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Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

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Emission Test Report Gold Bond Building Products Richmond, California

GYPSUM
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AP-42 Section 8.14
Reference Number
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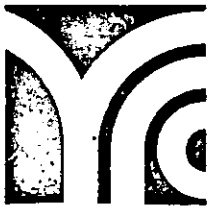

Environmental Consultants

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EMISSIONS MEASUREMENT BRANCH
MAIL DROP 13
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

FINAL REPORT

for an

EMISSION TEST PROGRAM

conducted at

GOLD BOND BUILDING PRODUCTS
1040 CANAL BLVD.
RICHMOND, CA 94804

Prepared by

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CONTRACT NUMBER 68-02-2819

WORK ASSIGNMENT 29

EPA PROJECT NUMBER 80-GYP-5

YRC PROJECT NUMBER 01-9517-29

March 30, 1981

PREFACE

The work reported herein was conducted by personnel from York Research Corporation (YRC), Radian Corporation and the United States Environmental Protection Agency (USEPA).

The scope of the work, issued under EPA Contract Number 68-02-2819, Work Assignment Number 29, was under the supervision of YRC Project Director, Mr. James W. Davison. Mr. Roger A. Kniskern, YRC Project Manager, was responsible for summarizing the test and analytical data contained in this report. Analyses of the samples were performed at the YRC laboratory in Stamford, Connecticut under the direction of Mr. Robert Q. Bradley.

Mr. Michael Palazzolo of Radian Corporation was responsible for monitoring the process operations during the testing program. Personnel from Radian Corporation will provide the Process Description and Operations section of this report.

Plant Manager, Robert Britt and Plant Superintendent, Michael Ward of Gold Bond were very helpful and cooperative throughout the test program. Their assistance is greatly appreciated.

Mr. Dennis Holzschuh of the Office of Air Quality Planning and Standards, Emission Measurement Branch, USEPA, served as Technical Manager and was responsible for coordinating the emission test program.

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1.0 INTRODUCTION

Section III of the Clean Air Act of 1970 charges the Administrator of the United States Environmental Protection Agency (USEPA) with the responsibility of establishing federal standards of performance for new stationary sources which may significantly contribute to air pollution. When promulgated, these standards of performance for new stationary sources (NSPS) will reflect the degree of emission limitation achievable through application of the best demonstrated emission control technology. To assemble this background information, the USEPA utilizes emission data obtained from controlled sources involved in the particular industry under consideration, in this case, the gypsum industry.

Based on the above criteria, the USEPA's Office of Air Quality Planning and Standards (OAQPS) selected Gold Bond Building Products in Richmond, California as a site to conduct an emission test program. York Research Corporation (YRC), under EPA Contract Number 68-02-2819, Work Assignment 29, was requested to conduct the test program. The results of this program are to provide a portion of the emission data required for establishing the NSPS for the gypsum industry.

The #1 flash calciner at Gold Bond was tested. Emissions from the calciner are controlled by a baghouse.

Emission sampling was conducted during the week of July 14, 1980 at the baghouse inlet and outlet using USEPA Reference Methods. Emissions from the #1 calciner were observed during sampling to determine opacity.

Emissions observations were also conducted at the storage bin area.

2.0 SUMMARY AND DISCUSSION OF TEST RESULTS

2.1 Particulate Tests

The gas stream and particulate data and results are summarized in Tables 1 through 4. Due to technical problems (see 5.0 Sampling and Analytical Procedures) only two tests were run simultaneously at the inlet and outlet. The sequence of testing is shown below:

Date:	7/15	7/16	7/16	7/16
	Test 1	Test 2	Test 3	
Inlet Test Times	1524-1526* 1709-2016	0916-1057	1248-1412	
Outlet Test Times	Test run was voided	Test 1 0926-1044	Test 2 1327-1517	Test 3 1612-1754 replaces the first outlet test run

* Unit shut down

Results of these two tests are presented for comparison in Tables 5 and 6. The baghouse removal efficiencies were calculated from the particulate concentration. The average removal efficiency was 99.97%.

2.2 Particle Size Distribution Tests

The results of the particle size distribution tests are presented in Tables 7 and 8 and Figures 2-1 and 2-2.Three test runs were conducted at the inlet and one test run was conducted at the outlet.

2.3 Observations of Emissions

Throughout the particulate testing, a certified observer conducted visual tests to determine the opacity of the emissions at the baghouse outlet. Average opacity readings for six

Table 1

SUMMARY OF EMISSION TEST RESULTS
BAGHOUSE INLET
GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA
ENGLISH UNITS

	Test 1	Test 2	Test 3	Average
Date Time	7/15/80 1524-2016	7/16/80 0913-1057	7/16/80 1248-1412	-
Volume of Dry Gas Sampled (DSCF)[a]	33.37	35.81	34.66	34.61
Percent Moisture By Volume	52.6	45.2	50.0	49.3
Average Stack Temperature, ^{o}F	300.2	297.7	305.8	301.3
Stack Volumetric Flow Rate (DSCFM)[b]	1217	1414	1283	1305
Percent Isokinetic	109.7	101.3	108.1	106.4
Total Particulate - Filter Catch and Front Half Acetone				
mg	46237.20	49279.90	51424.60	48980.57
gr/DSCF	21.33599	21.19546	22.84855	21.79333
lb/hr	222.56	256.86	251.25	243.55

[a] Dry Standard Cubic Feet at $68^{o}F$, 29.92 inches Hg.

[b] Dry Standard Cubic Feet Per Minute at $68^{o}F$, 29.92 inches Hg.

Table 2

SUMMARY OF EMISSION TEST RESULTS
BAGHOUSE INLET
GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA
METRIC UNITS

	Test 1	Test 2	Test 3	Average
Date Time	7/15/80 1524-2016	7/16/80 0913-1057	7/16/80 1248-1412	- -
Volume of Gas Sampled (DNM^3)[a]	0.95	1.01	0.98	0.98
Percent Moisture by Volume	52.6	45.2	50.0	49.3
Average Stack Temperature, ^oC	149	147.6	152.1	149.6
Stack Volumetric Flow Rate, (DNM^3/Min)[b]	34	40	36	37
Percent Isokinetic	109.7	101.3	108.1	106.4
Total Particulate - Filter Catch and Front Half Acetone				
mg	46237.20	49279.90	51424.60	48980.57
mg/DNM^3	48824.80	48503.23	52286.13	49871.39
Kg/Hr	100.95	116.51	113.97	110.48

[a] Dry Normalized Cubic Meters at 20^oC, 760 mm Hg.

[b] Dry Normalized Cubic Meters Per Minute at 20^oC, 760 mm Hg.

Table 3

SUMMARY OF EMISSION TEST RESULTS
BAGHOUSE OUTLET
GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA
ENGLISH UNITS

	Test 1	Test 2	Test 3	Average
Date	7/16/80	7/16/80	7/16/80	-
Time	0926-1044	1327-1517	1612-1754	-
Volume of Dry Gas Sampled (DSCF)[a]	51.47	58.92	53.73	54.71
Percent Moisture By Volume	46.2	47.6	49.3	47.7
Average Stack Temperature, ^{o}F	329.4	330.2	330.0	329.9
Stack Volumetric Flow Rate (DSCFM)[b]	1522	1423	1371	1439
Percent Isokinetic	109.3	108.5	102.7	106.9
Total Particulate - Filter catch and Front Half Acetone				
mg	30.56	19.68	15.62	21.95
gr/DSCF	0.00914	0.00514	0.00448	0.00625
lb/hr	0.12	0.06	0.05	0.08

[a] Dry Standard Cubic Feet at $68^{o}F$, 29.92 inches Hg.

[b] Dry Standard Cubic Feet Per Minute at $68^{o}F$, 29.92 inches Hg.

Table 4

SUMMARY OF EMISSION TEST RESULTS
BAGHOUSE OUTLET
GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA
METRIC UNITS

	Test 1	Test 2	Test 3	Average
Date	7/16/80	7/16/80	7/16/80	-
Time	0926-1044	1327-1517	1612-1754	-
Volume of Gas Sampled (DNM^3)[a]	1.46	1.67	1.52	1.55
Percent Moisture by Volume	46.2	47.6	49.3	47.7
Average Stack Temperature, ^oC	165.2	165.7	165.6	165.5
Stack Volumetric Flow Rate, (DNM^3/Min)[b]	43	40	39	41
Percent Isokinetic	109.3	108.5	102.7	106.9
Total Particulate - Filter Catch and Front Half Acetone				
mg	30.56	19.68	15.62	21.95
mg/DNM^3	20.93	11.77	10.24	14.31
Kg/Hr	0.05	0.03	0.02	0.04

[a] Dry Normalized Cubic Meters at 20^oC, 760 mm Hg.

[b] Dry Normalized Cubic Meters Per Minute at 20^oC, 760 mm Hg.

TABLE 5

COMPARISON OF INLET AND OUTLET
GAS STREAM AND PARTICULATE DATA

GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA
(ENGLISH UNITS)

	Inlet	Outlet	Inlet	Outlet	Average	
Test No.	2	1	3	2		
Date	7/16/80	7/16/80	7/16/80	7/16/80		
Time	0913-1057	0926-1044	1248-1412	1327-1517	Inlet	Outlet
Volume of Dry Gas Sampled (DSCF)[a]	35.81	51.47	34.66	58.92	35.23	55.20
Percent Moisture by Volume	45.2	46.2	50.0	47.6	47.6	46.9
Average Stack Temperature, ^{O}F	297.7	329.4	305.8	330.2	301.8	329.8
Stack Volumetric Flow Rate (DSCFM)[b]	1414	1522	1283	1423	1348	1472
Percent Isokinetic	101.3	109.3	108.1	108.5	104.7	108.9
Total Particulate - Filter Catch and Front Half Acetone						
mg	49279.90	30.56	51424.60	19.68	50354.95	25.12
gr/DSCF	21.19546	0.00914	22.84855	0.00514	22.02200	0.00714
lb/hr	256.86	0.12	251.25	0.06	254.06	0.09
Baghouse Removal Efficiency (%)[c]	99.96		99.98		99.97	

[a] Dry Standard Cubic Feet at $68^{O}F$, 29.92 inches Hg.

[b] Dry Standard Cubic Feet Per Minute at $68^{O}F$, 29.92 inches Hg.

[c] Based on gr/DSCF

TABLE 6

COMPARISON OF INLET AND OUTLET
GAS STREAM AND PARTICULATE DATA

GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA
(METRIC UNITS)

	Inlet	Outlet	Inlet	Outlet	Average	
Test No.	2	1	3	2		
Date	7/16/80	7/16/80	7/16/80	7/16/80		
Time	0913-1057	0926-1044	1248-1412	1327-1517	Inlet	Outlet
Volume of Gas Sampled (DNM^3)[a]	1.01	1.46	0.98	1.67	1.00	1.56
Percent Moisture by Volume	45.2	46.2	50.0	47.6	47.6	45.1
Average Stack Temperature, ^oC	147.6	165.2	152.1	165.7	149.8	165.4
Stack Volumetric Flow Rate, (DNM^3/Min)[b]	40	43	36	40	38	42
Percent Isokinetic	101.3	109.3	108.1	108.5	104.7	108.9
Total Particulate-Filter Catch and Front Half Acetone						
mg	49279.90	30.56	51924.60	19.68	50352.25	25.12
mg/DNM^3	48503.23	20.93	52286.13	11.77	50394.68	16.35
Kg/Hr	116.51	0.05	113.97	0.03	115.24	0.04
Baghouse Removal Efficiency (%)[c]	99.96		99.98		99.97	

[a] Dry Normalized Cubic Meters at 20^oC, 760 mm Hg.

[b] Dry Normalized Cubic Meters Per Minute at 20^oC, 760 mm Hg.

[c] Based on mg/DNM^3

TABLE 7

PARTICLE SIZE DISTRIBUTION
BAGHOUSE INLET
GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA

Test #	Date	Test Time (sec)	Particulate Concentration - Total gr/DSCF	Particle Size Range (Microns)	Mass in size range (% of Total)
1	7/15/80	30	11.9678	>7.05	58.51
				7.05-4.37	10.27
				4.37-2.94	11.65
				2.94-1.98	6.92
				1.98-1.25	6.35
				1.25-0.60	4.55
				0.60-0.35	1.06
				0.35-0.20	0.29
				<0.20	0.39
2	7/16/80	20	8.90561	>8.30	44.49
				8.30-5.16	15.26
				5.16-3.48	17.43
				3.48-2.35	8.53
				2.35-1.49	11.40
				1.49-0.72	5.88
				0.72-0.42	2.09
				0.42-0.26	0.24
				<0.26	1.46
3	7/16/80	20	6.80113	>8.90	23.89
				8.90-5.54	17.44
				5.54-3.73	20.23
				3.73-2.53	16.33
				2.53-1.60	11.49
				1.60-0.78	5.65
				0.78-0.46	1.93
				0.46-0.28	0.86
				<0.28	2.18

TABLE 8

PARTICLE SIZE DISTRIBUTION
BAGHOUSE OUTLET

GOLD BOND BUILDING PRODUCTS
RICHMOND, CALIFORNIA

Test #	Date	Test Time (min)	Particulate Concentration- Total gr/DSCF	Particle Size Range (microns)	Mass in size range (%)
1	7/16/80	120	0.02168	>8.03	10.96
				8.03-4.99	9.93
				4.99-3.36	10.98
				3.36-2.27	9.67
				2.27-1.44	11.19
				1.44-0.69	9.86
				0.69-0.41	10.38
				0.41-0.25	17.44
				<0.25	9.58

PARTICLE SIZE DISTRIBUTION

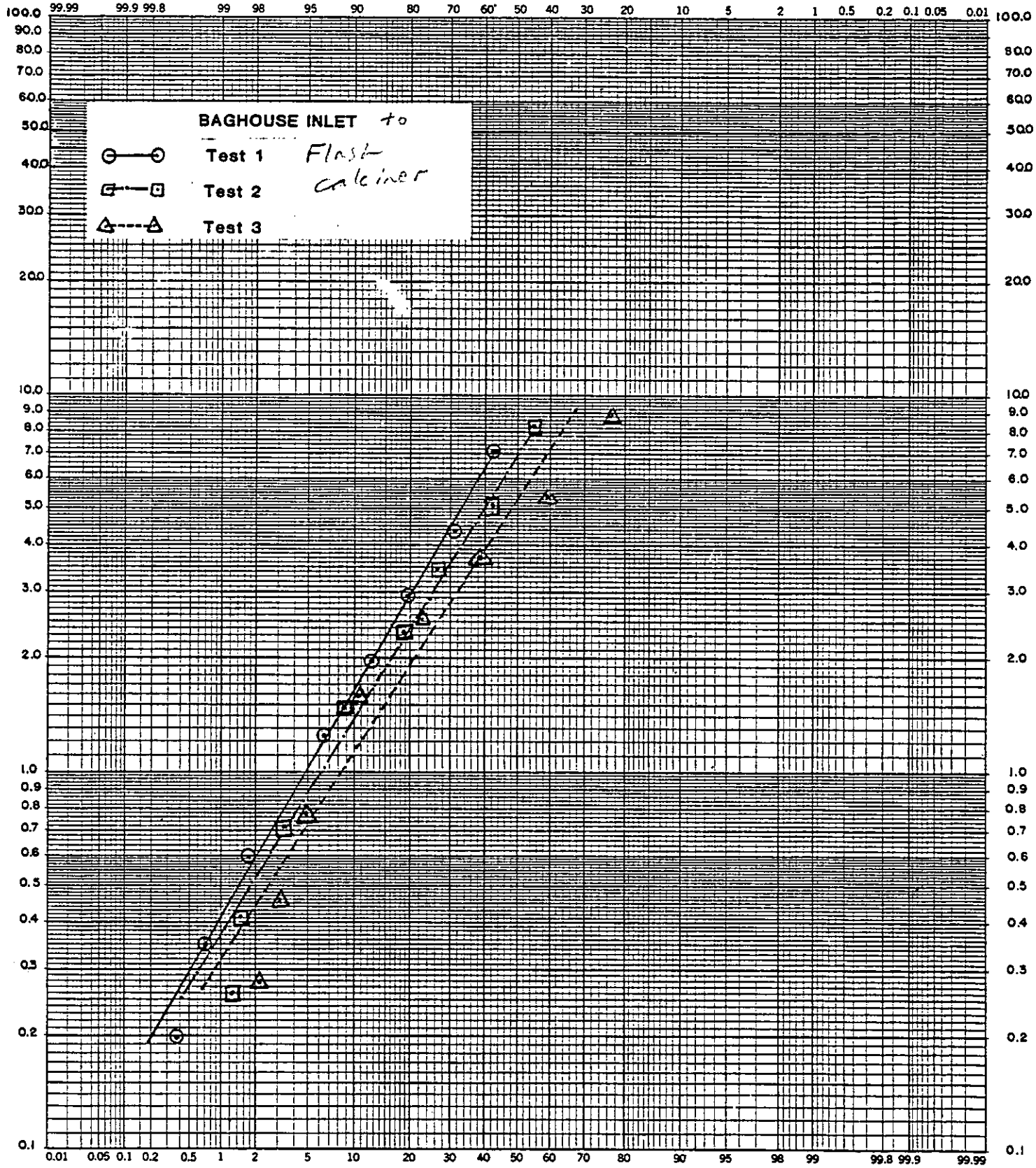


FIGURE 2.1

PARTICLE SIZE DISTRIBUTION

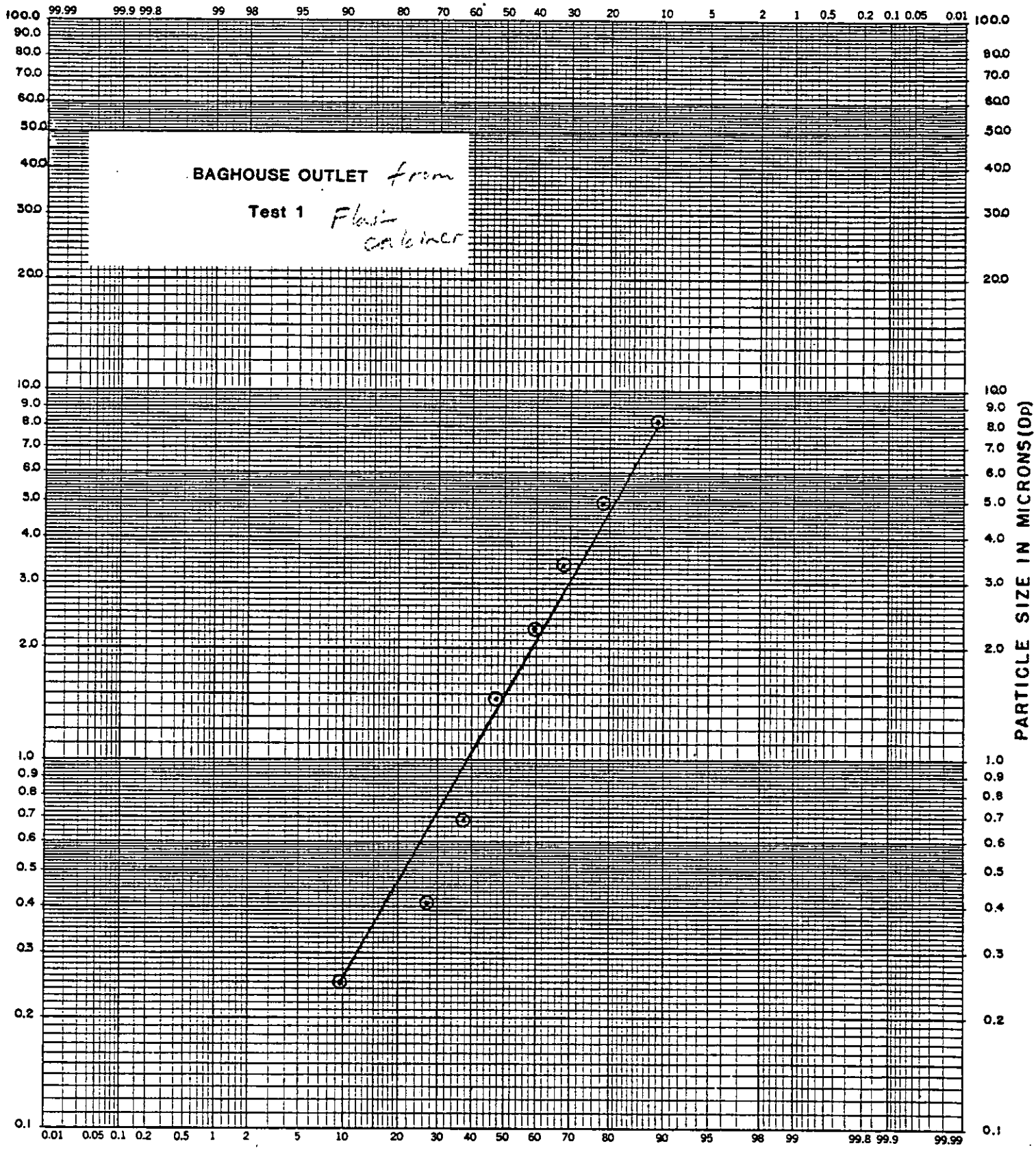


FIGURE 2.2

minute intervals are presented in Table 9. The visual tests were conducted for varying lengths of time, but in all cases they included the outlet particulate test period.

Visual tests were also conducted at the storage bin area. Three hours of opacity readings were conducted by a certified observer at the stucco silo. The frequency of fugitive emissions from a conveyor was also determined. This test was also conducted for three hours. The results of these tests are presented in Tables 10 and 11.

TABLE 9

SUMMARY OF VISIBLE EMISSIONS OBSERVATIONS
#1 CALCINER BAGHOUSE OUTLET

Gold Bond Building Products
Richmond, Calif.

TEST	1[a]	2	3	4[d]
DATE	7/15/80	7/16/80	7/16/80	7/16/80
TIME	1655-2017[b]	0926-1056	1250-1516	1620-1754
	- AVERAGE OPACITY (%) -			
SIX MINUTE INTERVAL				
1	0	0[c]	0	0
2	0	0[c]	0	0
3	0	0[c]	0	0
4	0	0[c]	0	0
5	0	0[c]	0	0
6	0	0	0	0
7	0	0[c]	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0[c]	0	0
13	0	0[c]	0	0
14	0	0[c]	0	0
15	0	0	0	0
16	0	0*	0	0*
17	0		0	
18	0		0	
19	0		0	
20	0		0	
21	0		0	
22	0		0	
23	0		0	
24	0		0	
25	0		0*	
26	0*			

[a] Outlet particulate test run subsequently voided.

[b] Unit shut down for approx. 1 hour.

[c] During this 6 minute interval vision obscured by steam plume. Some readings were assumed to remain zero.

[d] Outlet particulate testing only.

* Interval less than 6 minutes.

TABLE 10

SUMMARY OF VISIBLE EMISSIONS OBSERVATIONS
STORAGE BIN AREA - STUCCO SILO

Gold Bond Building Products
Richmond, Calif.

