REPORT NO. 76-LIM-12

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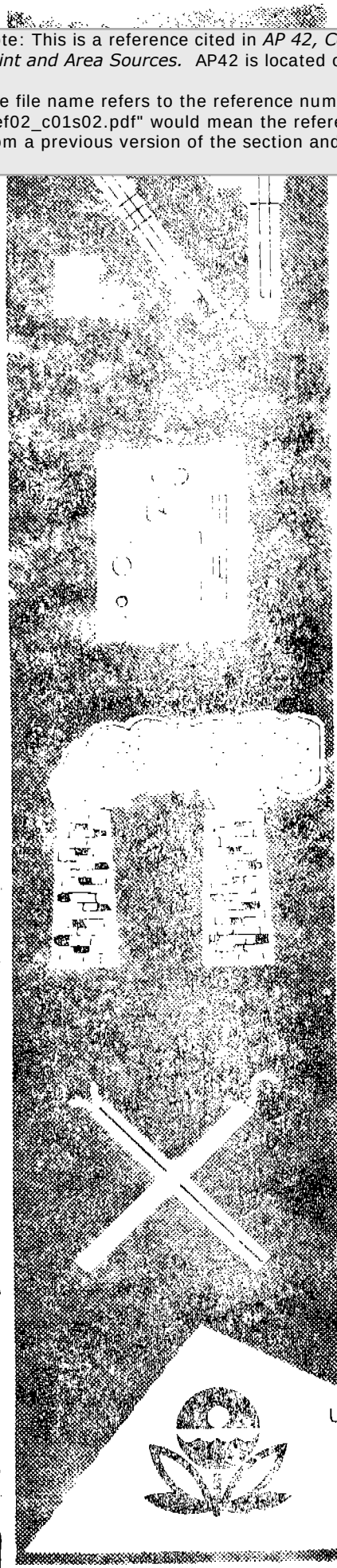
AP-42 Section 11.17
Reference 24
Report Sect. 4
Reference 21



AIR POLLUTION EMISSION TEST

FINAL REPORT

Kilns 4, 5, and 6

MARTIN-MARIETTA CHEMICAL CORPORATION

Woodville, Ohio

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Emission Measurement Branch
Research Triangle Park, North Carolina

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I. INTRODUCTION

Under the Clean Air Act of 1970 the Environmental Protection Agency is charged with the establishment of standards of performance for new or modified stationary sources which may contribute significantly to air pollution. A performance standard is based on the best emission reduction systems which have been shown to be technically and economically feasible.

In order to set realistic performance standards, accurate data on pollutant emissions is usually gathered from the stationary source category under consideration.

The three rotary kilns at the Martin Marietta Chemical Corporation, Woodville, Ohio are equipped with a baghouse for air pollution control and were selected by OAQPS for an emission testing program. In addition to obtaining atmospheric sulfur dioxide emission data, testing was conducted at each of the three inlet streams in attempt to quantify any sulfur dioxide removal by the baghouse.

Kiln No. 4 is a rotary unit producing 720 tons per day of soft-burned dolomitic lime. Kiln No. 5 is a rotary unit producing 960 tons per day of soft-burned lime. Kiln No. 6 is also a rotary unit, producing 400 tons per day of dead-burned dolomite. Kilns 4 and 5 are equipped with feed preheaters. Each of the three exhaust streams passes through separate mechanical particulate collectors before they are combined at the entrance plenum to the shared baghouse. The baghouse is a Western Precipitation

closed, vacuum-type with reverse-air cleaning. There are twenty-two compartments, with each compartment equipped with a separate fan and exhaust stack.

The fuel used in each kiln is high sulfur (2.4-4%) coal.

Samples were collected before and after the baghouse to determine total gas flow rates, gas composition, and sulfur dioxide emissions. Samples of the coal, feed, and product for each kiln were also collected. Testing was conducted by Emission Measurement Branch personnel during January 26-31, 1976.

II. SUMMARY OF RESULTS

The testing program at this facility was divided into two phases because of the number of sampling locations involved. The first phase was an evaluation of the three baghouse inlet streams to determine gas flow rates, composition, and SO_2 concentration. The second phase was the determination of the baghouse outlet SO_2 concentration and gas composition. During outlet testing, each of the three inlet streams were monitored so that inlet flow rate and gas composition could be determined.

Run Numbers 1-3 represent data obtained during Phase one. Each run consisted of two SO_2 samples, one moisture determination sample, one integrated gas sample, and a velocity traverse at each of the three sites. Continuous SO_2 analyzers were operated so that an independent measurement of SO_2 could be obtained. Nearly all of the SO_2 determinations by EPA Method 6 and instrumental techniques were unsuccessful due to accumulation of particulates in the sampling interface systems. Attempts were made to modify the interface so that valid samples could be obtained but no workable solution was found.

No valid SO_2 determinations by Method 6 were obtained at Kilns 4 or 5. The only run supported by instrumental results at Kiln 6 was Run 1. Very early in the day on January 27, all three instruments were performing properly and continuous monitoring was possible. However, the sample lines to the analyzers quickly became clogged with particulate and after mid-day

no further valid data were obtained. The results of inlet testing are presented in Tables 1 to 3 as Run Numbers 1-3.

After it was determined that SO_2 testing at the inlet was not possible, the equipment was moved to the baghouse outlet for Phase 2.

Six runs were performed at the outlets. During each run an SO_2 sample was collected simultaneously at six of the twenty-two outlets. An integrated bag sample was also collected at the outlet for gas composition analysis and SO_2 measurement. During each run, the velocity was monitored and an integrated gas sample was obtained for composition analysis at each inlet. The results of testing at each location are presented in Tables 1-3 for the inlet streams and Table 4 for the baghouse outlet. The runs designated as 6, 7, and 6/7 were performed while Kiln No. 4 was not operating. Only combustion air was passing through the kiln during those tests.

In the course of six runs at the baghouse outlet during normal operation, thirty-six SO_2 samples were obtained. Each of the twnety-two compartments was sampled at least once. Attempts were made to vary the timing of testing so that sampled compartments represented operation in various phases of a compartment operation except cleaning.

The sulfur dioxide concentrations measured at the baghouse exhausts ranged from 25 to 747 ppmv, dry, during the course of the six runs. There is a definite concentration gradient ranging from higher values from the compartments near the entrance plenum down to lower values at the end of the baghouse fartherest away from the inlet. This is probably due to incomplete mixing and stratification between the inlet streams. From the limited amount of SO_2 data available for the inlet streams, Kiln 6 had SO_2 concentrations of about 1000 ppm, while Kilns 4 and 5 had 130 and 25 respectively.

TABLE 1. Summary of Results, Inlet From No. 4 Kiln

Run Number	4-1	4-2	4-3	4-4	4-5	4-4/5	4-6	4-7	4-6/7	4-8	4-9	4-8/9	4-10	4-11
Date	1/27/76	1/27/76	1/28/76	1/29/76	1/29/76	1/29/76	1/30/76	1/30/76	1/30/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76
Time														
% M, Percent Moisture	3.62	3.86	3.52	3.83	3.83	3.83	2.98	2.98	2.98	5.57	5.57	5.57	5.57	5.57
M_d, Vol. Fraction Dry Gas	0.964	0.961	0.965	0.962	0.962	0.962	0.97	0.97	0.97	0.944	0.944	0.944	0.944	0.944
% CO_2	13.4	13.4	14.5	10.9	15.9	-	7.1	-	-	17.9	16.4	-	17.5	16.8
% O_2	12.9	13.0	12.0	14.9	11.9	-	14.9	-	-	10.8	11.6	-	11.4	8.6
% N_2	73.7	73.6	73.5	74.2	72.2	-	78.0	-	-	71.4	72.0	-	71.1	74.6
CO, ppm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW_d, Dry Gas Molecular Wt.	30.66	30.66	30.8	30.34	31.02	30.68	29.73	29.08	29.41	31.29	31.09	31.19	31.14	31.03
MW, Gas Molecular Wt.	30.20	30.17	30.35	29.87	30.53	30.20	29.38	28.75	29.07	30.55	30.36	30.45	30.4	30.3
T_s, Stack Temperature, °F	380	382	342	351	339	347	468	468	461	387	381	359	368	366
V_s, Gas Velocity, FPM	4226	4181	4103	3770	-	4086	3401	3417	3412	4262	4688	4403	4218	4164
Q_s, Standard Gas Flow Rate, DSCFM	61280	60340	31890	55690	-	60650	43460	43670	43930	58820	65150	62840	59550	58920
Q_a, Actual Flow Rate, ACFM	99620	98560	96720	88870	-	96320	80170	80470	80420	100480	110510	103790	99440	98160
ppm SO_2, Method 6	I	I	I	-	-	-	-	-	-	-	-	-	-	-
* ppm SO_2, Instrument	130 →		-	>10	>10	-	-	<10	-	<10	<10	-	<10	<10
C_{SO_2}, Concentration, lb/DSCF														
M_{SO_2}, SO_2 Mass Rate, lb/hr														

*I denotes analysis interference

54 60 1550 1210 1230 1200 1140

TABLE 2. Summary of Results, Inlet from No. 5 Kiln

Run Number	5-1	5-2	5-3	5-4	5-5	5-4/5	5-6	5-7	5-6/7	5-8	5-9	5-8/9	5-10	5-11
				← 76 →			← 78 →			← 72 →				
Date	1/27/76	1/27/76	1/28/76	1/29/76	1/29/76	1/29/76	1/30/76	1/30/76	1/30/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/7
Time														
% M, Percent Moisture	4.36	3.97	5.31	6.91	6.91	6.91	5.56	5.56	5.56	4.20	4.20	4.20	4.20	4.20
M_d, Vol. Fraction Dry Gas	0.956	0.960	0.947	0.931	0.931	0.931	0.944	0.944	0.944	0.958	0.958	0.958	0.958	0.958
% CO_2	12.9	14.1	15.1	21.5	-	-	-	-	-	-	15.3	-	20.9	14.3
% O_2	12.2	12.4	11.8	8.9	-	-	-	-	-	-	12.4	-	9.6	13.3
% N_2	74.9	73.5	73.1	69.6	-	-	-	-	-	-	72.3	-	69.6	72.4
CO, ppm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW_d, Dry Gas Molecular Wt.	30.55	30.74	30.89	31.85	31.12	31.8	31.12	31.12	31.37	31.12	30.94	30.94	31.58	30.82
MW, Gas Molecular Wt.	29.99	30.22	30.21	30.85	30.22	30.85	30.38	30.38	30.61	30.57	30.40	30.40	31.01	30.28
T_s, Stack Temperature, °F	406	367	370	384	378	370	358	360	360	349	345	345	350	362
V_s, Gas Velocity, FPM	3730	3890	3963	4339	4294	4164	4538	-	3690	4001	3886	4300	4010	4126
Q_s, Standard Gas Flow Rate, DSCFM	50260	55110	55010	57540	57350	56150	62460	-	50760	57200	55820	62920	57260	58060
Q_a, Actual Flow Rate, ACFM	87590	91350	93060	101890	100830	97780	106570	-	86700	93960	91250	102850	94170	96900
ppm SO_2, Method 6	I	I	I	-	-	-	-	-	-	-	-	-	-	-
ppm SO_2, Instrument	25 →		-	<10	12	-	<10	<10	-	-	<10	-	<10	10
C_{SO_2}, Concentration, lb/DSCF														
M_{SO_2}, SO_2 Mass Rate, lb/hr														

1120 820 1150 790

TABLE 3. Summary of Results, Inlet from No. 6 Kiln

40

Run Number	6-1	6-2	6-3	6-4	6-5	6-4/5	6-6	6-7	6-6/7	6-8	6-9	6-8/9	6-10	6-11
Date	1/27/76	1/27/76	1/28/76	1/29/76	1/29/76	1/29/76	1/30/76	1/30/76	1/30/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/7
Time														
% M, Percent Moisture	4.31	7.62	6.86	3.67	3.67	3.67	4.24	4.24	4.25	4.80	4.80	4.80	4.80	4.80
M_d, Vol. Fraction Dry Gas	0.957	0.924	0.931	.963	.963	0.963	.958	0.958	0.958	0.952	0.952	0.952	0.952	0.952
% CO_2	-	17.4	15.2	-	17.8	-	15.5	19.2	-	16.9	13.6	-	-	12.7
% O_2	-	9.4	10.6	-	8.3	-	12.3	8.4	-	9.6	12.0	-	-	11.7
% N_2	-	73.2	74.2	-	73.9	-	72.2	72.4	-	73.5	74.4	-	-	75.6
CO, ppm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW_d, Dry Gas Molecular Wt.	30.98	31.19	30.85	30.98	31.18	31.08	30.98	31.4	31.19	31.09	30.65	30.87	30.98	30.5
MW, Gas Molecular Wt.	30.42	30.19	29.96	30.49	30.67	30.59	30.44	30.84	30.65	30.46	30.04	30.25	30.36	29.90
T_s, Stack Temperature, °F	536	536	536	530	536	536	541	546	536	515	535	536	545	540
V_s, Gas Velocity, FPM	1888	2084	3946	2735	3477	2491	3170	3838	2709	2891	3193	2459	2608	4419
Q_s, Standard Gas Flow Rate, DSCFM	33680	35880	68240	48510	61310	43920	54850	66070	47100	51800	56050	43130	45330	77190
Q_a, Actual Flow Rate, ACFM	67340	74330	140750	97550	124020	88860	113070	136890	96620	103120	113870	87710	93020	157620
ppm SO_2, Method 6	833	74	78	-	-	-	-	-	-	-	-	-	-	-
ppm SO_2, Instrument	(700-1300) 1000	580	-	-	218	-	<10	373	-	416	75	-	400	373
C_{SO_2}, Concentration, lb/DSCF														
M_{SO_2}, SO_2 Mass Rate, lb/hr														

1880 1470 2190 1510 1316 1690

TABLE 4. Summary of Results, Baghouse Outlet

Run Number	0-1	0-2	0-3	0-4	0-5	0-4/5	(1)0-6	(1)0-7	0-6/7	0-8	0-9	0-8/9	0-10	0-11	Average All Kilns Fed	Average Kilns 5,6 only Fed
Date	1/27/76	1/27/76	1/28/76	1/29/76	1/29/76	1/29/76	1/30/76	1/30/76	1/30/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76		
Time																
% M, Percent Moisture																
M_d, Vol. Fraction Dry Gas																
% CO_2				-	12.0	-	13.5	-	-	16.8	-	-	17.1	15.3	15.3	13.5
% O_2				-	13.8	-	13.0	-	-	11.2	-	-	10.8	12.3	12.0	13.0
% N_2				-	74.2	-	73.5	-	-	72.0	-	-	72.1	72.4	72.7	73.5
CO, ppm				-	-	-	-	-	-	-	-	-	-	-	-	
MW_c, Dry Gas Molecular Wt.																
MW, Gas Molecular Wt.																
T_s, Stack Temperature, °F					290											
V_s, Gas Velocity, FPM																
*Q_s, Standard Gas Flow Rate, DSCFM	145220	151330	185140	161740	-	160720	160770	-	141790	167820	177020	168890	162140	194170	167420	151280
Q_a, Actual Flow Rate, ACFM																
**ppm SO_2, Method 6	-	-	-	256	121	-	240	194	-	284	194	-	143	196	199	217
ppm SO_2, Instrument	-	-	-	63	57	-	223	-	-	152	-	-	116	244	126	223
C_{SO_2}, Concentration, lb/DSCF															3.3×10^{-5}	3.6×10^{-5}
M_{SO_2}, SO_2 Mass Rate, lb/hr															332	327

*Assumed to be equal to total of inlet flows based on CO_2 balance
**Average of 6 compartments sampled; assumed equal flow rates.
(1)Kiln 5 & 6 only. Kiln 4 not being fed.

1270 1136 1110 1190

1.66 2.25 1.91 1.38 0.93 1.53

The ductwork at the baghouse plenum would tend to cause the Kiln 6 stream to stratify at the upper part of the plenum, and thus be picked up first by the near compartments.

To simplify presentation, the SO_2 concentration results for the six samples were averaged for each run. These averages range from 121 to 284 ppm, dry, with an overall average of 199 ppm for the six runs. Individual compartment results are presented in Table 5.

The initial test plan called for calculation of total outlet flow rate based on measured inlet rates with a correction for any possible leakage by a CO_2 balance. Because of the variability in the inlet gas composition results and the apparent incomplete mixing of the inlet streams, this approach was not followed. The system was inspected between the inlet and outlet sample points and was found to be essentially sealed. Therefore, the outlet standard flow rate can be assumed to be equal to the sum of the inlet flows. These ranged from 142,000 to 194,000 DSCFM, with an average of 167,400 DSCFM.

Combining this average flow with the overall average concentration, the SO_2 mass emission rate is 332 lb/hr.

During Run No.'s 6 and 7 while Kiln 4 was only being heated (no feed) the average SO_2 emission was 217 ppm with an average gas flow of 151,300 DSCFM. Combining the concentration and flow results in a mass emission rate of 327 lb/hr.

As was discussed earlier there was almost no data obtained at any of the inlet locations whereby instrumental versus Method 6 SO_2 concentration results could be compared. At the baghouse outlet, instrumental

TABLE 5. Individual Compartment SO_2 Results, Baghouse Outlet

Date	Run No.*	SO_2 Concentration ppmv, dry	Run Average ppmv, dry
1/29/76	0-4-2L	434	
	0-4-1A	61.8	
	0-4-2A	63.1	
	0-4-1L	634	
	0-4-1K	-	
	0-4-2D	85.9	256
	0-5-1B	48.7	
	0-5-1J	112	
	0-5-1H	229	
	0-5-2K	185	
	0-5-2E	97.4	
	0-5-2B	55.4	121
	0-6-2C	41.3	
	0-6-1B	124	
	0-6-2J	341	
	0-6-2F	235	
	0-6-1K	472	
	0-6-1F	226	240
5+6	0-7-1H	370	
	0-7-2G	282	
	0-7-2H	315	
	0-7-1A	113	
	0-7-2A	19.1	
	0-7-1D	63.6	194
	0-8-1G	226	
	0-8-1L	747	
	0-8-2C	24.6	
	0-8-2L	487	
	0-8-2D	121	
	0-8-1B	99.4	284
	0-9-1F	147	
	0-9-1J	426	
	0-9-2A	86.2	
	0-9-2E	137	
	0-9-2K	306	
	0-9-1A	60.2	194

TABLE 5. Individual Compartment SO_2 Results, Baghouse Outlet (Continued)

Date	Run No.*	SO_2 Concentration ppmv, dry	Run Average ppmv, dry
	0-10-1E	153	
	0-10-1K	280	
	0-10-2B	49.9	
	0-10-2F	194	
	0-10-2J	71.0	
	0-10-1B	112	143
	0-11-1D	110	
	0-11-1H	223	
	0-11-2C	31.7	
	0-11-2H	333	
	0-11-2G	284	
	0-11-1A	-	196
Average, Kilns 4, 5, & 6			199
Average Kilns 5 & 6 only			217

*Compartment tested identified by last two digits of Run No.

comparisons were made by analyzing the bag sample collected for gas composition analysis. Due to test run time limitations, only four compartments could be sampled. These were generally centrally located. On a general basis, the SO_2 concentration in the bag sample was less than the average of the six Method 6 tests per run. While no conclusive statement can be made, the results suggest that the Method 6 results were not invalidated by particulate interference. No accumulations were observed during testing.

Process samples were collected during each test period. Representative samples of coal, feed and product were selected for moisture and sulfur analysis. The results of these analyses are presented in Table 6.

Table 6. SUMMARY OF PROCESS SAMPLE ANALYSIS

Kiln No.	Run No.	Material	% Moisture	% Sulfur
4	1	Coal	1.59	3.60
5	1	"	1.25	3.38
6	1	"	1.11	2.84
4	4	"	1.63	2.92
5	4	"	1.65	3.80
6	4	"	1.50	2.43
4	5	"	1.20	3.01
5	5	"	1.98	3.43
6	5	"	1.08	3.05
4	4/5	Limestone	0.95	<0.01
4	4/5	Lime	0.02	0.01
5	4/5	Limestone	0.07	<0.01
5	4/5	Lime	0.01	<0.01
6	4/5	Limestone	0.05	<0.01
6	4/5	Iron	0.13	<0.01
6	4/5	DBD	0.07	<0.01
4	6/7	Coal	1.23	1.80
5	6/7	Coal	1.05	3.48
6	6/7	"	1.20	3.34
4	8/9	"	1.60	2.93
5	8/9	"	1.64	2.66
6	8/9	"	1.51	3.41
4	10/11	"	1.58	4.06
5	10/11	"	1.45	2.64
6	10/11	"	1.43	2.40

III. Process Description and Operation

Limestone consists primarily of calcium carbonate or combinations of calcium and magnesium carbonate with varying amounts of impurities. The most abundant of all sedimentary rocks, limestone is found in a variety of consistencies from marble to chalk. Lime is a calcined or burned form of limestone, commonly divided into two basic products - quicklime and hydrated lime. Calcination expels carbon dioxide from the raw limestone, leaving calcium oxide (quicklime). With the addition of water, calcium hydroxide (hydrated lime) is formed.

The basic processes in production are: (1) quarrying the limestone raw material; (2) preparing the limestone for kilns by crushing and sizing; (3) calcining the feed; and (4) optionally processing the quicklime further by additional crushing and sizing and the hydration. The majority of lime is produced in rotary kilns which can be fired by coal, oil, or gas. Rotary kilns have the advantages of high production per man-hour and a uniform product, but require higher capital investment and have higher unit fuel costs than most vertical kilns.

The Martin Marietta Corporation Woodville Ohio lime plant was source tested January 26-31, 1976. The Number 4, 5, and 6 rotary kilns and the Western Precipitation baghouse used to control particulate emissions from these kilns was source tested. The Number 4, 5, and 6 kilns were built in 1961 and 1962. They were originally designed to produce 300 tons per day of lime from the dolomitic limestone of their nearby quarry. In 1975, Kennedy Van Saun stone preheaters were added to the Number 4 and 5 kilns, raising their production capacity considerably. The Number 5 kiln had a feedrate of 80 tons of limestone per hour when the test crew arrived on

January 26. They cannot maintain the proper temperatures at this feedrate so the kiln is usually run at less than 80 tons per hour. The Number 4 kiln is identical to the Number 5 but it cannot run at nearly as high a feedrate. The plant is now in the process of installing a new crushing unit and a new cooler for the Number 4 kiln so that it will be able to produce as much as the Number 5 kiln. In their present status, it is estimated that the maximum production capacity of the number 4 and 5 kilns are 720 and 960 tons of lime per day respectively. The Number 6 kiln produces 480 tons per day of dead burned dolomite (DBD). During the testing all three kilns burned high sulfur (3 percent) coal.

After leaving the preheater, the kiln off-gas from two BOF kilns go to separate Research Cottrell Multiclones which have a design pressure drop of 3 IWC. A 1000 Hp fan sends the gases from each of the kilns to the baghouse. No water or air cooling of these streams is required. The DBD kiln is not equipped with a preheater. The DBD kiln off-gas goes directly to a bank of Western Precipitation centrifugal separators which has a design drop of 1.9 IWC and then directly to the baghouse. Cooling air is added as required to keep the baghouse inlet below 450°F.

The baghouse was manufactured by Western Precipitation and was put in operation in June of 1975. The house has twenty-two compartments and each compartment is equipped with its own 100 Hp fan mounted on the roof of the house and discharging to the atmosphere. Each compartment has 672 bags and 9,744 square feet of bag area for a total for the house of 14,784 bags and 214,368 square feet. The pressure drop across each compartment is measured.

