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

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

AP-42 Section 11.17
Reference 18
Report Sect. 4
Reference 15

Source Test of a Lime Plant

Ref 15
Draft of Ref 82

EMB Projects Report No.
76-LIM-9

Plant Tested

Martin-Marietta
Calera, Alabama

1 coal-and-gas fired kiln controlled by baghouse.
· uncontrolled: SO_2
· controlled: PM-filt, PM-cond, SO_2, NO_x, CO_2, CO
1 hydrator controlled by wet scrubber. PM-filt, PM-cond

September 8, 9, 10, 11, 12, and 17

Prepared for

Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Measurement Branch
Research Triangle Park
North Carolina 27711

by

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Monsanto Research Corporation
Dayton Laboratory
Dayton, Ohio 45407

Contract No. 68-02-1404, Task No. 19

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SECTION I

INTRODUCTION

Under the Clean Air Act of 1970, the Environmental Protection Agency is given the responsibility of establishing performance standards for new installations or modifications to existing installations in stationary source categories. As a contractor, Monsanto Research Corporation (MRC), under the EPA's "Field Sampling of Atmospheric Emissions" Program, was asked to undertake a sampling program to provide emission data from the Martin-Marietta Lime Plant in Calera, Alabama.

The field test work was directed by John M. Davis, Field Testing Section, Emission Measurement Branch. The sampling was performed by MRC with Thomas L. Peltier as Team Leader.

This report tabulates the data collected from the exhaust of the No. 3 lime kiln at the Martin-Marietta Lime Plant during the sampling program of September 8, 9, 10, 11, 12, and 17, 1975. A lime hydrator was also tested during the sampling program at the plant.

The lime kiln that was sampled is a continuous operation which produces between 181 and 209 metric tons (200 and 230 tons) per day of calcined lime. A baghouse is used to control the particulate emissions from the kiln, which burns both natural gas and pulverized coal. Particulate, sulfur dioxide, nitrogen oxides, and carbon monoxide emissions were

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measured at the outlet of the baghouse. Visible emissions measurements were also recorded. Sulfur dioxide levels at the inlet were also determined.

The hydrator, which converts quicklime to hydrated lime, produces 18.1 tonnes/hr (20 tons/hr). The particulate emissions from the continuous operation are controlled by a wet scrubber. The exhaust from the hydrator was sampled for particulate emissions at the outlet of the scrubber.

Particulate emissions from both sources were measured according to procedures described in the Federal Register, Vol. 36, No. 159, August, 1971, Method 5, "Determination of Particulate Emissions from Stationary Sources."

Method 1, "Sample and Velocity Traverses for Stationary Sources"; Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"; and Method 3, "Gas Analysis for Carbon Dioxide, Excess Air and Dry Molecular Weight" are other procedures that were required for the Method 5 tests. Method 6, "Determination of Sulfur Dioxide Emissions from Stationary Sources" and Method 7, "Determination of Nitrogen Oxide Emissions from Stationary Sources" were performed according to the procedures in the Federal Register, Vol. 36, No. 247, December 23, 1971. Method 9, "Visual Determination of the Opacity of Emissions from Stationary Sources" of the Federal Register, Vol. 39, No. 219, November 12, 1974, was performed on the exhausts of the baghouse. The carbon monoxide sampling and analysis on the exhaust gases of the lime kiln were performed according to Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources," of the Federal Register, Vol. 39, No. 47, March 8, 1974.

The EPA also conducted a sampling project during the sampling at Martin-Marietta. A continuous SO_2 monitoring device, a

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Dynascience Air Pollution Monitor, was used on both the inlet and outlet of the baghouse. Results from that sampling program are included in Appendix B.

The following sections of this report include: (1) summary of results, (2) process description and operation, (3) location of sampling points, (4) sampling and analytical procedures. Appendices include all field data and analytical data from this sampling project.

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SECTION II

SUMMARY OF RESULTS

Summaries of the particulate emissions from the No. 3 lime kiln are given in Tables 1 and 2. Six Method 5 tests were performed on the outlet of the baghouse which was used to control the particulate emissions from the kiln. Two runs were performed on each of the 3 outlet stacks of the baghouse. In Tables 1 and 2 the results of the six tests are listed individually along with an average result for the 3 stacks combined. This was obtained by summing the six tests and dividing the sum by three to obtain an emission rate for the entire kiln and baghouse.

The run numbers in Tables 1 and 2 refer to the stack location and the run number on that stack. The stacks were labeled 1 through 3 with the southern-most stack being No. 1. On September 9, the first day of Method 5 sampling, two simultaneous Method 5 tests were started on Stacks 1 and 2. Approximately halfway through the tests, a MRC operator discovered a broken U-bend on the train in Stack 2. The Run 2-1 (Stack No. - Run No.) was aborted and the train cleaned while Run 1-1 was continued. On September 10, two simultaneous Method 5 runs were performed on Stacks 1 and 2 (Run 2-2 and Run 1-2). Later that day, Run 3-1 performed after the sampling equipment was transferred to Stack 3. One Method 5 run was performed on the baghouse each of the next two days, one on Stack 2 and one on Stack 3. Runs 3-2 and 2-3 were not performed simultaneously

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Table 1. SUMMARY OF PARTICULATE EMISSIONS FROM THE BAGHOUSE (METRIC)

	RUN 1-S1	RUN-2S1	RUN 1S2	S3	S2	S3	
Run Number	1-1	2-2	1-2	3-1	3-2	2-3	Average[b]
Date	9-9-75	9-10-75	9-10-75	9-10-75	9-11-75	9-12-75	
Volume of Gas Sampled Nm^3[a]	1.90	2.33	2.23	2.43	2.48	2.00	
Percent moisture by volume	4.45	11.87	11.60	14.71	11.22	9.25	
Average stack temp. - °C	131	142	127	146	137	112	
Stack volumetric flow rate Nm^3/min	278	293	294	302	315	269	
Percent Isokinetic	96.3	112.2	111.2	117.9	115.6	108.5	
Run Time - Minutes	132	132	132	132	132	132	
Particulates - Front half							
mg	42.9	21.2	31.4	27.4	40.8	15.2	59.6
mg/Nm^3	22.8	9.1	14.1	11.3	16.5	7.6	27.1
Kg/hr	0.377	0.160	0.248	0.204	0.311	0.123	0.474
Particulates - Total							
mg	74.3	39.7	54.2	68.6	72.4	33.3	114.2
mg/Nm^3	39.1	17.0	24.3	28.2	29.2	16.7	51.5
Kg/hr	0.652	0.300	0.429	0.512	0.552	0.269	0.905
Percent Impinger Catch	42.3	46.7	42.0	60.1	43.6	54.3	47.6

a) Normal cubic meters at 21.1°C, 760 mm Hg

b) Adding 6 runs and dividing by 3

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Table 2. SUMMARY OF PARTICULATE EMISSIONS FROM THE BAGHOUSE (ENGLISH)

Run Number	1-1	2-2	1-2	3-1	3-2	2-3	Average[b]	
Date	9-9-75	9-10-75	9-10-75	9-10-75	9-11-75	9-12-75		
Volume of gas sampled - dscf[a]	67.00	82.44	78.82	85.75	85.75	70.51		
Percent moisture by volume	4.45	11.87	11.60	14.71	11.22	9.25		
Average stack temp. - °F	267	288	261	294	278	233		
Stack volumetric flow rate								
dscfm	9809	10356	10379	10649	11115	9513		
Percent Isokinetic	96.3	112.2	111.2	117.9	115.6	108.5		
Run time - minutes	132	132	132	132	132	132		
Particulates - front half								
mg	42.90	21.2	31.4	27.4	40.8	15.2	59.2	
grains/dscf	0.0099	0.004	0.0061	0.0049	0.0072	0.0033	0.0118	RANGE
lb/hr	0.829	0.351	0.546	0.449	0.682	0.271	1.043	
lb/ton prod.	0.092	0.039	0.061			0.030	0.167	0.090 - 0.276
Particulates - total								
mg	74.30	39.7	54.2	68.6	72.4	33.3	114.2	
grains/dscf	0.0171	0.0074	0.0106	0.0123	0.0127	0.0073	0.0225	
lb/hr	1.436	0.658	0.942	1.124	1.210	0.593	1.988	
Cond lb/ton prod.	0.067	0.034	0.044			0.036	0.136	0.102 - 0.201
Percent impinger catch	42.3	46.7	42.0	60.1	43.6	54.3	47.6	

[a]Dry standard cubic feet @ 70°F, 29.92 in Hg.

[b]Adding 6 runs and dividing by 3.

$\bar{Q}$ = 30,911 dscfm

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because of some question on September 11 as to whether 5 or 6 Method 5 runs would be required.

The Method 6 sulfur dioxide results are given in Table 3. The inlet testing was performed before the gases were manifolded to the various compartments in the baghouse. The outlet testing was done on Stacks 1 & 2 for the 6 runs. The table lists the 12 runs that were performed and gives the inlet and outlet average emissions of SO_2. The flow rate used to convert the concentration to mass emissions was 875 Nm^3/min (30911 dscf/min), which was determined by adding the six Method 5 runs and dividing by 3. The averages do not include Runs 1-I and 1-O since there was some doubt if the process was at steady-state. The steady-state problem arose because the plant was in the process of switching the fuel from natural gas to pulverized coal.

The zero emission results at the outlet create numerous questions for which there are no readily available answers. The runs were all performed with the same equipment and done simultaneously with the inlet sampling. Run 5-O gives the only measurable results, however, the corresponding inlet run, 5-I, gave the highest SO_2 values.

In conjunction with the SO_2 results, Table 4 gives the total sulfur results on the coal, product, and the baghouse dust. The samples were collected during the Method 6 runs and are referenced to the runs. The results in the table show the coal being burned had an average sulfur content of 0.92%. The product had an average sulfur content of 0.042%. However, the baghouse dust had a considerable sulfur content of between 0.99 and 1.58%. This result in conjunction with the zero SO_2 emissions from the baghouse leads one to believe the highly alkaline dust reacts with the SO_2 to remove it from the exhaust

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Table 3. SUMMARY OF SO_2 EMISSIONS

Run Number	1-I	1-O	2-I	2-O	3-I	3-O	4-I	4-O	5-I	5-O	6-I	6-O	Average[c] Inlet	Average Outlet
Date	9-9	9-9	9-9	9-9	9-10	9-10	9-10	9-10	9-11	9-11	9-12	9-12		
Run Length, min.	15	27	16	20	23	16	20	15	21	16	22	16		
Volume of gas sampled														
Nm^3	0.0226	0.0297	0.0223	0.0203	0.0267	0.0212	0.0220	0.0203	0.0238	0.0223	0.0238	0.0232		
dscf	0.797	1.050	0.787	0.718	0.943	0.747	0.777	0.717	0.839	0.789	0.841	0.820		
SO_2 Concentration														
ppm	0	0	147	0	67	0	107	0	186	78	174	0	136	16
g/Nm^3[a]	0	0	0.386	0	0.175	0	0.279	0	0.485	0.204	0.456	0	0.356	0.041
lb/dscf x 10^{-5}	0	0	2.405	0	1.089	0	1.743	0	3.028	1.274	2.842	0	2.221	0.255
SO_2 Emissions														
Kg/hr[a]	0	0	20.2	0	9.2	0	14.7	0	25.5	10.7	23.9	0	18.7	2.1
lb/hr[b]	0	0	44.6	0	20.2	0	32.3	0	56.2	23.6	52.7	0	41.2	4.7
													4.6	0.52
SO_2 Emissions - Dynascience					2.24				6.24	2.62				
ppm													96	58

a) Flow rate used - 875 Nm^3/min

b) Flow rate used - 30911 dscf/min

c) Both Run 1-I and 1-O not used in average since there was some doubt if process was at steady-state.

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Table 4. SUMMARY OF TOTAL SULFUR RESULTS

Date	9-9	9-9	9-10	9-10	9-11	9-12
Corresponding EPA 6 Run	1-I	2-I	3-I	4-I	5-I	6-I
% Total Sulfur						
Coal	1.02	0.72	0.95	1.14	0.78	0.90
Product	0.017	0.029	0.037	0.040	0.070	0.060
Baghouse Dust	1.09	1.31	0.99	1.57	1.58	1.46

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gases. This creates another question since glass wool is used as a filter in the Method 6 train and a large amount of particle is collected in the glass wool. There is no way to determine if the SO_2 reacts with the dust in the glass wool and is removed from the gas being drawn into the Method 6 train.

While MRC personnel were performing the Method 6 sampling on the baghouse, EPA personnel were attempting to ready a continuous monitoring system for sulfur dioxide emissions. A Dynascience monitor was used on September 13, the day after MRC personnel completed sampling on the baghouse. The reason the continuous and Method 6 testing were not performed simultaneously was that SO_2 calibration gas was not available until late on the 12th. The continuous monitor was used on both the inlet and the outlet of the baghouse.

A draft report of the testing is included in Appendix B. A discussion of the sampling operations and the results of the sampling are included in the draft report. An average SO_2 concentration in ppm for the inlet and outlet is included in Table 3. Comparing the results to Method 6 indicates a lower inlet, but a higher outlet concentration.

Table 5 presents the results of the Method 7 nitrogen oxides sampling. Grab flasks were taken on 3 different days with 12 flasks being used one day and 6 on the other two days for a total of 24 grab samples. Table 5 gives an average NO_x emission rate for each day and also an average for the 3 days of sampling. A flow rate of 875 Nm^3/min (30911 dscfm) was used to convert the concentration in the grab flask to an emission rate for the kiln. Of the 24 grab flasks taken, only one, No. 5 on September 9, seems to be in error. However, there is no way to determine if the grab flask leaked or the sample was mishandled.

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Table 5. SUMMARY OF NO_x EMISSIONS

Time	Run No.	Time	ppm[a]	grams/Nm³	lb/dscf x 10^{-5}	Kg/hr[b]	lb/hr[c]	
9-9-75	1	1640	255	0.483	3.01	25.36	55.83	
9-9-75	2	1641	225	0.426	2.66	22.37	49.33	
9-9-75	3	1642	149	0.282	1.76	14.81	32.64	
9-9-75	4	1643	248	0.470	2.93	24.68	54.34	
9-9-75	5	1657	52	0.098	0.61	5.15	~~11.31~~	
9-9-75	6	1658	152	0.289	1.80	15.17	33.38	
9-9-75	7	1659	227	0.431	2.69	22.63	49.89	
9-9-75	8	1659	274	0.519	3.24	27.25	60.09	
9-9-75	9	1700	270	0.511	3.19	26.83	59.16	
9-9-75	10	1710	176	0.333	2.08	17.48	38.58	
9-9-75	11	1711	178	0.337	2.10	17.69	38.95	
9-9-75	12	1712	274	0.521	3.25	27.35	60.28	
			208	0.392	2.44	20.56	45.32	
9-11-75	1	906	133	0.257	1.60	13.49	29.67	
9-11-75	2	907	132	0.250	1.56	13.13	28.93	
9-11-75	3	908	182	0.345	2.15	18.11	38.88	
9-11-75	4	909	236	0.447	2.79	23.47	51.75	
9-11-75	5	910	120	0.228	1.42	11.97	26.34	2.9 lb/ton prod
9-11-75	6	912	189	0.359	2.24	18.85	41.54	
			166	0.313	1.95	16.42	36.19	
9-12-75	1	947	297	0.562	3.51	29.51	65.10	
9-12-75	2	948	272	0.516	3.22	27.09	59.72	
9-12-75	3	949	298	0.564	3.52	29.61	65.28	
9-12-75	4	950	303	0.576	3.59	30.24	66.58	
9-12-75	5	951	323	0.614	3.83	32.24	71.03	7.9 lb/ton prod
9-12-75	6	952	221	0.420	2.62	22.05	48.59	
			288	0.542	3.38	28.45	62.72	
TOTAL AVERAGE			218	0.410	2.55	21.50	~~47.39~~ 48.95	5.4 lb/ton

a) Parts per million by volume

b) Flow rate used was 875 Nm³/min which is an average of the EPA Method 5 runs performed

c) Flow used was 30,911 dscfm which is an average of the EPA Method 5 runs performed

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The carbon monoxide emissions from the kiln are given in Table 6. The Method 10 testing was done on the exhaust gases collected in a Tedlar bag. The Orsat analysis was performed on the same gases as was the CO analysis. The integrated sample was over a time period which was usually one hour. The table lists the CO concentration in ppm, which was obtained from the calibration curves that are with the Beckman Infrared instrument. The same flow rate as was used to calculate SO_2 and NO_x emission rates was also used for CO emission rates. The CO concentration in the Tedlar bags was also determined by using Drager tubes which involves drawing a small amount of gas through a column of indicating material which changes color to indicate the concentration of CO present. The results from this method are also listed in Table 6.

Table 7 presents a summary of the visible emissions. The table gives the opacity readings which correspond to Method 5 runs. The two observers, T. Thalman from MRC and J. Burbank from the EPA, noticed only occasional periods of light visible emissions. The results in this table are for the baghouse emissions. Due to the location of the hydrator stack and the high moisture plume, the EPA personnel decided against attempting to obtain opacity readings while the hydrator was being sampled.

Method 5 testing on the hydrator was also performed and the results of the test are given in Tables 8 and 9. The first run was performed on September 12 while the other two took place on September 17. Due to the high moisture content of the exhaust from the scrubber, a large amount of water was collected and the impingers had to be emptied frequently. Maintaining isokinetic sampling during the run was difficult since the temperature of the saturated exhaust varied. The results in the tables show a high concentration of particulate,

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Table 6. SUMMARY OF CO EMISSIONS

Run Number	1	2	3	4	Average
Sample Time	1130-1215	830-930	800-856	830-920	
Date	9-9	9-10	9-11	9-12	
CO Concentration					
ppm	15	113	21	57	52
g/Nm^3	0.017	0.129	0.024	0.065	0.059
lb/dscf x 10^{-6}	1.077	8.062	1.498	4.069	3.677
CO Emissions					
Kg/hr[a]	0.91	6.77	1.26	3.41	3.09
lb/hr[b]	2.00	14.95	2.78	7.55	6.82
	0.22	1.66	0.31	0.84	0.76
CO by Drager Tube					
ppm	—	125	20	60	

a) Flow rate - 875 Nm^3/min

b) Flow rate - 30911 dscf/min

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Table 7. SUMMARY OF VISIBLE EMISSIONS

Date	9-9-75		9-10-75		9-10-75		9-11-75	
Corresponding EPA Method 5 Run	1-1		1-2		3-1		3-2	
	Obs. 1	Obs. 2	Obs. 1	Obs. 2	Obs. 1	Obs. 2	Obs. 1	Obs. 2
Duration of observation minutes	139	152[a]	166	184	163	162	155	149
No. of readings at 0% opacity	549	595	658	725	652	648	620	580
5	7	7	6	10	0	0	0	16
10	4	1	0	1	0	0	0	0
15	0	4	0	0	0	0	0	0
20	0	1	0	0	0	0	0	0
Percent readings at 0% opacity	98.04	97.86	99.10	98.51	100.00	100.00	100.00	97.32
5	1.25	1.15	0.90	1.36	0	0	0	2.68
10	0.71	0.16	0	0.14	0	0	0	0
15	0	0.66	0	0	0	0	0	0
20	0	0.16	0	0	0	0	0	0

a) From 1131-1257 stack #2 was observed for visible emissions, however, the particulate run on stack #2 was aborted. Observer No. 2 switched to reading stack #1 from 1305-1409.

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Table 8. SUMMARY OF PARTICULATE EMISSIONS FROM THE HYDRATOR (METRIC)

Run Number	1	2	3	Average
Date	9-12-75	9-17-75	9-17-75	
Volume of Gas Sampled - Nm^3	1.07	1.54	1.44	1.35
Percent Moisture	79.09	75.71	79.04	77.95
Average Stack Temp. - °C	93.9	93.3	95.0	94.1
Stack Volumetric Flow Rate - Nm^3/min	34.18	44.63	34.89	37.90
Percent Isokinetic	89.4	99.1	118.5	
Run Time - Minutes	128	128	128	128
Particulates - Front half				
mg	278.6	509.5	980.4	589.5
mg/Nm^3	260.4	330.8	680.8	424.0
Kg/hr	0.534	0.886	1.425	0.948
Particulates - Total				
mg	322.7	526.3	1025.2	624.7
mg/Nm^3	301.6	341.8	711.9	451.8
Kg/hr	0.618	0.915	1.490	1.008
Percent Impinger Catch	13.6	3.2	4.4	6.0

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Table 9. SUMMARY OF PARTICULATE EMISSIONS FROM THE HYDRATOR (ENGLISH)

Run Number	1	2	3	Average
Date	9-12-75	9-17-75	9-17-75	
Volume of Gas Sampled - dscf	37.65	54.52	50.97	47.67
Percent Moisture	79.09	75.71	79.04	77.95
Average Stack Temp. - °F	201	200	203	201
Stack Volumetric Flow Rate - dscf/min	1207	1576	1232	1338
Percent Isokinetic	89.4	99.1	118.5	
Run Time - Minutes	128	128	128	128
Particulates - Front half				
mg	278.6	509.5	980.4	589.5
grains/dscf	0.1139	0.1439	0.2962	0.1847
lb/hr	1.179	1.944	3.128	2.084
	0.131		0.348	0.232
Particulates - Total				
mg	322.7	526.3	1025.2	624.7
grains/dscf	0.1320	0.1487	0.3097	0.1968
lb/hr	1.365	2.008	3.271	2.215
	0.021	0.007	0.016	0.015
Cond - Percent Impinger Catch	13.6	3.2	4.4	6.0

but due to the low flow rate, the hourly emissions are low. The tables give the results of each run plus an average for the three runs.

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SECTION III

PROCESS DESCRIPTION

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SECTION IV

LOCATION OF SAMPLING POINTS

Figure 1 is a diagram of the 3 exhaust stacks located on the baghouse which controls the particulate emissions from the No. 3 lime kiln. There are six compartments in the baghouse and each stack exhausts two of them. The stacks were arbitrarily numbered 1 through 3 with the southern-most stack being Stack 1. The three identical stacks have a diameter of 1.29 meters (4'3") and are 3.71 meters (12'2") in length. The nearest upstream disturbances, which are the ducts from the compartments forming the stack, are 3.05 meters (2.4 stack diameters) from the sampling ports. The nearest downstream disturbance, the outlet, is 0.66 meter (0.5 stack diameter) from the sampling ports. The sampling on each stack was performed from a platform which circumscribed one-third of the stack. The two 24-point traverses were performed through two 7.6 cm (3 inch) nipples.

The sampling platforms were 3.4 meters (11 feet) above a walkway which extended the length of the baghouse. The walkway, which was approximately 80 feet above the ground, could be reached by using an external stairway. The sampling for Methods 5, 6, 7, and 10 was performed through the ports provided in each stack.

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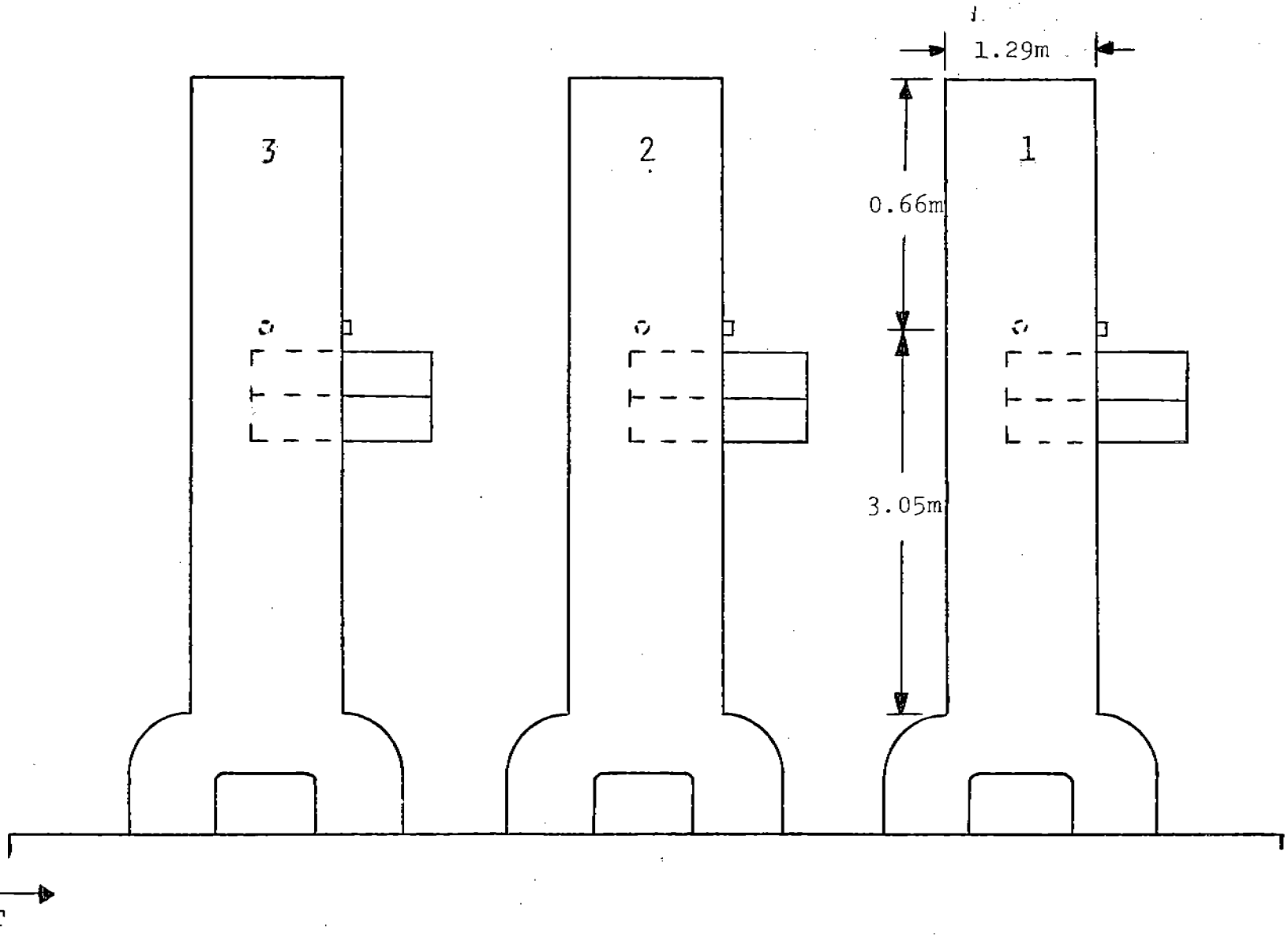

Figure 1. Outlets of baghouse on no. 3 kiln

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The inlet to the baghouse is shown in Figure 2. The rectangular duct, 0.99 meter by 1.52 meters, was used to transport the exhaust gases from the fan to the manifold system which directed the gases to the various compartments of the baghouse. A section of scaffold was used to reach the duct which was 1.83 meters above the floor of the building which housed the bags. Four 7.6 cm (3 inch) ports were located in the duct as shown in Figure 2. A thermocouple and a pressure tap, located in two of the ports, prevented the use of two ports. Since the 2 remaining ports were only 3 meters (2.5 stack diameters) from the fan, the requirements for Method 1 of the Federal Register could not be met. The Method 6 testing at the inlet was performed through one of these ports. An attempt was made to perform a temperature and velocity traverse on the inlet. The data from the traverse was not used to determine flow rates, however, it is included in Appendix F.

Figure 3 illustrates the exhaust stack of the Ducon wet scrubber which controls the particulate emissions from the hydrator. The stack has a diameter of 0.76 meter (30 inches) and has 5.36 meters (17.6 feet) of straight length. The nearest downstream disturbance, a bend in the stack, is 4.24 meters (5.6 diameters) from the two 10.1 cm (4 inch) ports that were used for Method 5 sampling. Two 7.6 cm (3 inch) ports were located 0.3 meter (12 inches) below the ports used for the sampling train. The nearest upstream disturbance, the outlet, was 1.12 meters (1.5 diameters) from the 10.1 cm (4 inch) ports. Two 16-point traverses were performed during the Method 5 testing on the hydrator exhaust. As can be seen in Figure 3, the sloped roof around the hydrator exhaust caused numerous problems in preparing a platform to support MRC personnel and the sampling equipment.