Test	1	2	3
Date	7/15/80	7/16/80	7/16/80
Time	1130-1230	1100-1200	1520-1620
	- AVERAGE OPACITY (%) -		
Six Minute Interval			
1	0	0	0
2	0	0	0
3	0	1.25	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	1.25
9	0	0	2.08
10	0	0	0

TABLE 11

SUMMARY OF FUGITIVE EMISSIONS OBSERVATIONS
STORAGE BIN AREA - CONVEYOR

Gold Bond Building Products
Richmond, Calif.

Date: July 16, 1980

Observation Period	Fugitive Emissions Observed (min)	Accumulated Observation Time (min)
1400-1420	0	20
1425-1445	0	40
1450-1510	0	60
1515-1535	0	80
1540-1600	0	100
1605-1625	0	120
1630-1650	0	140
1655-1715	0	160
1720-1740	0	180

Total Emission Time (min) = 0

Total Observation Time (min) = 180

Fugitive Emission Frequency = 0%

3.0 PROCESS DESCRIPTION AND OPERATION

3.1 Plant Description

The Gold Bond Building Products Richmond, California plant produces wallboard from gypsum ore mined in Mexico. The ore is shipped to the plant by ocean-going freighter. A simplified flow diagram for the process used at the Richmond plant is shown in Figure 3.1. Ore stockpiled at the plant is crushed to about minus 5 cm (2 inches) and then dried and ground to about 90 percent minus 100 mesh in a grinding mill. The ground crude gypsum, primarily calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$), is heated to around 571K (300°F) to remove 75 percent of its water of hydration and thus form calcium sulfate hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$). This process is known as calcining. The calcined gypsum or stucco is mixed with starch, water, and other additives to form a slurry. The slurry is spread between two paper sheets and formed into wet wallboard. The wallboard is subsequently dried in a multi-deck kiln, trimmed to the correct size, and shipped to distributors.

3.2 Process Equipment Tested

The emission tests conducted at the Richmond plant are shown in Table 12. A brief description of the major processing equipment tested at the plant is provided in the following sections.

Calcidyne Unit

The calciner used at the Richmond plant is a direct contact flash calciner of National Gypsum's own patented design. The Calcidyne unit is a continuous calciner in which gypsum is calcined through direct contact with hot gases. A schematic diagram of the unit is shown in Figure 3.2.

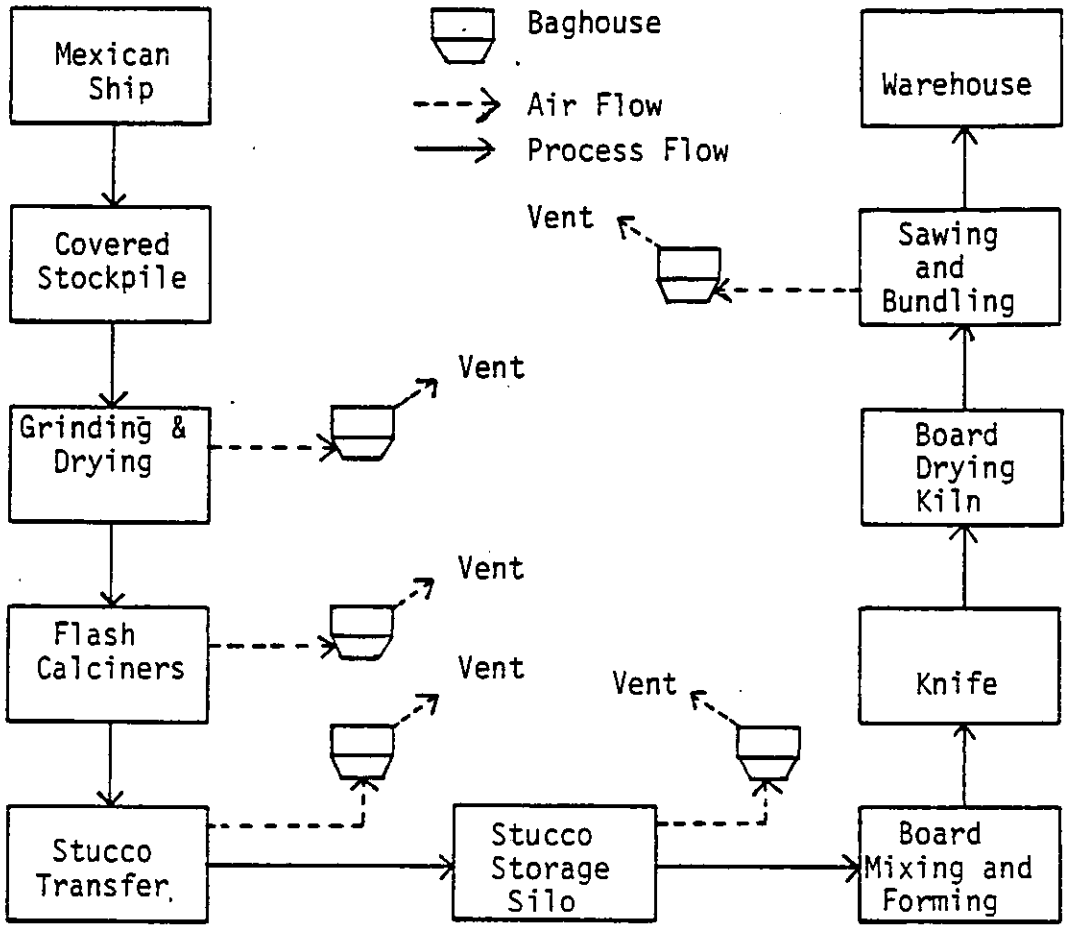
Stucco Storage

The stucco storage and transfer system used at the plant employs conventional screw conveyors and bucket elevators to transfer stucco from the Calcidyne units to a 318 Mg (350 ton) stucco storage silo and from the storage silo to the board forming line.

TABLE 12

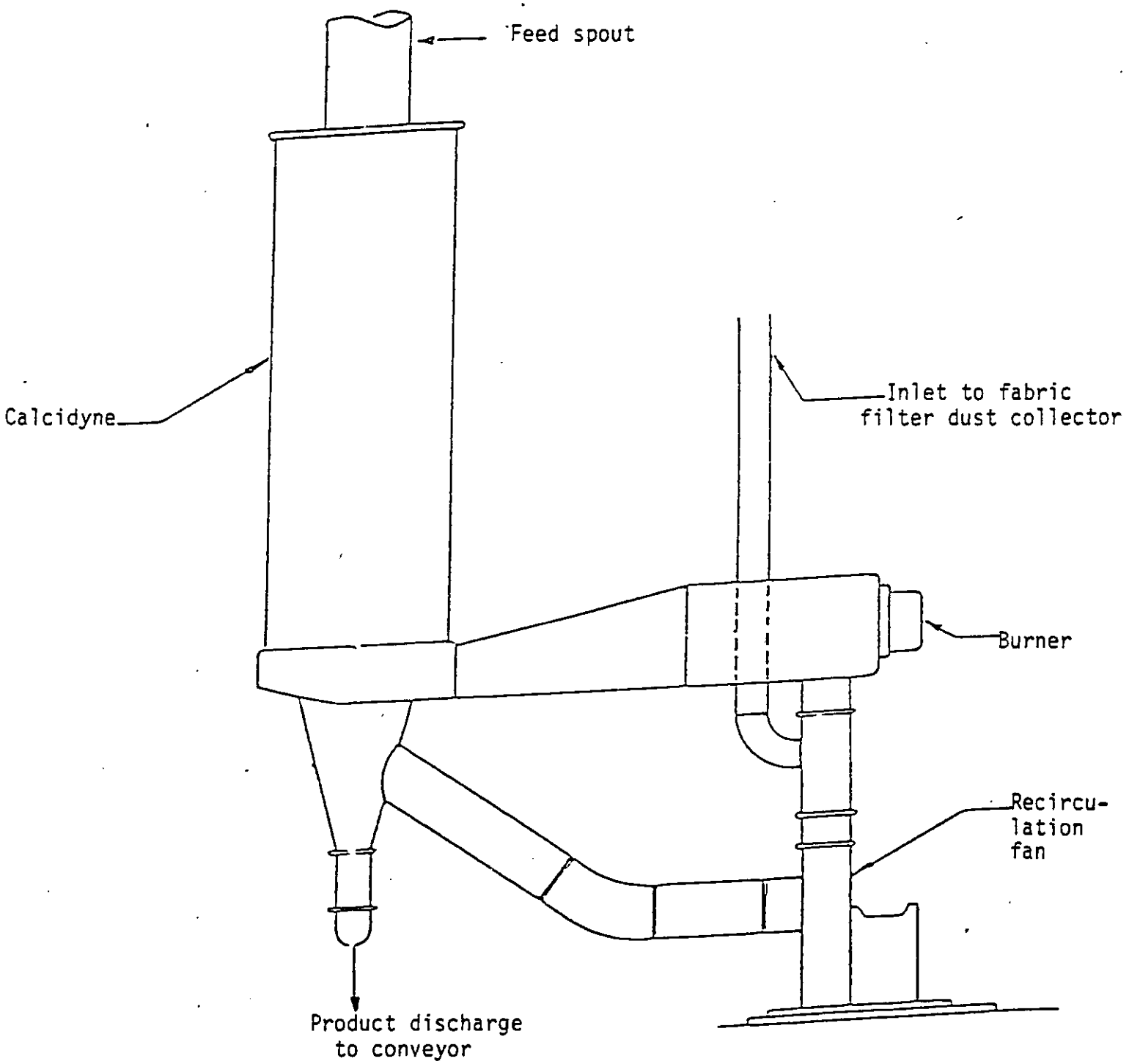
EMISSION TESTS CONDUCTED AT GOLD BOND
RICHMOND, CALIFORNIA PLANT

Process Tested	Date	Control Method	Test Type	Inlet Test	Outlet Test
Direct contact calciner	7/15/80	Fabric Filter	Particulate loading	3 EPA-5	3 EPA-5
Direct contact calciner	7/16/80	Fabric Filter	Particle size Visible emissions	3 Andersen --	1 Andersen EPA-9
Stucco storage silo	7/16/80	Fabric Filter	Visible emissions	--	EPA-9
Stucco transfer system (bucket elevator and screw conveyor)	7/16/80	Capture head/ Fabric Filter	Visible emissions	EPA-22	



Block flow diagram for Richmond board plant.

Figure 3.1



Calcidyne flash calciner.

Figure 3.2

3.3 Emission Controls

Fabric filter dust collectors are used at the Richmond plant to control gypsum particulate emissions. Dust laden gases exiting the direct contact calciners are vented to separate baghouses. Emissions from screw conveyors and bucket elevators are also vented to fabric filter dust collectors. Emissions from the stucco storage silo are vented to a separate baghouse.

Design and operating parameters for the baghouses tested at the Richmond plant are given in Table 12. Normal replacement frequencies and most recent replacement dates for bags in the dust collectors tested are shown in Table 13.

3.4 Process Conditions During Testing

In order to ensure that the calciner and the transfer and storage operations were operating at representative, steady-state conditions during the testing, various process parameters were monitored.

All processes operated normally during the emission testing. The operating conditions of each of the processes is discussed separately in the following sections.

Direct Contact Calciner

During the emission testing of the direct contact calciner, or Calcidyne unit, the calciner was operated at full design capacity, producing 7.0 tons per hour of calcined gypsum or stucco. The unit was burning natural gas during the tests.

Various process parameters, including inlet and outlet gas temperatures, stucco dust temperatures and fuel usage rates, were monitored during the testing. The data show that the process was running under representative steady state conditions during all of the outlet test runs. During the first baghouse inlet test, the temperature of the process unit increased slightly. However, this slight temperature variation is not significant. The baghouse outlet test that was run simultaneously with this first inlet test was discarded because the filter was improperly inserted into the filter holder. The baghouse pressure drop during all test runs was constant at 1.3 inches of water.

TABLE 13

CONTROL EQUIPMENT PARAMETERS

Process Unit Name	Baghouse Manufacturer	Number of Bags	Bag Dimensions (diam x length in inches)	Cloth Area (square feet)	Fabric Type	Design Air Flow (ACFM)	Air to Cloth Ratio	Duration of Pulse (sec)	Frequency of Cleaning (sec)	Pressure of Pulse (psig)
Direct Contact Calciner	Flex-Kleen (reverse pulse)	96	6 x 84	960	Nomex	4100	5:1	0.1	10	90
Stucco Silo	Sly (mechanical)	12	36 x 36	336	Cotton	1134[b]	3.4:1[b]	N/A	1 every 4 hrs.	N/A

[a] These values are approximate; they are varied automatically to maintain a set pressure drop across the filter.

[b] This value was estimated from motor size and rpm.

TABLE 14

BAG REPLACEMENT SCHEDULES

Process Unit Name	Last Date of Bag Replacement	Normal Replacement Frequency (Months)
Direct Contact Calciner	Early May 1980	4-6
Stucco Silo	July 12, 1980	12

Stucco Storage Silo

The stucco storage baghouse and silo were operated normally during the testing.

Stucco Transfer

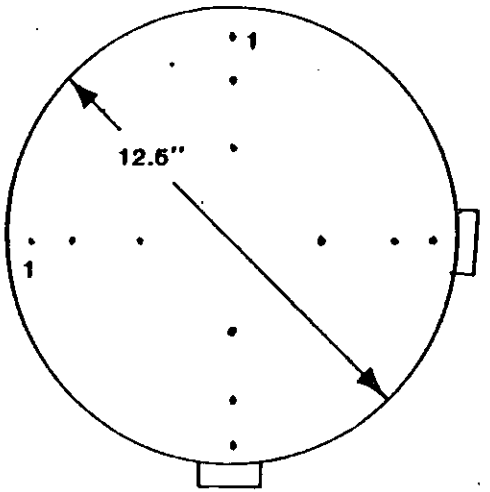
The stucco transfer system was operating normally during the testing. The system tested was transferring stucco from three calciners to the stucco cilo. The bucket elevator and screw conveyor tested for visible emissions were vented to a fabric filter baghouse.

4.0 TESTING LOCATIONS

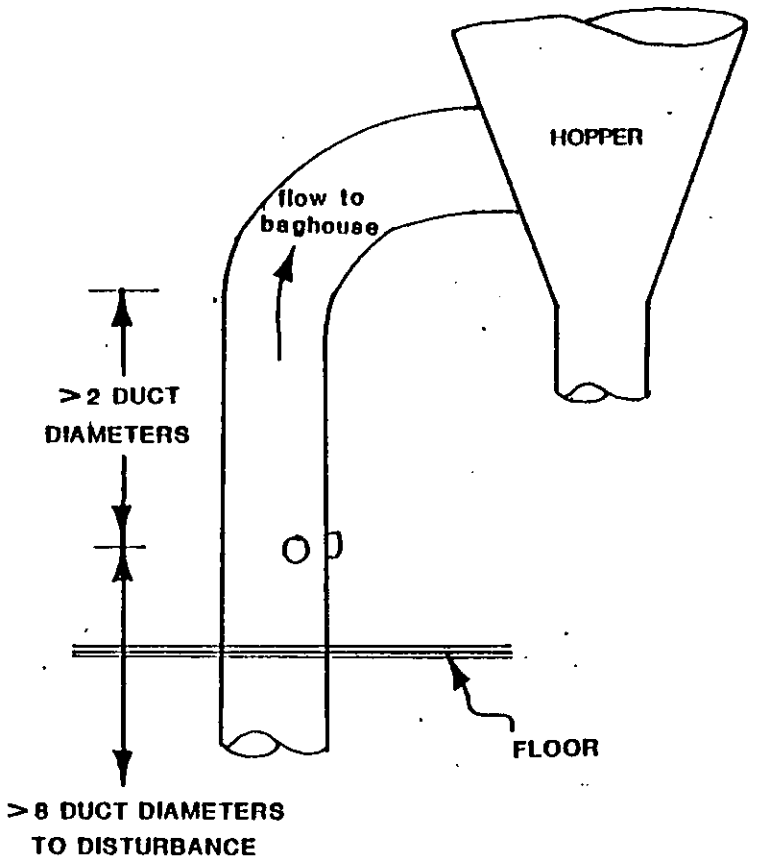
4.1 Sampling Locations

Particulate testing was conducted at the baghouse inlet and outlet. The inlet duct to the baghouse is 12.5 inches ID. Upstream and downstream disturbances are greater than 2 and 8 duct diameters, respectively, away from the test ports, so only 12 sampling points were required (Figure 4.1) per EPA Method 1 (Sample and Velocity Traverses for Stationary Sources). Each point was sampled for 5 minutes giving a total test time of 1 hour.

The outlet duct from the baghouse is also 12.5 inches ID. The test ports are located >8 duct diameters from a downstream disturbance and >2 duct diameters from the duct exit to the atmosphere. Twelve sampling points were used as required by EPA Method 1. For Test 1 each point was sampled for 6 minutes, the test time was increased to 8 minutes per point for Tests 2 and 3 in order to increase the gas sample volume. (Figure 4.2)



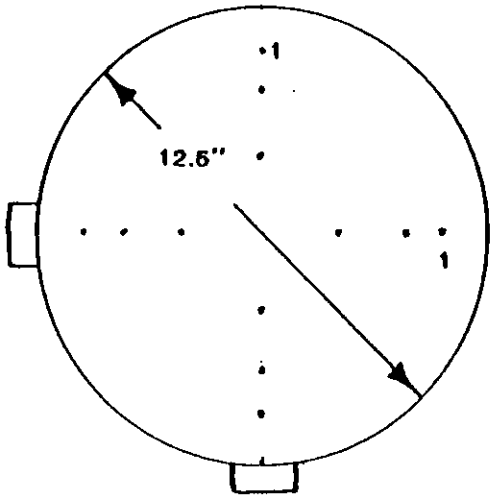
TRAVERSE POINT	DISTANCE FROM DUCT WALL (In.)
1	1.0
2	1.82
3	3.70
4	8.80
5	10.68
6	11.5



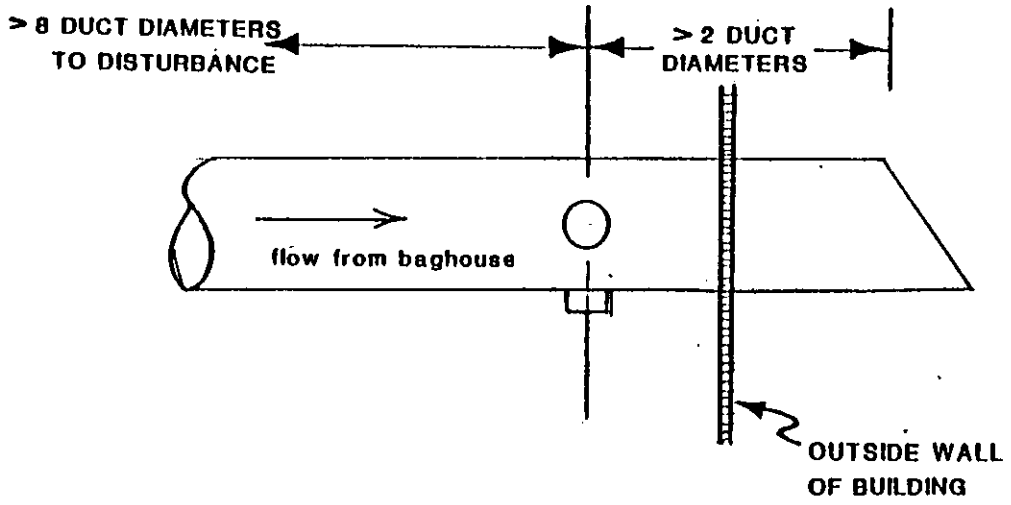
BAGHOUSE INLET DUCT

TEST PORT AND SAMPLING POINT LOCATIONS BAGHOUSE INLET

figure 4.1



TRAVERSE POINT	DISTANCE FROM DUCT WALL (In.)
1	1.10
2	2.04
3	3.39
4	7.11
5	8.46
6	9.40



BAGHOUSE OUTLET DUCT

TEST PORT AND SAMPLING POINT LOCATIONS BAGHOUSE OUTLET

figure 4.2

4.2 Emission Observation Locations

Calciner Baghouse Outlet

A certified observer conducted visible emissions tests per EPA Method 9 (Visual Determination of the Opacity of Emissions from Stationary Sources). The tests were conducted during the particulate test runs. Readings were taken beyond the attached steam plume, when it existed. The observer's location is shown in Figure 4.3.

Storage Bin Area

Three hours of Method 9 testing was conducted by a certified observer on emissions from the stucco silo.

Three hours of observations were also conducted inside the building at a conveyor. The observers' locations for testing are shown in Figures 4.4 and 4.5.

5.0 SAMPLING AND ANALYTICAL PROCEDURES

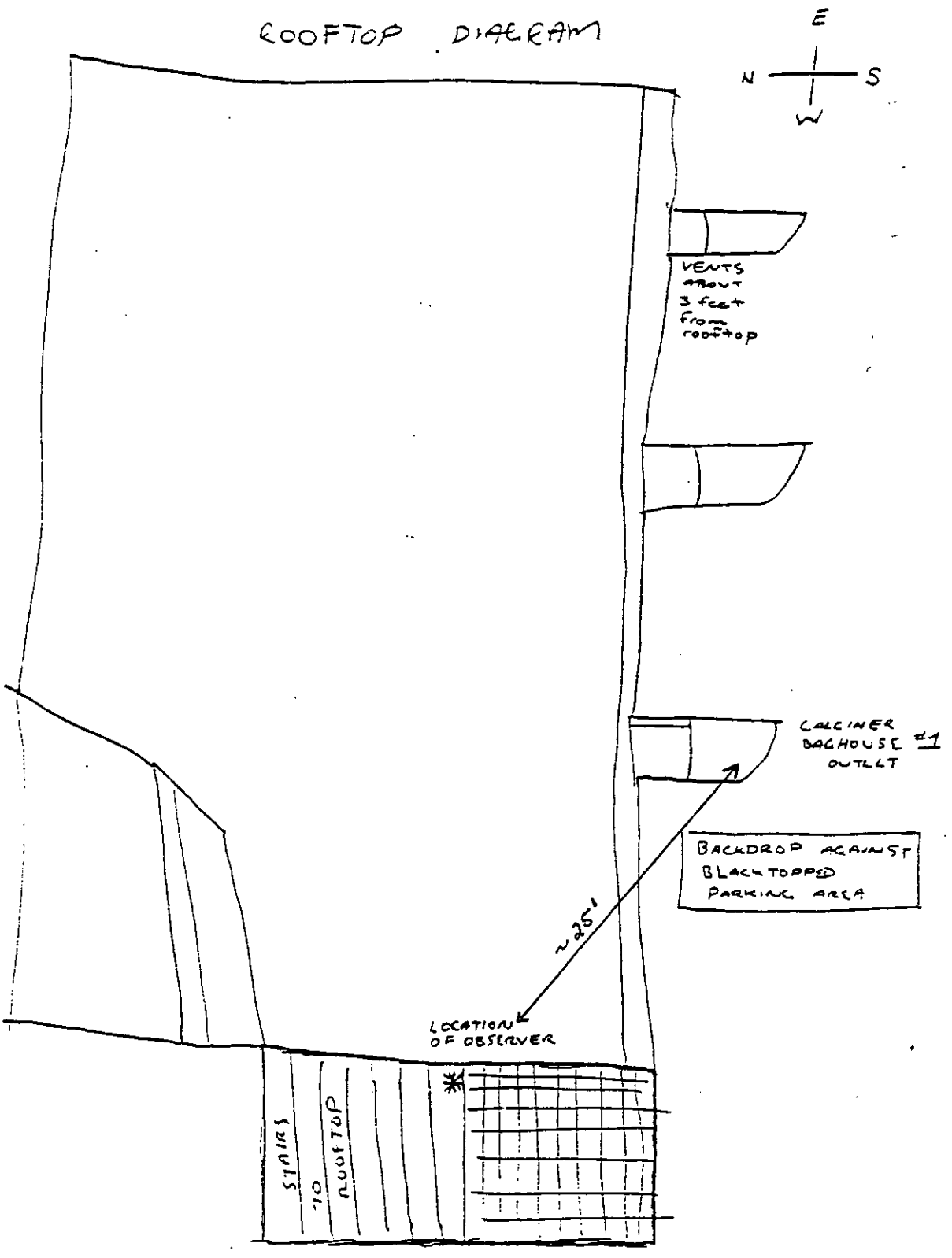
5.1 Sampling Apparatus

Nozzle

The nozzle, of appropriate diameter, was calibrated according to procedures outlined in EPA Method 5. The button-hook nozzle was made of 316 stainless steel.