The plant was operating normally throughout the inlet testing and was normal during the outlet testing except for January 30, when the Number 4

kiln was shut down. Two sets (6 and 7) of 6 tests were performed on the baghouse while the kiln was down. During both tests the induced draft fan was operating and during the second test series the kiln was being fed pulverized coal.

The operation of the kilns and the baghouse was monitored during the testing period and the process data that was collected is included in Appendix B. The process data collected during each test period is summarized in Table 3-1.

Process samples were collected by the process engineer during the testing periods. Limestone feed samples were taken at the beginning of each day and product lime samples were taken at the end of each day. The plant monitored the sulfur content of the product throughout the testing and some of this data is shown on the process data sheets. Coal samples were taken during the test runs. The plant chemist felt the percent sulfur in the coal during testing was about 2.5 to 3 percent. Three samples of coal collected by the process engineer on the first day of testing averaged 2.6 percent sulfur when tested by the plant chemist.

Table 3-1. SUMMARY OF KILN OPERATING DATA DURING SAMPLING

Test	Date	Stone Feed Rate (TPH)			Coal Feed Rate (TPH)			Burning Zone Temperature (°F)			Baghouse Pressure Drop (IWC)
		#4	#5	#6*	#4	#5	#6	#4	#5	#6	
4	1/29/76	54	76	40	3.9	6.1	4.8	2200	2200	2780	3.6
5	1/29/76	54	76	40	4.0	6.1	4.7	2050	2100	2700	4.0
6	1/30/76	0	78	40	0	6.3	5.1	-	2200	2700	4.0
7	1/30/76	0	78	40	2.6	6.3	5.0	2000	2200	2650	3.5
8	1/31/76	60	70	40	4.6	5.7	5.4	2200	2150	2760	4.1
9	1/31/76	60	72	40	4.5	5.8	5.4	2200	2000	2720	-
10	1/31/76	60	72	40	4.4	6.2	6.0	2200	2050	2720	4.1
11	1/31/76	60	72	40	4.4	6.1	5.9	2200	2050	2620	4.2

*Plus 1.15 TPH Iron Feed

AVE 58 74.25 40 4.3 6.08 5.75

IV. LOCATION OF SAMPLING POINTS

The sampling location in the No. 4 Kiln inlet to the baghouse was located in a horizontal run of 65 3/4" diameter ductwork. The sampling ports were more than eight equivalent downstream and more than two diameters upstream of any flow disturbance. This represents an ideal sampling location as defined by Method 1 (FR v36 n247 December 23, 1971). The duct was equipped with two sampling ports at 90° orientation. The duct cross section was divided into 12 equal areas as per Method 1.

The sampling location in the No. 5 Kiln inlet was at a point in the 65 3/4" diameter horizontal duct 21' (3.8 diameters) and 26' (4.7 diameters) from the nearest upstream and downstream disturbances. As per Method 1, the cross section was divided into 40 equal areas and velocity traverses were conducted through two ports at 90° orientation.

The sampling location in the No. 6 Kiln baghouse inlet was at a point in the 80 3/4" diameter horizontal duct 21' (3.1 diameters) and 32' (4.7 diameters) from the nearest upstream and downstream disturbances. The cross section was divided into 44 equal areas and traversing was performed through two ports at 90° orientation.

All gaseous samples at each of the inlet locations were collected at a single point approximately 36 inches into the duct.

The gaseous sampling locations at the baghouse exit was through a ¼" hole in the duct from the three-way reverse air control valve to the fan for each compartment. Diagrams of the baghouse compartment configuration and the outlet sampling locations are given in Figures 1 and 2 respectively.

Coal samples from each kiln were collected prior to the roller mill

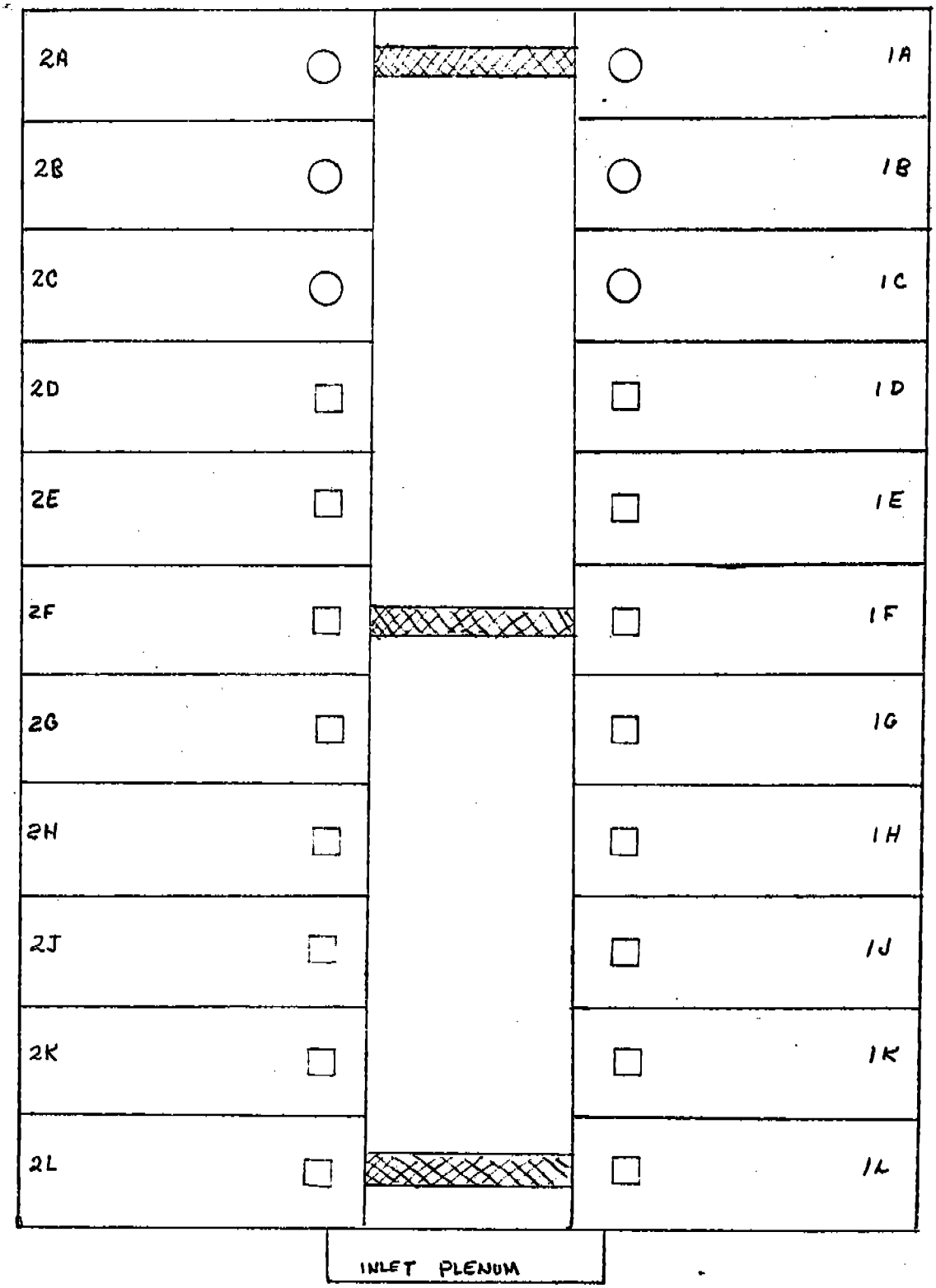


FIGURE 1 : BAGHOUSE OUTLET COMPARTMENT CONFIGURATION

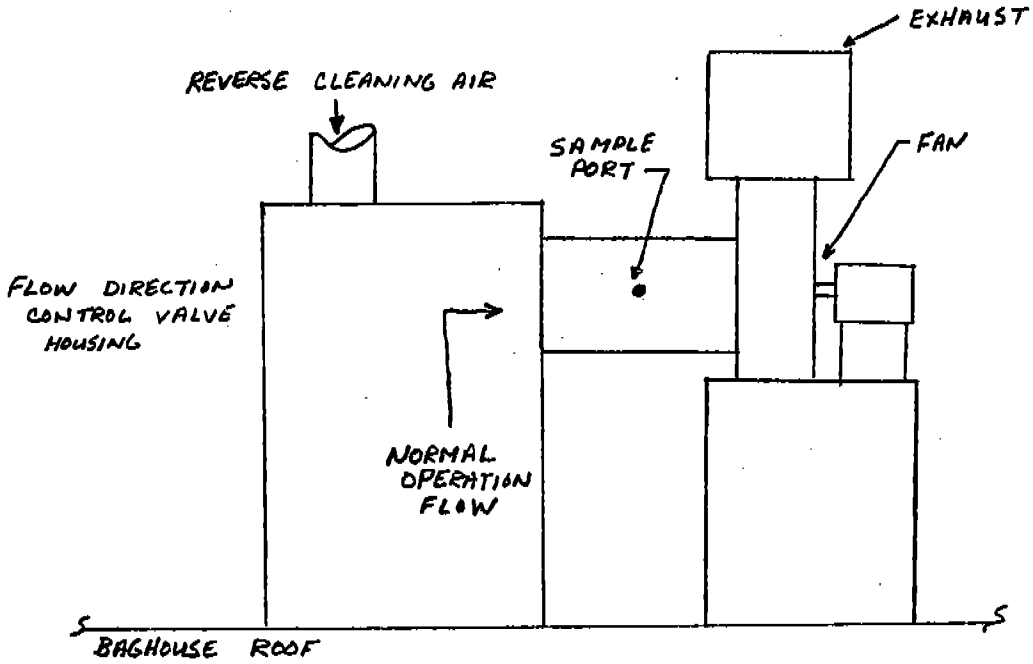


FIGURE 2 : SCHEMATIC DIAGRAM OF BAGHOUSE OUTLET SAMPLE LOCATION

at each kiln during testing. Kiln feed samples were collected before the preheater at each kiln. Product samples were collected from the conveyor after the cooler at each kiln.

V. SAMPLING AND ANALYTICAL PROCEDURES

The procedures used in this testing were as follows:

1. Velocity determination: Method 1 (F.R. v36 n247 December 23, 1971) was used to determine and locate the appropriate number of traverse points. Method 2 was used to determine gas velocity. During periods when velocity was monitored at a single reference point, the average stack velocity was calculated by the use of a correction factor to relate reference point velocity to average velocity. These correction factors were determined from tests where full traverses were performed.

2. Gas composition: Oxygen and carbon dioxide content were determined by Method 3. An Orsat apparatus was used for analysis.

3. Moisture: The water vapor content was determined by Method 4 except that larger impingers were used and tared silica gel was included as a final drying agent.

4. Sulfur dioxide: Method 6 was used to measure SO_2 concentrations with the following exceptions:

   a. At the baghouse outlet, the sampling probes consisted of six-foot lengths of unheated ¼" stainless steel/teflon tubing. No filtration was used prior to the absorbing train.

   b. At the inlet locations, a probe specially designed to decrease particulate pickup was used. This probe has shield gas pick-up ports to deflect particulate. However, it was found that this was not adequate to prevent particulate entrainment in the gas sample.

For comparative purposes, two Dynasciences SO_2 analyzers and one Dupont Model 461 SO_2 analyzers were used to monitor the inlet SO_2 concentrations. The sample was routed to the analyzers through a condenser and heated ¼" teflon sample line by a teflon coated diaphragm pump for each inlet stream. The sample interface systems quickly became loaded with particulates and were unusable. The remainder of inlet comparisons and all outlet comparisons were performed on the bag samples collected for gas composition analysis.

The process and coal samples were analyzed by ASTM D-271 for moisture content and ASTM D-1552 (Hi Temperature) for sulfur content.

APPENDIX A

COMPLETE RESULTS AND SAMPLE CALCULATION

Martin Marietta
Woodville Ohio
76LIM 12
#4 Kiln Inlet

SO_2 EMISSION DATA

Run No.	4-1A	4-1B	4-2A	4-2B	4-3A	4-3B
Date	1-27-76	1-27-76	1-27-76	1-27-76	1-28-76	1-28-76
mg SO_2						
T_m - Average Gas Meter Temperature, °F	49	43	30	32	29	26
P_b - Barometric Pressure, "Hg abs.	29.83	29.83	29.84	29.84	29.62	29.62
V_m - Volume of dry gas sampled @ meter conditions, ft.^{3}	1.789	0.775	0.791	0.830	0.73	0.791
ppm SO_2, Method 6						
ppm SO_2, INSTRUMENTAL						
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_m} 32$$

$$C_{SO_2} = \cancel{0.077}\ 0.0166 \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

SO_2 EMISSION DATA

Martin - Marietta
Woodville, Ohio
76 LIM 12
#4 Kiln Inlet

Run No.	4x1	4x2	4x3			
Date	1-28-76	1-28-76	1-28-76			
mg SO_2						
T_m - Average Gas Meter Temperature, ^oF	32	40	36			
P_b - Barometric Pressure, "Hg abs.	29.32	29.32	29.32			
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	0.602	0.739	0.837			
ppm SO_2, Method 6						
ppm SO_2, INSTRUMENTAL						
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \cancel{0.017}\ 0.0166 \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

PLANT _____

ADDRESS _____

SAMPLING LOCATION #4 Kiln

Report No. 76C1H112

Run No.	4-1	4-2	4-3
Date	1/29/76	1/27/76	1/28/76
$\overline{\Delta H}$	1.7	1.9	1.9
$\overline{T_m}$ °F	52	47	39
$\overline{T_m}$ °R	512	507 ~~497~~	499
P_b	29.83	29.84	29.62
V_m	41.953	27.132	27.7
$V_{m_{std}}$	43.47	28.41	29.26
V_w	34.4	24.1	22.5
$V_{w_{gas}}$	1.631	1.142	1.067
%M	3.62	3.86	3.52
M_d	0.964	.961	0.965
$\%CO_2$	13.4	13.4	14.5
$\%O_2$	12.9	13.0	12.0
%CO	—	—	—
$\%N_2$	73.7	73.6	73.5
MW_d	30.66	30.66	30.8
MW	30.20 ~~29.59~~	30.17 ~~29.60~~	30.35 ~~29.78~~
$\overline{T_s}$ °R	(380) 840	(382) 842	(342) 802
$\sqrt{\Delta P T_s}$ Factor	29.31	28.99	28.41
C_p	.85	.85	.85
P_s	30.26	30.28	30.02
V_s	4226	4181	4103
Q_s	61,283	60,338	61,889
Q_a	99,618	98,557	96,719
T_t			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↓	
	$T_{m_{in_1}}$	
	↓	
	$T_{m_{out_1}}$	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
÷	$T_{m_{in_2}}$	
ΔH_2	+	
+	$T_{m_{out_2}}$	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
$T_{m_{in_1}}$		
↓		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↓		
+		
÷		$\overline{T_m}$ °F
460		
+		$\overline{T_m}$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
	$V_{m_{std}}$	*
	↑	
0.0474		
↓		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL ($V_{m_{std}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↓		
44		
x		
$\%O_2$		$\%O_2$
↓		
32		
x		
+		
%CO+$\%N_2$		%CO
↓		
28		
x		
+		
100		
÷		MW_d
	MW_d	*
	↑	
x		
x⇄y		
CHS		
↓		
1		
+		
18		
x		
÷		MW
	460	1st set
	STO	
	T_{s_1}	
	RCL (n)	
	+	
	↓	
	↓	
	ΔH_1	

	x	
	√	
	x⇄y	
	T_{s_2}	
	RCL (n)	
	+	
	↓	
	↓	
	÷	
	↓	
CLR	↓	
T_{s_1}	ΔP_1	2nd, ..., nth set
+	x	
T_{s_2}	√	
+	↓	
(etc)	↓	
	↓	
460	↓	
↓	+	
n	↓	
STO	↓	
x	+	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T_s}$ °R
√		
ΔP_1		
√		
↓		
ΔP_2		
√		
+		
(etc)		
x	↓	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P T_s}$
$\sqrt{(\Delta P T_s)_1}$		*
↓		
512.8		
↓		
C_p		C_p
x		
x		
1		
↓		
P_s		P_s
√		
MW		
√		

x		
÷		
x		V_s
V_s		*
↓		
0.123		
↓		
A_s		
x		
x		
M_d		
↓		
P_s		
x		
STO (M_d x P_s)		
x		
$\overline{T_s}$ °R		
÷		Q_s
	Q_s	*
	↑	
0.05645		
↓		
$\overline{T_s}$ °R		
x		
x		
RCL (M_d x P_s)		
÷		Q_a
1032		
↓		
$\overline{T_s}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t		T_t
÷		
RCL (M_d x P_s)		
÷		
D_n		D_n
↓		
x		
÷		%I

*Insert only if you are not continuing from previous step.

A_s = 3395 in²

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. 76 LIM 12

Run No.	4-4	4-5	4-6
Date	1/29/76	1/29/76	1/30/76
$\overline{\Delta H}$			
$\overline{T}_m$ °F			
$\overline{T}_m$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M	3.83	3.83	2.98
M_d	0.962	0.962	0.97
$\%CO_2$	10.9	15.9	7.1
$\%O_2$	14.9	11.9	14.9
%CO	—	—	—
$\%N_2$	74.2	72.2	78.0
M_d	30.34	31.02	29.73
MW	29.87	30.53 ~~29.88~~	29.38
$\overline{T}_s$ °R	81 (351) ~~745~~	(339) 799	(468) 928
$\sqrt{\Delta P T_s}$ Factor	25.809 ~~33.20~~	~~49.45~~	22.98 ~~29.08~~
C_p	.85	.85	.85
P_s	29.92	29.82	29.28
V_s	3770 ~~4864~~	~~7145~~	3401 ~~3579~~
Q_s	55,690 ~~73,292~~	107,123	43,460 ~~45,741~~
Q_a	88,870 ~~114,654~~	168,427	80,170 ~~84,367~~
T_s			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↓	
	$T_{m_{in_1}}$	
	↓	
	$T_{m_{out_1}}$	
	+	
	x Σy	
	ΔH_2	
CLR	+	
ΔH_1	x Σy	2nd, ..., nth set
+	$T_{m_{in_2}}$	
ΔH_2	+	
+	$T_{m_{out_2}}$	
(etc)	+	
	x Σy	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x Σy	
$T_{m_{in_1}}$		
↓		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↓		
+		
÷		$\overline{T}_m$ °F
460		
+		$\overline{T}_m$ °R
x Σy		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x Σy		
÷		$V_{m_{std}}$
	$V_{m_{std}}$	*
	↓	
0.0947		
↓		

V_w		$V_{w_{gas}}$
x		
STO		
÷		
RCL ($V_{w_{gas}}$)		
100		
STO		
x		
x Σy		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↓		
44		
x		
$\%O_2$		$\%O_2$
↓		
32		
x		
+		
%CO+$\%N_2$		%CO
↓		
28		
x		
+		
100		
÷		MW
	%CO	*
	M_d	
x		
x Σy		
CHS		
↓		
1		
÷		
18		
x		
÷		MW
	460	
	STO	
	T_s	
	RCL (n)	
	↓	
	+	
	↓	
	÷	
	↓	
	$\sqrt{\Delta P T_s}$	

	x	
	÷	
	x Σy	
	T_{s_1}	
	↓	
	RCL (n)	
	+	
	↓	
	↓	
	↓	
	+	
	↓	
CLR	↓	
T_{s_1}	ΔP_1	
+	x	
T_{s_2}	√	
+	↓	
(etc)	↓	
	+	2nd, ..., nth set
460	↓	
↓	+	
n	↓	
STO	↓	
x	+	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T}_s$ °R
√		
ΔP_1		
√		
↓		
ΔP_2		
√		
+		
(etc)		
x	↓	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P T_s}$
$\sqrt{\Delta P T_s}$		*
↓		
5129.5		
↓		
C_p		C_p
x		
x		
1		
↓		
P_s		P_s
↓		
MW		
↓		

x		
÷		
x		V_s
V_s		*
↓		
0.123		
↓		
A_s		
x		
x		
M_d		
↓		
P_s		
x		
STO (M_d x P_s)		
x		
T_s °R		
÷		Q_s
	Q_s	*
	↓	
0.056645		
↓		
T_s °R		
x		
x		
RCL (M_d x P_s)		
÷		Q_a
1032		
↓		
T_s °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_s		T_s
÷		
RCL (M_d x P_s)		
÷		
D_n		D_n
↓		
x		
÷		%I

*Insert only if you are not continuing from a previous step.

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. 76 LM 12

	CLR	
	ΔH_1	1st set
	↑	
	Tm_{in1}	
	↑	
	Tm_{out1}	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
+	Tm_{in2}	
ΔH_2	+	
+	Tm_{out2}	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	ΔH
	x⇄y	
Tm_{in1}		
↑		
Tm_{out1}		
+		
Tm_{in2}		
+		
Tm_{out2}		
+		
(etc)		
RCL (n)		
↑		
+		
÷		$Tm°F$
460		
+		$Tm°R$
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m std}$
$V_{m std}$		
↑		*
0.0474		
↑		

V_w		V_w
x		$V_{w gas}$
STO		
+		
RCL ($V_{w gas}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
$\%CO + \%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
M_d		*
M_d		
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+		MW
460		↑
STO		
T_s		
RCL (n)		1st set
÷		
↑		
↑		
ΔP_1		

x		
√		
x⇄y		
T_{s2}		
RCL (n)		
+		
↑		
↑		
CLR	↑	
T_{s1}	ΔP_1	
+	x	
T_{s2}	√	
+	↑	
(etc)	↑	
	↑	
460	↑	2nd, ..., nth set
↑	+	
n	↑	
STO	↑	
x	↑	
+	n	
RCL (n)	STO	
÷	÷	$T_s°R$
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P_1 T_s}$
$\sqrt{\Delta P_1 T_s}$		*
↑		
5120.8		
↑		
C_p		C_p
x		
x		
1		
↑		
P_b		P_b
√		
MW		
√		

x		
÷		
x		V_s
V_s		*
↑		
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_b		
x		
STO ($M_d \times P_b$)		
x		
T_s °R		
÷		Q_s
Q_s		*
↑		
0.05645		
↑		
T_s °R		
x		
x		
RCL ($M_d \times P_b$)		
÷		Q_o
1032		
↑		
T_s °R		
x		
$V_{m std}$		
x		
V_s		
÷		
T_s		T_s
÷		
RCL ($M_d \times P_b$)		
÷		
D_n		D_n
↑		
x		
÷		%I

Run No.	4-7	4-8	4-9
Date	1/30/76	1/31/76	1/31/76
$\overline{\Delta H}$			
$\overline{T}_m$ °F			
$\overline{T}_m$ °R			
P_b			
V_m			
$V_{m std}$			
V_w			
$V_{w gas}$			
%M	2.98	5.57	5.57
M_d	0.97	0.944	0.944
$\%CO_2$	2.0	17.9	16.4
$\%O_2$	19.1	10.8	11.6
%CO	—	—	—
$\%N_2$	78.9	71.4	72.0
MW_d	29.08	31.29	31.09
MW	28.75	30.55	30.56
$\overline{T}_s$ °R	(468) 928	(387) 847	(381) 841
$\sqrt{\Delta P T_s}$	22.87	29.426	32.266
Factor	24.07	30.60	33.26
C_p	.85	.85	.85
P_s	29.28	29.65	29.65
V_s	3417 3617	4262 4461	4688 4934
Q_s	43,670 46,226	58,820 61,559	65,150 68,572
Q_o	80,470 85,262	100,480 105,158	110,510 116,308
T_t			
D_n			
%I			

*Insert only if you are not continuing from previous step.