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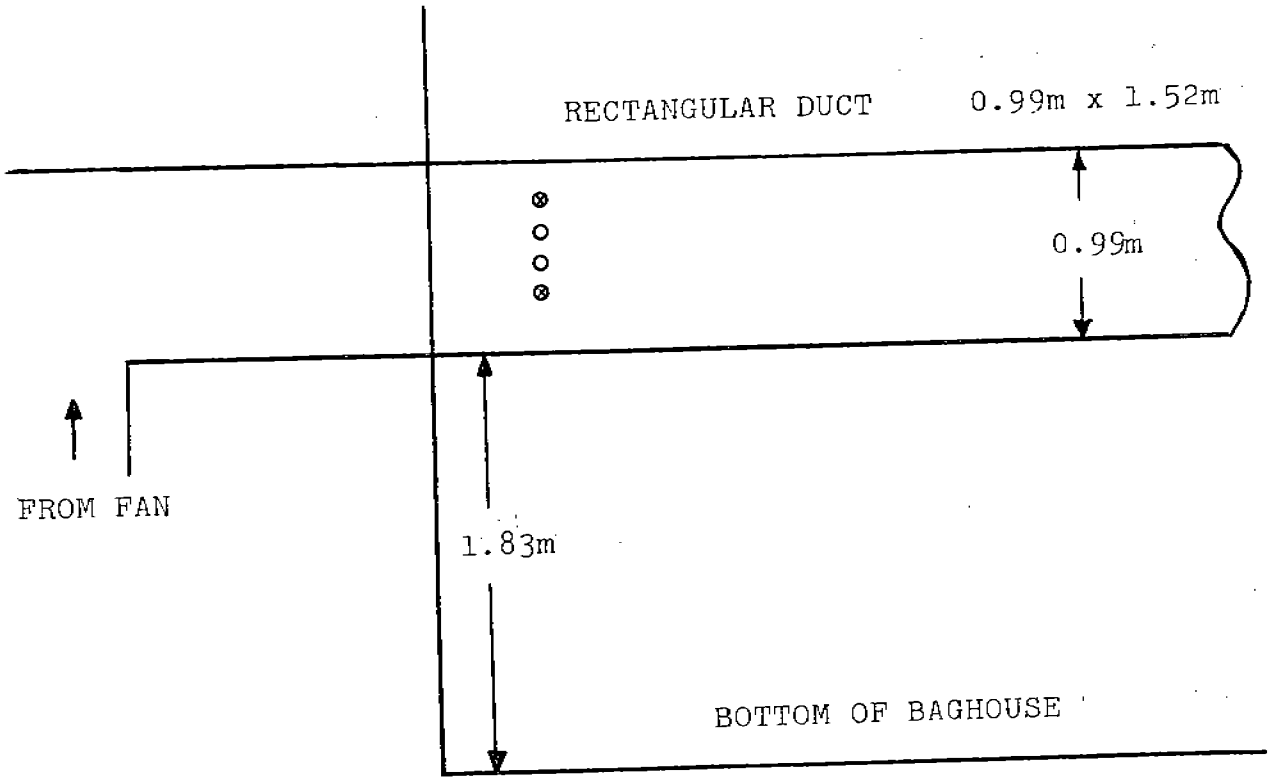

Figure 2. Inlet to baghouse on no. 3 kiln

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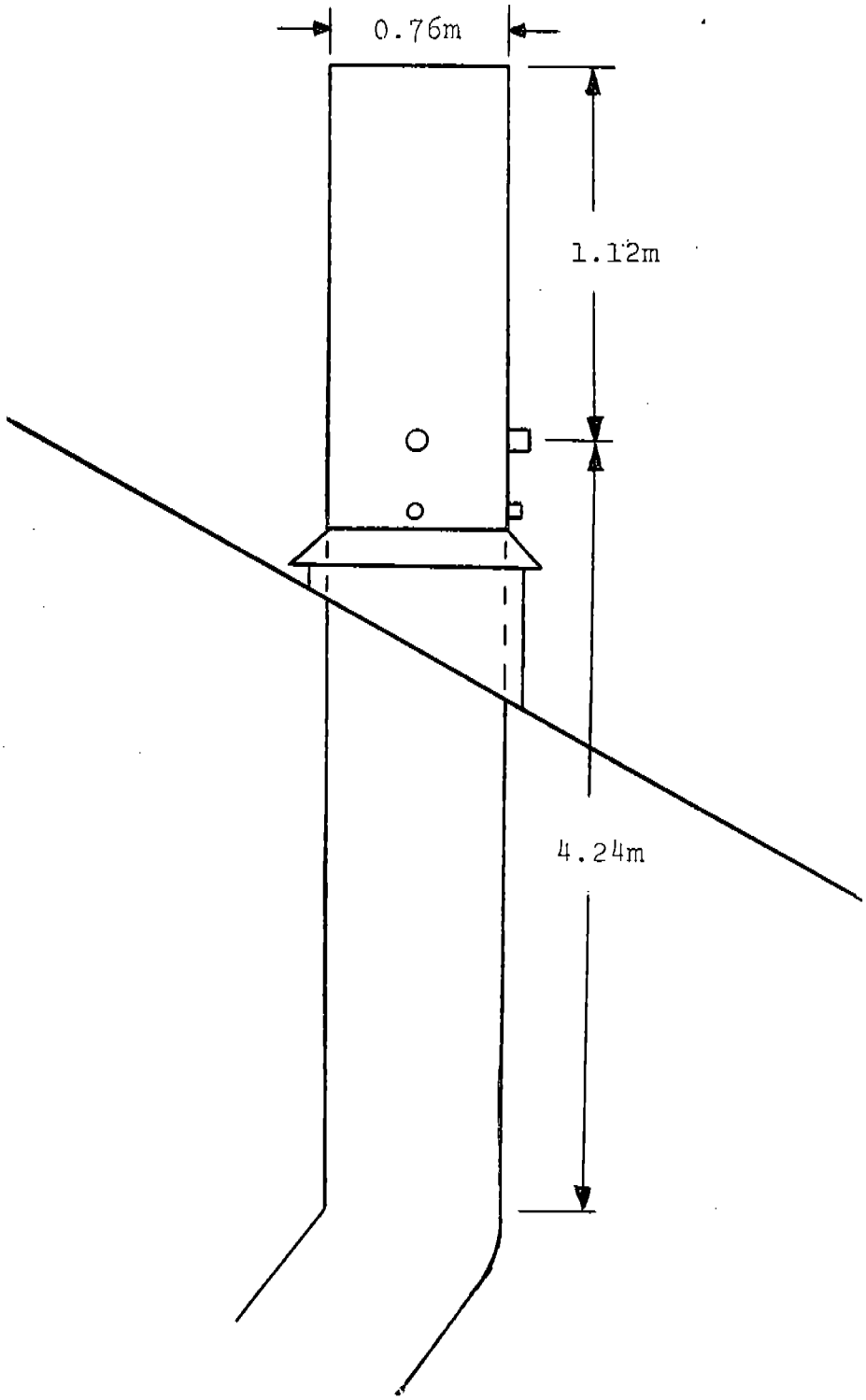

Figure 3. Outlet of hydrator

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SECTION V

SAMPLING AND ANALYTICAL PROCEDURES

The sampling of the inlet and outlet of the baghouse and the hydrator exhaust was done according to the methods of various Federal Registers (listed in Appendix H). The analyses of the samples collected were also performed according to Federal Register methods along with sulfur analysis by ASTM procedures.

The points on each traverse for particulate sampling were determined from Method 1. For the baghouse, all three stacks required 22-point traverses to meet Method 1 requirements. The large number of sampling points was a result of the short length of stack between the sampling ports and the outlet of the stack. Two 16-point traverses were used on the stack which exhausted the hydrator emissions.

The velocity and temperature traverses were performed with pitot tubes and digital thermometers that had been previously calibrated at the MRC laboratory. The moisture in the baghouse exhaust was determined by performing a Method 4 test on Stack 1. For the hydrator, the preliminary moisture was determined by assuming the stack gases to be saturated with water and using a psychrometric chart (wet bulb - dry bulb calculation) to find the moisture content of the gas stream. These moisture contents were then used in setting the nomograph for Method 5 testing.

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The particulate sampling on the kiln exhaust was performed according to Method 5 requirements. Six runs (2 per stack) were completed and a seventh was aborted when MRC personnel discovered a broken U-bend in the impinger system. The runs were performed using a nomograph which assumes a pitot tube coefficient, C_p, of 0.85. The field isokinetic calculation was performed using the 0.85 C_p. However, when the data was processed in the laboratory, the actual C_p was used in the calculations. This resulted in four of the runs being greater than 110 percent isokinetic.

The particulate sampling on the hydrator exhaust was made difficult by the high moisture content of the exhaust gases. The first run was slightly less than isokinetic and an adjustment to the nomograph was made for Run No. 2. However, during the third run the moisture content of the gas increased and resulted in the run being greater than isokinetic. During all three runs the impingers had to be emptied every 15 minutes and occasionally the silica gel changed because of the high moisture content of the exhaust gases.

The Method 6 sampling on the exhaust of the lime kiln was performed according to the guidelines of the Federal Register. The high temperature, positive pressure, and high particulate concentration at the inlet to the baghouse made sampling difficult. The hydrogen peroxide used in the impingers was returned to the laboratory for titration to determine the SO_2 concentration.

The nitrogen oxides sampling was performed over a span of 3 days. Twelve flasks were used the first day with 6 being used the other 2 days. The absorbing solution was returned to the laboratory for analysis of nitrogen oxides.

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The carbon monoxide samples were taken from the Tedlar bag of exhaust gas used for determining the dry molecular weight of the stack gas. The bags of integrated stack gas were collected during the Method 5 sampling and analyzed later in the day with a Beckman Model 864 Infrared Analyzer. Calibration gases of 302, 610, and 913 ppm were used to standardize the instrument. A small portion of the stack gas was pulled through a Drager tube to determine if there was any correlation between Method 10 and the simple Drager tube method.

The opacity readings were taken according to Method 9 of the Federal Register. One of the readers was from MRC while the other was from the EPA. The first two simultaneous runs were started with one reader observing each stack. The one Method 5 run was aborted and the two readers continued observing on the one stack. The two men would read the emissions from the same stack even when simultaneous Method 5 runs were performed. No opacity readings were taken on the last Method 5 run on the baghouse since the readings were low on the previous runs and there was a shortage of personnel available. No opacity readings were taken on the hydrator exhaust because of the high moisture content of the exhaust gases and the location of the stack which was surrounded by taller structures.

Total sulfur analysis was performed on the lime product and baghouse dust according to ASTM C25-72. A copy of the method has been included in Appendix H. The Standard Bromine Method was used to find the sulfur content of the materials which were collected during each of the sulfur dioxide runs on the lime kiln.

The sulfur analysis of the coal was done according to the procedures of ASTM D271-70. The coal was pulverized and ignited using the Parr bomb calorimeter method without regard

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to the heat content. The sulfur content was determined by the barium chloride gravimetric method.

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APPENDIX A

COMPLETE PARTICULATE RESULTS

Table A-1. PARTICULATE EMISSION DATA FOR NO. 3 LIME KILN

ABBR	DESCRIPTION 10/30/75	UNITS	1-1	2-2	1-2	3-1	3-2	2-3
TT	DURATION OF RUN	MINUTES	132.0	132.0	132.0	132.0	132.0	132.0
PB	BAROMETRIC PRESSURE	IN HG	29.82	29.75	29.75	29.75	29.64	29.54
DELH	AVG ORIFICE PRESS DROP	IN H2O	0.841	1.432	1.178	1.556	1.442	0.880
VM	VOL DRY GAS(METER CON)	DCF	71.545	87.229	82.910	92.100	90.835	72.898
TM	AVG GAS METER TEMP	DEG F	104.8	99.1	95.5	107.7	85.0	81.8
VMSTD	VOL DRY GAS (STD COND)	DSCF	67.00	82.44	78.82	85.75	87.75	70.51
VW	TOTAL H2O COLLECTED	ML	65.9	234.2	218.2	312.1	234.0	151.6
VWG	VOL H2O VAPOR(STD CON)	SCF	3.124	11.101	10.343	14.794	11.092	7.186
PCNTM	PERCNT MOISTURE BY VOL		4.45	11.87	11.60	14.71	11.22	9.25
MD	MOLE FRACTION DRY GAS		0.955	0.881	0.884	0.853	0.888	0.908
CO2	PERCENT CO2		8.8	9.6	9.6	9.6	9.6	8.2
O2	PERCENT O2		13.8	13.6	13.6	13.6	11.7	14.4
N2	PERCENT N2		77.4	76.8	76.8	76.8	78.5	77.4
MWD	MOL WT OF DRY GAS		30.0	30.1	30.1	30.1	30.0	29.9
MW	MOL WT OF STACK GAS		29.4	28.6	28.7	28.3	28.7	28.8
DELP	AVG STACK VELOCITY HEAD	IN H2O	0.069	0.092	0.086	0.101	0.104	0.069
CP	PITOT COEFFICIENT		0.819	0.807	0.819	0.819	0.807	0.807
TS	STACK TEMPERATURE	DEG F	267.	288.	261.	294.	278.	233.
PM	STACK PRESSURE(STATIC)	IN H2O	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
PS	STACK PRESSURE (ABS)	IN HG	29.81	29.74	29.74	29.74	29.63	29.53
VS	AVG STACK GAS VELOCITY	FPM	997.	1175.	1132.	1259.	1241.	980.
DS	STACK DIAMETER	INCHES	51.00	51.00	51.00	51.00	51.00	51.00
AS	STACK AREA	SQ IN	2042.8	2042.8	2042.8	2042.8	2042.8	2042.8
QS	STACK FLOW RT(DRY STD)	DSCFM	9809.	10356.	10379.	10649.	11115.	9513.
QA	STACK FLOW RT(ACTUAL)	ACFM	14138.	16670.	16058.	17859.	17599.	13895.
DN	PROBE TIP DIAMETER	INCHES	0.374	0.374	0.367	0.367	0.367	0.367
PCTI	PERCENT ISOKINETIC		96.3	112.2	111.2	117.9	115.6	108.5
MF	PARTICULATE (FRONT)	MG	42.90	21.20	31.40	27.40	40.80	15.20
MT	PARTICULATE (TOTAL)	MG	74.30	39.70	54.20	68.60	72.40	33.30
CAN	PARTICULATE (FRONT)	GR/DSCF	0.0099	0.0040	0.0061	0.0049	0.0072	0.0033
CAO	PARTICULATE (TOTAL)	GR/DSCF	0.0171	0.0074	0.0106	0.0123	0.0127	0.0073
CAT	PARTICULATE (FRONT)	GR/ACF	0.0068	0.0025	0.0040	0.0029	0.0045	0.0023
CAU	PARTICULATE (TOTAL)	GR/ACF	0.0118	0.0046	0.0068	0.0073	0.0080	0.0050
CAW	PARTICULATE (FRONT)	LB/HR	0.829	0.351	0.546	0.449	0.682	0.271
CAX	PARTICULATE (TOTAL)	LB/HR	1.436	0.658	0.942	1.124	1.210	0.593
			661	762	763	783		

Table A-2. PARTICULATE EMISSION DATA FOR THE HYDRATOR

ABBR	DESCRIPTION 10/30/75	UNITS	1-H	2-H	3-H
TT	DURATION OF RUN	MINUTES	128.0	128.0	128.0
PB	BAROMETRIC PRESSURE	IN HG	29.54	29.51	29.51
DELH	AVG ORIFICE PRESS DROP	IN H2O	0.319	0.675	0.565
VM	VOL DRY GAS(METER CON)	DCF	39.602	57.520	53.989
TM	AVG GAS METER TEMP	DEG F	90.3	92.0	94.0
VMSTD	VOL DRY GAS (STD COND)	DSCF	37.65	54.52	50.97
VW	TOTAL H2O COLLECTED	ML	3004.5	3585.0	4056.4
VWG	VOL H2O VAPOR(STD CON)	SCF	142.413	169.929	192.273
PCNTM	PERCNT MOISTURE BY VOL		79.09	75.71	79.04
MD	MOLE FRACTION DRY GAS		0.209	0.243	0.210
CO2	PERCENT CO2		0.0	0.0	0.0
O2	PERCENT O2		21.0	21.0	21.0
N2	PERCENT N2		79.0	79.0	79.0
MWD	MOL WT OF DRY GAS		28.8	28.8	28.8
MW	MOL WT OF STACK GAS		20.3	20.6	20.3
DELP	AVG STACK VELOCITY HEAD	IN H2O	0.120	0.153	0.125
CP	PITOT COEFFICIENT		0.804	0.804	0.804
TS	STACK TEMPERATURE	DEG F	201.	200.	203.
PM	STACK PRESSURE(STATIC)	IN H2O	-0.01	-0.01	-0.01
PS	STACK PRESSURE (ABS)	IN HG	29.54	29.51	29.51
VS	AVG STACK GAS VELOCITY	FPM	1486.	1669.	1519.
DS	STACK DIAMETER	INCHES	30.00	30.00	30.00
AS	STACK AREA	SQ IN	706.9	706.9	706.9
QS	STACK FLOW RT(DRY STD)	DSCFM	1207.	1576.	1232.
QA	STACK FLOW RT(ACTUAL)	ACFM	7291.	8191.	7455.
DN	PROBE TIP DIAMETER	INCHES	0.495	0.495	0.495
PCTI	PERCENT ISOKINETIC		89.4	99.1	118.5
MF	PARTICULATE (FRONT)	MG	278.60	509.50	980.40
MT	PARTICULATE (TOTAL)	MG	322.70	526.30	1025.20
CAN	PARTICULATE (FRONT)	GR/DSCF	0.1139	0.1439	0.2962
CAO	PARTICULATE (TOTAL)	GR/DSCF	0.1320	0.1487	0.3097
CAT	PARTICULATE (FRONT)	GR/ACF	0.0188	0.0277	0.0489
CAU	PARTICULATE (TOTAL)	GR/ACF	0.0218	0.0286	0.0512
CAW	PARTICULATE (FRONT)	LB/HR	1.179	1.944	3.128
CAX	PARTICULATE (TOTAL)	LB/HR	1.365	2.008	3.271

APPENDIX B

COMPLETE SO_2 RESULTS, CALCULATIONS, AND CONTINUOUS MONITORING REPORT

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Island of Bayhouse Run# 1-I

Barometric Pressure Absolute (in Hg)	BP =	29.82
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	578
Volume Through Dry Gas Meter (CF)	V_m =	0.872
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	0
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0079
Total Volume of Solution (ml)	V_s =	100
Volume of Aliquot (ml)	V_a =	25
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)}$$

C = 0 lbs/SCF

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 0 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Marlin - Marietta Date 9/25/75

Location Outlet of Baghouse Run# 2 - 0

Barometric Pressure Absolute (in Hg)	BP =	29.80
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	558
Volume Through Dry Gas Meter (CF)	V_m =	1.110
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	0
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)}$$

C = 0 lbs/SCF

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = \frac{6.377 \times 10^{4}(\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 0 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Inlet to Baghouse Run# 2 - I

Barometric Pressure Absolute (in Hg)	BP =	29.82
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	590
Volume Through Dry Gas Meter (CF)	V_m =	0.879
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	6.78
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	0.0099
Total Volume of Solution (ml)	V_s =	100
Volume of Aliquot (ml)	V_a =	25
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(.879)(29.82)}{(590)} = 0.787$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(6.78)(.0099)(100)}{(.787)(25)}$$

C = 2.405×10^{-5} lbs/SCF

ppm = 147

* Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2) 14.2 x 3	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

DSCFM = 30,911

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$S = 30{,}911 \times 2.405 \times 10^{-5}$ lb/SCF x 60 min/hr

$$S = \frac{6.377 \times 10^4 (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 44.6 (lbs/hr)

* the DSCFM from the 6 EPA 5 runs was used as the flow rate (an average of (1-1, 2-2, 3-1) + (1-2, 2-3, and 3-2))

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 4/25/75

Location Outlet of Baghouse - Run# 2-0

Barometric Pressure Absolute (in Hg)	BP =	29.82
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	566.5
Volume Through Dry Gas Meter (CF)	V_m =	.770
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	0
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0079
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50

Volume of Gas at Standard Conditions (SCF) = V_g

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)}$$

C = 0 lbs/SCF

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 0 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Inlet to Baghouse Run# 3 - J.

Barometric Pressure Absolute (in Hg)	BP =	29.75
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	563
Volume Through Dry Gas Meter (CF)	V_m =	1.007
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	3.68
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(1.007)(29.75)}{(563)} = 0.943$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(3.68)(.0099)(200)}{(.943)(50)}$$

C = 1.089×10^{-5} lbs/SCF

ppm SO_2 = 67

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

DSCFM = 30911

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

S = 30911 DSCFM × 60 min/hr × 1.089×10^{-5} lb/SCF

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 20.2 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 7/25/75

Location Outlet of Baghouse Run# 3 - 0

Barometric Pressure Absolute (in Hg)	BP =	29.75
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	545.5
Volume Through Dry Gas Meter (CF)	V_m =	.773
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	0
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)}$$

C = 0 lbs/SCF

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 0 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Inlet to Baghouse Run# 4 - I

Barometric Pressure Absolute (in Hg)	BP =	29.75
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	592
Volume Through Dry Gas Meter (CF)	V_m =	0.873
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	4.85
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(.873)(29.75)}{(592)} = 0.777$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(4.85)(.0099)(200)}{(.777)(50)}$$

C = 1.743×10^{-5} lbs/SCF

ppm SO_2 = 107

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

DSCFM = 30911

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = 30911 \text{ DSCFM} \times 60 \frac{\text{min}}{\text{hr}} \times 1.743 \times 10^{-5} \text{ lb/DSCF}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 32.3 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Outlet of Baghouse Run# 4 - 0

Barometric Pressure Absolute (in Hg)	BP =	29.75
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	565
Volume Through Dry Gas Meter (CF)	V_m =	.769
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	0
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0079
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	25
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(\quad)(\quad)}{(\quad)} = \_\_\_\_$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)}$$

C = 0 lbs/SCF

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 0 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Inlet to Baghouse Run# 5 - I

Barometric Pressure Absolute (in Hg)	BP =	29.64
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	557.5
Volume Through Dry Gas Meter (CF)	V_m =	0.891
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	4.55
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	25
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(.891)(29.64)}{(557.5)} = .839$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(4.55)(.0099)(200)}{(.839)(25)}$$

C = 3.028×10^{-5} lbs/SCF

ppm SO_2 = 186

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

DSCFM = 30911

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = 30911 \text{ DSCFM} \times 60 \frac{\text{min}}{\text{hr}} \times 3.028 \times 10^{-5} \text{ lb/SCF}$$

$$S = \frac{6.377 \times 10^4 (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 56.2 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin-Marietta Date 9/25/75

Location Outlet to Baghouse Run# 5-0

Barometric Pressure Absolute (in Hg)	BP =	29.64
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	540
Volume Through Dry Gas Meter (CF)	V_m =	0.811
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	3.6
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(29.64)(.811)}{(540)} = 0.789$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(3.6)(.0099)(200)}{(.789)(50)}$$

C = 1.274×10^{-5} lbs/SCF

ppm SO_2 = 78

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

DSCFM = 30911

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

S = 30911 DSCFM × 60 min/hr × 1.274×10^{-5} lb/scf

$$S = \frac{6.377 \times 10^4 (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 23.6 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Inlet to Baghouse Run# 6-I

Barometric Pressure Absolute (in Hg)	BP =	29.54
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	553
Volume Through Dry Gas Meter (CF)	V_m =	0.889
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	4.28
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	0.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	25
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(29.54)(.889)}{(553)} = 0.841$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(4.28)(.0099)(200)}{(.841)(25)}$$

C = 2.842×10^{-5} lbs/SCF

ppm SO_2 = 174

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

DSCFM = 30911

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = 30911 \text{ DSCFM} \times 60 \frac{\text{min}}{\text{hr}} \times 2.842 \times 10^{-5} \text{ lb/SCF}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 52.7 (lbs/hr)

METHOD 6

SO_2 CALCULATION

Plant Martin - Marietta Date 9/25/75

Location Outlet of Baghouse Run# 6 - 0

Barometric Pressure Absolute (in Hg)	BP =	29.54
Average Meter Temperature (°R) Absolute (°F + 460)	T_m =	544
Volume Through Dry Gas Meter (CF)	V_m =	0.853
Volume of $Ba(ClO_4)_2$ to Titrate Sample (ml)	V_t =	0
Volume of $Ba(ClO_4)_2$ to Titrate Blank (ml)	V_b =	0
Normality of $Ba(ClO_4)_2$ Solution (g-eq/l)	N =	0.0099
Total Volume of Solution (ml)	V_s =	200
Volume of Aliquot (ml)	V_a =	50
Volume of Gas at Standard Conditions (SCF) = V_g		

$$V_g = 17.71 \frac{(V_m)(BP)}{(T_m)} = 17.71 \frac{(\quad)(\quad)}{(\quad)} = 0$$

Concentration of SO_2 (lbs/SCF) dry basis = C

$$C = 7.05 \times 10^{-5} \frac{(V_t - V_b)(N)(V_s)}{(V_g)(V_a)} = 7.05 \times 10^{-5} \frac{(\quad)(\quad)(\quad)}{(\quad)(\quad)}$$

C = 0 lbs/SCF

Velocity of Stack Gas (Actual)(FPS)	V =	
% Moisture in Stack Gas	M =	
Area of Stack (ft^2)	A =	
Absolute Stack Temperature (°R)	T_s =	
Absolute Stack Pressure (in Hg)	P_s =	

SO_2 Flow Rate (lbs/hr) = S

$$S = \frac{6.377 \times 10^{+4}(1-(M \times 10^{-2}))(V)(A)(P_s)(C)}{(T_s)}$$

$$S = \frac{6.377 \times 10^{4} (\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)}$$

S = 0 (lbs/hr)

I. Introduction

The Martin-Marietta lime plant located near Calera, Alabama was the site of SO_2 measurement work performed by an Environmental Protection Agency test crew during the week of September 8, 1975. Three rotary lime kilns normally operated with natural gas were heated with coal and particulate emissions were controlled with an American Air Filter baghouse. Sampling was conducted at a port in the inlet duct to the baghouse and at a port in the baghouse outlet stack. A Dynascience SO_2 monitor was used as a source test system in measuring SO_2 concentrations. The purpose of the testing was two-fold: 1) to determine inlet and outlet SO_2 concentrations across the baghouse to establish, if any, SO_2 control was attained, and 2) to obtain SO_2 measurements that may be compared with Method 6 measurements made by a contractor's test crew. Other test data may be obtained from test report.

II. Summary and Discussion of Results

Testing was delayed nearly one week at the Martin-Marietta plant due to the unavailability of sample calibration gases. The first test day was September 13 and the equipment was mounted at the inlet to the baghouse. The static pressure was positive and the temperature was about 180°C (355°F). The dust concentration was fairly high; although, by turning the tip of the probe nozzle away from the direction of gas flow and drawing only about 0.8 lpm (1.7 CFH) of sample, plugging of the filter was not a problem. The Dynascience unit was calibrated with span gases of concentrations 185 ppm and 450 ppm and with ambient air for zero. Sampling began at about 9:45 am and continued until about 11:45 am when the sampling equipment was removed. The

probe and filter holder were cleaned and the testing equipment taken to the baghouse outlet.

At the outlet stack, the static pressure was nearly ambient and the stack temperature was about 115°C (240°F). The sampling equipment was mounted in a manner similar to the set-up used at the baghouse inlet. Calibration was completed and sampling began at about 2:45 pm. Sampling continued until about 3:45 pm when it was learned that the plant had switched to natural gas firing from coal-firing at about 3:15 pm. Plans were made with the plant manager for the plant to operate on coal on September 14 for the entire day. The kilns, however, were down for internal repairs on that day and no testing was completed.

Table 1 shows a summary of the SO_2 measurement results for the two test periods.

Table 1

Results of SO_2 Sampling at Martin-Marietta Lime Kiln

Location	SO_2 Concentrations (based on 10 - minute averages)		
	Average (ppm)	High (ppm)	Low (ppm)
inlet	98	224	58
outlet	58	71	45

These results have been corrected for span and zero drift of the Dynascience instrument. All data are shown in Appendix A.