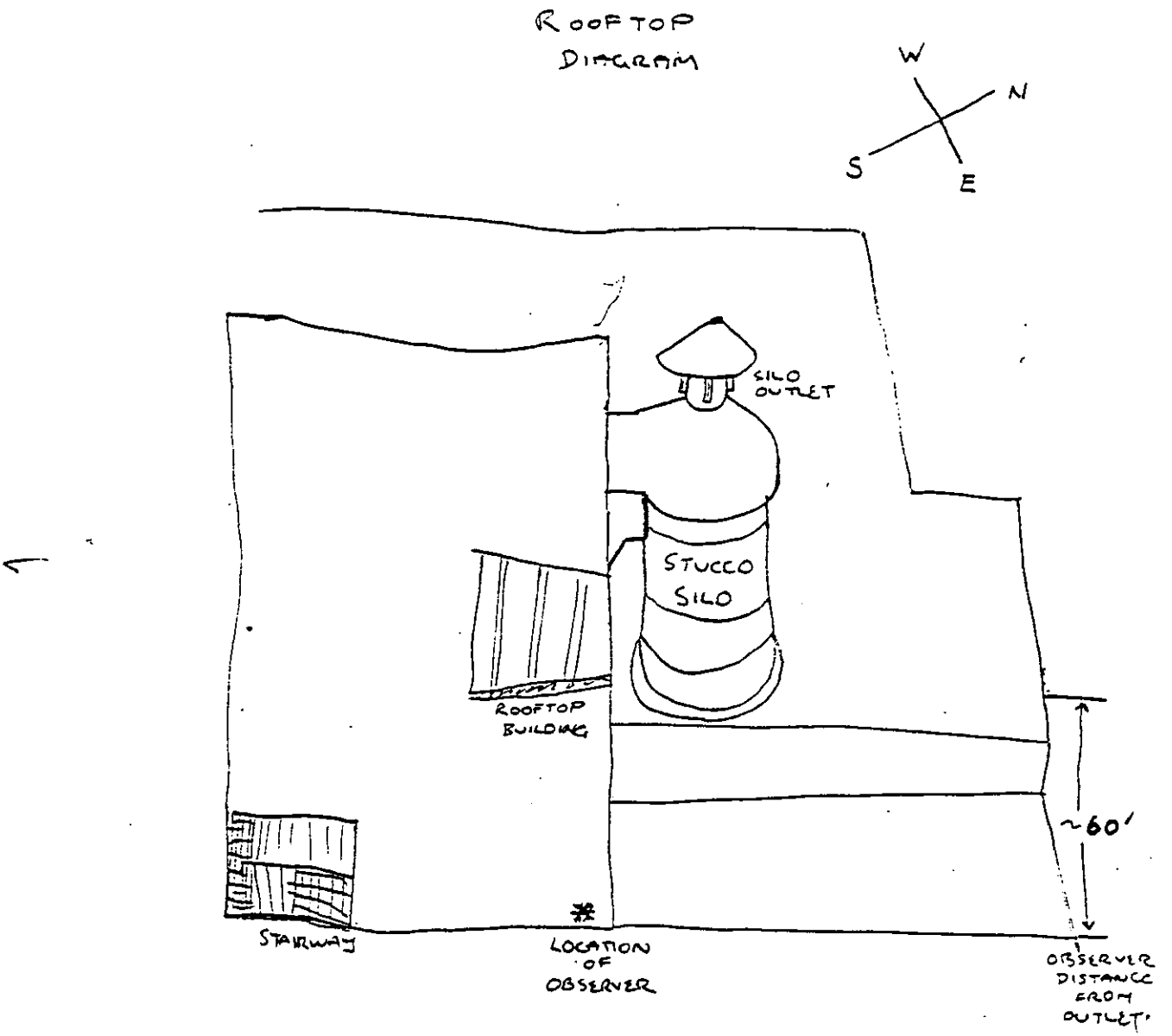
Probe

The liner for the sample probe was made of 316 stainless steel. A heating system, capable of maintaining a gas temperature of 248 $\pm$ 25°F at the exit end, was built into the probe. A thermocouple, used to monitor gas temperatures, was attached to the probe. A precalibrated Type S pitot tube was attached to the probe to allow constant monitoring of the stack gas velocity. The pitot tube was constructed in accordance with EPA Method 2.



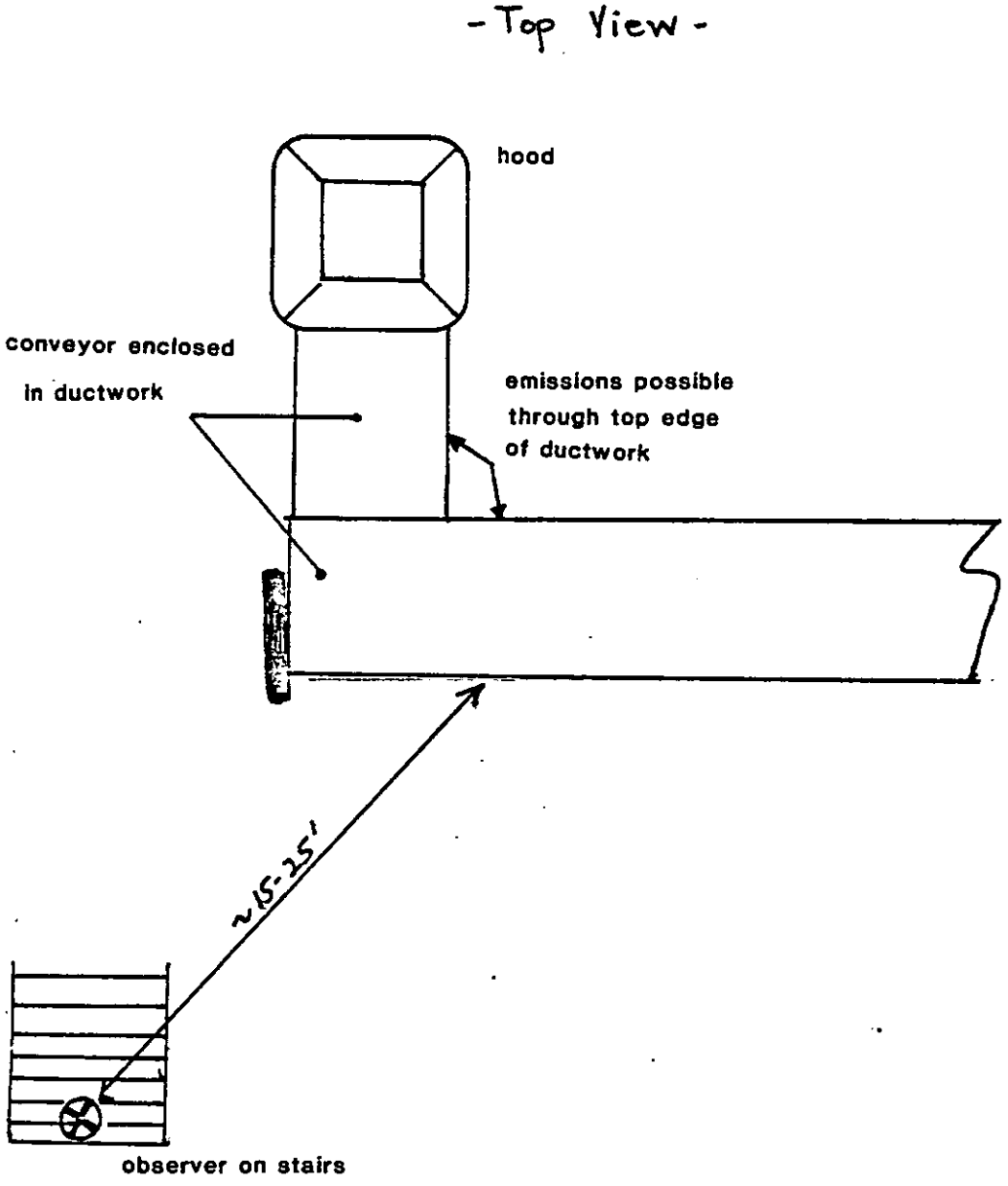
POSITION OF OBSERVER - BAGHOUSE OUTLET

figure 4.3



POSITION OF OBSERVER – STUCCO SILO

figure 4.4



POSITION OF OBSERVER - CONVEYOR

figure 4.5

Filter Holder

A tared fiberglass filter was encased in a borosilicate glass filter holder. A glass frit supported the filter. A silicone rubber gasket was used to provide a positive seal against leakage from around the filter. The filter holder was contained in a heated box capable of maintaining a temperature of 248 $\pm$ 25°F. A thermocouple, attached to a pyrometer was used to monitor the temperature inside the sample box.

Impinger Train

The train consisted of a series of four impingers connected with leak-free ground glass fittings. The first, third and fourth impingers were of the Greenburg-Smith design, modified by replacing the tip with 1.3 cm ID glass tube. The tube extends to approximately 1.3 cm from the bottom of the flask. The second impinger was of the Greenburg-Smith design with the standard tip. The impinger train was contained in an ice bath to cool the sample gas stream. A dial type thermometer, capable of measuring temperatures to within 2°F was placed at the outlet of the fourth impinger for monitoring purposes.

Metering System

A R.A.C. Train Stacksamplr[1] was used for the metering system. The system consists of the following:

- Calibrated orifice
- Vertical, inclined, dual manometer
- Dry gas meter (capable of measuring volume within 2 percent)
- Vacuum gauge
- Leak-free pump
- Thermometers (capable of measuring temperatures within 5.4°F)
- Electrical controls for sampling

[1] Research Appliance Company, Gibsonia, PA

The orifice and dry gas meter were calibrated in accordance with APTD-0576[2].

5.2 Preliminary Measurements

Gas velocity and temperature were measured at each sampling location in accordance with guidelines outlined in EPA Method 2 (Determination of Stack Gas Velocity and Volumetric Flow Rate).

The velocity pressure was measured on an inclined, dual manometer and the temperature was measured on a pyrometer. Measurements were recorded at each traverse point.

An ititial determination of the moisture in the gas at each location was also made. The moisture train was similar to the particulate sampling train, except that a filter was not used. The volume of water collected after sampling at a constant rate for 20 minutes was measured.

5.3 Particulate Sampling

The particulate emissions from the baghouse were determined in accordance with guidelines outlined in EPA Method 5 (Determination of Particulate Emissions from Stationary Sources).

Sampling

The sampling train at each test location consisted of the nozzle, probe, filter holder, impinger train and metering system. The sampling train is shown schematically in Figure 5.1. All connections were leak-free.

The nozzle size was determined using data obtained from the preliminary measurements. The first and second impingers were each initially filled with 100 ml of distilled water. The third impinger was left empty. The fourth impinger was filled with 300 g of dry, indicating type silica gel.

[2] Rom, J.J., Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment, Publ. No. APTD-0576, Office of Air Programs, EPA, Research Triangle Park, NC 1972.

MODIFIED PARTICULATE SAMPLING TRAIN

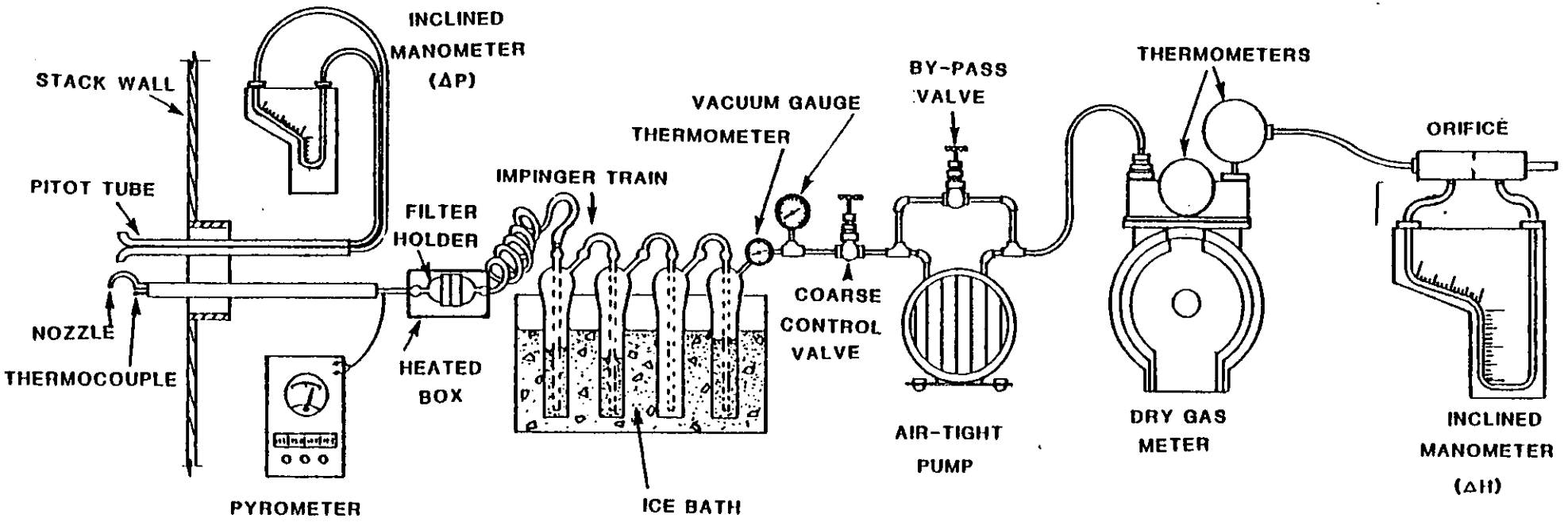


Figure 5.1

During each test, the following data were recorded at each traverse point:

- Point designation
- Clock time (24-hour clock)
- Dry gas meter reading (V_m, ft^3)
- Velocity pressure (Δp, in. H_2O)
- Desired pressure drop across orifice (ΔH, in. H_2O)
- Actual pressure drop across orifice (ΔH, in. H_2O)
- Stack temperature (T_s, ^oF)
- Dry gas meter temperature at inlet and outlet (T_m, ^oF)
- Vacuum gauge reading (in. Hg)
- Sample box temperature (^oF)
- Dry gas temperature at exit of last impinger (^oF)

The relationship of the Δp reading with the ΔH reading is a function of the following variables:

- Orifice calibration factor
- Gas meter temperature
- Moisture content of flue gas
- Ratio of flue gas pressure to barometric pressure
- Stack temperature
- Sampling nozzle diameter

A nomograph was used to correlate all of the above variables such that a direct relationship between Δp and ΔH could be determined by the test technician and isokinetic conditions could be maintained. Initial and final leak checks were performed on each sampling train prior to and upon completion of each test to confirm the existence of a leak-free system (leakage rates did not exceed 0.02 cfm per EPA standards). All measurements were recorded on the data sheets.

Sampling at the inlet location was complicated by the extremely high particulate concentration in the gas stream. The filters quickly became laden with particulate matter. At least two filters were used for each test and the probe was frequently

removed from the stack and shaken to dislodge the accumulated dust-cake from the filter. Although the sampling time was only 1 hour, the inlet tests took approximately 2 hours to complete.

Some technical problems caused the first (7/15/80) outlet test run to be voided. Three test runs were made on the following day. Only two outlet test runs coincide with inlet tests.

Sample Recovery

Upon completion of each test, the sampling trains were disassembled to permit sample recovery. The samples were recovered in the following manner:

Filter	- the filter was removed from the filter holder and placed in its original container.
Front-half Acetone	- the nozzle, probe and front half of the filter holder were rinsed with acetone three times. The wash was collected in a glass sample jar which had a teflon-lined lid.
Silica Gel	- the silica gel was returned to its original container.
Acetone Blank	- a sample of acetone from the field supply was collected in a glass jar, which had a teflon-lined lid.

Each sample container was labeled with the date, contents and test number and sealed with tape. The volume of water in the first three impingers was measured and recorded on the data sheets. The water was discarded.

Sample Analysis

Each sample was analyzed in the following manner:

Filter - the filter was removed from its sealed container and placed on a tared watch glass. The filter and watch glass were dessicated over anhydrous $CaSO_4$ for 24 hours and weighed to a constant weight. The weight was recorded to the nearest 0.01 mg.

Front-half Acetone - The acetone washings were transferred to a tared beaker. The acetone was evaporated at ambient temperature and pressure. The beaker was dessicated for 24 hours and weighed to a constant weight. The weight was recorded to the nearest 0.01 mg.

Silica Gel - The silica gel was weighed on a beam balance and the weight was recorded to the nearest 0.1 gram.

Acetone Blank - The acetone blank was transferred to a tared beaker. The acetone was evaporated at ambient temperature and pressure. The beaker was dessicated for 24 hours and weighed to a constant weight. The weight was recorded to the nearest 0.01 mg. This weight was subtracted from the final weight of the front-half acetone residue to obtain the net weight of particulate in the front half wash.

5.4 Gas Composition

The flue gas was analyzed for O_2 and CO_2 content with a Fyrite analyzer.

5.5 Particle Size Distribution

The particle size distribution samples were collected using an Andersen Cascade Impactor. The impactor aerodynamically classifies particles into multiple size ranges. It consists of eight stages

and a back-up filter (Figure 5.2). Each stage consists of a configuration of orifices of specific diameters above a collection plate. Tared glass fiber substrates were used on each stage as collection media.

Different sized particles are impacted on each stage corresponding to the size of the orifices on the plate above the collection substrates. The range of particle sizes retained on each substrate varies according to the velocity of the gas (as determined by the sample rate), the gas viscosity and the particle density. Since the orifices are arranged in descending diameters, the gas velocity increases and the particle size collected on each stage decreases.

Sampling

The sampling apparatus consisted of an Andersen impactor, eight pre-tared substrates and a pre-tared backup filter, nozzle, drying tube, vacuum pump, dry gas meter, calibrated orifice and manometer (Figure 5.3).

The sample train was checked for leaks at the completion of each sample run. Any leak rate above 0.02 cfm was considered unacceptable.

Using data obtained from the velocity traverse, a sampling rate (ΔH) was calculated. (Refer to Appendix 6.2 for calculations).

During each test the following data were recorded:

- Point designation
- Clock time (24-hour clock)
- Dry gas meter readings (Vm, ft^3)
- Actual pressure drop across orifice (ΔH, in H_2O)
- Dry gas meter temperatures (Tm, ^oF)
- Pressure drop, in stack (in. Hg)
- Vacuum (in. Hg)

ANDERSEN STACK SAMPLER

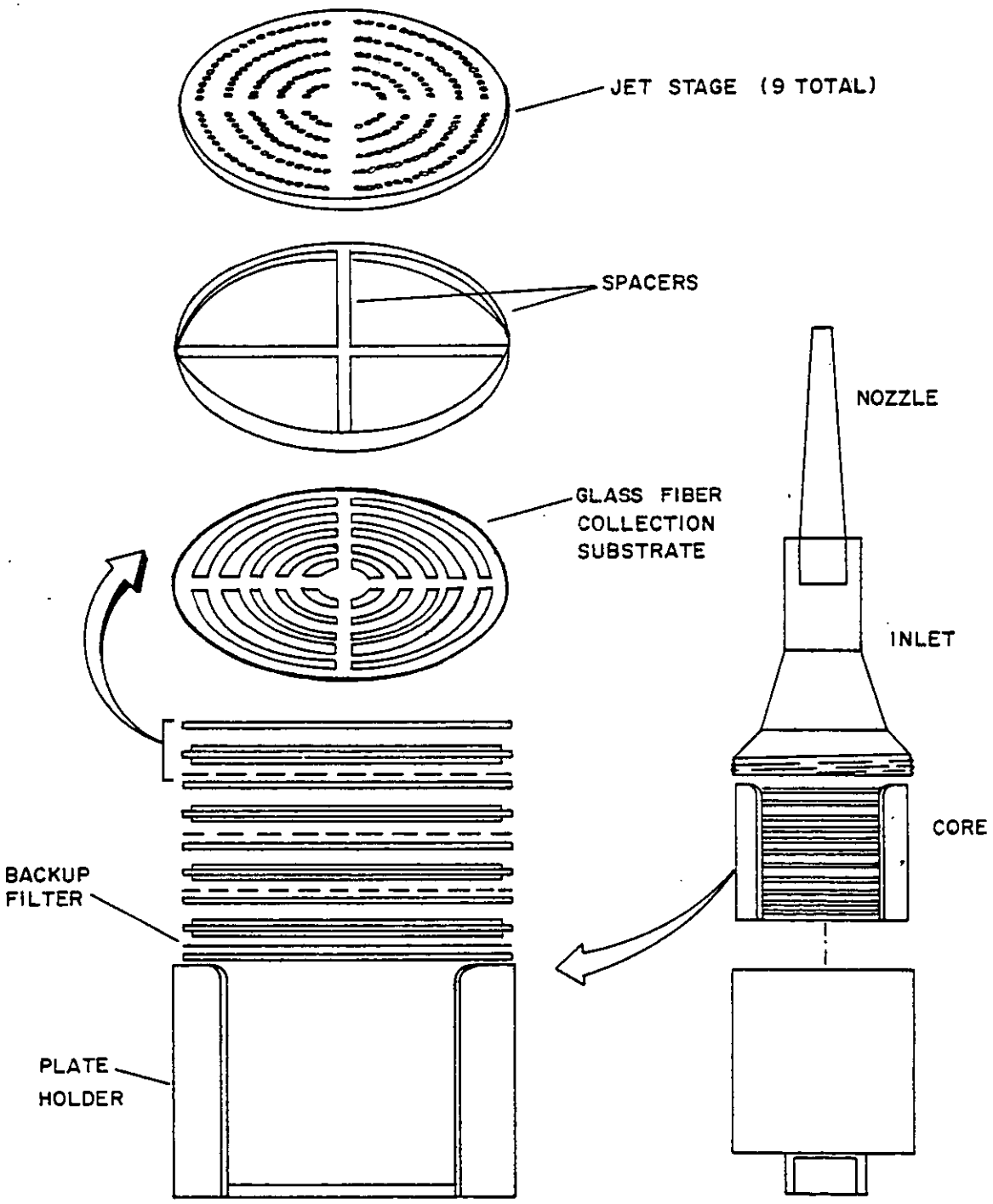


Figure 5.2

ANDERSEN SAMPLING TRAIN

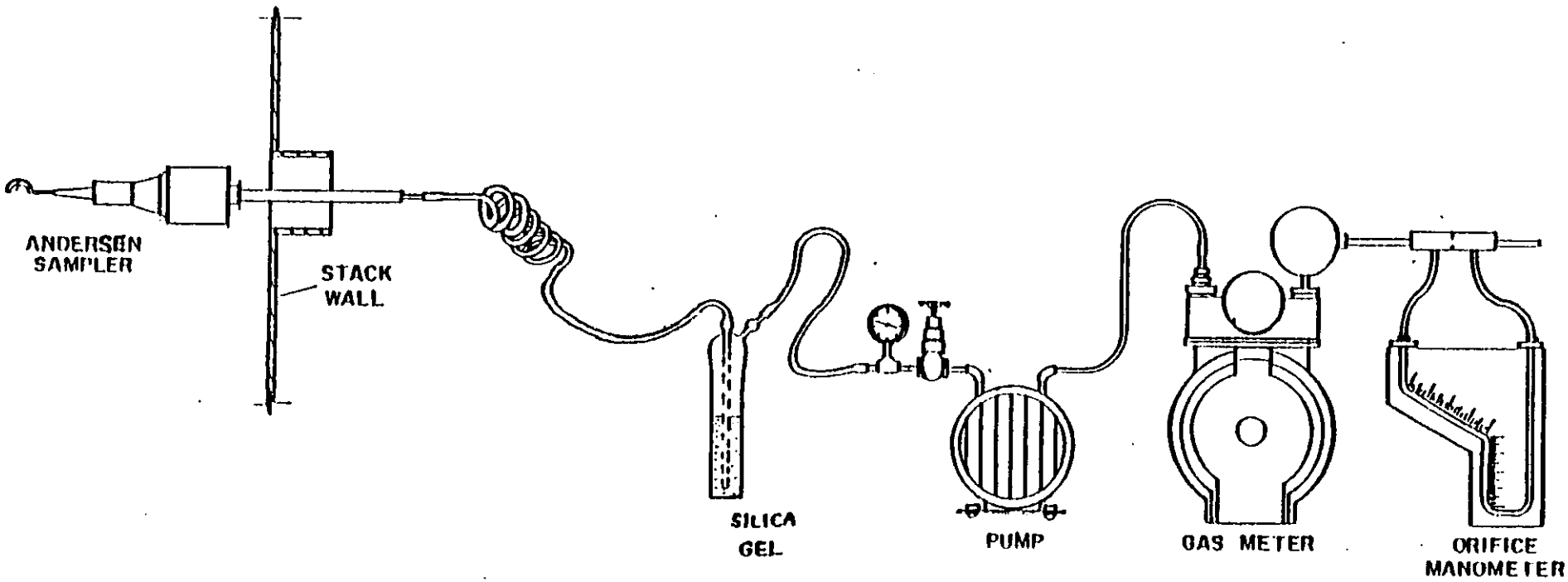


Figure 5.3

Sample Recovery

The Andersen impactor was disconnected from the probe and brought to the Gold Bond Laboratory for clean-up. Starting with stage 1, the fiberglass substrates were removed from the impactor and returned to their original containers. There were a total of 8 substrates and one backup filter for each sample.