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. 76 L/M 12

Run No.	4-10	4-11	
Date	1/31/76	1/31/76	
$\overline{\Delta H}$			
$\overline{T}_m$ °F			
$\overline{T}_m$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M	5.67	5.57	
M_d	0.944	0.944	
$\%CO_2$	17.5	16.8	
$\%O_2$	11.4	8.6	
%CO	—	—	
$\%N_2$	71.1	74.6	
MW_d	31.14	31.03	
MW	30.40 ~~29.45~~	30.30 ~~29.35~~	
$\overline{T}_s$ °R	(368) 828	(366) 826	
$\sqrt{\Delta P T_s}$ Factor	29.05 ~~30.58~~	28.629 ~~30.14~~	
C_p	.85	.85	
P_s	29.65	29.65	
V_s	4218 ~~4446~~	4164 ~~4384~~	
Q_s	59,550 ~~62,675~~	58,920 ~~62,034~~	
Q_a	99,440 ~~104,663~~	98,160 ~~103,347~~	
T_t			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↑	
	Tm_{in_1}	
	↑	
	Tm_{out_1}	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	
+	Tm_{in_2}	
ΔH_2	+	
+	Tm_{out_2}	
(etc)	+	2nd, ..., nth set
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
Tm_{in_1}		
↑		
Tm_{out_1}		
+		
Tm_{in_2}		
+		
Tm_{out_2}		
÷		
(etc)		
RCL (n)		
↑		
+		
÷		$\overline{T}_m$ °F
460		
+		$\overline{T}_m$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
	$V_{m_{std}}$	*
	↑	
0.0474		
↑		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL ($V_{w_{gas}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
$\%CO + \%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
	MW_d	
	↑	*
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+		MW
	460	
	STO	
	T_s	
	RCL (T_s)	
	÷	
	↑	
	↑	
	ΔP_1	1st set

	x	
	√	
	x⇄y	
	T_s	
	RCL (T_s)	
	+	
	↑	
	↑	
	÷	
	↑	
CLR	↑	
T_{s_1}	ΔP_2	
+	x	
T_{s_2}	√	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
x	↑	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T}_s$ °R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL (n)	RCL (m)	
÷	÷	$\sqrt{\Delta P T_s}$ Factor
	$\sqrt{\Delta P T_s}$ Factor	*
	↑	
SUM ΔP		
↑		
C_p		C_p
x		
x		
1		
↑		
P_s		P_s
√		
MW		
√		

x		
÷		
x		V_s
	V_s	*
	↑	
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO ($M_d \times P_s$)		
x		
$\overline{T}_s$ °R		
÷		Q_s
	Q_s	*
	↑	
0.05645		
↑		
$\overline{T}_s$ °R		
x		
x		
RCL ($M_d \times P_s$)		
÷		Q_a
1032		
↑		
$\overline{T}_s$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t		T_t
÷		
RCL ($M_d \times P_s$)		
÷		
D_n		D_n
↑		
x		
÷		%I

*Insert only if you are not continuing from previous step.

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. 76LM12

Run No.	4-4/5	4-6/7	4-8/9
Date	1/29/76	1/30/76	1/31/76
$\overline{\Delta H}$	1.9	1.8	2.0
$\overline{T_m}$ °F	53	55	49
$\overline{T_m}$ °R	513	515	509
P_b	29.42	29.24	29.46
V_m	20.321	19.11	21.05
$V_{m_{std}}$	20.74 ~~20.74~~	19.30	21.68
V_w	17.4	12.5	27.0
$V_{w_{gas}}$	0.825	0.593	1.28
%M	3.83	2.98	5.57
M_d	0.962	0.970	.944
$\%CO_2$			
$\%O_2$			
%CO			
MW_d	30.68	29.41	31.19
MW	30.20	29.07	30.45
$\overline{T_s}$ °R	(347) 807	(461) 921 ~~870~~	(359) 819
$\sqrt{\Delta P T_s}$ Factor	28.35	22,832 ~~28.36~~	30.35
C_p	.85	.85	.85
P_s	29.82	29.28	29.65
V_s	4086	3412 ~~3336~~	4403
Q_s	60,653	43,930 ~~45,311~~	62,836
Q_a	76,318	80,420 ~~78,403~~	103,791
T_t			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↑	
	Tm_{in_1}	
	↑	
	Tm_{out_1}	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
+	Tm_{in_2}	
ΔH_2	+	
+	Tm_{out_2}	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
Tm_{in_1}		
↑		
Tm_{out_1}		
+		
Tm_{in_2}		
+		
Tm_{out_2}		
+		
(etc)		
RCL (n)		
↑		
+		
÷		$\overline{T_m}$ °F
460		
+		$\overline{T_m}$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
	$V_{m_{std}}$	*
	↑	
0.0474		
↑		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL ($V_{w_{gas}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
%CO + $\%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
	↑	*
	MW	
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+		MW
	460	↑
	STO	
	$\overline{T_s}$	
	RCL (n)	2nd, ..., nth set
	÷	
	↑	
	$\sqrt{\Delta P}$	
	↑	
	$\sqrt{\Delta P_2}$	

	x	
	√	
	x⇄y	
	$\overline{T_s}$	
	RCL (n)	
	+	
	↑	
	↑	
CLR	↑	
$\overline{T_{s_1}}$	ΔP_1	
+	x	
$\overline{T_{s_2}}$	√	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
x	÷	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T_s}$ °R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P T_s}$
	$\sqrt{\Delta P T_s}$	*
	↑	
5128.8		
↑		
C_p		C_p
x		
x		
1		
↑		
P_s		P_s
√		
MW		

x		
÷		
x		V_s
	V_s	*
	↑	
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO (M_d x P_s)		
x		
$\overline{T_s}$ °R		
÷		Q_a
	Q_s	*
	↑	
0.05645		
↑		
$\overline{T_s}$ °R		
x		
x		
RCL (M_d x P_s)		
÷		Q_s
1032		
↑		
$\overline{T_s}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
$\overline{T_t}$		T_t
÷		
RCL (M_d x P_s)		
÷		
D_n		D_n
↑		
x		
÷		%I

*Insert only if you are not continuing from previous step.

#4 inlet point A 4 influence:

		$\frac{\overline{\sqrt{avg}}}{\sqrt{ref}}$	$\frac{\sqrt{\Delta p}\ avg}{\sqrt{\Delta p}\ ref}$
4-1:	$\sqrt{\Delta pT}$ ref = 30.~~74~~739		
	$\overline{\sqrt{\ }}$ avg = 29.306	0.954	0.964
4-2	$\sqrt{\Delta pT}$ ref = 29.223		
	$\sqrt{\Delta p}$ avg = 28.99	0.992	0.999
4-3	$\sqrt{\Delta pT}$ ref = 29.886		
	$\sqrt{\Delta pT}$ avg = 28.407	0.951	0.956
4-4/5	$\sqrt{\Delta pT}$ ref = 29.650		
	$\sqrt{\Delta pT}$ avg = 28.349	0.956	0.960
4-6/7	$\sqrt{\Delta pT}$ ref = 24.067		
	$\sqrt{\Delta pT}$ avg = 22.256	0.925	0.940
4-8/9	$\sqrt{\Delta pT}$ ref = 32.828		
	$\sqrt{\Delta pT}$ avg = 30.35	0.925	0.930
	avg correction factor	0.950	0.958

SO_2 EMISSION DATA

Martin Marietta
Woodville Ohio
7641112
#5 Kiln Inlet

Run No.	5-1A	5-1B	5-2A	5-2B	5-3A	5-3B
Date						
mg SO_2						
T_m - Average Gas Meter Temperature, ^oF						
P_b - Barometric Pressure, "Hg abs.						
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$						
ppm SO_2, Method 6						
ppm SO_2, INSTRUMENTAL						
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7406 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \cancel{0.017}\ 0.0166 \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

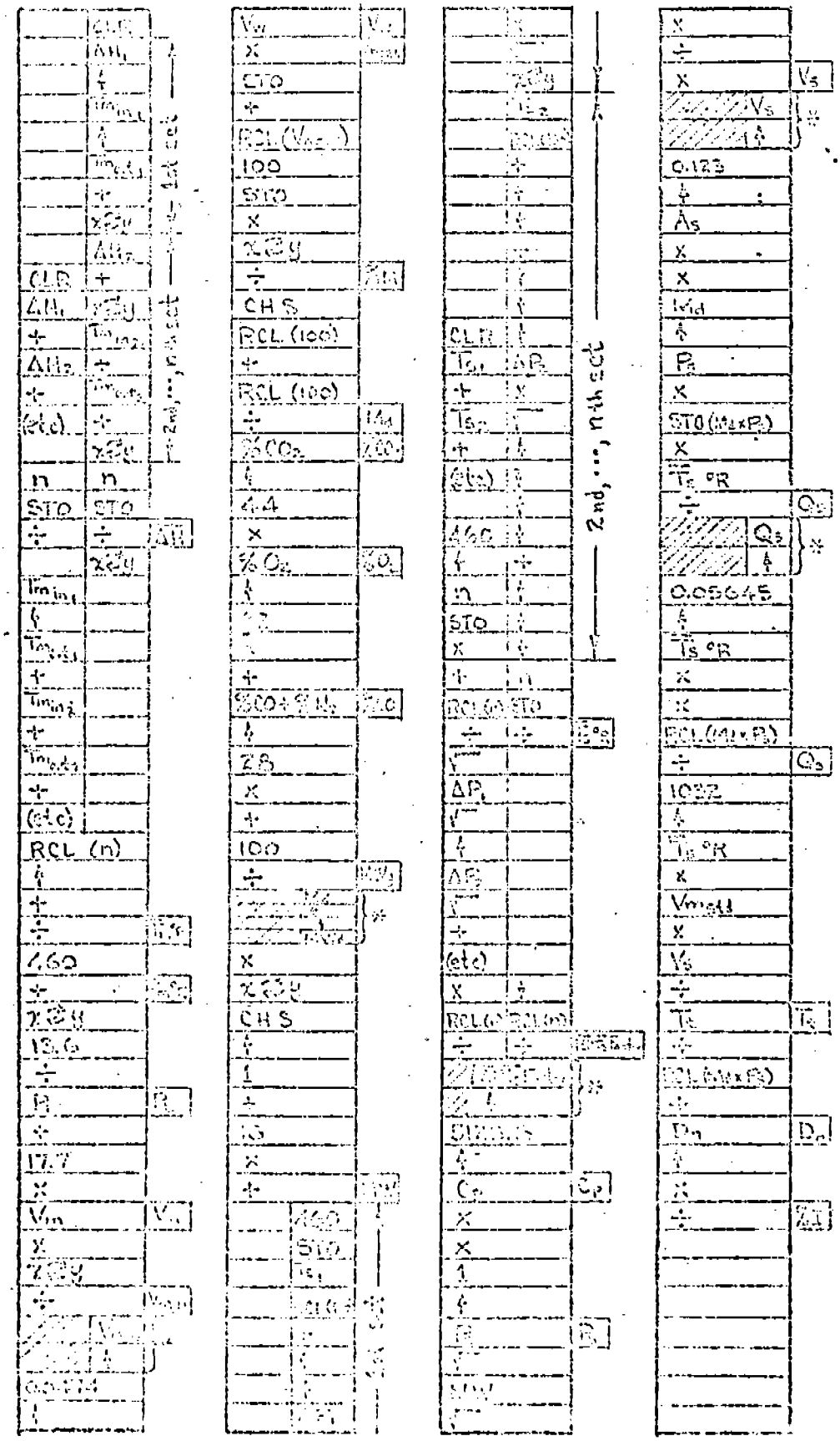
PLANT

ADDRESS

SAMPLING LOCATION #5 Kiln inlet

Report No. 76 CM 12

Run No.	S-1	S-2	S-3
Date	1/29/76	1/29/76	1/29/76
$\overline{\Delta H}$	1.7	1.7	1.7
$\overline{T_m}$ °F	38	40	39
$\overline{T_m}$ °R	498	500	499
P_b	29.83	29.84	29.62
V_m	40.552	24.511	22.995
$V_{m_{std}}$	43.20	26.02	24.28
V_w	41.5	22.7	28.7
$V_{w_{std}}$	1.967	1.076	1.36
%M	4.36	3.97	5.31
M_s	0.956	0.960	.947
$\%CO_2$	12.9	14.05	15.1
$\%O_2$	12.2	12.35	11.8
%CO	—	—	—
$\%N_2$	74.9	73.6	73.1
$\overline{\Delta H_@}$	30.55	30.74	30.39
MW	29.99	30.22	30.21
$\overline{T_s}$ °R	(406) 866	(367) 827	(~~347~~ 320) 764 930
$\sqrt{\Delta P_s}$ Meter	25.39	26.57	27.021 ~~25.82~~
C_p	.85	.85	.85
P_s	29.34	29.34	29.25 ~~25.82~~
V_s	3730	3890 ~~4286~~	3963 ~~3790~~
Q_s	50,260	55110 ~~60860~~	55010 ~~57,110~~
Q_a	87,590	91350 ~~100,870~~	93060 ~~85,920~~
T_s			
D_n			
%I			



*Insert only if you are not continuing from previous step.

$A_s = 3382\ in^2$

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. _____

CLR		
ΔH_1		
↑		
Tm_{in_1}		
↑		
Tm_{out_1}		
+		
x⇄y		
ΔH_2		
+		
x⇄y		
Tm_{in_2}		
+		
x⇄y		
Tm_{out_2}		
+		
x⇄y		
n		
STO		
÷	÷	$\overline{\Delta H}$
x⇄y		
Tm_{in_1}		
↑		
Tm_{out_1}		
+		
Tm_{in_2}		
+		
Tm_{out_2}		
+		
(etc)		
RCL (n)		
↑		
+		
÷		$\overline{Tm}$ °F
460		
+		$\overline{Tm}$ °R
x⇄y		
13.6		
÷		P_b
P_b		
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
//////	$V_{m_{std}}$	*
//////	↑	
0.0944		
↑		

2nd, ..., n th set

1st set

V_w		V_w
x		$V_{w_{std}}$
STO		
+		
RCL ($V_{m_{std}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
4.4		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
$\%CO + \%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
//////	↑	*
//////	MW_d	
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+		MW
	460	↑
	STO	
	Ts_1	
	RCL (Ts_1)	
	+	
	↑	
	↑	
	ΔP_1	

1st set

	x	
	√	
	x⇄y	
	Ts_2	
	RCL (Ts_2)	
	+	
	↑	
	↑	
	+	
	↑	
	↑	
CLR	↑	
Ts_1	ΔP_2	
+	x	
Ts_2	√	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
x	÷	
+	n	
RCL (n)	STO	
÷	÷	$\overline{Ts}$ °R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P_s}$ Factor
//////	$\sqrt{\Delta P_s}$ Factor	*
//////	↑	
5129.8		
↑		
C_p		C_p
x		
x		
1		
↑		
R		R
√		
MW		
√		

2nd, ..., n th set

x		
÷		
x		V_s
//////	V_s	*
//////	↑	
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO ($M_d \times P_s$)		
x		
$\overline{Ts}$ °R		
÷		Q_s
//////	Q_s	*
//////	↑	
0.05645		
↑		
$\overline{Ts}$ °R		
x		
x		
RCL ($M_d \times P_s$)		
÷		Q_o
1032		
↑		
$\overline{Ts}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t		T_t
÷		
RCL ($M_d \times P_s$)		
÷		
D_n		D_n
↑		
x		
÷		%I

Run No.	5-4	5-5	5-6
Date	1/29/76	1/29/76	1/30/76
$\overline{\Delta H}$			
$\overline{Tm}$ °F			
$\overline{Tm}$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M	① 6.91	① 6.91	③ 5.56
M_d	.931	.931	.944
$\%CO_2$	21.5	–	~~2.6~~
$\%O_2$	8.9	–	~~18.7~~
%CO	–	–	–
$\%N_2$	69.6	–	~~78.7~~
MW_d	31.80	–	29.16
		⑥ 31.12	⑥ 31.12
MW	30.85	30.22	30.38
	(384)	(378)	(358)
$\overline{Ts}$ °R	844	838	818
$\sqrt{\Delta P_s}$ Factor	29.72 ~~32.14~~	29.107 ~~31.46~~	30.724 ~~35.12~~
C_p	.85	.85	.85
P_s	① 28.9	① 28.9	⑥ 28.67
V_s	4339 ~~4692~~	4294 ~~4641~~	4538 ~~5008~~
Q_s	57540 ~~62230~~	57,350 ~~61,980~~	62460 ~~27,190~~
Q_o	101,890 ~~110,180~~	100,830 ~~105,980~~	106570 ~~131,900~~
T_t			
D_n			
%I			

A_s = 3382 in²

* Insert only if you are not continuing from previous step.

② from 5-4/7 ③ from 5-4/5/5-4/9

① from 5-4/5 ⑥ avg all tests

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. 76LIM12

Results	5-7	5-8	5-9
Date	1/30/76	1/31/76	1/31/76
$\overline{\Delta H}$			
$\overline{T}_m$ °F			
$\overline{T}_m$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{SFS}}$			
%M	5.56 ③	4.20 ①	4.20 ①
M_s	.944	.958	.958
$\%CO_2$	2.5	2.3 ~~1.0~~	15.3
$\%O_2$	19.4	19.3	12.4
%CO	–	–	–
$\%N_2$	78.1	78.4	72.3
MW_d	29.18 (31.12)	29.14 (31.12)	30.94
MW	30.38 (360)	30.57 (349)	30.40 (345)
$\overline{T}_s$ °R	820	809	805
$\sqrt{\Delta P T_s}$ Factor	~~56.09~~	29.582 ~~29.82~~	26.474 ~~31.77~~
C_p	.85	.85	.85
P_s	28.671	29.02 ②	29.02 ②
V_s	8285	4001 ~~4365~~	3886 ~~4663~~
Q_s	113,760	57200 ~~62,390~~	55820 ~~66,990~~
Q_D	194560	93960 ~~103,630~~	91250 ~~109,500~~
T_s			
D_n			
%I			

$A_s = 3382\ in^2$

*Insert only if you are not continuing from previous step.

① from 5-8/9 ② from 5-6/7 ③ from 5-7/5/5-8/9 ④ avg all tests

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. _____

CLR		
ΔH_1		
↓		
$T_{m_{in_1}}$		
↑		
$T_{m_{out_1}}$		
+		
x⇄y		
ΔH_2		
CLR +		
ΔH_1 x⇄y		
÷ $T_{m_{in_2}}$		
ΔH_2 +		
÷ $T_{m_{out_2}}$		
(etc) +		
x⇄y		
n n		
STO STO		
÷ ÷	$\overline{\Delta H}$	
x⇄y		
$T_{m_{in_1}}$		
↓		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↓		
+		
÷	$\overline{T_m}$ °F	
460		
+	$\overline{T_m}$ °R	
x⇄y		
13.6		
÷		
P_b	P_b	
+		
17.7		
x		
V_m	V_m	
x		
x⇄y		
÷	$V_{m_{std}}$	
$V_{m_{std}}$		
↓		
0.0474		
↑		

V_w	V_w	
x	$V_{w_{std}}$	
STO		
+		
RCL ($V_{m_{std}}$)		
100		
STO		
x		
x⇄y		
÷	%M	
CHS		
RCL (100)		
+		
RCL (100)		
÷	M_d	
$\%CO_2$	$\%CO_2$	
↓		
44		
x		
$\%O_2$	$\%O_2$	
↓		
32		
x		
+		
%CO + $\%N_2$	%CO	
↓		
28		
x		
+		
100		
÷	MW_d	
↓		
x		
x⇄y		
CHS		
↓		
1		
+		
18		
x		
+	MW	
460		
STO		
T_{s_1}		
RCL (100)		
+		
↓		
↑		
T_s		

1st set

x		
÷		
$\sqrt{\Delta P_1}$		
↓		
$\sqrt{\Delta P_2}$		
↑		
+		
0.125		
↓		
A_s		
x		
x		
M_d		
↓		
P_b		
x		
STO (M_d x P_b)		
x		
T_s °R		
÷	Q_s	
Q_s ↓		
0.05645		
↓		
T_s °R		
x		
x		
RCL (M_d x P_b)		
÷	Q_a	
1032		
↓		
T_s °R		
x		
$V_{m_{std}}$		
x		
Y_s		
÷		
T_t	T_t	
÷		
RCL (M_d x P_b)		
÷		
D_n	D_n	
↓		
x		
÷	%I	

2nd, ..., n-th set

x		
÷		
$\sqrt{\Delta P_1}$		
↓		
$\sqrt{\Delta P_2}$		
↑		
+		
CLR		
T_{s_1} ΔP_1		
+ x		
T_{s_2}		
+ ↓		
(etc) ↑		
↓		
460 ↑		
↓ +		
n ↑		
STO ↑		
x ↑		
+ n		
RCL (n) STO		
÷ ÷	$\overline{T_s}$ °R	
$\sqrt{\ }$		
ΔP_1		
$\sqrt{\ }$		
↓		
ΔP_2		
$\sqrt{\ }$		
+		
(etc)		
x ↑		
RCL (n) RCL (n)		
÷ ÷		
↓		
↑		
SIZE.S		
↓		
C_p	C_p	
x		
x		
1		
↓		
P_s	P_s	
↑		
MW		

2nd, ..., n-th set

Run No.	5-10	5-11
Date	1/31/76	1/31/76
$\overline{\Delta H}$		
$\overline{T_m}$ °F		
$\overline{T_m}$ °R		
P_b		
V_m		
$V_{m_{std}}$		
V_w		
$V_{w_{std}}$		
%M	4.20 ①	4.20 ①
M_d	.959	.958
$\%CO_2$	20.9	14.3
$\%O_2$	9.6	13.3
%CO	–	–
$\%N_2$	69.6	72.4
MW_d	31.58	30.82
MW	31.01	30.28
$\overline{T_s}$ °R	(350) 810	(362) 822
$\sqrt{\Delta P_1 s}$ Factor	27.595 ~~29.83~~	28.059 ~~30.33~~
C_p	.85	.85
P_s	29.02 ①	29.02 ①
V_s	4010 ~~4335~~	4126 ~~4460~~
Q_s	57260 ~~61,840~~	58060 ~~62,760~~
Q_a	94,170 ~~101,800~~	96900 ~~104,740~~
T_t		
D_n		
%I		

AS = 3382 in

*Insert only if you are not continuing from previous step.