With the limited SO_2 data available from the Martin-Marietta plant, any conclusion as to the effect of the baghouse on the SO_2 emissions would have little support. One observation that can be made, however, is that a great variation existed in the SO_2 concentration at the baghouse inlet. A sharp, high peak occurred during one ten-minute sampling period (379 ppm). Excluding the ten-minute sampling period that had an SO_2 concentration average of 224 ppm, the ten-minute average values ranged from 58 ppm to 107 ppm and the average was 83 ppm. Checks with plant personnel revealed no explanation for the variation in SO_2 concentration. Neither stone feed rate nor the coal feed rate were changed appreciably during the testing period until the switch to natural gas at 3:30 pm and this brought the SO_2 concentration down to near zero.

The inlet and outlet SO_2 concentration measurements show a 41% decrease in SO_2 across the baghouse. This result is based on only 20 minutes of sampling at the outlet and some 2 hours at the inlet and conducted at two different times.

More definite conclusions could be drawn from such testing if more data were available. An even better test program would include simultaneous inlet and outlet tests with the Dynascience monitors. Such a program could easily be arranged in the field with two instruments.

III. Process Description and Operation

A complete process description is written elsewhere in the test report. Briefly, the Martin-Marietta plant has three rotary kilns fired normally with natural gas, but may be fired with coal. Exhaust gases are drawn through an induced draft from that, in turn, exhausts gases to the baghouse.

IV. Location of Sampling Ports

The inlet sample port was located in a horizontal duct immediately downstream from the fan. The baghouse had three stacks from six bag compartments. Sampling was performed on the middle stack.

V. Sampling and Analytical Procedures

The SO_2 measurements were performed with a Dynascience membrane monitor. A special in-stack filter and condenser system was constructed so that a gas sample could be drawn from the stack and the particulate and moisture could be removed prior to entering the monitoring unit. The in-stack filter holder held glass wool and a glass-fiber mat filter. The 0.8 m long probe of stainless steel tubing was not heated, but mounted in the stack so as to be at stack conditions. The condenser was a Teflon coil in an ice bath and with a moisture trap.

The sample gas was drawn out of the stack by a leakless diaphragm pump at the rate of about 0.8 lpm. Output from the Dynascience monitor was recorded with a strip-chart recorder. Calibration was performed prior to each sampling period and immediately following each period. The calibration gases were 450 ppm SO_2 and 185 ppm SO_2 in nitrogen.

The strip chart read-out was divided into 10-minute intervals and the average was determined for each intervals. High and low values were also noted. Data are shown in Appendix A.

Appendix A

Corrected 10-Minute Averages of SO_2 Measurements at

Martin-Marietta Lime Plant Calera, Alabama

Date	Test Site	Time	Corrected Average PPM	High Peak PPM	Low Point PPM	Stack Temperature °C
9/13/75	Baghouse Inlet	9:52 am	86	95	79	
		10:02 am	87	107	77	
		10:12 am	107	177	86	174 (345°F)
		10:22 am	224	379	93	
		10:32 am	85	102	76	
		10:42 am	87	100	73	
		10:52 am	80	96	70	
		11:02 am	94	101	87	185 (365°F)
		11:12 am	78	91	68	
		11:22 am	72	81	66	
		11:32 am	58	65	54	
9/13/75	Baghouse Outlet	2:50 pm	45	60	40	115 (240°F)
		3:00	71	81	68	

APPENDIX C

COMPLETE NO_x RESULTS AND SAMPLE CALCULATION

Table C-1. NO_x RESULTS ON NO. 3 LIME KILN

NOX CALCULATION
VSC-SAMPLE VOLUME AT STANDARD CONDITIONS(DRY BASIS),ML.
MASS-MASS OF NO2 IN GAS SAMPLE,UG.
PPM-PPM,NOX AS NO2
LB/SCF-CONCENTRATION OF NOX AS NO2(DRY BASIS),LB/SCF

VSC	MASS	PPM	LB/SCF
0.169479E+04	0.823927E+03	0.254744E+03	0.301415E-04
0.167134E+04	0.717385E+03	0.224915E+03	0.266121E-04
0.187001E+04	0.530394E+03	0.148623E+03	0.175852E-04
0.183274E+04	0.867413E+03	0.248002E+03	0.293438E-04
0.173542E+04	0.171631E+03	0.518232E+02	0.613175E-05
0.180884E+04	0.523871E+03	0.151759E+03	0.179563E-04
0.175110E+04	0.758697E+03	0.227033E+03	0.268627E-04
0.183577E+04	0.958734E+03	0.273661E+03	0.323797E-04
0.172625E+04	0.889156E+03	0.269902E+03	0.319350E-04
0.182286E+04	0.610844E+03	0.175593E+03	0.207763E-04
0.184544E+04	0.626064E+03	0.177767E+03	0.210335E-04
0.178002E+04	0.932643E+03	0.274551E+03	0.324850E-04
0.177510E+04	0.452118E+03	0.133463E+03	0.157914E-04
0.175453E+04	0.441247E+03	0.131781E+03	0.155924E-04
0.182350E+04	0.632587E+03	0.181780E+03	0.215083E-04
0.189025E+04	0.850019E+03	0.235635E+03	0.278805E-04
0.184311E+04	0.421678E+03	0.119884E+03	0.141848E-04
0.176197E+04	0.636935E+03	0.189421E+03	0.224125E-04
0.172732E+04	0.980478E+03	0.297438E+03	0.351931E-04
0.174195E+04	0.904377E+03	0.272048E+03	0.321889E-04
0.179409E+04	0.101962E+04	0.297800E+03	0.352359E-04
0.180040E+04	0.104136E+04	0.303084E+03	0.358611E-04
0.179320E+04	0.110659E+04	0.323361E+03	0.382603E-04
0.180266E+04	0.763046E+03	0.221804E+03	0.262439E-04

METHOD 7

NO_x CALCULATIONS

Plant Martin - Marietta

Date Sept 9

Test No. 1

Volume of flask and valve (ml)	= VF =	2092
Initial absolute pressure of flask (in Hg)	= PI =	1.92
Final absolute pressure of flask (in Hg)	= PF =	27.75
Initial temperature of flask (°F)	= TI =	95
Final temperature of flask (°F)	= TF =	98
Mass of NO_x as NO_2 in gas sample (μg)	= M =	823.9

Volume of sample at standard conditions, dry basis(ml) = VS

$$VS = 17.71 \times (VF-25)\left(\frac{PF}{TF+460} - \frac{PI}{TI+460}\right)$$

$$VS = 17.71 \times (2092 - 25)\left(\frac{27.75}{98+460} - \frac{1.92}{95+460}\right) = 1693.8 \text{ ml}$$

Concentration of NO_x as NO_2 (dry basis) (lbs/scf) = C

$$C = 6.2 \times 10^{-5} \times \left(\frac{M}{VS}\right)$$

$$C = 6.2 \times 10^{-5} \times \left(\frac{823.9}{1693.8}\right) = 3.016 \times 10^{-5} \text{ lbs/scf}$$

Table D-1. CO RESULTS FOR NO. 3 LIME KILN

Stack #	Run #	CO by NDIR (ppm)	% CO_2 by Orsat	Volume Fraction of CO_2[1]	CO in Stack[2] (ppm)	CO ppm Drager tubes
1 m-m	1	16.6	8.8%	.088	15.1	
2 m-m	1	125	9.6%	.096	113	125
3 m-m	1	23	9.6%	.096	20.8	20
2 m-m	2	62	8.2%	.082	56.9	60

[1] Volume Fraction of CO_2 = % CO_2/100

[2] % CO in Stack = [% CO by NDIR][1 - (Volume Fraction of CO_2)]

FIELD DATA SHEET - METHOD 10

LOCATION Outlet Baghouse #3, Stack #1

TEST Run # 1

DATE 9/9/75

OPERATOR Thalman

TUNE METER READING 35

CALIB. METER READING

GAIN TURNS NUMBER 2.73

COMMENTS:

CLOCK TIME	ROTAMETER SETTING (~~Cubic ft/min~~, cubic ft/hr)	CO ANALYZER Meter Reading	RUN NUMBER
4:20 P.M.	3.0	2%	
4:30 P.M.	3.0	1½%	
4:40 P.M.	3.0	2%	
4:50 P.M.	3.0	1½%	
5:00 P.M.	3.0	1½%	
5:10 P.M.	3.0	1½%	

FIELD DATA SHEET - METHOD 10

LOCATION Outlet Baghouse #3, Stack #2

TEST Run #1

DATE 9/10/75

OPERATOR Thalman

TUNE METER READING 35

CALIB. METER READING

GAIN TURNS NUMBER 3.10

COMMENTS:

CLOCK TIME	ROTAMETER SETTING (Cubic ft/min, cubic ft/hr)	CO ANALYZER Meter Reading	RUN NUMBER
4:20 P.M.	3.0	14%	
4:31 P.M.	3.0	15%	

FIELD DATA SHEET - METHOD 10

LOCATION Outlet Baghouse #3, Stack #3

TEST Run # 1

DATE 9/11/75

OPERATOR Thalman

TUNE METER READING 35

CALIB. METER READING

GAIN TURNS NUMBER 2.84

COMMENTS:

CLOCK TIME	ROTAMETER SETTING (Cubic ft/min, cubic ft/hr)	CO ANALYZER Meter Reading	RUN NUMBER
1:15-1:35 P.M.	3.0	2.5%	
1:40-1:55 P.M.	3.0	2.5%	

FIELD DATA SHEET - METHOD 10

LOCATION Outlet Baghouse #3, Stack #2

TEST Run # 2

DATE 9/12/75

OPERATOR Thalman

TUNE METER READING 35

CALIB. METER READING

GAIN TURNS NUMBER 2.73

COMMENTS:

CLOCK TIME	ROTAMETER SETTING (Cubic ft/min, cubic ft/hr)	CO ANALYZER Meter Reading	RUN NUMBER
1:15-1:25 P.M.	3.0	7%	
1:25 P.M.- 1:35 P.M.	3.0	7%	

APPENDIX E

COMPLETE VISIBLE EMISSIONS RESULTS

FACILITY

Summary of Visible Emissions

Date: 9/9/75

Type of Plant: Lime and Cement

Observer #1

Type of Discharge: Stack

Distance from Observer to Discharge Point: 150ft.

Location of Discharge: Baghouse Outlet #3, Stack #1, Run #1

Height of Observation Point: Ground Level

Height of Point of Discharge:

Direction of Observer from Discharge Point: East

Description of Background: Sky (Blue Background)

Description of Sky: Clear to Partly Cloudy

Wind Direction: East

Wind Velocity: 2-5 miles/hr.

Color of Plume: White

Detached Plume: No

Duration of Observation: 3 hrs.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1130	1135	0	0
2	1136	1141	0	0
3	1142	1147	0	0
4	1148	1153	0	0
5	1154	1159	75	3.1
6	1200	1205	0	0
7	1206	1211	0	0
8	1212	1217	0	0
9	1218	1223	0	0
10	1224	1229	0	0
11	1230	1235	0	0
12	1236	1241	0	0
13 (4)	1242	1245	0	0
14 (1)	1305	1305	0	0
15	1306	1311	0	0
16	1312	1317	0	0
17	1318	1323	0	0
18	1324	1329	0	0
19	1330	1335	0	0
20	1336	1341	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1342	1347	0	0
22	1348	1353	0	0
23	1354	1359	0	0
24	1400	1405	0	0
25 (3)	1406	1408	0	0
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant ~~Martin-Marietta~~ Lime Kiln and Cement Date 9/9/75

Company Name Martin-Marietta Hours of Observation 2 hrs.

Plant Address Cayla Ala Observer T. Thalman

Type of Discharge (STACK) OTHER _____

Discharge Location Baghouse Outlet #35 Stack #1 - Run #1

Height of Point of Discharge 80 ft.

Observer's Location:

Distance to Discharge Point 150 ft.

Height of Observation Point Ground

Direction from Discharge Point East

Background Description Blue Background (Except where noted)

Weather: Clear Overcast (Partly Cloudy) Other _____ Color _____

Wind Direction East Wind Velocity 2-5 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black (White) Other _____

Plume Dispersion Behavior: Looping (Coning) Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible 30 ft.

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	137 min. 15 sec.	55	
5	1 min. 45 sec.	60	
10	1 min. 0 sec.	65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Cayla, Ala. Observer T. Thalman

Stack Location Outlet Baghouse 3-Stack #1 Observer's Location East of Source

Weather Conditions Blue Back ground

Left

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
11	30	0	0	0	0	1st Traverse
11	31	0	0	0	0	
11	32	0	0	0	0	
11	33	0	0	0	0	
11	34	0	0	0	0	
11	35	0	0	0	0	
11	36	0	0	0	0	
11	37	0	0	0	0	
11	38	0	0	0	0	
11	39	0	0	0	0	
11	40	0	0	0	0	
11	41	0	0	0	0	
11	42	0	0	0	0	
11	43	0	0	0	0	
11	44	0	0	0	0	
11	45	0	0	0	0	
11	46	0	0	0	0	
11	47	0	0	0	0	
11	48	0	0	0	0	
11	49	0	0	0	0	
11	50	0	0	0	0	
11	51	0	0	0	0	
11	52	0	0	0	0	
11	53	0	0	0	0	
11	54	0	0	0	0	
11	55	0	0	0	0	
11	56	0	0	10	10	Stack started puffing
11	57	10	10	5	5	
11	58	5	5	5	5	
11	59	5	0	0	0	Stopped puffing

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marrietta Date 9/9/75

Plant Address Cayla, Ala. Observer T. Thalman

Stack Location Outlet Baghouse 3-Stack #1 Observer's Location East (Sun at Back)

Weather Conditions Pc bad (Blue Background)

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
12	00	0	0	0	0	
12	01	0	0	0	0	
12	02	0	0	0	0	
12	03	0	0	0	0	
12	04	0	0	0	0	
12	05	0	0	0	0	
12	06	0	0	0	0	
12	07	0	0	0	0	
12	08	0	0	0	0	
12	09	0	0	0	0	
12	10	0	0	0	0	
12	11	0	0	0	0	
12	12	0	0	0	0	
12	13	0	0	0	0	
12	14	0	0	0	0	
12	15	0	0	0	0	
12	16	0	0	0	0	
12	17	0	0	0	0	
12	18	0	0	0	0	
12	19	0	0	0	0	
12	20	0	0	0	0	
12	21	0	0	0	0	
12	22	0	0	0	0	
12	23	0	0	0	0	
12	24	0	0	0	0	
12	25	0	0	0	0	
12	26	0	0	0	0	
12	27	0	0	0	0	
12	28	0	0	0	0	
12	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Cayla, Ala. Observer T. Thaxton

Stack Location Outlet Baghouse 3-Stack #1 Observer's Location East

Weather Conditions Blue Background

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
12	30	0	0	0	0	
12	31	0	0	0	0	
12	32	0	0	0	0	
12	33	0	0	0	0	
12	34	0	0	0	0	
12	35	0	0	0	0	
12	36	0	0	0	0	
12	37	0	0	0	0	
12	38	0	0	0	0	
12	39	0	0	0	0	
12	40	0	0	0	0	
12	41	0	0	0	0	
12	42	0	0	0	0	
12	43	0	0	0	0	
12	44	0	0	0	0	
12	45	0	0	0	0	
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Cayla, Ala. Observer T. Thalman

Stack Location Outlet Baghouse #3 - Stack #1 Observer's Location East

Weather Conditions Blue Background

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	00					
	01					
	02					
	03					
	04					
13	05	0	0	0	0	Start of 2ND Traverse
13	06	0	0	0	0	
13	07	0	0	0	0	
13	08	0	0	0	0	
13	09	0	0	0	0	
13	10	0	0	0	0	
13	11	0	0	0	0	
13	12	0	0	0	0	
13	13	0	0	0	0	
13	14	0	0	0	0	
13	15	0	0	0	0	
13	16	0	0	0	0	
13	17	0	0	0	0	
13	18	0	0	0	0	
13	19	0	0	0	0	
13	20	0	0	0	0	
13	21	0	0	0	0	
13	22	0	0	0	0	
13	23	0	0	0	0	
13	24	0	0	0	0	
13	25	0	0	0	0	
13	26	0	0	0	0	
13	27	0	0	0	0	
13	28	0	0	0	0	
13	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 7/9/75

Plant Address Cayla, Ala Observer F. Thalman

Stack Location Outlet Baghouse #3-Stack #1 Observer's Location East

Weather Conditions Blue Background

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
13	30	0	0	0	0	
13	31	0	0	0	0	
13	32	0	0	0	0	
13	33	0	0	0	0	
13	34	0	0	0	0	
13	35	0	0	0	0	
13	36	0	0	0	0	
13	37	0	0	0	0	
13	38	0	0	0	0	
13	39	0	0	0	0	
13	40	0	0	0	0	
13	41	0	0	0	0	
13	42	0	0	0	0	
13	43	0	0	0	0	
13	44	0	0	0	0	White Background
13	45	0	0	0	0	
13	46	0	0	0	0	
13	47	0	0	0	0	
13	48	0	0	0	0	
13	49	0	0	0	0	Blue "
13	50	0	0	0	0	
13	51	0	0	0	0	
13	52	0	0	0	0	White "
13	53	0	0	0	0	
13	54	0	0	0	0	
13	55	0	0	0	0	
13	56	0	0	0	0	
13	57	0	0	0	0	
13	58	0	0	0	0	Blue "
13	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Cayla, Fla. Observer T. Thalman

Stack Location Outlet Baghouse 3-Stack #1 Observer's Location East of Source

Weather Conditions Blue Background

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
14	00	0	0	0	0	Blue Background
	01	0	0	0	0	
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	End of Run #1, Stack
	09					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					

Date: 9/9/75

Type of Plant: Lime and Cement

Observer #2

Type of Discharge: Stack 1

Distance from Observer to Discharge Point: 60

Location of Discharge: Baghouse #3,* ~~Stack #1~~ Run #1

Height of Observation Point: Ground Level

Height of Point of Discharge: 80 ft.

Direction of Observer from Discharge Point: S

Description of Background: Blue Sky

Description of Sky: Clear

Wind Direction: ~~East~~ SE

Wind Velocity: 5-10 mph

Color of Plume: White

Detached Plume: No

Duration of Observation: 3 hrs.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1 (5)	1131	1135	0	0
2	1136	1141	0	0
3	1142	1147	0	0
4	1148	1153	0	0
5	1154	1159	110	4.6
6	1200	1205	0	0
7	1206	1211	0	0
8	1212	1217	5.0	0.2
9	1218	1223	0	0
10	1224	1229	0	0
11	1230	1235	0	0
12	1236	1241	0	0
13	1242	1247	0	0
14	1248	1253	0	0
15 (4)	1254	1259	0	0
16 (1)	1305	1305	0	0
17	1306	1311	0	0
18	1312	1317	0	0
19	1318	1323	0	0
20	1324	1329	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1330	1335	0	0
22	1336	1341	0	0
23	1342	1347	0	0
24	1348	1353	0	0
25	1354	1359	0	0
26	1400	1405	0	0
27 (4)	1406	1409	10	0.4
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

*From 1131—1257 Stack #2 was read for visible emissions, however, the particulate run on Stack #2 was voided at the halfway point in the run, so Observer #2 switched to read Stack #1 from 1305-1409.

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant _____ Date _____

Company Name _____ Hours of Observation _____

Plant Address _____ Observer _____

Type of Discharge STACK OTHER _____

Discharge Location _____

Height of Point of Discharge _____

Observer's Location:

Distance to Discharge Point _____

Height of Observation Point _____

Direction from Discharge Point _____

Background Description _____

Weather: Clear Overcast Partly Cloudy Other _____ Color _____

Wind Direction _____ Wind Velocity _____ mi/hr

Plume Description:

Detached: Yes No

Color: Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	148 min. 45 sec.	55	
5	1 min. 45 sec.	60	
10	0 min 15 sec.	65	
15	1 min. 0 sec.	70	
20	0 min. 15 sec	75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Calera, AL Observer Jason Burlinski

Stack Location kiln baghouse center stack Observer's Location 60' S

Weather Conditions 90% Clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
	30					Wind: 5-10 mph SE
11	31	0	0	0	0	Color of Plume: white (observed earlier this morning)
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	Background: clear blue
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	Emission from other stacks also zero
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	a trace of a plume is apparent at times, considered < 5% opacity
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	5	15	20	15	apparent cleaning cycle - begins with great billowing clouds from underneath baghouse
	57	15	15	10	5	
	58	5	5	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Calera, Alabama Observer Jason Burbank

Stack Location Fabric baghouse outlet stack Observer's Location 60' S

Weather Conditions 85% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
12	00	0	0	0	0	Winds 0-10 mph east (changed)
	01	0	0	0	0	Background: clear blue
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
→	15	0	0	5	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Calera AL Observer Jason Burbank

Stack Location kiln baghouse center stk Observer's Location 60' S

Weather Conditions 50% clear

HR	MIN	SECONDS 00	15	30	45	COMMENTS
12	30	0	0	0	0	Background: clear blue
	31	0	0	0	0	wind: 0-5 mph SW
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	cloud behind center stack
	35	0	0	0	0	(southwest stack visible against blue - zero opacity)
	36	0	0	0	0	blue background again
	37	0	0	0	0	
	38	0	0	0	0	cloud background
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	blue background
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	changing parts
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58					break: particulate seen down due
	59					to broken glassware.

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 7/9/75

Plant Address Calera AL Observer Jason Burbank

Stack Location ~~West~~ kiln baghouse ~~southwest~~ stack Observer's Location 60' S

Weather Conditions 80% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
1	00					Background blue
	01					Wind 5-10 SW
	02					
	03					
	04					
1	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	background interference
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/9/75

Plant Address Calera AL Observer Jason Burbank

Stack Location Kilnbaghouse south stack Observer's Location 60' S

Weather Conditions 80% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
2	30	0	0	0	0	Background: Blue
	31	0	0	0	0	Wind 0-5 mph SW
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	Note: Some ambient dust
	35	0	0	0	0	could obscure 5% readings
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	cloud in background
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	blue background
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 7/9/75

Plant Address Calera AL Observer Jason Burbank

Stack Location Kiln baghouse ~~north~~ south Observer's Location 60' S

Weather Conditions 80% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
2	00	0	0	0	0	Background: clear blue sky
	01	0	0	0	0	Wind 5-10 mph SW
	02	0	0	0	0	
	03	0	0	0	0	cloud in background
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	blue background (moved to 60' S in)
→	07	0	5	0	5	emitted dust from bottom of baghouse
	08	0	0	0	0	(cleaning cycle)
	09	0	0	0	0	
	10					End particulate run on west stack
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					

Summary of Visible Emissions

Date: 9/10/75

Type of Plant: Lime and Cement

Observer #1

Type of Discharge: Stack

Distance from Observer to Discharge Point: 150ft

Location of Discharge: Outlet Baghouse #3 Stack #1, Run #2

Height of Observation Point: Ground Level

Height of Point of Discharge: 80ft.

Direction of Observer from Discharge Point: East

Description of Background: Sky, Blue Background

Description of Sky: Clear, Blue Sky

Wind Direction: East

Wind Velocity: 2-5 miles/hr.

Color of Plume: White

Detached Plume: No

Duration of Observation: 3 hrs.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1 (5)	0819	0823	0	0
2	0824	0829	0	0
3	0830	0835	0	0
4	0836	0841	0	0
5	0842	0847	0	0
6	0848	0853	0	0
7	0854	0859	30	1.3
8	0900	0905	0	0
9	0906	0911	0	0
10	0912	0917	0	0
11	0918	0923	0	0
12	0924	0929	0	0
13	0930	0935	0	0
14	0936	0941	0	0
15	0942	0947	0	0
16	0948	0953	0	0
17 (2)	0954	0955	0	0
18 (3)	1015	1017	0	0
19	1018	1023	0	0
20	1024	1029	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1030	1035	0	0
22	1036	1041	0	0
23	1042	1047	0	0
24	1048	1053	0	0
25	1054	1059	0	0
26	1100	1105	0	0
27	1106	1111	0	0
28	1112	1117	0	0
29	1118	1123	0	0
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant Lime and Cement

Date 9/10/75

Company Name Martin-Marietta

Hours of Observation 2:12

Plant Address Calera, Ala.

Observer T. Thalman

Type of Discharge (STACK) OTHER _____

Discharge Location Outlet Baghouse #3 Stack #1 Run # 2

Height of Point of Discharge 80 ft.

Observer's Location:

Distance to Discharge Point 150 ft.

Height of Observation Point Ground Level

Direction from Discharge Point East

Background Description Blue Background

Weather: (Clear) Overcast Partly Cloudy Other _____ Color Blue

Wind Direction East Wind Velocity 2-5 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black (White) Other _____

Plume Dispersion Behavior: Looping (Coning) Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible 30 ft.

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	164 min. 30 sec.	55	
5	1 min 30 sec	60	
10		65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

Run # 2

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta

Date 9/10/75

Plant Address Calera, Ala

Observer T. Thulman

Stack Location Outlet baghouse #3, Stack #1

Observer's Location East

Weather Conditions Clear, Blue Background

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	00					
	01					
	02					
	03					
	04					
	05					
	06					
	07					
	08					
	09					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
7	19	0	0	0	0	
8	20	0	0	0	0	
8	21	0	0	0	0	
8	22	0	0	0	0	
8	23	0	0	0	0	
8	24	0	0	0	0	
8	25	0	0	0	0	
8	26	0	0	0	0	
8	27	0	0	0	0	
8	28	0	0	0	0	
8	29	0	0	0	0	

Run #2

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, Ala Observer T. Thalman

Stack Location Outlet Baghouse #3, Stack #1 Observer's Location East

~~[illegible]~~ Weather Conditions Blue Background

TIME						COMMENTS
HR	MIN	SECONDS 00	15	30	45	
8	30	0	0	0	0	
8	31	0	0	0	0	
8	32	0	0	0	0	
8	33	0	0	0	0	
8	34	0	0	0	0	
8	35	0	0	0	0	
8	36	0	0	0	0	
8	37	0	0	0	0	
8	38	0	0	0	0	
8	39	0	0	0	0	
8	40	0	0	0	0	
8	41	0	0	0	0	
8	42	0	0	0	0	
8	43	0	0	0	0	
8	44	0	0	0	0	
8	45	0	0	0	0	
8	46	0	0	0	0	
8	47	0	0	0	0	
8	48	0	0	0	0	
8	49	0	0	0	0	
8	50	0	0	0	0	
8	51	0	0	0	0	
8	52	0	0	0	0	
8	53	0	0	0	0	
8	54	0	0	0	0	
8	55	0		0	0	
8	56	0	0	0	0	
8	57	5	5	5	5	
8	58	5	0	5	0	
8	59	0	0	0	0	

Run a

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/10/75

Plant Address Calera Ala. Observer T. Thalman

Stack Location Outlet Baghouse #3, Stack #1 Observer's Location East

Weather Conditions Blue Background

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
9	00	0	0	0	0	
9	01	0	0	0	0	
9	02	0	0	0	0	
9	03	0	0	0	0	
9	04	0	0	0	0	
9	05	0	0	0	0	
9	06	0	0	0	0	
9	07	0	0	0	0	
9	08	0	0	0	0	
9	09	0	0	0	0	
9	10	0	0	0	0	
9	11	0	0	0	0	
9	12	0	0	0	0	
9	13	0	0	0	0	
9	14	0	0	0	0	
9	15	0	0	0	0	
9	16	0	0	0	0	
9	17	0	0	0	0	
9	18	0	0	0	0	
9	19	0	0	0	0	
9	20	0	0	0	0	
9	21	0	0	0	0	
9	22	0	0	0	0	
9	23	0	0	0	0	
9	24	0	0	0	0	
9	25	0	0	0	0	
9	26	0	0	0	0	
9	27	0	0	0	0	
9	28	0	0	0	0	
9	29	0	0	0	0	

Run #2

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/[illegible]

Plant Address Calera, Ala. Observer T. Thatman

Stack Location Outlet Baghouse #3, Stack #1 Observer's Location East

Weather Conditions Blue Background

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
9	30	0	0	0	0	
9	31	0	0	0	0	
9	32	0	0	0	0	
9	33	0	0	0	0	
9	34	0	0	0	0	
9	35	0	0	0	0	
9	36	0	0	0	0	
9	37	0	0	0	0	
9	38	0	0	0	0	
9	39	0	0	0	0	
9	40	0	0	0	0	
9	41	0	0	0	0	
9	42	0	0	0	0	
9	43	0	0	0	0	
9	44	0	0	0	0	
9	45	0	0	0	0	
9	46	0	0	0	0	
9	47	0	0	0	0	
9	48	0	0	0	0	
9	49	0	0	0	0	
9	50	0	0	0	0	
9	51	0	0	0	0	
9	52	0	0	0	0	
9	53	0	0	0	0	
9	54	0	0	0	0	
9	55	0	0	0	0	
9	56					
9	57					
9	58					
9	59					

Run #2

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta

Date 9/10/75

Plant Address Calera, Ala.

