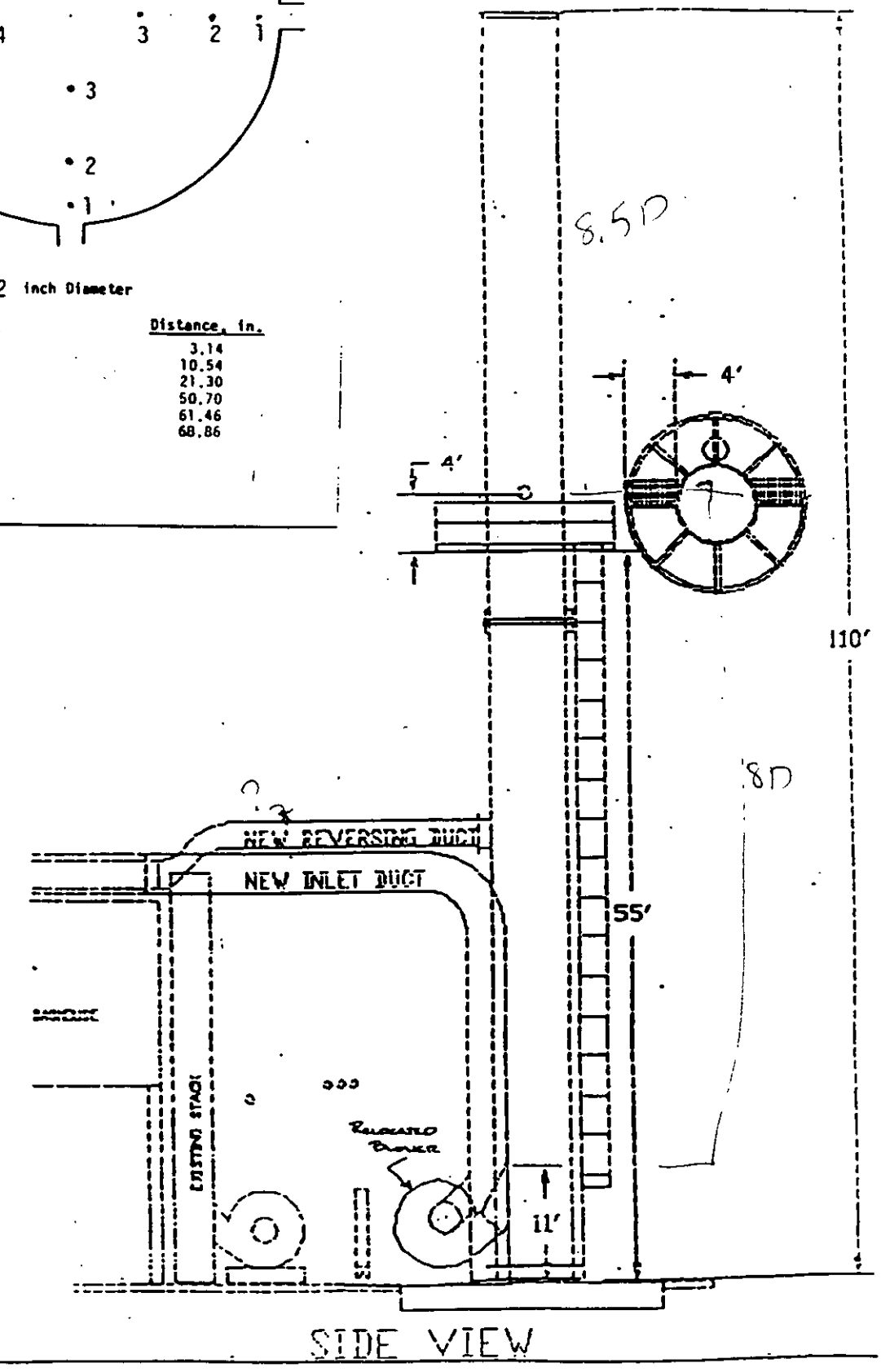

MINERAL WOOL - FLOW DIAGRAM
SPL
COKE
ROCK
SLAG
CUPOLA NO. 1
SPINNER
BLOW CHAMBER
PRODUCT CYCLONE
PRODUCT CYCLONE
TUMBLER
ROCKWOOL BAGGER
STORAGE/ SHIPPING
COOLING WATER
SOLID WASTE
CINDERS
SHOT
SAMPLE PORT
EXHAUST TO ATMOSPHERE
SPARK BOX
BAGHOUSE
SAMPLE PORT
EXHAUST TO ATMOSPHERE
SAMPLE PORT
DUCT SCRUBBER
SOLID WASTE
CINDERS
SHOT
SCRUBBER WATER
SOLID WASTE
CINDERS
SHOT
CATCH BASIN
SOLIDS
R. L. GUILLOUD
1986MAY21
LLSK-860528-JWC-PE

FIGURE 2
Sampling Location

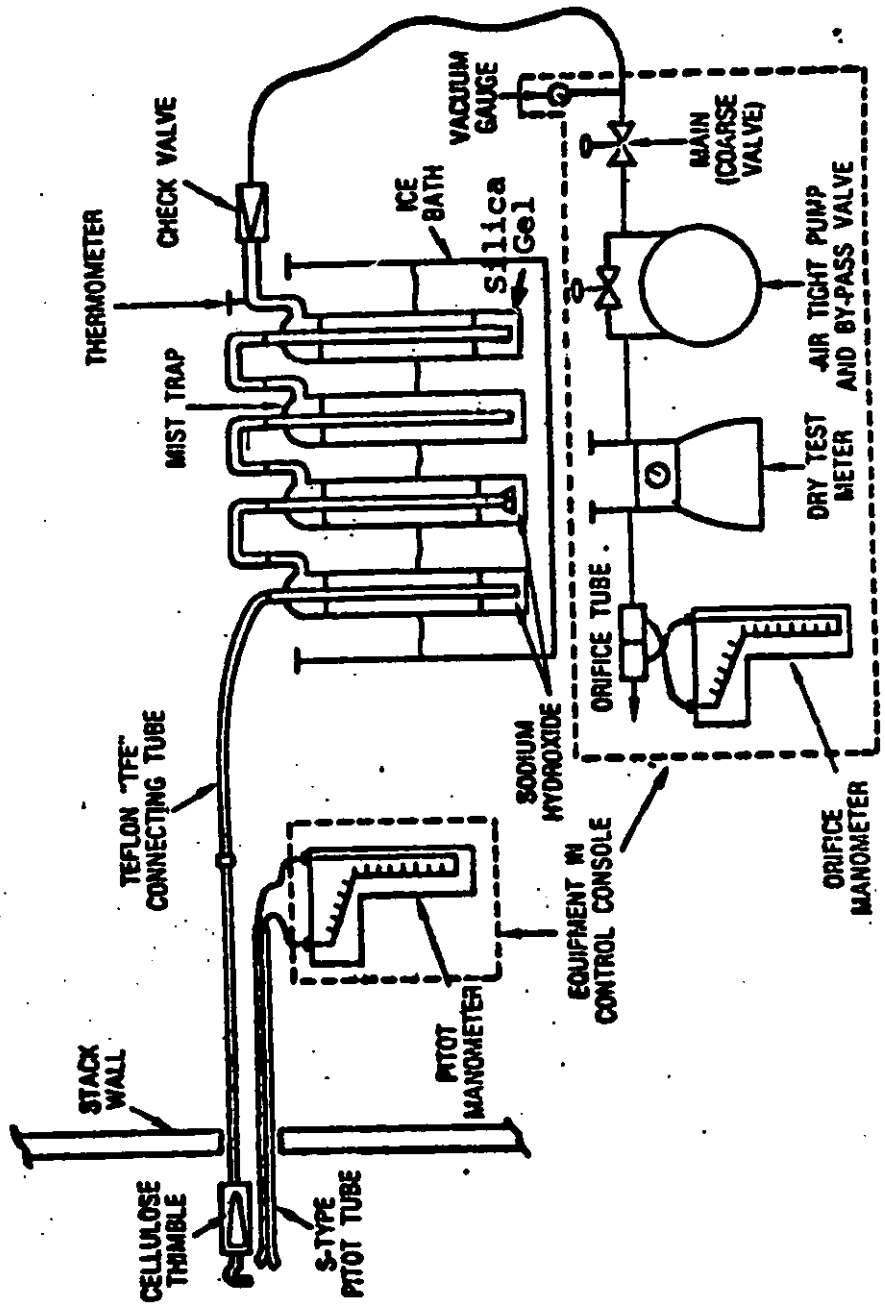


72 inch Diameter

Traverse Point	Distance, in.
1	3.14
2	10.54
3	21.30
4	50.70
5	61.46
6	68.86



SIDE VIEW



ALCOA METHOD 4075A SAMPLING TRAIN

FIGURE 3

APPENDIX A

Nomenclature
Sample Calculations

NOMENCLATURE

A_n	Area of nozzle, sq ft.
A_s	Area of stack, sq ft.
B_{wo}	Moisture content of stack gas
$\%CO_2$	Percentage of carbon dioxide in stack gas
C_p	Pitot tube coefficient
DH	Average pressure differential across orifice meter, inches H_2O
DH@	Orifice pressure differential that gives 0.75 cfm of air at standard temperature and pressure, inches H_2O
D_n	Nozzle diameter, inches
(DP)1/2	Square root of average pressure differential across pitot tube, inches H_2O
%I	Percent isokinicity
M_d	Dry stack gas molecular weight, lb/lb-mole
M_n	Particulate weight in grams
M_s	Wet stack gas molecular weight, lb/lb-mole
$\%O_2$	Percentage of oxygen in stack gas
P_b	Barometric pressure, inches Hg
P_s	Stack pressure, inches Hg
θ	length of test, minutes
T_m	meter temperature, degrees Fahrenheit
T_s	stack temperature, degrees Fahrenheit
V_{lc}	volume of liquid collected, milliliters
V_m	meter volume, cubic feet
V_{mstd}	dry meter volume at standard temperature and pressure, cubic feet (dscf)
V_s	velocity of stack gas, feet/second
V_{wstd}	volume of water vapor in stack gas at standard temperature and pressure, cubic feet (scf)
Y_d	Meter factor, cf/cf

CALCULATIONS

VOLUME METERED STD - (29.92) (68 F)

$$Vmstd = (17.64)(Vm)\left(\frac{Pb + \Delta H/13.6}{Tm}\right)(Yd)$$

VOLUME OF WATER VAPOR -

$$Vwstd = (0.0471)(Vlc)$$

MOISTURE -

$$Bwo = \frac{Vwstd}{Vmstd + Vwstd}$$

$$\% \text{ MOISTURE} = Bwo \times 100$$

DRY MOLECULAR WEIGHT -

$$Md = 0.44(\%\ CO2) + 0.32(\%\ O2) + 0\ 28(\%\ N + \%\ CO)$$

WET MOLECULAR WEIGHT -

$$Ms = Md(1-Bwo) + 18(Bwo)$$

VELOCITY -

$$Vm = 85.49 \times (Cp)(\sqrt{\Delta P})\left(\sqrt{\frac{(460 + Ts)}{(Ps)(Ms)}}\right)$$

% ISOKINICITY -

$$\%I = \frac{(0.0945)(460 + Ts)(Vmstd)}{(Ps)(Vs)(An)(\theta)(1-Bwo)}$$

VOLUME OUT OF STACK -

$$ACFM = 60 \times Vs \times As$$

$$DSFM = ACFM\left(\frac{Ps}{29.92}\right)\left(\frac{528}{460 + Ts}\right)(1-Bwo)$$

GR/DSCF -

$$Cs = (15.43)\frac{ms}{Vmstd}$$

LB/HR -

$$\frac{Cs \times DSCFM \times 60}{7000}$$

APPENDIX B

Production Records

Date 5/18/88

American Rockwool, Inc.
Daily Production Report

AUG. 12,036
total 11,144 Bags

	Bags per Line		72 Line 1		75 Line 2	
	#1 today	#2 today	today	MTD average	today	MTD average
Day of Operation			1	7	1	7
Charge (uncorrected)			232,248#	1,706,111#	240,288#	1,727,564#
Coke (uncorrected) Coke / SPL.	848.33 AUG.	903.25 AUG.	16,470# / 20,360#	154,780# / 93,233#	17,080# / 21,679#	158,955# / 95,913#
Charge/Coke Ratio			6.30	6.87	6.19	677
#1 Wool Good Production	#5371 ✓	5,793 Bags	155,759#	1,194,510#	—	—
#2 Wool Good Production	—	#3,219	—	—	93,351#	816,566#
Wool Cryo or Pouring		109 Bales	—	—	74,073#	432,268#
Recovery %			67.06%	70.01%	69.67%	72.28%
Percent Efficiency	76.11%	81.81%	—	—	—	—
	today Oxygen	MTD Total	today	MTD Total	today	MTD Total
Hour of Operation Start	255"		24	168	24	168
Downtime Schedule Used	35"					
Downtime Unschedule Bal.	220"		143 mins	333 mins	—	67 mins
% Downtime tap out			41 mins	280 mins	33 mins	275 mins
% Downtime						

72 Charges Used #1		75 #2		today	MTD today
Tenn. 400#	28751# ✓	400	29,661# ✓	58,412# ✓	434,668#
Steel 400#	29,024# ✓	400	29,984# ~~29,987~~ ✓	59,008 ~~59,011~~ ✓#	409,667#
D.U.Q. 1300#	93,947# ~~93,944~~ ✓	1300	97,034# ~~97,134~~ ✓	190,981 ~~191,078~~ ✓#	1,506,807#
Trap 1,100#	78,979# ✓	1100	81,854# ~~81,756~~ ✓	160,835 ~~160,735~~ ✓#	1,063,333#
St. Louis N.R.	—	—		—	15,900#
Coke 260# 115#	16,470# ✓	260# 115#	17,080# ✓	33,550# ✓	313,735#
SPL. 210# 450#	20,360# ✓	210# 450#	21,679 ~~21,678~~ ✓	42,039 ~~42,038~~ ✓#	189,146#
Lime 25/50	1550# ✓	25/50#	1,750 ✓	3300 ✓	3,300#

Comments: (State reason for downtime. List major inoperative equipment. Explain unusual performance. List major charge changes. State critical materials not on hand). # two test. 8:00 AM to 4:00 PM.

1 Line 41 mins tapout. 68 mins to change Head. 75 mins to weld on spinner.

2 Line 33 mins tapout.

PRODUCTION REPORT

LINE: 1

DATE: 5/5-85

FOREMAN RANDY

Charge	lbs.
Coke	260
Dug	1300
Trap	1100
Lime SPL	210
Steel	400
Tenn	400
St. Louis	
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
8-9		294	294		
9-10		294	294		
10-11		294	294		
11-12	116 2 / 232	294	294		
12-1		294	294		
1-2		294	324		
2-3		294	294		
3-4		294	294		
Total----------		2352	2382		

Comments:

10 min Tap out

FOREMAN JACK

Charge	lbs.	
Coke	260 - 115	
Dug	1300	1300
Trap	1100	1100
Lime	25 - 50	
Steel	400	400
Tenn	400 - 400	
St. Louis		
~~Ky~~ SPL	210 - 450	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
4-5		294	245		
5-6		294	245		
6-7	819 / 1602	294	245		
7-8		294	1657		
8-9		294	0		
9-10		294	245		
10-11		294	245		
11-12		294	245		
Total----------		2352	1617		

Comments:

TAP Out 10 MINS

Off Line 7:45 Change Head

Back on Line 8:53

TAP Out 7 MINS

FOREMAN

Charge	lbs
Coke 115	140
Dug	1300
Trap	1100
Lime	50
Steel	400
Tenn	400
St. Louis	
Ky SPL	450

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
12-1		294	147		
1-2		294	196		
2-3	694	294	245		
3-4	Y 2	294	196		
4-5	1388	294	196		
5-6		294	245		
6-7		294	147		
7-8		294	98		
Total----------		2352	1372		

Comments:

Taps out 10 mins

Taps out 4 mins

Taps out for 1 hr 5 mins
waiting on line
6:15 on Line

CHARGING SHEET

DATE 5-18-88 SHIFT 1ST LINE 1 CHARGER Earl [illegible]

COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.								8:00	
2.	650 1400	550 750			200	196 1596		8:27	
3.	1403	755		208	200	1610		8:29	
4. 262	648 629	555 561		470		207 200		8:32	
5.	1400	771			210	1600		8:39	
6.	1406	749		198	205	1605		8:43	
7. 268	657 645	544 540		466		199 205		8:46	
8.	1396	748			208	1601		8:55	
9.	1399	749		203	206	1599		9:00	
10. 267	650 662	543 542		470		200 206		9:04	
11.	1412	750			208	1618		9:16	
12.	1415	749		211	202	1598		9:20	
13. 267	669 676	547 550		478		183 172		9:21	
14.	1426	750			200	1598		9:36	
15.	1405	749		205	204	1620		9:39	
16. 265	656 654	545 549		470		215 196		9:42	
17.	1403	749			200	1599		9:49	
18.	1432	746		224	210	1620		9:50	
19. 270	666 626	536 573		494		188 235		9:55	
20.	1399	773			200	1634		10:09	
21.	1406	748		212	198	1598		10:10	
22. 259	658 654	550 547		471		192 197		10:17	
23.	1403	749			202	1600		10:2[illegible]	
24.	1408	751		210	206	1596		10:28	
25. 261	657 661	545 545		491		188 190		10:35	
26.	1410	749			204	1600		10:37	
27.	1402	758		209	205	1600		10:41	
28. 260	644 653	553 547		469		198 204		10:45	
29.	1401	748	12		201	1605		10:57	
30.	1422	749		204	201	1691		10:58	
31. 268	673 653	548 545		472		269 197		11:03	
32.	1403	750			202	1600		11:12	
33.	1416	777		217	201	1600		11:14	
34. 262	639	576		479		184		11:16	

CHARGING SHEET

DATE 5-19-88 SHIFT 7 LINE I CHARGER E.W.

	COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.		652	547				211			
2.		1402	750			203	1613		11:26	
3.		1404	748		212	205	1601		11:29	
4.	262	656 658	543 541		470		197 193		11:31	
5.		1406	748			207	1599		11:45	
6.		1399	750		210	212	1600		11:47	
7.	262	649 653	538 535		472		201 195		11:50	
8.		1403	750			215	1598		12:04	
9.		1414	752		193	211	1610		12:05	
10.	306	660 666	541 548		479		196 189		12:07	
11.		1416	750			208	1605		12:24	
12.		1399	754		201	200	1600		12:25	
13.	269	645 642	554 549		470		201 202		12:27	
14.		1400	758			209	1602		12:40	
15.		1405	750		217	210	1604		12:46	
16.	251	655 646	540 551		468		199 213		12:48	
17.		1397	753			202	1612		1:00	
18.		1411	751		211	207	1606		1:02	
19.	260	660 656	544 547		471		195 193		1:06	
20.		1407	751			204	1600		1:18	
21.		1403	751		205	208	1613		1:22	
22.	265	652 652	543 547		470		210 209		1:25	
23.		1405	753			206	1614		1:32	
24.		1418	755		205	200	1594		1:44	
25.	265	663 658	555 545		470		176 207		1:47	
26.		1403	745	11		200	1610		1:57	
27.		1412	764		209	200	1602		2:00	
28.	261	648 651	564 551		470		190 206		2:03	
29.		1404	753			202	1610		2:17	
30.		1414	747		211	211	1611		2:21	
31.	256	667 654	536 547		467		197 200		2:25	
32.		1406	752			205	1606		2:37	
33.		1425	754		205	202	1611		2:42	
34.	265	671	554		470		186		2:45	

CHARGING SHEET

DATE 7-18-88 SHIFT 1 LINE I CHARGER E W

	COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.		1424	743			200	1601		2:53	
2.		1401	750		206	203	1600		2:59	
3.	265	651 / 649	547 / 547		471		194 / 202		3:03	
4.		1398	749			202	1600		3:10	
5.		1412	751		214	206	1603		3:12	
6.	259	661 / 655	545 / 544		473		191 / 198		3:14	
7.		1403	748			204	1601		3:28	
8.		1398	751		207	208	1600		3:31	
9.	263	647 / 650	543 / 548		470		202 / 199		3:37	
10.		1400	750			202	1599		3:47	
1.		1413	757		223	204	1610		3:49	
12.	267	656 / 653	553 / 544		470		197 / 196		3:52	
3.		1401	748			199	1600			
14.		1400	750			204	1600			
5.		650	546				200			
16.					51					
7.										
18.										
19.										
20.										
21.										
22.										
23.										
24.										
25.										
26.										
27.										
28.					71					
29.										
30.										
31.										
32.										
33.										
34.	1054	6553	5465		830	2032	1964			

CHARGING SHEET

DATE 5-18-88 SHIFT T LINE T CHARGER Monte

	COKE	DUQ.	TRAP	LIME	[illegible]	STEEL	TENN	OTHER	TIME	COMMENTS
1.	[illegible]	[illegible]	1100	—	240	[illegible]	[illegible]		[illegible]	
2.	240	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
3.	[illegible]	[illegible]	1100	—	[illegible]	[illegible]	400		4:40	
4.	[illegible]	1300	1100	—	240	[illegible]	400		4:55	
5.	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]		5:15	
6.	[illegible]	[illegible]	[illegible]	25	[illegible]	[illegible]	[illegible]		5:35	
7.	[illegible]		[illegible]	25	[illegible]	[illegible]	[illegible]		5:55	
8.	[illegible]	[illegible]	[illegible]	25	[illegible]	[illegible]	[illegible]		6:15	
9.	260	[illegible]	[illegible]	25	240	[illegible]	[illegible]		6:35	
10.	260	[illegible]	[illegible]	25	[illegible]	[illegible]	[illegible]		6:55	
11.	[illegible]	[illegible]	[illegible]	25	[illegible]	[illegible]	400		7:15	
12.	260	1300	1100	25	[illegible]	[illegible]	[illegible]		7:35	
13.	260	[illegible]	[illegible]	25	[illegible]	[illegible]	[illegible]		7:55	
14.	260	1300	[illegible]	25	240	[illegible]	[illegible]		9:05	
15.	260	1360	1100	25	[illegible]	[illegible]	400		9:25	
16.	260	1300	1100	25	[illegible]	[illegible]	400		9:45	
17.	260	[illegible]	[illegible]	25	[illegible]	[illegible]	[illegible]		10:05	
18.	260	[illegible]	1100	25	[illegible]	[illegible]	400		10:25	
19.	260	1300	1100	25	[illegible]	400	400		10:45	
20.	260	1300	1100	25	[illegible]	400	400		11:00	
1.	260	[illegible]	1100	25	[illegible]	[illegible]	[illegible]		[illegible]	
2.	260	1300	1100	50	450	[illegible]	[illegible]		11:35	
3.	260	1300	1100	50	[illegible]	[illegible]	[illegible]		11:55	
4.										
5.					23					
6.										
7.										
8.										
9.										
0.										
1.										
2.										
3.										
4.	5980	29,900	25,300	500	5310	9200	9200			

CHARGING SHEET

DATE 5-18-99 SHIFT [illegible] LINE [illegible] CHARGER [illegible]

COKE	DUQ.	TRAP	LIME	[illegible]	STEEL	TENN	OTHER	TIME	COMMENTS
1. [illegible]	1800	[illegible]	50	[illegible]	400	[illegible]		12:15	
2. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		12:35	
3. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
4. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		1:15	
5. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
6. 150	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		1:59	
7. 150	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
8. 115	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
9. [illegible]	[illegible]	[illegible]	50	[illegible]	400	400		[illegible]	
10. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		3:[illegible]	
11. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		[illegible]	
12. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		[illegible]	
13. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		4:21	
14. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		4:40	
15. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
16. [illegible]	[illegible]	[illegible]	[illegible]	450	400	400		[illegible]	
17. [illegible]	[illegible]	[illegible]	[illegible]	450	400	400		5:35	
18. [illegible]	[illegible]	[illegible]	[illegible]	450	400	400		5:57	
19. 200	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		6:17	
20. 200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
21. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		7:47	
22.									
23.				21					
24.									
25.									
26.									
27.									
28.									
29.									
30.									
31.									
32.									
33.									
34. 3345	27,300	23,100	1050	9,450	8,400	8,400			

COPY IT PRINTING CO. [illegible]

PRODUCTION REPORT

LINE: E

DATE: 5-15-55

FOREMAN Randy

Charge	lbs.
Coke	260
ug	1300
Trap	1100
ime Spl.	210
Steel	400
enn	400
t. Louis	
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
8-9		294	34		
9-10		294			
10-11		294			
11-12		294			
12-1		294			
1-2		294			
2-3		294			
3-4		294	✓		✓
Total----------		2352	34	Bales 89	

Comments:

Tap out 10 mins.

FOREMAN JACK

Charge	lbs.
Coke	260 - 115
ug	1300 - 1300
Trap	
ime	25 - 50
teel	400 - 400
enn	400 - 400
t. Louis	
Ky SPL	210 - 450

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
4-5		294		Bales	
5-6		294	49		
6-7	769	294	245		
7-8	2	294	245		
8-9	1538	294	245		
9-10		294	245		
10-11		294	245		
11-12		294	245	✓	
Total----------		2352	1519	4 Bales 20	✓

Comments:

Tap out 5 mins

Tap out 8 mins

FOREMAN Jack + Randy

Charge	lbs
Coke	115
ug	1300
Trap	
ime	
teel	
Tenn	400
t. Louis	400
Ky	1450

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
12-1		294	147		
1-2		294	196		1
2-3	844	294	196		
3-4	2	294	196		
4-5	1688	294	196		
5-6		294	196		
6-7		294	245		
7-8		294	294	✓	
Total----------		2352	1666		

Comments:

Tap out 10 mins

COPY IT PRINTING CO 500

TIER	BLOWING WOOL	POURING WOOL	CRYOGENIC WOOL
1 51"	630	48" 22. 625	50" 53. 685
2 51"	670	49" 25. 640	54" 54. 690
3 50"	620	44" 25. 620	57" 55. 685
4 48"	605	43" 30. 615	53" 56. 680
5 48"	695	42" 31. 660	50" 57. 690
6 50"	790	43" 32. 680	50" 58. 675
7 40"	660	55" 33. 680	50" 55. 685
8 45"	690	55" 34. 680	50" 60. 680
9 48"	725	58" 35. 700	49" 61. 665
10 52"	710	56" 36. 685	50" 62. 690
11 55"	700	57" 37. 685	50" 63. 680
12 58"	705	56" 38. 700	54" 64. 690
13 54"	665	52" 39. 710	53" 65. 695
14 58"	665	51" 40. 690	53" 166. 690
15 53"	620	52 41. 680	51" 67. 695
16 57"	620	51" 42. 695	52" 68. 700
17 57"	650	50" 43. 700	51" 69. 690
18 53"	665	49" 44. 685	53" 70. 700
19 57	680	53" 45. 705	52" 71. 700
20 52"	635	50" 46. 685	49" 72. 690
21 58"	625	51" 47. 695	49" 73. 695
22 48"	640 640	52" 48. 690	54" 74. 690
23 50"	630	53" 49. 695	50" 75. 690
24 48"	645	51" 50. 665	52" 76. 690
25 48"	640	53" 51. 695	52" 77. 690
26 48"	625	53" 52. 685	51" 78. 700
TOTAL			

LOADSHEET

AMERICAN ROCKWOOL, INC.
HWY. 64 EAST ALTERNATE
P. O. BOX 880
SPRING HOPE, NC 27882

TELEPHONE: 919 478 5111
800 682 2968 NC
800 334 0394 OTHER

1 Shift

DATE: 5-18-88

CUSTOMER: _____

_____

INVOICE NO.: _____

CUSTOMER ORDER NO: _____

TRAILER NO.: 51450

DRIVER: _____

LOADED BY: Cooper

_____

SUPERVISOR: D.L.M.

CC-2500

TIER	BLOWING WOOL	POURING WOOL	CRYOGENIC WOOL
79. 52"	700		
80. 54"	680		
81. 54"	705		
82. 52"	695		
83. 56"	690		
84. 52"	675		
85. 55"	695		
86. 52"	675		
87. 50"	675		
88. 52"	685		
89. 49"	670		
90.			
91.			
92.			
93.			
94.			
95.			
18			
19			
20			
21			
22			
23			
24			
25			
26			
TOTAL			

LOADSHEET

AMERICAN ROCKWOOL, INC.
HWY. 64 EAST ALTERNATE
P. O. BOX 880
SPRING HOPE, NC 27882

TELEPHONE: 919 478 5111
800 682 2968 NC
800 334 0394 OTHER

1 Shift

DATE: 5-18-88

CUSTOMER: _____

_____

INVOICE NO.: _____

CUSTOMER ORDER NO: _____

TRAILER NO.: 51450

DRIVER: _____

89 Bales 60,215 ÷ 29# 2074 Bag's

LOADED BY: Cooper

_____

SUPERVISOR: D.L.M.

CC-2500

TIER	BLOWING WOOL	POURING WOOL	CRYOGENIC WOOL
1 49"	665		
2 49"	660		
3 53"	685		
4 53"	685		
5 53"	690		
6 50"	695		
7 53"	690		
8 51"	715		
9 53"	685		
10 50"	715		
11 50"	680		
12 50"	695		
13 53"	675		
14 50"	695		
15 53"	685		
16 53"	680		
17 53"	680		
18 53"	690		
19 54"	680		
20 54"	715		
21			
22			
23			
24			
25			
26			
TOTAL			

AMERIC
HWY

SPR

TELEPH

DATE:

CUSTOM

INVOIC

CUSTOM ORDER

TRAILER NO.:

DRIVER:

20 Bales 13,768# ÷ 29# = 474 Bags

LOADED BY:

SUPERVISOR:

CC-2500

Rudy Gurley

CHARGING SHEET

— cupola 2

DATE 5-18-88 SHIFT 1 sh LINE II CHARGER E. W

COKE	DUQ.	TRAP	LIME	SPL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	1300	1100			400	400		8:00	
2.	651	544				206			
3.	1402	751			207	1608		8:17	
4.	1400	750		223 323 129	200	1600		8:18	
5. 252	650 655	550 546		475 87		200 188 388		8:20	
6.	1411	756			210	1599		8:36	
7.	1412	775		209 7	201	1605		8:37	
8. 262	637 647	574 550		471		193 208		8:40	
9.	1399	752			202	1607		8:55	
10.	1399	749		203	210	1599		8:57	
11. 270	650 660	539 547		473		200 200		9:02	
12.	1410	750			203	1610		9:16	
13.	1414	752		198	201	1600		9:17	
14. 274	662 650	551 548		472		186 208		9:23	
15.	1400	750			202	1608		9:35	
16.	1405	753		199	199	1600		9:37	
17. 278	652 668	554 548		477		195 178		9:40	
18.	1419	751			203	1597		9:49	
19.	1399	753		217	206	1600		9:53	
20. 275	646 662	547 538		492		191 188		9:57	
21.	1419	753			215	1607		10:08	
22.	1404	750		207	199	1607		10:13	
23. 263	654 658	551 546		470		203 191		10:15	
24.	1408	750			204	1599		10:26	
25.	1397	750		212	208	1602		10:30	
26. 262	647 644	542 551		474		205 196		10:32	
27.	1402	758	12		207	1598		10:43	
28.	1404	749		207	208	1597		10:48	
29. 263	655 659	541 547		470		193 187		10:50	
30.	1409	750			203	1596		10:57	
31.	1408	748		206	199	1608		11:00	
32. 269	660 654	549 554		475		200 203		11:04	
33.	1409	755			201	1612		11:17	
34.	1400	748			205	1612		11:20	
2928	1.02	543		2291	4890	212			

COPY-IT PRINTING

CHARGING SHEET

DATE 5-18-88 SHIFT I SOL LINE II CHARGER E.W.

	COKE	DUQ.	TRAP	LIME	SOL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	268	655	546		224 474		199		11:21	
2.		1403	748			202	1602		11:35	
3.		1406	758		218	200	1603		11:37	
4.	259	648 663	553 544		477		197 188		11:39	
5.		1409	746			202	1597		11:55	
6.		1413	751		209	203	1607		11:57	
7.	261	662 667	548 537		470		194 193		11:59	
8.		1415	748			211	1608		12:11	
9.		1408	750		199	201	1602		12:1[illegible]	
10.	271	658 657	549 553		470		194 194		12:18	
11.		1405	748			195	1599		12:35	
12.		1406	763		217	202	1599		12:38	
13.	268	643 653	561 545		495		193 211		12:41	
14.		1402	749			205	1613		12:58	
15.		1403	747		214	206	1600		1:00	
16.	260	656 652	541 540		474		197 202		1:04	
17.		1402	750			210	1604		1:18	
18.		1402	749		174	206	1600		1:20	
19.	306	653 657	543 554		480		195 198		1:23	
20.		1405	748			200	1597		1:37	
21.		1398	757		207	200	1610		1:39	
22.	263	641 642	557 554		470		210 195		1:45	
23.		1402	760	12		202	1597		1:56	
24.		1402	751		204	204	1600		1:58	
25.	265	651 653	547 545		469		198 203		2:02	
26.		1400	747			202	1603		2:17	
27.		1399	750		205	201	1598		2:19	
28.	267	649 654	545 540		472		204 198		2:23	
29.		1404	750			210	1602		2:37	
30.		1431	750		187	204	1597		2:40	
31.	295	651 640	546 561		482		166 208		2:43	
32.		1400	760			199	1608		2:[illegible]	
33.		1399	749		204	199	1600		2[illegible]	
34.	265	651	550		469		200		3:[illegible]	

CHARGING SHEET

DATE 5-18-88 SHIFT 1 LINE II CHARGER E. W.

	COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.		1405	750			212	1600		3:19	
2.		1406	748		229	204	1603		3:23	
3.	262	456 645	549 553		471		197 202		3:24	
4.		1398	753			200	1600		3:27	
5.		1401	750		225	209	1600		3:39	
6.	267	651	541		472		197		3:41	
7.		1414	750			202	1610			
8.		664	548				196			
9.										
10.										
11.										
12.										
13.										
14.										
15.										
16.										
17.										
18.										
19.										
20.										
21.										
22.										
23.										
24.										
25.										
26.										
27.										
28.										
29.										
30.										
31.										
32.										
33.										
34.	529	3271	2724		1414	1027	989			

COPY-IT PRINT

CHARGING SHEET

DATE 5-18-84 SHIFT II SPC LINE II CHARGER [illegible]

	COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]		[illegible]	
2.	260	[illegible]	[illegible]	—	[illegible]	[illegible]	400		[illegible]	
3.	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	400		[illegible]	
4.	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]		[illegible]	
5.	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]		5:15	
6.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400	[illegible]		5:35	
7.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		5:55	
8.	260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		[illegible]	
9.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		6:30	
10.	[illegible]	[illegible]	1100	[illegible]	[illegible]	400	400		[illegible]	
11.	[illegible]	[illegible]	1100	[illegible]	210	400	400		7:10	
12.	[illegible]	[illegible]	1100	[illegible]	210	400	400		7:30	
13.	260	1300	1100	[illegible]	[illegible]	400	400		7:50	
14.	260	1300	1100	[illegible]	210	400	400		[illegible]	
15.	260	1300	1100	[illegible]	210	400	400		[illegible]	
16.	260	1300	1100	[illegible]	210	400	400		[illegible]	
17.	260	1300	1100	[illegible]	210	400	400		9:10	
18.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400	400		9:30	
19.	260	1300	[illegible]	[illegible]	[illegible]	400	400		9:50	
20.	[illegible]	[illegible]	[illegible]	[illegible]	210	[illegible]	400		10:10	
21.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400	400		[illegible]	
22.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400	400		10:45	
23.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		[illegible]	
24.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		[illegible]	
25.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	400		[illegible]	
26.										
27.					25					
28.										
29.										
30.										
31.										
32.										
33.										
34.	6500	32,500	27,500	550	5,730	10,000	10,000			

COPY-IT PRINTING CO

CHARGING SHEET

DATE 5-16-05 SHIFT 3rd LINE TT CHARGER Don

	COKE	DUQ.	TRAP	LIME	SPC	STEEL	TENN	OTHER	TIME	COMMENTS
1.	260	1300	1100	50	450	400	400		12:18	
2.	260	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		12:37	
3.	260	1300	[illegible]	50	450	[illegible]	[illegible]		12:58	
4.	300	1300	[illegible]	50	450	[illegible]	[illegible]		1:19	
5.	300	1300	[illegible]	50	450	[illegible]	[illegible]		1:37	
6.	150	1300	[illegible]	[illegible]	450	[illegible]	[illegible]		1:55	
7.	150	1300	[illegible]	[illegible]	450	[illegible]	[illegible]		2:20	
8.	115	1300	[illegible]	[illegible]	450	[illegible]	[illegible]		2:39	
9.	115	1300	1100	50	450	400	400		3:57	
10.	115	1300	[illegible]	[illegible]	450	[illegible]	[illegible]		3:22	
11.	115	1300	[illegible]	[illegible]	450	[illegible]	[illegible]		3:40	
12.	115	1300	[illegible]	[illegible]	450	[illegible]	[illegible]		3:56	
13.	115	1300	[illegible]	[illegible]	450	400	[illegible]		4:14	
14.	115	1300	[illegible]	50	450	[illegible]	[illegible]		4:37	
15.	115	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		4:55	
16.	115	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		5:14	
17.	200	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		5:35	
18.	200	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		5:55	
19.	200	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		6:16	
20.	200	1300	[illegible]	[illegible]	450	400	400		6:37	
21.	140	1300	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		6:59	
22.	140	1300	[illegible]	[illegible]	[illegible]	[illegible]	400		7:20	
23.	140	1300	[illegible]	[illegible]	[illegible]	[illegible]	400		7:35	
24.	140	1300	[illegible]	[illegible]	[illegible]	[illegible]	400		7:59	
25.										
26.					24					
27.										
28.										
29.										
30.										
31.										
32.										
33.				50×24=1200						
34.	3875	31,200	26,400	1200	10,800	9,600	9,600			

COPY-IT PRINTING CO 1000

7/6

Date 5/17/88

American Rockwool, Inc.
Daily Production Report

AVG. 12,184

total 12,377

	Bags per Line		80 Line 1		78.5 Line 2	
	#1 today	#2 today	today	MTD average	today	MTD average
Day of Operation			1	6	1	6
Charge (uncorrected)			256,263#	1,473,863#	251,476#	1,487,276#
Coke (uncorrected) Coke / SPL	446.36 AVG.	437.5 AVG.	24,535# / 10,713#	138,310# / 72,873#	24,270# / 10,500#	141,875# / 74,235#
Charge/Coke Ratio		6,154 Bags	7.27	6.97	7.23	6.88
#1 Wool Good Production	#6223		180,467	1,038,751#	—	—
#2 Wool Good Production	—	#4704	—	—	136,416#	723,215#
Wool Cryo or Pouring		65 Bales	—	—	42,075#	358,195#
Recovery %			70.42%	70.47%	70.97%	72.71%
Percent Efficiency	88.19%	87.21%				
	today OXUGEN	MTD Total	today	MTD Total	today	MTD Total
Hour of Operation Start	290"		24	144	24	144
Downtime Schedule used	40"					
Downtime Unschedule Bal	255"		20 min's	190 min's	~~0~~	67 min's
% Downtime tap out			50 min's	239 min's	38 min's	242 min's
% Downtime						

80 Charges Used #1		78.5 #2		today	MTD today
Tenn. 400#	31,709#	400	31,247#	62,956#	376,256#
Steel 400#	32,246#	400	31,610#	63,856#	350,656#
D.U.Q. 1300#	104,359#	1,300	102,420	206,779#	1,315,729#
Trap 1100#	87,949#	1100	86,195	174,148#	902,598#
N-R St. Louis	—		—	—	15,900#
Coke 385#/260#	24,535#	385#/260#	24,270#	48,805#	280,135#
S.P.L. 210#	~~10,715~~ 10,710#	210#	10,500#	~~21,213~~ 21,210#	147,108#

Comments: (State reason for downtime. List major inoperative equipment. Explain unusual performance. List major charge changes. State critical materials not on hand). Run #1 test from 8:00 am to 4:00 pm

#1 Line 50 min's tapout, 20 min's to fix scale on Baggery.

#2 Line 38 min's tapout.

apparently ran 385 coke, no SPL during test

City #55

PRODUCTION REPORT

LINE: F

DATE: 5-17-55

FOREMAN Randy

Charge	lbs.
Coke	985
ug	1300
Trap	1100
Lime	
Steel	400
Tenn	UCC
St. Louis	
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
8-9		294	245		
9-10		294	294		
10-11		294	245		
11-12		294	294		
12-1	1070 x 2 = 2140	294	245		
1-2		294	296		
2-3		294	245		
3-4		294	294		
Total----------		2352	2058	✓	

Comments:

10 min Tap out

10 Tap out

20 Min Fix scales on Bagger

FOREMAN Jack Woods

Charge	lbs.
Coke	385-260
ug	1300
Trap	1100
Lime	
Steel	400
Tenn	400
St. Louis	
Ky SPL	210

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
4-5		294	245		
5-6	1056 x 2 = 2112	294	245		
6-7		294	245		
7-8		294	294		
8-9		294	245		
9-10		294	294		
10-11		294	294		
11-12		294	245		
Total----------		2352	2107	✓	

Comments:

Tap Out 7 Mins

Tap Out 9 Mins

FOREMAN Jack + Randy

Charge	lbs
Coke	260
ug	1300
Trap	1100
Lime	
Steel	400
Tenn	400
St. Louis	
Ky SPL	210

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
12-1		294	245		
1-2		294	294		
2-3	1025	294	245		
3-4	x 2	294	245		
4-5	2050	294	245		
5-6		234	245		
6-7		294	245		
7-8		294	294		
Total----------		2352	2058	✓	

Comments:

Tap out 8 mins

Tap out 6 mins

CHARGING SHEET

DATE 5/17/88 SHIFT 7-5 LINE 7 CHARGER [illegible]

	COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]		5:08	
2.		[illegible]	749			[illegible]	1600		8:12	
3.		652 711	543 446				230 195		7:13	
4.		[illegible]	[illegible]			205	[illegible]		8:21	
5.		1412	749			204	1603		8:23	
6.	387	663 681	545 564				191 [illegible]		8:26	
7.		1450	760			[illegible]	[illegible]		8:37	
8.		1405	753			198	[illegible]		8:43	
9.	385	650 652	555 551				211 207		8:45	
10.		1404	752			[illegible]	[illegible]		[illegible]	
11.		[illegible]	757			[illegible]	[illegible]		9:00	
12.	398	652 645	555 546				190 210		9:03	
13.		1397	745			203	1607		9:14	
14.		1400	750			[illegible]	[illegible]		9:15	
15.	[illegible]	650 635	545 547				204 205		9:[illegible]1	
16.		1405	770			203	1610		9:27	
17.		1407	745			[illegible]	1595		9:29	
18.	391	662 654	534 546				188 196		9:34	
19.		1404	750			204	1602		9:44	
20.		1397	749			203	1605		9:46	
21.	386	648 655	546 540				205 197		9:52	
22.		1402	747			[illegible]	[illegible]		10:00	
23.		1412	751			200	[illegible]		10:02	
24.	390	642 670	551 551				156 160		10:05	
25.		1420	756			199	1600		10:17	
26.		1417	751			202	1599		10:21	
27.	396	646 650	547 545				189 190		10:23	
28.		1415	765			200	[illegible]		10:33	
29.		1498	751			205	1601		10:34	
30.	[illegible]	747 644	546 540		(12)		103 215		10:40	
31.		1487	748			205	[illegible]		10:50	
32.		1408	745			207	1598		10:52	
33.	387	659	549				190		10:54	
34.	4655	15,213	12555			4662	4400			

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CHARGING SHEET

DATE 5-17-88 SHIFT 1st LINE I CHARGER [illegible]

COKE	DUQ. 682	TRAP 548	LIME		STEEL	TENN 171	OTHER	TIME	COMMENTS
1.	1421	740			201	1602		11:06	
2.	1415	802			202	1605		11:08	
3. 395	603 643	600 560				190 196		11:10	
4.	1404	761			201	1600		11:23	
5.	1400	750			200	1600		11:25	
6. 386	650 648	550 607				200 165		11:28	
7.	1455	807			200	1600		11:40	
8.	1408	751			202	1607		11:42	
9. 385	657 650	549 541				199 215		11:45	
10.	1402	752			211	1617		11:47	
11.	1400	748			200	1601		11:50	
12. 385	652 657	548 541				201 199		11:53	
13.	1407	750			209	1606		11:56	
14.	1400	749			205	1608		12:01	
15. 385	651 657	544 555				208 203		12:06	
16.	1413	756			201	1616		12:15	
17.	1405	752			202	1603		12:16	
18. 398	653 654	550 537				198 196		12:21	
19.	1402	750			213	1600		12:33	
20.	1401	747			209	1600		12:34	
21. 386	654 655	538 551				199 196		12:40	
22.	1406	751			200	1602		12:50	
23.	1405	75[illegible]			200	1600		12:55	
24. 385	652 661	553 542				195 200		1:[illegible]	
25.	1411	750			208	1611		1:25	
26.	1402	751			214	1616		1:27	
27. 395	651 653	537 549				214 207		1:30	
28.	1402	749			200	1609		1:43	
29.	1400	750			203	1599		1:45	
30. 395	650 652	547 543		11		199 212		1:50	
31.	1402	750			207	1614		2:02	
32.	1405	749			198	1604		2:04	
33. 401	657	551				198		2:07	
34. 4296	14,342	12,141			4486	4361			

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CHARGING SHEET

DATE 5-17-88 SHIFT I SH LINE I CHARGER C M

	COKE	DUQ. 670	TRAP 556	LIME		STEEL	TENN 173	OTHER	TIME	COMMENTS
1.		1428	758			202	1601		2:21	
2.		1409	755			205	1616		2:33	
3.	384	654 652	550 547				207 198		2:46	
4.		1403	750			203	1603		2:37	
5.		1419	751			200	1600		2:44	
6.	384	668 649	551 541				161 200		2:49	
7.		1399	750			209	1609		2:54	
8.		1399	749			204	1603		2:58	
9.	389	650 636	545 547				204 197		3:04	
10.		1406	770			203	1603		3:12	
11.		1409	767			201	1613		3:15	
12.	388	647 637	561 550				204 202		3:23	
13.		1407	750			200	1609		3:30	
14.		1400	771			203	1609		3:38	
15.	390	629 655	568 553				203 193		3:35	
16.		1408	753			202	1600		3:47	
17.		1421	745			259	1627		3:49	
18.	387	672 664	490 541				186 186		3:52	
19.		1416	752			211	1602			
20.		1402	751			198	1611			
21.		651	553				209			
22.										
23.										
24.										
25.										
26.										
27.										
28.										
29.					(6½)					
30.										
31.										
32.										
33.										
34.	2324	9154	7673			2898	7748			

CHARGING SHEET

DATE 5-17-86 SHIFT 2nd LINE 1 CHARGER Monte

	COKE	DUQ.	TRAP	LIME	SPL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	2160				210	400	400		4:02	
2.	2160				210	400	400		4:20	
3.	2160				210	400	400		4:41	
4.	2160				210	400	400		5:00	
5.	2160				210	400	400		5:18	
6.	2160				210	400	400		5:39	
7.	2160				210	400	400		6:01	
8.	2160				210	400	400		6:22	
9.	2160				210	400	400		6:41	
10.	2160				210	400	400		7:00	
11.	2160				210	400	400		7:20	
12.	2160				210	400	400		7:38	
13.	2160				210	400	400		7:55	
14.	2160				210	400	400		8:10	
15.	2160				210	400	400		8:30	
16.	2160				210	400	400		8:50	
17.	2160				210	400	400		9:10	
18.	2160				210	400	400		9:30	
19.	2160				210	400	400		9:50	
20.	2160				210	400	400		10:05	
21.	2160				210	400	400		10:20	
22.	2160				210	400	400		10:40	
23.	2160				210	400	400		11:00	
24.	2160				210	400	400		11:20	
25.	2160				210	400	400		11:40	
26.	2160	1300	1100		210	400	400		11:55	
27.										
28.					26					
29.										
30.										
31.										
32.										
33.										
34.	1760	33,800	28,600		5460	10400	10400			

CHARGING SHEET

DATE SHIFT LINE CHARGER

	COKE	DUQ.	TRAP	LIME	[illegible]	STEEL	TENN	OTHER	TIME	COMMENTS
1.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	
2.	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]			
3.	[illegible]	[illegible]	[illegible]				[illegible]		[illegible]	
4.	[illegible]	[illegible]	[illegible]						1:35	
5.	[illegible]	[illegible]	[illegible]						[illegible]	
6.	[illegible]	[illegible]	[illegible]						[illegible]	
7.	[illegible]	[illegible]	[illegible]						[illegible]	
8.	[illegible]	[illegible]	[illegible]						[illegible]	
9.	[illegible]	[illegible]	[illegible]						[illegible]	
10.	[illegible]	[illegible]	[illegible]						[illegible]	
11.	[illegible]	[illegible]	[illegible]						[illegible]	
12.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
13.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
14.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
15.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
16.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
17.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
18.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
19.	[illegible]	650	[illegible]		[illegible]	200	200		6:03	
20.	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]		6:21	
21.	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]		6:30	
22.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
23.	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]		[illegible]	
24.	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]		[illegible]	
25.	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	
26.										
27.					24.5					
28.										
29.										
30.										
31.										
32.										
33.										
34.	650	31550	26950		5253	9800	9800			

PRODUCTION REPORT

LINE: II

DATE: 5-17-88

FOREMAN Randy

Charge	lbs.
Coke	385
Aug	1300
Trap	1100
Lime	
Steel	400
Tenn	400
St. Louis	
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
8-9		294	245		
9-10		294	245		
10-11		294	245		
11-12		294			
12-1		294			
1-2		294			
2-3		294			
3-4		294		✓	
Total----------		2352	735		Bags 1.5

Comments:

42 075 LBS = 1451 Bags

FOREMAN [illegible]

Charge	lbs.
Coke	385-260
Aug	1300
Trap	1100
Lime	
Steel	400
Tenn	400
St. Louis	
Ky SPL	210

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
4-5		294	245		
5-6		294	245		
6-7		294	294		
7-8		294	245		
8-9		294	245		
9-10		294	245		
10-11		294	294		
11-12		294	245		
Total----------		2352	2058	✓	

Comments:

Tap out 8 mins

Tap out 5 mins

Tap out 5 mins

FOREMAN Jack & Randy

Charge	lbs
Coke	260
Aug	1300
Trap	1100
Lime	
Steel	400
Tenn	400
St. Louis	
Ky SPL	210

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
12-1		294	196		
1-2		294	245		
2-3	95 3	294	245		
3-4	x 2	294	294		
4-5	1910	294	245		
5-6		294	196		
6-7		294	245		
7-8		294	245		
Total----------		2352	1911	✓	

Comments:

Tap out 10 mins

Tap out 10 mins

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CHARGING SHEET

DATE 5/6/85 SHIFT IST LINE II CHARGER [illegible]

COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1. [illegible]	[illegible]	[illegible]			[illegible]	[illegible]		8:05	
2.	1400	748			205	[illegible]		8:11	
3. 395	652 691	543 503				200 201		8:15	
4.	1399	708			205	1600		8:23	
5.	1413	722			203	1605		8:25	
6. 386	641 633	519 568				192 198		8:27	
7.	1402	769			201	1600		8:39	
8.	1426	750			206	1604		8:41	
9. 394	626 652	544 563				178 191		8:44	
10.	1410	758			195	1601		8:55	
11.	1411	747			200	1600		8:56	
12. 386	664 655	547 550				189 199		9:02	
13.	1410	752			202	1609		9:13	
14.	1399	751			204	1598		9:18	
15. 391	648 647	549 549				199 203		9:19	
16.	1398	751			202	1601		9:27	
17.	1401	748			204	1597		9:32	
18. 390	653 650	544 549				196 201		9:34	
19.	1400	750			201	1601		9:45	
20.	1403	749			201	1599		9:48	
21. 388	654 655	548 540				196 197		9:50	
22.	1403	748			208	1600		10:00	
23.	1406	749			203	1599		10:04	
24. 392	657 664	546 546				192 188		10:06	
25.	1413	749			203	1601		10:18	
26.	1401	748			202	1614		10:20	
27. 392	658 657	546 550				208 198		10:22	
28.	1409	752			202	1607		10:33	
29.	1398	757			203	1599		10:36	
30. 387	641 651	554 547				201 220		10:38	
31.	1400	749			202	1620		10:54	
32.	1410	748	17		204	1600		10:57	
33. 393	665	544				187		10:59	
4,669	15,117	12,549			4654	4534			

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CHARGING SHEET

DATE 5-17-88 SHIFT I Sh LINE II CHARGER C7M

COKE	DUQ. 660	TRAP 545	LIME		STEEL	TENN 191	OTHER	TIME	COMMENTS
1.	1408	748			203	1599		11:10	
2.	1410	768			200	1612		11:12	
3. 383	642 650	565 544				203 201		11:16	
4.	1400	750			206	1601		11:24	
5.	1449	753			205	1609		11:27	
6. 385	645 655	548 552				161 211		11:29	
7.	1407	751			199	1618		11:44	
8.	1412	752			206	1597		11:48	
9. 400	660 669	546 541				185 199		11:50	
10.	1420	751			210	1609		12:00	
1.	1408	757			205	1590		12:03	
12. 386	651 657	552 543				190 190		12:05	
3.	1408	751			208	1598		12:15	
14.	1414	749			207	1603		12:19	
5. 390	665 660	542 546				189 185		12:20	
16.	1412	752			206	1597		12:35	
7.	1406	750			[illegible]	1606		12:37	
18. 386	656 666	550 543				200 187		12:38	
19.	1414	748			205	1601		12:50	
20.	1401	748			196	1607		12:54	
21. 349	653 650	548 547				206 203		12:59	
22.	1400	752			203	160[illegible]		1:06	
23.	1407	752			201	160[illegible]		1:10	
24. 345	655 627	551 556				194 216		1:14	
25.	1384	757			201	1600		1:25	
26.	1424	753			205	1604		1:29	
27. 390	681 647	548 553				170 201		1:31	
28.	1399	752			199	1600		1:43	
29.	1408	751		11	214	1602		1:47	
30. 394	657 644	537 554				194 198		1:49	
31.	1400	756			202	1598		2:02	
32.	1405	782			210	1622		2:06	
33. 388	622	573				217		2:08	
34. 4274	14422	12,087			4491	4280			

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CHARGING SHEET

DATE 5-17-88 SHIFT I Sh LINE II CHARGER CM

	COKE	DUQ. (655)	TRAP (543)	LIME		STEEL	TENN (220)	OTHER	TIME	COMMENTS
1.		1410	755			212	1630		2:21	
2.		1409	752			205	1605		2:25	
3.	385	651 652	547 549				200 202		2:29	
4.		1402	750			201	1604		2:37	
5.		1397	757			207	1608		2:45	
6.	384	645 640	545 543				211 200		2:48	
7.		1408	748			205	1608		2:57	
8.		1400	748			199	1601		3:00	
9.	387	652 651	549 548				201 205		3:05	
10.		1497	748			200	1604		3:16	
11.		1412	757			206	1608		3:18	
12.	393	655 654	551 547				204 202		3:20	
13.		1403	749			202	1605		3:36	
14.		1407	754			218	1608		3:39	
15.	388	653 643	536 559				201 225		3:41	
16.		1399	756			196	1627		3:50	
17.		1454	753			200	1625		3:52	
18.	386	701 653	553 545				171 185		3:54	
19.		1403	756			211	1597			
20.										
21.										
22.										
23.										
24.					(L)					
25.										
26.										
27.										
28.	2327	4824								
29.		4664	20							
30.		11	78.6							
31.	29									
32.										
33.										
34.	2327	8531	7113			2,665	7633			

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CHARGING SHEET

DATE 5-17-88 SHIFT 2nd LINE II CHARGER [illegible]

	COKE	DUQ.	TRAP	LIME	SFL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	2100	1300	1100		210	400	400		4:05	
2.	2100	1300	[illegible]		210	400	400		4:25	
3.	2100	1300	[illegible]		210	400	400		4:45	
4.	2100	1300	[illegible]		210	400	400		5:05	
5.	2100	1200	1100		210	400	400		5:25	
6.	2100	1300	[illegible]		210	400	400		5:45	
7.	2100	1300	[illegible]		210	400	400		6:05	
8.	2100	1300	[illegible]		210	400	400		6:25	
9.	2100	1300	[illegible]		210	400	400		6:45	
10.	2100	1300	[illegible]		210	400	400		7:05	
11.	2100	1300	[illegible]		210	400	400		7:25	
12.	2100	1300	[illegible]		210	400	400		7:40	
13.	2100	1300	[illegible]		210	400	400		7:55	
14.	2100	1200	[illegible]		210	400	400		8:15	
15.	2100	1300	[illegible]		210	400	400		8:35	
16.	2100	1300	[illegible]		210	400	400		8:55	
17.	2100	1300	[illegible]		210	400	400		9:15	
18.	2100	1300	[illegible]		210	400	400		9:35	
19.	2100	1300	[illegible]		210	400	400		9:50	
20.	2100	1300	1100		210	400	400		10:10	
21.	2100	1300	1100		210	400	400		10:25	
22.	2100	1300	1100		210	400	400		10:40	
23.	2100	1300	1100		210	400	400		11:05	
24.	2100	1300	1100		210	400	400		11:25	
25.	2100	1300	1100		210	400	400		11:45	
26.										
27.					25					
28.										
29.										
30.										
31.										
32.										
33.										
34.	6,500	32,500	27,500		5,250	10,000	10,000			

CHARGING SHEET

DATE 5-17-88 SHIFT 2nd LINE II CHARGER [illegible]

	COKE	DUQ.	TRAP	LIME	ST.	STEEL	TENN	OTHER	TIME	COMMENTS
1.		13	1100							
2.		2								
3.		2								
4.		3	11						1:17	
5.		3							1:35	
6.		2	11						1:53	
7.		2	11						2:11	
8.		3								
9.		13								
10.		2	11						3:11	
11.		13	11						3:32	
12.									3:49	
13.										
14.									4:31	
15.			1100			400			4:50	
16.		1200				400			5:09	
17.		1200	1100				400		5:27	
18.						200			5:39	
19.						400			5:58	
20.										
21.										
22.										
23.									7:14	
24.										
25.										
26.										
27.					94.5					
28.										
29.										
30.										
31.										
32.										
33.										
34.	6,500	31,550	26,950		5250	9,800	9,800			

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Date 5/19/86

American Rockwool, Inc.
Daily Production Report

AVG. 11,655
total 8,988 Bag's

	Bags per Line		67 Line 1		57.5 Line 2	
	#1 today	#2 today	today	MTD average	today	MTD average
Day of Operation			1	8	1	8
Charge (uncorrected)			217,875 #	1,923,986 #	186,683 #	1,914,247 #
Coke (uncorrected) coke			18,465 #	173,245 #	17,460 #	176,415 #
SPL	791.70 AVG	607.58 AVG	19,001 #	112,234 #	14,582 #	110,495 #
Charge/Coke Ratio			5.81	6.73	5.82	6.67
#1 Wool Good Production	4636 ✓	4352 ✓	134,444 #	1,328,954 #	—	—
#2 Wool Good Production		4,097 ✓	—	—	118,813 #	935,379 #
Wool Cryo or Pouring		11 Bales	—	—	7406 #	439,678 #
Recovery %			61,70 %	69,07 %	67,61 %	71.83 %
Percent Efficiency	65,70 %	61.67 %	—	—	—	—
	today OXYGEN	MTD Total	today	MTD Total	today	MTD Total
Hour of Operation Start +	220"		24	192	24	192
Downtime Schedule Used	35"					
Downtime Unschedule B01	185"		210 mins	543 mins	510 mins	577 mins
% Downtime tap out			35 mins	315 mins	—	275 mins
% Downtime						

66 Charges Used #1		57.5 #2		today	MTD today
Tenn. 400	26,655 # ✓	400	22,896 # ✓	49551 ✓	484,219 #
Steel 400	24,909 # ✓	400	23016 # ~~22,896~~ ✓	49985 ~~49,785~~ # ✓	459,452 #
D.U.Q. 1366	~~87,290~~ 87090 # ✓	1300	74,891 # ✓	161981 ~~162,181~~ # ✓	1,668,988 #
Trap 1160	73,724 # ✓	1100	63,186 # ✓	136,911 # ✓	1,200,243 #
St. Louis NR	—		—	—	15,900 #
140 # Core 280 #	16946 # ~~18,465~~ ✓	140 # 280 #	17,460 # ✓	34406 # ~~35,985~~ ✓	349,666 #
450 # SPL 210 #	19,001 # ✓	450 # 210 #	14,582 # ✓	33,583 # ✓	222,729 #
Lime	3,297 # ✓		2834 # ✓	6131 ✓	9431

Comments: (State reason for downtime. List major inoperative equipment. Explain unusual performance. List major charge changes. State critical materials not on hand). # three test. 8:00 AM to 4:00 PM.

1 Line 35 min's tapout. 110 min's Electrical short on Bagger 110 min's to Replace motor on Cupola Blower fan.

2 Line 510 min's Drop Bottom. Back on Line 8:30 PM.

OXYGEN 200 = 12..
185 = 7:30

PRODUCTION REPORT

LINE: I
DATE: 5-19-88

FOREMAN

Charge	lbs.
Coke	140
Duq	1300
Trap	1100
Lime	50
Steel	400
Tenn	400
~~St. Louis~~ SPL	450
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
8-9		294	196		
9-10		294	49		
10-11		294	196		
11-12	876 / 1750	294	275		
12-1		294	294		
1-2		294	245		
2-3		294	245		
3-4		294	245		
Total----------		2352	[illegible]	1745	

Comments:
15 min working on Bagger
20 min working on Bagger
1hr 15 Electrical Short in Bagger

FOREMAN Jack

Charge	lbs.
Coke	140 - 280
Duq	1300 - 1300
Trap	1100 - 1100
Lime	50 - 0
Steel	400 - 400
Tenn	400 - 400
St. Louis	
~~Ky~~ SPL	450 - 210

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
4-5		294	196		
5-6	490 / +2 / 1380	294	196		
6-7		294	147		
7-8		294	0		
8-9		294	98		
9-10		294	245		
10-11		294	245		
11-12		294	245		
Total----------		2352	1372		

Comments:
Tap Out 5 Mins
Off-Line at 6:50
Change Motor ON Cubulo Deck
On-Line at 8:35
Tap Out 7 Mins

FOREMAN

Charge	lbs
Coke	
Duq	
Trap	
Lime	
Steel	
Tenn	
St. Louis	
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
12-1		294	245		
1-2		294	245		
2-3	761	294	245		
3-4	x 2	294	196		
4-5	1522	294	196		
5-6		294	196		
6-7		294	196		
7-8		294			
Total----------		2352	1519		

Comments:
Tap out 8 mins
Tap out 7 mins
Tap out 8 mins
Bagger Cylord was Chang 6:45

COPY-IT PRINTING CO 500

CHARGING SHEET

DATE 5-19-88 SHIFT 1st LINE I CHARGER

COKE	DUQ.	TRAP	LIME	SPL	STEEL	TENN	OTHER	TIME	COMMENTS
1. 140	[illegible]	1100	50	450	400	400		8:00	
2. 140	648	552	30	451		200		8:10	
3.	1400	752	1630	311	200	1600		8:25	
4.	1398	790	1625	453	211	1600		8:29	
5. 144	608 658	589 558	25 23	597		202 193		8:31	
6.	1411	753	1627		195	1604		8:46	
7.	1458	755	1628	309	198	1602		8:48	
8. 141	703 654	557 552	26 22	450		144 159		8:50	
9.	1406	752	1627		200	1605		9:07	
10.	1400	755	1625	445	205	1600		9:09	
11. 145	645 646	550 555	25 20	590		200 204		9:20	
12.	1401	755	1625		200	1605		9:29	
13.	1402	750	1628	447	205	1600		9:31	
14. 140	652 660	550 536	28 8	587		198 191		9:33	
15.	1412	752	1641		216	1603		9:51	
16.	1400	755	1624	443	211	1601		9:53	
17. 148	645 648	544 557	23 26	591		201 196		10:01	
18.	1408	760	1630		203	1604		10:10	
19.	1403	750	1625	452	203	1605		10:14	
20. 146	653 660	547 547	20 29	598		202 196		10:16	
21.	1410	750	1635		203	1606		10:31	
22.	1440	760	1640	456	211	1610		10:39	
23. 144	680 647	549 551	20 30	600		170 197		10:41	
24.	1398	751	1625		200	1595		10:56	
25.	1400	749	1627	463	203	1600		10:59	
26. 144	651 649	546 552	27 21	607		200 202		11:01	
27.	1401	752	1624		200	1603		11:09	
28.	1407	764	1625	448	213	1600		11:15	
29. 148	643 660	551 550	25 22	590		193 193		11:17	
30.	1410	750	1625		200	1603		11:28	
31.	1408	750	1621	454	203	1599		11:33	
32. 138	658 655	547 545	22 25	593		191 197		11:36	
33.	1405	750	1627		205	16[illegible]2		11:52	
2237	1420	747	1625		210	160[illegible]		11:55	

[illegible] 26 [illegible] 4610 [illegible] 4610

COPY-IT PRINTING CO 16

CHARGING SHEET

DATE 5-19-88 SHIFT SOL LINE I CHARGER

	COKE	DUQ.	TRAP	LIME	345	STEEL	TENN	OTHER	TIME	COMMENTS
1.	150	668	547	16	495		189		12:46	
2.		1420	752	1625		205	1609		12:16	
3.		1399	758	1631	350	200	1603		12:19	
4.	143	671 / 652	558 / 553	28 / 26	493		204 / 193		12:20	
5.		1405	759	1624		200	1598		12:30	
6.		1397	750	1623	444	206	1602		12:32	
7.	146	647 / 659	544 / 540	21 / 19	590		205 / 207		1243	
8.		1407	748	1628		208	1614		12:50	
9.		1401	752	1624	438	199	1599		12:51	
10.	147	644 / 665	553 / 550	25 / 24	585		198 / 209		12:54	
11.		1413	748	1626		198	1602		1:11	
12.		1408	747	1625	451	199	1600		1:13	
13.	145	681 / 663	548 / 554	23 / 27	596		197 / 201		1:15	
14.		1417	754	1630		200	1603		1:30	
15.		1419	756	1630	442	196	1624		1:32	
16.	149	623 / 637	560 / 562	26 / 23	591		205 / 199		1:34	
17.		1403	769	1625		207	1602		1:53	
18.		1400	751	1625	442	200	1600		1:55	
19.	240	649 / 680	551 / 520	25 / 31	642		200 / 199		1:57	
20.		1400	720	1630		200	1599		2:14	
21.		1399	750	1625	432	199	1599		2:16	
22.	213	649 / 649	551 / 536	26 / 25	645		200 / 195		2:19	
23.		1405	756	1625		200	1600			
24.		1409	754	1630	444	199	1609		134	
25.	203	655 / 652	555 / 553	21 / 29	647		200 / 193		143	
26.		1405	753	1627		200	1595		300	
27.		1408	750	1623	212	203	1620		303	
28.	260	658	547	3	432	200	212		300	
29.	360	1360	1100	50	210	400	400		3246	
30.	260	1366	1100	50	210	400	400		350	
31.										
32.			(10)							
33.										
34.	2278	14394	12,102	515	4420	4419	4406			

COPY-IT PRINTING C

CHARGING SHEET

DATE 5-19-88 SHIFT 2ND LINE I CHARGER K.M.