① from 5-8/9

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. _____

	CLR	1st set
	ΔH_1	
	↓	
	$T_{m_{in_1}}$	
	↓	
	$T_{m_{out_1}}$	
	+	
	$\times \Delta\theta$	
	ΔH_2	
CLR	+	
ΔH_1	$\times \Delta\theta$	
+	$T_{m_{in_2}}$	2nd set
ΔH_2	÷	
+	$T_{m_{out_2}}$	
(etc)	+	
	$\times \Delta\theta$	
n	n	
STO	STO	
÷	÷	ΔH
	$\times \Delta\theta$	
$T_{m_{in_1}}$		
↓		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↓		
+		
÷	$\overline{T_m}$	
460		
+	$\overline{T_m}$	
$\times \Delta\theta$		
13.6		
÷		
P_s	P_s	
+		
17.7		
×		
V_m	V_m	
×		
$\times \Delta\theta$		
÷	$\overline{V_m}$	
$V_{m_{std}}$		
↓		
0.0947		
↓		

V_w	V_w	
×	ρ_{H_2O}	
STO		
+		
RCL ($V_{m_{std}}$)		
100		
STO		
×		
$\% H_2O$		
÷	$\%H_2O$	
CHS		
RCL (100)		
−		
RCL (100)		
÷	M_d	
$\% CO_2$	$\%CO_2$	
↓		
44		
×		
$\% O_2$	$\%O_2$	
↓		
32		
×		
+		
$\%CO + \% H_2$	$\%CO$	
↓		
28		
×		
+		
100		
÷	MW_d	
	M_d	
×		
$\times \Delta\theta$		
CHS		
↓		
1		
÷		
18		
×		
+	MW_w	
460		
STO		
T_m		
RCL		
+		
T_s		1st set
↓		
ΔP_s		

×		
÷		
$\times \Delta\theta$		
T_s		
RCL		
+		
↓		
↓		
÷		
↓		
CLR		
T_s	ΔP_s	
+	×	
T_s	√	
+	↓	
(etc)	↓	
	↓	
460	↓	
↓	+	
n	↓	
STO	↓	
×	↓	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T_s}$
√		
ΔP_s		
√		
↓		
ΔP_s		
√		
+		
(etc)		
×	↓	
RCL (n)	RCL (n)	
÷	÷	$\overline{C_p A_s P_s}$
$\overline{C_p A_s P_s}$		
↓		
STO (n)		
↓		
C_p	C_p	
×		
×		
1		
↑		
P_s	P_s	
↓		
MW		
↓		

×		
÷		
×	V_s	
V_s		
↓		
0.173		
↓		
A_s		
×		
×		
M_d		
↓		
P_s		
×		
STO ($M_d \times P_s$)		
×		
$\overline{T_s}$ °R		
÷	Q_s	
Q_s		
↓		
0.09664.5		
↓		
$\overline{T_s}$ °R		
×		
×		
RCL ($M_d \times P_s$)		
÷	Q_a	
1052		
↓		
$\overline{T_s}$ °R		
×		
$V_{m_{std}}$		
×		
V_s		
÷		
T_t	T_t	
÷		
RCL ($M_d \times P_s$)		
÷		
D_n	D_n	
↓		
×		
÷	$\%I$	

Run No.	5-4/5	5-6/7	5-8
Date	1/29/76	1/30/76	1/31
$\overline{\Delta H}$	1.77		1.7
$\overline{T_m}$ °F	49		41
$\overline{T_m}$ °R	509		50
P_b	29.40		29.
V_m	20.817		19.3
$V_{m_{std}}$	21.39		20.
V_w	33.5		18.
$V_{w_{std}}$	1.588		.88
%M	6.91	③ 5.56	4.2
M_d	0.931	④ 0.944	0.9
$\%CO_2$			
$\%O_2$			
%CO			
MW_d	① 31.8	② 31.37	④ 30.
MW	30.85	30.61	30.
$\overline{T_s}$ °R	370 (830)	360 820	34 (965 72 80
$\sqrt{\Delta P T_s}$ Factor	28.52	25.09	28. 29.
C_p	.85	.85	.8
P_s	28.90	28.67	25 29.
V_s	4164	3690	43 416
Q_s	56,150	50,760	629 664
Q_a	97,780	86,700	102 97
T_t			
D_n			
%I			

$A_s = 3382$ in

*Insert only if you are not continuing from previous step.

① from S-4
② from S-9
③ avg S-4/S-9
④ avg S-4/5/S-8/9

#5 inlet point E point 12 reference

			$\frac{\sqrt{\Delta pT}\ avg}{\sqrt{\Delta pT}\ ref}$
5-1 :	$\sqrt{\Delta pT}$ ref:	29.932	
	$\sqrt{\Delta pT}$ avg:	25.39	0.848
double check calculation TEMP 5-2 :	$\sqrt{\Delta pT}$ ref	29.326	
	$\sqrt{\Delta pT}$ avg	26.57	0.906
check TEMP 5-3 :	$\sqrt{\Delta pT}$ ref	~~25.995~~ 26.561	
	$\sqrt{\Delta pT}$ avg	~~25.82~~ 27.021	1.017
5-4/5:	$\sqrt{\Delta pT}$ ref	34.088	
	$\sqrt{\Delta pT}$ avg	30.166	0.885
5-6/7	$\sqrt{\Delta pT}$ ref :	~~28.284~~ 28.636	
	$\sqrt{\Delta pT}$ avg :	~~26.470~~ 26.803	0.936
5-8/9	$\sqrt{\Delta pT}$ ref:	31.081	
	$\sqrt{\Delta pT}$ avg:	29.842	0.960

avg correction factor 0.925

SO_2 EMISSION DATA

Martin Marietta
Woodville Ohio
76LIM12
#6 Kiln inlet

Run No.	6-1A	6-1B	6-2A	6-2B	6-3A	6-3B
Date	1/27/76	1/27/76	1/27/76	1/27/76	1/28/76	1/28/76
mg SO_2	55.60	12.60	1.690	9.062	3.226	3.533
T_m - Average Gas Meter Temperature, °F	492 32	492 32	485 25	486 26	491 31	488 28
P_b - Barometric Pressure, "Hg abs.	29.83	29.83	29.84	29.84	29.62	29.62
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	0.651	0.256	0.747	0.914	0.570	0.504
ppm SO_2, Method 6	1056	609	27.6	121	70.3	86.6
ppm SO_2, INSTRUMENTAL						
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_{os}} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

PLANT _____

ADDRESS _____

SAMPLING LOCATION #6 kiln inlet

Report No. 76 L 14 11

Run No.	6-1	6-2	6-3
Date	1/27/76	1/27/76	1/28/76
$\overline{\Delta H}$	1.7	1.77	1.77
$\overline{T_m}$ °F	44	41	37
$\overline{T_m}$ °R	504	501	497
P_b	29.83	29.84	29.62
V_m	35.946	25.533	16.646
$V_{m_{std}}$	70.63	27.05	17.65
V_w	67.1	47.0	27.4
$V_{w_{gas}}$	3.181	2.23	1.30
%M	4.31	7.62	6.86
M_d	0.957	0.924	0.931
$\%CO_2$	–	17.4	15.2
$\%O_2$	–	9.4	10.6
%CO	–	–	–
$\%N_2$	–	73.2	74.2
M_d ①	30.95	31.15	30.85
MW	30.42	30.15	29.96
$\overline{T_s}$ °R	996 (5%) 868.02	996 821.29	996 796.93
MAFR Factor	13.066	14.225	27.205
C_p	.85	.85	.85
P_s	29.38	29.37	29.28
V_s	1688 ~~1797~~	2080 ~~1924~~	3946 ~~3605~~
Q_s	33680 ~~36770~~	35980 ~~40170~~	68240 ~~77908~~
Q_a	67340 ~~64,079~~	74330 ~~68,610~~	140,750 ~~129,590~~
T_s			
D_n			
%I			

* Insert only if you are not continuing from previous step.

① avg of all tests

$A_s = 5137 in^2$

* Average of Tests 4-10

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. _____

	CLR	
	ΔH_1	1st set
	↑	
	$T_{m_{in_1}}$	
	↑	
	$T_{m_{out_1}}$	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
+	$T_{m_{in_2}}$	
ΔH_2	÷	
+	$T_{m_{out_2}}$	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
$T_{m_{in_1}}$		
↑		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
÷		
(etc)		
RCL (n)		
↑		
+		
÷		$\overline{T_m}$ °F
460		
+		$\overline{T_m}$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
$V_{m_{std}}$		*
↑		
0.0474		
↑		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL (V_{wcond})		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
$\%CO + \%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
M_d		*
MW_d		
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+		MW
	460	1st set
	STO	
	T_{s_1}	
	RCL(T_s)	
	+	
	↑	
	↑	
	ΔP_1	

	x	
	√	
	x⇄y	
	T_{s_2}	
	RCL(T_s)	
	+	
	↑	
	↑	
	÷	
	↑	
	↑	
CLR	↑	
T_{s_1}	ΔP_2	
+	x	2nd, ..., nth set
T_{s_2}	√	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
x	÷	
+	n	
RCL(n)	STO	
÷	÷	$\overline{T_s}$ °R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL(n)	RCL(n)	
÷	÷	$\overline{\Delta P_{avg}}$
$\overline{\Delta P_{avg}}$		*
↑		
5129.6		
↑		
C_p		C_p
x		
x		
1		
↑		
P		P
√		
MW		
√		

x		
÷		
x		V_s
V_s		*
↑		
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO ($M_d \times P_s$)		
x		
$\overline{T_s}$ °R		
÷		Q_s
Q_s		*
↑		
0.05645		
↑		
$\overline{T_s}$ °R		
x		
x		
RCL($M_d \times P_s$)		
÷		Q_s
1032		
↑		
$\overline{T_s}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t		T_t
÷		
RCL($M_d \times P_s$)		
÷		
D_n		D_n
↑		
x		
÷		%I

Run No.	6-4	6-5	6-6
Date	1/29/76	1/29/76	1/30/76
$\overline{\Delta H}$			
$\overline{T_m}$ °F			
$\overline{T_m}$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M	3.67	3.67	4.24
M_d	.963	.963	.958
$\%CO_2$	1.3	17.8	15.5
$\%O_2$	19.7	8.3	12.3
%CO	–	–	–
$\%N_2$	79	73.9	72.2
MW_d	29.0 @ 30.98	31.18	30.98
MW	30.49	30.67	30.44
$\overline{T_s}$ °R	(530) 990	(536) 996	(541) 1001
$\sqrt{\Delta P T_s}$ Factor	18.61	23.72	21.44
C_p	.85	.85	.85
P_s	28.86	28.86	28.61
V_s	2735	3477	3170
Q_s	48510	61,310	54850
Q_a	97550	124,020	113,070
T_t			
D_n			
%I			

$A_s = 5137 in^2$

* Insert only if you are not continuing from previous step.

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. _____

CLR		
ΔH_1		1st set
↑		
$T_{m_{in_1}}$		
↑		
$T_{m_{out_1}}$		
+		
x⇄y		
ΔH_2		
CLR +		
ΔH_1 x⇄y		2nd, ..., nth set
+ $T_{m_{in_2}}$		
ΔH_2 +		
+ $T_{m_{out_2}}$		
(etc) +		
x⇄y		
n n		
STO STO		
÷ ÷	$\Delta\bar{H}$	
x⇄y		
$T_{m_{in_1}}$		
↑		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↑		
÷		
÷	$\bar{T}_m$ °F	
460		
+	$\bar{T}_m$ °R	
x⇄y		
13.6		
÷		
P_b	P_b	
÷		
17.7		
x		
V_m	V_m	
x		
x⇄y		
÷	$V_{m_{std}}$	
▨ $V_{m_{std}}$		*
▨ ↑		
0.0974		
1		

V_w	V_w	
x	$V_{w_{std}}$	
STO		
+		
RCL ($V_{m_{std}}$)		
100		
STO		
x		
x⇄y		
÷	%M	
CHS		
RCL (100)		
÷		
RCL (100)		
÷	M_d	
%CO_2	%CO_2	
↑		
44		
x		
%O_2	%O_2	
↑		
32		
x		
+		
%CO + %N_2	%CO	
↑		
28		
x		
+		
100		
÷	MW_d	
▨ MW_d		*
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+	MW	
460		1st set
STO		
T_s		
RCL (n)		
÷		
↑		
↑		
ΔP_1		

x		
÷		
x⇄y		
T_{s_1}		
+		
T_{s_2}		
+		
(etc)		
460		
↑ +		
n		
STO		
x		
+		
RCL (n) STO		
÷ ÷	$\bar{T}_s$ °R	
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x ÷		
RCL (n) RCL (n)		
÷ ÷	$\sqrt{\Delta P_s T_s}$ factor	
▨ $\sqrt{\Delta P_s T_s}$ factor		**
↑		
SIZE (n)		
↑		
C_p	C_p	
x		
x		
1		
↑		
P_s	P_s	
√		
MW		
↑		

x		
÷		
x	V_s	
▨ V_s		*
▨ ↑		
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO (M_d x P_s)		
x		
T_s °R		
÷	Q_s	
▨ Q_s		*
↑		
0.05645		
↑		
T_s °R		
x		
x		
RCL (M_d x P_s)		
÷	Q_o	
1032		
↑		
T_s °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t	T_t	
÷		
RCL (M_d x P_s)		
÷		
D_n	D_n	
↑		
x		
÷	%I	

Run No.	6-7	6-8	6-9
Date	1/30/76	1/31/76	1/31/76
$\Delta\bar{H}$			
$\bar{T}_m$ °F			
$\bar{T}_m$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M	4.24	4.80	4.80
M_d	.958	.952	.952
%CO_2	19.2	16.9	13.6
%O_2	8.4	9.6	12.0
%CO	—	—	—
%N_2	72.4	73.5	74.4
MW_d	31.40	31.09	30.65
MW	30.84	30.46	30.04
$\bar{T}_s$ °R	(546) 1006	(515) 975	(535) 995
$\sqrt{\Delta P_s T_s}$ Factor	26.15	19.724	21.83
C_p	.85	.85	.85
P_s	28.61	29.04	29.04
V_s	3838	2891	3193
Q_s	66070	51800	56049
Q_o	136,890	103,120	113870
T_t			
D_n			
%I			

$A_s = 5137 \text{ in}^2$

*Insert only if you are not continuing from previous step.

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. 76LIM12

Run No.	6-10	6-11	
Date	1/31/76	1/31/76	
$\overline{\Delta H}$			
$\overline{T_m}$ °F			
$\overline{T_m}$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M	4.80	4.80	
M_s	.952	.952	
$\%CO_2$	5.1	12.7	
$\%O_2$	17.2	11.7	
%CO	—		
$\%N_2$	77.8	76.6	
M_d	29.50 @30.48	30.5	
MW	30.36	29.90	
$\overline{T_s}$ °R	(545) 1005	(540) 1000	
$\sqrt{\Delta P_s}$ Factor	17.76	29.67	
C_p	.85	.85	
P_s	29.04	29.04	
V_s	2608	4419	
Q_s	45330	77194	
Q_a	93020	157620	
T_s			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↑	
	Tm_{in_1}	
	↑	
	Tm_{out_1}	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
+	Tm_{in_2}	
ΔH_2	+	
+	Tm_{out_2}	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
Tm_{in_1}		
↑		
Tm_{out_1}		
+		
Tm_{in_2}		
+		
Tm_{out_2}		
+		
(etc)		
RCL (n)		
↑		
+		
÷		$\overline{Tm}$ °F
460		
+		$\overline{Tm}$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
$V_{m_{std}}$		*
↑		
0.0424		
↑		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL ($V_{w_{gas}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
%CO + $\%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW
↑		*
$\%N_2$		
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
÷		MW
	460	
	STO	
	$\overline{Ts}$	
	RCL (n)	1st set
	+	
	↑	
	↑	
	↑	
	$\overline{\Delta H}$	

	x	
	÷	
	x⇄y	
	$\overline{Ts}$	
	RCL (n)	
	+	
	↑	
CLR	↑	
Ts_1	ΔP_1	
+	x	
Ts_2	√	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
x	÷	
+	n	
RCL (n)	STO	
÷	÷	$\overline{Ts}$ °R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P_s}$
$\sqrt{(\Delta P_s \times P_s)}$		*
↑		
5129.8		
↑		
C_p		C_p
x		
x		
1		
↑		
P_s		P_s
√		
MW		
√		

x		
÷		
x		V_s
V_s		*
↑		
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO ($M_d \times P_s$)		
x		
$\overline{Ts}$ °R		
÷		Q_s
Q_s		*
↑		
0.05645		
↑		
$\overline{Ts}$ °R		
x		
x		
RCL ($M_d \times P_s$)		
÷		Q_a
1052		
↑		
$\overline{Ts}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
$\overline{Ts}$		T_s
÷		
RCL ($M_d \times P_s$)		
÷		
D_n		D_n
↑		
x		
÷		$\overline{\Delta H}$

*Insert only if you are not continuing from previous step.

$A_s = 5137\ in^2$

PLANT _____

ADDRESS _____

SAMPLING LOCATION _____

Report No. _____

Run No. / Date	6-4/5 1/29/76	6-6/7 1/30/76	6-8/ 1/31/
$\overline{\Delta H}$	1.77		1.7
$\overline{T}_m$ °F	67		50
$\overline{T}_m$ °R	527		51
P_b	29.40		29.
V_m	23.696		20.
$V_{m_{std}}$	23.52		21.
V_w	18.9		22.
$V_{w_{std}}$	.896		1.08
%M	3.67	4.25	4.8
M_d	.963	.958	.95
$\%CO_2$			
$\%O_2$			
%CO			
MW_d	31.08	31.19	30.8
MW	30.59	30.65	30.
$\overline{T}_s$ °R	(530) ~~545~~ 996	996 ~~677~~	99 ~~67~~
$\sqrt{\Delta P_s}$ Factor	~~16.919~~ ~~17.11~~	~~18.399~~ ~~17.11~~	16.7 ~~17~~
C_p	.85	.85	.8
P_s	28.86	28.61	29.
V_s	2491 ~~2270~~	2709 ~~2535~~	24 ~~227~~
Q_s	43920 ~~48310~~	47,100 ~~50290~~	431 ~~474~~
Q_a	88860 ~~80960~~	96620 ~~90230~~	877 809
T_f			
D_n			
%I			

$A_s = 5137\ in^2$

* Insert only if you are not continuing from previous step.

* AVERAGE OF TESTS 4-10

#6 inlet reference pt = point 14 East

			$\frac{\sqrt{\Delta pT}\ avg}{\sqrt{\Delta pT}\ ref}$
6-1	$\sqrt{\Delta pT}$ ref	13.390	
	$\sqrt{\Delta pT}$ avg	13.066	0.976
6-2	$\sqrt{\Delta pT}$ ref	14.114	
	$\sqrt{\Delta pT}$ avg	14.225	1.008
6-3	$\sqrt{\Delta pT}$ ref	24.850	
	$\sqrt{\Delta pT}$ avg	27.205	1.095
6-4/5	$\sqrt{\Delta pT}$ ref	17.572	
	$\sqrt{\Delta pT}$ avg	16.979	0.966
6-6/7	$\sqrt{\Delta pT}$ ref	18.130	
	$\sqrt{\Delta pT}$ avg	18.399	1.015
6-8/9	$\sqrt{\Delta pT}$ ref	17.572	
	$\sqrt{\Delta pT}$ avg	16.720	0.942

average correction factor 1.000

SO_2 EMISSION DATA

Martin Marietta
Woodville Ohio
Baghouse Outlet
76 LIM 12

Run No.	04-2L ~~04-24~~	04-1A	04-2A	04-1L	04-1K	04-2O
Date	1/29/76	1/29/76	1/29/76	1/29/76	1/29/76	1/29/76
mg SO_2	55.76	8.76	9.52 ~~9.29~~	91.70	—	11.83
T_m - Average Gas Meter Temperature, °F	68	56	51	51	BAD TEST ABNORMALITY	61
P_b - Barometric Pressure, "Hg abs.	29.41	29.41	29.41	29.41		29.41
V_m - Volume of dry gas sampled @ meter conditions, ft.³	1.761	1.863	1.966	1.89		1.828
ppm SO_2, Method 6	434	61.8	63.1 ~~61.6~~	634	—	85.9
ppm SO_2, INSTRUMENTAL			63			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

$$\text{mg } SO_2 = (V_{bs} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

INLET INSTRUMENT

K4	K5	K6
710	6	—

6.2
6.05

Martin Marietta
Woodville Ohio
Baghouse Outlet
76 LIM 12

SO_2 EMISSION DATA.

Run No.	0-5-1B	0-5-1J	0-5-1H	0-5-2K	0-5-2E	0-5-2B
Date	1/29/76	1/29/76	1/29/76	1/29/76	1/29/76	1/29/76
mg SO_2	7.83	15.97	26.88	23.65	12.60	8.76
T_m - Average Gas Meter Temperature, °F	57	55	57	73	68	54
P_b - Barometric Pressure, "Hg abs.	29.42	29.42	29.42	29.42	29.42	29.42
V_m - Volume of dry gas sampled @ meter conditions, ft.^{3}	2.119	1.827	1.548	1.734	1.746	2.069
ppm SO_2, Method 6	48.7	112	~~211~~ ~~233~~ ~~229~~	195	97.4	55.4
ppm SO_2, INSTRUMENTAL			57			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

INLET INSTRUMENT

K4	K5	K6
~~12~~ 0	12	218

$$\text{mg } SO_2 = (V_{os} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

SO_2 EMISSION DATA

Martin Marietta
Woodville, Ohio
Baghouse Outlet
76-21M-12

Run No.	0-6-2C	0-6-1B	0-6-2J	0-6-2F	0-6-1K	0-6-1F
Date	1/30/76	1/30/76	1/30/76	1/30/76	1/30/76	1/30/76
mg SO_2	6.60	18.59	37.79	29.49	63.59	28.11
T_m - Average Gas Meter Temperature, °F	489 29	506 46	520 60	510 50	535 75	519 59
P_b - Barometric Pressure, "Hg abs.	29.20	29.20	29.20	29.20	29.20	29.20
V_m - Volume of dry gas sampled @ meter conditions, ft.^{3}	2.006 ~~2.006~~	1.945	1.479 ~~1.439~~	1.642	1.849	1.658
ppm SO_2, Method 6	41.3	124	341	235	472	226
ppm SO_2, INSTRUMENTAL			223			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

INLET INSTRUMENT

K4	K5	K6
-	<10	<10

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.0117}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

SO_2 EMISSION DATA

Martin Marietta
Weedville Ohio
76 LIM 12
Baghouse Outlet

Run No.	0-7-1H	0-7-2G	0-7-2H	0-7-1A	0-7-2A	0-7-1D
Date	1/30/76	1/30/76	1/30/76	1/30/76	1/30/76	1/30/76
mg SO_2	47.77	29.34	28.11	18.12	2.15	2.46
T_m - Average Gas Meter Temperature, °F	~~546~~ 86	~~515~~ 55	~~524~~ 64	~~505~~ 45	~~493~~ 33	~~530~~ 70
P_b - Barometric Pressure, "Hg abs.	29.20	29.20	29.20	29.20	29.20	29.20
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	1.808	1.374	1.202	2.085	1.427	0.526
ppm SO_2, Method 6	370	282	315	113	19.1	63.6
ppm SO_2, INSTRUMENTAL			—			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

INLET.	INSTRUMENT	
K4	K5	K6
<10	<10	373

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

SO_2 EMISSION DATA

Martin Marietta
Woodville Ohio
76 LIM 12
Baghouse Outlet

Run No.	0-8-1G	0-8-1L	0-8-2C	0-8-2L	0-8-2D	0-8-1B
Date	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76
mg SO_2	28.65	100.76	3.23	72.96	16.74	15.97
T_m - Average Gas Meter Temperature, °F	531 71	537 77	515 55	532 72	45 525	32 ~~592~~ 492
P_b - Barometric Pressure, "Hg abs.	29.46	29.46	29.46	29.46	29.46	29.46
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	1.713	1.843	1.720	2.028	1.855	2.012
ppm SO_2, Method 6	226	747	24.6	487	121	99.4
ppm SO_2, INSTRUMENTAL			152			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