Observer T. Thalman

Stack Location Outlet Baghouse #3, Stack #1

Observer's Location East

Weather Conditions Clear/Blue Background

HR	MIN	SECONDS 00	15	30	45	COMMENTS
10	00					Shut down for lunch
	01					
	02					
	03					
	04					
	05					
	06					
	07					
	08					
	09					
	10					
	11					
	12					
	13					
	14					
10	15	0	0	0	0	Start-up 2ND Traverse
10	16	0	0	0	0	
10	17	0	0	0	0	
10	18	0	0	0	0	
10	19	0	0	0	0	
10	20	0	0	0	0	
10	21	0	0	0	0	
10	22	0	0	0	0	
10	23	0	0	0	0	
10	24	0	0	0	0	
10	25	0	0	0	0	
10	26	0	0	0	0	
10	27	0	0	0	0	
10	28	0	0	0	0	
10	29	0	0	0	0	

Run #2

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marrietta Date 9/10/75

Plant Address Calera, Ala. Observer T. Thalman

Stack Location Outlet Baghouse #3, Stack #1 Observer's Location East

Weather Conditions Clear (Blue Background)

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10	30	0	0	0	0	
10	31	0	0	0	0	
10	32	0	0	0	0	
10	33	0	0	0	0	
10	34	0	0	0	0	
10	35	0	0	0	0	
10	36	0	0	0	0	
10	37	0	0	0	0	
10	38	0	0	0	0	
10	39	0	0	0	0	
10	40	0	0	0	0	
10	41	0	0	0	0	
10	42	0	0	0	0	
10	43	0	0	0	0	
10	44	0	0	0	0	
10	45	0	0	0	0	
10	46	0	0	0	0	
10	47	0	0	0	0	
10	48	0	0	0	0	
10	49	0	0	0	0	
10	50	0	0	0	0	
10	51	0	0	0	0	
10	52	0	0	0	0	
10	53	0	0	0	0	
10	54	0	0	0	0	
10	55	0	0	0	0	
10	56	0	0	0	0	
10	57	0	0	0	0	
10	58	0	0	0	0	
10	59	0	0	0	0	

Run #2

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/10/79

Plant Address Calera Ala. Observer T. Thalman

Stack Location Outlet 1 house #3, Stack #1 Observer's Location East

Weather Conditions Clear/Blue Background

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
11	00	0	0	0	0	
11	01	0	0	0	0	
11	02	0	0	0	0	
11	03	0	0	0	0	
11	04	0	0	0	0	
11	05	0	0	0	0	
11	06	0	0	0	0	
11	07	0	0	0	0	
11	08	0	0	0	0	
11	09	0	0	0	0	
11	10	0	0	0	0	
11	11	0	0	0	0	
11	12	0	0	0	0	
11	13	0	0	0	0	
11	14	0	0	0	0	
11	15	0	0	0	0	
11	16	0	0	0	0	
11	17	0	0	0	0	
11	18	0	0	0	0	
11	19	0	0	0	0	
11	20	0	0	0	0	
11	21	0	0	0	0	
11	22	0	0	0	0	
11	23	0	0	0	0	End of Run
11	24					
11	25					
11	26					
11	27					
11	28					
11	29					

Date: 9/10/75

Type of Plant: Lime and Cement

Observer #2

Type of Discharge: Stack

Distance from Observer to Discharge Point: 60'

Location of Discharge: Outlet Baghouse #3, Stack #, Run #2

Height of Observation Point: Ground Level

Height of Point of Discharge: 85 ft.

Direction of Observer from Discharge Point: SE

Description of Background: Sky Blue,

Description of Sky: 80% Clear

Wind Direction: E

Wind Velocity: 0-10 mph

Color of Plume: White

Detached Plume: NO

Duration of Observation:

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1 (5)	0819	0823	0	0
2	0824	0829	0	0
3	0830	0835	0	0
4	0836	0841	0	0
5	0842	0847	0	0
6	0848	0853	0	0
7	0854	0859	40	1.7
8	0900	0905	0	0
9	0906	0911	0	0
10	0912	0917	0	0
11	0918	0923	0	0
12	0924	0929	0	0
13	0930	0935	0	0
14	0936	0941	10	.4
15	0942	0947	0	0
16	0948	0953	0	0
17	0954	0959	0	0
18	1000	1005	0	0
19	1006	1011	0	0
20	1012	1017	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1018	1023	0	0
22	1024	1029	0	0
23	1030	1035	0	0
24	1036	1041	0	0
25	1042	1047	0	0
26	1048	1053	10	.4
27	1054	1059	0	0
28	1100	1105	0	0
29	1106	1111	0	0
30	1112	1117	0	0
31 (5)	1118	1122	0	0
32				
33				
34				
35				
36				
37				
38				
39				
40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant _____ Date _____

Company Name _____ Hours of Observation _____

Plant Address _____ Observer _____

Type of Discharge STACK OTHER _____

Discharge Location _____

Height of Point of Discharge _____

Observer's Location:

Distance to Discharge Point _____

Height of Observation Point _____

Direction from Discharge Point _____

Background Description _____

Weather: Clear Overcast Partly Cloudy Other _____ Color _____

Wind Direction _____ Wind Velocity _____ mi/hr

Plume Description:

Detached: Yes No

Color: Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	181 min. 15 sec.	55	
5	2 min. 30 sec.	60	
10	0 min 15 sec.	65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Joan Burbank

Stack Location kiln baghouse #3, stack 1 Observer's Location 60' SE

Weather Conditions 80% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
	00					
	01					
	02					
	03					
	04					
	05					
	06					
	07					
	08					
	09					
	10					
	11					
	12					
	13					
	14					
	15					Background: blue sky
	16					Wind: 0-10 mph east (S.E)
	17					
	18					
8	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 baghouse, #1 stack, Sand Observer's Location 60' SE

Weather Conditions 90% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
8	30	0	0	0	0	Background: blue sky
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
9	57	5	5	5	5	
	58	10	5	5	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 baghouse: stack 9 (south) Observer's Location 60' SE

Weather Conditions 90% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
9	00	0	0	0	0	Background: blue sky
	01	0	0	0	0	Wind 0-10 mph SE
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/16/75

Plant Address Calera, AL Observer Joan Burbank

Stack Location #3 kiln baghouse, stack #2 (S) Observer's Location 60' SE

Weather Conditions 90% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
9	30	0	0	0	0	changing parts on particulate sum
	31	0	0	0	0	
	32	0	0	0	0	
	33	0	0	0	0	Background: blue sky
	34	0	0	0	0	Wind : 5-10 mph SE
	35	0	0	0	0	
	36	0	0	0	0	Power loss
	37	0	0	0	0	
	38	0	0	0	0	
→	39	5	0	5	0	cleaning cycle?
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	Trim leaves
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 kiln baghouse stack # / south Observer's Location 60' SE

Weather Conditions 80% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	00	0	0	0	0	Wind 5-10 mph SE
	01	0	0	0	0	Background: clear blue sky
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	Trim returns
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	Power return (15 min down?)
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera AL Observer Jason Burbank

Stack Location #3 kiln baghouse stk #2 Observer's Location 60' SE

Weather Conditions 90% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	30	0	0	0	0	Background: blue sky
	31	0	0	0	0	Wind: 5-10 mph SE
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	some cirrus cloud in background
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	background blue
	48	0	0	0	0	
	49	0	0	5	5	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta

Date 9/10/75

Plant Address Calera, AL

Observer Jason Burbank

Stack Location #3 kilnbaghouse stack #1

Observer's Location 60' SE

Weather Conditions 90° clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
11	00	0	0	0	0	Background : blue sky
	01	0	0	0	0	Wind . 0-5 mph SW
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	cloud in background
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	blue background
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	End of particulate run
	23					
	24					
	25					
	26					
	27					
	28					
	29					

Summary of Visible Emissions

Date: 9/10/75

Type of Plant: Lime and Cement

Observer # 1

Type of Discharge: Stack

Distance from Observer to Discharge Point: 150'

Location of Discharge: Outlet Baghouse #3 Stack #3, Run #1

Height of Observation Point: Ground Level

Height of Point of Discharge: 80ft.

Direction of Observer from Discharge Point: East

Description of Background: Clear to P. Cloudy (Blue to White) Sky

Description of Sky: Clear to P. Cloudy

Wind Direction: ~~E~~ East

Wind Velocity: 2-5 miles/hr.

Color of Plume: White

Detached Plume: No.

Duration of Observation: 2 hrs. 42 min.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1300	1305	0	0
2	1306	1311	0	0
3	1312	1317	0	0
4	1318	1323	0	0
5	1324	1329	0	0
6	1330	1335	0	0
7	1336	1341	0	0
8	1342	1347	0	0
9	1348	1353	0	0
10	1354	1359	0	0
11	1400	1405	0	0
12	1406	1411	0	0
13	1412	1417	0	0
14	1418	1423	0	0
15	1424	1429	0	0
16	1430	1435	0	0
17	1436	1441	0	0
18	1442	1447	0	0
19	1448	1453	0	0
20	1454	1459	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1500	1505	0	0
22	1506	1511	0	0
23	1512	1517	0	0
24	1518	1523	0	0
25	1524	1529	0	0
26	1530	1535	0	0
27	1536	1541	0	0
28 (1)	1542	1542	0	0
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant Lime and Cement Date 9/10/75

Company Name Martin-Marrietta Hours of Observation 2:12

Plant Address Calera, Ala Observer T. T Halman

Type of Discharge (STACK) OTHER _____

Discharge Location Outlet Baghouse #3, Stack #3 → Run #1

Height of Point of Discharge 80 ft.

Observer's Location:

Distance to Discharge Point 150 ft.

Height of Observation Point Ground Level

Direction from Discharge Point East

Background Description Clear to P.Cloudy

Weather: (Clear) Overcast (Partly Cloudy) Other _____ Color Blue

Wind Direction East Wind Velocity 2-5 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black (White) Other _____

Plume Dispersion Behavior: Looping (Coning) Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible 30 ft.

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	163 min. 0 sec.	55	
5		60	
10		65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta

Date 9/10/75

Plant Address Calera Ala

Observer T. Thalman

Stack Location Outlet Baghouse #3, Stack #3

Observer's Location East

Weather Conditions ~~Clear~~ P. Cloudy

Run #1

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
13	00	0	0	0	0	Blue Background
13	01	0	0	0	0	
13	02	0	0	0	0	
13	03	0	0	0	0	
13	04	0	0	0	0	
13	05	0	0	0	0	
13	06	0	0	0	0	
13	07	0	0	0	0	
13	08	0	0	0	0	
13	09	0	0	0	0	
13	10	0	0	0	0	
13	11	0	0	0	0	
13	12	0	0	0	0	
13	13	0	0	0	0	
13	14	0	0	0	0	
13	15	0	0	0	0	
13	16	0	0	0	0	
13	17	0	0	0	0	
13	18	0	0	0	0	
13	19	0	0	0	0	
13	20	0	0	0	0	Gray Background
13	21	0	0	0	0	
13	22	0	0	0	0	
13	23	0	0	0	0	Blue Background
13	24	0	0	0	0	
13	25	0	0	0	0	
13	26	0	0	0	0	
13	27	0	0	0	0	
13	28	0	0	0	0	
13	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/10/75

Plant Address Calera, Ala. Observer T. Thulman

Stack Location Outlet Baghouse #3, Stack #3 Observer's Location East

Weather Conditions P. Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
13	30	0	0	0	0	
13	31	0	0	0	0	
13	32	0	0	0	0	
13	33	0	0	0	0	
13	34	0	0	0	0	
13	35	0	0	0	0	
13	36	0	0	0	0	
13	37	0	0	0	0	
13	38	0	0	0	0	
13	39	0	0	0	0	
13	40	0	0	0	0	
13	41	0	0	0	0	
13	42	0	0	0	0	
13	43	0	0	0	0	
13	44	0	0	0	0	
13	45	0	0	0	0	
13	46	0	0	0	0	
13	47	0	0	0	0	
13	48	0	0	0	0	
13	49	0	0	0	0	
13	50	0	0	0	0	
13	51	0	0	0	0	
13	52	0	0	0	0	
13	53	0	0	0	0	
13	54	0	0	0	0	
13	55	0	0	0	0	
13	56	0	0	0	0	
13	57	0	0	0	0	
13	58	0	0	0	0	
13	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/10/79

Plant Address Calera, Ala Observer T. Thalman

Stack Location Outlet Baghouse #3, Stack #3 Observer's Location East

Weather Conditions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
14	00	0	0	0	0	
14	01	0	0	0	0	
14	02	0	0	0	0	
14	03	0	0	0	0	
14	04	0	0	0	0	
14	05	0	0	0	0	
14	06	0	0	0	0	
14	07	0	0	0	0	
14	08	0	0	0	0	
14	09	0	0	0	0	
14	10	0	0	0	0	
14	11	0	0	0	0	
14	12	0	0	0	0	
14	13	0	0	0	0	
14	14	0	0	0	0	
14	15	0	0	0	0	
14	16	0	0	0	0	
14	17	0	0	0	0	
14	18	0	0	0	0	
14	19	0	0	0	0	
14	20	0	0	0	0	
14	21	0	0	0	0	
14	22	0	0	0	0	
14	23	0	0	0	0	
14	24	0	0	0	0	
14	25	0	0	0	0	
14	26	0	0	0	0	
14	27	0	0	0	0	
14	28	0	0	0	0	
14	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera Ala. Observer T. Thalman

Stack Location Baghouse #3, Stack #3 Observer's Location

Weather Conditions P.Cloudy

Run #1

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
14	30	0	0	0	0	
14	31	0	0	0	0	
14	32	0	0	0	0	
14	33	0	0	0	0	
14	34	0	0	0	0	
14	35	0	0	0	0	
14	36	0	0	0	0	2ND Half Start
14	37	0	0	0	0	
14	38	0	0	0	0	
14	39	0	0	0	0	
14	40	0	0	0	0	
14	41	0	0	0	0	
14	42	0	0	0	0	
14	43	0	0	0	0	
14	44	0	0	0	0	
14	45	0	0	0	0	
14	46	0	0	0	0	
14	47	0	0	0	0	
14	48	0	0	0	0	
14	49	0	0	0	0	
14	50	0	0	0	0	
14	51	0	0	0	0	
14	52	0	0	0	0	
14	53	0	0	0	0	
14	54	0	0	0	0	White Background
14	55	0	0	0	0	
14	56	0	0	0	0	
14	57	0	0	0	0	
14	58	0	0	0	0	
14	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/10/75

Plant Address Calera, Ala Observer T. Thalman

Stack Location Baghouse, Stack # 3 Observer's Location East

Weather Conditions P. Cloudy

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
15	00	0	0	0	0	
15	01	0	0	0	0	Blue Background
15	02	0	0	0	0	
15	03	0	0	0	0	
15	04	0	0	0	0	
15	05	0	0	0	0	
15	06	0	0	0	0	
15	07	0	0	0	0	
15	08	0	0	0	0	
15	09	0	0	0	0	
15	10	0	0	0	0	
15	11	0	0	0	0	
15	12	0	0	0	0	
15	13	0	0	0	0	
15	14	0	0	0	0	
15	15	0	0	0	0	
15	16	0	0	0	0	
15	17	0	0	0	0	
15	18	0	0	0	0	
15	19	0	0	0	0	
15	20	0	0	0	0	
15	21	0	0	0	0	
15	22	0	0	0	0	
15	23	0	0	0	0	
15	24	0	0	0	0	
15	25	0	0	0	0	
15	26	0	0	0	0	
15	27	0	0	0	0	
15	28	0	0	0	0	
15	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marrietta Date 9/10/75

Plant Address Calera, Ala. Observer T. Thalman

Stack Location Baghouse #3, Stack #3 Observer's Location East

Weather Conditions P. Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
15	30	0	0	0	0	
15	31	0	0	0	0	
15	32	0	0	0	0	
15	33	0	0	0	0	
15	34	0	0	0	0	
15	35	0	0	0	0	
15	36	0	0	0	0	
15	37	0	0	0	0	
15	38	0	0	0	0	
15	39	0	0	0	0	
15	40	0	0	0	0	
15	41	0	0	0	0	
15	42	0	0	0	0	
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

Summary of Visible Emissions

Date: 9/10/75

Type of Plant: Lime and Cement

Observer #2

Type of Discharge: Stack

Distance from Observer to Discharge Point: 90'

Location of Discharge: Baghouse #3, Stack #3 Run #1

Height of Observation Point: Ground Level

Height of Point of Discharge: 80ft.

Direction of Observer from Discharge Point: SE

Description of Background: 50% Clear Sky, White and Blue Background

Description of Sky: P. Cloudy

Wind Direction: S East

Wind Velocity: 0-5mph

Color of Plume: White

Detached Plume: No

Duration of Observation: 2½ hours

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average	Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	1300	1305	0	0	21	1500	1505	0	0
2	1306	1311	0	0	22	1506	1511	0	0
3	1312	1317	0	0	23	1512	1517	0	0
4	1318	1323	0	0	24	1518	1523	0	0
5	1324	1329	0	0	25	1524	1529	0	0
6	1330	1335	0	0	26	1530	1535	0	0
7	1336	1341	0	0	27	1536	1541	0	0
8	1342	1347	0	0	28				
9	1348	1353	0	0	29				
10	1354	1359	0	0	30				
11	1400	1405	0	0	31				
12	1406	1411	0	0	32				
13	1412	1417	0	0	33				
14	1418	1423	0	0	34				
15	1424	1429	0	0	35				
16	1430	1435	0	0	36				
17	1436	1441	0	0	37				
18	1442	1447	0	0	38				
19	1448	1453	0	0	39				
20	1453	1459	0	0	40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant _____ Date _____

Company Name _____ Hours of Observation _____

Plant Address _____ Observer _____

Type of Discharge STACK OTHER _____

Discharge Location _____

Height of Point of Discharge _____

Observer's Location:

Distance to Discharge Point _____

Height of Observation Point _____

Direction from Discharge Point _____

Background Description _____

Weather: Clear Overcast Partly Cloudy Other _____ Color _____

Wind Direction _____ Wind Velocity _____ mi/hr

Plume Description:

Detached: Yes No

Color: Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	162 min. 0 sec.	55	
5		60	
10		65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 kiln baghouse stack #3 (north) Observer's Location 90' SE

Weather Conditions 50% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
1	00	0	0	0	0	white / gray cloud background
	01	0	0	0	0	
	02	0	0	0	0	Wind 0 - 5 mph S
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	Blue sky background
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location Baghouse #3 stack #3 north Observer's Location 60' SE

Weather Conditions 70% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
1	30	0	0	0	0	Background: blue sky
	31	0	0	0	0	Wind: 0-5 mph South
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	white/gray cloud background
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	blue background
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location kiln baghouse #3 stk #3 Observer's Location 90' S.E.

Weather Conditions 75° No cloud

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
2	00	0	0	0	0	Background: blue sky
	01	0	0	0	0	Wind: 0-5 mph S
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	light gray/white cloud background
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	blue background
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	white cloud background
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	blue b.g.
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 4/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location Kiln baghouse #3, stack #3 Observer's Location 60' SE

Weather Conditions 70% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
2	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	Blue sky background
	33	0	0	0	0	Wind 0-5 mph SW
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location Kiln baghouse #3 stk #3 Observer's Location 60' SE

Weather Conditions 35% clear

HR	MIN	SECONDS 00	15	30	45	COMMENTS
3	00	0	0	0	0	Background: Blue sky
	01	0	0	0	0	Wind: 0-10 mph South
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta

Date 9/10/75

Plant Address Calera, AL

Observer Jason Burbank

Stack Location #3 kiln baghouse, stack #3

Observer's Location 50' S.E

Weather Conditions 15% clear

HR	MIN	00	15	30	45	COMMENTS
3	30	0	0	0	0	Background: blue sky → light high clouds
	31	0	0	0	0	Wind: 5-15 mph SE
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	No more blue sky to read against — med gray cloud background
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	0	0	0	
	41	0	0	0	0	Particulate cloud ended.
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9/11/75

Type of Plant: Lime and Cement

Observer #1

Type of Discharge: Stack

Distance from Observer to Discharge Point: 150ft

Location of Discharge: Outlet Baghouse #3, Stack #3 Run #2

Height of Observation Point: Ground Level

Height of Point of Discharge: 80ft.

Direction of Observer from Discharge Point: East

Description of Background: Blue Background (Sky)

Description of Sky: Blue, Clear Skys; White Background 0908-0954, 1005-1006, 1018-1034

Wind Direction: East

Wind Velocity: 2-5 mi/hr.

Color of Plume: White

Detached Plume: No

Duration of Observation: 2 ½ hours

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	0800	0805	0	0
2	0806	0811	0	0
3	0812	0817	0	0
4	0818	0823	0	0
5	0824	0829	0	0
6	0830	0835	0	0
7	0836	0841	0	0
8	0842	0847	0	0
9	0848	0853	0	0
10	0854	0859	0	0
11	0900	0905	0	0
12	0906	0911	0	0
13	0912	0917	0	0
14	0918	0923	0	0
15	0924	0929	0	0
16	0930	0935	0	0
17	0936	0941	0	0
18	0942	0947	0	0
19	0948	0953	0	0
20	0954	0959	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1000	1005	0	0
22	1006	1011	0	0
23	1012	1017	0	0
24	1018	1023	0	0
25	1024	1029	0	0
26(5)	1030	1034	0	0
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant Lime and Cement Date 9/11/75

Company Name Martin Marrietta Hours of Observation 3

Plant Address Calera, Ala. Observer Tim Thalman

Type of Discharge (STACK) OTHER _____

Discharge Location Outlet Baghouse #3, Stack #3 Run #2

Height of Point of Discharge 80 ft.

Observer's Location:

Distance to Discharge Point 150 ft.

Height of Observation Point Ground Level

Direction from Discharge Point East

Background Description Blue Background

Weather: (Clear) Overcast Partly Cloudy Other _____ Color Blue

Wind Direction East Wind Velocity 2-5 mi/hr

Plume Description:

Detached: Yes (No)

Color: Black (White) Other _____

Plume Dispersion Behavior: Looping (Coning) Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible 30 ft.

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	155 min. 0 sec.	55	
5		60	
10		65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta

Date 9/11/75

Plant Address Calera, Ala.

Observer Tim Thalman

Stack Location Outlet Baghouse #3, Stack #3

Observer's Location East

Weather Conditions Clear (Blue Background).

HR	MIN	SECONDS 00	15	30	45	COMMENTS
8	00	0	0	0	0	
8	01	0	0	0	0	
8	02	0	0	0	0	
8	03	0	0	0	0	
8	04	0	0	0	0	
8	05	0	0	0	0	
8	06	0	0	0	0	
8	07	0	0	0	0	
8	08	0	0	0	0	
8	09	0	0	0	0	
8	10	0	0	0	0	
8	11	0	0	0	0	
8	12	0	0	0	0	
8	13	0	0	0	0	
8	14	0	0	0	0	
8	15	0	0	0	0	
8	16	0	0	0	0	
8	17	0	0	0	0	
8	18	0	0	0	0	
8	19	0	0	0	0	
8	20	0	0	0	0	
8	21	0	0	0	0	
8	22	0	0	0	0	
8	23	0	0	0	0	
8	24	0	0	0	0	
8	25	0	0	0	0	
8	26	0	0	0	0	
8	27	0	0	0	0	
8	28	0	0	0	0	
8	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/11/75

Plant Address Calera, Ala Observer Tim Thalman

Stack Location Outlet Baghouse #3, Stack #3 Observer's Location East

Weather Conditions Clear (Blue Background

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
8	30	0	0	0	0	
8	31	0	0	0	0	
8	32	0	0	0	0	
8	33	0	0	0	0	
8	34	0	0	0	0	
8	35	0	0	0	0	
8	36	0	0	0	0	
8	37	0	0	0	0	
8	38	0	0	0	0	
8	39	0	0	0	0	
8	40	0	0	0	0	
8	41	0	0	0	0	
8	42	0	0	0	0	
8	43	0	0	0	0	
8	44	0	0	0	0	
8	45	0	0	0	0	
8	46	0	0	0	0	
8	47	0	0	0	0	
8	48	0	0	0	0	
8	49	0	0	0	0	
8	50	0	0	0	0	
8	51	0	0	0	0	
8	52	0	0	0	0	
8	53	0	0	0	0	
8	54	0	0	0	0	
8	55	0	0	0	0	
8	56	0	0	0	0	
8	57	0	0	0	0	
8	58	0	0	0	0	
8	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta

Date 9/11/75

Plant Address Calera, Ala

Observer Jim Thalman

Stack Location Baghouse #3, Stack #3

Observer's Location East

Weather Conditions Clear (Blue Background)

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
9	00	0	0	0	0	
9	01	0	0	0	0	
9	02	0	0	0	0	
9	03	0	0	0	0	
9	04	0	0	0	0	
9	05	0	0	0	0	
9	06	0	0	0	0	
9	07	0	0	0	0	End of 1st Half Run
9	08	0	0	0	0	White Background
9	09	0	0	0	0	
9	10	0	0	0	0	
9	11	0	0	0	0	
9	12	0	0	0	0	
9	13	0	0	0	0	
9	14	0	0	0	0	
9	15	0	0	0	0	
9	16	0	0	0	0	
9	17	0	0	0	0	
9	18	0	0	0	0	
9	19	0	0	0	0	
9	20	0	0	0	0	
9	21	0	0	0	0	
9	22	0	0	0	0	
9	23	0	0	0	0	
9	24	0	0	0	0	
9	25	0	0	0	0	
9	26	0	0	0	0	
9	27	0	0	0	0	Start of 2nd Half
9	28	0	0	0	0	
9	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/11/75

Plant Address Calera, Ala Observer Tim Thalman

Stack Location Baghouse #3, Stack #3 Observer's Location East

Weather Conditions Cloudy

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
9	30	0	0	0	0	White Background
9	31	0	0	0	0	
9	32	0	0	0	0	
9	33	0	0	0	0	
9	34	0	0	0	0	
9	35	0	0	0	0	
9	36	0	0	0	0	
9	37	0	0	0	0	
9	38	0	0	0	0	
9	39	0	0	0	0	
9	40	0	0	0	0	
9	41	0	0	0	0	
9	42	0	0	0	0	
9	43	0	0	0	0	
9	44	0	0	0	0	
9	45	0	0	0	0	
9	46	0	0	0	0	
9	47	0	0	0	0	
9	48	0	0	0	0	
9	49	0	0	0	0	
9	50	0	0	0	0	
9	51	0	0	0	0	
9	52	0	0	0	0	
9	53	0	0	0	0	
9	54	0	0	0	0	
9	55	0	0	0	0	Blue Background
9	56	0	0	0	0	
9	57	0	0	0	0	
9	58	0	0	0	0	
9	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta

Date 9/11/75

Plant Address Calera, Ala.