	COKE	DUQ.	TRAP	LIME	SPL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	260	1300	1100	50	210	400	400		4:15	
2.	400	650	550	25	210	200	200		4:35	1/2
3.	260	1300	1100	50	210	400	400		4:55	
4.	260	1300	1100	50	210	400	400		5:10	
5.	260	1300	1100	50	210	400	400		5:30	
6.	300	1300	1100	50	210	400	400		5:50	
7.	260	1300	1100	50	210	400	400		6:10	
8.	260	1300	1100	50	210	400	400		6:30	
9.	400	650	550	25	210	200	200		8:30	1/2
10.	350	1300	1100	50	210	400	400		8:55	
11.	350	1300	1100	50	210	400	400		9:15	
12.	350	1300	1100	50	210	400	400		9:30	
13.	280	1300	1100	50	210	400	400		9:45	
14.	280	1300	1100	50	210	400	400		10:05	
15.	280	1300	1100	50	210	400	400		10:25	
16.	280	1300	1100	50	210	400	400		10:45	
17.	280	1300	1100	50	210	400	400		11:00	
18.	280	1300	1100	50	210	400	400		11:20	
19.	280	1300	1100	50	210	400	400		11:35	
20.	280	1300	1100	50	210	400	400		11:52	
21.										
22.					~~20~~					
23.					19					
24.										
25.										
26.										
27.										
28.										
29.										
30.										
31.										
32.										
33.										
34.	5950	24,700	20,900	950	4,200	7600	7,600			

COPY-IT PRINTING CO 1000

CHARGING SHEET

DATE 5-13-99 SHIFT 3rd LINE 1 CHARGER Charlie

	COKE	DUQ.	TRAP	LIME	SPL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	280	1300	1100	50	210	400	400		12:05	
2.	280	1300	1100	50	210	400	400		12:23	
3.	280	1300	1100	50	210	400	400		12:44	
4.	280	1300	1100	50	210	400	400		1:02	
5.	280	1300	1100	50	210	400	400		1:20	
6.	280	1300	1100	50	210	400	400		1:39	
7.	280	1300	1100	50	210	400	400		1:58	
8.	280	1300	1100	50	210	400	400		2:19	
9.	280	1300	1100	50	210	400	400		2:42	
10.	280	1300	1100	50	210	400	400		2:59	
1.	280	1300	1100	50	210	400	400		3:20	
12.	280	1300	1100	50	210	400	400		3:40	
13.	280	1300	1100	50	210	400	400		3:59	
14.	280	1300	1100	50	210	400	400		4:23	
15.	280	1300	1100	50	210	400	400		4:41	
16.	280	1300	1100	50	210	400	400		4:58	
17.	280	1300	1100	50	210	400	400		5:17	
18.	280	1300	1100	50	210	400	400		5:35	
19.	280	1300	1100	50	210	400	400		5:54	
20.	280	1300	1100	50	210	400	400		6:16	
21.	280	1300	1100	50	210	400	400		6:35	
22.	280	1300	1100	50	210	400	400		6:53	
23.	280	1300	1100	50	210	400	400		7:12	
24.	280	1300	1100	50	210	400	400		7:30	
25.	280	1300	1100	50	210	400	400		7:51	
26.										
27.						(25)				
28.										
29.										
30.										
31.										
32.										
33.										
34.	7000	32500	27,500	1250	5250	10,000	10,000			

COPY IT PRINTING CO.

PRODUCTION REPORT

LINE: II

DATE: 5-19-88

FOREMAN Randy

Charge	lbs.
Coke	140
Mug	1300
Trap	1100
Lime	50
Steel	400
Tenn	400
~~St. Louis~~ SPL	450
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
8-9		294	177	11	
9-10		294	245		
10-11		294	245		
11-12	330	294			
12-1	1/660	294			
1-2		294			
2-3		294			
3-4		294			
Total----------		2352	667	11 Bales	

Comments:

DROP bottom

8 1/2 hours

FOREMAN JACK

Charge	lbs.
Coke	260
Mug	1300
Trap	1100
Lime	
Steel	400
Tenn	400
St. Louis	
Ky SPL	210

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
4-5		294			
5-6		294			
6-7	1591	294			
7-8	2/1182	294	98		
8-9		294	245		
9-10		294	294		
10-11		294	294		
11-12		294	245		
Total----------		2352	1176		

Comments:

ON LINE AT 7:35

FOREMAN JACK + RANDY

Charge	lbs
Coke	
Mug	
Trap	
Lime	
Steel	
Tenn	
St. Louis	
Ky	

Shift	Product	Bags per Hour Plan	29 lb	other	Var.
12-1		294	245		
1-2		294	294		
2-3	1142	294	294		
3-4	x 2	294	245		
4-5	2284	294	294		
5-6		294	294		
6-7		294	294		
7-8		294	294		
Total----------		2352	2254		

Comments:

PRINTING CO 500

TIER	BLOWING WOOL	POURING WOOL	CRYOGENIC WOOL
1 51"	700		
2 48"	685		
3 47"	735		
4 46"	790		
5 40"	685		
6 46"	645		
7 48"	635		
8 49"	620		
9 52"	640		
10 50"	635		
11 46'	635		
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
TOTAL			

LOADSHEET

AMERICAN ROCKWOOL, INC.
HWY. 64 EAST ALTERNATE
P. O. BOX 880
SPRING HOPE, NC 27882

TELEPHONE: 919 478 5111
800 682 2968 NC
800 334 0394 OTHER

1 Shift

DATE: 5-19-88

CUSTOMER: _____

INVOICE NO.: _____

CUSTOMER ORDER NO: _____

TRAILER NO.: 5 15 26

DRIVER: _____

11 bale's 7,405# ÷ 29# = 255 Bag's

LOADED BY: Cooper

SUPERVISOR: D. L. M.

CC-2500

CHARGING SHEET

DATE 5-19-88 SHIFT 1st LINE II CHARGER

	COKE	DUQ.	TRAP	LIME	SP	STEEL	TENN	OTHER	TIME	COMMENTS
1	(141)	1314	1190	(5)	(450)	203	[illegible]		7:03	
2.	(140)	650	549	(24)	(452)		200		8:05	
3.		1400	750	1626	(313)	201	1607		8:25	
4.		1400	751	1625	(455)	200	1603		8:26	
5.	(141)	649 644	551 543	(17 18)	596		208 188		2:28	
6.		1517	754	1623		211	1605		8:46	
7.		1407	754	1628	(311)	202	1598		8:48	
8.	(139)	253 647	550 554	(30 26)	450	[illegible]	191 200		8:51	
9.		1400	753	1626		198	1600		9:07	
10.		1401	748	1621	(437)	209	1600		9:13	
11.	(159)	253 647	539 550	(21 25)	587		199 200		9:16	
12.		1398	751	1625		201	1600		9:30	
13.		1400	749	1629	(455)	204	1600		9:33	
14.	(141)	651 651	545 547	(29 20)	596		200 204		9:37	
15.		1399	748	1623		201	1603		9:55	
16.		1401	751	1625	(448)	203	1602		9:58	
17.	(145)	650 649	548 553	(23 24)	593		201 199		9:59	
18.		1405	756	1628		203	1604		10:11	
19.		1400	753	1630	(441)	200	1607		10:13	
20.	(154)	647 652	553 547	(23 31)	595		207 202		10:16	
21.		1402	750	1635		203	1604		10:37	
22.		1400	755	1630	(452)	200	1608		10:38	
23.	(150)	645 650	552 543	(22 25)	602		208 199		10:43	
24.		1401	757	1625		208	1606		11:05	
25.		1400	752	1630	(442)	205	1603		11:08	
26.	(151)	648 656	547 542	(27 16)	593		203 195		11:10	
27.		1414	758	1625		196	1609		11:18	
28.		1407	750	1630	(444)	203	1606		11:20	
29.	(150)	657 673	547 545	(24 23)	594	[illegible]	199 190		11:25	
30.		1420	747	1633		202	1610		11:36	
31.		1407	750	1628	(450)	210	1607	( )	11:42	
32.	(148)	657 660	540 545	(21 28)	598		200 191		11:45	
33.		1409	749	1628		200	1600		11:50	
34.		1400	751	1624	(12)	202	1607		11:53	

1749 649 1407 738 549 1314 (77) 566 <098> 4502 207 4693

COPY-IT PRINTING CO.

CHARGING SHEET

DATE 5-19-88 SHIFT 1ST (SBL) LINE II CHARGER E W

	CORE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1.	149	660	542	19	598		197		11:58	
2.		1407	747	1623	449	205	1604		1230	
3.		1399	758	1630		208	1605		1234	
4.	142	648	555	25	587		204		1240	
5.		1399	747	1625	445	206	1661		1:42	
6.		652	541	54			202			
7.										
8.										
9.										
10.										
11.										
12.							13½			
13.										
14.										
15.										
16.										
17.										
18.										
19.										
20.										
21.										
22.										
23.										
24.										
25.										
26.										
27.										
28.										
29.										
30.										
31.										
32.										
33.										
34.	291	1953	1638	68	894	614	603			

DROP BOTTOM 1:42 P.M.

COPY-IT PRINTING CO

CHARGING SHEET

DATE 5-19-88 SHIFT 2ND LINE II CHARGER Monte K.M.

	COKE	DUQ.	TRAP	LIME		STEEL	TENN	OTHER	TIME	COMMENTS
1	2000									
2.	500	650	550	25	—	200	200	Drop Bottom and Reset		1/2
3.	500	1300	1100	50	—	400	400		—	
4.	500	1300	1100	50	—	400	400		—	
5.	500	1300	1100	50	—	400	400		—	
6.	540	1300	1100	50	—	400	400		7:30	
7.	260	1300	1100	50	210	400	400		7:55	
8.	260	1300	1100	50	210	400	400		8:15	
9.	260	1300	1100	50	210	400	400		8:35	
10.	260	1300	1100	50	210	400	400		8:55	
11.	260	1300	1100	50	210	400	400		9:15	
12.	260	1300	1100	50	210	400	400		9:30	
13.	260	1300	1100	50	210	400	400		9:50	
14.	260	1300	1100	50	210	400	400		10:10	
15.	260	1300	1100	50	210	400	400		10:30	
16.	260	1300	1100	50	210	400	400		10:40	
17.	260	1300	1100	50	210	400	400		10:00	
18.	260	1300	1100	50	210	400	400		11:20	
19.	260	1300	1100	50	210	400	400		11:35	
20.	260	1300	1100	50	400	400	400		11:50	
21.										
22.										
23.										
24.										
25.										
26.										
27.										
28.										
29.										
30.										
31.										
32.										
33.										
34.	8140	24,050	20,350	925	3130	7400	7400			

18 1/2

COPY-IT PRINTING CO 1000

CHARGING SHEET

DATE 5-12-99 SHIFT 3rd LINE E CHARGER Chuck

	COKE	DUQ.	TRAP	LIME	SPL	STEEL	TENN	OTHER	TIME	COMMENTS
1.	280	1300	1100	50	210	400	400		12:14	
2.	280	1300	1100	50	210	400	400		12:32	
3.	280	1300	1100	50	210	400	400		12:54	
4.	280	1300	1100	50	210	400	400		1:13	
5.	280	1300	1100	50	210	400	400		1:31	
6.	280	1300	1100	50	210	400	400		1:50	
7.	280	1300	1100	50	210	400	400		2:09	
8.	280	1300	1100	50	210	400	400		2:28	
9.	280	1300	1100	50	210	400	400		2:46	
10.	280	1300	1100	50	210	400	400		3:05	
1.	280	1300	1100	50	210	400	400		3:23	
12.	280	1300	1100	50	210	400	400		3:41	
3.	280	1300	1100	50	210	400	400		4:00	
14.	280	1300	1100	50	210	400	400		4:19	
5.	280	1300	1100	50	210	400	400		4:37	
16.	280	1300	1100	50	210	400	400		4:58	
7.	280	1300	1100	50	210	400	400		5:17	
18.	280	1300	1100	50	210	400	400		5:35	
9.	280	1300	1100	50	210	400	400		5:54	
20.	280	1300	1100	50	210	400	400		6:12	
1.	280	1300	1100	50	210	400	400		6:31	1/2
22.	280	650	550	25	210	200	200		6:44	✓
3.	280	1300	1100	50	210	400	400		7:02	
24.	280	1300	1100	50	210	400	400		7:20	
5.	280	1300	1100	50	210	400	400		7:39	
26.	280	1300	1100	50	210	400	400		7:58	
27.										
28.										
29.					25.5					
30.										
31.										
32.										
33.										
34.	7280	33,150	28,050	1,275	5,460	10,200	10,200			

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APPENDIX C

Calibrations
- a. Sampling Consoles
- b. Pitots
- c. Thermocouples
- d. Nozzles
- e. Critical Orifices

Alcoa Meter — ZP

DRY GAS METER CALIBRATION DATA

Pretest

Meter box serial number 1287-3081 — check on factory calibration

Calibrated by Lois D. Perine

Date 88-03-31

		Run Number 1	2	3	4	5	
Critical Orifice ID		15/9-1	14/2-1	13/3-1	13/1-1	12/4-1	
Critical Orifice K' factor		0.2917	0.9568	0.5459	0.6319	0.8030	
Dry Gas Meter							
Final reading	ft^3	152.710	156.330	169.095	165.155	174.925	
Initial reading	ft^3	150.800	153.400	165.400	161.000	169.600	
Difference, V_m	ft^3	1.910	2.930	3.695	4.155	5.325	
Inlet/Outlet temperatures							
Initial	°F	76/77	77/77	80/78	79/77	81/78	
Final	°F	76/77	77/77	80/78	80/78	80/79	
Avg. temperature, t_d	°F	76.5	77	79	78.5	80	
Time, θ	min/sec	5 10.24	5 10.59	5 10.27	5 10.27	5 10.27	
	min	5.0040	5.0098	5.0045	5.0045	5.0045	
Orifice man. rdg. ΔH	in. H_2O	0.40	1.10	1.70	2.20	3.60	
Bar. pressure, P_b	in. Hg	29.16	29.16	29.16	29.16	29.16	
Ambient temperature, t_i	°F	75	75	75	75	75	
Pump vacuum	in. Hg	23	21	20	19	17	
$V_{m(std)}$	ft^3	1.8332	2.8144	3.5414	3.9909	5.1184	Avg
$V_{cr(std)}$	ft^3	1.8402	2.8851	3.4442	3.9868	5.0663	
DGM cal. factor, Y		1.0038	1.0251	0.9726	0.9990	0.9898	1.00
Orifice factor, ΔH@		1.6798	1.8773	1.8314	1.8757	1.8718	1.83

Leak check

0 dfm @ 28 in Hg

$$V_{m(std)} = 17.64\, V_m \frac{(P_b + \Delta H/13.6)}{(t_d + 460)}$$

$$V_{cr(std)} = K' \frac{P_b\ \theta}{\sqrt{t_i + 460}}$$

$$Y = \frac{V_{cr(std)}}{V_{m(std)}}$$

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

Alcoa Meter # <F

DRY GAS METER CALIBRATION DATA

Posttest

Meter box number 1287-3081 (Serial)

Calibrated by LD Pernick

Date 88-05-19 post-test

		Run Number 1	2	3	4	5	
Critical Orifice ID		15/4-1	14/2-1	13/3-1	13/1-1	12/4-1	
Critical Orifice K' factor		0.2917	0.4568	0.6319	0.5459	0.8030	
Dry Gas Meter							
Final reading	ft^3	553.110	546.715	543.265	551.040	536.815	
Initial reading	ft^3	551.200	543.700	539.600	546.900	531.500	
Difference, V_m	ft^3	1.910	3.015	3.665	4.140	5.375	
Inlet/Outlet temperatures							
Initial	°F	85/85	85/85	86/85	85/85	87/86	
Final	°F	84/84	85/85	86/85	85/85	88/85	
Avg. temperature, t_d	°F	85	85	85.5	85	87	
Time, θ	min/sec	5/0.24	5/0.07	5/0.27	5/0.26	5/0.27	
	min	5	5	5	5	5	
Orifice man. rdg. ΔH	in. H_2O	0.42	1.10	1.60	2.10	3.60	
Bar. pressure, P_b	in. Hg	29.92	29.92	29.92	29.92	29.92	
Ambient temperature, t_i	°F	84	84	84	84	84	
Pump vacuum	in. Hg	24	22	21	20	17	
$V_{m(std)}$	ft^3	1.85	2.93	3.557	4.03	5.23	Avg
$V_{cr(std)}$	ft^3	1.87	2.93	3.501	4.05	5.15	
DGM cal. factor, Y		1.01	1.00	0.98	1.00	0.98	0.99
Orifice factor, ΔHθ		1.77	1.75	1.73	1.77	1.81	1.77

Leak check

0 cfm @ 28 in Hg

$$V_{m(std)} = 17.64\, V_m \frac{(P_b + \Delta H/13.6)}{(t_d + 460)}$$

$$V_{cr(std)} = K' \frac{P_b\, \theta}{\sqrt{t_i + 460}}$$

$$Y = \frac{V_{cr(std)}}{V_{m(std)}}$$

$$\Delta H\theta = \frac{0.0317\, \Delta H}{P_b\, (t_{d_o} + 460)} \cdot \left[\frac{(t_d + 460)\, \theta}{V_m}\right]^2$$