Sample Analysis

The fiberglass substrates and the backup filters were dessicated and weighed to a constant weight. The net weight gain was recorded to the nearest 0.01 mg.

YRC PROJECT NO. 01-9517-29

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6.0 APPENDICES

6.1 Computer Data Printouts

6.1.1 Particulate Tests - Baghouse Inlet

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1-BAGHOUSE INLET

PARTICULATE SUMMARY IN ENGLISH UNITS

DESCRIPTION	UNITS	1	2	3	AVERAGE
GENERAL DATA					
DATE OF RUN		JUL 15,80	JUL 16,80	JUL 16,80	
BAROMETRIC PRESSURE	IN.HG	30.01	30.01	30.01	
STACK PRESSURE, ABS.	IN.HG	29.72	29.72	29.72	
STACK AREA	SQ. FT	0.85	0.85	0.85	
NET TIME OF RUN	MIN	60.0	60.0	60.0	
PERCENT ISOKINETIC		109.7	101.3	108.1	106.4
GAS DATA					
AVG STACK GAS VELOCITY	FPS	72.484	72.713	72.977	72.725
AVG STACK TEMPERATURE	DEG.F	300.2	297.7	305.8	301.3
ACTUAL STACK FLOWRATE	ACFM	3705.	3717.	3731.	3718.
STK FLOWRATE,DRY,STD	DSCFM	1217.	1414.	1283.	1305.
MOLECULAR WT-DRY STK GAS		29.56	29.56	29.56	
MOLECULAR WT-STK GAS		23.48	24.33	23.78	
MOLE FRACTION DRY GAS		0.474	0.548	0.500	
GAS ANALYSIS (DRY PERCENT BASIS)					
CARBON DIOXIDE		7.0	7.0	7.0	7.0
OXYGEN		11.0	11.0	11.0	11.0
CARBON MONOXIDE		0.0	0.0	0.0	0.0
NITROGEN		82.0	82.0	82.0	82.0
MOISTURE BY VOL		52.6	45.2	50.0	49.3
SAMPLE COLLECTION DATA					
TOTAL H2O COLLECTED	ML	780.0	624.0	730.0	
VOL H2O VAPOR-STD COND	SCF	36.97	29.58	34.60	
VOL DRY GAS-METER COND	DCF	35.77	38.00	37.39	
VOL DRY GAS-STD COND	DSCF	33.37	35.81	34.66	
AVG GAS METER TEMP	DEG.F	111.6	105.9	115.3	
AVG ORIF PRES DROP	IN.H2O	1.329	1.387	1.381	
PARTICULATE WEIGHT DATA					
NET WEIGHT PARTIAL	MG	0.00	0.00	0.00	0.00
NET WEIGHT TOTAL	MG	46237.20	49279.90	51424.60	48980.57
PARTICULATE EMISSIONS					
PARTIAL					
GRAINS PER SCFD		0.00000	0.00000	0.00000	0.00000
GRAINS PER SCFD @12%CO2		0.00000	0.00000	0.00000	0.00000
GRAINS PER ACF		0.00000	0.00000	0.00000	0.00000
POUNDS PER HOUR		0.00	0.00	0.00	0.00
POUNDS PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000
TOTAL					
GRAINS PER SCFD		21.33599	21.19546	22.84855	21.79333
GRAINS PER SCFD @12%CO2		36.57597	36.33508	39.16895	37.36000
GRAINS PER ACF		7.00731	8.06179	7.85719	7.64210
POUNDS PER HOUR		222.56	256.86	251.25	243.55
POUNDS PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1-BAGHOUSE INLET

PARTICULATE SUMMARY IN METRIC UNITS

DESCRIPTION	UNITS	1	2	3	AVERAGE
GENERAL DATA					
DATE OF RUN		JUL 15,80	JUL 16,80	JUL 16,80	
BAROMETRIC PRESSURE	MM.HG	762.25	762.25	762.25	
STACK PRESSURE, ABS.	MM.HG	754.78	754.78	754.78	
STACK AREA	M2	0.079	0.079	0.079	
NET TIME OF RUN	MIN	60.0	60.0	60.0	
PERCENT ISOKINETIC		109.7	101.3	108.1	106.4
GAS DATA					
AVG STACK GAS VELOCITY	M/S	22.093	22.163	22.243	22.167
AVG STACK TEMPERATURE	DEG.C	149.0	147.6	152.1	149.6
ACTUAL STACK FLOWRATE	AM3/M	105.	105.	106.	105.
STK FLOWRATE,DRY,STD	DNM3/M	34.	40.	36.	37.
MOLECULAR WT-DRY STK GAS		29.56	29.56	29.56	
MOLECULAR WT-STK GAS		23.48	24.33	23.78	
MOLE FRACTION DRY GAS		0.474	0.548	0.500	
GAS ANALYSIS (DRY PERCENT BASIS)					
CARBON DIOXIDE		7.0	7.0	7.0	7.0
OXYGEN		11.0	11.0	11.0	11.0
CARBON MONOXIDE		0.0	0.0	0.0	0.0
NITROGEN		82.0	82.0	82.0	82.0
MOISTURE BY VOL		52.6	45.2	50.0	49.3
SAMPLE COLLECTION DATA					
TOTAL H2O COLLECTED	ML	780.0	624.0	730.0	
VOL H2O VAPOR-STD COND	NM3	1.05	0.84	0.98	
VOL DRY GAS-METER COND	DM3	1.01	1.08	1.06	
VOL DRY GAS-STD COND	DNM3	0.95	1.01	0.98	
AVG GAS METER TEMP	DEG.C	44.2	41.1	46.3	
AVG ORIF PRES DROP	MM.H2O	33.761	35.242	35.084	
PARTICULATE WEIGHT DATA					
NET WEIGHT PARTIAL	MG	0.00	0.00	0.00	0.00
NET WEIGHT TOTAL	MG	46237.20	49279.90	51424.60	48980.57
PARTICULATE EMISSIONS					
PARTIAL					
MG/NORMALIZED CU.METERS		0.00	0.00	0.00	0.00
MG/NORM. CU.M @12% CO2		0.00	0.00	0.00	0.00
MG/ACTUAL CU. METERS		0.00	0.00	0.00	0.00
KILOGRAMS/HOUR		0.00	0.00	0.00	0.00
KILOGM PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000
TOTAL					
MG/NORMALIZED CU.METERS		48824.80	48503.23	52286.13	49871.39
MG/NORM. CU.M @12% CO2		83699.65	83148.39	89633.36	85493.80
MG/ACTUAL CU. METERS		16035.38	18448.41	17980.22	17488.01
KILOGRAMS/HOUR		100.95	116.51	113.97	110.48
KILOGM PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1-BAGHOUSE
DUCT NUMBER: INLET
DUCT AREA: 0.8550.FT.,12.5"ID
DUCT LOCATION: BAGHOUSE#1
FILTER NUMBERS: 37047,37049,37050,37052

TEST NUMBER: 1
DATE: JUL 15,80
TEST COND: NORMAL
BAR. PRESS-IN HG: 30.01
PITOT TUBE FACTOR: 0.890
TIME TEST STARTED: 1524

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I --
START	0.0	332.235								
A-1	2.5	334.101	1.000	1.600	98.	98.	0.255	345.	81.709	130.5
1	5.0	335.690	0.950	1.500	106.	106.	0.255	330.	78.894	112.2
2	7.5	337.000	0.800	1.300	106.	106.	0.255	330.	72.399	100.8
2	10.0	338.550	0.950	1.450	106.	106.	0.255	330.	78.894	109.4
3	12.5	339.940	0.850	1.350	106.	106.	0.255	330.	74.627	103.7
3	15.0	341.280	0.850	1.350	110.	108.	0.255	340.	75.098	100.4
4	17.5	342.841	0.820	1.300	112.	108.	0.255	340.	73.760	118.9
4	20.0	344.440	0.800	1.300	114.	108.	0.255	335.	72.627	122.9
5	22.5	345.880	0.770	1.200	120.	110.	0.255	335.	71.253	112.4
5	25.0	347.360	0.700	1.100	122.	112.	0.255	240.	63.748	113.5
6	27.5	348.760	0.750	1.100	126.	116.	0.255	180.	63.095	98.8
6	30.0	349.629	0.700	1.100	126.	116.	0.255	180.	60.955	63.5
START	30.0	356.410								
B-1	32.5	358.240	1.000	1.600	115.	115.	0.255	330.	80.944	125.0
1	35.0	359.670	1.050	1.700	118.	115.	0.255	330.	82.943	95.2
2	37.5	361.385	0.950	1.500	118.	116.	0.255	330.	78.894	120.0
2	40.0	362.851	0.940	1.500	120.	118.	0.255	340.	78.973	103.6
3	42.5	364.500	0.820	1.350	120.	118.	0.255	340.	73.760	124.7
3	45.0	365.905	0.810	1.300	122.	118.	0.255	340.	73.309	106.8
4	47.5	367.450	0.760	1.200	104.	106.	0.255	310.	69.666	120.5
4	50.0	368.951	0.840	1.350	104.	106.	0.255	310.	73.241	111.3
5	52.5	370.580	0.840	1.350	108.	106.	0.255	330.	74.186	122.2
5	55.0	371.730	0.810	1.300	110.	106.	0.255	330.	72.850	87.8
6	57.5	373.450	0.650	1.050	112.	108.	0.255	150.	57.345	128.5
6	60.0	374.790	0.630	1.050	112.	108.	0.255	150.	56.456	101.7

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE', STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1-BAGHOUSE
DUCT NUMBER: INLET
DUCT AREA: 0.855O.FT.,12.5"ID
DUCT LOCATION: BAGHOUSE#1
FILTER NUMBERS: 37055,37056

TEST NUMBER: 2
DATE: JUL 16,80
TEST COND: NORMAL
BAR. PRESS-IN HG: 30.01
PITOT TUBE FACTOR: 0.890
TIME TEST STARTED: 913

SAMPLE POINT --	CLAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I --
START	0.0	375.645								
A-1	2.5	377.000	1.100	1.750	86.	88.	0.255	335.	83.669	80.6
1	5.0	378.846	1.000	1.600	86.	88.	0.255	335.	79.775	115.1
2	7.5	380.050	1.000	1.600	92.	88.	0.255	335.	79.775	74.9
2	10.0	381.468	1.000	1.600	92.	88.	0.255	335.	79.775	88.2
3	12.5	383.150	0.950	1.500	99.	90.	0.255	335.	77.755	106.8
3	15.0	384.497	0.950	1.000	99.	90.	0.255	340.	77.999	85.8
4	17.5	386.200	0.850	1.450	106.	96.	0.255	340.	73.780	114.0
4	20.0	387.815	0.800	1.300	110.	100.	0.255	340.	71.577	110.9
5	22.5	389.778	0.840	1.350	114.	102.	0.255	310.	71.956	128.7
5	25.0	391.400	0.840	1.350	114.	102.	0.255	310.	71.956	106.4
6	27.5	393.007	0.840	1.350	114.	102.	0.255	180.	65.602	96.1
6	30.0	394.474	0.600	1.000	118.	104.	0.255	150.	54.128	101.0
START	30.0	394.474								
B-1	32.5	396.200	0.940	1.500	108.	106.	0.255	335.	77.345	108.9
1	35.0	397.854	0.940	1.500	111.	107.	0.255	335.	77.345	104.1
2	37.5	399.515	0.860	1.400	113.	108.	0.255	335.	73.980	109.1
2	40.0	401.106	0.860	1.400	115.	108.	0.255	335.	73.980	104.4
3	42.5	402.690	0.860	1.400	115.	108.	0.255	335.	73.980	104.0
3	45.0	404.268	0.860	1.400	115.	108.	0.255	335.	73.980	103.6
4	47.5	405.950	0.860	1.400	118.	109.	0.255	335.	73.980	110.2
4	50.0	407.456	0.880	1.450	122.	110.	0.255	345.	75.305	97.9
5	52.5	408.980	0.840	1.350	122.	110.	0.255	310.	71.956	99.2
5	55.0	410.596	0.890	1.450	122.	110.	0.255	200.	68.573	94.6
6	57.5	412.150	0.700	1.100	124.	112.	0.255	150.	58.465	98.4
6	60.0	413.640	0.700	1.100	120.	114.	0.255	150.	58.465	94.4

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1-BAGHOUSE
DUCT NUMBER: INLET
DUCT AREA: 0.8550.FT.,12.5"ID
DUCT LOCATION: BAGHOUSE#1
FILTER NUMBERS: 37058,37059

TEST NUMBER: 3
DATE: JUL 16,80
TEST COND: NORMAL
BAR. PRESS-IN HG: 30.01
PITOT TUBE FACTOR: 0.890
TIME TEST STARTED: 1248

SAMPLE POINT --	FLAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH20)	ORIFICE RDG (INH20)	METERTEMP (DEG.F) IN	METERTEMP (DEG.F) OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I --
START	0.0	415.203								
A-1	2.5	416.750	1.000	1.600	105.	105.	0.255	340.	80.938	102.0
1	5.0	418.361	1.000	1.600	105.	105.	0.255	340.	80.938	106.2
2	7.5	420.080	1.000	1.600	110.	108.	0.255	340.	80.938	113.0
2	10.0	421.593	1.000	1.600	110.	108.	0.255	340.	80.938	99.4
3	12.5	422.620	0.940	1.500	112.	108.	0.255	340.	78.473	69.5
3	15.0	424.176	0.900	1.450	114.	109.	0.255	340.	76.785	107.5
4	17.5	426.300	0.860	1.400	120.	110.	0.255	340.	75.059	149.7
4	20.0	427.567	0.800	1.300	120.	110.	0.255	340.	72.394	92.6
5	22.5	429.200	0.860	1.400	120.	11.	0.255	300.	73.159	117.5
5	25.0	430.679	0.800	1.300	120.	110.	0.255	300.	70.560	105.3
6	27.5	432.170	0.650	1.050	122.	112.	0.255	170.	57.908	107.0
6	30.0	433.557	0.650	1.050	122.	112.	0.255	170.	57.908	99.5
START	30.0	433.557								
B-1	32.5	435.340	1.000	1.600	120.	114.	0.255	340.	80.938	116.3
1	35.0	437.118	1.000	1.600	120.	114.	0.255	340.	80.938	116.0
2	37.5	438.940	0.860	1.400	122.	116.	0.255	340.	75.059	127.9
2	40.0	440.440	0.860	1.400	126.	116.	0.255	340.	75.059	105.2
3	42.5	441.880	0.640	1.050	130.	118.	0.255	340.	64.751	116.7
3	45.0	443.275	0.580	0.950	130.	118.	0.255	340.	61.641	118.7
4	47.5	444.980	0.850	1.400	130.	120.	0.255	340.	74.622	119.8
4	50.0	446.467	0.850	1.400	130.	120.	0.255	340.	74.622	104.5
5	52.5	448.075	0.840	1.400	130.	120.	0.255	300.	72.303	110.8
5	55.0	449.646	0.920	1.500	130.	120.	0.255	300.	75.668	103.4
6	57.5	451.240	0.850	1.400	130.	122.	0.255	180.	66.744	100.1
6	60.0	452.597	0.760	1.200	130.	122.	0.255	180.	63.111	90.1

6.1.2 Particulate Tests - Baghouse Outlet

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1 OUTLET

PARTICULATE SUMMARY IN ENGLISH UNITS

DESCRIPTION	UNITS	1	2	3	AVERAGE
GENERAL DATA					
DATE OF RUN		JUL 16,80	JUL 16,80	JUL 16,80	
BAROMETRIC PRESSURE	IN.HG	30.01	30.01	30.01	
STACK PRESSURE, ABS.	IN.HG	30.02	30.02	30.02	
STACK AREA	SQ. FT	0.85	0.85	0.85	
NET TIME OF RUN	MIN	72.0	96.0	96.0	
PERCENT ISOKINETIC		109.3	108.5	102.7	106.9
GAS DATA					
AVG STACK GAS VELOCITY	FPS	82.120	78.979	78.628	79.909
AVG STACK TEMPERATURE	DEG.F	329.4	330.2	330.0	329.9
ACTUAL STACK FLOWRATE	ACFM	4198.	4037.	4019.	4085.
STK FLOWRATE,DRY,STD	DSCFM	1522.	1423.	1371.	1439.
MOLECULAR WT-DRY STK GAS		29.56	29.56	29.56	
MOLECULAR WT-STK GAS		24.22	24.06	23.86	
MOLE FRACTION DRY GAS		0.538	0.524	0.507	
GAS ANALYSIS (DRY PERCENT BASIS)					
CARBON DIOXIDE		7.0	7.0	7.0	7.0
OXYGEN		11.0	11.0	11.0	11.0
CARBON MONOXIDE		0.0	0.0	0.0	0.0
NITROGEN		82.0	82.0	82.0	82.0
MOISTURE BY VOL		46.2	47.6	49.3	47.7
SAMPLE COLLECTION DATA					
TOTAL H2O COLLECTED	ML	932.0	1129.6	1102.8	
VOL H2O VAPOR-STD COND	SCF	44.18	53.54	52.27	
VOL DRY GAS-METER COND	DCF	51.94	60.24	55.15	
VOL DRY GAS-STD COND	DSCF	51.47	58.92	53.73	
AVG GAS METER TEMP	DEG.F	79.1	85.4	87.3	
AVG ORIF PRES DROP	IN.H2O	2.079	1.550	1.303	
PARTICULATE WEIGHT DATA					
NET WEIGHT PARTIAL	MG	0.00	0.00	0.00	0.00
NET WEIGHT TOTAL	MG	30.56	19.68	15.62	21.95
PARTICULATE EMISSIONS					
PARTIAL					
GRAINS PER SCFD		0.00000	0.00000	0.00000	0.00000
GRAINS PER SCFD @12%CO2		0.00000	0.00000	0.00000	0.00000
GRAINS PER ACF		0.00000	0.00000	0.00000	0.00000
POUNDS PER HOUR		0.00	0.00	0.00	0.00
POUNDS PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000
TOTAL					
GRAINS PER SCFD		0.00914	0.00514	0.00448	0.00625
GRAINS PER SCFD @12%CO2		0.01568	0.00882	0.00767	0.01072
GRAINS PER ACF		0.00331	0.00181	0.00153	0.00222
POUNDS PER HOUR		0.12	0.06	0.05	0.08
POUNDS PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE', STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GULD BOND'
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1
DUCT NUMBER: OUTLET
DUCT AREA: 0.8550.FT.,12.5"ID
DUCT LOCATION: BAGHOUSE#1
FILTER NUMBERS: 37037