Observer Jim Thalman

Stack Location Baghouse #3, Stack #2

Observer's Location East

Weather Conditions PiCloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10	00	0	0	0	0	
10	01	0	0	0	0	
10	02	0	0	0	0	
10	03	0	0	0	0	
10	04	0	0	0	0	
10	05	0	0	0	0	White Background
10	06	0	0	0	0	
10	07	0	0	0	0	Blue "
10	08	0	0	0	0	
10	09	0	0	0	0	
10	10	0	0	0	0	
10	11	0	0	0	0	
10	12	0	0	0	0	
10	13	0	0	0	0	
10	14	0	0	0	0	
10	15	0	0	0	0	
10	16	0	0	0	0	
10	17	0	0	0	0	
10	18	0	0	0	0	* White Background
10	19	0	0	0	0	
10	20	0	0	0	0	
10	21	0	0	0	0	
10	22	0	0	0	0	*
10	23	0	0	0	0	
10	24	0	0	0	0	
10	25	0	0	0	0	
10	26	0	0	0	0	
10	27	0	0	0	0	
10	28	0	0	0	0	
10	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin-Marietta Date 9/11/75

Plant Address Calera, Ala. Observer Tim Thalman

Stack Location Baghouse #3, Stack # 3 Observer's Location East

Weather Conditions Cloudy

COMMENTS Run #2

TIME HR	MIN	SECONDS 00	15	30	45
10	30	0	0	0	0
10	31	0	0	0	0
10	32	0	0	0	0
10	33	0	0	0	0
10	34	0	0	0	0
	35				
	36				
	37				
	38				
	39				
	40				
	41				
	42				
	43				
	44				
	45				
	46				
	47				
	48				
	49				
	50				
	51				
	52				
	53				
	54				
	55				
	56				
	57				
	58				
	59				

Summary of Opacity Emissions

Date: 9/11/75

Type of Plant: Lime and Cement

Observer #2

Type of Discharge: Stack

Distance from Observer to Discharge Point: 90'

Location of Discharge: Baghouse #3 Stack #3 Run #2

Height of Observation Point: Ground Level

Height of Point of Discharge: 80 ft.

Direction of Observer from Discharge Point: SE

Description of Background: Blue to White Sky

Description of Sky: 95% Clear

Wind Direction: East

Wind Velocity: 0-10 mph.

Color of Plume: White

Detached Plume: No

Duration of Observation: 2 1/2 hrs.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1 (1)	0805	0805	0	0
2	0806	0811	0	0
3	0812	0817	0	0
4	0818	0823	0	0
5	0824	0829	35	1.5
6	0830	0835	5	.2
7	0836	0841	30	1.3
8	0842	0847	0	0
9	0848	0853	0	0
10	0854	0859	0	0
11	0900	0905	0	0
12	0906	0911	0	0
13	0912	0917	0	0
14	0918	0923	0	0
15	0924	0929	0	0
16	0930	0935	0	0
17	0936	0941	0	0
18	0942	0947	0	0
19	0948	0953	0	0
20	0954	0959	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	1000	1005	0	0
22	1006	1011	0	0
23	1012	1017	0	0
24	1018	1023	10	.4
25	1024	1029	0	0
26 (4)	1030	1033	0	0
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant _____ Date _____

Company Name _____ Hours of Observation _____

Plant Address _____ Observer _____

Type of Discharge STACK OTHER _____

Discharge Location _____

Height of Point of Discharge _____

Observer's Location:

Distance to Discharge Point _____

Height of Observation Point _____

Direction from Discharge Point _____

Background Description _____

Weather: Clear Overcast Partly Cloudy Other _____ Color _____

Wind Direction _____ Wind Velocity _____ mi/hr

Plume Description:

Detached: Yes No

Color: Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

Summary of Observations:

Opacity	Aggregate Time @ Opacity	Opacity	Aggregate Time @ Opacity
0	145 min. 0 sec.	55	
5	4 min 0 sec	60	
10		65	
15		70	
20		75	
25		80	
30		85	
35		90	
40		95	
45		100	
50			

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta

Date 7/11/75

Plant Address

Observer Jason Burbank

Stack Location #3 baghouse #3 stack (North)

Observer's Location on adjacent roof, 90' SE

Weather Conditions 95% clear

	HR	MIN	SECONDS 00	15	30	45	COMMENTS
		00					Background: blue sky - slight haze
		01					
		02					Wind: 0-10 mph. South
		03					
		04					
8		05	0	0	0	0	
		06	0	0	0	0	
		07	0	0	0	0	
		08	0	0	0	0	
		09	0	0	0	0	
		10	0	0	0	0	
		11	0	0	0	0	
		12	0	0	0	0	
		13	0	0	0	0	Background: light gray haze
		14	0	0	0	0	
		15	0	0	0	0	
		16	0	0	0	0	
		17	0	0	0	0	
		18	0	0	0	0	
		19	0	0	0	0	
		20	0	0	0	0	
		21	0	0	0	0	
		22	0	0	0	0	
		23	0	0	0	0	
		24	5	5	5	0	Possible heat distortion
		25	0	5	5	0	
		26	5	0	5	0	Background: blue with very slight haze
		27	0	0	0	0	
		28	0	0	0	0	
		29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/10/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 baghouse, #5 stack (north) Observer's Location on ground roof, 90' SE

Weather Conditions 80% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
8	30	0	0	0	0	Background: hazy cloud (med gray)
	31	0	0	0	0	
	32	0	0	0	0	Wind 0-10 mph S
	33	0	0	0	0	
	34	0	0	5	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	
	38	0	0	0	0	
	39	0	0	0	0	
	40	0	5	0	5	Plume with this angle + background is on lower limit of perceptability
	41	5	5	5	5	
	42	0	0	0	0	Plume is apparently dark colored
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	Background: hazy cloud with intermittent hazy blue
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta

Date 7/11/85

Plant Address Calera, AL

Observer Jason Burbank

Stack Location #3 baghouse, #3 stack

Observer's Location ground roof, 70' SE

Weather Conditions 80% clear

HR	MIN	SECONDS 00	15	30	45	COMMENTS
9	00	0	0	0	0	Wind 0-10 mph South
	01	0	0	0	0	Background: hazy blue, intermittent
	02	0	0	0	0	hazy cloud
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	Changing ports for particulate test
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	New port Test up
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/11/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 baghouse, #3 stack Observer's Location adjacent roof, 100' SE

Weather Conditions overcast

HR	MIN	SECONDS 00	15	30	45	COMMENTS
9	30	0	0	0	0	Background: med gray cloud
	31	0	0	0	0	Wind 0-5 mph South
	32	0	0	0	0	
	33	0	0	0	0	
	34	0	0	0	0	
	35	0	0	0	0	
	36	0	0	0	0	
	37	0	0	0	0	light gray background -
	38	0	0	0	0	doubtful if plume would show up
	39	0	0	0	0	against this background
	40	0	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	0	0	0	0	
	44	0	0	0	0	
	45	0	0	0	0	
	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
	49	0	0	0	0	
	50	0	0	0	0	
	51	0	0	0	0	
	52	0	0	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	0	0	0	
	57	0	0	0	0	
	58	0	0	0	0	
	59	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/11/75

Plant Address Calera, AL Observer Jason Burbank

Stack Location #3 kiln/baghouse, stack #3 Observer's Location adjacent roof, 100' SE

Weather Conditions 10% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	00	0	0	0	0	Background: cloud, med-light gray
	01	0	0	0	0	
	02	0	0	0	0	Wind 0-10 mph S
	03	0	0	0	0	
	04	0	0	0	0	
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	0	
	09	0	0	0	0	
	10	0	0	0	0	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	5	5	0	0	possible heat distortion
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	0	0	0	

RECORD OF VISIBLE EMISSIONS

Company Name Martin Marietta Date 9/11/75

Plant Address Cockrell, AL Observer John Burbank

Stack Location #3 baghouse, #3 stack Observer's Location ground roof 100' S.E.

Weather Conditions 5% clear

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	30	0	0	0	0	Background: gray clouds
	31	0	0	0	0	Wind: 0-10 mph S.
	32	0	0	0	0	
	33	0	0	0	0	
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

APPENDIX F

FIELD DATA SHEETS FOR
METHODS 5, 6, AND 7.

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Martin-Marietta
DATE 9-5-75
SAMPLING LOCATION Baghouse Outlet
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 54
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 3
STACK I.D., (DISTANCE A - DISTANCE B) 51"
NEAREST UPSTREAM DISTURBANCE 2.4
NEAREST DOWNSTREAM DISTURBANCE 0.5
CALCULATOR Pilton

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
~~1~~	~~.011~~	~~51~~	~~1/2~~	~~3~~	~~3 1/2~~
2	.032		1 5/8		3 5/8
3	.055		2 3/4		5 3/4
4	.079		4		7
5	.105		5 3/8		8 3/8
6	.132		6 3/4		9 3/4
7	.161		8 1/4		11 1/4
8	.194		9 7/8		12 7/8
9	.23		11 3/4		14 3/4
10	.272		13 7/8		16 7/8
11	.323		16 1/2		19 1/2
12	.398		20 1/4		23 1/4
13	.602		30 3/4		33 3/4
14	.677		34 1/2		37 1/2
15	.728		37 1/8		40 1/8
16	.77		39 1/4		42 1/4
17	.806		41 1/8		44 1/8
18	.839		42 3/4		45 3/4
19	.868		44 1/4		47 1/4
20	.895		45 5/8		48 5/8
21	.921		47		50
22	.945		48 1/4		51 1/4
23	.968		49 3/8		52 3/8
~~24~~	~~.989~~		~~50 1/2~~		~~53 1/2~~

EPA (Dur) 232
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT Martin – Marietta
DATE 9-8
LOCATION #1 Baghouse
STACK I.D. 51"
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O – .08
OPERATORS Peltier – Kircher

SOUTH

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
~~1~~		
2	.105	230
3	.06	230
4	.07	236
5	.08	243
6	.075	245
7	.08	250
8	.08	255
9	.08	257
10	.085	260
11	.09	264
12	.09	266
13	.09	270
14	.09	271
15	.09	272
16	.08	273
17	.09	275
18	.09	276
19	.09	278
20	.085	279
21	.09	279
22	.09	280
23	.075	280
~~24~~		
AVERAGE	.285	

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SCHEMATIC OF TRAVERSE POINT LAYOUT

North

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
~~1~~	~~.08~~	
2	.08	249
3	.08	255
4	.08	261
5	.08	264
6	.09	270
7	.09	272
8	.09	273
9	.08	275
10	.085	276
11	.08	278
12	.09	279
13	.085	280
14	.08	283
15	.085	284
16	.08	284
17	.08	285
18	.07	285
19	.07	284
20	.05	284
21	.05	284
22	.03	274
23	.03	269
~~24~~		
AVERAGE	.270	

TOTAL AVE {278} 275 269

EPA (Dur) 233
4/72

GENERAL DATA SHEET

TYPE RUN - Moisture - Martin Marietta

DATE: 9-8 RUN NO. 1

LOCATION: #1 Stack Baghouse OPERATORS: Peltier

	INITIAL	FINAL	
METER TEMPERATURE	98°	103°	100.5
METER READING	52.803	53.874	1.071 cf
TIME	1300	13:30	30 min.
FLOW RATE	2 cfh		
BAROMETRIC PRESSURE	29.75		

COMMENTS:

MOISTURE IN STACK GAS DETERMINATION

METHOD 4

Plant Martin-Marietta Date 9-8-75

Run # 1 Location Sampled #1 Baghouse on #8 Kiln

Volume of gas at meter conditions (CF) = VM = 1.071

Average meter temperature (°F) = TM = 100.5°F

Barometric pressure absolute (in Hg) = PB = 29.75

VMS = Volume of gas sampled at standard conditions (SCF)

$$VMS = \frac{(17.71)(VM)(PB)}{(TM + 460)} = \frac{17.71\ (1.071)(29.75)}{(100.5 + 460)} = 1.007 \text{ SCF}$$

Volume of water final 33.0 Wt. of silica gel final 25.5

Volume of water initial 30.0 Wt. of silica gel initial 24.9

Volume collected V_1 = 3.0 Wt. of water V_2 = .6 gm

Total volume of water collected (ml) = $V_1 + V_2$ = VL = 3.6

Volume of water vapor at standard conditions (CF) = VW

VW = (.0474)(VL) = .0474(3.6) = 0.1706

Mole fraction of water vapor = M

$$M = \frac{VW}{VMS + VW} = \frac{(0.1706)}{(1.007) + (0.1706)} = M = 0.1449$$

Percent moisture = (100)(M) = 100 ( ) = %M 14.49

NOMOGRAPH DATA

PLANT Martin-Marietta

DATE 9-8-75

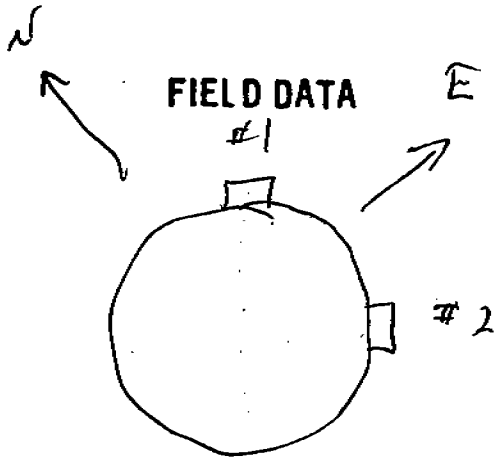
SAMPLING LOCATION #1 Baghouse

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O console #5	$\Delta H_@$	1.674
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	100°F
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	14.5
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	29.75
STATIC PRESSURE IN STACK, in. Hg — 0.08 ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	29.74
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.0
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	269°F
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.078
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	0.09
C FACTOR	0.81	
CALCULATED NOZZLE DIAMETER, in.	~~0.490~~ .442	
ACTUAL NOZZLE DIAMETER, in.	~~0.490~~ 0.374	
REFERENCE Δp, in. H_2O	~~0.[illegible]~~ 0.150	

EPA (Dur) 234
4/72

FIELD DATA

PLANT Martin-Marietta Lime Kiln
DATE 9-9-75
SAMPLING LOCATION #3 Baghouse #1 stack
SAMPLE TYPE EPA #5
RUN NUMBER 1-1
OPERATOR McKenlree
AMBIENT TEMPERATURE 100°F
BAROMETRIC PRESSURE 29.82
STATIC PRESSURE, (P_s) -0.08
FILTER NUMBER (s) 11-05



PROBE LENGTH AND TYPE 6' glass
NOZZLE I.D. 0.374
ASSUMED MOISTURE, % 14.5
SAMPLE BOX NUMBER 4
METER BOX NUMBER 5
METER $\Delta H_@$ 1.674
C FACTOR 0.81
PROBE HEATER SETTING high
HEATER BOX SETTING high
REFERENCE Δp 0.150

SCHEMATIC OF TRAVERSE POINT LAYOUT

Pitot Tube 5B φ = .8

~~Actually sampled~~ 70

READ AND RECORD ALL DATA EVERY 3 MINUTES LEAK RATE ____ CFM @ ____ "Hg

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	PROBE TEMP °F
			259.871										
1	0	1136	259.871	0.09	1.10	1.10	268	94	95	2.9	186	97	270
2	3	1139	261.625	0.08	0.98	0.98	269	98	96	2.8	207	83	281
3	6	1142	263.325	0.09	1.10	1.10	271	100	97	2.9	222	78	280
4	9	1145	265.125	0.09	1.10	1.10	271	101	97	3.0	230	78	278
5	12	1148	266.950	0.095	1.15	1.15	271	100	98	3.0	235	75	268
6	15	1151	268.850	0.09	1.10	1.10	271	100	98	3.0	265	74	260
7	18	1154	270.550	0.085	1.04	1.04	271	102	98	3.0	300	78	267
8	21	1157	272.325	0.08	0.98	0.98	271	104	99	3.0	261	78	265
9	24	1200	274.055	0.09	1.10	1.10	272	105	99	3.0	265	75	262
10	27	1203	275.900	0.09	1.10	1.10	272	105	100	3.0	279	74	259
11	30	1206	277.700	0.09	1.10	1.10	271	105	100	3.0	276	74	256
12	33	1209	279.500	0.09	1.10	1.10	269	106	101	3.0	288	72	246
13	36	1212	281.300	0.085	1.04	1.04	271	106	101	3.0	286	72	242
14	39	1215	283.100	0.070	0.86	0.86	272	107	102	2.9	301	76	248
15	42	1218	284.850	0.06	0.72	0.72	267	107	103	2.8	314	77	250
16	45	1221	286.300	0.06	0.72	0.72	264	107	102	2.7	302	79	254

#3 Baghouse #1 Stack

PLANT Martin Marietta Lime Kiln DATE 9-9-75 RUN NO. 1-1

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	PROBE TEMP °F
17	48	1224	287.825	0.06	0.72	0.72	262	107	103	2.7	320	77	253
18	51	1227	289.300	0.06	0.72	0.72	263	108	103	2.7	302	76	249
19	54	1230	290.844	~~0.06~~ .06	0.72	.72	269	106	104	2.7	327	87	274
		1239	290.844	~~0.06~~	~~0.72~~	~~0.72~~	~~269~~	~~106~~	~~104~~	~~2.7~~	~~327~~	~~87~~	~~274~~
20	57	1242	292.750	0.065	0.78	0.78	271	105	104	2.7	284	76	271
21	60	1245	293.850	0.07	0.86	0.86	268	104	105	2.9	287	73	266
22	63	1248	295.500	0.065	0.78	0.78	265	103	105	2.9	288	74	266
	66	1251	297.016										
23	66	1308	297.016	.065	0.78	0.81	264	103	102	2.9	322	85	289
24	69	1311	298.800	.065	.78	.80	268	104	103	2.9	342	74	314
25	72	1314	300.420	.065	.78	.80	269	105	103	2.9	357	74	324
26	75	1317	302.010	.065	.78	.78	272	107	104	2.9	341	75	323
27	78	1320	303.600	.06	.72	.77	271	108	105	2.9	349	76	319
28	81	1323	305.180	.06	.72	.76	270	109	105	2.9	344	78	309
29	84	1326	306.750	.06	.72	.75	270	110	106	2.9	353	77	302
30	87	1329	308.320	.06	.72	.74	270	112	107	2.9	335	78	295
31	90	1332	309.880	.06	.72	.74	270	112	107	2.9	341	78	278
32	93	1335	311.460	.06	.72	.74	271	111	107	2.9	339	82	218
33	96	1338	313.030	.06	.72	.75	270	110	108	2.9	328	81	192
34	99	1341	314.600	.06	.72	.74	270	110	109	2.9	338	81	170
35	102	1344	316.200	.06	.72	.73	268	110	109	2.9	339	79	158
36	105	1347	317.720	.06	.72	.72	263	109	109	2.9	348	77	149
37	108	1350	319.300	.06	.72	.73	262	109	109	2.9	343	79	141
38	111	1353	320.860	.06	.72	.73	260	108	109	2.9	340	82	135
39	114	1356	322.420	.06	.72	.73	259	107	109	2.9	358	83	131
40		13											

107 OVER

PLANT M - M DATE 9/9/75 RUN NO. 1 - 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		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	~~SAMPLE BOX TEMPERATURE~~, °F IMPING	~~IMPINGER TEMPERATURE~~, °F OVEN	
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
40	117	1359	324.000	.055	.68	.72	259	107	109	2.9	82	348	128
41	120	1402	325.520	.055	.68	.66	259	106	110	2.8	82	333	123
42	123	1405	327.010	.050	.60	.66	259	106	109	2.9	82	345	121
43	126	1408	328.510	.050	.60	.66	259	105	109	2.8	82	351	122
44	129	1411	329.960	.050	.60	.61	259	105	109	2.8	82	356	122
	132	1414	331.416										

100
22.6
77.4

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta
DATE 9/9/75
SAMPLING TIME (24-hr CLOCK) 11:30 to 1215
SAMPLING LOCATION
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Bag
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 95 °F
OPERATOR MC

COMMENTS:
1st 45 min of method five runs

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	8.8		8.8		8.8		8.8	44/100	3.87
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.6		22.6		13.8		13.8	32/100	4.42
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	22.6		22.6		0		0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							77.4	28/100	21.67
								TOTAL	29.96

22.6

EPA (Dur) 230
4/72

CLEAN-UP DATA

Plant Martin - Marietta Comments:
Date 9/9/75
Sampling Location Exit Bag House Stack #1
Sample Type
Run Number S-75-003-031, 2, 3, 4
Sample Box Number
Clean-up Man MacDonald + Son.

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	229 ml	119 ml	3 ml	ml	ml
Initial Vol.	200 ml	100 ml	0 ml	ml	ml
Net Vol.	29 ml	19 ml	3 ml	ml	ml

Total Net Volume in Impingers 51 ml

SILICA GEL

Final Weight	214.9 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	14.9 g	g	g

Total Net Weight in Silica Gel 14.9 g

Total Moisture 65.9 g

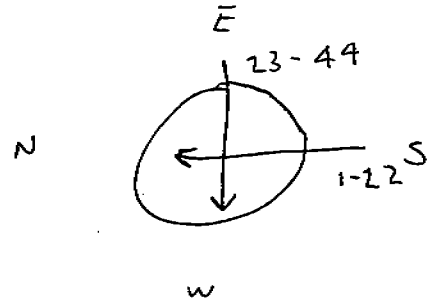
Filter Number(s) 11-05

MRC 7/73

FIELD DATA

.807

PLANT Martin - Marietta
DATE 9-10-75
SAMPLING LOCATION #3 Baghouse Stack #2
SAMPLE TYPE EPA-5
RUN NUMBER 2-2
OPERATOR Kircher / Cox
AMBIENT TEMPERATURE 91
BAROMETRIC PRESSURE 29.75
STATIC PRESSURE, (P_s) -.08
FILTER NUMBER (s) 11-01



PROBE LENGTH AND TYPE 6' Pitot S-A
NOZZLE I.D. .374
ASSUMED MOISTURE, % 7
SAMPLE BOX NUMBER 4
METER BOX NUMBER MRC-4
METER $\Delta H_@$ 1.83
C FACTOR 1.02
PROBE HEATER SETTING Hi
HEATER BOX SETTING Hi
REFERENCE Δp 0.12

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3 MINUTES LEAK RATE 0 CFM @ 15" Hg

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	0		841.216										
0	0	08:23	841.216	.080	1.08	1.10	269	90	89	3.1	293	92	215
1	3	08:26	842.700	.080	1.25	1.25	278	93	89	3.4	308	77	215
2	6	08 29	844.520	.090	1.40	1.39	283	96	90	3.8	292	76	215
3	9	08 32	846.450	.090	1.40	1.40	285	97	90	3.8	274	75	210
4	12	08 35	848.520	.090	1.40	1.40	286	98	91	3.9	252	74	206
5	15	08 38	850.430	.090	1.40	1.40	287	98	91	3.9	296	75	208
6	18	08 41	852.400	.090	1.40	1.40	287	99	92	3.9	283	76	206
7	21	08 44	854.390	.095	1.47	1.46	290	102	93	3.9	303	78	208
8	24	08 47	856.390	.090	1.40	1.40	291	103	93	3.9	285	77	215
9	27	08 50	858.420	.090	1.40	1.40	292	103	94	3.9	290	77	214
10	30	08 53	860.360	.090	1.40	1.40	292	104	95	3.9	300	78	218
11	33	08 56	862.295	.090	1.40	1.40	293	105	96	3.9	303	79	213
12	36	08 59	864.240	.090	1.40	1.40	294	105	96	3.9	297	78	211
13	39	09 02	866.210	.10	1.54	1.54	293	103	97	4.0	299	77	207
14	42	09 05	868.210	.11	1.70	1.70	294	101	97	4.4	296	78	207
15	45	09 08	870.300	.11	1.70	1.70	294	101	98	4.3	264	78	206
16	48	09 11	872.530	.11	1.70	1.70	295	99	97	4.3	271	77	201

PLANT Martin-Marietta DATE 9-10-75 RUN NO. 2-2

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	PROBE
17	51	09 14	874.800	.11	1.70	1.70	294	97	97	4.3	268	76	196
18	54	09 17	876.860	.10	1.54	1.54	289	96	97	4.0	282	76	197
19	57	09 20	879.050	.10	1.54	1.54	288	96	97	4.1	290	76	197
20	60	09 23	880.960	.10	1.54	1.54	290	98	98	4.1	287	77	204
21	63	09 26	882.950	.10	1.54	1.54	290	99	98	4.2	295	77	208
22	66	09 29	884.943	.10	1.54	1.54	292	100	98	4.2	284	82	216
				.080	1.25	1.25							
23	66	10:17	886.640	.080	1.25	1.25	278	97	98	3.9	238	76	186
24	69	10:20	888.380	.070	1.10	1.10	278	97	98	3.8	235	76	186
25	72	10:23	888.380	.070	1.10	1.10	279	98	98	3.8	234	75	192
26	75	10:26	890.060	.070	1.10	1.10	279	99	98	3.7	284	77	211
27	78	10:29	891.720	.070	1.10	1.10	280	100	99	3.7	305	79	216
28	81	10:32	893.470	.070	1.10	1.10	280	102	98	3.7	279	80	221
29	84	10:35	895.190	.070	1.10	1.10	283	103	99	3.7	295	80	222
30	87	10:38	897.030	.080	1.25	1.25	285	103	99	4.0	285	77	214
31	90	10:41	898.930	.080	1.25	1.25	286	103	99	4.1	287	77	213
32	93	10:44	900.810	.090	1.40	1.40	287	103	100	4.2	316	77	216
33	96	10:47	902.820	.090	1.40	1.40	287	103	100	4.2	318	77	217
34	99	10:50	904.800	.090	1.40	1.40	290	103	100	4.2	312	77	210
35	102	10:53	906.860	.090	1.40	1.40	289	103	101	4.2	320	78	216
36	105	10:56	908.900	.100	1.54	1.54	289	103	101	4.3	312	78	211
37	108	10:59	911.050	.100	1.54	1.54	289	104	101	4.3	309	79	224
38	111	11:02	913.220	.110	1.70	1.70	289	104	102	4.4	335	80	225
39	114	11:05	915.450	.110	1.70	1.70	290	106	102	4.4	324	84	227
40	117	11:08	[illegible]	.110	1.70	1.70	291	106	102	4.3	318	82	222
41	120	11:01	919.780	.100	1.54	1.54	292	106	103	4.3	322	80	226
42	123	11:14	921.910	.110	1.70	1.70	291	107	103	4.6	331	81	232
43	126	11:17	924.140	.110	1.70	1.70	290	106	103	4.6	292	78	223
44	129	11:20	926.340	.100	1.54	1.54	291	104	103	4.5	274	79	217
	132	11:23	928.445										

32.06

CLEAN-UP DATA

Plant Martin - Marietta
Date 9/10/75
Sampling Location Stack #2
Sample Type Method 5
Run Number 2
Sample Box Number 4
Clean-up Man Cash - Cook

Comments:
5-75-003-041 - Filter
-042 F 1/2 Acetone
-043 B 1/2 H_2O
-044 B 1/2 Acetone
-045 B 1/2 H_2O-Et_2O Ext.