INLET INSTRUMENTS

K1	K5	K6
<10	–	416

$$\text{mg } SO_2 = (V_{bs} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

SO_2 EMISSION DATA

Martin Marietta
Woodville Ohio
76 LIM-12
Baghouse Outlet

Run No.	0-9-1F	0-9-1J	0-9-2A	0-9-2E	0-9-2K	0-9-1A
Date	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76
mg SO_2	19.05	52.53	18.75	15.82	39.32	9.68
T_m - Average Gas Meter Temperature, °F	52 512	67 527	50 510	75 535	76 536	35 495
P_b - Barometric Pressure, "Hg abs.	29.46	29.46	29.46	29.46	29.46	29.46
V_m - Volume of dry gas sampled @ meter conditions, ft.^{3}	1.693	1.652	1.618	1.570	1.751	2.024
ppm SO_2, Method 6	147	426	86.2	137	306	60.2
ppm SO_2, INSTRUMENTAL			—			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

INLET INSTRUMENT

K4	K5	K6
<10	<10	75

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

Martin Marietta
Woodville Ohio
76 JAN 12
Baghouse Outlet

SO_2 EMISSION DATA

Run No.	0-10-1E	0-10-1K	0-10-2B	0-10-2F	0-10-2J	0-10-1B
Date	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76
mg SO_2	19.97	46.69	6.60	28.26	10.84	17.66
T_m - Average Gas Meter Temperature, °F	34 494	44 504	56 516	64 524	66 526	37 497
P_b - Barometric Pressure, "Hg abs.	29.46	29.46	29.46	29.46	29.46	29.46
V_m - Volume of dry gas sampled @ meter conditions, ft.^{3}	1.644	2.135	1.736	1.939	2.043	1.998
ppm SO_2, Method 6	153	280	49.9	194	71.0	112
ppm SO_2, INSTRUMENTAL			116			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

OUTLET 1-L : 717 ppm

INLET INSTRUMENT

K4	K5	K6
<10	<10	400

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.017}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

SO_2 EMISSION DATA

Martin Marietta
Woodville Ohio
76 21M12
Baghouse Outlet

Run No.	0-11-1D	0-11-1H	0-11-2C	0-11-2H	0-11-2G	0-11-1A
Date	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76	1/31/76
mg SO_2	14.52	33.64 ~~40.86~~	3.38 ~~50.92~~	50.52 ~~33.64~~	40.86 ~~3.38~~	blk
T_m - Average Gas Meter Temperature, °F	35 495	44 504	62 522	68 528	66 522	39 499
P_b - Barometric Pressure, "Hg abs.	29.46	29.46	29.46	29.46	29.46	29.46
V_m - Volume of dry gas sampled @ meter conditions, ft.^{3}	1.658	1.935	1.417	2.036	1.908	2.007
ppm SO_2, Method 6	110	223 ~~271~~	31.7 ~~477~~	333	284	—
ppm SO_2, INSTRUMENTAL			244			
C_{SO_2}, lb/DSCF						
M_{SO_2}, lb/hr						

$$\text{ppm } SO_2 = \frac{0.7496 \times \text{mg } SO_2 \times (T_m + 460)}{P_b \times V_m}$$

INLET INSTRUMENT

K9	K5	K6
<10	10	373

$$\text{mg } SO_2 = (V_{as} - V_{bs}) N \frac{V_s}{V_a} 32$$

$$C_{SO_2} = \frac{0.0166}{\cancel{0.0177}} \times 10^{-5} (\text{ppm } SO_2)$$

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

PLANT Martin Marietta

ADDRESS Woodville Ohio

SAMPLING LOCATION Baghouse Outlet

Report No. 76-1212

Run No.	0-4	0-5	0-6
Date	1/29/76	1/29/76	1/30/76
$\overline{\Delta H}$			
$\overline{T_m}$ °F			
$\overline{T_m}$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M			
M_d			
$\%CO_2$	5.95	12.0	13.5
$\%O_2$	17.25	13.8	13.0
%CO	–	–	–
$\%N_2$	76.8	74.2	73.5
MW_d	29.64	30.47	30.68
MW			
$\overline{T_s}$ °R			
$\sqrt{\Delta P T_s}$ Factor			
C_p			
P_s			
V_s			
Q_s			
Q_a			
T_t			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↓	
	Tm_{in_1}	
	↓	
	Tm_{out_1}	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
+	Tm_{in_2}	
ΔH_2	+	
+	Tm_{out_2}	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
Tm_{in_1}		
↓		
Tm_{out_1}		
+		
Tm_{in_2}		
+		
Tm_{out_2}		
+		
(etc)		
RCL (n)		
↓		
+		
÷		$\overline{Tm}$ °F
460		
+		$\overline{Tm}$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
$V_{m_{std}}$		*
↓		
0.0474		
↑		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL ($V_{w_{gas}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↓		
44		
x		
$\%O_2$		$\%O_2$
↓		
32		
x		
+		
%CO+$\%N_2$		%CO
↓		
28		
x		
+		
100		
÷		MW_d
MW_d		*
↓		
x		
x⇄y		
CHS		
↓		
1		
+		
18		
x		
+		MW
	460	
	STO	
	T_{s_1}	
	RCL (T_{s_1})	1st set
	+	
	↓	
	↓	
	ΔP_1	

	x	
	√	
	x⇄y	
	T_{s_2}	
	RCL (T_{s_2})	
	+	
	↓	
	↓	
	÷	
	↓	
	↓	
CLR	↓	
T_{s_1}	ΔP_2	2nd, ..., nth set
+	x	
T_{s_2}	√	
+	↓	
(etc)	↓	
	↓	
460	↓	
↓	+	
n	↓	
STO	↓	
x	↓	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T_s}$ °R
√		
ΔP_1		
√		
↓		
ΔP_2		
√		
+		
(etc)		
x	↓	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P T_s}$ Factor
$\sqrt{\Delta P T_s}$ Factor		*
↓		
5123.8		
↓		
C_p		C_p
x		
x		
1		
↓		
P		P_s
√		
MW		
√		

x		
÷		
x		V_s
V_s		*
↓		
0.123		
↓		
A_s		
x		
x		
M_d		
↓		
P_s		
x		
STO (M_d x P)		
x		
$\overline{T_s}$ °R		
÷		Q_s
Q_s		*
↓		
0.05645		
↓		
$\overline{T_s}$ °R		
x		
x		
RCL (M_d x P)		
÷		Q_a
1032		
↓		
$\overline{T_s}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t		T_t
÷		
RCL (M_d x P)		
÷		
D_n		D_n
↓		
x		
÷		%I

* Insert only if you are not continuing from previous step.

PLANT Martin Marietta

ADDRESS Uniontown Ohio

SAMPLING LOCATION Baghouse Outlet

Report No. 76LIH12

Run No.	0-7	0-8	0-9
Date	1/30/76	1/31/76	1/31/76
$\overline{\Delta H}$			
$\overline{T_m}$ °F			
$\overline{T_m}$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{gas}}$			
%M			
M_d			
$\%CO_2$	3.1	16.8	4.3
$\%O_2$	19.1	11.2	18.1
%CO	–	–	–
$\%N_2$	77.8	72.0	77.6
MW_d	29.26	31.13	29.41
MW			
$\overline{T_s}$ °R			
$\sqrt{\Delta P T_s}$ Factor			
C_p			
P_s			
V_s			
Q_s			
Q_a			
$\overline{T_s}$			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↑	
	$T_{m_{in_1}}$	
	↑	
	$T_{m_{out_1}}$	
	+	
	x⇄y	
	ΔH_2	
CLR	+	2nd, ..., nth set
ΔH_1	x⇄y	
+	$T_{m_{in_2}}$	
ΔH_2	+	
+	$T_{m_{out_2}}$	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
$T_{m_{in_1}}$		
↑		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↑		
+		
÷		$\overline{T_m}$ °F
460		
+		$\overline{T_m}$ °R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
	$V_{m_{std}}$	*
	↑	
0.0474		
↑		

V_w		V_w
x		$V_{w_{gas}}$
STO		
+		
RCL ($V_{m_{std}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
$\%CO + \%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
	MW_d	*
	↑	
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
÷		MW
	460	
	STO	
	T_s	
	RCL ($\overline{T_s}$)	
	↑	
	↑	
	↑	
	$\sqrt{\Delta P}$	

	x	
	÷	
	x⇄y	
	$\sqrt{\Delta P_1}$	2nd, ..., nth set
	↑	
	T_{s_1}	
	RCL ($\overline{T_s}$)	
	+	
	↑	
	↑	
	+	
	↑	
CLR	↑	
T_{s_1}	ΔP_2	
+	x	
T_{s_2}	$\sqrt{\ }$	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
x	↑	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T_s}$ °R
$\sqrt{\ }$		
ΔP_1		
$\sqrt{\ }$		
↑		
ΔP_2		
$\sqrt{\ }$		
+		
(etc)		
x	↑	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P T_s}$ Factor
	(RCL (n))	*
	↑	
512.0.5		
↑		
C_p		C_p
x		
x		
1		
↑		
P_b		P_b
↑		
MW		
↑		

x		
÷		
x		V_s
V_s		*
↑		
0.123		
↑		
Δs		
x		
x		
M_d		
↑		
P_b		
x		
STO ($M_d \times P_b$)		
x		
$\overline{T_s}$ °R		
÷		Q_s
	Q_s	*
	↑	
0.05645		
↑		
$\overline{T_s}$ °R		
x		
x		
RCL ($M_d \times P_b$)		
÷		Q_a
1032		
↑		
$\overline{T_s}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
$\overline{T_s}$		$\overline{T_s}$
÷		
RCL ($M_d \times P_b$)		
÷		
D_n		D_n
↑		
x		
÷		%I

*Insert only if you are not continuing from previous step.

PLANT Martin Marietta

ADDRESS Woodville Ohio

SAMPLING LOCATION Baghouse Outlet

Report No. 76LIM 12

Run No.	0-10	0-10-12	0-11
Date	1/31/76	1/31/76	1/31/76
$\overline{\Delta H}$			
$\overline{T_m}$ °F			
$\overline{T_m}$ °R			
P_b			
V_m			
$V_{m_{std}}$			
V_w			
$V_{w_{SES}}$			
%M			
M_d			
$\%CO_2$	17.1	16.8	15.3
$\%O_2$	10.8	9.5	12.3
%CO	—	-	-
$\%N_2$	72.1	73.7	72.4
MW_d	31.16	31.07	30.94
MW			
$\overline{T_s}$ °R			
$\sqrt{\Delta P T_s}$ Factor			
C_p			
P_s			
V_s			
Q_s			
Q_a			
T_t			
D_n			
%I			

	CLR	
	ΔH_1	1st set
	↑	
	$T_{m_{in_1}}$	
	↑	
	$T_{m_{out_1}}$	
	+	
	x⇄y	
	ΔH_2	
CLR	+	
ΔH_1	x⇄y	2nd, ..., nth set
+	$T_{m_{in_2}}$	
ΔH_2	+	
+	$T_{m_{out_2}}$	
(etc)	+	
	x⇄y	
n	n	
STO	STO	
÷	÷	$\overline{\Delta H}$
	x⇄y	
$T_{m_{in_1}}$		
↑		
$T_{m_{out_1}}$		
+		
$T_{m_{in_2}}$		
+		
$T_{m_{out_2}}$		
+		
(etc)		
RCL (n)		
↑		
÷		
÷		$\overline{T_m}$°F
460		
+		$\overline{T_m}$°R
x⇄y		
13.6		
÷		
P_b		P_b
+		
17.7		
x		
V_m		V_m
x		
x⇄y		
÷		$V_{m_{std}}$
//////	$V_{m_{std}}$	*
//////	↑	
0.0274		
↑		

V_w		V_w
x		$V_{w_{SES}}$
STO		
+		
RCL ($V_{w_{SES}}$)		
100		
STO		
x		
x⇄y		
÷		%M
CHS		
RCL (100)		
+		
RCL (100)		
÷		M_d
$\%CO_2$		$\%CO_2$
↑		
44		
x		
$\%O_2$		$\%O_2$
↑		
32		
x		
+		
%CO+$\%N_2$		%CO
↑		
28		
x		
+		
100		
÷		MW_d
//////	↑	*
//////	MW_d	
x		
x⇄y		
CHS		
↑		
1		
+		
18		
x		
+		MW
	460	↑
	STO	
	T_{s_1}	
	RCL(n)	1st set
	+	
	↑	
	↑	
	ΔP_1	

	x	
	√	
	x⇄y	
	T_{s_2}	
	RCL(n)	
	+	
	↑	
	↑	
CLR	↑	
T_{s_1}	ΔP_2	
+	x	
T_{s_2}	√	
+	↑	
(etc)	↑	
	↑	
460	↑	2nd, ..., nth set
↑	+	
n	↑	
STO	↑	
x	↑	
+	n	
RCL(n)	STO	
÷	÷	$\overline{T_s}$°R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
x	↑	
RCL(n)	RCL(n)	
÷	÷	$\sqrt{\Delta P T_s}$ Factor
//////	//////	*
//////	↑	
512.6.R		
↑		
C_p		C_p
x		
x		
1		
↑		
P_s		P_s
√		
MW		
√		

x		
÷		
x		V_s
//////	V_s	*
//////	↑	
0.123		
↑		
A_s		
x		
x		
M_d		
↑		
P_s		
x		
STO (M_d x P_s)		
x		
$\overline{T_s}$ °R		
÷		Q_a
//////	Q_s	*
//////	↑	
0.09645		
↑		
$\overline{T_s}$ °R		
x		
x		
RCL (M_d x P_s)		
÷		Q_s
1032		
↑		
$\overline{T_s}$ °R		
x		
$V_{m_{std}}$		
x		
V_s		
÷		
T_t		T_t
÷		
RCL (M_d x P_s)		
÷		
D_n		D_n
↑		
x		
÷		%I

*Insert only if you are not continuing from previous step.

Sample Calculations for Moisture, Gas Molecular Weight and Volumetric Flow Rate

Run 4-1

1. Volume of dry gas sampled at standard conditions[a], DSCF

$$V_{m_{std}} = \frac{17.7 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{T_m + 460} = \frac{17.7 \times 41.953 \left(29.83 + \frac{1.7}{13.6}\right)}{(52 + 460)} = 43.47 \text{ DSCF}$$

2. Volume of water vapor at standard conditions[b], SCF

$$V_{w_{gas}} = 0.0474 \times V_w = 0.0474 \times 34.4 = 1.63 \text{ SCF}$$

3. Percent moisture in stack gas

$$\% M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} = \frac{100 \times 1.63}{43.47 + 1.63} = 3.6 \%$$

4. Mole fraction of dry gas

$$M_d = \frac{100 - \% M}{100} = \frac{100 - 3.6}{100} = 0.964$$

5. Molecular weight of dry stack gas

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

$$\left(13.4 \times \frac{44}{100}\right) + \left(12.9 \times \frac{32}{100}\right) + \left(73.7 \times \frac{25}{100}\right) = 30.66$$

6. Molecular weight of wet stack gas

$$MW = MW_d \times M_d + 18\,(1-M_d) = 30.66 \times 0.964 + 18\,(1 - 0.964) = 30.2$$

7a. Stack gas velocity at stack conditions, fpm

$$V_s = 5128.8 \times Cp \times \left(\sqrt{\Delta P_s \times (T_s + 460)}\right)_{avg} \frac{1}{P_s \times MW}^{1/2} =$$

$$5128.8 \times 0.85 \times 29.31 \left[\frac{1}{30.26 \times 30.2}\right]^{1/2} = 4226 \quad \text{fpm}$$

8. Stack gas volumetric flow rate at standard conditions[d], DSCFM

$$Q_s = \frac{0.123 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)} = \frac{0.123 \times 4226 \times 3395 \times 0.964 \times 30.26}{(380 + 460)} = 61{,}280 \text{ DSCFM}$$

9. Stack gas volumetric flow rate at stack conditions, ACFM

$$Q_a = \frac{.05645 \times Q_s\,(T_s + 460)}{P_s \times M_d} = \frac{.05645 \times 61280\,(380 + 460)}{30.26 \times 0.964} = 99620 \text{ ACFM}$$

---

[a]Dry standard cubic feet at 70°F, 29.92 in. Hq.

[b]Standard conditions, 70°F, 29.92 in. Hq.

[d]Dry standard cubic feet per minute at 70°F, 29.92 in. Hq.

Sample Calculations, Sulfur Dioxide

1. Milligrams SO_2 equivalents collected, mg.

$$mg\ SO_2 = (V_t - V_{tb})\ N\ \left(\frac{V_{soln}}{V_a}\right)\ 32$$

2. Concentration of SO_2 in stack, ppmv

$$ppm\ SO_2 = \frac{0.7496 \times mg\ SO_2 \times (T_m + 460)}{P_b \times V_m}$$

3. C_{SO_2}, concentration of SO_2, lb/DSCF

$$C_{SO_2} = 0.017 \times 10^{-5}\ (ppm\ SO_2)$$

4. M_{SO_2}, Mass flow rate of SO_2, lb/hr

$$M_{SO_2} = C_{SO_2} \times Q_s \times 60$$

V_t = volume of barium perchlorate titrant required in analysis of sample
V_{tb} = volume of barium perchlorate titrant required in analysis of blank
N = normality of barium perchlorate titrant
V_{soln} = total volume of solution in which SO_2 is contained
V_a = sample aliquot size analyzed
T_m = average dry gas meter temperature, °F
P_b = barometric pressure, in. Hq.
Q_s = stack gas flow rate, DSCFM

APPENDIX B

COMPLETE PROCESS OPERATION DATA

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt KCH | Date 27 JAN 76

PRODUCT# 124 FEED# 123 | Data Set No. 1 | Page 1

#4 KILN —	Units	9:00	12:00	1400	1500	1600	1700	1800
STROKES PER HOUR		145	100	100	100	100	100	100
COAL	Ton/Hr.	4.5	3.9	3.6	3.7	3.7	3.7	3.6
KILN SPEED	RPM	90	70	70	70	70	70	70
STONE FEED RATE	TPH	58	40	40	40	40	40	40
MID KILN TEMP	°F	1600	1600	1600	1600	1630	1640	1630
HEAT EXCH. TEMP.	°F	1950	1950	1950	1950	1930	1930	1920
BURN ZONE TEMP.	°F	2550	2550	2500	2500	2400	2400	2400
PRE HEATER TEMP.	°F	1400	1440	1450	1460	1460	1470	1470
changed production between 1000 & 1100 (1040)								
BAGHOUSE —		9:30	1630					
COMPARTMENT OFF		1C	1C					
INLET TEMP	°F	440	400					
INLET PRESSURE	"WC	4.1	6.5					

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt KCH

Date 1-27-76 / 1-28-76

Data Set No. 1 | Page 2

#4 KILN	Units	1900	2000	2100		900	1000	1100
STROKES PER HOUR		110	120	125		125	125	125
COAL FEED RATE	TPH	3.6	3.6	3.8		3.9	3.9	3.9
KILN SPEED	RPH	75	75	80		80	80	80
STONE FEED RATE	TPH	45	48	50		50	50	50
MID KILN TEMP.	°F	1640	1620	1610		1600	1600	1600
HEAT EXCH. TEMP.	°F	1920	1920	1940		1950	1950	1950
BURN ZONE TEMP.	°F	2400	2450	2500		2400	2400	2400
PREHEATER TEMP.	°F	1470	1460	1440		1430	1430	1430

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt KCH | Date 1-28-76

Data Set No. 1 | Page 3

#4 KILN	Units	1200	1300	1400	1500	1600	1700	
STROKES PER HOUR		125	125	135	135	135	135	
COAL FEED RATE	TPH	3.9	3.9	3.8	3.8	3.7	3.7	
KILN SPEED	RPH	80	80	85	85	85	85	
STONE FEED RATE	TPH	50	50	54	54	54	54	
MID KILN TEMP.	°F	1600	1570	1550	1550	1520	1530	
HEAT EXCH. TEMP.	°F	1950	1920	1920	1920	1850	1880	
BURN ZONE TEMP.	°F	2400	2400	2400	2400	2200	2200	
PREHEATER TEMP.	°F	1400	1400	1400	1390	1370	1370	
to 53 @ 1315 to 54 @ 1330								

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt KCH

Date 1-29-76

Data Set No. 1 | Page 4

#4 KILN	Units	1200	1300	1400	1500	1600	1700	1800
STROKES PER HOUR		135	135	135	135	135	150	150
COAL FEED RATE	TPH	3.9	4.0	3.9	4.0	4.0	4.0	3.9
KILN SPEED	RPH	85	85	85	85	85	85	85
STONE FEED RATE	TPH	~~58~~ 54	~~58~~ 54	~~58~~ 54	~~58~~ 54	~~58~~ 54	~~59~~ 54	~~59~~ 54
MID KILN TEMP	°F	1550	1550	1550	1550	1570	1570	1550
HEAT EXCH. TEMP	°F	1900	1900	1900	1900	1900	1900	1940
BURN ZONE TEMP.	°F	2200	2200	2200	2200	2000	2050	2150
PREHEATER TEMP	°F	1360	1360	1380	1380	1390	1385	1370
4:45 to 150 strokes - ram shut off								
SULFUR PRODUCT	%	.018		.018		.015		0.016
BAGHOUSE	TIME	1420	1530					
COMP. OFF		1C	1C					
INLET (#6) TEMP	°F	410	410					
INLET PRESSURE	IWC	6.2	5.5					

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt KCH

Date 1-30-76

Data Set No. 1 | Page 5

#4 KILN	Units	900	1000	1500					
STROKES PER HOUR		14-B	SHUT OUT RING-COATING STOPPING	BACK ON LINE					
COAL FEED RATE	TPH	3.6							
KILN SPEED	RPH	85							
STONE FEED RATE	TPH	54							
MID KILN TEMP	°F	1400							
HEAT EXCH. TEMP	°F	1700							
BURN ZONE TEMP	°F	2000							
PREHEATER TEMP	°F	1250							
ID DAMPER FAN	% OPEN	78							
SULFUR		0.034							

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt KCH | Date 1-31-76

Data Set No. | Page 6

#4 KILN —	Units	800	900	1000	1100	1200	1300	1400
STROKES PER HOUR		150	150	150	150	150	150	150
COAL FEED RATE	TPH	4.2	4.6	4.5	4.4	4.3	4.4	4.4
KILN SPEED	RPH	100	100	100	100	100	100	100
STONE FEED RATE	TPH	60	60	60	60	60	60	60
MID KILN TEMP.	°F	1600	1600	1600	1600	1600	1600	1600
HEAT EXCH. TEMP	°F	1900	1900	1900	1900	1900	1950	1950
BURN ZONE TEMP.	°F	2000	2200	2200	2200	2200	2200	2200
PREHEATER TEMP	°F	1430	1440	1460	1450	1440	1460	1450
ID DAMPER SETTING	% OPEN	78	78	78	78	78	78	78
% SULFUR LIME	%							

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 4

Operators K. C. Hustvedt ICCH

Date 1-31-76

Data Set No. 1 | Page 7

#4 KILN	Units	1500	1600	1700	1500	1600	1700		
STROKES PER HOUR		180	180	180	150	150	150		
COAL FEED RATE	TPH	6.1	6.1	5.9	4.4	4.4	4.3		
KILN SPEED RATE	RPH	115	115	115	100	100	100		
STONE FEED RATE	TPH	60	60	60	60	60	60		
MID KILN TEMP	°F	1680	1660	1640	1600	1600	1580		
HEAT EXCH. TEMP.	°F	—	—	—	1950	1970	1950		
BURN ZONE TEMP.	°F	K#5 data			2200	2200	2200		
PREHEATER TEMP	°F				1460	1400	1370		
ID DAMPER SETTING	% OPEN				78	78	78		
SULFUR LIME	%					0.049			