TEST NUMBER: 1
DATE: JUL 16,80
TEST COND: NORMAL
BAR. PRESS-IN HG: 30.01
PITOT TUBE FACTOR: 0.880
TIME TEST STARTED: 926

SAMPLE POINT --	FLAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH20)	ORIFICE RDG (INH20)	METERTEMP (DEG.F) IN	METERTEMP (DEG.F) OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
START	0.0	681.968								
A-1	3.0	684.210	1.200	2.250	65.	64.	0.259	330.	85.888	110.0
2	6.0	686.445	1.200	2.250	66.	65.	0.259	330.	85.888	109.5
3	9.0	688.685	1.200	2.250	74.	64.	0.259	330.	85.888	109.4
4	12.0	690.940	1.200	2.250	76.	65.	0.259	325.	85.615	109.6
5	15.0	693.105	1.100	2.100	78.	66.	0.259	330.	82.231	110.1
6	18.0	695.270	1.100	2.100	82.	68.	0.259	330.	82.231	109.7
7	21.0	697.395	1.050	2.000	83.	68.	0.259	330.	80.340	110.2
8	24.0	699.535	1.050	2.000	85.	70.	0.259	330.	80.340	110.7
9	27.0	701.525	0.900	1.700	88.	70.	0.259	330.	74.381	111.0
10	30.0	703.500	0.900	1.700	88.	70.	0.259	325.	74.145	109.8
11	33.0	706.040	0.840	1.600	88.	70.	0.259	330.	71.859	146.6
12	36.0	707.895	0.800	1.500	90.	72.	0.259	330.	70.127	109.5
START	36.0	707.895								
B-1	39.0	709.390	1.200	2.250	83.	74.	0.259	330.	85.888	72.3
2	42.0	711.660	1.200	2.250	84.	76.	0.259	330.	85.888	109.6
3	45.0	713.885	1.200	2.250	85.	77.	0.259	330.	85.888	107.3
4	48.0	716.140	1.200	2.250	90.	75.	0.259	330.	85.888	108.6
5	51.0	718.410	1.200	2.250	90.	76.	0.259	330.	85.888	109.3
6	54.0	720.685	1.200	2.250	92.	76.	0.259	330.	85.888	109.4
7	57.0	722.880	1.100	2.100	94.	78.	0.259	330.	82.231	110.0
8	60.0	724.980	1.000	1.900	95.	78.	0.259	325.	78.156	110.0
9	63.0	727.170	1.100	2.100	95.	78.	0.259	330.	82.231	109.7
10	66.0	729.400	1.100	2.100	96.	78.	0.259	330.	82.231	111.7
11	69.0	731.650	1.200	2.250	98.	78.	0.259	330.	85.888	107.8
12	72.0	733.910	1.200	2.250	98.	78.	0.259	330.	85.888	108.3

YORK RESEARCH CORPORATION — JOB NUMBER: 9517-29
ONE RESEARCH DRIVE', STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND — TEST NUMBER: 2
PLANT LOCATION: RICHMOND,CA — DATE: JUL 16,80
UNIT TESTED: CALCINER#1 — TEST COND: NORMAL
DUCT NUMBER: OUTLET — BAR. PRESS-IN HG: 30.01
DUCT AREA: 0.8550.FT.,12.5"ID — PITOT TUBE FACTOR: 0.870
DUCT LOCATION: BAGHOUSE#1 — TIME TEST STARTED: 1327
FILTER NUMBERS: 37041

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	METERTEMP (DEG.F) OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
START	0.0	734.843								
A-1	4.0	737.225	1.200	1.800	72.	70.	0.249	330.	85.201	96.9
2	8.0	739.665	1.000	1.500	72.	72.	0.249	330.	77.777	108.5
3	12.0	742.705	1.000	1.500	74.	74.	0.249	330.	77.777	135.0
4	16.0	745.275	1.100	1.650	82.	72.	0.249	330.	81.573	108.5
5	20.0	747.955	1.200	1.800	84.	74.	0.249	330.	85.201	108.1
6	24.0	750.625	1.200	1.800	90.	74.	0.249	330.	85.201	107.4
7	28.0	753.205	1.100	1.650	90.	74.	0.249	330.	81.573	108.4
8	32.0	755.780	1.100	1.650	95.	77.	0.249	330.	81.573	107.7
9	36.0	758.295	1.050	1.550	96.	78.	0.249	330.	79.698	107.6
10	40.0	760.770	1.000	1.500	97.	78.	0.249	330.	77.777	108.4
11	44.0	763.135	0.900	1.350	98.	80.	0.249	325.	73.552	108.7
12	48.0	765.485	0.900	1.350	98.	80.	0.249	330.	73.786	108.4
START	48.0	765.485								
B-1	52.0	767.940	1.100	1.650	88.	80.	0.249	330.	81.573	102.9
2	56.0	770.510	1.100	1.650	90.	80.	0.249	330.	81.573	107.6
3	60.0	773.080	1.100	1.650	92.	81.	0.249	330.	81.573	107.5
4	64.0	775.655	1.100	1.650	97.	81.	0.249	330.	81.573	107.4
5	68.0	778.215	1.050	1.600	98.	82.	0.249	330.	79.698	109.2
6	72.0	780.820	1.100	1.650	97.	82.	0.249	330.	81.573	108.6
7	76.0	783.250	0.940	1.400	98.	82.	0.249	330.	75.408	109.5
8	80.0	785.690	0.960	1.450	100.	83.	0.249	335.	76.447	109.0
9	84.0	788.060	0.900	1.350	100.	83.	0.249	335.	74.019	109.4
10	88.0	790.395	0.900	1.350	101.	83.	0.249	330.	73.786	107.4
11	92.0	792.730	0.900	1.350	102.	84.	0.249	330.	73.786	107.3
12	96.0	795.085	0.900	1.350	102.	84.	0.249	330.	73.786	108.2

YORK RESEARCH CORPORATION — JOB NUMBER: 9517-29
ONE RESEARCH DRIVE', STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1
DUCT NUMBER: OUTLET
DUCT AREA: 0.85SQ.FT.,12.5"ID
DUCT LOCATION: BAGHOUSE#1
FILTER NUMBERS: 37039

TEST NUMBER: 3
DATE: JUL 16,80
TEST COND: NORMAL
BAR. PRESS-IN HG: 30.01
PITOT TUBE FACTOR: 0.870
TIME TEST STARTED: 1612

SAMPLE POINT --	FLAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	METERTEMP (DEG.F) OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I --
START	0.0	796.850								
A-1	4.0	799.225	1.100	1.400	76.	75.	0.249	330.	81.910	103.1
2	8.0	801.600	1.100	1.400	78.	76.	0.249	330.	81.910	102.9
3	12.0	803.940	1.100	1.400	85.	78.	0.249	330.	81.910	101.0
4	16.0	806.280	1.050	1.350	86.	78.	0.249	330.	80.026	103.3
5	20.0	808.575	1.000	1.300	88.	78.	0.249	330.	78.098	103.7
6	24.0	810.850	1.000	1.300	94.	80.	0.249	330.	78.098	102.4
7	28.0	813.075	0.940	1.200	95.	81.	0.249	330.	75.719	103.2
8	32.0	815.275	0.940	1.200	96.	82.	0.249	330.	75.719	102.0
9	36.0	817.465	0.920	1.180	96.	82.	0.249	330.	74.909	102.6
10	40.0	819.640	0.900	1.150	97.	83.	0.249	330.	74.090	102.9
11	44.0	821.780	0.900	1.150	98.	84.	0.249	330.	74.090	101.2
12	48.0	823.935	0.860	1.100	98.	85.	0.249	330.	72.425	104.2
START	48.0	823.935								
B-1	52.0	826.330	1.100	1.400	90.	80.	0.249	330.	81.910	103.0
2	56.0	828.715	1.100	1.400	94.	82.	0.249	330.	81.910	102.3
3	60.0	831.080	1.100	1.400	96.	82.	0.249	330.	81.910	101.3
4	64.0	833.470	1.100	1.400	96.	82.	0.249	330.	81.910	102.4
5	68.0	835.855	1.100	1.400	97.	83.	0.249	330.	81.910	102.1
6	72.0	838.210	1.050	1.350	97.	83.	0.249	330.	80.026	103.2
7	76.0	840.525	1.000	1.300	98.	83.	0.249	330.	78.098	103.9
8	80.0	842.875	1.000	1.300	96.	82.	0.249	330.	78.098	105.6
9	84.0	845.130	1.000	1.300	96.	82.	0.249	330.	78.098	101.3
10	88.0	847.430	1.000	1.300	96.	84.	0.249	330.	78.098	103.3
11	92.0	849.715	1.000	1.300	96.	84.	0.249	330.	78.098	102.6
12	96.0	852.000	1.000	1.300	96.	85.	0.249	330.	78.098	102.5

6.1.3 Particle Size Distribution Tests

YORK RESEARCH CORPORATION — JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA GYPSUM — TEST NUMBER: 1
PLANT LOCATION: RICHMOND, CALIF — DATE: JUL 15,80
UNIT TESTED: #1 CALCINER — CONDITIONS: NORMAL
STACK NUMBER: INLET — AMBIENT TEMP-DEG F: 80
STACK LOCATION: INLET — BAR. PRESS - IN HG:29.92

ANDERSEN PARTICLE SIZING

STAGE	DIAMETER (MICRONS)	WEIGHT (MILLIGRAMS)	% PER STAGE	CUM% <UPPER DIAM	GR/SCFD PER STAGE	MG/NCMD PER STAGE
1	> 7.05	157.51	58.51		7.002972	******
2	7.05-4.37	27.64	10.27	41.49	1.228888	2812.5
3	4.37-2.94	31.37	11.65	31.22	1.394726	3192.1
4	2.94-1.98	18.62	6.92	19.56	0.827854	1894.7
5	1.98-1.25	17.08	6.35	12.65	0.759385	1738.0
6	1.25-0.60	12.26	4.55	6.30	0.545086	1247.5
7	0.60-0.35	2.85	1.06	1.75	0.126712	290.01
8	0.35-0.20	0.79	0.29	0.69	0.035124	80.39
FILTER	< 0.20	1.06	0.39	0.39	0.047128	107.86

STACK TEMP.(DEG.F). . . . 335.0
STACK PRESSURE(IN.HG) . . 29.63
GAS ANALYSIS (DRY PERCENT)
CO2 . . . . . 7.00
CO 0.00
N2 . . . . . 82.00
O2 . . . . . 11.00
H2O 52.60

SAMPLING RATE(ACFM) . . . 2.220
(SCFMD). . . 0.694
(NCMMD). . . 0.020
IMPACTOR TEMP.(DEG.F) . . 335.0
PARTICLE DENSITY(GM/CC) . 1.00
TEST TIME (MIN) 0.50
TOTAL WEIGHT (MG) 269.1
TOTAL GR/SCFD 11.9678
TOTAL MG/NCMD 27390.9

YORK RESEARCH CORPORATION — JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA GYPSUM — TEST NUMBER: 2
PLANT LOCATION: RICHMOND, CALIF — DATE: JUL 16,80
UNIT TESTED: #1 CALCINER — CONDITIONS: NORMAL
STACK NUMBER: INLET — AMBIENT TEMP-DEG F: 80
STACK LOCATION: INLET — BAR. PRESS - IN HG:29.92

ANDERSEN PARTICLE SIZING

STAGE	DIAMETER (MICRONS)	WEIGHT (MILLIGRAMS)	% PER STAGE	CUM% <UPPER DIAM	GR/SCFD PER STAGE	MG/NCMD PER STAGE
1	> 8.30	49.93	44.49		3.962370	9068.7
2	8.30-5.16	15.26	13.60	55.51	1.211011	2771.6
3	5.16-3.48	17.43	15.53	41.91	1.383219	3165.7
4	3.48-2.35	8.53	7.60	26.38	0.676928	1549.2
5	2.35-1.49	11.40	10.16	18.78	0.904687	2070.5
6	1.49-0.72	5.88	5.24	8.62	0.466628	1067.9
7	0.72-0.42	2.09	1.86	3.38	0.165859	379.60
8	0.42-0.26	0.24	0.21	1.51	0.019046	43.59
FILTER	< 0.26	1.46	1.30	1.30	0.115863	265.18

STACK TEMP.(DEG.F). . . . 335.0
STACK PRESSURE(IN.HG) . . 29.63
GAS ANALYSIS (DRY PERCENT)
CO2 . . . . . 7.00
CO 0.00
N2 . . . . . 82.00
O2 . . . . . 11.00
H2O 45.20

SAMPLING RATE(ACFM) . . . 1.630
(SCFMD). . . 0.589
(NCMMD). . . 0.017
IMPACTOR TEMP.(DEG.F) . . 335.0
PARTICLE DENSITY(GM/CC) . 1.00
TEST TIME (MIN) 0.33
TOTAL WEIGHT (MG) 112.2
TOTAL GR/SCFD 8.90561
TOTAL MG/NCMD 20382.3

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA GYPSUM TEST NUMBER: 3
PLANT LOCATION: RICHMOND,CA DATE: JUL 16,80
UNIT TESTED: #1 CALCINER CONDITIONS: NORMAL
STACK NUMBER: INLET AMBIENT TEMP-DEG F: 80
STACK LOCATION: INLET BAR. PRESS - IN HG:29.92

ANDERSEN PARTICLE SIZING

STAGE	DIAMETER (MICRONS)	WEIGHT (MILLIGRAMS)	% PER STAGE	CUM% <UPPER DIAM	GR/SCFD PER STAGE	MG/NCMD PER STAGE
1	> 8.90	17.84	23.89		1.625128	3719.4
2	8.90-5.54	13.02	17.44	76.11	1.186052	2714.5
3	5.54-3.73	15.10	20.23	58.67	1.375529	3148.1
4	3.73-2.53	12.19	16.33	38.44	1.110444	2541.4
5	2.53-1.60	8.58	11.49	22.11	0.781592	1788.8
6	1.60-0.78	4.22	5.65	10.62	0.384419	879.82
7	0.78-0.46	1.44	1.93	4.97	0.131176	300.22
8	0.46-0.28	0.64	0.86	3.04	0.058301	133.43
FILTER	< 0.28	1.63	2.18	2.18	0.148484	339.84

STACK TEMP.(DEG.F). . . . 335.0
STACK PRESSURE(IN.HG) . . 29.63
GAS ANALYSIS (DRY PERCENT)
CO2 . . . . . 7.00
CO 0.00
N2 . . . . . 82.00
O2 . . . . . 11.00
H2O 45.20

SAMPLING RATE(ACFM) . . . 1.420
(SCFMD). . . 0.513
(NCMMD). . . 0.015
IMPACTOR TEMP.(DEG.F) . . 335.0
PARTICLE DENSITY(GM/CC) . 1.00
TEST TIME (MIN) 0.33
TOTAL WEIGHT (MG) 74.66
TOTAL GR/SCFD 6.80113
TOTAL MG/NCMD 15565.7

YORK RESEARCH CORPORATION — JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA GYPSUM — TEST NUMBER: 1
PLANT LOCATION: RICHMOND, CALIF — DATE: JUL 16,80
UNIT TESTED: #1 CALCINER — CONDITIONS: NORMAL
STACK NUMBER: OUTLET — AMBIENT TEMP-DEG F: 75
STACK LOCATION: OUTLET — BAR. PRESS - IN HG: 29.65

ANDERSEN PARTICLE SIZING

STAGE	DIAMETER (MICRONS)	WEIGHT (MILLIGRAMS)	% PER STAGE	CUM% <UPPER DIAM	GR/SCFD PER STAGE	MG/NCMD PER STAGE
1	> 8.03	10.71	10.96		0.002376	5.44
2	8.03-4.99	9.71	9.93	89.04	0.002154	4.93
3	4.99-3.36	10.73	10.98	79.11	0.002381	5.45
4	3.36-2.27	9.45	9.67	68.13	0.002097	4.80
5	2.27-1.44	10.94	11.19	58.46	0.002427	5.55
6	1.44-0.69	9.64	9.86	47.27	0.002139	4.89
7	0.69-0.41	10.15	10.38	37.40	0.002252	5.15
8	0.41-0.25	17.05	17.44	27.02	0.003782	8.66
FILTER	< 0.25	9.36	9.58	9.58	0.002077	4.75

STACK TEMP.(DEG.F). . . . 330.0
STACK PRESSURE(IN.HG) . . 29.66
GAS ANALYSIS (DRY PERCENT)
CO2 . . . . . 7.00
CO 0.00
N2 . . . . . 82.00
O2 . . . . . 11.00
H2O 49.30

SAMPLING RATE(ACFM) . . . 1.720
(SCFMD). . . 0.580
(NCMMD). . . 0.016
IMPACTOR TEMP.(DEG.F) . . 330.0
PARTICLE DENSITY(GM/CC) . 1.00
TEST TIME (MIN) 120.0
TOTAL WEIGHT (MG) 97.74
TOTAL GR/SCFD 0.02168
TOTAL MG/NCMD 49.63

6.2 Calculation Formulae

PARTICULATE CALCULATION KEY

A_s	=	Stack area (ft^2)
C	=	Dry particulate concentration - Gr/SCFD
CO_2, O_2, N_2, CO	=	Percent by volume (dry basis) in flue gas
C_p	=	Pitot tube correction factor
D_n	=	Sample nozzle diameter (in.)
E	=	Dry particulate emissions - lb/hr
% EA	=	Percent excess air
E_F	=	Emissions by F Factor - Lb/MMBtu
E_{Fc}	=	Emissions by F_c Factor - Lb/MMBtu
E_{HI}	=	Emissions by actual heat input - Lb/MMBtu
E_n	=	Average normal emission rate (non-soot blow)
E_p	=	Prorated emission rate
E_{sb}	=	Emission rate during soot blow
F	=	F Factor (SCFD/MMBtu)
F_c	=	F_c Factor
GCV	=	Gross caloric value of fuel fired (Btu/lb)
H, C, S, N, O	=	Percent by weight of fuel fired
% I	=	Sampling isokinetics
% M	=	Percent moisture by volume in stack gas
M_d	=	Mole fraction of dry gas
M_f	=	Front half sample weight (milligrams)
MW	=	Molecular weight of stack gas
MW_d	=	Molecular weight of dry stack gas
P_b	=	Barometric pressure ("Hg)

P_m	=	Average orifice pressure drop ("H_2O)
P_s	=	Stack pressure ("Hg absolute)
ΔP_s	=	Velocity pressure ("H_2O)
Q_A	=	Stack gas flow rate, stack conditions - ACFM
Q_s	=	Stack gas flow rate, standard conditions - SCFMD
T	=	Time unit in operation per day (hours)
T_m	=	Average meter temperature (^oF)
T_s	=	Stack temperature (^oF)
T_{sb}	=	Time unit blows soot per day (hours)
T_t	=	Test time (minutes)
V_m	=	Volume of gas sampled at meter conditions - ft^3
$V_{m_{std}}$	=	Volume of dry gas sampled at standard conditions - ft^3
V_s	=	Stack gas velocity at stack conditions - fps
V_w	=	Milliliters of water condensed in impingers
$V_{w_{gas}}$	=	Volume of water vapor at 70^oF and 29.92" Hg, ft^3

PARTICULATE CALCULATIONS

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

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

$$V_{m_{std}} = \frac{17.7 \times V_m(P_b + \frac{P_m}{13.6})}{(T_m + 460)}$$

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

$$V_{w_{gas}} = 0.0474 \times V_w$$

3. % Moisture in stack gas

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

4. Mole fraction of dry gas

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

5. Average molecular weight of dry stack gas

$$M W_d = (\% CO_2 \times .44) + (\% O_2 \times .32) + (\% N_2 \times .28) + (\% CO \times .28)$$

6. Molecular weight of stack gas

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

7. Stack velocity at stack conditions, fps

$$V_s = 85.48 \times C_p \sqrt{\frac{\Delta P_s \times (T_s + 460)}{P_s \times MW}}$$

7e. Average stack velocity at stack conditions, fps

$$V_s = (85.48)\ (C_p)\left(\sqrt{\overline{\Delta P_s (T_s + 460)}}\right)\left(\frac{1}{\sqrt{(P_s)(MW)}}\right)$$

where $\sqrt{\overline{\Delta P_s (T_s + 460)}}$ is the average square root of the product of the velocity head and the absolute stack temperature.

8. Stack gas flow rate, stack conditions, ACFM

$$Q_A = 60 \times V_s \times A_s$$

9. Stack gas flow rate, standard conditions, SCFMD

$$Q_s = \frac{1062.6 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)}$$

10. Percent isokinetic

$$\% I = \frac{17.24 \times (T_s + 460) \times Vm_{std}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

11. Dry particulate concentration - Gr/SCFD

$$C = 0.01543 \times \frac{M_f}{Vm_{std}}$$

12. Dry particulate emissions - lb/hr

$$E = 0.008572 \times C \times Q_s$$

13. Particulate emissions by actual heat input - Lb/MMBtu

$$E_{HI} = \frac{E}{MMBtu/Hr}$$

14. % Excess air at sampling point

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

15. F Factor

$$F = \frac{10^6 \ (3.64\%H) + (1.53\%C) + (.57\%S) + (.14\%N) - (.46\%O)}{GCV}$$

16. F_c Factor

$$F_c = \frac{321 \times 10^3 \ \%C}{GCV}$$

17. Emissions by F Factor (Lb/MMBtu)

$$E_F = \frac{CF}{7000} \quad \frac{20.9}{20.9-\% \ O_2}$$

18. Emissions by F_c Factor (Lb/MMBtu)

$$E_{F_c} = \frac{CF_c}{7000} \quad \frac{100}{\% \ CO_2}$$

19. Prorated Emissions

$$E_p = E_n + (E_{sb} - E_n) \quad \frac{T_{sb}}{T}$$

YORK RESEARCH CORPORATION JOB NUMBER: 9517-29
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA-GOLD BOND
PLANT LOCATION: RICHMOND,CA
UNIT TESTED: CALCINER#1 OUTLET

PARTICULATE SUMMARY IN METRIC UNITS

DESCRIPTION	UNITS	1	2	3	AVERAGE
GENERAL DATA					
DATE OF RUN		JUL 16,80	JUL 16,80	JUL 16,80	
BAROMETRIC PRESSURE	MM.HG	762.25	762.25	762.25	
STACK PRESSURE, ABS.	MM.HG	762.59	762.59	762.59	
STACK AREA	M2	0.079	0.079	0.079	
NET TIME OF RUN	MIN	72.0	96.0	96.0	
PERCENT ISOKINETIC		109.3	108.5	102.7	106.9
GAS DATA					
AVG STACK GAS VELOCITY	M/S	25.030	24.073	23.966	24.356
AVG STACK TEMPERATURE	DEG.C	165.2	165.7	165.6	165.5
ACTUAL STACK FLOWRATE	AM3/M	119.	114.	114.	116.
STK FLOWRATE,DRY,STD	DNM3/M	43.	40.	39.	41.
MOLECULAR WT-DRY STK GAS		29.56	29.56	29.56	
MOLECULAR WT-STK GAS		24.22	24.06	23.86	
MOLE FRACTION DRY GAS		0.538	0.524	0.507	
GAS ANALYSIS (DRY PERCENT BASIS)					
CARBON DIOXIDE		7.0	7.0	7.0	7.0
OXYGEN		11.0	11.0	11.0	11.0
CARBON MONOXIDE		0.0	0.0	0.0	0.0
NITROGEN		82.0	82.0	82.0	82.0
MOISTURE BY VOL		46.2	47.6	49.3	47.7
SAMPLE COLLECTION DATA					
TOTAL H2O COLLECTED	ML	932.0	1129.6	1102.8	
VOL H2O VAPOR-STD COND	NM3	1.25	1.52	1.48	
VOL DRY GAS-METER COND	DM3	1.47	1.71	1.56	
VOL DRY GAS-STD COND	DNM3	1.46	1.67	1.52	
AVG GAS METER TEMP	DEG.C	26.2	29.7	30.7	
AVG ORIF PRES DROP	MM.H2O	52.811	39.370	33.105	
PARTICULATE WEIGHT DATA					
NET WEIGHT PARTIAL	MG	0.00	0.00	0.00	0.00
NET WEIGHT TOTAL	MG	30.56	19.68	15.62	21.95
PARTICULATE EMISSIONS					
PARTIAL					
MG/NORMALIZED CU.METERS		0.00	0.00	0.00	0.00
MG/NORM. CU.M @12% CO2		0.00	0.00	0.00	0.00
MG/ACTUAL CU. METERS		0.00	0.00	0.00	0.00
KILOGRAMS/HOUR		0.00	0.00	0.00	0.00
KILOGM PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000
TOTAL					
MG/NORMALIZED CU.METERS		20.93	11.77	10.24	14.31
MG/NORM. CU.M @12% CO2		35.87	20.18	17.56	24.54
MG/ACTUAL CU. METERS		7.58	4.15	3.49	5.08
KILOGRAMS/HOUR		0.05	0.03	0.02	0.04
KILOGM PER PROCESS UNIT		0.00000	0.00000	0.00000	0.00000

ENGLISH TO METRIC CONVERSION FACTORS

FROM ENGLISH	TO METRIC	MULTIPLY BY
DSCF	DNm^3	0.02832
DSCFM	DNm^3/min	0.02832
Tons/hr	Mg/hr	0.9072
gr/DSCF	g/DNm^3	2.288
lb/hr	Kg/hr	0.4536
lb/ton	Kg/Mg	0.5
°F	°C	-32, x 5/9*

* First subtract 32 from °F temperature, then multiply by 5/9.