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	279 ml	130 ml	~1.0 ml	ml	ml
Initial Vol.	100 ml	100 ml	0 ml	ml	ml
Net Vol.	179 ml	30 ml	1.0 ml	ml	ml

179
31
10

Total Net Volume in Impingers ~~330~~ ~~270~~ 210 ml

210
242

SILICA GEL

Final Weight	224.2 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	24.2 g	g	g

Total Net Weight in Silica Gel ~~[illegible]~~ 234. 24.2 g

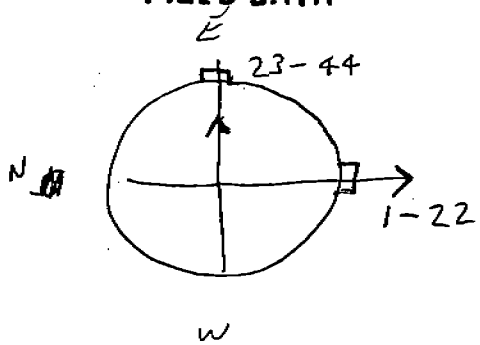
Total Moisture ~~[illegible]~~ 234.2 g

Filter Number(s) 11-01

MRC 7/73

FIELD DATA

PLANT Martin-Marietta
DATE 9-10-75
SAMPLING LOCATION #3 Baghouse Stack #1
SAMPLE TYPE EPA Method-5
RUN NUMBER #1-2
OPERATOR ~~Kircher~~ McKendree
AMBIENT TEMPERATURE 100°F
BAROMETRIC PRESSURE 29.75
STATIC PRESSURE, (P_s) -0.08
FILTER NUMBER (s) 11-06



PROBE LENGTH AND TYPE 6' S-B
NOZZLE I.D. .367
ASSUMED MOISTURE, % 7
SAMPLE BOX NUMBER 3-1
METER BOX NUMBER MRC-5
METER $\Delta H_@$ 1.674
C FACTOR 0.91
PROBE HEATER SETTING Hi
HEATER BOX SETTING Hi
REFERENCE Δp 0.135

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3 MINUTES LEAK RATE 0 CFM @ 15 "Hg

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	Probe Temp °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
1	0	0823	331.622	0.08	1.10	1.10	258	85	85	3.1	266	85	210
2	3	0826	333.325	0.08	1.10	1.10	261	89	86	3.1	270	71	222
3	6	0829	335.750	0.09	1.23	1.23	264	91	87	3.1	274	69	222
4	9	0832	336.999	0.09	1.23	1.23	264	93	87	3.1	277	69	212
5	12	0835	338.950	0.095	1.30	1.30	264	94	88	3.2	276	69	197
6	15	0838	340.900	0.09	1.23	1.23	265	95	88	3.2	278	70	173
7	18	0841	342.850	0.09	1.23	1.23	265	96	89	3.2	277	70	162
8	21	0844	345.000	0.09	1.23	1.23	266	98	90	3.2	275	71	154
9	24	0847	346.700	0.095	1.30	1.30	266	99	90	3.2	282	72	152
10	27	0850	348.650	0.100	1.36	1.36	267	101	91	3.2	280	72	149
11	30	0853	350.770	0.095	1.30	1.30	267	102	92	3.1	282	73	148
12	33	0856	352.650	0.100	1.36	1.36	267	103	93	3.2	281	72	147
13	36	0859	354.660	0.100	1.36	1.36	264	101	93	3.2	283	72	144
14	39	0902	356.690	0.098	1.34	1.34	264	99	93	3.2	284	72	135
15	42	0905	358.710	0.085	1.17	1.17	264	97	94	3.4	289	71	130
16	45	0908	360.650	0.08	1.10	1.10	265	97	94	3.0	282	73	123

PLANT #3 Baghouse Stack #1 Martin Marietta DATE 9/10/75 RUN NO. 1-2

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	Probe Temp °F
17 16	48	0911	362.475	0.090	1.23	1.23	265	95	94	3.0	279	72	119
18 17	51	0914	364.375	0.085	1.17	1.17	265	94	94	3.0	273	72	115
19 18	54	0917	366.375	0.08	1.10	1.10	252	93	94	3.0	279	73	113
20 19	57	0920	368.110	0.075	1.02	1.02	243	92	94	3.0	277	75	109
21 20	60	0923	369.890	0.075	1.02	1.02	236	94	94	3.0	280	75	112
22 21	63	0926	371.675	0.073	0.98	0.98	235	94	94	3.0	281	76	111
22	66		373.438										
23	66	1017	373.438	0.090	1.23	1.23	257	92	94	3.0	190	76	345
24	69	1020	375.280	0.090	1.23	1.23	257	93	94	3.0	207	73	334
25	72	1023	377.220	0.090	1.23	1.23	258	94	94	3.0	225	72	326
26	75	1026	379.250	0.085	1.17	1.17	259	96	94	3.2	244	72	315
3 27	78	1029	381.125	0.10	1.36	1.36	261	97	94	3.2	265	73	304
6 28	81	1032	383.025	0.10	1.36	1.36	262	99	94	3.3	266	75	294
9 29	84	1035	385.025	0.10	1.36	1.36	263	100	95	3.4	279	75	290
12 30	87	1038	387.025	0.095	1.30	1.30	263	100	95	3.4	286	75	284
15 31	90	1041	389.030	0.10	1.36	1.36	263	100	96	3.4	293	74	285
18 32	93	1044	391.045	0.095	1.30	1.30	263	100	96	3.4	293	74	289
21 33	96	1047	393.020	0.085	1.17	1.17	262	100	96	3.3	292	74	289
24 34	99	1050	394.950	0.080	1.10	1.10	259	100	96	3.2	287	76	284
27 35	102	1053	396.750	0.080	1.10	1.10	261	100	97	3.2	287	76	281
30 36	105	1056	398.595	0.080	1.10	1.10	262	100	97	3.2	297	77	279
33 37	108	1059	400.395	0.075	1.02	1.02	261	100	98	3.2	297	78	282
36 38	111	1102	402.150	0.078	1.07	1.07	262	100	98	3.2	306	79	283
39 39	114	1105	403.940	0.075	1.02	1.02	263	101	98	3.2	315	80	285
42 40	117	1108	405.720	0.075	1.02	1.02	265	102	98	3.2	304	81	287
45 41	120	1109	1111 407.495	0.075	1.02	1.02	262	102	99	3.2	306	80	285
48 42	123	1112	1114 409.275	0.070	0.95	0.95	261	103	99	3.1	317	81	287
51 43	126	1115	1117 411.000	0.070	0.95	0.95	260	101	99	3.1	298	79	279
54 44	129	1118	1120 412.775	0.070	0.95	0.95	259	100	99	3.1	297	77	274
	132		1123 414.532										

CLEAN-UP DATA

Plant Martin Marietta

Date 9/10/75

Sampling Location Stack #1 - Baghouse

Sample Type Method 5

Run Number 2

Sample Box Number

Clean-up Man Cash, Cof

Comments:

Samples

S-75-003-036 Filter
037 1st 1/2 Acc
038 2nd 1/2 H_2O
039 2nd 1/2 Acc
040

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	258 ml	130 ml	9.0 ml	ml	ml
Initial Vol.	100 ml	100 ml	0.0 ml	ml	ml
Net Vol.	158 ml	30 ml	9.0 ml	ml	ml

Total Net Volume in Impingers 197 ml

SILICA GEL

Final Weight	221.2 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	21.2 g	g	g

Total Net Weight in Silica Gel 21.2 g

Total Moisture 218.2 g

Filter Number(s) 11-06

MRC 7/73

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin - Marietta
DATE 9/10/75
SAMPLING TIME (24-hr CLOCK) 0830 - 0930
SAMPLING LOCATION
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD Orsat.
AMBIENT TEMPERATURE 84°F
OPERATOR LMC

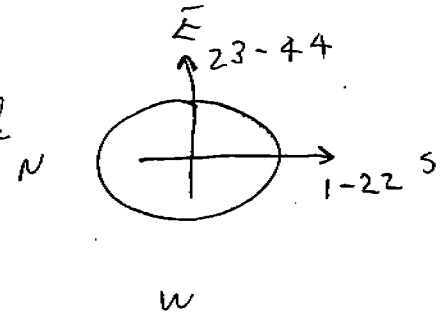
COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	44/100	4.22
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	23.2	13.6	23.2	13.6	23.2	13.6	13.6	32/100	4.35
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	23.2	0	23.2	0	23.2	0	0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							76.8	28/100	21.50
								TOTAL	30.08

EPA (Dur) 230
4/72

FIELD DATA

PLANT Martin - Marietta
DATE 9-10-75
SAMPLING LOCATION #3 Baghouse #3 stack
SAMPLE TYPE 5 - EPA
RUN NUMBER 3 - 1
OPERATOR Pullin + McDonald
AMBIENT TEMPERATURE 100
BAROMETRIC PRESSURE 29.75
STATIC PRESSURE, (P_s) -.08
FILTER NUMBER (s) 11-03



Pitot tube # 5-B

PROBE LENGTH AND TYPE 6'
NOZZLE I.D. .367
ASSUMED MOISTURE, % 7
SAMPLE BOX NUMBER 4
METER BOX NUMBER MRC - 4
METER $\Delta H_@$ 1.83
C FACTOR 1.02
PROBE HEATER SETTING HJ
HEATER BOX SETTING HJ
REFERENCE Δp .12

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3 MINUTES LEAK RATE less than .015 CFM @ 15 "Hg
also leaked checked after run

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
			928.728										
1	0	1305	928.728	.10	1.54	1.54	291	103	104	2.0	185	91	322
2	3	1308	930.880	.09	1.39	1.39	292	103	104	1.9	228	84	347
3	6	1311	932.850	.10	1.54	1.54	292	106	102	2.0	269	89	348
4	9	1314	934.880	.095	1.46	1.46	294	108	105	2.0	282	84	336
5	12	1317	936.910	.095	1.46	1.46	295	110	106	2.0	268	84	310
6	15	1320	938.920	.090	1.39	1.39	295	111	106	2.0	276	86	312
7	18	1323	940.905	.090	1.39	1.39	291	113	106	2.0	274	86	311
8	21	1326	942.875	.095	1.46	1.46	295	113	107	2.0	272	85	313
9	24	1329	944.800	.10	1.54	1.54	297	113	107	2.1	280	84	311
10	27	1332	946.—	.105	1.61	1.61	298	113	108	2.1	285	85	311
11	30	1335	949.060	.105	1.61	1.61	297	113	108	2.1	284	85	310
12	33	1338	951.200	.10	1.54	1.54	296	115	109	2.1	282	83	308
13	36	1341	953.315	.085	1.31	1.31	292	114	110	2.0	283	286	305
14	39	1344	955.310	.08	1.25	1.25	291	113	110	2.0	287	85	303
15	42	1348	957.400	.08	1.25	1.25	293	112	110	2.0	285	85	303
16	45	1351	959.050	.08	1.25	1.25	294	111	110	2.0	282	84	299

PLANT MARTIN MARIETTA DATE 9/10/75 RUN NO. #1 STACK-3

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	Probe Temp °F
17	48	1354	961.000	.08	1.25	1.25	293	108	110	2.0	277	84	292
18	51	1357	962.990	.08	1.25	1.25	294	107	110	2.0	286	84	291
19	54	1400	964.860	.08	1.25	1.25	292	107	110	2.0	284	85	290
20	57	1403	966.750	.08	1.25	1.25	293	106	110	2.0	282	86	288
21	60	1406	968.680	.08	1.25	1.25	292	106	109	2.0	287	85	290
22	63	1409	970.630	.08	1.25	1.25	292	108	109	2.0	293	85	293
~~23~~	66	1412	972.385										
23	66	1438	972.385	.11	1.70	1.70	285	104	105	1.8	180	98	324
24	69	1441	974.430	.11	1.70	1.70	286	104	106	2.1	258	75	351
25	72	1444	977.001	.12	1.85	1.85	291	107	106	2.2	303	80	351
26	75	1447	979.208	.12	1.85	1.85	293	109	107	2.2	318	80	348
27	78	1450	981.103	.12	1.85	1.85	294	109	107	2.2	321	81	336
28	81	1453	983.306	.12	1.85	1.85	295	108	107	2.4	340	81	321
29	84	1457	985.608	.12	1.85	1.85	297	108	107	2.4	347	81	307
30	87	1500	988.010	.13	2.00	2.00	297	109	108	2.4	350	82	310
31	90	1503	990.382	.12	1.85	1.85	298	109	108	2.4	374	80	296
32	93	1506	992.590	.13	2.00	1.90	298	108	108	2.4	389	78	293
33	96	1509	994.890	.13	2.00	2.00	299	108	108	2.6	391	78	289
34	99	1512	997.280	.12	1.85	1.85	300	107	108	2.6	370	77	280
35	102	1515	999.570	.11	1.70	1.70	294	106	108	2.5	392	78	281
36	105	1518	1001.730	.10	1.54	1.54	297	107	108	2.4	402	79	285
37	108	1521	1003.860	.10	1.54	1.54	295	108	108	2.3	396	79	286
38	111	1524	1005.960	.10	1.54	1.54	292	106	108	2.3	375	78	275
39	114	1527	1008.070	.10	1.54	1.54	291	105	108	2.3	367	78	274
40	117	1530	~~1009.~~	.10	1.54	1.54	293	106	108	2.3	349	78	275
41	120	1533	1012.280	.10	1.54	1.54	294	104	107	2.3	351	79	269
42	123	1536	1014.390	.10	1.54	1.54	292	102	107	2.3	351	79	270
43	126	1539	1016.500	.10	1.54	1.54	291	102	106	2.3	340	79	275
44	129	1541	1018.600	.11	1.70	1.70	291	101	106	2.5	332	79	275
	132.33	1544	1020.828										

5-75-003-046 Fil
47 F.½
48 B½ H_2O
49 B½ Ace
50 Ether

CLEAN-UP DATA

Plant MARTIN MARETTA

Comments:

Date 9/10/75

Sampling Location BAG HOUSE #1

Sample Type E.P.A. METHOD 5

Run Number 1 STACK 3

Sample Box Number MRC #

Clean-up Man W. McDONALD

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	324 ml	170 ml	3 ml	ml	ml
Initial Vol.	100 ml	100 ml	0 ml	ml	ml
Net Vol.	224 ml	70 ml	3 ml	ml	ml

Total Net Volume in Impingers 297 ml

SILICA GEL

Final Weight	215.1 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	15.1 g	g	g

Total Net Weight in Silica Gel 15.1 g

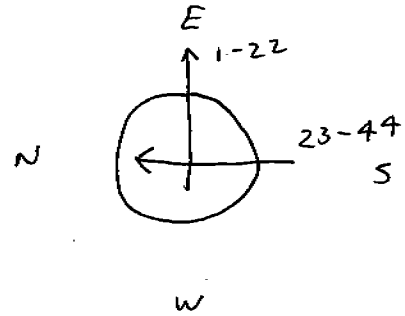
Total Moisture 312.1 g

Filter Number(s) 11-03

MRC 7/73

FIELD DATA

PLANT Martin - Marietta
DATE 9-11-75
SAMPLING LOCATION #3 Baghouse #3 Stack
SAMPLE TYPE EPA-5
RUN NUMBER 3-2
OPERATOR Kircher / Cox
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE 29.64
STATIC PRESSURE, (P_s) -.08
FILTER NUMBER (s) 11-07



Pitot 5-A

PROBE LENGTH AND TYPE 6'
NOZZLE I.D. .367
ASSUMED MOISTURE, % 12
SAMPLE BOX NUMBER 5
METER BOX NUMBER MRC-5
METER $\Delta H_@$ 1.674
C FACTOR .88
PROBE HEATER SETTING Hi
HEATER BOX SETTING Hi
REFERENCE Δp .135

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3 MINUTES LEAK RATE 0 CFM @ 15" Hg

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
1	0	08 00	414.750	.130	1.80	1.80	277	79	82	3.2	240	67	244
2	3	08 03	417.180	.130	1.80	1.80	279	80	82	3.2	247	62	256
3	6	08 06	419.480	.130	1.80	1.80	279	80	82	3.2	250	61	262
4	9	08 09	421.760	.130	1.80	1.80	276	81	81	3.2	259	64	259
5	12	08 12	424.050	.135	1.85	1.85	282	81	81	3.2	262	65	255
6	15	08 15	426.380	.130	1.80	1.80	283	81	81	3.2	268	66	256
7	18	08 18	428.680	.130	1.80	1.80	283	81	81	3.2	272	67	253
8	21	08 21	430.980	.135	1.85	1.85	284	82	81	3.2	292	67	256
9	24	08 24	433.290	.130	1.80	1.80	285	82	81	3.2	330	67	256
10	27	08 27	435.595	.130	1.80	1.80	285	82	81	3.2	347	67	261
11	30	08 30	437.930	.130	1.80	1.80	284	82	81	3.2	357	65	263
12	33	08 33	440.240	.130	1.80	1.80	286	82	81	3.2	362	65	262
13	36	08 36	442.560	.130	1.80	1.80	286	82	81	3.2	360	64	253
14	39	08 39	444.820	.120	1.65	1.65	286	82	81	3.2	361	64	253
15	42	08 42	447.020	.110	1.51	1.51	284	82	81	3.1	356	65	260
16	45	08 45	449.140	.110	1.51	1.51	284	82	81	3.1	382	65	258
1/0	48												

3 Bag house Stack

PLANT Martin Marietta DATE 9-11-75 RUN NO. 3-2

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		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
17	48	08 48	451.250	.110	1.51	1.51	284	83	81	3.1	390	65	256
18	51	08 51	453.350	.110	1.51	1.51	283	83	81	3.1	400	65	253
19	54	08 54	455.470	.110	1.51	1.51	282	83	82	3.1	399	65	248
20	57	08 57	457.580	.100	1.38	1.38	275	83	82	3.1	391	65	249
21	60	09 00	459.580	.090	1.25	1.25	273	84	82	2.9	384	66	258
22	63	09 03	461.510	.090	1.25	1.25	270	85	83	2.9	375	67	269
	66	09 06	463.432										
23	66	09 30	463.432	.070	.97	.97	273	84	86	2.2	333	73	115
24	69	09 33	465.150	.080	1.11	1.11	272	84	86	2.3	337	66	150
25	72	09 36	466.930	.070	.97	.97	271	84	86	2.3	355	66	195
26	75	09 39	468.700	.080	1.11	1.11	271	85	86	2.3	375	67	221
27	78	09 42	470.510	.080	1.11	1.11	270	86	86	2.3	391	69	236
28	81	09 45	472.290	.080	1.11	1.11	271	85	86	2.3	404	70	241
29	84	09 48	474.110	.080	1.11	1.11	272	87	86	2.4	413	71	252
30	87	09 51	476.000	.080	1.11	1.11	273	88	86	2.4	418	72	254
31	90	09 54	477.800	.090	1.25	1.25	279	90	86	2.9	428	72	255
32	93	09 57	479.770	.090	1.25	1.25	279	90	87	2.9	426	71	247
33	96	10 00	481.720	.100	1.38	1.38	280	91	87	3.0	429	69	239
34	99	10 03	483.790	.100	1.38	1.38	282	92	87	3.0	418	71	247
35	102	10 06	485.830	.100	1.38	1.38	276	92	88	3.0	413	72	249
36	105	10 09	487.870	.100	1.38	1.38	276	91	89	3.0	402	73	254
37	108	10 12	489.900	.100	1.38	1.38	275	91	89	3.0	385	74	254
38	111	10 15	491.930	.100	1.38	1.38	275	91	89	3.0	374	74	257
39	114	10 18	493.920	.090	1.25	1.25	276	92	89	3.0	362	75	263
40	117	10 21	495.850	.090	1.25	1.25	275	94	90	3.0	341	73	259
41	120	10 24	497.800	.090	1.25	1.25	273	93	90	2.9	344	73	256

PLANT Martin Marietta DATE 9-11-75 RUN NO. 3-2 #3 Baghouse Stack #3

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
42	123	10 27	499.760	.090	1.25	1.25	273	91	90	2.9	339	74	255
43	126	10 30	501.700	.090	1.25	1.25	274	90	90	2.9	337	73	257
44	129	10 33	503.630	.090	1.25	1.25	273	89	90	2.9	330	73	259
	132	10 36	505.585										

CLEAN-UP DATA

Plant Martin Marietta Comments:
Date 9/11/75
Sampling Location Baghse - Stack # 3
Sample Type EPA #5
Run Number 2
Sample Box Number V
Clean-up Man Cox / Cook

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	274 ml	130 ml	8.0 ml	ml	ml
Initial Vol.	100 ml	100 ml	0.0 ml	ml	ml
Net Vol.	174 ml	30 ml	8.0 ml	ml	ml

Total Net Volume in Impingers 212 ml

SILICA GEL

Final Weight	222.0 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	22.0 g	g	g

Total Net Weight in Silica Gel 22.0 g

Total Moisture 234 g

Filter Number(s) 11-07

MRC 7/73

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta
DATE 9/11/75
SAMPLING TIME (24-hr CLOCK) 8:03 to 08:56
SAMPLING LOCATION
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE
OPERATOR W. McDonald

COMMENTS:

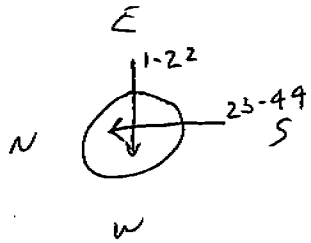
RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	44/100	4.22
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.2	11.6	21.4	11.8	21.4	11.8	11.7	32/100	3.74
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	21.4	.2	21.6	.2	21.6	.2	.2	28/100	0.06
N_2 (NET IS 100 MINUS ACTUAL CO READING)		78.6		78.4		78.4	78.5	28/100	21.95
								TOTAL	29.97

EPA (Dur) 230
4/72

Baghouse #3
stack #2

FIELD DATA

PLANT Martin - Marietta
DATE 9/12/95
SAMPLING LOCATION Stack #2
SAMPLE TYPE EPA #5
RUN NUMBER # 2-3
OPERATOR JK
AMBIENT TEMPERATURE 80°F
BAROMETRIC PRESSURE 29.54
STATIC PRESSURE, (P_s) -0.08
FILTER NUMBER (s) 11-09



PROBE LENGTH AND TYPE 6' Pitot Tube 5-A
NOZZLE I.D. .367
ASSUMED MOISTURE, % 10
SAMPLE BOX NUMBER MRC
METER BOX NUMBER MRC 5
METER $\Delta H_@$ 1.674
C FACTOR .86
PROBE HEATER SETTING Hi
HEATER BOX SETTING Hi
REFERENCE Δp (.155 at 280°) Set at .148 for 230°

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3 MINUTES LEAK RATE .01 CFM @ 15 "Hg

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
1	0	08 21	506.542	.080	1.02	1.02	229	81	81	3.0	256	71	247
2	3	08 24	508.396	.060	.76	.76	228	81	81	2.8	277	67	252
3	6	08 27	509.940	.060	.76	.76	227	81	81	2.8	278	67	252
4	9	08 30	511.480	.060	.76	.76	228	80	81	2.8	277	67	251
5	12	08 33	513.000	.060	.76	.76	228	80	81	2.8	275	67	251
6	15	08 36	514.550	.060	.76	.76	230	80	80	2.8	268	68	249
7	18	08 39	516.100	.070	.90	.90	233	80	80	29	274	70	247
8	21	08 42	517.760	.070	.90	.90	231	80	80	3.0	268	69	243
9	24	08 45	519.440	.070	.90	.90	230	79	80	3.0	268	69	246
10	27	08 48	521.100	.070	.90	.90	230	79	80	3.0	272	71	248
11	30	08 51	522.780	.070	.90	.90	229	79	79	3.0	268	71	249
12	33	08 54	524.460	.070	.90	.90	229	79	79	3.0	264	70	247
13	36	08 57	526.130	.070	.90	.90	230	79	79	3.0	272	70	246
14	39	09 00	527.800	.060	.76	.76	229	80	79	3.0	275	70	251
15	42	09 03	529.380	.070	.90	.90	228	80	79	3.0	272	70	251
16	45	09 06	531.060	.070	.90	.90	228	80	80	3.0	271	71	251

Baghouse # 2 Stack

PLANT Martin-Marietta DATE 9-12-75 RUN NO. 2-3

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
17	48	09 09	532,740	.070	.90	.90	227	81	80	3.0	271	70	255
18	51	09 12	534,400	.070	.90	.90	228	81	80	3.0	273	70	252
19	54	09 15	536.090	.070	.90	.90	226	82	80	3.0	277	70	257
20	57	09 18	537.770	.070	.90	.90	226	82	80	3.0	275	69	256
21	60	09 21	539.420	.070	.90	.90	229	82	81	3.0	276	69	253
22	63	09 24	541.100	.075	.96	.96	232	82	81	3.0	273	69	253
	66	09 27	542.808										
2													
23	66	09 54	542.808	.065	.82	.82	233	81	82	2.9	237	71	212
24	69	09 57	544.400	.060	.76	.76	234	83	82	2.9	235	67	214
25	72	10 00	545.930	.070	.90	.90	235	82	82	3.0	234	65	202
26	75	10 03	547.700	.065	.82	.82	235	82	82	2.9	242	65	204
27	78	10 06	549.210	.065	.82	.82	236	83	82	2.9	248	67	213
28	81	10 09	550.830	.070	.90	.90	236	82	82	3.0	256	68	205
29	84	10 12	552.520	.070	.90	.90	238	82	82	3.0	267	69	214
30	87	10 15	554.180	.070	.90	.90	240	83	82	3.0	271	69	221
31	90	10 18	555.850	.070	.90	.90	240	84	83	3.0	271	69	215
32	93	10 21	557.540	.070	.90	.90	241	83	83	3.0	278	68	210
33	96	10 24	559.210	.070	.90	.90	241	84	83	3.0	281	68	212
34	99	10 27	560.890	.070	.90	.90	242	84	83	3.0	285	71	224
35	102	10 30	562.560	.075	.96	.96	241	84	83	3.0	287	68	218
36	105	10 33	564.300	.075	.96	.96	243	84	83	3.0	297	68	218
37	108	10 36	566.020	.075	.96	.96	242	84	83	3.0	289	67	225
38	111	10 39	567.730	.070	.90	.90	242	85	84	3.0	297	70	231
39	114	10 42	569.390	.070	.90	.90	241	85	84	3.0	303	69	222
40	117	10 45	571.080	.070	.90	.90	241	85	84	3.0	306	68	217
41	120	10 48	572.760	.070	.90	.90	241	85	84	3.0	306	70	224

3 bagho[illegible]
Stack #2

PLANT MARTIN- MARIETTA DATE 9-12-75 RUN NO. 2-3

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	Probe
					DESIRED	ACTUAL		INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F				
42	123	10 51	574.430	.070	.90	.90	242	85	84	3.0	309	69	225
43	126	10 54	576.100	.070	.90	.90	238	85	84	3.0	307	69	220
44	129	10 57	577.780	.070	.90	.90	236	85	84	3.0	304	69	225
	132	11 00	579.440										

CLEAN-UP DATA

Plant Martin Marietta

Date 9/12/75

Sampling Location Stack #2 Baghouse

Sample Type Method 5

Run Number 2

Sample Box Number

Clean-up Man Cook - Cooper - McBride

Comments:
5-75-003-056 - Filter
5-75-003-057 F 1/2 Acc
5-75-003-058 B 1/2 H_2O
5-75-003-059 B 1/2 Acc
5-75-003-060 B 1/2 H_2O-Et_2O Ext

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	210 ml	120 ml	210 ml	ml	ml
Initial Vol.	100 ml	100 ml	ml	ml	ml
Net Vol.	110 ml	20 ml	ml	ml	ml

Total Net Volume in Impingers 131 ml

SILICA GEL

Final Weight	220.6 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	20.6 g	g	g

Total Net Weight in Silica Gel ~~151.6~~ 20.6 g

Total Moisture 151.6 g

Filter Number(s) 11-09

MRC 7/73

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta
DATE 9/12/75
SAMPLING TIME (24-hr CLOCK) 0830 to 0920
SAMPLING LOCATION Baghouse outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Bag
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE
OPERATOR L. Cash

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	44/100	3.61
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.6	14.4	22.5	14.3	22.6	14.4	14.4	32/100	4.61
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	22.6	0	22.5	0	22.6	0	0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							77.4	28/100	21.67
								TOTAL	29.89 ~~30.17~~

EPA (Dur) 230
4/72

TRAVERSE POINT LOCATIONS FOR RECTANGULAR DUCTS

PLANT Martin - Marietta

DATE 9-11-75

SAMPLING LOCATION Inlet to Baghouse

INSIDE STACK DIMENSIONS 39" x 60"

INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (Distance B) 3"

EQUIVALENT STACK I.D. 47.27

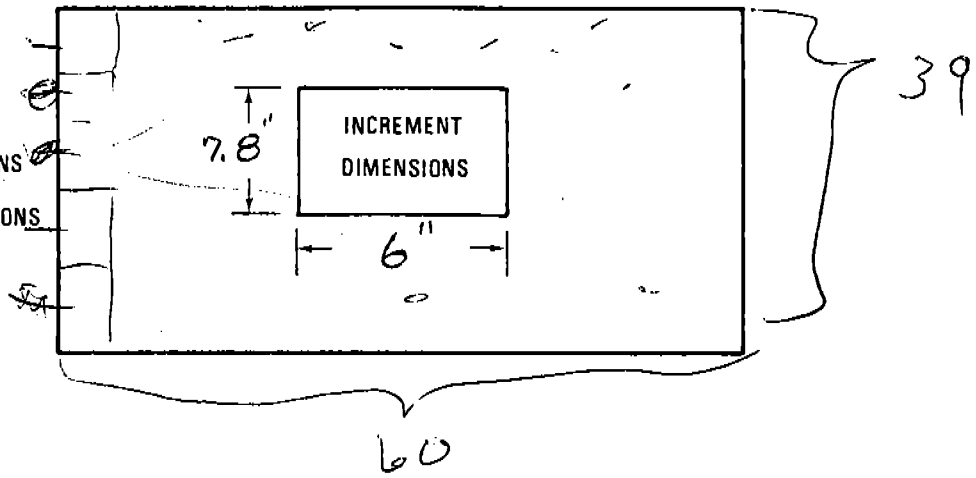
NEAREST UPSTREAM DISTURBANCE Tapered stack