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH

Date 27 JAN 76

Data Set No. 2 | Page 1

Feed - #125
Product - #126

#5 KILN —	Units	9:00	12:00	1400	1500	1600	1700	1800
STROKES PER HOUR		200	100	100	100	100	100	100
COAL FEED RATE	TPH	6.4	4.0	4.6	4.0	4.0	4.1	4.1
KILN SPEED	RPH	115	70	70	70	70	70	70
STONE FEED RATE	TPH	80	40	40	40	40	40	40
MID KILN TEMP.	°F	1660	1620	1670	1670	1650	1650	1650
PRE-HEATER TEMP	°F	1380	1395	1440	1435	1490	1470	1450
changed production between 1000 & 1100								
BURNING ZONE TEMP.	°F	[redacted]	1950	1800	1800	—	—	—
Feed #127 Iron #128 Product #129								
#6 KILN —								
STONE FEED RATE	TPH	38	38	38	38	38	38	38
IRON FEED RATE	TPH	1.30	1.30	1.30	1.30	1.30	1.30	1.30
COAL FEED RATE	TPH	3.4	4.8	5.0	4.6	4.4	4.2	4.2
KILN SPEED	RPH	60	60	60	60	60	60	60
HEAT EXCH TEMP.	°F	1470	1500	1500	1440	1460	1470	1470
BURNING ZONE TEMP	°F	2300	2700	2720	2640	2640	2620	2640

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH

Date 1-27-76 / 1-28-76

Data Set No. 2 | Page 2

#5 KILN	Units	1900	2000	2100		900	1000	1100
STROKES PER HOUR		110	140	140		150	150	150
COAL FEED RATE	TPH	4.1	4.4	4.4		5.5	4.4	5.5
KILN SPEED	RPH	70	85	85		90	90	90
STONE FEED RATE	TPH	44	56	56		60	60	60
MID KILN TEMP.	°F	1630	1650	1600		1620	1550	1550
PRE HEATER TEMP.	°F	1410	1400	1350		1360	1320	1320
BURNING ZONE TEMP.	°F	—	—	—		1900	1700	1600
# 6 KILN								
STONE FEED RATE	TPH	38	38	38		38	38	38
IRON FEED RATE	TPH	1.3	1.7	1.3		1.25	1.25	1.15
COAL FEED RATE	TPH	4.2	4.3	4.3		4.4	4.6	4.6
KILN SPEED	RPH	65	65	65		65	65	65
HEAT EXCH. TEMP.	°F	1440	1430	1440		1430	1480	1480
BURNING ZONE TEMP.	°F	2680	2640	2700		2680	2600	2600

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH

Date 1-28-76

Data Set No. 2 | Page 3

#5 KILN	Units	1200	1300	1400	1500	1600	1700	
STROKES PER HOUR		150	150	150	150	150	150	
COAL FEED RATE	TPH	6.3	6.3	5.9	5.7	5.7	5.7	
KILN SPEED	RPH	90	90	90	95	95	95	
STONE FEED RATE	TPH	60	60	60	60	60	60	
MID KILN TEMP	°F	1580	1600	1620	1630	1660	1660	
PRE HEATER TEMP	°F	1340	1360	1370	1390	1410	1410	
BURNING ZONE TEMP	°F	1600	2000	2100	2000	2100	2200	
#6 KILN								
STONE FEED RATE	TPH	38	38	38	38	38	38	
IRON FEED RATE	TPH	1.15	1.15	1.15	1.15	1.15	1.15	
COAL FEED RATE	TPH	4.6	4.4	4.4	4.4	4.4	4.2	
KILN SPEED	RPH	65	65	65	65	65	65	
HEAT EXCHANGE TEMP	°F	1480	1480	1480	1480	1460	1440	
BURNING ZONE TEMP	°F	2600	2640	2620	2640	2600	2500	

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH

Date 1-29-76

Data Set No. 2 | Page 4

#5 KILN	Units	1200	1300	1400	1500	1600	1700	1800
STROKES PER MINUTE		185	185	190	190	190	190	190
COAL FEED RATE	TPH	6.0	6.1	6.1	6.1	6.3	6.3	6.5
KILN SPEED	RPH	115	115	118	118	118	118	118
STONE FEED RATE	TPH	74	74	76	76	76	76	76
MID KILN TEMP	°F	1690	1700	1710	1720	1660	1660	1660
PRE HEATER TEMP	°F	1395	1405	1420	1415	1380	1380	1400
BURNING ZONE TEMP	°F	2400	2200	2200	2200	2100	2100	2100
change @ 2400	%	.016					.022	0.053
SULFUR								
#6 KILN								
STONE FEED RATE	TPH	38	38	40	40	40	40	16
IRON FEED RATE	TPH	1.15	1.15	1.15	1.15	1.15	1.15	0.50
COAL FEED RATE	TPH	4.8	4.8	4.8	4.7	4.7	3.2	5.4
KILN SPEED	RPH	65	65	65	65	65	65	25
HEAT EXCHANGE TEMP	°F	1480	1480	1480	1480	1480	1400	1370
BURNING ZONE TEMP	°F	2780	2780	2760	2700	2600	2100	2500

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH

Date 1-30-76

Data Set No. 2 | Page 5

#5 KILN	Units	900	1000	1100	1200	1300	1400	1500
STROKES PER HOUR		195	195	195	195	185	175	175
COAL FEED RATE	TPH	6.3	6.3	6.3	6.3	6.3	5.8	5.9
KILN SPEED	RPH	120	120	120	120	120	108	108
STONE FEED RATE	TPH	78	78	78	78	76	70	70
MID KILN TEMP	°F	1720	1710	1680	1680	1680	1680	1680
PRE HEATER TEMP	°F	1430	1395	1400	1405	1420	1415	1405
BURNING ZONE TEMP	°F	2200	2200	2200	1700	1700	1850	1900
ID DAMPER SETTING	% OPEN	4-7	4-5	4-5	4-5	4-8	4-8	4-8
SULFUR LIME	%	0.023		0.034		0.069		
to 185 strokes @ 1200 (76 tons)	to 90 tons @ 1315			to 56 tons @ 1335		to 70 tons 1350		
#6 KILN								
STONE FEED RATE	TPH	37	40	40	40	40	40	40
IRON FEED RATE	TPH	1.05	1.15	1.15	1.15	1.15	1.15	1.15
COAL FEED RATE	TPH	5.6	5.1	5.1	5.1	4.9	5.1	5.0
KILN SPEED	RPH	50	60	60	60	60	55	55
HEAT EXCH. TEMP	°F	1480	1480	1470	1470	1450	1480	1470
BURNING ZONE TEMP.	°F	2680	2700	2600	2650	2700	2640	2650

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH

Date 1-31-76

Data Set No. 2 | Page 6

#5 KILN	Units	800	900	1000	1100	1200	1300	1400
STROKES PER HOUR		175	175	180	180	180	180	180
COAL FEED RATE	TPH	6.2	5.6	5.8	5.8	6.0	6.2	6.2
KILN SPEED	RPH	115	115	115	115	115	115	115
STONE FEED RATE	TPH	70	70	72	72	72	72	72
MID KILN TEMP	°F	1670	1710	1690	1670	1670	1680	1680
PREHEATER TEMP	°F	1415	1425	1405	1395	1395	1395	1410
BURNING ZONE TEMP	°F	2050	2150	2000	2000	2000	2000	2050
ID DAMPER FAN	% OPEN	6.0	6.7	6.0	6.0	6.0	6.0	6.0
% S, LIME	%							
to 72 TPH @ 945								
#6 KILN								
STONE FEED RATE	TPH	40	40	40	40	40	40	37
IRON FEED RATE	TPH	1.15	1.15	1.15	1.15	1.15	1.15	1.05
COAL FEEDRATE	TPH	5.3	5.4	5.4	5.4	5.5	5.7	6.0
KILN SPEED	RPH	55	55	55	50	50	50	50
HEAT EXCH TEMP	°F	1420	1440	1460	1460	1480	1490	1500
BURNING ZONE TEMP	°F	2760	2760	2720	2720	2700	2720	2700
ID FAN	% OPEN	80	80	100	100	80	80	80

Company Martin Marietta Corporation | Location Woodville, Ohio

Facility Rotary Kiln | Unit No. 5 & 6

Operators K. C. Hustvedt KCH | Date 1-31-76

Data Set No. 2 | Page 7

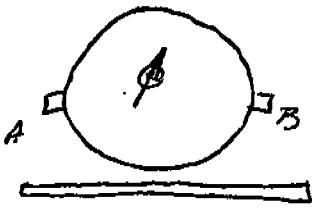
#5 KILN	Units	1500	1600	1700					
STROKES PER HOUR		180	180	180					
COAL FEED RATE	TPH	6.1	6.1	5.9					
KILN SPEED RATE	RPH	115	115	115					
STONE FEED RATE	TPH	~~60~~ 72	~~60~~ 72	~~60~~ 72					
MID KILN TEMP	°F	1680	1660	1640					
PREHEATER TEMP	°F	1395	1360	1360					
BURNING ZONE TEMP	°F	2060	2050	2050					
ID DAMPER SETTING	% OPEN	60	60	60					
% SLIME			0.020						
#6 KILN									
STONE FEED RATE	TPH	40	40	40					
IRON FEED RATE	TPH	1.15	1.15	1.15					
COAL FEED RATE	TPH	6.0	5.8	5.8					
KILN SPEED RATE	RPH	160	155	155					
HEAT EXCH. TEMP	°F	1500	1510	1520					
BURN ZONE TEMP	°F	2720	2620	2610					
ID DAMPER SETTING	% OPEN	80	72	73					

APPENDIX C

FIELD DATA

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

(FLOW INTO PAPER)
CROSS-SECTION



SCHEMATIC OF SAMPLING LOCATION

PLANT MARTIN-MARIETTA, WOODVILLE, OHIO
DATE 1/21/76
SAMPLING LOCATION #8 BAGHOUSE INLET
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 69 1/2"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 3 3/4"
STACK I.D., (DISTANCE A - DISTANCE B) 65 3/4" ≈ 5 1/2'
NEAREST UPSTREAM DISTURBANCE ≈35' (>2 DIA.)
NEAREST DOWNSTREAM DISTURBANCE ≈130' (>8 DIA.)
CALCULATOR DAVIS

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)
B 1	.044	5 1/2'	2 7/8"	3 3/4"	6 5/8"
2	.147	"	9 3/4"	"	13 1/2
3	.295	"	19 1/2"	"	23 1/4
4	.705	"	46 1/2"	"	50 1/4
5	.853	"	56 1/4"	"	60
6	.956	"	63 1/8"	"	66 7/8
BA 1	.044	5 1/2'	2 7/8"	5 3/8"	8 1/4"
2	.147	"	9 3/4"	"	15 1/8
3	.295	"	19 1/2"	"	24 7/8
4	.705	"	46 1/2"	"	51 7/8
5	.853	"	56 1/4"	"	61 5/8
6	.956	"	63 1/8"	"	68 1/2
			A_s = 3395 in²		

EPA (Dur) 232
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/27/76

Plant M-M, Wilmington, Calif. Location

Bar. Pressure 29.83 "Hg

Ambient Temp. 22 °F

Run No. 4-1A

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator DAVIS-HARRISON

Comments:
LEAK ✓ .005CFM

CRAT BEGUN AT 3:58 PM

~~4:50 PAUSE OFF~~

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
4:50 PM	199.014	4	48°F
4:56	200.532	4	48°F
4:00	200.835	4	50°F
4:05	200.803	4	50F
	1.987 1.789		49

Comments:

Impinger Bucket No. 8 10

Meter Box No. 6

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/27/76

Plant M-M, WDVILL, OHIO Location #4 INLET

Bar. Pressure 29.83 "Hg Comments:

Ambient Temp. 22°F °F LEAK ✓ 0.0CFM

Run No. 4-1B 4:40 POWER OFF

Power Stat Setting 4:55 POWER ON

Filter Used: Yes ___ No ✓

Operator DAVIS HARRISON

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
4:43PM	200.973	4	44°F
4:56	201.3	4	44
5:02	201.748	4	42
	0.775		43

Comments:

Impinger Bucket No. 2

Meter Box No. 6

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location MARTIN-MARIETTA, OHIO

Test MOISTURE 4-1

Date 1/27/86

Operator DAVIS-HARRISON

By Absorption:

Barometric Pressure 29.53

Comments:

IMPINGER BUCKET #1
METER: W-5

LEAK ✓ 0.0 @ 15" Hg

4:50 POWER OFF
4:55 " ON

ΔP "H2O	T °F	Clock Time	Meter (Ft³)	~~Flow Meter Setting~~ ΔH (CFH)	Meter Temperature, Tm
1.2	415	3:50 4:52	644.984	ΔH = 1.8" H2O	45°F
1.2	397	3:55 4:57	649.64	1.8	48°F
1.2	400	4:07	656.0	1.8	50°F
1.2	393	4:17	663	1.5	55°F
1.1	400	4:45	678	1.4	58°F
1.1	400	5:04	686.937	1.8	56°F

Tube No.	Weight, grams		
	Final	Initial	Difference
1	120	100	20
2	105	100	5
3	0	0	0
Si Gel	209.4	200	9.4

41.953 1.7 52

(W) = weight of moisture collected = 34.4

$$\% \text{ Moisture by Volume} = \frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta
DATE 1/27/76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE
OPERATOR Burbank

COMMENTS: Run 4-1

GAS \ RUN	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	13.4	13.4	~~23.3~~				13.4	44/100	5.896
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.3	12.9					12.9	32/100	4.128
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	—	—					—	28/100	~~20.636~~
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.7	28/100	20.636 ~~30.66~~
								TOTAL	30.66

262
134
128

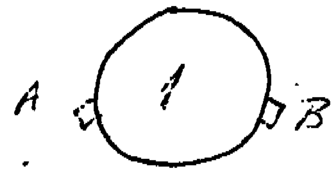
13.4
12.9
26.3

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT M-M, WOODVILLE, OHIO
DATE 1/27/76
LOCATION #4 INLET
STACK I.D. 5'6"
BAROMETRIC PRESSURE, in. Hg 29.83
STACK GAUGE PRESSURE, in. H_2O 5.8 (.426 "Hg)
OPERATORS DAVIS, HARRISON

4-1



X-SECTION (FLOW INTO PAPER)

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.8	395
2	.99	395
3	1.2	400
4	1.1	399
5	1.1	391
6	1.0	380
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	.78	335
2	1.0	370
3	1.1	375
4	1.1	370
5	1.2	376
6	.93	369
	351.675	
√	= 29.306	380
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/27/76

Plant M-M, WOODVILLE, OHIO Location #4 INLET

Bar. Pressure 29.84 "Hg Comments: LEAK ✓ : 0.0 CFM

Ambient Temp. 28 °F

Run No. 4-2A

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator DAVIS, HARRISON

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
6:50	201.767	4	30°F
6:58	202.15	4	30°F
7:05	202.558	4	30°F
~~7:16~~			
	0.791		30

Comments:

Impinger Bucket No. 3

Meter Box No. 6

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/27/76

Plant M-M, Uhrichsville, OHO Location INLET #4

Bar. Pressure 29.84 "Hg Comments: LEAK <.001 CFM

Ambient Temp. 28 °F

Run No. 4-2B

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator DAVIS, HARRISON

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
7:15	202.582	4	30°F
7:20	202.9	4	32°F
7:25	203.1	4	32°F
7:30	203.412	4	32°F
	0.83		32

Comments:

Impinger Bucket No. 10

Meter Box No. 6

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location M.F.M., WOODSVILLE, OHIO

Test MOISTURE 4-2

Date 1/27/76

Operator DAVIS, HARRISON

By Absorption:

Barometric Pressure 29.24

Comments:

LEAK V:
0.0 CFM @ 15" Hg

IMPINGER BASKET #4

ΔH - "H_2O

ΔP "H_2O	T	Clock Time	Meter (Ft^3)	~~Flow Meter Setting~~ (CFH)	Meter Temperature, Tm
1.1	385	6:50	687.755	1.9	40°F
1.1	380	6:58	692.6	1.9	42°F
1.0	380	7:10	700.7	1.9	45°F
1.0	357	7:16	704	1.9	47°F
.98	354	7:26	711.5	1.9	50°F
.99	355	7:32	714.887	1.9	50°F
			27.132	1.9	47

NOTE: BECAUSE THERMOCOUPLE WIRE NOTICED TO BE LOOSE, LOCATION OF PROBE PLACEMENT AGAINST TEMP OF 393 (PT. 5)

Tube No.	Weight, grams		
	Final	Initial	Difference
1	114	100	14
2	103	100	3
3	0	0	0
Silicel	207.1	200	7.1

(W) = weight of moisture collected = 24.1

% Moisture by Volume = $\dfrac{100 \cdot W}{\left(\dfrac{375 \cdot P_b \cdot V_m}{T_m + 460}\right) + W}$

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCSI-30 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

4-2

PLANT Martin Marietta Woodville Oh

DATE 1/27/76

SAMPLING TIME (24-hr CLOCK) 1850 - 1932

SAMPLING LOCATION #4 Kiln inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Bag

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE

OPERATOR

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	13.4	13.4	13.3	13.3	13.4	13.4	13.4	44/100	5.896
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.4	13.0	26.4	13.1	26.4	13.0	13.0	32/100	4.16
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)		—		—		—		28/100	—
N_2 (NET IS 100 MINUS ACTUAL CO READING)		73.6		73.6		73.6	73.6	28/100	20.608
								TOTAL	30.66

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

4.2

PLANT [illegible]
DATE 1/27/76
LOCATION #4 INLET
STACK I.D. 5'6"
BAROMETRIC PRESSURE, in. Hg 29.84
STACK GAUGE PRESSURE, in. H_2O (A) 6.0 (B) 6.44" H_2O
OPERATORS DAVIS, HARRISON

X-SECTION
(FLOW INTO PAPER)
SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.78	374
2	.98	390
3	1.0	391
4	1.0	394
5	1.0	~~393~~ 393
6	.92	~~390~~ 391
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	.75	362
2	1.0	382
3	1.2	391
4	1.1	380
5	1.2	378
6	1.1	374
	347.918	
	$\bar{\sigma}$ = 28.99	382
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/25/76

Plant M-M, Waverly Ohio Location #4 INLET.

Bar. Pressure 29.62 "Hg Comments: LEAK ✓ 0.0015 CFM

Ambient Temp. 15 °F

Run No. 4-3A

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator DAVIS, HARRISON

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
1624 PM	208.0	5	28°F
10:31	208.3	5	28
10:36	208.5	4.5	28
10:41	208.73	4.5	30°F
	0.73		29

Comments:

Impinger Bucket No. 4

Meter Box No. 6

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/28/76

Plant [illegible], Ohio Location #4 INLET

Bar. Pressure 29.62 "Hg Comments: LEAK ✓ : .0005 CFM

Ambient Temp. 15 °F

Run No. 4-3B

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator Davis, Harrow

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:50 AM	208.757	4	26°F
10:55	209.0	4	26°
11:00	209.3	4.5	26
11:05	209.548	4.5	26°
	.791		26

Comments:

Impinger Bucket No. 4 12

Meter Box No. 6

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location [illegible]

Test [illegible] #-3

Date 1/28/76

Operator DAVIS, HARRON

Comments: LEAK ✓ [illegible]

By Absorption:

Barometric Pressure 29.62

IMPINGER BOX #5
METER BOX W5

ΔP	T	Clock Time	Meter (Ft^3)	~~Flow Meter Setting (CFH)~~ ± 1	Meter Temperature, Tm
1.1	350	10:25 AM	729.3	1.9	36°F
1.1	355	10:35	737.0	1.9	40°
1.1	352	10:45	743.5	1.7	40°
1.6	353	10:55	750.0	1.7	40
1.1	340	11:06	757.0	1.9	40
			27.7	1.9	39

Tube No.	Weight, grams		
	Final	Initial	Difference
1	118	100	18
2	99	100	-1
3	0	0	0
Silicel	205.5	200	5.5

(W) = weight of moisture collected = 22.5

$$\% \text{ Moisture by Volume} = \frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin - Marietta
DATE 1-28-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION 4-3
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Integ
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 30
OPERATOR Harrison

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	14.4	14.4	~~28.4~~ 14.6	14.6			14.5	44/100	6.38
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.4	12.0	26.6	12.0			12.0	32/100	3.84
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	—
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.5	28/100	20.58
								TOTAL	30.8

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT MM, WOODWARD, OHIO
DATE 1/28/76
LOCATION #4 INLET
STACK I.D. 576"
BAROMETRIC PRESSURE, in. Hg 29.62
STACK GAUGE PRESSURE, in. H_2O A 5.5 (.404" Hg)
OPERATORS Davis, Harbou.

SCHEMATIC OF TRAVERSE POINT LAYOUT

Run 4-3

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.90	328
2	.92	350
3	1.05	352
4	1.1	352
5	1.2	350
6	1.05	340
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	.77	314
2	.78	345
3	1.03	345
4	1.05	352
5	1.08	343
6	.98	327
	340.889	
	28.407	342
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/28/76

Plant M-M, WOODVILLE, OHIO Location INLET #4

Bar. Pressure 29.32 "Hg Comments:

Ambient Temp. 28 °F LEAK ✓ .0005 CFM

Run No. 4X1 - NO ISOPROPANOL IMPINGER

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator CHRIS ANDERSON

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:20	215.150	4.5	30
2:25	215.4	4.5	32
2:30	215.6	3.5	32
2:35	215.752	2.5	32
	0.602		32

Comments:

Impinger Bucket No. 1

Meter Box No. 6

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/28/76

Plant M-M, WOODVILLE, OHIO

Location #4 INLET

Bar. Pressure 29.32 "Hg

Stack Temperature ≈ 375 °F

Ambient Temp. 22 °F

Stack Dimensions 5'6" DIA.

Run No. ~~4-6~~ 4X2, 4X3

LEAK ✓: < .001 CFM

Power Stat Setting

Filter Used: Yes ___ No ___

4-6 (DRYING TUBE ~~GLASS WOOL~~)

Operator DAVIS, HARRISON

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN	
4:09	219.412	4.5	40	4X2
4:24	220.151	4.5	40	
	RUN #4-7	GLASS WOOL		
	LEAK	✓: < .001 CFM		
4:59	220.181	4.5	36	4X3
5:07	220.63	4.5	36	
5:14	221.018	4.5	36	

Impingers with ___ ml of ___

Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 11 (4X2) 9 (4-X3)

Meter Box No. 6

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 11/28/76

Plant MAT, WATERVILLE, OHIO Location #4 INLET

Bar. Pressure 29.32 "Hg Stack Temperature ≈ 375 °F

Ambient Temp. 22 °F Stack Dimensions 5'6" DIA

Run No. ~~4~~ 5 ~~4~~ LEAK V ≈.001 CFM

Power Stat Setting ~~#3~~ 4-5 (DRYING TUBE)

Filter Used: Yes ___ No ___

Operator DAVIS, HARRISON

VOID

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:44PM	218.679	4.5	40
3:50	219.05	4.5	40
3:54	TOM LOGAN CAME UP AND SAID THAT HE HAD BEEN		
	BACKFLUSHING THE CONTINUOUS MONITOR IMPINGER		
	SO THAT, IN OTHER WORDS, THE TEST		
	DIDN'T COUNT.		