PITOT CALIBRATION
1988 MAY 09

PITOT P1

	P_{std}	P_s	C_p
SIDE A	.18	.25	.84
	.18	.25	.84
	.17	.24	.83
			AVG. .84
SIDE B	.17	.24	.83
	.17	.24	.83
	.18	.25	.84
			AVG. .835
SIDE A	.43	.60	.84
	.42	.58	.84
	.42	.58	.84
			AVG. .84
SIDE B	.43	.60	.84
	.43	.60	.84
	.42	.59	.835
			AVG. .84

P_{std} = Standard Pitot Tube
P_s = S-Type Pitot Tube

C_p = Pitot Tube Coefficient

$$C_p = .99\sqrt{\frac{P_{std}}{P_s}}$$

TEMPERATURE CALIBRATION

Name Lisa D. Penick Date 88-05-09

Barometric Pressure _____ Land Elevation _____

ICE BATH

Extech pyrometer #1

Hg in Glass Thermometer Temperature				Corrected Hg in Glass Temperature				Temperature Device thermocouple Identification No. 1 Temperature			
°C	°K	°F	°R	°C	°K	°F	°R	°C	°K	°F	°R
1		33						1		31	

BOILING WATER BATH

Hg in Glass Temperature				Corrected Temperature				Device thermocouple No. 1			
°C	°K	°F	°R	°C	°K	°F	°R	°C	°K	°F	°R
100		212						100		212	

MINERAL OIL BATH

Point	Hg in Glass Temperature				Corrected Temperature				Device No.			
	°C	°K	°F	°R	°C	°K	°F	°R	°C	°K	°F	°R
1												
2												
3												
4												

ALCOA

ENVIRONMENTAL CONTROL LABORATORY
NOZZLE CALIBRATION DATA

Nozzle # D-1
Plant Anheuser Busch
Sampling Location Cupola (#2 stack)
Calibrated by L.D. Pennick

Pre-test		Post-test	
Date	88-05-09	Date	88-05-23
Measurement #1	0.290	Measurement #1	0.291
Measurement #2	0.288	Measurement #2	0.289
Measurement #3	0.285	Measurement #3	0.285
AVERAGE	0.288	AVERAGE	0.288

Nozzle # D-2
Plant Anheuser Busch
Sampling Location Cupola (#2 stack)
Calibrated by L.D. Pennick

Pre-test		Post-test	
Date	88-05-09	Date	88-05-23
Measurement #1	0.290	Measurement #1	0.293
Measurement #2	0.295	Measurement #2	0.291
Measurement #3	0.293	Measurement #3	0.294
AVERAGE	0.293	AVERAGE	0.293

DRAFT
DO NOT QUOTE OR CITE

Date 85-06-17 Train ID BB2-130 DGM Cal. Factor 1.008

Critical Orifice ID #15/4-1

			Run Number	
		Example	1	2
Dry Gas Meter				
Final reading	ft^3	887.375	889.383	891.387
Initial reading	ft^3	885.400	887.400	889.400
Difference, V_m	ft^3	1.975	1.983	1.987
Inlet/Outlet temperatures				
Initial	°F	104/91	103/93	104/94
Final	°F	110/93	107/95	108/96
Avg. temperature, t_d	°F	100.25	99.5	100.5
Time, θ	min/sec	5/0.24	5/0.27	5/0.29
	min	5.004	5.0045	5.0048
Orifice man. rdg., ΔH	in. H_2O	0.46	0.46	0.46
Bar. pressure, P_{bar}	in. Hg	28.58	28.58	28.58
Ambient temperature, t_j	°F	97	97	97
Pump vacuum	in. Hg	23	23	23
K' factor		0.2906	0.2922	0.2922
Average			0.2917	

$$K' = \frac{17.64\ V_m\ Y\ (P_{bar} + \Delta H/13.6)\ \sqrt{t_j + 460}}{P_{bar}\ (t_d + 460)\ \theta}$$

Figure 2. Data sheet for determining K' factor.

DRAFT
DO NOT QUOTE OR CITE

Date 85-06-17 Train ID 882-130 DGM Cal. Factor 1.008

Critical Orifice ID #14/2-1

			Run Number	
		Example	1	2
Dry Gas Meter				
Final reading	ft^3	928.090	931.216	934.432
Initial reading	ft^3	925.000	928.100	931.300
Difference, V_m	ft^3	3.090	3.116	3.132
Inlet/Outlet temperatures				
Initial	°F	107/89	112/90	114/92
Final	°F	117/91	119/95	121/95
Avg. temperature, t_d	°F	101	104	105.5
Time, θ	min/sec	5 10.09	5 10.21	5 10.26
	min	5.0015	5.0035	5.0043
Orifice man. rdg., ΔH	in. H_2O	1.20	1.20	1.20
Bar. pressure, P_{bar}	in. Hg	28.55	28.55	28.55
Ambient temperature, t_i	°F	78.8	78.8	79
Pump vacuum	in. Hg	20	20	20
K' factor		0.4559	0.4571	0.4574
Average			0.4568	

$$K' = \frac{17.64\ V_m\ Y\ (P_{bar} + \Delta H/13.6)\ \sqrt{t_i + 460}}{P_{bar}\ (t_d + 460)\ \theta}$$

Figure 2. Data sheet for determining K' factor.

DRAFT
DO NOT QUOTE OR CITE

Date 85-06-17 Train ID BB2-130 DGM Cal. Factor 1.008

Critical Orifice ID #13/3-1

			Run Number	
		Example	1	2
Dry Gas Meter				
Final reading	ft^3	950.555	954.365	958.164
Initial reading	ft^3	946.800	950.600	954.400
Difference, V_m	ft^3	3.755	3.765	3.764
Inlet/Outlet temperatures				
Initial	°F	120/100	121/100	121/100
Final	°F	125/100	125/101	126/102
Avg. temperature, t_d	°F	111.25	111.75	112.25
Time, θ	min/sec	5 10.24	5 10.37	5 10.27
	min	5.004	5.0062	5.0045
Orifice man. rdg., ΔH	in. H_2O	1.8	1.8	1.8
Bar. pressure, P_{bar}	in. Hg	28.55	28.55	28.55
Ambient temperature, t_i	°F	80.6	80.6	80.6
Pump vacuum	in. Hg	20	20	20
K' factor		0.5156	0.5163	0.5159
Average				0.5159

$$K' = \frac{17.64\ V_m\ Y\ (P_{bar} + \Delta H/13.6)\ \sqrt{t_i + 460}}{P_{bar}\ (t_d + 460)\ \theta}$$

Figure 2. Data sheet for determining K' factor.

DRAFT
DO NOT QUOTE OR CITE

Date 85-06-17 Train ID 882-130 DGM Cal. Factor 1.008

Critical Orifice ID # 13/1-1

			Run Number	
		Example	1	2
Dry Gas Meter				
Final reading	ft^3	8.070	12.770	16.875
Initial reading	ft^3	3.700	8.100	12.300
Difference, V_m	ft^3	4.370	4.370	4.575
Inlet/Outlet temperatures				
Initial	°F	123/103	124/103	124/104
Final	°F	126/103	127/103	127/103
Avg. temperature, t_d	°F	113.75	113.75	114
Time, θ	min/sec	5' 10.37"	5' 10.04"	5' 10.39"
	min	5.0062	5.004	5.0065
Orifice man. rdg., ΔH	in. H_2O	2.40	2.40	2.40
Bar. pressure, P_{bar}	in. Hg	28.55	28.55	28.55
Ambient temperature, t_i	°F	78.6	78.6	78.6
Pump vacuum	in. Hg	21	21	21
K' factor		0.6318	0.6319	0.6321
Average				0.6319

$$K' = \frac{17.64\ V_m\ Y\ (P_{bar} + \Delta H/13.6)\ \sqrt{t_i + 460}}{P_{bar}\ (t_d + 460)\ \theta}$$

Figure 2. Data sheet for determining K' factor.

DRAFT
DO NOT QUOTE OR CITE

Date 85-06-17 Train ID 882-130 DGM Cal. Factor 1.008

Critical Orifice ID #12/4-1

			Run Number	
		Example	1	2
Dry Gas Meter				
Final reading	ft^3	23.960	37.165	43.170
Initial reading	ft^3	18.400	29.600	37.600
Difference, V_m	ft^3	5.56	5.565	5.570
Inlet/Outlet temperatures				
Initial	°F	123 / 103	130 / 103	134 / 104
Final	°F	133 / 103	134 / 104	136 / 105
Avg. temperature, t_d	°F	115.25	117.75	119.75
Time, θ	min/sec	5' 10.16	5' 10.30	5' 10.13
	min	5.0027	5.005	5.0022
Orifice man. rdg., ΔH	in. H_2O	4.00	4.00	4.00
Bar. pressure, P_{bar}	in. Hg	28.55	28.55	28.55
Ambient temperature, t_j	°F	78.8	78.8	78.8
Pump vacuum	in. Hg	19	19	19
K' factor		0.6036	0.6025	0.6009
Average			0.6030	

$$K' = \frac{17.64\ V_m\ Y\ (P_{bar} + \Delta H/13.6)\ \sqrt{t_j + 460}}{P_{bar}\ (t_d + 460)\ \theta}$$

Figure 2. Data sheet for determining K' factor.

APPENDIX D

Parameters Sheets
Raw Data
- Method 4075A

PARAMETER SHEET

PLANT Alcoa Rockyard Spring Hope
CITY Spring Hope STATE NC
DATE 88-05-17

RUN 1 METHOD 4075-A
UNIT both
○ INLET
⊗ OUTLET STACK
START TIME 9:25 (AM)/PM
FINISH TIME 10:28 AM/(PM)
METER OPERATOR SVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.93

FILTER NO.
THIMBLE NO. 1

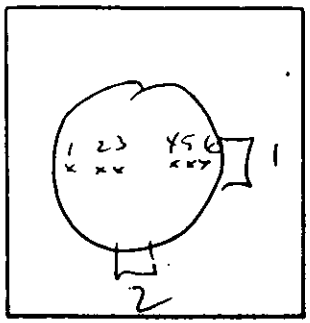
		DATA			RESULTS		
1	Pb	29.84	"Hg	Vmstd	38.28	dscf
2	Static	-0.12	"wc	Vwstd	0.791	scf
3	Vlc	16.8	ml	Bwo	0.02	
4	Mn		g	Md	29.04	lb/lb-mole
5	θ	60	min	Ms	28.92	lb/lb-mole
6	% O_2	18		Vs	24.47	ft/s
7	% CO_2	2		% I	101.4	
8	DH	1.35	"wc	acfm	41500	
9	Cp	0.84		dscfm	38020	
10	Tm	80	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.421	$\sqrt{"wc}$			lb/hr
12	Ts	103	F	SO_2		lb/hr
13	Vm	39.14	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	29.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	K-F	7.6	

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant Spring Hope
Unit# 6th Inlet/Outlet Stack
Operator JJH
Date 88-05-17
Run No. 1
Sample Box No.
Meter Box No. 2P
Meter DH@ 1.33
K Factor 7.31 @ 90/135
Pitot C_p 0.84 Pitot Leak Ck ✓
Leak Rate Before =0= CFM @ 19 Hg
Leak Rate After =0= CFM @ 5 Hg
Static Press., In. H_2O (+) (−) 0.12

Start Time 9:25 AM PM
Finish Time 10:29 AM PM
Meter Yd 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s —
Thimble # 1
Beaker #

Ambient Temperature, °F 70
Barometric Pressure, In. Hg 29.84
Assumed Moisture, % 2
Heater Box Setting N/A
Probe Length, Ft. No.
Nozzle Diameter, In. 0.293
Probe Heater Setting N/A
% O_2 18
% CO_2 2
H_2O, ml
Silica Gel, gm 11.8
Total Vic 16.8
Stack Area, Ft^2 28.27
Pyrometer No.

K: 7.50 75/105

MIN/PT 5

TRAVERSE POINT NUMBER	SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 175.02 GAS SAMPLE VOLUME V_m, Ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m in, °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET T_m out, °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_s, °F	SAMPLE BOX TEMPERATURE T_p, °F
1-1	5	3	102	0.13	1.3	178.40	74	69	39	NA
2	10	3	102	0.19	1.4	181.71	78	71	41	
3	15	4	100	0.21	1.6	185.26	83	72	42	
4	20	4	101	0.21	1.6	188.83	85	73	44	
5	25	3	101	0.19	1.4	192.17	86	75	46	
6	30	2	101	0.10	0.75	194.65	86	76	48	
2-1	35	3	104	0.16	1.2	197.76	93	76	55	
2	40	2	106	0.13	0.98	200.61	86	77	58	
3	45	4	104	0.21	1.6	204.13	98	78	59	
4	50	4	104	0.21	1.6	207.65	87	79	60	
5	55	4	105	0.24	1.8	211.38	86	78	60	
6	60	2	106	0.13	0.98	214.16	86	78	62	
TOTAL			1236	5.056	16.21		AVG. 1008	AVG. 901		
AVERAGE			103	0.421	1.35	39.14	AVG. 80			

PARAMETER SHEET

PLANT Alcoa Rockwood
CITY Sylacauga STATE Al
DATE 88-05-17

RUN 2 METHOD 4075-A
UNIT Both
○ INLET
⊗ OUTLET Stack
START TIME 11:30 (AM)/PM
FINISH TIME 12:33 AM/(PM)
METER OPERATOR JV

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 2

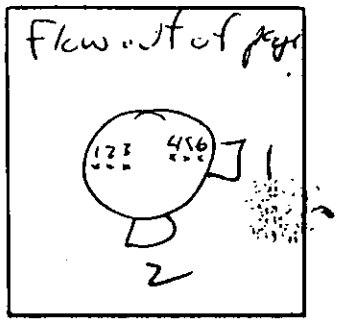
		DATA		RESULTS		
1	Pb	29.84	"Hg	Vmstd	39.09	dscf
2	Static	-0.12	"wc	Vwstd	1.178	scf
3	Vlc	25	ml	Bwo	0.029	
4	Mn		g	Md	28.96	lb/lb-mole
5	θ	60	min	Ms	28.64	lb/lb-mole
6	% O_2	18		Vs	25.66	ft/s
7	% CO_2	1.5		% I	101.1	
8	DH	1.46	"wc	acfm	43520	
9	Cp	0.84		dscfm	38950	
10	Tm	96	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.437	$\sqrt{"wc}$			lb/hr
12	Ts	111	F	SO_2		lb/hr
13	Vm	41.14	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	28.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	K-F	7.59	

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant: Spring Hope
Unit#: 30th Inlet/Outlet: STACK
Operator: JVA
Date: 88-05-17
Run No.: 2
Sample Box No.:
Meter Box No.: 2P
Meter DH@: 1.83
K Factor: 7.56 75/105
Pitot C_p: 0.84 Pitot Leak Ck: ✓
Leak Rate Before: 0.005 CFM @ 15 Hg
Leak Rate After: 0.004 CFM @ 7 Hg
Static Press., In. H_2O (+/-): 0.12

Start Time: 11:50 AM PM
Finish Time: 12:33 AM PM
Meter Y_d: 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s:
Thimble #:
Beaker #:

Ambient Temperature, °F:
Barometric Pressure, In. Hg: 29.94
Assumed Moisture, %: 2.0
Heater Box Setting:
Probe Length, Ft.: No.:
Nozzle Diameter, In.: 0.293
Probe Heater Setting:
% O_2: 18
% CO_2: 1~~2~~
H_2O, ml: ~~15~~ 13
Silica Gel, gm: 12
Total V_{lc}: ~~27~~ 25
Stack Area, Ft²: 28.27
Pyrometer No.:

K = 7.6 @ 95/115

TRAVERSE POINT NUMBER	MIN/PT 5 SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 214.41 GAS SAMPLE VOLUME V_m, Ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m in, °F	OUTLET T_m out, °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_b °F
1-1	5	4	110	0.21	1.6	217.95	96	85	54	N/A
2	10	5	112	0.24	1.8	221.71	100	87	56	
3	15	4	113	0.17	1.3	225.01	101	87	56	
4	20	5	112	0.19	1.4	228.37	99	88	58	
5	25	4	110	0.17	1.3	231.61	101	89	60	
6	30	3	109	0.13	0.99	234.1	102	90	65	
2-1	35	5	110	0.17	1.3	237.75	99	91	66	
2	40	5	110	0.21	1.6	241.32	104	92	67	
3	45	5	110	0.17	1.3	244.61	105	92	68	
4	50	6	111	0.23	1.75	248.31	104	92	70	
5	55	6	110	0.24	1.8	252.09	105	94	71	
6	60	5	110	0.18	1.4	255.55	102	93	71	
TOTAL			1327	5.246	17.54		AVG. 1218	AVG. 1080		
AVERAGE			111	0.437	1.46	41.14	AVG. 96			

We can't wait for tomorrow ALCOA

PARAMETER SHEET

ALCOA

PLANT Am Rockwool
CITY SpHope STATE NC
DATE 88-05-17

RUN 3 METHOD 4075-A
UNIT Both
○ INLET
⊗ OUTLET STACK
START TIME 2:32 AM/PM
FINISH TIME 3:33 AM/PM
METER OPERATOR JVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 3

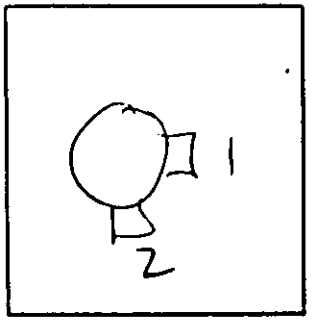
	DATA			RESULTS		
1	Pb	29.84	"Hg	Vmstd	40.45	dscf
2	Static	-0.12	"wc	Vwstd	1.366	scf
3	Vlc	29	ml	Bwo	0.033	
4	Mn		g	Md	28.96	lb/lb-mole
5	θ	60	min	Ms	28.6	lb/lb-mole
6	% O_2	18		Vs	26.26	ft/s
7	% CO_2	1.5		% I	102.6	
8	DH	1.55	"wc	acfm	44540	
9	Cp	0.84		dscfm	39720	
10	Tm	87	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.447	$\sqrt{"wc}$			lb/hr
12	Ts	111	F	SO_2		lb/hr
13	Vm	41.87	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	28.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	K-F	7.41	

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant Spring Hope
Units# Both Inlet/Outlet STACK
Operator SVA
Date 88-05-17
Run No. 3
Sample Box No.
Meter Box No. 2P
Meter DH@ 1.83
K Factor 1.76 96/111
Pitot C_p 0.84 Pitot Leak Ck ✓
Leak Rate Before 0.000 CFM @ 15 Hg
Leak Rate After 0.000 CFM @ 6 Hg
Static Press., In. H_2O (+/-) 0.12

Start Time 2:32 AM (PM)
Finish Time 3:33 AM (PM)
Meter Yd 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s
Thimble #
Beaker #

Ambient Temperature, °F 80
Barometric Pressure, In. Hg 29.44
Assumed Moisture, % 2
Heater Box Setting
Probe Length, Ft. No.
Nozzle Diameter, In. 0.293
Probe Heater Setting
% O_2 18
% CO_2 1.5
H_2O, ml 13
Silica Gel, gm 16
Total Vlc 29
Stack Area, Ft^2 28.27
Pyrometer No.