NEAREST DOWNSTREAM DISTURBANCE at least 2 diameters

NUMBER OF TRAVERSE POINTS 50 ARRAY 5 x 10

CALCULATOR Pelther

ILLUSTRATE PORT LOCATIONS AND STACK DIMENSIONS

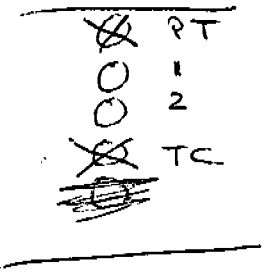


TRAVERSE POINT NUMBER	INSIDE OF NEAR WALL TO TRAVERSE POINT (Distance A)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF DISTANCES A+B)	PORT LOCATION	DISTANCE FROM EDGE OF STACK
1	3	3"	6		
2	9		12		
3	15		18		
4	21		24		
5	27		30		
6	33		36		
7	39		42		
8	45		48		
9	51		54		
10	57		60		

174.548
104
1103

PRELIMINARY VELOCITY TRAVERSE

PLANT M - M
DATE 9-11-75
LOCATION Inlet to Baghouse
STACK I.D. 66 x 39
BAROMETRIC PRESSURE, in. Hg 29.64
STACK GAUGE PRESSURE, in. H_2O + 0.95
OPERATORS Peltier & McDonald
Pitot No 5-13



SCHEMATIC OF TRAVERSE POINT LAYOUT

	TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	1	.36	367
	2	.37	375
	3	.32	384
	4	.40	397
	5	.44	412
	6	.51	424
	7	.57	433
	8	.59	439
	9	.60	450
	10	.59	457
2	1	0.30	332
	2	0.26	346
	3	0.30	364
	4	0.44	386
	5	0.53	397
	6	0.58	409
	7	0.57	432
	8	0.59	438
	9	0.56	447
	10	0.53	451
	TC 10	0.53	450
	PT 10	0.57	453
	AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
TC 6	.59	444
PT 6	.45	447
TC 2	.30	413
PT 2	.33	412
AVERAGE		

EPA (Dur) 233
4/72

METHOD 2

STACK GAS VELOCITY CALCULATIONS

Plant Martin - Marietta

Date 9/22/75

Test No. Inlet of Baghouse

Area of stack (ft^2) = A = 16.25

Pitot tube coefficient, type S = CP = .82

Temperature (average) of stack (°F) = TS = 425

Average of square root of velocity head (in H_2O)$^{1/2}$ = $\sqrt{\Delta p}$ = .680

Absolute pressure of stack gas in Hg = PS = 29.71

note PS = Barometric pressure (in Hg)-(static pressure (in H_2O)/13.6)

Percent moisture = M = 12 %

Molecular weight of stack gas - (lbs/lb mole) = MS = 28.56

VS = stack gas velocity (f.p.s.)

$$VS = 85.48 \times CP \times \sqrt{\frac{TS+460}{PS \times MS}} \times (\sqrt{\Delta p})ave$$

$$VS = 85.48 \times .82 \times \sqrt{\frac{425+460}{29.56 \times 29.71}} \times (.680) = 47.85 \frac{ft}{sec}$$

Q_S = volumetric flow rate (SCFM)

$$Q_S = 60 \times (1-(M \times 10^{-2}))VS \times A \times \left(\frac{530}{TS+460}\right) \times \left(\frac{PS}{29.92}\right)$$

$$Q_S = 60 \times (.88) \times 47.85 \times 16.25 \times \left(\frac{530}{425+460}\right) \times \left(\frac{29.71}{29.92}\right) = 24414 \text{ scfm}$$

GENERAL DATA SHEET - Martin Marietta

TYPE RUN - Method 6

DATE: 9-9 RUN NO. 1-I

LOCATION: Inlet Baghouse OPERATORS: Peltier

	INITIAL	FINAL	
METER TEMPERATURE	117	119	118
METER READING	166.974	167.846	0.872
TIME	1001	1016	15 min
FLOW RATE	4 cfh	—	
BAROMETRIC PRESSURE	29.82		

$$0.872 \times \frac{29.82}{29.92} \times \frac{530}{578} = 0.797 \text{ SCF}$$

COMMENTS:

Baghouse was operating in a manner such that there was a large amount of fugitive dust in the sampling area.

The point had high positive pressure and the gas was very dirty.

ambient Temp ~ 115°F

GENERAL DATA SHEET

TYPE RUN - EPA #6 - Martin Marietta #1 Bag house

DATE: 9/9/75 RUN NO. 1

LOCATION: NE port stack #1 OPERATORS: McKenbree/Cox

	INITIAL	FINAL	
METER TEMPERATURE	97°F	99°F	98°F avg
METER READING	845.189 ~~76°F~~	846.299	1.110
TIME	1005 Am	1032 Am	28 min 1047 hrs
FLOW RATE	2.3cfh	2.3 cfH	2.3
BAROMETRIC PRESSURE	29.80" Hg	29.80" Hg	

Leak rate <0.001c fm

COMMENTS:

$$1.110 \times \frac{29.80}{29.92} \times \frac{530}{558} = 1.050 \text{ SCF}$$

GENERAL DATA SHEET

TYPE RUN - SO_2 Martin Marietta

DATE: 9-9 RUN NO. 2-I

LOCATION: Inlet to Bag OPERATORS: _____

	INITIAL	FINAL	
METER TEMPERATURE	130	130	130
METER READING	168.690	169.569	0.879
TIME	1328	1344	16
FLOW RATE	3		
BAROMETRIC PRESSURE	29.82		

COMMENTS:
Vacuum was reading 10" at 15 min

$$.879 \times \frac{29.82}{29.92} \times \frac{530}{590} = 0.787 \text{ SCF}$$

GENERAL DATA SHEET

TYPE RUN - EPA #6 Martin Marrietta

DATE: 9/9/75 RUN NO. 2-0

LOCATION: #3 Baghouse stack #1 OPERATORS: McKendree

	INITIAL	FINAL	
METER TEMPERATURE	105°F	108°F	106.5°F avg
METER READING	847.580 ~~848.350~~ ~~848.350~~	848.350	0.770
TIME	1330 ~~1350~~ hrs	1350	20 min end Purge 1405
FLOW RATE	2.0 ~~3.5~~ cfh		
BAROMETRIC PRESSURE	29.82" Hg		

Leak Rate < 0.001 cfm

COMMENTS:

$$0.770 \times \frac{29.82}{29.92} \times \frac{530}{566.5} = 0.718 \text{ SCF}$$

GENERAL DATA SHEET

TYPE RUN - SO_2 M-M

DATE: 9-10-75 RUN NO. 3-I

LOCATION: Inlet Baghouse OPERATORS: Pellier

	INITIAL	FINAL	
METER TEMPERATURE	102	104	103
METER READING	170.263	171.270	1.007
TIME	~~12~~ 730	753	23 min
FLOW RATE	3 cfh		
BAROMETRIC PRESSURE	29.75		

COMMENTS: Vacuum of 5" Hg

$$1.007 \times \frac{29.75}{29.92} \times \frac{530}{563} = 0.943 \text{ SCF}$$

GENERAL DATA SHEET

TYPE RUN - EPA #6 Martin Marietta

DATE: 9/10/75 RUN NO. 3-0

LOCATION: #3 Baghouse Stack #1 OPERATORS: McKendree

	INITIAL	FINAL	
METER TEMPERATURE	84°F	87°F	85.5
METER READING	848.769	849.542	0.773
TIME	0727 hrs	0743 hrs	Purge ending 16min 0759 hrs
FLOW RATE	3.5 cfh		
BAROMETRIC PRESSURE	29.75		

Leak Check < 0.001 cfm @ 15" Hg

COMMENTS:

$$0.773 \times \frac{29.75}{29.92} \times \frac{530}{545.5} = 0.747 \text{ SCF}$$

GENERAL DATA SHEET

TYPE RUN - SO_2 M-M

DATE: 9-10-75 RUN NO. 4-I

LOCATION: Baghouse Inlet OPERATORS: Pettis

	INITIAL	FINAL	
METER TEMPERATURE	132	132	132
METER READING	171.842	172.715	0.873
TIME	1410	1430	20 min
FLOW RATE	3 cfh		
BAROMETRIC PRESSURE	29.75		

COMMENTS: Fuse blew on probe heat about 5 min into run. pump was wide open + only pulling 2 scfh.

$$0.873 \times \frac{29.75}{29.92} \times \frac{530}{592} = 0.777$$

GENERAL DATA SHEET

TYPE RUN - EPA #6 Martin Marietta

DATE: 9/10/75 RUN NO. 4-0

LOCATION: #3 Baghouse stack #2 OPERATORS: McKenbree

	INITIAL	FINAL	
METER TEMPERATURE	106 °F	104 °F	105 °F avg
METER READING	854.794	855.563	0.769
TIME	1408 hrs	1423 hrs	purged till 15 min 1439
FLOW RATE	3.5 cfh		
BAROMETRIC PRESSURE	29.75" Hg		

Leak Rate < 0.001 cfm

COMMENTS:

$$0.769 \times \frac{29.75}{29.92} \times \frac{530}{565} = 0.717$$

GENERAL DATA SHEET

TYPE RUN - SO_2 M-M

DATE: 9-11-75 RUN NO. 5-I

LOCATION: Baghouse Inlet OPERATORS: Pellier

	INITIAL	FINAL	
METER TEMPERATURE	97	98	97.5
METER READING	173.267	174.158	0.891
TIME	803	824	21 min
FLOW RATE	~~[illegible]~~ 3scf		
BAROMETRIC PRESSURE	29.64		

COMMENTS:

$$.891 \times \frac{29.64}{29.92} \times \frac{530}{557.5} = 0.839$$

232
22

GENERAL DATA SHEET

TYPE RUN - EPA #6 Martin Marietta

DATE: 7/11/75 RUN NO. 5-0

LOCATION: #3 Baghouse Stack #2 OPERATORS: McCandree

	INITIAL	FINAL	
METER TEMPERATURE	80°F	80°F	80°F avg
METER READING	856.254	857.065	0.811 End purge
TIME	0800 hrs	0816 hrs	16 min 0832 hrs
FLOW RATE	3.5 cfh		
BAROMETRIC PRESSURE	29.64		

Leak rate < 0.001 cfm

COMMENTS:

$$.811 \times \frac{29.64}{29.92} \times \frac{530}{540} = 0.789$$

GENERAL DATA SHEET

TYPE RUN - SO_2 - M-M

DATE: 9-12-75 RUN NO. 6-I

LOCATION: Inlet to Baghouse OPERATORS: Pettis

	INITIAL	FINAL	
METER TEMPERATURE	93	93	93
METER READING	174.885	175.774	0.889
TIME	810	832	22 min
FLOW RATE	5 cfh		
BAROMETRIC PRESSURE	29.54		

COMMENTS: Lost power at 7:30 — then got started at 810

5" Hg. Vacuum

$$0.889 \times \frac{29.54}{29.92} \times \frac{530}{553} = 0.841$$

GENERAL DATA SHEET

TYPE RUN - EPA #6 Martin Marietta

DATE: 9/12/75 RUN NO. 6-0

LOCATION: #3 Baghouse Stack #2 OPERATORS: McKendree

	INITIAL	FINAL	
METER TEMPERATURE	84°F	84°F	84
METER READING	858.235	859.088	0.853
TIME	0809 ~~0745~~ hrs	0825 ~~0800~~ hrs	end purge 0842 16 min
FLOW RATE	3.5 cfh		
BAROMETRIC PRESSURE	29.54		

Leak Check 0 cfm @ 12" Hg

COMMENTS:

$$0.853 \times \frac{29.54}{29.92} \times \frac{530}{544} = 0.820 \text{ SCF}$$

SOURCE SAMPLING PROCEDURE – EPA METHOD 7 – NOx

Date 9/9/75

Company Martin Marietta

Project EPA #1

Sample Point #3 Baghouse Stack #1

Analyst

5-75-003-060 thru 0232

Sample Day	Sample Time	Sample No.	Stopper Flask No.	Initial Bar. Press. in Hg	Initial Flask Vacuum in Hg	Initial Temp. oF	Clean Up Analysis Day	Clean Up Analysis Time	Final Bar. Press. in Hg	Final Flask Vacuum in Hg	Final Temp. oF	ABS @ 420	TOTAL Dil. ml	FLASK Vol.-ABS ml	NOx Conc. lb/scf	NOx Conc. ppm
9/9	1640	1	1/1	29.82	27.90	95	9/10	11:10	29.75	-2.0	98					
	1641	2	10/10	"	28.10			11:15		-2.0	103					
	1642	3	3/3	"	28.00			11:20		-0.0	94					
	~~1657~~	~~1~~	~~14~~	"	~~27.60~~											
	1643	4	2/2	"	27.50			11:25		+.6	105					
	1657	5	~/17	"	27.7			12:40		+0.2	101					
	1658	6	9/9	"	27.6			1515		+0.5	98					
	1659	50/50 7	50/13	"	27.8			1520		-0.7	96					
	1659	8	15/15	"	27.1			1525		-0.3	97					
	1700	9	11/11	"	27.7			1535		-1.1	94					
	1710	10	7/7	"	27.9			1557		-0.1	92					
	1711	11	8/8	"	27.9			1555		-0.8	92					
	1712	12	42/4	"	[illegible]			1548		+0.1	92					
				"												
				"												

[redacted] Nos [redacted] 7, 8 [redacted] 10 [redacted] + [redacted] ch [redacted] 9/11/75 [redacted] 1 [redacted] pm [redacted]

SOURCE SAMPLING PROCEDURE – EPA METHOD 7 – NOx

Date 9/11/75

Company MARTIN MARIETTA C ALA

Project NOx C EPA METHOD 7

Sample Point BAG HOUSE OUTLET

Analyst W. McDONALD

Sample Day	Sample Time	Sample No.	Stopper Flask No.	Initial Bar. Press. in Hg	Initial Flask Vacuum in Hg	Initial Temp. oF	Clean Up Analysis Day	Clean Up Analysis Time	Final Bar. Press. in Hg	Final Flask Vacuum in Hg	Final Temp. oF	ABS @ 420	TOTAL Dil. ml	FLASK Vol.-ABS ml	NOx Conc. lb/scf	NOx Conc. ppm
													S-75-003-073			
9/11/75	0906 AM	1	50/50	29.64	27.50	82.0	9/12/75	08 50	29.54	-0.8	80°F		-073			
✓	0907 AM	2	42/4	29.64	28.0	82.0	9/12	07 55	29.54	-1.2	81°F		-074			
✓	0908 AM	3	7/7	29.64	28.2	82.0	9/12	07 57	29.54	-0.8	83°F		-075			
✓	0909 AM	4	8/8	29.64	28.4	82.0	9/12	08 00	29.54	-1.0	84°F		-076			
✓	0910 AM	5	39/12	29.64	28.3	82.0	9/12	08 02	29.54	-0.5	85°F		-077			
✓	0912 AM	6	30/16	29.64	27.9	82.0	9/12	08 05	29.54	-1.2	85°F		-078			
✓	1110	7	1/1	29.64	27.7 ~~27.0~~											
✓		8	10/10		27.8 ~~27.4~~											
✓		9	17/17		27.8 ~~27.7~~											
✓		10	9/9													
✓		11														
✓		12														

Flasks not used

SOURCE SAMPLING PROCEDURE - EPA METHOD 7 - NOx

Date 9-12-75

Company Martin - Marietta

Project 6912-19

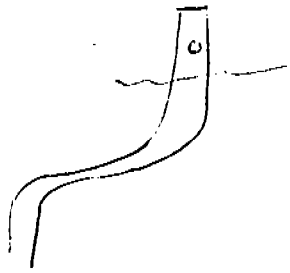
Sample Point Baghouse Outlet

Analyst

Sample Day	Sample Time	Sample No.	Flask No.	Initial Bar. Press. in Hg	Initial Flask Vacuum in Hg	Initial Temp. oF	Clean Up Analysis Day	Clean Up Analysis Time	Final Bar. Press. in Hg	Final Flask Vacuum in Hg	Final Temp. oF	ABS @ 420	TOTAL Dil. ml	FLASK Vol.-ABS ml	NOx Conc. lb/scf	NOx Conc. ppm
9/12	0947	1	11/11	29.54	28.0	87	9/13	1730	29.65	-2.2	81					
9/12	0948	2	9/9		28.2	87		1735		-1.8						
9/12	0949	3	10/10		28.3	86		1740		-1.6						
9/12	0950	4	1/1		28.1	86		1745		-2.2						
9/12	0951	5	7/17		27.8	86		1750		-1.0						
9/12	0952	6	15/15		28.1	86		1755		-1.6						

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Martin - Marietta
DATE 9-5-75
SAMPLING LOCATION Hydrator
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A)
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B)
STACK I.D., (DISTANCE A - DISTANCE B) 30
NEAREST UPSTREAM DISTURBANCE 4 diameters
NEAREST DOWNSTREAM DISTURBANCE 2 diameters
CALCULATOR Pelton



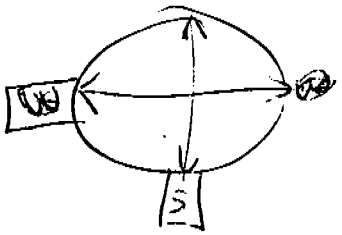
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
~~1~~	~~.014~~	~~30"~~	~~3/8~~		
2	.044		1 3/8		
3	.075		2 1/4		
4	.109		3 1/4		
5	.146		4 3/8		
6	.188		5 5/8		
7	.236		7 1/8		
8	.296		8 7/8		
9	.382		11 1/2		
10	.618		18 1/2		
11	.704		21 1/8		
12	.764		22 7/8		
13	.812		24 3/8		
14	.854		25 5/8		
15	.891		26 3/4		
16	.925		27 3/4		
17	.956		28 5/8		
~~18~~	~~.986~~		~~29 5/8~~		

EPA (Dur) 232
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT Martin - Marietta
DATE 9/13/75
LOCATION Hydrator
STACK I.D. 30"
BAROMETRIC PRESSURE, in. Hg 29.54
STACK GAUGE PRESSURE, in. H_2O -.01" H_2O
OPERATORS McDonald & Thalman



SCHEMATIC OF TRAVERSE POINT LAYOUT

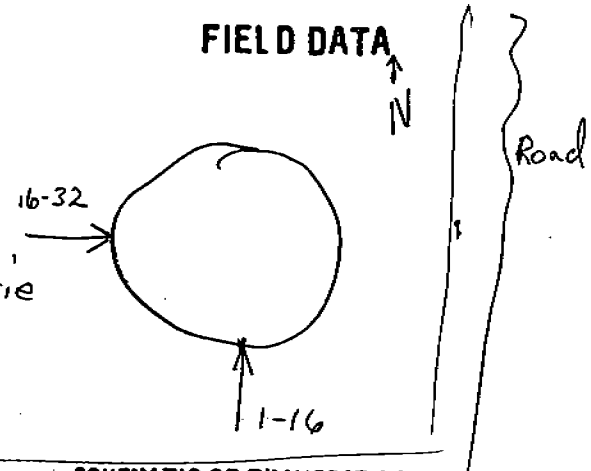
TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.03	206
2	.06	207
3	.07	206
4	.08	206
5	.07	205
6	.06	204
7	.06	180
8	.10	182
9	.11	198
10	.11	204
11	.14	203
12	.14	204
13	.12	205
14	.10	204
15	.07	204
16	.05	205
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.06	203
2	.09	202
3	.12	202
4	.13	202
5	.14	201
6	.15	202
7	.14	201
8	.14	202
9	.14	201
10	.14	201
11	.13	201
12	.12	201
13	.11	201
14	.11	201
15	.10	201
16	.09	201
AVERAGE		

EPA (Dur) 233
4/72

FIELD DATA

PLANT Martin-Marietta
DATE 9/12/75
SAMPLING LOCATION Hydraytor
SAMPLE TYPE EPA-5
RUN NUMBER 1
OPERATOR Thalman, McKendrie
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 29.54
STATIC PRESSURE, (P_s) -.01" H_2O
FILTER NUMBER (s) 38-12



PROBE LENGTH AND TYPE 4 ft.
NOZZLE I.D. .495
ASSUMED MOISTURE, % 85
SAMPLE BOX NUMBER MRC
METER BOX NUMBER MRC#3
METER $\Delta H_@$ ~~1.83~~ 2.012
C FACTOR .05
PROBE HEATER SETTING HI
HEATER BOX SETTING HI
REFERENCE Δp .68 → .76 → .70
Pts 1,2 3 4→

SCHEMATIC OF TRAVERSE POINT LAYOUT

4B Pitot Tube READ AND RECORD ALL DATA EVERY 4 MINUTES LEAK RATE .01 CFM @ 15 "Hg

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	Prob. Temp
1	0	1100	395.046	.09	.24	.24	204	87	87	1.0	238	87	232
2	4	1104	396.275	.11	.285	.285	202	88	87	1.5	269	54	240
3	8	1108	397.351	.12	.285	.285	202	89	87	2.0	306	83	262
4	12	1112	398.449	.12	.31	.31	199	90	88	2.0	319	82	279
5	16	1116	399.995	.11	.285	.285	199	91	90	2.0	326	81	284
6	20	1120	400.930	.14	.37	.37	199	93	89	2.0	322	81	291
7	24	1124	402.249	.13	.34	.34	201	93	89	2.0	317	81	289
8	28	1128	403.780	.12	.31	.31	205	94	89	2.0	315	88	271
9	32	1132	404.641	.12	.31	.31	203	93	89	3.0	312	77	269
* 10	36	~~1136~~ 1142	405.829	.13	.34	.34	204	91	89	2.0	311	81	308
11	40	~~1140~~ 1146	406.847	.12	.31	.31	205	91	89	2.0	304	78	293
12	44	~~1144~~ 1150	408.151	.12	.31	.31	205	91	89	3.0	309	77	287
13	48	~~1148~~ 1154	409.415	.13	.34	.34	203	92	89	3.0	310	78	281
14	52	~~1152~~ 1158	410.605	.15	.39	.39	201	92	88	3.0	311	79	277
15	56	~~1156~~ 1202	411.542	.13	.34	.34	196	92	89	3.0	308	78	274
16	60	~~1200~~ 1206	413.390	.11	.285	.285	196	92	88	3.2	309	79	263

*Change H_2O in Imp. 64 -- 414.603

PLANT Martin-Marietta DATE 9/12/75 RUN NO. 1 Stack

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	Probe
		1227											
1	*64	~~1210~~	414.603	0.14	.37	.37	201	90	88	3.2	307	86	307
2	68	1231	415.950	0.17	.45	.45	201	90	89	4.1	310	83	282
3	72	1235	416.—	0.19	.50	.50	203	91	88	4.8	310	82	276
4	76	1239	418.925	0.19	.50	.50	202	91	88	5.0	311	82	272
5	80	1243	420.493	0.18	.47	.47	202	91	88	5.2	313	84	269
6	84	1247	422.030	0.18	.47	.47	202	92	88	5.4	313	86	273
7	88	1251	423.540	0.08	.21	.21	198	92	89	3.5	313	90	273
8	92	1255	424.684	0.08	.21	.21	201	91	89	3.0	314	97	310
*9	96	1304	425.700	0.05	.13	.13	202	92	89	3.0	317	96	305
10	100	1308	426.580	~~0.09~~ .10	.26	.26	202	93	90	4.0	322	97	311
11	104	1312	427.640	.10	.26	.26	202	93	90	4.2	324	97	307
12	108	1316	428.780	.08	.21	.21	199	93	90	6.0	326	96	299
13	112	1320	429.950	.08	.21	.21	198	94	91	5.0	328	96	302
14	116	1324	431.070	~~.09~~ .10	.33 ~~.26~~	.33 ~~.26~~	197	94	91	5.0	328	96	302
* 15	120	1328	432.240	.08	.275	.275	199	95	91	6.5	331	96	302
16	124	1332	433.420	.09	.30	.30	~~198~~ 200	95	91	7.0	332	95	296
	128	1336	434.648										

* changed Nomo (200c)

* H_2O empty

146 X5
250
248
252
156
216
162

CLEAN-UP DATA

Plant Martin Marietta

Comments:

Date 9/12/75

Sampling Location Hydrator

Sample Type EPA #5

Run Number No. 1

Sample Box Number

Clean-up Man Cox Cush McDonald

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	2494 ml	452 ml	239 ml	ml	ml
Initial Vol.	100 ml	100 ml	0 ml	ml	ml
Net Vol.	2394 ml	352 ml	239 ml	ml	ml

Total Net Volume in Impingers 2985 ml

SILICA GEL

Final Weight	219.5 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	19.5 g	g	g

Total Net Weight in Silica Gel 19.5 g

Total Moisture 3004.5 g

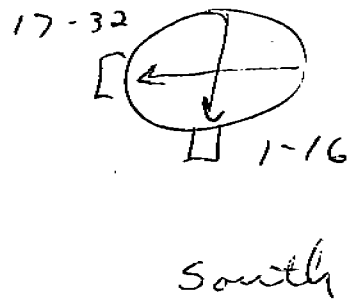
Filter Number(s) 38-12

MRC 7/73

FIELD DATA

Pitot # 4B

PLANT Martin-Marietta
DATE 9/17/75
SAMPLING LOCATION Hydrator
SAMPLE TYPE EPA-5
RUN NUMBER 2
OPERATOR Peltier, McDonald
AMBIENT TEMPERATURE 90°F
BAROMETRIC PRESSURE 29.51
STATIC PRESSURE, (P_s) -.08
FILTER NUMBER (s) 39-21



PROBE LENGTH AND TYPE 4' WR
NOZZLE I.D. .495
ASSUMED MOISTURE, % 78
SAMPLE BOX NUMBER
METER BOX NUMBER 3
METER $\Delta H_@$ 2.012
C FACTOR
PROBE HEATER SETTING HI
HEATER BOX SETTING HI
REFERENCE Δp ~~.85~~ ~~.44~~ .43

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 4 MINUTES LEAK RATE ____ CFM @ ____ "Hg

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				
1	0	944	622.689	.12	.55	.55	204	87	86	4.0	252	69	Pitot
2	4	948	624.270	.14	.625	.625	202	87	86	4.2	280	85	3
3	8	952	625.990	.16	.70	.70	201	89	87	4.4	305	92	
4	12	956	627.840	.16	.70	.70	202	90	87	4.4	307	85	
5	16	1000	629.690	.15	.67	.67	203	90	88	5.0	309	80	
6	20	1004	631.440	.15	.67	.67	202	91	89	4.5	318	75	
1010 7	24	1014	633.300	.15	.67	.67	201	92	89	5.0	327	74	252
8	28	1018	635.075	.16	.70	.70	202	92	89	5.5	326	75	
9	32	1022	636.880	.16	.70	.70	202	92	90	7.0	337	78	
10	36	1026	638.740	.16	.70	.70	205	92	90	9.0	329	83	
11	40	1030	640.610	.16	.70	.70	203	92	90	7.5	339	85	
12	44	1040	642.405	.19	.83	.83	198	94	91	5.0	331	75	
13 *	48	1044	644.300	.19	.83	.83	198	94	91	5.6	324	73	
14	52	1048	646.305	.19	.83	.83	198	94	91	6.0	332	74	
15	56	1052	648.360	.18	.79	.79	195	93	91	6.0	329	75	247
16	60	1056	650.370	.19	.83	.83	197	94	92	6.5	319	76	
*	64	1100	652.345										