PARTICLE SIZE CALCULATIONS

Operator _____ Duct Dimensions _____

Impactor I.D. _____ Nozzle Size:dn(in) _____

Pitot Factor: F_s _____ Meter Temp: T_m(deg F) _____

Clock Time _____ Meter Rate: R_m(cfm) _____

1) Stack Pressure: $P_s = P_b + \frac{Pst}{13.6}$ = _____ + $\frac{\quad}{13.6}$ = _____ inHg

2) Mole Fraction Dry Gas: $M_d = 1 - \frac{\%H_2O}{100}$ = 1 - $\frac{\quad}{100}$ = _____

3) Mol Wt. Dry Flue Gas: $MW_d = (.44 \times \%CO_2)+(.32 \times \%O_2)+(.28 \times \%CO)+(.28 \times \%N_2)$

= (.44 x ___)+(.32 x ___)+(.28 x ___)+(.28 x ___) = _____

4) Mol Wt. Flue Gas: $MW = (MW_d) \times (M_d) + [18 \times (1-M_d)]$

= ____ x ____ + 18 x (1 - ____) = _____

5) Stack Gas Velocity: $V_{st} = 85.35 \times (F_s) \times \sqrt{\frac{\Delta P \times (Tst + 460)}{P_s \times MW}}$

= 85.35 x _____ x $\sqrt{\frac{\quad \times (\quad + 460)}{\quad}}$ = _____ fps

6) Sample Rate: $Q_n = .327 \times (V_{st}) \times (d_n^2)$

= .327 x _____ x (____)^2 = _____ ACFM

7) Meter Rate: $R_m = (Q_n) \times \frac{P_s}{P_m} \times \frac{T_m + 460}{T_{st} + 460} \times M_d$

= _____ x $\left(\frac{\quad}{\quad}\right)$ x $\frac{\quad + 460}{\quad + 460}$ x _____ = _____ cfm

8) Orifice $\Delta H = \frac{(cfm)^2 \quad (\Delta H\ @)}{0.5625}$

= $\frac{(\quad)^2 \quad (\quad)}{0.5625}$

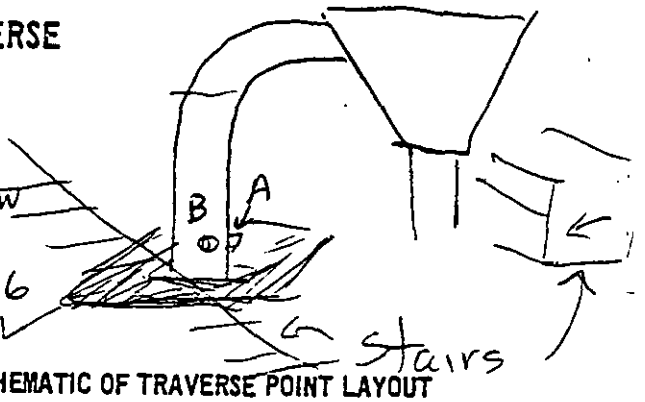
06-4-80

6.3 Field Data Sheets

6.3.1 Particulate Testing - Baghouse Inlet

PRELIMINARY VELOCITY TRAVERSE

PLANT EPA - Gold Bond Gypsum
DATE 7/15
LOCATION Inlet
STACK I.D. 12.5"
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O -4.0"
OPERATORS Denaro Nowak



SCHEMATIC OF TRAVERSE POINT LAYOUT

>2 diameters
>8 diameters > disturbances

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	1.0	325
2	0.95	325
3	0.91	330
4	0.78	330
5	0.75	330
6	0.69	170
B 1		
2		
3		
4		
5		
6		
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	1.1	315
2	0.99	315
3	0.85	315
4	0.81	315
5	0.74	315
6	0.61	175
AVERAGE		

$\Delta p_s Av$ = 0.85
$T_s Av$ = 320° F excludes pts A6 + B6 ✓

ES-045

FIGURE 2

FIELD MOISTURE DETERMINATION

JOB NO. 9517-29

LOCATION Inlet

TEST NO. Morsture

DATE 7/15

OPERATOR DeBarzo/Nowak

COMMENTS:

Environmental Consulta

1) BY APPROXIMATION METHOD:

BAROMETRIC PRESSURE _____ 37046

CLOCK TIME	GAS METER READING (V_m) 1 ft^3	ORIFICE PRESSURE DIFFERENCTIAL (ΔH) in H_2O	Meter Temperature, Tm °F
1114	317.256	1.87	In 87 Out 87
1119	320.90	1.87	94 87
1124	324.57	1.87	102 88
1129	328.24	1.87	110 102
1134	331.970	—	112 98

	Impinger Vol (ml)	Silica Gel (Gr.)
Initial	200	
Final	416	
Net	216.	

248
168
416

(W) = weight of moisture collected = _____

% Moisture by Volume = _____

2) BY WET AND DRY BULB TEMPERATURES:

Wet Bulb Temp: _____ °F % Moisture from Psychometric Chart

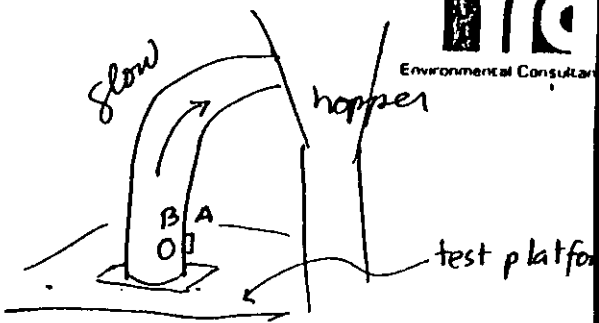
Dry Bulb Temp: _____ °F _____

FIELD DATA

JOB. NO. 9517-29
PLANT GYPSUM
DATE 7/15
SAMPLING LOCATION INLET
SAMPLE TYPE pair
RUN NUMBER 1
OPERATOR MD
AMBIENT TEMPERATURE 95°F
BAROMETRIC PRESSURE 29.92 30.01
STATIC PRESSURE, (P_g) -4" H2O
FILTER NUMBER(s)
TAR(s)

PROBE I.D. 040-005
PROBE LENGTH AND TYPE 5S-5'
NOZZLE I.D. .255"
ASSUMED MOISTURE, % 42%
SAMPLE BOX, I.D. 2
METER BOX, I.D. S-2166
METER $\Delta H_@$ 1.87
Cp .89 brown
PROBE HEATER SETTING 50%
HEATER BOX SETTING 100%
REFERENCE Δp 1.175

Vol. H_2O (ml)
Final 922
Initial 200
Net Gain 722
Leak Check
Initial 0.00 @ 18 "Hg
Final 0.00 @ 23 "Hg



Schematic of Port Locations
(Indicate north, Label Ports A, B et

#1 = FL-38 .42840 #2 = FL92-.43656

READ AND RECORD ALL DATA EVERY 2.5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F			
Start	0	1524	332.235									
A 1	2.5	1526:30	334.101	1.0	1.6	1.6	345	98	98	7	225	70
1	5	1654:30	335.69	.95	1.5	1.5	330	106	106	13		
* 2	7.5	1710	337.00	.8	1.3	1.3	330	106	106	23		
2	10	1712.5	338.55	.95	1.45	1.45	330	106	106	23		
* 3	12.5	1715	339.94	.85	1.35	1.35	330	106	106	23		
** 3	15	1731:30	341.28	.85	1.35	1.35	340	110	108	14		
4	17.5	1734:0	342.841	.82	1.3	1.3	340	112	108	14		
4	20	1744:30	344.44	.8	1.3	1.3	335	114	108	8		
* 5	22.5	1747	345.88	.77	1.2	1.2	335	120	110	16		
5	25	1753.30	347.36	.7	1.1	1.1	240	122	112	10		
6	27.5	1756	348.76	.75	1.2	1.1	180	126	116	18		
** 6	30	1758:30	349.629	.7	1.1	.7	180	126	116	24		

continued on next pg

COMMENTS:

* stop to shake filter ** stop to change filter

SAMPLING LOCATION Inlet (1) 2 of 2 Page 2 of 2

TEST NUMBER 1

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Start	0	1834	356.410									
** B 1	32.5	1836.30	358.24	1	1.6	1.6	330	115	115	8	225	70
1	35	1839	359.670	1.05	1.7	1.7	330	118	115	23		
* 2	37.5	1843.30	361.385	.95	1.55	1.55	330	118	116	10		
2	40	1846	362.851	.94	1.5	1.5	340	120	118	22		
* 3	42.5	1851	364.50	.82	1.35	1.35	340	120	118	12		
3	45	1853.30	365.905	.81	1.3	1.3	340	122	118	22		
** 4	47.5	1901.30	367.45	.76	1.2	1.2	310	104	106	8	250	70
4	50	1904	368.951	.84	1.35	1.35	310	104	106	20		
* 5	52.5	2007.45	370.58	.84	1.35	1.35	330	108	106	9		
5	55	2010.15	371.73	.81	1.3	1.3	330	110	106	23		
* 6	57.5	2014	373.45	.65	1.05	1.05	150	112	108	9		
6	60	2016.30	374.790	.63	1.05	1.05	150	112	108	23		

Ran 1st 10 minutes of part B.
Frit had crack.
Start over.

48.5
23

1859
1901

5.15
4.30
7
7.45

1130
2.30
1.00

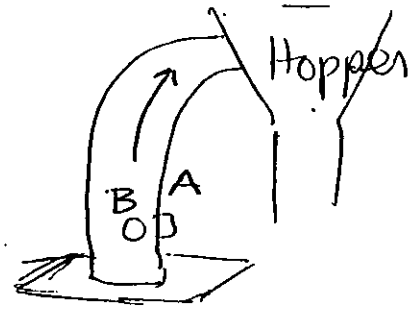
A #37051
A #37053
#4 #37052
Inlet 37047
#2 #37049
SG 37048
GM #37050

FIELD DATA

JOB. NO. 9517-29
PLANT GYPSUM
DATE 7/16
SAMPLING LOCATION INlet
SAMPLE TYPE part
RUN NUMBER 2
OPERATOR MD
AMBIENT TEMPERATURE 95°F
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_g) −4 " H2O
FILTER NUMBER(s) 1
TAR(s)

PROBE I.D. 040-0
PROBE LENGTH AND TYPE 5' S-4'
NOZZLE I.D. .255
ASSUMED MOISTURE, % 42%
SAMPLE BOX I.D. 02
METER BOX I.D. 3 2166
METER $\Delta H@$ 1.87
Cp .59
PROBE HEATER SETTING 50%
HEATER BOX SETTING 100%
REFERENCE Δp 1.150

Vol. H_2O (ml)
Final 777
Initial 200
Net Gain 577
Leak Check
Initial 0.00 @ 28 "Hg
Final 0.00 @ 28 "Hg



Environmental Consultants

Schematic of Port Locations
(Indicate north, Label Ports A, B et

#1 = FL-35 .40332 #2 = FL-36 .40523

READ AND RECORD ALL DATA EVERY 2½ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
START	0	0913	375.645									
A1	2.5	915:30	378.00	1.1	1.75	1.75	335	86	88	8	240	70
*1	5	098	378.846	1.0	1.6	1.6	335	86	88	23		
2	7.5		380.05	1.0	1.6	1.6	335	92	88	10	225	
*2	10	925	381.468	1.0	1.6	1.6	335	92	88	23		
3	12.5	929:30	383.15	.95	1.5	1.5	335	99	90	11		
*3	15	32	384.497	.95	1.5	1.0	340	99	90	23		
4	17.5	937	386.20	.85	1.45	1.45	340	106	96	15		
*4	20	42:45	387.815	.8	1.3	1.3	340	110	100	a 14		
*5	22.5	947	389.778	.84	1.35	1.35	310	114	102	14		
*5	25	951	391.400	.84	1.35	1.35	380			15		
*6	27.5	955	393.007	.84	1.35	1.35	180			15		
*6	30	59:30	394.474	.6	1.0	1.0	150	118	104	12		
START	0											
1	3											
1	35											
2												
2	40											
3												
3	45											
4												
4	50											
5												
5	55											

continued on next page.

COMMENTS:

*-stop to shake filter **stop to change filter

a vacuum up to 23 by 2 ½ min.

01-4-00

Test 2 page 2

SAMPLING LOCATION IN

TEST NUMBER 2

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
** Start	0	1025:30	394.474									
B1	32.5	1018	396.200	.94	1.5	1.5	335	108	106	8	225	50
* 1	35	1020:30	397.854	.94	1.5	1.5		111	107	15		
- 2	37.5	1025	399.515	.86	1.4	1.4		113	108	10		
* 2	40	1027:30	401.106	.86	1.4	1.4		115	108	20		
3	42.5	1031:30	402.69	.86	1.4	1.4	335	115	108	9		
* 3	45	1034	404.268	.86	1.4	1.4	335	115	108	17		
4	47.5	1038	405.95	.86	1.4	1.4	335	118	109	9		
* 4	50	1040:30	407.456	.88	1.45	1.45	345	122	110	23		
* 5	52.5	1044:45	408.98	.84	1.35	1.35	310	122	110	10		
* 5	55	1049	410.596	.89	1.45	1.45	200	122	110	23		
* 6	57.5	1053	412.150	.7	1.1	1.1	150	124	112	10		
* 6	60	1057	413.640	.7	1.1	1.1	150	120	114	8		

#37056

#37054

#37055

#37057

(3)

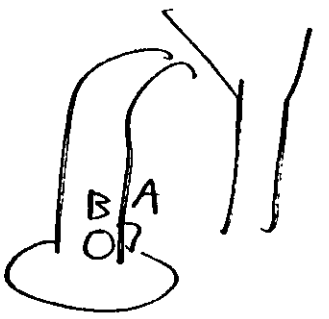
JOB. NO. 9517-29
PLANT 9412SUM
DATE 5/17
SAMPLING LOCATION IN
SAMPLE TYPE PART
RUN NUMBER 3
OPERATOR MD
AMBIENT TEMPERATURE 95°F
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_g) -4
FILTER NUMBER(s)
TAR(s)

PROBE I.D. 040-005?
PROBE LENGTH AND TYPE SS-4'
NOZZLE I.D. .255
ASSUMED MOISTURE, % 42%
SAMPLE BOX, I.D. 02
METER BOX, I.D. S-216B
METER $\Delta H_@$ 1.87
Cp .89
PROBE HEATER SETTING 50%
HEATER BOX SETTING 100%
REFERENCE Δp 1.175

Vol. H_2O (mls)
Final 878
Initial 200
Net Gain 678

Leak Check
Initial 0.00 @ 21 "Hg
Final .01 @ 28 "Hg

AH37102



Schematic of Port Locations
(Indicate north, Label Ports A,B etc.

#1 - #2 - READ AND RECORD ALL DATA EVERY 2.5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Start	0	1248:30	415.203									
A 1	2.5	1251	416.75	1.0	1.6	1.6	340	105	105	8	285	45
* 1	5	1253:30	418.361	1.0	1.6	1.6	340	105	105	16	225	45
2	7.5	1257:15	420.08	1.0	1.6	1.6	340	110	108	10	225	45
* 2	10	1259:45	421.593	1.0	1.6	1.6	340	110	108	20	225	45
3	12.5	1305:45	422.62	.94	1.5	1.5	340	112	108	12		
* 3	15	1308:25	~~424.175~~ → 424.175	.9	1.45	1.45	340	114	109	17		
4	17.5	1312:30	~~426.30~~	.86	1.4	1.4	340	120	110	10		
* 4	20	1315	427.567	.8	1.3	1.3	340	120	110	17		
5	22.5	1319	429.20	.86	1.4	1.4	300	120	110	10		
* 5	25	1321:30	430.679	.8	1.3	1.3	300	120	110	19		
6	27.5	1325:30	432.17	.65	1.05	1.05	170	122	112	10		
** 6	30	1328	433.557	.65	1.05	1.05	170	122	112	18		
24												
	Continue next page											
1												
95												
2 154												
250												
243												
106												
878												

AH37059
#1 Filter 37058
SG 37060
AH37101

COMMENTS:
*stop to shake ** stop to change filter

04-4-80

SAMPLING LOCATION 1N (3) Page 2 of 2

TEST NUMBER 3

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
Start	0	1335	433.557									
** B 1	32.5	1337:30	435.34	1.0	1.6	1.6	340	120	114	7	250	50
* 1	35	1340	437.118	1.0	1.6	1.6	340	120	114	15		
2	37.5	1343:30	438.94	.86	1.4	1.4	340	122	116	12		
2	40	1346	440.44	.86	1.4	1.4	340	126	116	15		
3	42.5	1348:30	441.88	.64	1.05	1.05	340	130	118	15		
* 3	45	1351	443.275	.58	.95	.95	340	130	118	15		
* 4	47.5	1355	444.98	.85	1.4	1.4	340	130	120	15		
4	50	1357:30	446.467	.85	1.4	1.4	340	130	120	23		
* 5	52.5	1401:25	448.075	.84	1.4	1.4	300	130	120	17		
* 5	55	1405	449.646	.92	1.5	1.5	300	130	120	22		
* 6	57.5	1409:30	451.09	.85	1.4	1.4	180	130	122	17		
* 6	60	1412	452.597	.76	1.2	1.2	180	130	122	22		

slight decr. in flow → kept on vacuum down.

6.3.2 Particulate Testing - Baghouse Outlet

PRELIMINARY VELOCITY TRAVERSE

PLANT ~~GP~~ GOLD BOND BUILDING
DATE 7-15-80
LOCATION OUTLET
STACK I.D. 12.5"
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS Burke – Keith

$C_p = 0.88$
Box # = 1856
$\Delta H@ = 1.85$

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	1.1	330
2	1.1	320
3	1.3	320
4	1.1	300
5	.89	290
6	.82	290
~~7~~		
~~8~~		
~~9~~		
~~10~~		
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	1.2	~~330~~ 330
2	1.2	~~330~~ 330
3	1.0	~~2~~ 330
4	.99	330
5	.98	330
6	90	330
Static		+0.18
Δp_s = 1.048		in H_2O
$T_{s(avg)}$ = 319 °F		
AVERAGE		

ES-045

FIGURE 2

FIELD MOISTURE DETERMINATION

JOB NO. 9517-29

LOCATION OUTLET

TEST NO. Moisture

DATE 7/14

OPERATOR Burke

COMMENTS:

Environmental Consultar

1) BY APPROXIMATION METHOD:

BAROMETRIC PRESSURE _____

CLOCK TIME	GAS METER READING (V_m) l ft^3	ORIFICE PRESSURE DIFFERENCTIAL (ΔH) in H_2O	Meter Temperature, Tm
1121	578.140	1.85	72 69
1126	581.480	1.85	85 72
1131	584.	1.85	
1136	588.200	1.85	95 75
1141	591.535	1.85	95 75

	Impinger Vol (ml)	Silica Gel (g.)
Initial	200	
Final	2454	
Net	254	

104

140
114
254

1 ml = 1g

114

(W) = weight of moisture collected = _____

% Moisture by Volume = _____

2) BY WET AND DRY BULB TEMPERATURES:

Wet Bulb Temp: _____ °F % Moisture from Psychometric Chart

Dry Bulb TempL _____ °F _____

02-4-80

FIELD DATA

DO LEAK TEST
TEST 1

JOB. NO. -01-9517-27
PLANT Gyps Gold Bond
DATE 7-18-80
SAMPLING LOCATION Outlet
SAMPLE TYPE Part
RUN NUMBER 2
OPERATOR Burke - Keith
AMBIENT TEMPERATURE 60°
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_s) +0.18
FILTER NUMBER(s) 043397
TAR(s) FL-93

PROBE I.D. 5' SS.
PROBE LENGTH AND TYPE
NOZZLE I.D. .259
ASSUMED MOISTURE, % 40
SAMPLE BOX, I.D. —
METER BOX, I.D. 1856
METER $\Delta H_@$ 1.77
Cp .85
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp .99

Vol. H_2O (mls)
Final 1046
Initial 200
Net Gain 846 +386 SG
Leak Check
Initial .015 @ 12 "Hg
Final 0.00 @ 15 "Hg

SG 37038
filter 37037
FHA. 37038

Schematic of Port Locations
(Indicate north, Label Ports A, B et

READ AND RECORD ALL DATA EVERY (6) MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	0926	681.968									
A 1	3	0929	684.210	1.2	2.25	2.25	330	65	64	7.0	250	60
	6	932	686.445	1.2	2.25	2.25	330	66	65	7.0	250	60
2	9	935	688.685	1.2	2.25	2.25	330	74	74	7.0	250	60
	12	938	690.940	1.2	2.25	2.25	325	76	65	8.0	250	60
3	15	941	693.105	1.1	2.1	2.1	330	78	66	8.0	250	60
	18	944	695.270	1.1	2.1	2.1	330	82	68	8.0	250	60
4	21	947	697.385	1.05	2.0	2.0	330	83	68	8.5	250	60
	24	950	699.535	1.05	2.0	2.0	330	85	70	8.5	250	60
5	27	953	701.525	.90	1.7	1.7	330	88	70	7.0	250	60
	30	956	703.500	.90	1.7	1.7	325	88	70	7.5	250	60
6	33	959	706.040	.84	1.6	1.6	330	88	70	6.5	250	60
	36	1002	707.895	.80	1.5	1.5	330	90	72	6.5	250	60

COMMENTS:

SAMPLING LOCATION 1, 2, 3

TEST NUMBER

Page ___ of ___

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	36 / 1008	707.895									
B 1	39 / 1011	709.390	1.2	2.25	2.25	330	83	74	8.5	250	60
	42 / 1014	711.660	1.2	2.25	2.25	330	84	76	8.5	250	60
2	45 / 1017	713.885	1.2	2.25	2.25	330	85	77	8.5	250	60
	48 / 1020	716.140	1.2	2.25	2.25	330	90	75	9.0	250	60
3	51 / 1023	718.410	1.2	2.25	2.25	330	90	76	9.5	250	60
	54 / 1026	720.685	1.2	2.25	2.25	330	92	76	10.0	250	65
4	57 / 1029	722.880	1.1	2.1	2.1	330	94	78	9.5	250	65
	60 / 1032	724.980	1.0	1.9	1.9	325	95	78	8.5	250	65
5	63 / 1035	727.170	1.1	2.1	2.1	330	95	78	9.0	250	65
	66 / 1038	729.400	1.1	2.1	2.1	330	96	78	9.0	250	65
6	69 / 1041	731.650	1.2	2.25	2.25	330	98	78	9.5	250	65
	72 / 1044	733.910	1.2	2.25	2.25	330	98	78	9.5	250	65