MIN/PT 5 — Initial Volume: 255.64

TRAVERSE POINT NUMBER	SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	GAS SAMPLE VOLUME V_m, Ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER		TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_p, °F
							INLET T_m In, °F	OUTLET T_m out, °F		
1-1	5	3	113	0.23	1.8	259.43	88	85	56	N/A
2	10	4	112	0.26	2.00	263.35	90	84	58	
3	15	3	113	0.20	1.5	266.84	91	84	59	
4	20	2	112	0.15	1.2	270.00	91	84	59	
5	25	3	111	0.21	1.6	273.52	91	84	60	
6	30	2	110	0.11	0.85	276.20	91	84	60	
2-1	35	3	109	0.22	1.7	279.85	88	83	58	
2	40	3	111	0.2	1.5	283.30	91	83	58	
3	45	3	110	0.2	1.5	286.72	91	83	59	
4	50	4	110	0.25	1.9	290.55	91	83	60	
5	55	4	109	0.25	1.9	294.38	90	82	59	
6	60	3	108	0.15	1.2	297.51	90	82	60	✓
TOTAL			1328	5.365	18.65		AVG. 1003	AVG. 1001		
AVERAGE			111	0.447	1.55	41.87	AVG. 87			

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PARAMETER SHEET

ALCOA

PLANT Am Rockwool
CITY Sp Hope STATE NC
DATE 88-05-18

RUN 4 METHOD 4075-A
UNIT Both
○ INLET
⊗ OUTLET STACK
START TIME 9:01 AM/PM
FINISH TIME 10:03 AM/PM
METER OPERATOR JVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 4

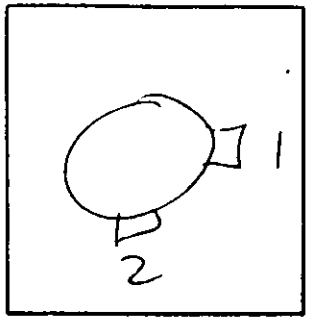
	DATA			RESULTS		
1	Pb	29.8	"Hg	Vmstd	35.85	dscf
2	Static	-0.11	"wc	Vwstd	0.942	scf
3	Vlc	20	ml	Bwo	0.026	
4	Mn		g	Md	28.88	lb/lb-mole
5	θ	60	min	Ms	28.6	lb/lb-mole
6	% O_2	18		Vs	22.91	ft/s
7	% CO_2	1		% I	100.3	
8	DH	1.21	"wc	acfm	38860	
9	Cp	0.84		dscfm	36000	
10	Tm	76	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.396	$\sqrt{"wc}$			lb/hr
12	Ts	93	F	SO_2		lb/hr
13	Vm	36.45	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	28.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	KF	7.59	

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant Spring Hope
Unit# both Inlet/Outlet STACK
Operator JVH
Date 9-02-16
Run No. 4
Sample Box No.
Meter Box No. 2P
Meter DH@ 1.63
K Factor 7.57 @ 110/90/2.5
Pitot C_p 0.84 Pitot Leak Ck ✓
Leak Rate Before 0.002 CFM @ 15 Hg
Leak Rate After 0.000 CFM @ 6 Hg
Static Press., In. H_2O (+/-) 0.11

Start Time 9:00 AM PM
Finish Time 10:03 AM PM
Meter Y_d 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s
Thimble # 4
Beaker #

Ambient Temperature, °F 62
Barometric Pressure, In. Hg 29.90
Assumed Moisture, % 2.5
Heater Box Setting
Probe Length, Ft. No.
Nozzle Diameter, In. 0.293
Probe Heater Setting
% O_2 18
% CO_2 1
H_2O, ml 10
Silica Gel, gm 10
Total Vlc 20
Stack Area, Ft^2 2.27
Pyrometer No.

7.57 110/90/2.5

TRAVERSE POINT NUMBER	MIN/PT. SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 297.92 GAS SAMPLE VOLUME V_m, Ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m in, °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET T_m out, °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_p, °F
1-1	5	3	90	0.18	1.4	301.13	72	62	58	N/A
2	10	4	90	0.22	1.7	304.70	79	64	58	
3	15	3	91	0.2	1.5	308.10	80	64	58	
4	20	2	92	0.12	0.9	310.80	80	67	58	
5	25	3	92	0.18	1.4	314.04	80	67	58	
6	30	2	90	0.08	0.60	316.48	83	68	58	
2-1	35	3	93	0.17	1.3	319.50	77	69	57	
2	40	3	95	0.15	1.1	322.40	84	70	58	
3	45	3	95	0.15	1.1	325.31	86	72	59	
4	50	4	96	0.21	1.6	328.83	89	74	59	
5	55	3	98	0.16	1.2	331.95	90	75	59	
6	60	2	96	0.1	0.75	334.37	91	77	59	
TOTAL			1118	4.755	14.55		AVG. 99.1	AVG. 92.9		
AVERAGE			(93)	(0.396)	(1.21)	(36.45)	AVG. (76)			

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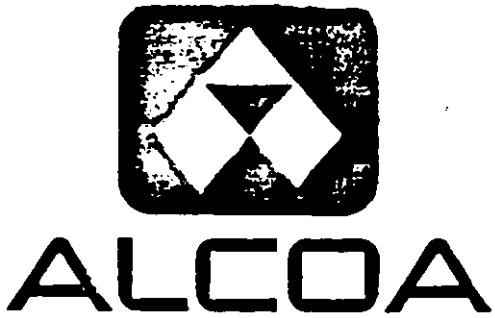
L : 7.56

PARAMETER SHEET



PLANT Am Rockwood
CITY Mt Hope STATE NC
DATE 88-05-18

RUN 5 METHOD 4075-A
UNIT Bolt
○ INLET
⊗ OUTLET STACK
START TIME 11:01 (AM)/PM
FINISH TIME 12:02 AM/(PM)
METER OPERATOR JVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 5

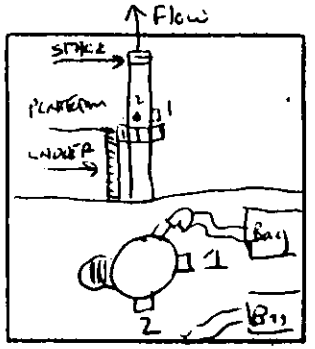
		DATA		RESULTS		
1	Pb	29.8	"Hg	Vmstd	37.84	dscf
2	Static	-0.17	"wc	Vwstd	1.107	scf
3	Vlc	23.5	ml	Bwo	0.028	
4	Mn		g	Md	28.88	lb/lb-mole
5	θ	60	min	Ms	28.57	lb/lb-mole
6	% O_2	18		Vs	24.49	ft/s
7	% CO_2	1		% I	100.8	
8	DH	1.35	"wc	acfm	41530	
9	Cp	0.84		dscfm	37820	
10	Tm	86	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.420	$\sqrt{"wc}$			lb/hr
12	Ts	101	F	SO_2		lb/hr
13	Vm	39.17	ft^3	Gaseous F		lb/hr
14	Dn	0.243	in	Particulate F		lb/hr
15	As	28.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	KF	7.59	

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant Spring Hope
Unit# 6th Inlet/Outlet STACK
Operator SJA
Date 88-05-18
Run No. 5
Sample Box No.
Meter Box No. 2P
Meter DH@ 1.93
K Factor 3.5 @ 110/90
Pitot C_p 0.84 Pitot Leak Ck ✓
Leak Rate Before 0.001 CFM @ 15 Hg
Leak Rate After -0- CFM @ 3 Hg
Static Press., In. H_2O (+) (-) 0.17

Start Time 11:01 AM PM
Finish Time 12:02 AM PM
Meter Y_d 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s
Thimble # 5
Beaker #

Ambient Temperature, °F
Barometric Pressure, In. Hg 29.8
Assumed Moisture, % 2.4
Heater Box Setting
Probe Length, Ft. No.
Nozzle Diameter, In. 0.297
Probe Heater Setting
% O_2 18
% CO_2 1
H_2O, ml 20
Silica Gel, gm 13.5
Total Vlc 23.5
Stack Area, Ft^2 28.27
Pyrometer No.

TRAVERSE POINT NUMBER	SAMPLING TIME θ, min. (MIN/PT)	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	GAS SAMPLE VOLUME V_m, Ft^3 (Initial Volume: 334.56)	GAS SAMPLE TEMPERATURE AT DRY GAS METER: INLET T_m In. °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER: OUTLET T_m out. °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_b, °F
1-1	5	2	100	0.12	0.9	337.38	87	81	56	N/A
2	10	4	102	0.23	1.7	340.92	93	82	55	
3	15	4	102	0.21	1.6	344.45	90	81	57	
4	20	3	101	0.16	1.2	347.59	92	81	56	
5	25	3	101	0.16	1.2	350.66	91	83	57	
6	30	3	102	0.12	0.9	353.40	93	82	59	
2-1	35	3	100	0.16	1.2	356.46	88	82	60	
2	40	4	100	0.21	1.6	360.04	89	82	58	
3	45	4	100	0.2	~~1.5~~ 1.5	363.52	98	82	57	
4	50	4	99	0.21	1.6	367.09	90	83	58	
5	55	4	100	0.18	1.4	370.42	91	82	59	
6	60	4	99	0.18	1.4	373.73	92	83	60	
TOTAL			1206	5.043	16.2		AVG. 1054	AVG. 984		
AVERAGE			101	0.420	1.35	39.17	AVG. 86			

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PARAMETER SHEET

ALCOA

PLANT Am Rockwool
CITY Sylvope STATE NC
DATE 88-05-18

RUN 6 METHOD 4075-A
UNIT Both
○ INLET
⊗ OUTLET STACK
START TIME 12:52 AM/PM
FINISH TIME 1:53 AM/PM
METER OPERATOR SVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 6

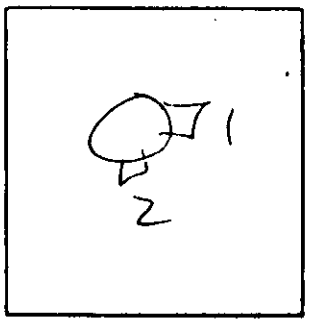
	DATA			RESULTS		
1	Pb	29.8	"Hg	Vmstd	36.27	dscf
2	Static	-0.15	"wc	Vwstd	1.107	scf
3	Vlc	23.5	ml	Bwo	0.03	
4	Mn		g	Md	28.9	lb/lb-mole
5	θ	60	min	Ms	28.58	lb/lb-mole
6	% O_2	18.5		Vs	23.54	ft/s
7	% CO_2	1		% I	101.5	
8	DH	1.23	"wc	acfm	39920	
9	Cp	0.84		dscfm	35980	
10	Tm	90	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.402	$\sqrt{"wc}$			lb/hr
12	Ts	106	F	SO_2		lb/hr
13	Vm	37.83	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	28.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	K-F	7.56	

PARTICULATE TESTING RAW DATA SET

ALCOA

Plant Spring Hall
Unit# 35th Inlet/Outlet STACK
Operator SVA
Date 08-05-15
Run No. 6
Sample Box No. ____
Meter Box No. 2P
Meter DH@ 1.93
K Factor 7.5
Pitot C_p 0.84 Pitot Leak Ck ✓
Leak Rate Before -0- CFM @ 15 Hg
Leak Rate After -0- CFM @ 7 Hg
Static Press., In. H_2O (+/-) 0.15

Start Time 12:52 AM/PM
Finish Time 1:53 AM/PM
Meter Yd 1.000



SCHEMATIC OF TESTING LOCATION

Filter #'s ____
Thimble # 6
Beaker # ____

Ambient Temperature, °F ____
Barometric Pressure, In. Hg 29.3
Assumed Moisture, % 2.8
Heater Box Setting ____
Probe Length, Ft. ____ No. ____
Nozzle Diameter, In. 0.293
Probe Heater Setting ____
% O_2 18.5
% CO_2 1
H_2O, ml 12
Silica Gel, gm 11.5
Total V_{lc} 23.5
Stack Area, Ft^2 28.27
Pyrometer No. ____

TRAVERSE POINT NUMBER	MIN/PT ____ SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 373.82 GAS SAMPLE VOLUME V_m, Ft^3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m In, °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET T_m out, °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_b °F
1-1	5	2	101	0.15	1.1	376.88	90	84	60	N/A
2	10	2	102	0.17	1.3	380.11	97	85	60	
3	15	3	102	0.19	1.4	383.46	100	86	57	
4	20	3	103	0.19	1.4	386.78	103	89	57	
5	25	3	105	0.16	1.2	389.94	104	91	58	
6	30	2	105	0.08	0.6	392.25	102	90	58	
2-1	35	3	105	0.17	1.3	395.51	99	90	57	
2	40	3	108	0.17	1.3	398.77	100	90	59	
3	45	3	109	0.19	1.4	402.13	100	91	60	
4	50	3	110	0.16	1.2	405.29	102	91	60	
5	55	3	110	0.18	1.4	408.62	98	90	60	
6	60	3	110	0.15	1.1	411.65	102	90	60	✓
TOTAL			1269	4.826	14.7		AVG. 1193	AVG. 977		
AVERAGE			(106)	(0.402)	(1.23)	(37.83)	AVG. (90)			

PARAMETER SHEET

ALCOA

PLANT Am Packwood
CITY So Hope STATE NC
DATE 98-05-18

RUN 7 METHOD 4075-A
UNIT Both
○ INLET
⊗ OUTLET STACK
START TIME 3:30 AM/PM
FINISH TIME 4:31 AM/PM
METER OPERATOR JVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 7

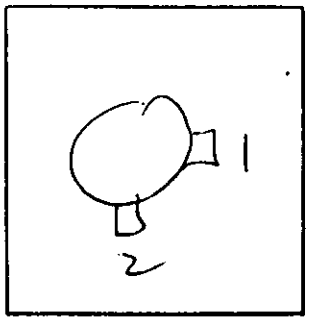
		DATA			RESULTS		
1	Pb	29.9	"Hg	Vmstd	38.83	dscf	
2	Static	-0.14	"wc	Vwstd	0.989	scf	
3	Vlc	21	ml	Bwo	0.025		
4	Mn		g	Md	29.02	lb/lb-mole	
5	θ	60	min	Ms	28.75	lb/lb-mole	
6	% O_2	19.5		Vs	25.53	ft/s	
7	% CO_2	1.5		% I	99.9		
8	DH	1.46	"wc	acfm	43310		
9	Cp	0.84		dscfm	39160		
10	Tm	89	F	Particulate		gr/dscf	
11	$\sqrt{Dp}$	0.437	$\sqrt{"wc}$			lb/hr	
12	Ts	107	F	SO_2		lb/hr	
13	Vm	40.41	ft^3	Gaseous F		lb/hr	
14	Dn	0.293	in	Particulate F		lb/hr	
15	As	25.27	ft^2	Total F		lb/hr	
16	Yd	1.00	cf/cf	K-F	7.59		

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant Spring HAAP
Unit# Kiln Inlet/Outlet STACK
Operator JVA
Date 09-05-18
Run No. 7
Sample Box No.
Meter Box No. 2P
Meter DH@ 1.83
K Factor ~~7.5~~ 7.5
Pitot C_p 0.84 Pitot Leak Ck ✓
Leak Rate Before 0.005 CFM @ 15 Hg
Leak Rate After 0.003 CFM @ 7 Hg
Static Press., in. H_2O (+/-) ~~0.~~ 0.14

Start Time 3:30 AM/PM
Finish Time 4:31 AM/PM
Meter Yd 1.02



SCHEMATIC OF TESTING LOCATION

Filter #'s
Thimble # 7
Beaker #

Ambient Temperature, °F
Barometric Pressure, In. Hg 29.60
Assumed Moisture, % 2.8
Heater Box Setting
Probe Length, Ft. No.
Nozzle Diameter, In. 0.293
Probe Heater Setting
% O_2 19.5
% CO_2 1.5
H_2O, ml 10
Silica Gel, gm 11
Total Vic 21
Stack Area, Ft² 28.27
Pyrometer No.