Impingers with ___ ml of ___

Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 10

Meter Box No. 6

NCAP-36 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT Martin Mar.
DATE JAN 29, 1976
LOCATION INLET #4
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.38
STACK GAUGE PRESSURE, in. H_2O
OPERATORS M MUNDAY

Time (Start ~ 14:00)

~~TRAVERSE POINT NUMBER~~	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0 min	1.2	~~240~~ ? delete
10 min	1.2	352
20 min	1.1	352
30 min	1.0	351
40 min	1.1	350
50 min	~~1.7~~	349
60 min	~~2.8~~	350
	~~233.121~~	~~335~~
	$\bar{T}$ = 33.303	
	27.167	351
AVERAGE		

Run 4-4

no temp change probably plugging pitot delete

avg correction factor = 0.95

∴ avg $\sqrt{\Delta p T}$ = 0.95(27.167) = 25.809

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Mar
DATE JAN 29, 1976
SAMPLING TIME (24-hr CLOCK) 1400 — 1505
SAMPLING LOCATION Inlet #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD
AMBIENT TEMPERATURE 37°F
OPERATOR Mark Mondary

COMMENTS:

Run 4-4

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	11.0	11.0	10.8	10.8			10.9	44/100	4.796
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.8	14.8	25.8	15.0			14.9	32/100	4.768
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							74.2 ~~72.4~~	28/100	20.776
								TOTAL	30.34

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT Martin Mar.
DATE Jan. 29, 1976
LOCATION unit # 4
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.38
STACK GAUGE PRESSURE, in. H_2O
OPERATORS M. Munday

Time (start 15:05)

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0 MIN	2.8	350
10 MIN	2.75	351
20 MIN	3.2	350
30 MIN	3.2	345
40 MIN	3.3	280
50 MIN	3.15	359
	296.725	339
	$\sqrt{\ }$ = 49.454	
	appears to be plugged pitot tube	
	data questionable	
AVERAGE		

Run 4-5

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Mar.
DATE Jan. 29, 1976
SAMPLING TIME (24-hr CLOCK) 15:00 - 16:00
SAMPLING LOCATION INLET #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD
AMBIENT TEMPERATURE 50°F
OPERATOR M. Murray

COMMENTS:
Run 4-5

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	15.8	15.8	16.0	16.0			15.9	44/100	6.996
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.8	12.0	27.8	11.8			11.9	32/100	3.808
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.2	28/100	20.216
								TOTAL	31.02

EPA (Dur) 230
4/72

FIELD MOISTURE DETERMINATION

Location Martin-Marietta Inlet KY #4 Comments: Run 4

Test 1-29-76 4-

Date 1-29-76

Operator Harrison

Dust impinger ball chipped slightly during disassembly

By Absorption:

Barometric Pressure 29.42

Run #4-4/5

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, T_m
16:07	992.805	1.93	53
16:14	999.000.47	1.93	53
16:24	1003.13	1.9	53
16:37	1013.136	—	53

Tube No.	Weight, grams		
	Final	Initial	Difference
1	~~105~~ 110	100	~~5~~ 10
2	~~96~~ 101	100	~~-4~~ 1
3	0	0	0
Silica Gel	206.4	200	6.4

(W) = weight of moisture collected = 17.4

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

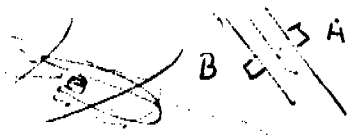
Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT _____
DATE 1-27-76
LOCATION Inlet Kiln #4
STACK I.D. _____
BAROMETRIC PRESSURE, in. Hg 29.42
STACK GAUGE PRESSURE, in. H_2O 5.5 (.404"Hg)
OPERATORS [redacted] / Davis



Pitot # 7-01

SCHEMATIC OF TRAVERSE POINT LAYOUT

RUN # 4-4/5

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A-1	.74	336
A-2	.98	337
A-3	1.05	345
A-4	1.08	354
A-5	1.1	355
A-6	1.03	347
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B-1	.65	347
B-2	1.03	320
B-3	1.08	340
B-4	1.1	360
B-5	1.1	362
B-6	1.07	364
	340.150	347
	$\sqrt{\ } = 28.349$	
AVERAGE		

EPA (Dur) 233
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT Martin Marietta
DATE JAN 30, 1976
LOCATION inlet # 4
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS Mack Munday

Time (start – 9:00 am)

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0 min	1.2	373
10 min	1.1	405
20 min	.73	415
30 min		
40 min		
50 min		
AVERAGE		

No more data taken, Kiln to inlet # 4 shut down

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT M & M [illegible]
DATE Jan 30 19[illegible]
LOCATION [illegible]
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS M. Munday

Time (Start ~ 11:15AM)

~~TRAVERSE POINT~~ NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Run 0 min	0.63	469
10 min	0.63	469
20 min	0.62	466
30 min	0.62	467
	96.319	468
	$\bar{v}$ = 24.08	
avg correction factor = 0.95		
∴ $\bar{v}$ =	24.08(.95) =	22.88
AVERAGE		

Run 4-6

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Mt M. Woodville
DATE JAN 30, 1976
SAMPLING TIME (24-hr CLOCK) 11:15AM — 11:35AM
SAMPLING LOCATION INlet #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD
AMBIENT TEMPERATURE 33°
OPERATOR M. Murday

COMMENTS:

Run 4-07

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	2.0	2.0	~~21.0~~ 2.0	2.0			2.0	44/100	0.88
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.0	19.0	21.2	19.2			19.1	32/100	6.112
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.9	28/100	22.092
								TOTAL	29.08

EPA (Dur) 230
A/72

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE Jan 30 1976
LOCATION [illegible] #4
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS M. Minday

Time (start ~ 11:45am)

TRAVERSE ~~POINT~~ ~~NUMBER~~	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
Run ② 0 min	0.63	465
10 min	0.64	466
20 min	0.62	468
30 min	0.62	471
	96.296	468
	$\bar{\sqrt{}} = 24.074$	
avg correction factor = 0.95		
$\bar{\sqrt{}}_{avg}$ = 0.95(24.074) = 22.87		
AVERAGE		

Run 4-7

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT M+M Woodville
DATE JAN 30, 1976
SAMPLING TIME (24-hr CLOCK) 11:45 am — 12:15 pm
SAMPLING LOCATION Inlet #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Bag
ANALYTICAL METHOD
AMBIENT TEMPERATURE 34°
OPERATOR M. Minday

COMMENTS:

Run 4-6

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	7.0	7.0	7.2	7.2			7.1	44/100	3.124
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.0	15.0 ~~14.0~~	22.6	14.8 ~~13.8~~			14.9	32/100	4.768
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.0	28/100	21.84
								TOTAL	29.73

EPA (Dur) 233
4/72

FIELD MOISTURE DETERMINATION

Location #4 INLET

Test 1ST OF DAY (1:30 PM)

Date 1/8/76

Operator DAVID HARRISON

Comments: LEAKS

By Absorption:

Barometric Pressure 29.24

4-6/7

4.4 "H2O"

Clock Time	Meter (Ft^3)	~~Elon Meter Setting (CFH)~~	Meter Temperature, Tm
1:30	210.650	1.8	50
1:40	217.8	1.7	58
1:57	229.76	1.9	58

Tube No.	Weight, grams		
	Final	Initial	Difference
1	90	100	-10
2	107	100	7
3	0	0	0
Silicel	215.5	200	15.5

(W) = weight of moisture collected = 12.5

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. ____ °F

Dry Bulb Temp. ____ °F

% Moisture From Psychometric Chart

NCAP-30 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT M-M CHIC
DATE 1/30/76
LOCATION #4 INLET
STACK I.D. 8'
BAROMETRIC PRESSURE, in. Hg 29.24
STACK GAUGE PRESSURE, in. H_2O .55 (.04" Hg)
OPERATORS DAVIS, HARRISON

1ST VEL. TRAV. OF DAY

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.45	* 240 (?)
2	.61	* 350
3	.63	* 400
4	.64	445
5	.68	465
6	.57	470
*thermometer not stabilized DELETE		
AVERAGE		

Run A-6/7

A ⊂ (1) ⊃ B

FLOW INTO PAPER
HORIZONTAL DUCT

SCHEMATIC OF TRAVERSE POINT LAYOUT

1:10 – 1:25 PM

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	.28	* 270
2	.52	* 450
3	.59	455
4	.64	464
5	.67	465
6	.59	460
	267.077	~~470~~
	$\bar{v}$ = 22.256	
	22.832	461
AVERAGE		

EPA (Dur) 233
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT M & M - Woodville
DATE [illegible]
LOCATION Unit #4
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.45
STACK GAUGE PRESSURE, in. H_2O
OPERATORS R. Munday

Time (Start ~ 9:00 am)

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0 min	1.1	391
10 min	1.1	389
20 min	1.2	385
30 min	1.1	385
40 min	1.1	385
50 min		
	153.975	387
	$\bar{v}$ = 30.795	
avg correction = 0.95		
$\bar{v}$ = 0.95	(30.995) =	29.426
AVERAGE		

Run 4-8

Data taken at A

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

4-8

DRY MOLECULAR WEIGHT DETERMINATION

PLANT AMM. ~ Woodville
DATE JAN 31, 1976
SAMPLING TIME (24-hr CLOCK) 9:00 am – 9:15 am
SAMPLING LOCATION Inlet #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD
AMBIENT TEMPERATURE 51°
OPERATOR M. Minday Kelly

COMMENTS: Flow rate on pump was too high, therefore it took less than the expected time to fill up.

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	18.0	18	17.8	17.8			17.9	44/100	7.876
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	28.7	10.7	28.6	10.8			10.75	32/100	3.44
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							71.35	28/100	19.978
								TOTAL	31.29

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible] Woodville
DATE [illegible]
LOCATION [illegible]
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.45
STACK GAUGE PRESSURE, in. H_2O
OPERATORS M. Minday

Data taken at A

SCHEMATIC OF TRAVERSE POINT LAYOUT

Time (10:00 am - 5:00 pm)

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
5 min	1.1	384
10 min	1.5	382
20 min	1.2	381
30 min	1.3	379
40 min	1.7	377
	169.821	381
	$\bar{v}$ = 33.964	
avg correction factor =		0.95
$\bar{v}$ = 0.95 (33.964) =		32.266
AVERAGE		

Run 4-9

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

4-9

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta - Woodville
DATE Jan 31, 1976
SAMPLING TIME (24-hr CLOCK) (10:00 AM ~ 10:40 AM)
SAMPLING LOCATION INLET #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Bag
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 80°F
OPERATOR M. Munday

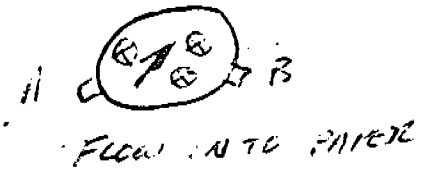
COMMENTS: Analyzed - RTH

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	16.4	16.4	16.4	16.4			16.4	44/100	7.216
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	28.1	11.7	28.0	11.6			11.65	32/100	3.728
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							71.95	28/100	20.146
								TOTAL	31.09

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT M-M OHIO
DATE 1/31/76
LOCATION #4 OUTLET
STACK I.D. 5'6"
BAROMETRIC PRESSURE, in. Hg 29.46
STACK GAUGE PRESSURE, in. H_2O 2.6 (.191" Hg)
OPERATORS DAVIS



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A1	.94	359
2	1.15	360
3	1.2	360
4	1.3	360
5	1.2	370
6	1.05	365
AVERAGE		

Rem 4-8/9

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B1	.73	359
2	1.1	360
3	1.2	355
4	1.2	350
5	1.2	350
6	1.3	340
		359
	$\bar{v}$ = ~~30.59~~ 30.35	
	~~Avg correction = 0.95~~	
	~~$\bar{v}$ = 0.95 (30.58) =~~	~~29.05~~
AVERAGE		

EPA (Dur) 233
4/72

FIELD MOISTURE DETERMINATION

Location INLET #2 MM, OHIO

Test 4-8, 9

Date 11/3/76

Operator DAVIS, FRANSEN

Comments: LEAK ✓ : < .01 CFM

By Absorption:

Barometric Pressure 29.46

Δh "H_2O 4-8/9

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFM)	Meter Temperature, Tm
11:05 AM	339.419	2.0	45
11:15	348.1	2.0	50
11:25	353.4	2.0	50
11:35	360.469	2.0	50

Tube No.	Weight, grams		
	Final	Initial	Difference
1	116	100	16
2	105	100	5
3	0	0	0
Si Gel	206.0	200	6.0

(W) = weight of moisture collected = 27.0

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$

IMP. BUCKET #2

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

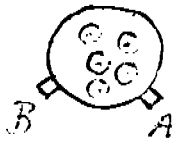
Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O [illegible]
OPERATORS M. Murray



Monitored at Port A

SCHEMATIC OF TRAVERSE POINT LAYOUT

Time (Start ~ 2:15pm)

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0 min	1.1	366
10 min	1.1	365
20 min	1.15	366
30 min	1.2	371
40 min	1.1	370
	152.882	368
	$\bar{v}$ = 30.576	
avg correction = 0.95		
$\bar{v}$ = 0.95 (30.576) =		
AVERAGE		

Run 4-90

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

4-10

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta ~ Woodville
DATE Jan 31, 1976
SAMPLING TIME (24-hr CLOCK) 2:15pm — 2:50
SAMPLING LOCATION Inlet #4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Bag
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 27°F
OPERATOR M. Minday

COMMENTS:

GAS \ RUN	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	17.4	17.4	17.6	17.6			17.5	44/100	7.70
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	28.7	11.3	29.0	11.4			11.35	32/100	3.632
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							71.15	28/100	19.922
								TOTAL	31.14

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT Martin Marietta - Woodville
DATE Jan 31 1976
LOCATION Kiln #4
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.33
STACK GAUGE PRESSURE, in. H_2O
OPERATORS M. Mirada

Data taken at port A

SCHEMATIC OF TRAVERSE POINT LAYOUT

Time (start ~ 3:05 pm)

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0 min	1.1	367
10 min	1.1	367
20 min	1.1	365
30 min	1.1	365
40 min	1.1	364
	150.678	366
	$\bar{v}$ = 30.136	
avg correction = 0.95		
$\bar{v}_{apT}$ = 0.95(30.136) = 28.629		
AVERAGE		

Run 4-118

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

4-11

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta ~ Woodville
DATE JAN. 31, 1976
SAMPLING TIME (24-hr CLOCK) (3:05pm — 3:25pm)
SAMPLING LOCATION Inlet #4 (Port A)
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 29°F
OPERATOR M. Munday

COMMENTS:

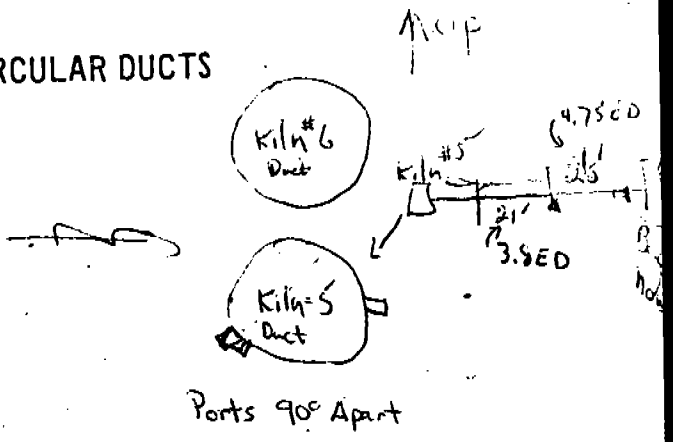
Port locations

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	16.8	16.8	16.8	16.8			16.8	44/100	7.392
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.4	8.6	25.4	8.6			8.6	32/100	2.752
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							74.6	28/100	20.888
								TOTAL	31.03 ~~31.39~~

EPA (Dur) 230
4/72

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Martin Marietta
DATE 1-26-76
SAMPLING LOCATION Inlet Kiln #5
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 70 7/8"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 5 1/4"
STACK I.D., (DISTANCE A - DISTANCE B) 65 5/8" (5.47')
NEAREST UPSTREAM DISTURBANCE 21' (Bend) 3.8 E.D.
NEAREST DOWNSTREAM DISTURBANCE 26' (Bend) 4.75 E.D.
CALCULATOR Harrison



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 21	1.3	65 5/8"	.85 (1.0")	5.25	6.25
2	3.9		2.56		7.81
3	6.7		4.40		9.65
4	9.7		6.36		11.61
5	12.9		8.47		13.72
6	16.5		10.83		16.08
7	20.4		13.39		18.64
8	25.0		16.41		21.66
9	30.6		20.08		25.33
10	~~38.8~~ 38.8		25.46		30.71
11	61.2		40.16		45.41
12	69.4		45.54		50.79
13	75.0		49.22		54.47
14	79.6		52.24		57.49
15	83.5		54.80		60.05
16	87.1		57.16		62.41
17	90.3		59.26		64.51
18	93.3		61.23		66.48
19	96.1		63.07		68.32
20 40	98.7		64.77 (64.63)		69.88
			$A_s = 3382\ in^2$		

EPA (Dur) 232
4/72

GAS SAMPLING FIELD DATA

ΔP 1-1
ΔP 1-7
ΔP 1-7

Material Sampled for SO_2

Date 1/27/76

Plant MM-0 Location K-5 INLET

Bar. Pressure 29.83 "Hg Stack Temperature see velocity traverse °F 711

Ambient Temp. 20 °F Stack Dimensions 65 5/8"

Run No. 1-A BUCKET 3

Power Stat Setting 50

Filter Used: Yes ___ No X

Operator McCarley

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:30	320.855	~4	36
3:45	321.590	~4	38
	0.735		37

Impingers with ___ ml of ___

Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 3

Meter Box No. 4

NCAP-35 (12/67)

GAS SAMPLING FIELD DATA

ΔP 1.4
1.7
1.5
1.7

Material Sampled for SO_2

Date 1/27/76

Plant MM-O

Location K-5 INLET

Bar. Pressure 29.53 "Hg

Stack Temperature see velocity #1 °F

Ambient Temp. 20 °F

Stack Dimensions 65 5/8"

Run No. 1-B BUCKET 4

Power Stat Setting 50

Filter Used: Yes ___ No X

Operator McLaughlin

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:55	321.615	4 → 0	37
STOP 4:20 START 4:25			
4:25	322.504	4	37
	0.889		37

stopped to clean stopcock (lime dust)

___ Impingers with ___ ml of ___

___ Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 4

Meter Box No. 4

NCAP-36 (12/67)

MM-0

FIELD MOISTURE DETERMINATION

Location K-5 INLET

Comments:

Test 1

Date 1/27/76

Operator McCarthy

By Absorption:

Barometric Pressure 29.83

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
3:30	223.800 ~~227.500~~	AH 1.7	28/46
4:30	264.352	1.7	50/30
	40.552		38

Tube No.	Weight, grams		
	Final	Initial	Difference
1	122	100	22
2	107	100	7
3	2	0	2
Si Gel	210.5	200	10.5

(W) = weight of moisture collected = 41.5

$$\% \text{ Moisture by Volume} = \frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT MM-C
DATE 1/27/76
LOCATION K-5 INLET
STACK I.D. 65 8"
BAROMETRIC PRESSURE, in. Hg 29.83
STACK GAUGE PRESSURE, in. H_2O -6.7
OPERATORS

After Run #1

SCHEMATIC OF TRAVERSE POINT LAYOUT

E

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.65	310
2	.72	350
3	.80	375
4	.81	390
5	.84	400
6	.94	420
7	1.00	430
8	.82	435
9	.96	440
10	1.10	442
11	1.00	445
12	0.99	445
13	0.99	445
14	0.95	445
15	0.95	445
16	0.88	445
17	0.74	435
18	0.70	385
19	0.62	305
20	0.60	215
	14.00	7624
	$\sqrt{\Delta P}$ =	25.39
AVERAGE		

W

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
21	.52	410
22	.62	~~410~~ 420
23	.72	430
24	.74	430
25	.76	435
26	.80	435
27	.87	440
28	.90	440
29	.91	443
30	.92	445
31	.91	445
32	~~.79~~	445
33	.54	400
34	.75	410
35	.65	415
36	.48	390
37	.50	335
38	.55	260
39	.3	175
40	.3	135
AVERAGE		

EPA (Dur) 233
4/72

AVE. $\sqrt{\Delta P}$ = 0.88 AVE T_s = 406°F

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MM-0
DATE 1/27/76
SAMPLING TIME (24-hr CLOCK) 3:30 - 4:20
SAMPLING LOCATION K-5 RUN 1
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INT BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 20
OPERATOR BODY

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	13.0	13.0	12.9	12.9	12.9	12.9	12.9	44/100	5.676
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	~~23.0~~ 25.1	12.1	25.1	12.2	25.1	12.2	12.2	32/100	3.904
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	—
N_2 (NET IS 100 MINUS ACTUAL CO READING)							74.9	28/100	20.972
								TOTAL	30.55

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

ΔP ~~1.4~~ 1.4 1.4 1.1

Date 1/27/76

Plant MM-0 Location K-5

Bar. Pressure 29.84 "Hg Stack Temperature no velocity # °F

Ambient Temp. 19 °F Stack Dimensions 65 5/8"

Run No. 2-4

Power Stat Setting 100

Filter Used: Yes ___ No ✓

Operator _____

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
650	322.728 ~~322.537~~	4	28
705	323.562	4	30

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 7

Meter Box No. 4

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/27/76

Plant MM-C

Location K-5

Bar. Pressure 29.94 "Hg

Stack Temperature see velocity °F

Ambient Temp. very cold <19°F

Stack Dimensions 65 5/8"

Run No. 2-B

Power Stat Setting 100

Filter Used: Yes ___ No X

Operator McCarley

ΔP 1.0
1.3
1.3
1.3

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
7:15	323.688	4	30
7:30	324.207	4	30

Impingers with ___ ml of ___

Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 12

Meter Box No. 4

NCAP-36 (12/67)

MP-0

FIELD MOISTURE DETERMINATION

Location K-5

Test 2

Date 1/27/76

Operator McCarley

Comments:

By Absorption:

Barometric Pressure 29.84

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
6:50	264.460	1.7 AH	30 / - 2
7:30	288.971	1.7	42 / - 2
			45 / - 2
	24.511		45 / - 2
		1.7	40

Tube No.	Weight, grams		
	Final	Initial	Difference
1	166	100	66
2	50	100	-50
3	0	0	0
Silica Gel	206.7	200	6.7

(W) = weight of moisture collected = 22.7

$$\% \text{ Moisture by Volume} = \frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-80 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT MM-D
DATE 1/27/76
LOCATION K-5 INLET
STACK I.D. 65 5/8"
BAROMETRIC PRESSURE, in. Hg 29.54"
STACK GAUGE PRESSURE, in. H_2O -6.8 in.
OPERATORS Milarkey

Run 5-2

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.84	400
2	.75	400
3	.84	400
4	.87	398
5	.89	395
6	.90	400
7	.91	398
8	1.0	398
9	1.0	398
10	1.1	395
11	1.0	400
12	1.0	400
13	.97	400
14	.97	400
15	1.1	395
16	.94	395
17	.85	355
18	.78	365
19	.40	300
20	.10	235
	17.01	8058
		367
AVERAGE		

$\sqrt{\Delta p}$

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
21	.65	55
22	.60	60
23	.74	75
24	.77	150
25	.82	155
26	.88	185
27	.92	205
28	.93	225
29	1.0	250
30	1.0	265
31	1.2	290
32	1.0	300
33	1.0	350
34	.76	325
35	.99	340
36	.92	350
37	.88	355
38	.85	365
39	.74	365
40	.65	325
AVERAGE		

EPA (Dur) 233
4/72

AVE $\sqrt{\Delta P}$ = .94

AVE T_s = 367

14.1
12.3
26.4

26.4
14.1
12.3

26.4
4
12.4

DRY MOLECULAR WEIGHT DETERMINATION

7:25 PM

PLANT MARTIN MARETTA
DATE 1/27/76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION #5 INLET - Run-2
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INTERGRATED
ANALYTICAL METHOD
AMBIENT TEMPERATURE 30°
OPERATOR BIDDY

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	13.2		14.1	14.1	14.0	14.0	14.05	44/100	6.182
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.6		26.4	12.3	26.4	12.4	12.35 ~~26.4~~	32/100	3.952
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	—		—		—		—	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)				73.6		73.6	73.6	28/100	20.608
								TOTAL	30.74

EPA (Dur) 230

ΔP 1.5
1:1
3.0
1.2

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/28/76

Plant MM-O

Location K-5 -INLET

Bar. Pressure 29.62 "Hg

Stack Temperature 360 °F

Ambient Temp. 19 °F

Stack Dimensions

Run No. 3-A

Power Stat Setting 100

Filter Used: Yes ___ No X

Operator

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:25	329.778	2	25
10:40	330.370	2	27

Impingers with ___ ml of

Impingers with ___ ml of

Total number of Impingers

Sample Bottle No.