25
208
230
170
154
190

JOB. NO. 01-9517-27
PLANT Gypsum - Gold Bond
DATE 10-16-80
SAMPLING LOCATION outlet
SAMPLE TYPE PART
RUN NUMBER 2
OPERATOR Burke
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_s) +.18
FILTER NUMBER(s) FC-34
TAR(s) 0.40345

PROBE I.D. ASME
PROBE LENGTH AND TYPE
NOZZLE I.D. .249
ASSUMED MOISTURE, % 40
SAMPLE BOX, I.D.
METER BOX, I.D. 1856
METER $\Delta H_@$ 1.97
Cp .84
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp .79 1.25

Vol. H_2O (ml)
Final 1260
Initial 200
Net Gain 1060

Leak Check
Initial .005 @ 18 "Hg
Final 000 @ 11 "Hg

S6 = 69.64m NET GA.
filter
S.G.
F.H.A.

new probe
new ASME nozzle
37041
37042
37043

Schematic of Port Locations
(Indicate north, Label Ports A,B et

READ AND RECORD ALL DATA EVERY 4 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 1327	734.843									
A 1	4 1331	737.225	1.2	1.8	1.8	330	72	70	3.0	250	60
	8 1335	739.665	1.0	1.5	1.5	330	72	72	5.0	250	60
2	12 1339	742.705	1.0	1.5	1.5	330	74	74	5.0	250	60
	16 1349	745.275	1.1	1.65	1.65	330	82	72	5.5	250	60
3	20 1353	747.955	1.2	1.8	1.8	330	84	74	6.5	250	60
	24 1357	750.625	1.2	1.8	1.8	330	90	74	6.5	250	60
4	28 1401	753.205	1.1	1.65	1.65	330	90	74	6.0	250	60
	32 1405	755.780	1.1	1.65	1.65	330	95	77	6.0	250	60
5	36 1409	758.295	1.05	1.55	1.55	330	96	78	6.0	250	60
	40 1413	760.770	1.0	1.5	1.5	330	97	78	6.0	250	60
6	44 1417	763.135	.90	1.35	1.35	325	98	80	6.0	250	60
	48 1421	765.485	.90	1.35	1.35	330	98	80	6.0	250	60

COMMENTS:

SAMPLING LOCATION _____ Page 2 of 2

TEST NUMBER _____

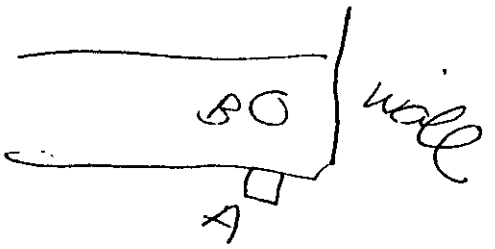
TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m, ft³)	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	48 / 1429	765.485									
B 1	52 / 1433	767.940	1.1	1.65	1.65	330	88	80	6.0	250	60
	56 / 1437	770.510	1.1	1.65	1.65	330	90	80	6.5	250	60
2	60 / 1441	773.080	1.1	1.65	1.65	330	92	81	6.5	250	60
	64 / 1445	775.655	1.1	1.65	1.65	330	97	91	7.0	250	60
3	68 / 1449	778.215	1.05	1.60	1.60	330	98	82	7.0	250	60
	72 / 1453	780.820	1.1	1.65	1.65	330	97	82	7.0	250	60
4	76 / 1457	783.250	.94	1.4	1.4	330	98	82	7.0	250	60
	80 / 1501	785.690	.96	1.45	1.45	335	100	83	7.0	250	60
5	84 / 1505	788.060	.90	1.35	1.35	335	100	83	6.5	250	60
	88 / 1509	790.395	.90	1.35	1.35	330	101	83	6.5	250	60
6	92 / 1513	792.730	.90	1.35	1.35	330	102	84	6.5	250	60
	96 / 1517	795.085	.90	1.35	1.35	330	102	84	6.5	250	60

JOB. NO. 01-9517-27
PLANT Gypsum Goodpaster
DATE 5-17-80
SAMPLING LOCATION OUTLET
SAMPLE TYPE PART
RUN NUMBER 3
OPERATOR Rick
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 30.01
STATIC PRESSURE, (P_g) -.18
FILTER NUMBER(s) EA-91
TAR(s) 432.75

PROBE I.D. ASME
PROBE LENGTH AND TYPE
NOZZLE I.D. .249
ASSUMED MOISTURE, % 45
SAMPLE BOX, I.D. —
METER BOX, I.D. 1856
METER $\Delta H_@$ 1.99
Cp .87
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp

Vol. H_2O (ml)
Final 1225
Initial ~~0000~~ 200
Net Gain 1025
Leak Check
Initial 00 @ 5 "Hg
Final 000 @ 12 "Hg

3 - 9.5
2 - 7.2
1 - 3.5
2 - 2.16
3 - 2.42
1225



Schematic of Port Locations
(Indicate north, Label Ports A, B etc

READ AND RECORD ALL DATA EVERY 4 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 412	796.850									
A 1	4 / 416	799.225	1.1	1.4	1.4	330	76	75	3.5	250	60
	8 / 420	801.600	1.1	1.4	1.4	330	78	76	4.5	250	60
2	12 / 424	803.940	1.1	1.4	1.4	330	85	78	5.0	250	60
	16 / 428	806.280	1.05	1.35	1.35	330	86	78	5.0	250	60
3	20 / 432	808.575	1.0	1.30	1.30	330	88	78	5.0	250	60
	24 / 436	810.850	1.0	1.3	1.3	330	94	80	5.0	250	60
4	28 / 440	813.075	.94	1.2	1.2	330	95	81	5.0	250	60
	32 / 444	815.275	.94	1.2	1.2	330	96	82	5.0	250	60
5	36 / 448	817.465	.92	1.18	1.18	330	96	82	5.0	250	60
	40 / 452	819.640	.90	1.15	1.15	330	97	83	5.0	250	60
6	44 / 456	821.780	.90	1.15	1.15	330	98	84	5.0	250	60
	48 / 500	823.935	.86	1.1	1.1	330	98	85	5.0	250	60

SG 37044
DH 37045
37039

COMMENTS:

04-4-80

SAMPLING LOCATION _____

TEST NUMBER _____

Page ___ of ___

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	48	506	823.935									
B 1	52	510	826.330	1.1	1.4	1.4	330	90	80	5.5	250	60
	56	514	828.715	1.1	1.4	1.4	330	94	82	5.5	250	60
2	60	518	831.080	1.1	1.4	1.4	330	96	82	6.0	250	60
	64	522	833.470	1.1	1.4	1.4	330	96	82	6.0	250	60
3	68	526	835.855	1.1	1.4	1.4	330	97	83	6.0	250	60
	72	530	838.210	1.05	1.35	1.35	330	97	83	6.0	250	60
4	76	534	840.525	1.0	1.3	1.3	330	98	83	6.0	250	60
	80	538	842.895	1.0	1.3	1.3	330	96	82	6.0	250	60
5	84	542	845.130	1.0	1.3	1.3	330	96	82	6.0	250	60
	88	546	847.430	1.0	1.3	1.3	330	96	84	6.0	250	60
6	92	550	849.715	1.0	1.3	1.3	330	96	84	6.0	250	60
	96	554	852.000	1.0	1.3	1.3	330	96	85	6.0	250	60

6.3.3 Particle Size Distribution Testing

PARTICLE SIZE DATE SHEET

JOB NO. 01-9517-29
CLIENT GOLD BOND-EPA
PLANT LOCATION
DATE 7-15
RUN NO. 1
TEST LOCATION INLET
OPERATOR KEITH
BAROMETRIC PRESSURE (Pb) 29.92

STATIC PRESSURE (P_s) $-4.0''H_2O$
METER BOX I.D. S-2166
METER BOX ΔH @ 1.87
IMPACTOR I.D.
NOZZLE I.D. ~~.259~~ .249
PITOT FACTOR (F_s) .89
TRAVERSE POINT NO. 5
SAMPLING RATE (ΔH, in.H_2O 1.84

TIME 24-Hr. CLOCK	METER READING (Ft^3)	PRESSURE DROP (in. Hg)	METER TEMP. (°F) in	METER TEMP. (°F) out	VACUUM (in. Hg)
2130	375.082	~~2.30~~	95		4.0
2130.5	375.444				

Comments: AND IN #37103

PARTICLE SIZE DATE SHEET

JOB NO. 9517-29
CLIENT GOLD BOND - EPA
PLANT LOCATION RICHMOND, CA
DATE 7-16-80
RUN NO. 2
TEST LOCATION INLET
OPERATOR KEITH
BAROMETRIC PRESSURE (Pb) 29.92

STATIC PRESSURE (P_s) -4.0 "H_2O
METER BOX I.D. S-2166
METER BOX ΔH @ 1.87
IMPACTOR I.D.
NOZZLE I.D. ~~.249~~
PITOT FACTOR (F_s)
TRAVERSE POINT NO. 5
SAMPLING RATE (ΔH, in.H_2O 1.34

TIME 24-Hr. CLOCK	METER READING (Ft^3)	PRESSURE DROP (in. Hg)	METER TEMP. (°F) in	METER TEMP. (°F) out	VACUUM (in. Hg)
1130	413.934		105		7.5
1130:20	414.141				

Comments:

AND IN. #37104

05-4-80

PARTICLE SIZE DATE SHEET

JOB NO. 9517-29
CLIENT GOLD BOND - EPA
PLANT LOCATION RICHMOND, CA
DATE 7-16-80
RUN NO. 3
TEST LOCATION INLET
OPERATOR KEITH
BAROMETRIC PRESSURE (Pb) 29.92

STATIC PRESSURE (P_s) -4.0" H_2O
METER BOX I.D. S-2166
METER BOX ΔH @ 1.87
IMPACTOR I.D.
NOZZLE I.D. .249
PITOT FACTOR (F_s)
TRAVERSE POINT NO. 5
SAMPLING RATE (ΔH, in.H_2O 1.34

TIME 24-Hr. CLOCK	METER READING (Ft^3)	PRESSURE DROP (in. Hg)	METER TEMP. (°F) in	METER TEMP. (°F) out	VACUUM (in. Hg)
1200	414.307		110		
1200 20	414.3489		119		9.0

Comments:

AND IN. #3 37105

05-4-80

PARTICLE SIZE DATE SHEET

JOB NO. 9427-29
CLIENT GOLD BOND - EPA
PLANT LOCATION RICHMOND, CA.
DATE 7-16-80
RUN NO. 1
TEST LOCATION OUTLET
OPERATOR KEITH
BAROMETRIC PRESSURE (Pb) 29.29 30.01

STATIC PRESSURE (P_s) +0.18
METER BOX I.D. 5-2166
METER BOX ΔH @ 1.87
IMPACTOR I.D.
NOZZLE I.D. .249
PITOT FACTOR (F_s)
TRAVERSE POINT NO. 5
SAMPLING RATE (ΔH, in.H_2O) 1.25

TIME 24-Hr. CLOCK	METER READING (Ft^3)	PRESSURE DROP (in. Hg)	METER TEMP. (°F) in	METER TEMP. (°F) out	VACUUM (in. Hg)
START 1812	452.836		74	72	7.0
– 1912	490.36		132	110	7.5
– 1922	495.45		120	108	7.0
– 1932	501.07		99	95	7.0
– 1942	508.48		96	90	7.0
– 1952	514.82		93	84	7.0
– 2002	520.257		92	82	
		Av=	101	92	
			Av: 96.5		

Comments:

526.257
452.836
73.421 CU

AND OUT #4 37106

Environmental Consultants

05-4-80

6.3.4 Opacity Readings - Baghouse Outlet

VISIBLE EMISSIONS FIELD DATA

Date 7/15/80 Job Number _____

Observer WARREN D. HOPKINS Plant & Location Gold Bond RICHMOND CALIF.

Observation Point CALCINER BAGHOUSE #1 Wind & Speed Light Breeze 5-10mph

Stack: Distance from ~25' Height ~15' ABOVE OUTLET (OBSERVATIONS MADE FROM) Direction FROM EAST

Observation Began 1655 Ended 1755 Sky Condition CLEAR

% Opacity

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

Comments: LOCATION DIAGRAM ON BACK

VISIBLE EMISSIONS FIELD DATA

Date 7/15/80 Job Number _____

Observer WARREN D. HOPKINS Plant & Location GOLD BOND RICHMOND CALIF.

Observation Point CALCINER BAGHOUSE #1 Wind & Speed Light; <5-10mph

Stack: Distance from ~25' Height 15' ABOVE Direction _____

Observation Began 1755 Ended 1855 Sky Condition CLEAR

% Opacity

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

Comments: At APPROXIMATELY 1805 and throughout the remainder of the test program the outlet emissions contained steam from condensing moisture in the gas. This determination was after observing (unofficially) the cooler ambient temperature conditions during early morning and like steam mixed conditions, ~~of~~ the outlet.

VISIBLE EMISSIONS FIELD DATA

Date July 15, 1980 Job Number

Observer WARREN D. HOPKINS Plant & Location Gold Bond RICHMOND, CA

Observation Point CALCINER BAG HOUSE OUTLET #1 Wind & Speed Light <5 mph

Stack: Distance from ~25' Height 15' ABOVE Direction

Observation Began 1855- Ended 1900 Sky Condition CLEAR

2000 - 2017

% Opacity

SEC. / MIN	0	15	30	45	SEC. / MIN	0	15	30	45	SEC. / MIN	0	15	30	45
0	0	0	0	0	20	0	0	0	0	40				
1	0	0	0	0	21	0	0	0	0	41				
2	0	0	0	0	22	0	0	0	0	42				
3	0	0	0	0	23					43				
4	0	0	0	0	24					44				
1900 5	0	0	0	0	25					45				
6	0	0	0	0	26					46				
7	0	0	0	0	27					47				
8	0	0	0	0	28					48				
9	0	0	0	0	29					49				
10	0	0	0	0	30					50				
11	0	0	0	0	31					51				
12	0	0	0	0	32					52				
13	0	0	0	0	33					53				
14	0	0	0	0	34					54				
15	0	0	0	0	35					55				
16	0	0	0	0	36					56				
17	0	0	0	0	37					57				
18	0	0	0	0	38					58				
19	0	0	0	0	39					59				

Comments: At 1900 unit was shut-down and observations delayed. Observation continued at 2000. Increased amount of steam condensing in effluent.

VISIBLE EMISSIONS FIELD DATA

Date July 16, 1980 Job Number 01-9517-27

Observer WARREN D HOPKINS Plant & Location Gold Bond RICHMOND CALIF

Observation Point CALCINER Outlet #1 Wind & Speed VERY LIGHT (5-10 MPH AND LESS)

Stack: Distance from ~25' Height 15' ABOVE OUTLET Direction NW

Observation Began 0926 Ended 1026 Sky Condition CLEAR

% Opacity

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

Comments: • In Lower righthand corner denotes steam blowing into itself from all three outlets - any possible emissions would be impossible to determine at this time. Assumed to remain at a constant zero opacity reading

VISIBLE EMISSIONS FIELD DATA

Date 7/16/80 Job Number 01-9517-27

Observer WARREN D. HIGGINS. Plant & Location Gold Bond Richmond Calif.

Observation Point CALCINER OUTLET #1 Wind & Speed VERY LIGHT

Stack: Distance from ~25' Height 15' above Direction NW

Observation Began 1026 Ended 1056 Sky Condition CLEAR + SUNNY

% Opacity

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

Comments: _____

VISIBLE EMISSIONS FIELD DATA

Date July 16, 1980 Job Number 01-9517-27

Observer WARREN D. HOPKINS Plant & Location Gold Bond RICHMOND CALIF.

Observation Point CALCINER Outlet #1 Wind & Speed Light Breeze

Stack: Distance from ~25' Height ~15' above Direction NW

Observation Began 1250 Ended 1350 Sky Condition CLEAR

% Opacity

INLET BEGAN

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

← OUTLET BEGAN 37

* OUTLET BEGAN 37

Comments: _____

VISIBLE EMISSIONS FIELD DATA

Date 7/16/80 Job Number 01-9517-27

Observer WARREN D. HOPKINS Plant & Location Gold Bond RICHMOND CALIF.

Observation Point CALCINER #1 outlet Wind & Speed LIGHT BREEZE

Stack: Distance from ~25' Height 15' above Direction NW

Observation Began 1350 Ended 1450 Sky Condition CLEAR

% Opacity

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

Comments: _____

VISIBLE EMISSIONS FIELD DATA

Date 7/16/80 Job Number 01-9517-27

Observer WARREN D HOPKINS Plant & Location COLD BOND RICHMOND CALIF

Observation Point CALCINER #1 outlet Wind & Speed LIGHT BREEZE

Stack: Distance from ~25' Height 15' above Direction NW

Observation Began 1450 Ended 1516 Sky Condition CLEAR

% Opacity

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

Comments: _____

VISIBLE EMISSIONS FIELD DATA

Date 7/16/90 Job Number 01-9517-27

Observer WARREN D. HOPKINS Plant & Location GOLD BOND RICHMOND CALIF

Observation Point Calciner outlet #1 Wind & Speed Light Breeze <5

Stack: Distance from ~25' Height 15' above Direction NW

Observation Began 1620 Ended 1720 Sky Condition CLEAR

% Opacity

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

Comments: _____

VISIBLE EMISSIONS FIELD DATA

Date 7/10/80 Job Number 01-9517-27

Observer WARREN D. HOSKINS Plant & Location GOLD BOND RICHMOND CALIF.

Observation Point Calciner outlet #1 Wind & Speed LIGHT BREEZE <5mph

Stack: Distance from ~25' Height 15' above Direction NW

Observation Began 1720 Ended 1754 Sky Condition CLEAR

% Opacity

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

Comments: _____

6.3.5 Opacity Readings - Stucco Silo

VISIBLE EMISSIONS FIELD DATA

Date July 15, 1980 Job Number

Observer WARREN D HOPKINS Plant & Location GOLD BOND RICHMOND, CALIF.

Observation Point Stucco Silo Wind & Speed BREEZY; 10-15 mph

Stack: Distance from ~60' Height OBSERVATIONS TAKEN ~15 MOVE SILO OUTLET Direction FROM NW

Observation Began 1130 Ended 1230 Sky Condition CLEAR

% Opacity

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

Comments: Observation Diagram on Back

VISIBLE EMISSIONS FIELD DATA

Date July 16, 1980

Job Number 01-9517-27

Observer WARREN D. HOPKINS

Plant & Location Gold Bond RICHMOND CALIF

Observation Point Stucco Silo

Wind & Speed ~~VARY LIGHT~~ 10-15 mph Breezy

Stack: Distance from ____ Height ____

Direction NW

Observation Began 1100 Ended 1200

Sky Condition CLEAR

% Opacity

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

Comments: _____

VISIBLE EMISSIONS FIELD DATA

Date 7/16/80 Job Number 01-9517-27

Observer WARREN D. HOPKINS Plant & Location Gold Bond Richmond Plant

Observation Point Stucco Silo Wind & Speed Light Breeze <5 mph

Stack: Distance from ____ Height ____ Direction NW

Observation Began 1520 Ended 1620 Sky Condition CLEAR

% Opacity

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

Comments: During the 5min. interval with opacity of 0 to 5 (46.5 to 51.5) a rotary like tapping was going on within the silo (cleaning sides)?

6.3.6 Fugitive Emission Testing - Storage Bin Area - Conveyor

EPA METHOD 22

FUGITIVE EMISSIONS FIELD DATA

01-9517-29

Date: July 16, 1980

Observer: Strautman / Demaris

Company: Gold Bond Building Products

Location: Richmond, California

? CONVEYOR - TRANSFER UNIT (STUCCO)

INDOOR - LIGHTING: CANDESCENT

DISTANCE: 15' - 25'

on steps at floor level.

Observation Began: 1400 Ended: 1740

Total Observation Period	Accumulated Observation Time	Total Time (min)
1400 - 1420	0	20
1425 - 1445	0	40
1450 - 1510	0	60 (1 hr)
1515 - 1535	0	80
1540 - 1600	0	100
1605 → 1625	0	120 (2 hr)
1630 → 1650	0	140
1655 → 1715	0	160
1720 → 1740	0	180 (3 hr)

6.4 List of Apparatus and Calibration Data

LIST OF APPARATUS

Location	Inlet	Outlet
RAC Box No.	5-2166	5-1856
ΔH@	1.87	1.97
Probe No/C_p	040-005/0.89	Test 1 - 054-002/.88 Test 2+3 - 316-48-002/.87
Nozzle Diameter	0.255"	Test 1 - 0.259" Test 2+3 - 0.249"

CALIBRATION

DRY GAS METER & ORIFICE

DATE 7/9/80

METER BOX NO. 2166

BAROMETRIC PRESSURE, P_b = 29.90 in. Hg.

DRY GAS METER NO. Wet Hop.

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test Meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	Y	ΔH@
0.5	5	270.564	78	90	55	70.25	12.02	1.00	1.61
		265.454	78	98	82				
1.0	5	275.700	78	92	90	93.50	538.5	1.00	1.78
		270.564	78	107	90				
1.5	10	286.006	78	100	89	98.25	14.98	1.00	1.85
		275.700	78	109	96		999		
2.0	10	296.385	78	107	96	102.75	13.09	1.00	1.87
		286.006	78	114	93				
3.0	10	306.806	78	110	98	106.25	10.91	1.00	1.93
		296.381	78	117	100		650.5		
4.0	10	317.257	78	115	100	109	9.47	1.00	1.93
		306.806	78	119	102		568.3		

Average ____ ____

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w} \right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

Y = Ratio of accuracy of wet test meter to dry test meter.

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.

INLET

RAC Box Calib.