TRAVERSE POINT NUMBER	MIN/PT 5 SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 411.74 GAS SAMPLE VOLUME V_m, Ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m in, °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET T_m out, °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_p, °F
1-1	5	3	110	0.18	1.4	415.02	93	85	60	N/A
2	10	3	108	0.18	1.4	418.30	93	85	60	
3	15	3	107	0.20	1.5	421.70	95	85	61	
4	20	4	107	0.21	1.6	425.25	96	85	61	
5	25	3	108	0.13	0.98	428.13	97	85	62	
6	30	3	106	0.13	0.98	431.08x	95	85	63	
2-1	35	4	106	0.21	1.6	434.48	92	85	62	
2	40	5	108	0.23	1.7	438.08	94	84	63	
3	45	4	107	0.18	1.4	441.44	95	85	63	
4	50	5	105	0.23	1.7	445.08	96	86	64	
5	55	5	106	0.23	1.7	448.71	94	85	63	
6	60	4	105	0.2	1.5	452.15	94	85	64	
TOTAL			1283	5.214	17.46		AVG. 1126	AVG. 1020		
AVERAGE			(107)	(0.437)	(1.46)	(40.41)	AVG. (89)			

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PARAMETER SHEET

ALCOA

PLANT Am Rockwood
CITY S Hope STATE NC
DATE 88-05-19

RUN 8 METHOD 9075-A
UNIT Both
○ INLET
⊗ OUTLET STACK
START TIME 9:20 (AM)/PM
FINISH TIME 10:21 AM/(PM)
METER OPERATOR SVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 8

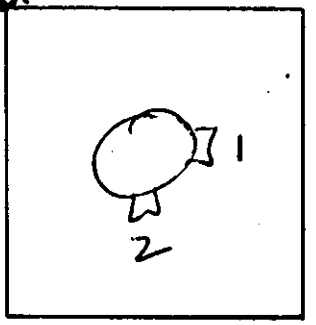
		DATA		RESULTS		
1	Pb	29.92	"Hg	Vmstd	37.78	dscf
2	Static	-0.14	"wc	Vwstd	0.966	scf
3	Vlc	20.5	ml	Bwo	0.025	
4	Mn		g	Md	29.00	lb/lb-mole
5	θ	60	min	Ms	28.73	lb/lb-mole
6	% O_2	19.0		Vs	24.24	ft/s
7	% CO_2	1.5		% I	99.8	
8	DH	1.35	"wc	acfm	41110	
9	Cp	0.84		dscfm	38130	
10	Tm	87	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.420	$\sqrt{"wc}$			lb/hr
12	Ts	95	F	SO_2		lb/hr
13	Vm	39.03	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	28.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	K-F(wet)	7.50	

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant: SJ Hope
Unit#: 6th Inlet/Outlet: STACK
Operator: JVA
Date: 88-05-[illegible] -19
Run No.: 8
Sample Box No.:
Meter Box No.: 2P
Meter DH@: 1.83
K Factor: 7.5
Pitot C_p: 0.84 Pitot Leak Ck: ✓
Leak Rate Before: 0.005 CFM @ 15 Hg
Leak Rate After: -0- CFM @ 6 Hg
Static Press., In. H_2O (+/-): 0.14

Start Time: 9:20 AM PM (E.D.T.)
Finish Time: 10:21 AM PM
Meter Y_d: 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s:
Thimble #: 8
Beaker #:

Ambient Temperature, °F:
Barometric Pressure, In. Hg: 29.92
Assumed Moisture, %: 2.8
Heater Box Setting:
Probe Length, Ft.: No.:
Nozzle Diameter, In.: 0.293
Probe Heater Setting:
% O_2: 19
% CO_2: 1.5
H_2O, ml: 10
Silica Gel, gm: 10.5
Total V_{lc}: 20.5
Stack Area, Ft²: 28.27
Pyrometer No.:

TRAVERSE POINT NUMBER	MIN/PT 5 SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 452.24 GAS SAMPLE VOLUME V_m, Ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m in, °F	OUTLET T_m out, °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_p °F
1-1	5	3	94	0.22	1.7	455.87	83	75	60	N/A
2	10	3	95	0.22	1.7	459.47	90	78	60	
3	15	2	96	0.15	1.1	462.42	94	79	59	
4	20	3	95	0.19	1.4	465.70	93	80	60	
5	25	4	95	0.23	1.7	469.32	94	82	60	
6	30	2	94	0.12	0.90	472.07 x	94	82	60	
2-1	35	2	95	0.13	0.98	474.90	93	84	62	
2	40	3	96	0.18	1.4	478.26	96	85	62	
3	45	4	95	0.2	1.5	481.72	95	85	62	
4	50	4	95	0.2	1.5	485.17	95	85	62	
5	55	3	94	0.14	1.1	488.17	94	84	62	
6	60	3	93	0.16	1.2	491.27 x	93	84	62	
TOTAL			1137	5.041	16.18		AVG. 1114	AVG. 983		
AVERAGE			95	0.420	1.35	39.03	AVG. 87.375			

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PARAMETER SHEET

ALCOA

PLANT Am Rockwood
CITY S. Hope STATE NC
DATE 88-05-19

RUN 9 METHOD 4075-A
UNIT Both
○ INLET
⊗ OUTLET STACK
START TIME 11:09 (AM)/PM
FINISH TIME 12:09 AM/(PM)
METER OPERATOR JVA

COMMENTS:

METER BOX NO. 2P
DH @ 1.83

FILTER NO.
THIMBLE NO. 9

		DATA			RESULTS		
1	Pb	29.92	"Hg	Vmstd	36.8	dscf
2	Static	-0.14	"wc	Vwstd	1.06	scf
3	Vlc	22.5	ml	Bwo	0.028	
4	Mn		g	Md	28.88	lb/lb-mole
5	θ	60	min	Ms	28.58	lb/lb-mole
6	% O_2	18		Vs	23.41	ft/s
7	% CO_2	1		% I	100.8	
8	DH	1.27	"wc	acfm	39710	
9	Cp	0.84		dscfm	36780	
10	Tm	86	F	Particulate		gr/dscf
11	$\sqrt{Dp}$	0.405	$\sqrt{"wc}$			lb/hr
12	Ts	94	F	SO_2		lb/hr
13	Vm	37.95	ft^3	Gaseous F		lb/hr
14	Dn	0.293	in	Particulate F		lb/hr
15	As	29.27	ft^2	Total F		lb/hr
16	Yd	1.00	cf/cf	K-F	7.7	

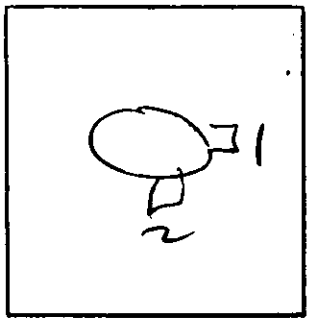
used - 7.5

PARTICULATE TESTING
RAW DATA SET

ALCOA

Plant: Spring Hope
Unit#: Both Inlet/Outlet: Stack
Operator: SJA
Date: 09-05-19
Run No.: 2
Sample Box No.:
Meter Box No.: 2P
Meter DH@: 1.83
K Factor: 3.5
Pitot C_p: 0.84 Pitot Leak Ck: ✓
Leak Rate Before: 0.003 CFM @ 15 Hg
Leak Rate After: 0.003 CFM @ 9 Hg
Static Press., In. H_2O (+/-): 0.94

Start Time: 11:09 AM PM
Finish Time: 12:09 AM PM
Meter Y_d: 1.00



SCHEMATIC OF TESTING LOCATION

Filter #'s:
Thimble #: 9
Beaker #:

Ambient Temperature, °F:
Barometric Pressure, In. Hg: 29.92
Assumed Moisture, %: 2.8
Heater Box Setting:
Probe Length, Ft.: No.:
Nozzle Diameter, In.: 0.293
Probe Heater Setting:
% O_2: 18
% CO_2: 1
H_2O, ml: 12
Silica Gel, gm: 10.5
Total Vlc: 22.5
Stack Area, Ft²: 28.27
Pyrometer No.:

MIN/PT:

TRAVERSE POINT NUMBER	SAMPLING TIME θ, min.	VACUUM In. Hg	STACK TEMPERATURE T_s, °F	VELOCITY HEAD DP_s	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER DH, In. H_2O	Initial Volume: 491.36 GAS SAMPLE VOLUME V_m, Ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET T_m in. °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET T_m out. °F	TEMP. OF GAS LEAVING CONDENSER OR LAST IMPINGER T_c, °F	SAMPLE BOX TEMPERATURE T_b, °F
1-1	5	3	94	0.18	1.4	494.71	77	75	51	N/A
2	10	4	94	0.21	1.6	498.20	82	75	44	
3	15	4	94	0.16	1.2	501.24	84	76	48	
4	20	4	92	0.18	1.4	504.58	86	76	52	
5	25	4	95	0.18	1.4	507.89	90	78	54	
6	30	3	92	0.10	0.75	510.40	91	79	56	
2-1	35	4	92	0.14	1.1	513.34	90	80	56	
2	40	5	93	0.18	1.4	516.67	96	82	58	
3	45	5	94	0.18	1.4	520.02	99	84	59	
4	50	5	95	0.20	1.5	523.50	104	87	59	
5	55	4	96	0.15	1.1	526.45	101	87	60	
6	60	3	96	0.13	0.98	529.31	98	87	60	
TOTAL			1129	4.865	15.23		AVG. 1098	AVG. 966		
AVERAGE			(94)	(0.405)	(1.27)	(37.95)	AVG. (86)			

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APPENDIX E

Laboratory Data
- Method 4075A
  - Nozzle
  - Thimble
  - Impinger
  - Particulate

****
* FINAL REPORT *
****

J.O. : 88-052325 NO. SAMP. : 28 APPROVED : 88-06-03

SUBMITTED BY : L.D.PENIX PHONE : 2572
LOCATION : ENVIRONMENTAL CONTROL LAB
SHOP ORDER : 14H1000891 TID :
SYSTEM ID. : SPRING HOPE 4075A'S AM. ROCKWOOL
PROJ. LEADER : JOE GIBB PHONE : 2597

REPORT CC : L.C.BLAYDEN,J.E.GIBB,J.V.APICELLA

LSN	SAMPLE IDENTIFICATION
816041	539363 IMPINGERS 1
816042	539364 IMPINGERS 2
816043	539365 IMPINGERS 3
816044	539366 IMPINGERS 4
816045	539367 IMPINGERS 5
816046	539368 IMPINGERS 6
816047	539369 IMPINGERS 7
816048	539370 IMPINGERS 8
816049	539371 IMPINGERS 9
816052	539374 BLANK
816053	539375 NOZZLE 1
816054	539376 NOZZLE 2
816055	539377 NOZZLE 3
816056	539378 NOZZLE 4
816057	539379 NOZZLE 5
816058	539380 NOZZLE 6
816059	539381 NOZZLE 7
816060	539382 NOZZLE 8
816061	539383 NOZZLE 9
816064	539386 THIMBLE 1
816065	539387 THIMBLE 2
816066	539388 THIMBLE 3
816067	539389 THIMBLE 4
816068	539390 THIMBLE 5
816069	539391 THIMBLE 6
816070	539392 THIMBLE 7
816071	539393 THIMBLE 8
816072	539394 THIMBLE 9

N.D. (OR ND) = NOT DETECTED
- (OR BLANK) = NOT DETERMINED

AREA: 201 - FLUORIDE LAB

APPROVED:88-06-03

ANALYSIS: FLUORIDE

UNITS:TOTAL MG

LSN/ID	FLUORIDE
816041 539363 IMP INGERS 1	1.2
816042 539364 IMP INGERS 2	4.8
816043 539365 IMP INGERS 3	4.9
816044 539366 IMP INGERS 4	12.8
816045 539367 IMP INGERS 5	46.9 mg.
816046 539368 IMP INGERS 6	87.2
816047 539369 IMP INGERS 7	66.0
816048 539370 IMP INGERS 8	26.0
816049 539371 IMP INGERS 9	37.5
816052 539374 BLA NK	#

ANALYSIS: FLUORIDE

UNITS:TOTAL MG

LSN/ID	FLUORIDE
816053 539375 NOZ ZLE 1	0.2
816054 539376 NOZ ZLE 2	0.2
816055 539377 NOZ ZLE 3	0.1
816056 539378 NOZ ZLE 4	0.7
816057 539379 NOZ ZLE 5	0.6
816058 539380 NOZ ZLE 6	0.3
816059 539381 NOZ ZLE 7	0.2
816060 539382 NOZ ZLE 8	0.2
816061 539383 NOZ ZLE 9	0.3

ANALYSIS: TOTAL PARTICULATE FLUORIDE

UNITS:TOTAL MG

LSN/ID	TOTAL PARTICULATE FLUORIDE
816064 539386 THI MBLE 1	1.6
816065 539387 THI MBLE 2	1.8
816066 539388 THI MBLE 3	1.9
816067 539389 THI MBLE 4	4.3
816068 539390 THI MBLE 5	5.8
816069 539391 THI MBLE 6	5.8
816070 539392 THI MBLE 7	6.6 + 66 + .2 = 72.8 mg .0728 g
816071 539393 THI MBLE 8	6.1 + 26.0 + .2 = 32.3 mg. .0323 g
816072 539394 THI MBLE 9	6.7

COMMENTS:

SAMPLES WERE ANALYZED BY METHODS 913C (DISTILLATION) AND 914F (SIE)

DUPLICATE:	RUN 1 MG/L	RUN 2 MG/L
LSN#816047	122	123

SPIKE: LSN# 816045 - 5ML OF A 1000 MG/L FLUORIDE STD WAS ADDED TO 50 ML OF SAMPLE IN THE DISTILLATION FLASK. FINAL DISTILLATION VOLUME WAS 500 ML.

SPIKED SAMPLE ANALYSIS	200.8 MG/L
UNSPIKED SAMPLE ANALYSIS	99.9 MG/L
RECOVERED FLUORIDE	100.9 MG/L
ADDED FLUORIDE	100.0 MG/L
% RECOVERY	101 %

- NO VOLUME WAS RECEIVED ON LSN# 816052 (CAUSTIC BLANK)
THE FLUORIDE RESULT WAS 0.3 MG/L

NOZZLE WASH DUPLICATE:	RUN1 MG/L	RUN2 MG/L
LSN# 816055	1.6	1.6

SPIKE: LSN# 816058 - 5 ML OF A 1000 MG/L FLUORIDE STD WAS ADDED TO 50 ML OF SAMPLE IN DISTILLATION FLASK. FINAL DILUTION VOLUME WAS 500 ML.

SPIKED SAMPLE ANALYSIS	103.5 MG/L
UNSPIKED SAMPLE ANALYSIS	2.6 MG/L
RECOVERED FLUORIDE	100.9 MG/L
ADDED FLUORIDE	100.0 MG/L
% RECOVERY	101 %

SMALL BLK THIMBLE - 0.1 TOTAL MG FLUORIDE
SPIKE: .1050 G NAF WAS ADDED TO A BLK THIMBLE. TO ALL THIMBLES .5G CAO WAS ADDED. ALL WERE ASHED, FUSED WITH NAOH, DISTILLED AND ANALYZED SIE.
47.5 MG OF FLUORIDE WAS ADDED TO THE THIMBLE - 48.0 MG OF FLUORIDE WAS RECOVERED OR 101 %

LAB REFERENCES: 2760:213, 2760:214, 2760:215

ANALYST(S): SANDRA DEISEROTH

****

APPROVED BY: NORMA J. HORNUNG
FINAL APPROVED BY: NANCY M. FITZGERALD

*** END OF REPORT ***

ALCOA

BALANCE Sartorius
OPERATOR J.D. Penix
DATE 88-05-09
SHEET 1 OF 1

PLANT American Rockwool
LOCATION stack
UNIT cupola (+2)
RUN 1-9

RUN #	IDENTIFICATION NUMBER	F B	WASH ML	WASH CORR.	GROSS WT.	TARE WT.	NET WT.	FILTER DESCRIPTION
1	1	T			1.8070	1.7960	0.0110	
2	2	T			1.2382	1.2277	0.0105	
3	3	T			1.3399	1.3332	0.0067	
4	4	T			1.3038	1.2964	0.0074	
5	5	T			1.3924	1.3781	0.0143	
6	6	T			2.0481	2.0322	0.0159	
7	7	T			1.6432	1.6254	0.0178	
8	8	T			1.4941	1.4811	0.0130	
9	9	T			2.0535	2.0397	0.0138	