* emptied H_2O from impingers

$CaO + H_2O$

$CaOH_2$

PLANT Martin - Marietta DATE 9-17-75 RUN NO. 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
1	64	1108	652.345	.16	.70	.70	198	94	92	5.0	358	74
2	68	1112	654.100	.16	.70	.70	202	93	92	7.0	362	74
3	72	1116	655.940	.16	.70	.70	201	93	92	8.5	353	77
4	76	1120	657.950	.16	.70	.70	200	94	92	7.2	359	80
5	80	1124	659.720	.16	.70	.70	197	94	92	7.5	367	81
6	84	1128	661.565	.18	.79	.79	202	94	93	10.0	362	77
7 *	88	1138	663.564	.25	1.00	1.08	200	94	93	10.0	365	75
8	92	1142	665.620	.19	.83	.83	202	94	93	10.0	365	76
9	96	1146	667.660	.11	.49	.49	199	95	93	6.0	369	80
10	100	1150	669.330	.08	.365	.365	196	95	93	5.5	372	79
11	104	1154	670.720	.12	.54	.54	198	95	93	6.5	367	78
12	108	1158	672.315	.13	.58	.58	198	95	93	7.5	373	77
13 xx	112	1202	674.010	.13	.59	.59	200	95	93	9.0	372	79
14 *	116	1210	675.675	.11	.49	.49	199	96	94	7.0	376	77
15	120	1214	677.205	.11	.49	.49	200	95	94	7.5	371	75
16	124	1218	678.800	.08	.37	.37	198	95	94	10.0	372	77
	128	1222	680.206									

Prob

266

* Emptied impingers

xx changed NOMO

CLEAN-UP DATA

Plant Martin-Marietta
Date 9/17/75
Sampling Location Hydrator
Sample Type Method 5
Run Number 2
Sample Box Number
Clean-up Man McDonald + Son

Comments:
Filter S-75-003-090
F 1/2 Ace S-75-003-091
B 1/2 H_2O S-75-003-092
B 1/2 Ace S-75-003-093
B 1/2 H_2O/Et_2O Ext. S-75-003-094

IMPINGERS

	#1	#2	#3	#4	#5	
Final Vol.	3039 ml	432 ml	270 ml	ml	ml	270
Initial Vol.	100 ml	100 ml	0 ml	ml	ml	332
Net Vol.	2939 ml	332 ml	270 ml	ml	ml	2939
						3541

Total Net Volume in Impingers 3541 ml

SILICA GEL

Final Weight	244.0 g	g	g
Initial Weight	200.0 g	g	g
Net Weight	44.0 g	g	g

Total Net Weight in Silica Gel 44.0 g

Total Moisture 3585 g

Filter Number(s) 39-24

182
418
481
~~403~~
495
489
461
3039

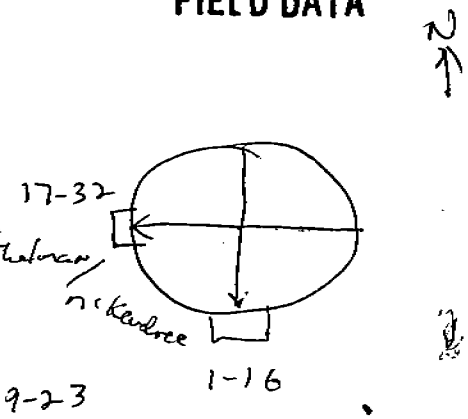
MRC 7/73

* drained excess water from Imp. #1, 2, & 3, + put in 300g dry silica gel

** drained imp., put in new filter, + 300g silica gel leaked check 0.014 @ 15.9" Hg

FIELD DATA

PLANT Martin - Marietta
DATE 9-17-75
SAMPLING LOCATION Hydrator
SAMPLE TYPE EPA-5
RUN NUMBER 3
OPERATOR Pether - McDonald / Thalman / McKendree
AMBIENT TEMPERATURE 95
BAROMETRIC PRESSURE 29.51
STATIC PRESSURE, (P_s) -.08
FILTER NUMBER (s) 53 21 38-25, 39-23



SCHEMATIC OF TRAVERSE POINT LAYOUT

Pitot # 4B
PROBE LENGTH AND TYPE 4'
NOZZLE I.D. .495
ASSUMED MOISTURE, % 28
SAMPLE BOX NUMBER
METER BOX NUMBER 3
METER $\Delta H_@$ 2.012
C FACTOR
PROBE HEATER SETTING HI
HEATER BOX SETTING HI
REFERENCE Δp .43

READ AND RECORD ALL DATA EVERY 4 MINUTES LEAK RATE .04 CFM @ 15 "Hg

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	PROBE TEMP
			681.981		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
1	0	1402	681.981	0.08	0.37	0.37	204	89	89	3.2	170	78	
2	4	1406	683.250	0.10	0.45	0.45	203	91	89	8.0	214	75	
3	8	1410	684.745	0.12	0.54	0.54	201	91	89	7.0	247	78	253
4	12	1414	686.325	0.11	0.49	0.49	204	92	90	10.0	268	79	264
5	16	1418	687.925	0.10	0.45	0.45	205	92	90	10.0	284	86	273
6	20	1422	689.750	0.17	0.76	0.76	200	93	90	11.0	286	95	280
7	24	1426	691.885	0.17	0.76	0.76	201	94	91	12.4	299	93	286
8 *	28	1430	693.711	0.15	0.67	0.67	201	94	92	6.0	317	89	
9	32	1502	695.935	0.15	0.67	0.67	204	94	92	13.4	322	79	
10	36	1506	697.350	0.15	0.67	0.67	201	94	92	14.5	322	85	
11	40	1510	699.200	0.15	0.67	0.67	202	94	92	15	320	101	
12	44 **	1514 (1512)	701.042	0.15	0.67	0.67	206	93	92	3.3	252	85	
13	48	1556	702.700	0.15	0.67	0.67	201	94	92	5.2	298	79	
14	52	1600	704.680	0.15	0.67	0.67	201	95	92	6.4	330	76	
15	56	1604	706.375	0.14	0.635	0.635	200	95	93	7.0	320	76	
16	60	1608	708.175	0.145	0.65	0.65	200	96	93	8.9	316	77	319

*** [redacted] water, [redacted] filter + silica gel
** drained water

PLANT Martin-Marietta Hydrometer DATE 9/12/75 RUN NO. 3

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
	64	1612	709.999									
17	64	1619	709.999	0.14	0.64	0.64	205	96	93	7.5	308	83
18	68	1623	711.885	0.145	0.655	0.655	204	95	94	15	312	87
19	72	1627	713.550	0.14	0.64	0.64	203	96	94	15.8	309	95
20	76	1631	715.475	0.145	0.655	0.655	205	96	94	20.2	305	91
21	80**	1647	717.210	0.145	0.655	0.655	205	96	95	8.0	247	78
22	84	1651	719.050	0.17	0.76	0.76	205	96	95	12.0	272	78
23	88	1655	721.000	0.165	0.735	0.735	205	96	95	14.0	284	81
24	92**	1659	723.006	0.165	0.735	0.735	205	97	95	4.5	296	82
25	96	1700	724.850	0.06	0.27	0.27	202	97	95	3.2	306	75
26	100	1714	726.280	0.07	0.294	0.294	205	97	96	3.4	308	73
27	104	1717	727.465	0.08	0.37	0.37	207	97	95	4.5	311	73
28	108	1721	728.945	0.09	0.425	0.425	205	98	95	5.8	317	74
29	112	1725	730.415	0.09	0.425	0.425	203	98	95	6.0	318	75
30	116	1729	731.950	0.10	0.47	0.47	202	98	96	6.2	317	78
31	120	1733	733.415	0.06	0.284	0.284	195	98	96	5.4	316	80
32	124	1737	734.680	0.06	0.284	0.284	195	98	96	5.4	315	80
	128	1741	735.970									82

305

CLEAN-UP DATA

Plant Martin Marietta
Date 9/17/75
Sampling Location Hydrator
Sample Type Method 5
Run Number 3
Sample Box Number
Clean-up Man McDonald & Cook

Comments: Filter - S-75-003-095
A 1/2 Acetone S-75-003-096
B 1/2 H_2O S-75-003-097
B 1/2 Acetone S-75-003-098

IMPINGERS

	#1	#2	#3	#4	#5
Final Vol.	3471 ml	496 ml	178 ml	ml	ml
Initial Vol.	100 ml	100 ml	0 ml	ml	ml
Net Vol.	3371 ml	396 ml	178 ml	ml	ml

Total Net Volume in Impingers 3945 ml

SILICA GEL

Final Weight	336.3 g	330.9 g	544.2 g
Initial Weight	300 g	300.9 g	500.0 g
Net Weight	36.3 g	30.9 g	44.2 g

Total Net Weight in Silica Gel 111.4 g

Total Moisture 4056.4 g

Filter Number(s) 5321(A)
38-25 (B)
39-23 (C)

55
490
491
475
492
496
484
488

MRC 7/73

APPENDIX G

ANALYTICAL DATA SHEETS

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/9/75

SAMPLING LOCATION Baghouse Stack #1

SAMPLE TYPE EPA-5

RUN NUMBER 1-1

SAMPLE BOX NUMBER 4

CLEAN-UP MEN McDonald

ANALYST S. Kulich

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-032 31.6 mg

FILTER NUMBER 0.3580 g
0.3467 tare
0.0113 g

CONTAINER S-75-003-031 11.3 mg

FRONT HALF SUBTOTAL 42.9 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-033 12.6 mg

ETHER-CHLOROFORM EXTRACTION 4.2 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-034 14.6 mg

BACK HALF SUBTOTAL 31.4 mg

TOTAL WEIGHT 74.3 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	_____ g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/10/75

SAMPLING LOCATION Stack #2

SAMPLE TYPE EPA-5

RUN NUMBER 2-2

SAMPLE BOX NUMBER 4

CLEAN-UP MEN Cook + Cox

ANALYST L. Kulik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-042 11.7 mg

FILTER NUMBER 0.3727 — CONTAINER S-75-003-041 9.5 mg

0.3632 tare

0.0095 g

FRONT HALF SUBTOTAL 21.2 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-043 8.6 mg

ETHER-CHLOROFORM EXTRACTION 0.4 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-044 9.5 mg

BACK HALF SUBTOTAL 18.5 mg

TOTAL WEIGHT 39.7 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	_____ g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/10/75

SAMPLING LOCATION Baghouse Stack #1

SAMPLE TYPE EPA-5

RUN NUMBER 1-2

SAMPLE BOX NUMBER 4

CLEAN-UP MEN Cook-Cox

ANALYST F. Rubik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-037 17.3 mg

FILTER NUMBER 0.3808

0.3667 tare

0.0141 g

CONTAINER S-75-003-036 14.1 mg

FRONT HALF SUBTOTAL 31.4 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-038 9.0 mg

ETHER-CHLOROFORM EXTRACTION 5.4 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-039 8.4 mg

BACK HALF SUBTOTAL 22.8 mg

TOTAL WEIGHT 54.2 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	_____ g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/10/75

SAMPLING LOCATION #3 Baghouse #3 Stack

SAMPLE TYPE EPA-5

RUN NUMBER 3-1

SAMPLE BOX NUMBER

CLEAN-UP MEN McDonald

ANALYST L. Kulik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-047 16.1 mg

FILTER NUMBER 0.3613

0.3500 tare

0.0113 g

CONTAINER S-75-003-046 11.3 mg

FRONT HALF SUBTOTAL 27.4 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S75-003-048 20.7 mg

ETHER-CHLOROFORM EXTRACTION 9.2 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-049 11.3 mg

BACK HALF SUBTOTAL 41.2 mg

TOTAL WEIGHT 68.6 mg

MOISTURE

IMPINGERS

FINAL VOLUME ____ ml

INITIAL VOLUME ____ ml

NET VOLUME ____ ml

SILICA GEL

FINAL WEIGHT	____ g	____ g	____ g
INITIAL WEIGHT	____ g	____ g	____ g
NET WEIGHT	____ g	____ g	____ g

TOTAL MOISTURE ____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/11/75

SAMPLING LOCATION #3 Baghouse #3 Stack

SAMPLE TYPE EPA-5

RUN NUMBER 3-2

SAMPLE BOX NUMBER 5

CLEAN-UP MEN Cay + Cash

ANALYST F. Kulik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-052 23.0 mg

FILTER NUMBER 0.3639
0.3461 tare
0.0178 g

CONTAINER S-75-003-051 17.8 mg

FRONT HALF SUBTOTAL 40.8 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-053 12.8 mg

ETHER-CHLOROFORM EXTRACTION 10.0 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-054 8.8 mg

BACK HALF SUBTOTAL 31.6 mg

TOTAL WEIGHT 72.4 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	_____ g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/12/75

SAMPLING LOCATION #3 Baghouse - Stack #2

SAMPLE TYPE EPA-5

RUN NUMBER 2-3

SAMPLE BOX NUMBER 5

CLEAN-UP MEN Cash, Cox, McDonald

ANALYST F. Kulik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-023-057 9.1 mg

FILTER NUMBER 0.3635
0.3574 tare
0.0061 g

CONTAINER S-75-023-056 6.1 mg

FRONT HALF SUBTOTAL 15.2 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-022-058 6.1 mg

ETHER-CHLOROFORM EXTRACTION 3.6 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-022-059 8.4 mg

BACK HALF SUBTOTAL 18.1 mg

TOTAL WEIGHT 33.3 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	_____ g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/12/75

SAMPLING LOCATION Hydrator

SAMPLE TYPE EPA-5

RUN NUMBER 1

SAMPLE BOX NUMBER 3

CLEAN-UP MEN Cash, Coy, McDonald

ANALYST J Kulik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-086 22.1 mg

FILTER NUMBER 0.6865
0.4300 face
0.2565 g

CONTAINER S-75-003-085 256.5 mg

FRONT HALF SUBTOTAL 278.6 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-088 10.6 mg

ETHER-CHLOROFORM EXTRACTION 20.1 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-087 13.4 mg

BACK HALF SUBTOTAL 44.1 mg

TOTAL WEIGHT 322.7 mg

MOISTURE

IMPINGERS

FINAL VOLUME ____ ml

INITIAL VOLUME ____ ml

NET VOLUME ____ ml

SILICA GEL

FINAL WEIGHT	____ g	____ g	____ g
INITIAL WEIGHT	____ g	____ g	____ g
NET WEIGHT	____ g	____ g	____ g

TOTAL MOISTURE ____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/15/75

SAMPLING LOCATION Hydrator

SAMPLE TYPE EPA-5

RUN NUMBER 2

SAMPLE BOX NUMBER 3

CLEAN-UP MEN McDonald

ANALYST F. Kubik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-091 65.5 mg

FILTER NUMBER 0.8231

0.3791 tare

0.4440 g

CONTAINER S-75-003-090 <144.0 mg

FRONT HALF SUBTOTAL 509.5 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-092 0.3 mg

ETHER-CHLOROFORM EXTRACTION 8.3 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-093 8.2 mg

BACK HALF SUBTOTAL 16.8 mg

TOTAL WEIGHT 526.3 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	g	g	g
INITIAL WEIGHT	g	g	g
NET WEIGHT	g	g	g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Martin Marietta

DATE 9/17/75

SAMPLING LOCATION Hydrator

SAMPLE TYPE EPA-5

RUN NUMBER 3

SAMPLE BOX NUMBER 3

CLEAN-UP MEN McDonald + Cash

ANALYST F. Kulik

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER S-75-003-096 94.4 mg

	A	B	C
FILTER NUMBER	0.7567	0.6896	0.6282
tare wt.	0.4229	0.3853	0.3803
	0.3338 g	0.3043 g	0.2479 g

CONTAINER S-75-003-095 886.0 mg

FRONT HALF SUBTOTAL 980.4 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-097 7.0 mg

ETHER-CHLOROFORM EXTRACTION 23.0 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER S-75-003-098 14.8 mg

BACK HALF SUBTOTAL 44.8 mg

TOTAL WEIGHT 1025.2 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

SILICA GEL

FINAL WEIGHT	_____ g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____ g

EPA (Dur) 231
4/72

ANALYSIS REPORT	PROJECT NUMBER 3-680-7601-6912-19
TO Tom Pelhei	FROM L. A. Kulik
DATE 10/25/75	CC

Total % Sulfur of combusted coal sample
Method: Parr Bomb Calorimeter Manual, Manual #120 pg 71

Sample #	g Sample	g $BaSO_4$	% S	Avg % S
S-75-002-002	1.0022	0.0657	0.90	1.02
"	1.0736	0.0883	1.13	
S-75-002-005	1.1335	0.0615	0.745	0.722
"	1.0098	0.0504	0.699	
S-75-002-008	1.0241	0.0713	0.956	0.953
"	1.0113	0.0699	0.949	
S-75-002-011	1.0508	0.0881	1.15	1.14
"	1.0500	0.0867	1.13	
S-75-002-014	1.0117	0.0577	0.783	0.778
"	1.0576	0.0595	0.773	
S-75-002-017	1.0847	0.0709	0.898	0.897
"	1.0051	0.0656	0.896	

Calculation: $\frac{\text{wt (g) } BaSO_4 \times 13.734}{\text{wt sample (g)}} = \%S$

ANALYSIS REPORT	PROJECT NUMBER 13-000-760.01-6912-19
TO Tom Peltier	FROM F. A. Kulik
DATE 11/25/75	CC

MRC NB pg 167374 Page 1

% Sulfur by ASTM C25-72 - Standard Bromine Method for Total Sulfur

Sample #	g Sample	g $BaSO_4$	% S	Avg % S
S-75-003-003	1.0017	0	0	0.002
"	1.0009	0.3	0.004	
S-75-003-006	1.0023	0.8	0.011	0.014
"	1.0027	1.2	0.016	
S-75-003-009	1.0001	1.6	0.008	0.008
"	1.0010	1.5	0.007	
S-75-003-012	1.0007	2.3	0.032	0.024
"	1.0008	1.2	0.016	
S-75-003-015	1.0020	7.0	0.096	0.055
"	1.0008	1.0	0.014	
S-75-003-018	1.0015	3.2	0.044	0.045
"	1.0057	3.4	0.046	
S-75-003-001	1.0019	77.0	1.06	1.07
"	1.0001	78.7	1.08	
S-75-003-004	1.0007	93.6	1.28	1.29
"	1.0026	94.5	1.29	

Calculation: $\frac{\text{wt } BaSO_4 (g) - \text{wt of } BaSO_4 \text{ in Blank} \times 13.734}{\text{g sample}} = \%S$

ANALYSIS REPORT	PROJECT NUMBER 13-000-760.01-6912-19
TO T. Peltier	FROM F.O. Kulik
DATE 11/25/75	CC

page 2

Sample #	g Sample	g $BaSO_4$	% S	Avg % S
S-75-003-010	1.0920	122.2	1.54	1.56
"	1.0031	115.2	1.58	
S-75-003-013	1.0116	110.8	1.50	1.56
"	1.0004	117.6	1.61	
S-75-003-016	1.0078	106.0	~~1.46~~ 1.44	1.44
"	1.0056	105.3	1.44	
S-75-003-007	1.0019	72.5	0.994	0.970
S- "	1.0031	69.0	0.945	

Baghouse dust

APPENDIX H

SAMPLING AND ANALYTICAL PROCEDURES

SAMPLING AND ANALYTICAL METHODS

1. Methods 1 through 4 and 6 and 7 from the Federal Register, Vol. 36, No. 247, December 23, 1971, were followed during the sampling at the Martin-Marietta in Calera, Alabama.

2. Method 5 from the Federal Register, Vol. 36, No. 159, August 17, 1971, was followed during the particulate sampling at Martin-Marietta. The clean-up procedure used followed the guidelines of the above Federal Register, and "Specifications for Incinerator Testing at Federal Facilities," U. S. Department of Health, Education, and Welfare publication, October 1967.

3. Method 9 from the Federal Register, Vol. 39, No. 219, November 12, 1974, was used to determine the visible emissions.

4. Method 10 from the Federal Register, Vol. 39, No. 47, March 8, 1974, was followed during the carbon monoxide sampling and analysis.

5. The total sulfur analysis of the coal collected during the Method 6 runs was performed according to ASTM D271-70.

6. The total sulfur analysis of the product and the baghouse dust was performed according to ASTM Designation: C25-72, "The Standard Methods of Chemical Analysis of Limestone, Quicklime, and Hydrated Lime."
(See copy on following pages.)

Standard Methods of

CHEMICAL ANALYSIS OF LIMESTONE, QUICKLIME, AND HYDRATED LIME[1]

This Standard is issued under the fixed designation C 25; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

23. Total Sulfur

23.1 *Standard Bromine Method*—Weigh 1 g of the prepared sample. Add approximately 0.5 g of Na_2CO_3. Mix thoroughly in a porcelain crucible (Note 27) and heat gently until sintered. Then ignite for 15 min at a temperature of approximately 1000 C, taking care to allow access of air to the contents of the crucible. Cool and place the crucible in a 250-ml beaker and cover with hot water. Add 10 ml of bromine water, then 30 ml HCl (1+1) and boil until solution is complete and all bromine has been expelled. Remove the crucible, washing it with water. Add a few drops of methyl red and render the solution alkaline with NH_4OH (1+1). Boil the solution for 1 or 2 min, filter, and wash with hot water. To the filtrate add 5 ml of HCl (1+1), adjust the volume to about 200 ml, bring the solution to boiling, and while boiling add 10 ml of hot $BaCl_2$ (10 percent). Allow to stand overnight. Filter, wash with hot water, ignite, and weigh as $BaSO_4$.

NOTE 27—It is usually desirable to make a fusion in a platinum crucible. However, it has been found that with limestones very high in impurities, when the fusion is made in a muffle, the damage to platinum ware is considerable. It has been proved that the use of porcelain crucibles introduces no appreciable error.

23.2 *Alternative Leco Method:*

23.2.1 *Description*—The total sulfur in various types of materials can be determined accurately by the Leco automatic titrator and high frequency induction furnace. The sulfur in the sample burns to SO_2 in the furnace and is carried to the titrator by the oxygen stream. The gas enters a titration vessel containing HCl, KI, starch, and just enough KIO_3 to release some free iodine to turn the starch blue. The SO_2 bleaches the blue color and KIO_3 solution is added automatically to maintain the blue color. When all the SO_2 has been released, the blue color no longer fades and the amount of KIO_3 solution used is read on a buret directly as percent sulfur.

NOTE 28—The Leco instrument should be standardized by using a calcium oxide of known sulfur content as determined by the bromine method in 21.1.

23.2.2 *Apparatus:*

23.2.2.1 *Induction Furnace*, "S" modification, Leco Model No. 521.

23.2.2.2 *Automatic Titrator*, Leco Model No. 532.

23.2.2.3 *Oxygen Tank and Regulators.*

23.2.2.4 *Purifying Train*, Leco Model No. 516.

23.2.2.5 *Combustion Crucibles*, Leco Model No. 528-120.

23.2.2.6 *Crucible Covers*, Leco Model No. 528-41.

23.2.2.7 *Glass Accelerator Scoop*, Leco Model No. 503-32.

23.2.2.8 *Starch Dispenser.*

23.2.2.9 *Timer*, Leco Model No. 593-100.

23.2.2.10 *Loading Funnel*, Leco Model No. 503-31.

23.2.3 *Reagents:*

23.2.3.1 *Copper Ring Accelerator*, Leco Catalog No. 550-184.

23.2.3.2 *Hydrochloric Acid* (HCl) 35 percent, Baker Catalog No. 9535.

23.2.3.3 *Low-Sulfur Powdered Iron*, Leco Catalog No. 501-78.

23.2.3.4 *Phenylmercuric Acetate*, MC&B Catalog No. P 5027.

23.2.3.5 *Potassium Iodate* (KIO_3) crystal, Baker Catalog No. 3156.

23.2.3.6 *Potassium Iodide* (KI) crystal, Baker Catalog No. 3162.

23.2.3.7 *Starch*, water-soluble, Baker Catalog No. 4006.

23.2.3.8 *Tin Metal Accelerator*, Leco Catalog No. 501-76.

23.2.4 *Solutions:*

23.2.4.1 *Hydrochloric Acid*—Dilute 15 ml of hydrochloric acid to 1 liter with water.

23.2.4.2 *Starch*—Weigh 9.0 g of starch into a small beaker. Add 5 to 10 ml of water and stir into a smooth paste. Add starch slowly while stirring into 500 ml of boiling water. Cool and add 15 g of KI. Transfer the solution to a 1-liter volumetric flask, shake well, and dilute to volume. Discard any starch solution that imparts a red tinge to the blue color when titrating. To help preserve the starch solution, add 0.01 g of phenylmercuric acetate.

23.2.4.3 *Potassium Iodate, Standard Solution*—Accurately weigh 0.22269 g of KIO_3. Correct this mass for purity. Transfer carefully into a 1-liter volumetric flask and dilute to volume with water. The solution is stable for at least 3 months. For a 0.500-g sample mass, the buret reads directly in percent sulfur.

23.2.5 *Procedure:*

23.2.5.1 Allow 15 min for the electronics in the furnace and titrator to warm up.

23.2.5.2 Weigh 0.500 + 1.0 mg of prepared sample and brush carefully into the crucible using the loading funnel.

23.2.5.3 Add accelerators to the crucible using level scoops in the following order: (*1*) 1 scoop of tin metal, (*2*) 1 scoop of iron powder, and (*3*) 1 copper ring.

23.2.5.4 Cover the crucible with a crucible cover. Do not reuse crucibles or covers.

23.2.5.5 Run a blank determination for each series of determination, that is, all accelerators and no sample.

23.2.5.6 Place the sample on the pedestal and lift into position in the combustion tube.

23.2.5.7 With the oxygen flow set at 1.0 liter/min, add the HCl to the middle of the bell-shaped portion of the titration vessel. Always fill to the same point.

23.2.5.8 Add one measure of starch solution to the titration vessel.

23.2.5.9 Turn the double throw switch to the END POINT position (down). Allow the instrument to set the end point. After the indicator light (for solenoid valve) has stopped blinking, place the switch in the NEUTRAL position and fill the KIO_3 buret. Turn the switch to the TITRATE position.

23.2.5.10 Set the GRID CURRENT TAP Switch to "Low," "Medium," or "High" position. Determine the position on a test run, with the sample and accelerators that will give a complete burn-off above 350 mA as indicated on the PLATE CURRENT AMMETER.

23.2.5.11 Set the automatic timer to the time required to combust the sample completely as follows:

Sample	Time, min
Quicklime	8
Hydrated lime	10
Limestone	12

23.2.5.12 After the furnace has shut off, read directly in percent sulfur.

23.2.5.13 Report the analysis as percent total sulfur.

APPENDIX I

SAMPLING LOG

SAMPLING LOG

Run No.*	Location	Date	On	Off	Total Run Time, min.
S 1-I	Baghouse Inlet	9-9	1001	1016	15
S 1-0	Baghouse, Stack 1	"	1005	1032	27
P 1-1	" " 1	"	1136 1239 1308	1230 1251 1414	132
C 1	Baghouse Outlet	"	1130	1215	45
S 2-I	" Inlet	"	1328	1344	16
S 2-0	Baghouse, Stack 1	"	1330	1350	20
N 1-12	" " 1	"	1640	1712	32
S 3-I	Baghouse Inlet	9-10	730	753	23
S 3-0	Baghouse, Stack 1	"	727	743	16
P 2-2	" " 2	"	823 1017	929 1123	132
P 1-2	" " 1	"	823 1017	929 1123	132
C 2	Baghouse Outlet	"	830	930	60
P 3-1	Baghouse, Stack 3	"	1305 1438	1412 1544	132
S 4-I	Baghouse Inlet	"	1410	1430	20
S 4-0	Baghouse, Stack 2	"	1408	1423	15
S 5-I	Baghouse Inlet	9-11	803	824	21
S 5-0	Baghouse, Stack 2	"	800	816	16

SAMPLING LOG - (con't.)

Run	No.*	Location	Date	On	Off	Total Run Time, min.
N	1-6	Baghouse Outlet	9-11	906	912	6
P	3-2	Baghouse, Stack 3	"	800	906	
				930	1036	132
C	3	" Outlet	"	806	856	50
S	6-I	" Inlet	9-12	810	832	22
S	6-0	Baghouse, Stack 2	"	809	825	16
P	2-3	" " 2	"	821	927	
				954	1100	132
C	4	Baghouse Outlet	"	830	920	50
N	1-6	" "	"	947	952	5
P	1	Hydrator	"	1100	1132	
				1138	1210	
				1227	1259	
				1304	1336	128
P	2	"	9-17	9411	1004	
				1010	1030	
				1036	1100	
				1108	1128	
				1134	1202	
				1206	1222	128
P	3	"	"	1402	1430	
				1458	1514	
				1552	1612	
				1619	1631	
				1643	1659	
				1705	1741	128

P - Method 5
S - Method 6
N - Method 7
C - Method 10

APPENDIX J

JOB PARTICIPANTS

Project Participants

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