Box = 2166

$\Delta H@$

$$Y = \frac{V_w P_b (t_d + 460)}{V_d (P_b - K)(t_w + 460)}$$

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

Constant Values [K]

.5"	.0368	2.0"	.147
.)"	.0737	3.0"	.221
.5"	.110	4.0"	.294

Tolerances:

Y = .99 to 1.01 Ideal 1.00

$\Delta H@$ = 1.6 - 2.1 Ideal 1.84

$$\frac{5 \times 29.9 (90.25 + 460)}{1 (29.9 + .0368)(78 + 460)}$$

$$\frac{.01585}{29.90(90.25 + 460)} \left[\frac{(78 + 460)12.}{5} \right.$$

$$\frac{5 \times 29.9 (93.5 + 460)}{5.136 (29.9 + .0737)(78 + 460)}$$

$$\frac{.0317}{29.9 (93.5 + 460)} \left[\frac{(78 + 460)8.9}{5} \right.$$

$$\frac{10 \times 29.9 (98.25 + 460)}{0.306 (29.9 + .110)(78 + 460)}$$

$$\frac{.04755}{29.9 (98.25 + 460)} \left[\frac{(78 + 460)14.9}{10} \right.$$

$$\frac{10 \times 29.9 (102.75 + 460)}{10.379 (29.9 + .147)(78 + 460)}$$

$$\frac{.0634}{29.9 (102.75 + 460)} \left[\frac{(78 + 460)13.09}{10} \right.$$

$$\frac{10 \times 29.9 (106.25 + 460)}{10.421 (29.9 + .221)(78 + 460)}$$

$$\frac{.0951}{29.9 (106.25 + 460)} \left[\frac{(78 + 460)10.9}{10} \right.$$

$$\frac{10 \times 29.9 (109 + 460)}{10.451 (29.9 - .294)(78 + 460)}$$

$$\frac{.126E}{29.9 (109 + 460)} \left[\frac{(78 + 460)947}{10} \right.$$

Brown

PITOT CALIBRATION

Blue

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s	ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
54	.67	.80	.89	.27	.34	.79	.89
.56	.69	.81	.90	.30	.37	.81	.90
.44	.55	.80	.89	.37	.47	.78	.88
.37	.47	.78	.88	.40	.51	.78	.88
.45	.56	.80	.89	.39	.49	79	.89

F_s = .89

FLOW

F_s = .87

FLOW

$C_s = \sqrt{\frac{P_{std}}{P_s}}$

F_{std} = 1.00

Pitot Tube No. 040 - 005

Calibrated by: Joel F. Burke

DATE June 4, 1980

Inlet

234/242/180/250 x 1.0

NOZZLE CALIBRATION

Date 5/20/80 Calibrated by JB

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
#4	.255	.255	.256	.001	.255
.255					

where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Nozzle calibration data.

inlet - Denard
7/15

CALIBRATION

DRY GAS METER & ORIFICE

DATE 7/10/80

METER BOX NO. 1856

BAROMETRIC PRESSURE, P_b = 29.85 in. Hg.

DRY GAS METER NO. VT

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter Outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min.	Y	ΔH@
0.5	5	533.490	78	78	75	79.25	12.75	1.04	1.86
		528.1076	78	81	79		767		
1.0	5	578.325	78	84	82	85	9.17	1.05	1.89
		573.490	78	91	83		551.5		
1.5	10	547.976	78	91	83	90.75	15.05	1.06	1.89
		538.327	78	103	89		903		
2.0	10	557.690	78	100	89	96.75	13.36	1.06	1.97
		547.974	78	105	93		801.5		
3.0	10	567.379	83	99	92	97.75	10.72	1.05	1.93
		557.690	80	106	94		643		
4.0	10	576.814	93	94	87	86.5	7.43	1.05	2.03
		567.391	87	91	82		446		

Average

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔH@: $\frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w} \right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

Y = Ratio of accuracy of wet test meter to dry test meter.

ΔH@ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O.

OUTLET

7/10/80 Y

RAC Box Calib.

Box = 1856

$\Delta H @$ wet

$$\frac{V_w P_b (t_d + 460)}{V_d (P_b - K)(t_w + 460)}$$

$$\frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w} \right]^{.5}$$

Constant Values [K]

.5"	.0368	2.0"	.147
1.0"	.0737	3.0"	.221
1.5"	.110	4.0"	.294

Tolerances:

Y = .99 to 1.01 Ideal 1.00

$\Delta H @$ = 1.6 - 2.1 Ideal 1.84

$$\frac{5 \times 29.85 (79.25 + 460)}{1 (29.85 + .0368)(78 - 460)}$$

$$\frac{.01585}{29.85 (79.25 + 460)} \left[\frac{(78 + 460)12.}{5} \right]^{.5}$$

$$\frac{5 \times 29.85 (85 + 460)}{.835 (29.85 + .0737)(78 + 460)}$$

$$\frac{.0317}{29.85 (85 + 460)} \left[\frac{(78 + 460)9.}{5} \right]^{.5}$$

$$\frac{10 \times 29.85 (90.75 + 460)}{.649 (29.85 + .110)(78 + 460)}$$

$$\frac{.04755}{29.85 (90.75 + 460)} \left[\frac{(78 + 460)15.0}{10} \right]^{.5}$$

$$\frac{10 \times 29.85 (96.75 + 460)}{.711 (29.85 + .147)(78 + 460)}$$

$$\frac{.0634}{29.85 (96.75 + 460)} \left[\frac{(78 + 460)13.3}{10} \right]^{.5}$$

$$\frac{10 \times 29.85 (97.75 + 460)}{.689 (29.85 + .221)(83 + 460)}$$

$$\frac{.0951}{29.85 (97.75 + 460)} \left[\frac{(83 + 460)10.7}{10} \right]^{.5}$$

$$\frac{10 \times 29.85 (86.5 + 460)}{.733 (29.85 + .294)(83 + 460)}$$

$$\frac{.126E}{29.85 (86.5 - 460)} \left[\frac{(83 - 460)0.}{10} \right]^{.5}$$

PITOT CALIBRATION

White

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
.26	.36	.70	.84
.30	.40	.75	.86
.32	.44	.73	.85
.40	.52	.76	.87
.46	.61	.75	.86

F_s = .85

FLOW

Black

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
.42	.54	.77	.88
.48	.61	.78	.88
.50	.64	.78	.88
.52	.66	.78	.88
.58	.74	.78	.88

F_s = .88

FLOW

BLACK IN FLOW

$C_s = \sqrt{\frac{P_{std}}{P_s}}$

F_{std} = 1.00

Pitot Tube No. 054-002

Calibrated by: Joel F. Burke

DATE June 3, 1980

OUTLET - Test

PITOT CALIBRATION

Blue

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
39	51	76	.87
40	.52	.76	.87
37	.47	.78	.88
.35	.46	.74	.86
.34	.44	.77	.88

F_s = .87

FLOW

White

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
30	.36	.83	.91
.31	.37	.83	.91
50	57	.85	93
.56	.65	.86	.92
.55	.64	.85	.92

F_s = .91

FLOW

$F_s = \sqrt{\frac{P_{std}}{P_s}}$

F_{std} = 1.00

Pitot Tube No. 316-48-002

Calibrated by: Joel F. Burke

DATE June 4, 1980

OUTLET— Test 2+3

NOZZLE CALIBRATION

Date 5/30/90 Calibrated by W. HOPKINS

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
1/4	.260	.262	.258	.006	.259

where:

$D_{1,2,3}$ = nozzle diameter measured on a different diameter, in. Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in. Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

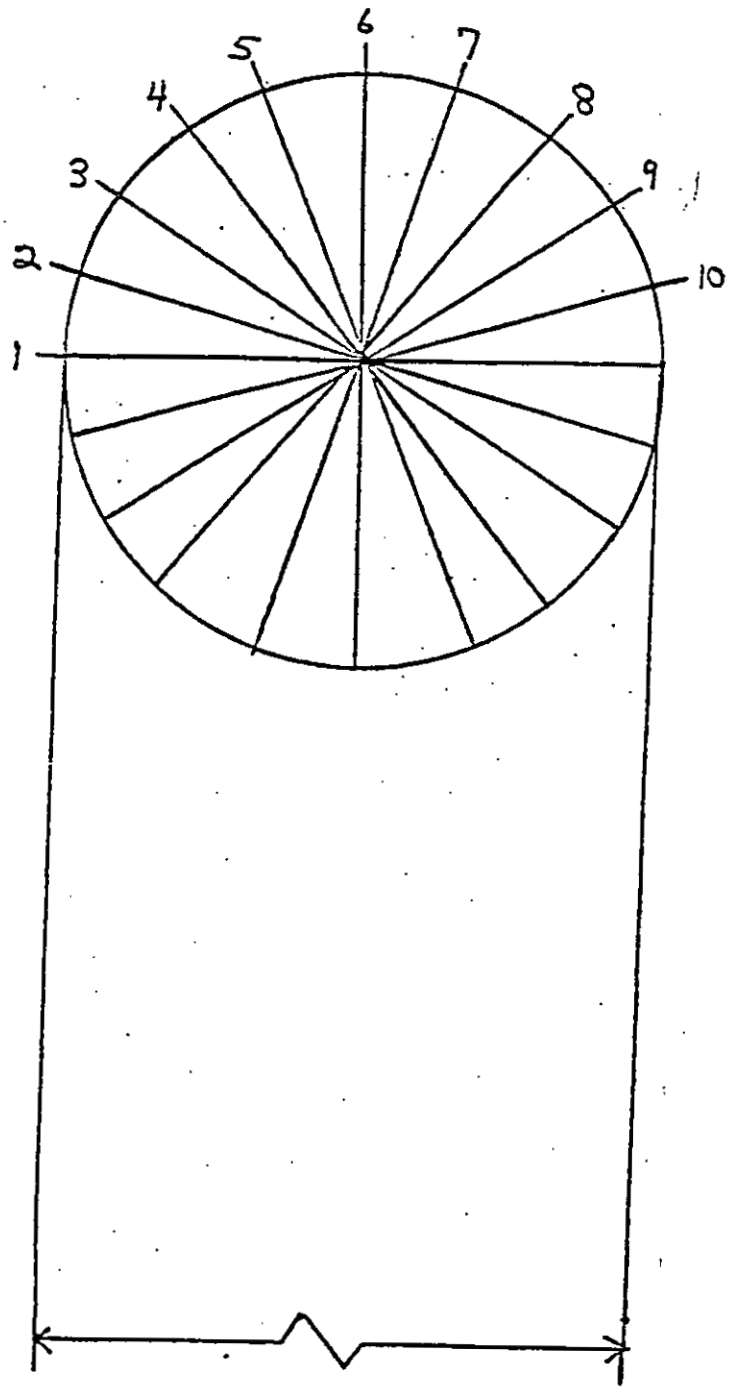
Nozzle calibration data.

777

259

OUTLET Test 1

Nozzle Calibration



Nozzle 1/4"

1	.249
2	.249
3	.249
4	.248
5	.248
6	.249
7	.250
8	.250
9	.250
10	.250

Measured Average Size .249

OUTLET
Test 2+3

6.5 Laboratory Data

01-9517-29

PARTICULATE ANALYSIS FORM

JOB NO. 01-9517-29 TYPE OF SAMPLE: Filter DATE: 7/28

Log No.	Type	Stack No.	Test	Gross (Gr)	Tare (Gr)	Glass (Gr)	Net (Gr)	Vol (ml)	Blank (Gr)	Resu
37103	Andersen	inlet 199-1	1	0.34638	0.18887		0.15751			
01-9517-29		199-2		0.20192	0.17428		0.02764			
		199-3		0.22254	0.19117		0.03137			
		199-4		0.19465	0.17603		0.01862			
	✓	199-5		0.20468	0.18760		0.01708			
		199-6		0.18245	0.17019		0.01226			
		199-7		0.19221	0.18936		0.00285			
		199-8		0.17188	0.17109		0.00079			
		199-9		0.23800	0.23694		0.00106			
37037	01-9517-27	outlet	1	0.43799	0.43397		0.00402			
37050	01-9517-29	inlet filter3	1	10.17955	0.43764		9.74191			
37052	01-9517-29	inlet filter4	1	11.58129	0.40997		11.17132			
37056	01-9517-29	inlet filter3	2	21.32672	0.40523		20.92149			
37049	01-9517-29	inlet filter2	1	12.11607	0.43656		11.67951			
37054	01-9517-29	inlet filter1	2	20.30050	0.40332		19.89718			
37047	01-9517-29	inlet filter1	1	6.75183	0.42840		6.32343			
37039	01-9517-27	outlet filter	3	0.44038	0.43675		0.00358			
37041	01-9517-27	outlet filter	2	0.40799	0.40345		0.00454			
37058	01-9517-29	inlet filter1	23	15.90176	0.43833		15.46343			
37059	01-9517-29	inlet filter2	3	14.84931	0.40029		14.44902			

PARTICULATE ANALYSIS

JOB NO. 01-9517-29 TYPE OF SAMPLE: Filters DATE: 7/26

Log No.	Type	Stack No.	Test	Gross (Gr)	Tare (Gr)	Glass (Gr)	Net (Gr)	Vol (ml)	Blank (Gr)	Result
37106	Andersen ✓	outlet 333-1	4	0.19972	0.18901		0.01071			
		333-2		0.18471	0.17450		0.00971			
		333-3		0.20072	0.18999		0.01073			
		333-4		0.18138	0.17193		0.00945			
		333-5		0.20393	0.19299		0.01094			
		333-6		0.18461	0.17497		0.00964			
		333-7		0.19915	0.18900		0.01015			
		333-8		0.18089	0.17204		0.017049			
		333-9		0.25278	0.24342		0.00936			
37104	Andersen	inlet 715-1	2	0.23358	0.18365		0.04993			
		715-2		0.18440	0.16914		0.01526			
	✓	715-3		0.21122	0.19379		0.01743			
		715-4		0.17800	0.16947		0.00853			
		715-5		0.19739	0.18599		0.01140			
		715-6		0.17210	0.16622		0.00588			
		715-7		0.19412	0.19203		0.00209			
		715-8		0.16858	0.16834		0.00024			
		715-9		0.24278	0.24132		0.00146			
37105	Andersen	inlet 662-1	3	0.20983	0.19199		0.01784			
		662-2		0.18714	0.17412		0.01302			
	✓	662-3		0.20411	0.18901		0.01510			
		662-4		0.18267	0.17048		0.01219			
		662-5		0.19749	0.18891		0.00858			
		662-6		0.17468	0.17046		0.00422			
		662-7		0.19355	0.19211		0.00144			
		662-8		0.17358	0.17294		0.00064			
		662-9		0.23964						

PARTICULATE ANALYSIS FORM

JOB NO. 01-9517-29 TYPE OF SAMPLE: Acetone Samples DATE: 7/21/80

Log No.	Type	Stack No.	Test	Gross (Gr)	Tare (Gr)	Glass (Gr)	Net (Gr)	Vol (ml)	Blank (Gr)	Resu
37051	Acetone IN	1		68.05618	67.2462		0.81098	328		0.7950
37053	Acetone IN	1		70.36029	63.8300		6.53029	234		6.5184
37057	Acetone IN	2		74.38054	65.8975		8.48304	450		8.4612
37101	Acetone IN	3		79.89659	64.7856		15.11099	341		15.094
37102	Acetone IN	3		72.26568	65.8310		6.43468	350		6.4177
37038	Acetone OUT	1		64.36420	64.3234		0.0408	294		0.0265
37043	Acetone OUT	2		66.75363	66.7236		0.03003	307		0.0151
37045	Acetone OUT	3		65.37666	65.3492		0.02746	318		0.0120
37040	Acetone Blank	—		65.39635	65.3912		0.00515	106	0.0000485	—

Silica Gel Weights

Inlet

Test #	Net gain (g)
1	58 g
2	47 g
3	52 g

Outlet

Test #	Net gain (g)
1	86
2	69.6
3	77.8

6.6 Project Participants

The following YRC personnel participated in the test program:

Joel Burke
Maria Denaro
Warren Hopkins
Richard Keith
Richard Nowak
Sabina Strautman

STATE OF MAINE
Department of Environmental Protection

MAIN OFFICE: RAY BUILDING, HOSPITAL STREET, AUGUSTA
MAIL ADDRESS: STATE HOUSE, AUGUSTA 04333

Henry E. Warren
COMMISSIONER
289-2811

ADMINISTRATIVE SERVICES:
289-2691

BUREAUS:

AIR QUALITY CONTROL
289-2437

LAND QUALITY CONTROL
289-2111

WATER QUALITY CONTROL
289-2591
OIL POLLUTION CONTROL
289-2591

REGIONAL OFFICES:

CENTRAL STREET
BANGOR 04401
947-6746

34 MAIN STREET
PRESQUE ISLE 04769
764-3737

OIL POLLUTION CONTROL
COMMERCIAL STREET
PORTLAND
773-6491

OIL SPILL REPORTS ONLY
TOLL FREE 1-800-482 0777

CITIZENS' ENVIRONMENTAL
ASSISTANCE SERVICE
289-2591
TOLL FREE 1-800-452-1942

AIR QUALITY CONTROL
17 COMMERCIAL STREET
PORTLAND
871-8196

LAND QUALITY CONTROL
17 COMMERCIAL STREET
PORTLAND
871-8196

April 9, 1980

Mr. Warren Hopkins
York Research
1 Research Drive
Stamford, Connecticut 06904

Dear Warren:

Please be advised that you successfully completed our recent "Visible Emissions Evaluation" Course. Having participated in the smoke evaluation sessions on April 1-3, 1980, you met the following certification criteria:

1) The average deviation for the sets of 25 black smoke and 25 white smoke emissions was less than 7.5%.

2) The deviation of each reading was 15% or less.

3) A minimum of 250 readings for an initial certification.

This certification is valid for six months from the date you completed your testing.

Sincerely,

Jeffrey C. Emery

Jeffrey C. Emery
Environmental Services Specialist
Bureau of Air Quality Control

JCE/dmm

6.7 Work Assignment

WORK ASSIGNMENT

ENVIRONMENTAL PROTECTION AGENCY

Research Triangle Park, N.C. 27711

EPA CONTRACT NO: 68-02-2819

CONTRACTOR: York Research Corporation

ASSIGNMENT NO: 29

ASSIGNMENT CHANGE NO:

TITLE: ~~Presurvey~~ TEST PROGRAM

DATE:

DESCRIPTION

The Contractor shall perform a n emission test in accordance with the basic contract scope of work for the Emission Measurement Branch, and as set forth in the attached "Source Sampling and Analysis Schedule" at the following site:

Company Name: Gold Bond Building Products
Location: Richmond, California
Industry: Gypsum
Project No.: 80-GYP-5

The Emission Measurement Branch's Technical Manager is Dennis Holzschuh, Mail Drop 13, EMB, ESED, OAQPS, Research Triangle Park, North Carolina 27711.

Upon notification of approval of the proposed source test report, the Contractor shall provide 10 copies of the final report with appendices and 10 copies as a summary without appendices.

All pretest survey, proposed final, and final source test reports and SOTDAT Data Forms shall be submitted directly to J. E. McCarley, Emission Measurement Branch, ESED, Mail Drop 13, Research Triangle Park, North Carolina 27711.

All samples shall be shipped to: Dennis Holzschuh, ESED, EMB, MD-13, RTP, NC 27711

ESTIMATE OF	GOVERNMENT ESTIMATE	CONTRACTOR ESTIMATE
LABOR HOURS	420	
DURATION OF WORK	90 days	
COMPLETION DATE	October 20, 1980	

REQUESTER'S SIGNATURE	ORG CODE	TELEPHONE	DATE
Dennis P. Holzschuh	ESED/EMB	(919) 541-5243	7/8/80

APPROVALS (IF APPLICABLE)	SIGNATURE	DATE
BRANCH CHIEF		7/5/80
DIVISION CHIEF		7/9/80
PROJECT MANAGER	Thomas M. Bibb	7/9/80
CONTRACTING OFFICER		

CONTRACTOR'S REPRESENTATIVE ACKNOWLEDGEMENT

SIGNATURE	TITLE	DATE

EPA(RTP)235

RCE SAMPLING AND ANALYSIS SCHEDULE

Contract No.: 68-02-2812

Company Name: Gold Bond Building Products

Company Location: Richmond, California

Industry: Gypsum

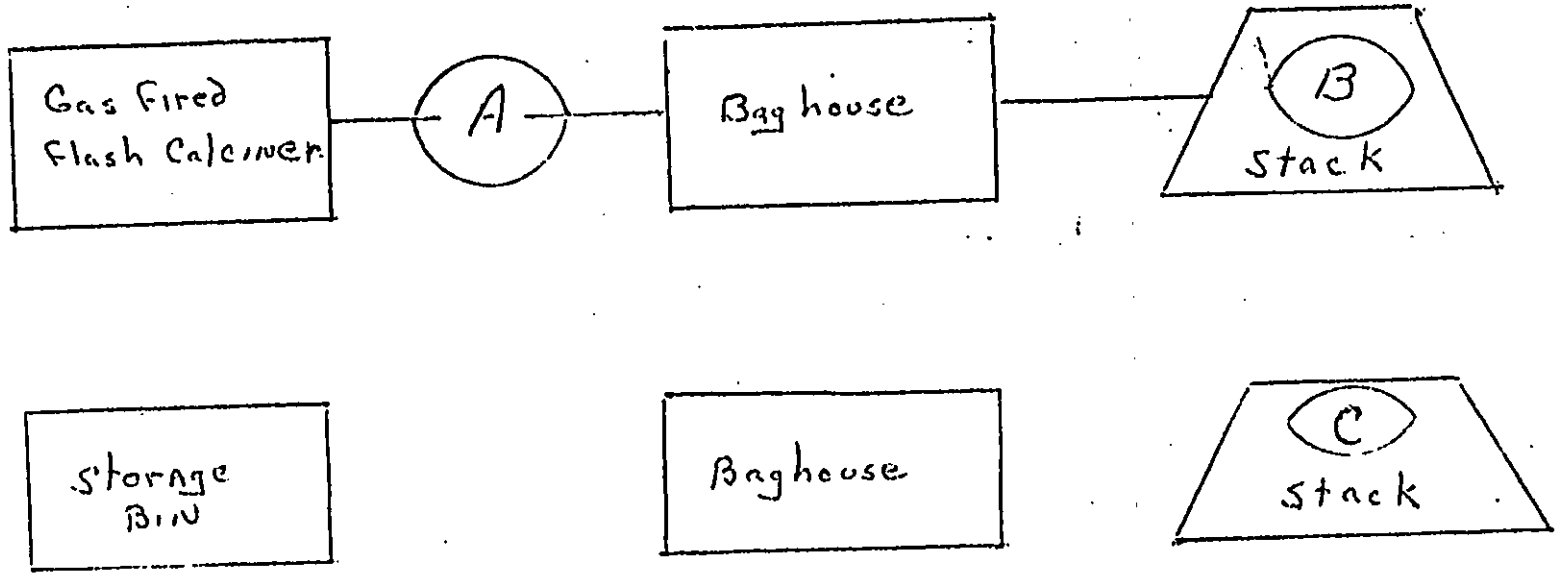
Process: Flash Calciner

Control Equipment: Baghouse

Total No. of Samples	Sample Type	Sampling Method	Sample Collected By	Minimum Sampling Time	Minimum Gas Volume Sampled ft^3	Initial Analysis Type	Method	By	Final Analysis Type	Method	By
3	Particulate	EPA-5	CTR	2 hrs	60 cu ft	Mass	EPA-5	CTR			
3	Particle Size	Anderson	CTR	N/A	N/A	-	-	-			
3	Particulate	EPA-5	CTR	2 hrs	60 cu ft	Mass	EPA-5	CTR			
1	Particle Size	Anderson	CTR	N/A	N/A	-	-	-			
3	Visible Emissions	EPA-9	CTR	2 hrs	N/A	-	-	-			
3	Visible Emissions	EPA-9	CTR	1 hr	N/A	-	-	-			

REMARKS:

1. Sampling shall be performed with ± 10% isokinetic conditions.
2. Methods are EPA unless indicated otherwise. ... 40 from the Federal Register Volume 36 ...


Gas Fired
Flash Calciner
A
Bag house
B
Stack
Storage
Bin
Baghouse
C
Stack