Impinger Bucket No. 3

Meter Box No. 4

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

ΔP 1.0
1.2
1.1
1.1
3.5

Material Sampled for SO_2

Date 1/28/76

Plant MM-0 Location K-5 INLET

Bar. Pressure 29.62 "Hg Stack Temperature 360 °F

Ambient Temp. 19 °F Stack Dimensions

Run No. 3-B

Power Stat Setting 100

Filter Used: Yes ___ No X

Operator

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
11:40	331.826	2	28
11:55	332.227	2	28

Impingers with ___ ml of

Impingers with ___ ml of

Total number of Impingers

Sample Bottle No.

Impinger Bucket No. 8

Meter Box No. 4

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location K-5 INLET

Comments:

Test S-3

Date 1/28/76

Operator

By Absorption:

Barometric Pressure 29.62

Clock Time	Meter (Ft^3)	Flow Meter Setting ~~(CFH)~~ ΔH	Meter Temperature, Tm
10:25	369.905	1.7	34 / -2
10:40			45 / -2
10:45	-- --		50 / 26
11:10	392.900		

from up 11:00

Tube No.	Weight, grams		
	Final	Initial	Difference
1	100	98	-2
2	100	124	24
3	0	2	2
Si Gel	190	194.7	4.7

(W) = weight of moisture collected = 28.7

% Moisture by Volume = $\dfrac{100 \cdot W}{\left(\dfrac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart

NCAP-30 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MARTIN MARETTA
DATE 1/28/76
SAMPLING TIME (24-hr CLOCK) 1630
SAMPLING LOCATION -75 5 INLET 5-3
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) INTEGRATED
ANALYTICAL METHOD
AMBIENT TEMPERATURE 20
OPERATOR BIDDY / BURBANKS

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	15.1	15.1	15.1	15.1			15.1	44/100	6.644
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.9	11.8	26.9	11.8			11.8	32/100	3.776
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.1	28/100	20.468
								TOTAL	30.89

SO_2 =

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT MM-O
DATE 1/28/76
LOCATION K-5 INLET S-3
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O 5.0 Neg -
OPERATORS

SCHEMATIC OF TRAVERSE POINT LAYOUT

E

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.75	160 *
2	.80	173 *
3	.82	153 *
4	.80	190 *
5	.85	210 *
6	.90	225 *
7	.85	260 *
8	.80	290 *
9	.75	300 *
10	.75	310 *
11	.82	320 *
12	.85	335 *
13	.85	340 *
14	.88	350 *
15	.88	360 *
16	.86	360
17	.80	360
18	.74	360
19	.73	360
20	.72	365
		5451
AVERAGE		

W

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
21	.60	250 *
22	.80	260 *
23	.56	255 *
24	.84	250 *
25	.83	255 *
26	.93	270 *
27	1.0	250 *
28	1.1	290 *
29	1.1	300 *
30	1.1	320 *
31	1.1	325 *
32	1.2	330 *
33	1.1	335 *
34	1.0	340 *
35	1.0	345 *
36	.96	350 *
37	.95	355 *
38	.94	355 *
39	.93	360
40	.80	360
37.517		
	ΔP = 25.82	
	27.021	
	$\sqrt{\Delta p}$ = 0.938	
AVERAGE		

EPA (Dur) 233 4/72

* DUE TO SLOW RESPONSE OF DIAL THERMOMETER THE STARRED TEMP. VALUES CANNOT BE CONSIDERED CORRECT. AFTER STABILIZATION AVG. STACK TEMP WAS CALCULATED TO BE 370°F

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/28/76

Plant MM-0 Location K-5 INLET

Bar. Pressure 29.32 "Hg Stack Temperature ____ °F

Ambient Temp. ____ °F Stack Dimensions ____

Run No. ~~3-C~~ S-X-1

Power Stat Setting ____

Filter Used: Yes ____ No ____

Operator ____

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:10	332.275	4	30

STOPLOCK STOPPED UP 2-minutes after start

NO GOOD

____ Impingers with ____ ml of ____

____ Impingers with ____ ml of ____

Total number of Impingers ____

Sample Bottle No. ____

Impinger Bucket No. 2

Meter Box No. 4

NCAP-36 (12/67)

X-BAG 1/28/76 K-5

3:40 to 4:20

MM-0

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date

Plant

Location

Bar. Pressure "Hg

Comments:

Ambient Temp. °F

Run No.

Power Stat Setting

Filter Used: Yes___ No___

Operator

SAMPLE TAKEN FROM BAG

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
4:40	576.069	4	50
5:00	577.079	~ 4	58

Comments:

Impinger Bucket No. 3

Meter Box No. 10

NCAP-36 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO
DATE 1-29-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Stack 5 - Inlet Run 5-4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR

COMMENTS: operating @ 2 CSN

GAS \ RUN	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	21.5	21.5	21.4	21.5	~~20.8~~	~~20.8~~	21.5	44/100	9.46
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	30.4	8.9	30.3	8.9	~~30.6~~		8.9	32/100	2.848
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							69.6	28/100	19.488
								TOTAL	31.80

PRELIMINARY VELOCITY TRAVERSE

PLANT: MMO
DATE:
LOCATION: Stacks Inlet
STACK I.D.:
BAROMETRIC PRESSURE, in. Hg:
STACK GAUGE PRESSURE, in. H_2O:
OPERATORS:

Monitored at pt 12

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	
0	1.4"	380	$\sqrt{\Delta p}$ = 34.29
10	1.5	380	35.49
20	1.4	380	34.29
30	1.1	380	30.39
40	1.2	390	Run 5 31.94
50	1.1	390	30.58
60	.92	390	27.96
32.134(0.925)		= 29.72	
0	.92	370	27.96
10	1.3	375	32.95
20	1.4	375	34.25
30	1.1	380	Run 5 30.40
40	1.2	375	31.65
47	1.2	375	31.65
31.467(.925) =		29,107	
AVERAGE			

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MNO
DATE 1-28-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Inlet 1005 Sample #2
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD Run 9-5
AMBIENT TEMPERATURE
OPERATOR DPB

COMMENTS: Run 2 min
Bags in Place
Leaky bag

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								44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)								32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

FIELD MOISTURE DETERMINATION

Location Inlet # 5

Test

Date 1-29-76

Operator RPH

Comments: Box R1

By Absorption:

Barometric Pressure 29.40

5-~~8~~4/5

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
5:04	434.761	1.77	63 39
5:16		1.77	61 37
5:23	-- --	1.77	63 36
5:36	455.578	1.77	60 35

Tube No.	Weight, grams		
	Final	Initial	Difference
1	126	100	26
2	102	100	2
3	0	0	0
Silgel	205.5	200	5.5

(W) = weight of moisture collected = 33.5

$$\% \text{ Moisture by Volume} = \frac{100 \cdot W}{\left(\frac{375 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$$

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. °F

Dry Bulb Temp. °F

% Moisture From Psychometric Chart

NCAP-30 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT MMO
DATE 1-27-70
LOCATION INLET 5
STACK I.D. 1730 — 1845
BAROMETRIC PRESSURE, in. Hg 27.40
STACK GAUGE PRESSURE, in. H_2O — 6.8"
OPERATORS CO PH

Static 6.8" H_2O

Run 5-4/5

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F → 370
1	.9	175*
2	1.1	205*
3	1.1	220*
4	.98	230*
5	1.1	235*
6	1.3	250*
7	1.3	260*
8	1.3	275*
9	1.3	285*
10	1.3	295*
11	1.6	310*
12	1.4	325*
13	1.3	330*
14	1.2	340*
15	1.2	345*
16	1.2	350*
17	1.1	355*
18	1.0	355
19	1.0	355
20	.80	360
AVERAGE		

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
21	.6	150*
22	.6	160*
23	.9	200*
24	1.0	200*
25	1.1	200*
26	1.1	200*
27	1.1	250*
28	1.1	270*
29	1.1	310*
30	1.2	330*
31	1.1	340*
32	1.1	360*
33	1.1	375*
34	1.1	375 ~~375~~
35	1.1	375 ~~400~~
36	1.1	375 ~~440~~
37	1.1	375 ~~440~~
38	1.1	~~370~~
39	1.1	~~370~~
40	.94	~~370~~
AVERAGE		

$\sqrt{\Delta p}$ = 1.047
$\sqrt{\Delta p T}$ = 30.166

EPA (Dur) 233
4/72

DUE TO SLOW RESPONSE OF DIAL THERMOMETER, THE STARRED TEMP VALUES CANNOT BE CONSIDERED CORRECT. AFTER STABILIZATION, AVG. STACK TEMP WAS CALCULATED TO BE 370° F

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: MMO
DATE: 1-30-76
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: INLET NO. 3
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: DPN

COMMENTS:
2 CFH
~~[illegible]~~ test
Run 5-6

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	2.8	2.8	2.4	2.4			2.6	44/100	1.144
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.2	18.4	21.4	19.0			18.7	32/100	5.984
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.7	28/100	22.036
								TOTAL	29.16

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT ____________________
DATE 1-30-76
LOCATION Inlet No. 5
STACK I.D. ____________________
BAROMETRIC PRESSURE, in. Hg 29.17
STACK GAUGE PRESSURE, in. H_2O ____________________
OPERATORS DPH

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	1.2	365
10		
20		
30		
40		
50		
60		
0	1.3	355
10	1.4	360
18	2.8 (circled)	360
	plugged pitot	
	33.215(.925) = 30.724	
AVERAGE		

(circled) 32.55
Run 5 6 (circled) 33.88
(circled) 47.92

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

PRELIMINARY VELOCITY TRAVERSE

PLANT ______________________
DATE 1-30-76
LOCATION Inlet NOS
STACK I.D. ______________________
BAROMETRIC PRESSURE, in. Hg 29.20
STACK GAUGE PRESSURE, in. H_2O ______________________
OPERATORS DPH

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	3.8"	360°F
10	4.0"	360°F
20	3.5"	360°F
30	4.1"	360
~~40~~ 30	38	360
50		
60		
AVERAGE		

55.82
57.27
53.57
Run 5 57.98
55.82

plugged pitot tube

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: MMO
DATE: 1-30-76
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: Inlet NO 5
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: DPH

COMMENTS: 2nd test Started today

Run 5-7

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	2.4	2.4	2.6	2.6	2.6		2.5	44/100	1.1
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.0	19.6	21.8	~~21.8~~	19.2		19.4	32/100	6.208
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.1 ~~78.8~~	28/100	21.868
								TOTAL	29.18

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT MNO
DATE 1-30-76
LOCATION Inlet #5
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.24
STACK GAUGE PRESSURE, in. H_2O
OPERATORS OPH

Max. temp. on west Port 350° F
Max stack temp. 370 East Port

Run 5-6/7

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.67	150 *
2	.71	150 *
3	.73	150 *
4	.81	150 *
5	.84	160 *
6	.87	175 *
7	.83	195 *
8	.89	210 *
9	.91	230 *
10	.91	245 *
11	.91	250 *
12	.93	265 *
13	.93	275 *
14	.94	285 *
15	.89	295 *
16	.86	302 *
17	.83	310 *
18	.81	315 *
19	.73	320 *
20	.69	325 *
AVERAGE		

SCHEMATIC OF TRAVERSE POINT LAYOUT

East Duct

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
21	.66	250 *
22	.71	250 *
23	.71	255 *
24	.83	260 *
25	.86	275 *
26	.88	285 *
27	.94	295 *
28	.93	300 *
29	[illegible]	[illegible] *
30	.98	320 *
31	.99	330 *
32	1.0	335 *
33	1.1	340 *
34	1.1	345 *
35	1.1	350 *
36	1.1	355 *
37	1.1	355 *
38	1.0	360 *
39	.50	360 *
40	.16	360 *
	37.435	
	$\sqrt{\Delta p} = 0.936$	
	$\sqrt{\Delta pT} =$ ~~26.470~~ 26.803	
AVERAGE		

AP 1 D.C.

EPA (Dur) 233 4/72

* DUE TO THE SLOW RESPONSE OF THE DIAL THERMOMETER THE STARRED TEMP. VALUES CANNOT BE CONSIDERED CORRECT. AFTER STABILIZATION, AVERAGE STACK TEMP. WAS CALCULATED TO BE 360° F

5-8

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO

DATE 1-31-76

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Inlet NO 5

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD

AMBIENT TEMPERATURE

OPERATOR DPH Kelly

COMMENTS: OFH 4

bad bag.

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	2.4	2.4	2.2	2.2		X	2.3	44/100	1.012
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.8	19.4	21.4	19.2			19.3	32/100	6.176
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.4	28/100	21.952
								TOTAL	29.14

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg 29.33
STACK GAUGE PRESSURE, in. H_2O [illegible]
OPERATORS [illegible] PH

start time 2:15

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	$\sqrt{\Delta P}$ ↓
0	1.1	355	29.94
10	1.2	350	31.18
20	1.1	350	29.84
30	1.1	345	Run 29.76
35½	1.0	345	28.37
	29.818(.925) =	27.582	
	Start time	3:06	
0	1.2	340	30.98
10	1.1	340	29.69
20	.93	350	Run 27.45
30	.86	350	26.39
~~28~~	28.62(.925) =	26.474	
AVERAGE			

EPA (Dur) 233
4/72

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

5-9

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO
DATE 1-31-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Inlet WCS
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR DPH Kelly

COMMENTS: 4 CFH

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	15.4	15.4	15.2	15.2			15.3	44/100	6.732
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.8	12.4	27.6	12.4			12.4	32/100	3.968
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.3	28/100	20.244
								TOTAL	30.94

EPA (Dur) 230
4 72

FIELD MOISTURE DETERMINATION

Location _____ Comments:

Test _____

Date _____

Operator _____

By Absorption:

Barometric Pressure _____

5-8/9

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
0	465.761	1.77	46 & 45.25
10		1.77	54 26
20	-- --	1.77	55 29
30	485.108	1.77	60 31

Tube No.	Weight, grams		
	Final	Initial	Difference
1	114	100	14
2	100	100	0
3	0	0	0
Silica Gel	204.7	200	4.7

(W) = weight of moisture collected = 18.7

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{3/5 \cdot P_B \cdot V_m}{T_m + 460}\right) + W}$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

EQ-P-30 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg 29.42
STACK GAUGE PRESSURE, in. H_2O [illegible]
OPERATORS [illegible]

[illegible] (EST.

West Port

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.82	250 *
2	.81	
3	.86	
4	.91	
5	1.1	
6	1.0	
7	1.1	
8	1.1	
9	1.2	
10	1.2	
11	1.1	
12	1.1	265 *
13	1.2	265 *
14	1.1	275 *
15	1.2	285 *
16	1.2	295 *
17	1.2	300 *
18	1.2	305 *
19	1.2	310 *
20	.97	315 *
AVERAGE		

Run 5-8/9

$\sqrt{\Delta P}$ = 28.39

SCHEMATIC OF TRAVERSE POINT LAYOUT

East Port

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
21	1.6	250 *
22	.99	
23	1.1	
24	1.3	
25	1.2	
26	1.4	
27	1.3	
28	1.4	
29	1.4	
30	1.3	
31	1.2	
32	1.2	
33	1.1	
34	1.1	260 *
35	1.1	270 *
36	1.1	275 *
37	1.1	280 *
38	.99	290 *
39	.97	295 *
40	.77	300 *
	42.072	
	$\sqrt{\Delta p}$ = 1.052	
	$\sqrt{\Delta p T}$ = 29.842	
AVERAGE		

EPA (Dur) 233 * DUE TO THE SLOW RESPONSE OF DIAL THERMOMETER, THE
4/72 STARRED VALUES ABOVE CANNOT BE CONSIDERED CORRECT. AFTER
STABILIZATION, AVG. STACK TEMP WAS CALCULATED TO BE 345° F

5-10

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: [illegible]
DATE: 1-31-76
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: Inlet NOS
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: [illegible]

COMMENTS:

4 CFH

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	21.0	21.0	20.8	20.8			20.9	44/100	9.02
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	30.6	9.6	30.4	9.6			9.6	32/100	3.072
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							69.6	28/100	19.488
								TOTAL	31.58

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D.
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O
OPERATORS [illegible]

9:00 AM start

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	1.1	345
10	1.1	350
20	1.1	350
30	1.1	350
38½	1.1	350
29.832(.925) = 27.595		
	2nd test	
start Time 10:02		
0	1.1	360
10	1.2	365
20	1.1	365
30	1.1	360
36½	1.1	360
30.334(.925) = 28.059		
AVERAGE		

29.76
29.85
Run 3-10
29.85
29.85
29.85

30.03
30.[illegible]
Run 3-11
30.12
30.03
30.03

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

5 11

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: MMIO

DATE: 1-31-76

SAMPLING TIME (24-hr CLOCK):

SAMPLING LOCATION: Inlet 1005

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):

ANALYTICAL METHOD:

AMBIENT TEMPERATURE:

OPERATOR: M. P. M.

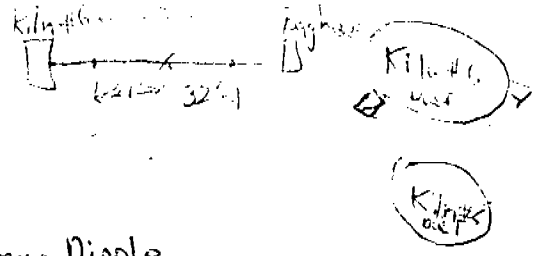
COMMENTS: 4 C F H

GAS \ RUN	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	14.2		14.4		14.2		14.27	44/100	6.279
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.8	13.6	27.6	13.2	27.4	13.2	13.33	32/100	4.266
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.4	28/100	20.272
								TOTAL	30.82

EPA (Dur) 230
4/72

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Martin Marietta
DATE 1-26-76
SAMPLING LOCATION Inlet Kiln #6
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 84 1/2"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 3 5/8" Note: Remove Nipple
STACK I.D., (DISTANCE A - DISTANCE B) 80 7/8" (6.74')
NEAREST UPSTREAM DISTURBANCE 21' (Bend) 3.1 E.D.
NEAREST DOWNSTREAM DISTURBANCE 32' (Bend) 4.75 E.D.
CALCULATOR [illegible]



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 23	1.1	80 7/8"	.89 (1.0)	3 5/8 | 3.625	4.63 4 5/8
2	3.5		2.83		6.46 6 1/2
3	6.0		4.85		8.48 8 1/2
4	8.7		7.04		10.67 10 5/8
5	11.6		9.38		13.01 13
6	14.6		11.81		15.44 15 1/2
7	18.0		14.56		18.19 18 1/4
8	21.8		17.63		21.26 21 1/4
9	26.1		21.11		24.74 24 3/4
10	31.5		25.48		29.11 29 1/8
11	39.8		32.19		35.82 35 7/8
12	60.7		49.09		52.72 52 3/4
13	68.5		55.40		59.03 59
14	73.9		59.77		63.40 63 3/8
15	78.2		63.24		66.87 66 7/8
16	82.0		66.32		69.95 70
17	85.4		69.07		72.70 72 3/4
18	88.4		71.49		75.12 75 1/8
19	91.3		73.84		77.47 77 1/2
20	94.0		76.02		79.65 79 5/8
21	96.5		78.04		81.67 81 7/8
22 44	98.9		79.98 (79.875)		83.50 83 1/2

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$A_s = 5137 \text{ in}^2$

GAS SAMPLING FIELD DATA

AP 1-1
AP 1-6
AP 1-7

Material Sampled for SO_2

Date 1/27/86

Plant [illegible]

Location C-6 inlet

Bar. Pressure 29.83 "Hg

Stack Temperature 550° °F

Ambient Temp. 20° °F

Stack Dimensions 80 7/8"

Run No. 1-A Bucket #1

Power Stat Setting 50

Filter Used: Yes ___ No X

Operator C. Hohenkirk

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:30	273.561	4	31°F
3:45	274.218	4 & 2	31°F
~~[illegible]~~			~~[illegible]~~

Flow was restricted last few minutes of run — line dust in unbelief

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 1

Meter Box No. 1

NCAP-36 (12/87)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/27/76

Plant MM-C

Location R-6 INLET

Bar. Pressure 29.53 "Hg

Stack Temperature 550 °F

Ambient Temp. [illegible] °F

Stack Dimensions 90 2/3"

Run No. 1-B BUCKET

ΔP = 3.4"

Power Stat Setting

Filter Used: Yes ___ No X

Operator D Holzschuh

End of [illegible] clogged w/ meter Box

stopped 4:00-4:15

Stop

Lime dust in umbilical restricted flow

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:55	274.305	<2	32
4:00	Start 4:15	<2	
4:25	274.561	<2	32

___ Impingers with ___ ml of ___

___ Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. ___

Meter Box No. 1

NCAP-35 (12/67)

Location R-C inlet

Test 1

Date 1/27/76

Operator C. Hirzenbach

Comments: 1.7"

by Absorption:

Barometric Pressure 29.83

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
3.30	936.252	1.7"	40° & 37°
4.30	972.728	1.7"	50° & 42

OFF

Tube No.	Weight, grams		
	Final	Initial	Difference
1	104	100	4
2	146	100	46
3	2	0	2
Si Gel	215.1	200	15.1

(W) = weight of moisture collected = 67.1

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{(29.92 \cdot V)}{(T_m + 460)}\right) + W}$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

6-2

27.0
17.3
9.7

26.5
17.4
9.1

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta
DATE 1/27/78
SAMPLING TIME (24-hr CLOCK) 15:52 –
SAMPLING LOCATION Point 6 (#6 Kiln) Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Integrated Bag
ANALYTICAL METHOD
AMBIENT TEMPERATURE 30°
OPERATOR Buchanan

COMMENTS: Flow Rate 7.5 DSCFM
Pt 6 Stack temp 540 @ 1855 hrs
535 @ 1925
Pt 5 " " 435 @ 1855 hrs
435 @ 1925

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	17.4	17.4	17.3	17.3		17.4	17.35	44/100	7.364
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.5	9.1	27.0	9.7	27.0	~~26.8~~	9.40 ~~9.15~~	32/100	3.008
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)		—		—		—	—	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)		73.5		73.0			73.25	28/100	20.51
								TOTAL	31.15

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PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible] Run 6-1
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O -6.1
OPERATORS [illegible]

SCHEMATIC OF TRAVERSE POINT LAYOUT

W

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.15	310*
2	.1	295*
3	.12	285*
4	.15	260*
5	.17	285*
6	.18	300*
7	.20	310*
8	.17	350*
9	.16	370*
10	.16	390*
11	.16	410*
12	.19	435*
13	.21	460*
14	.21	475*
15	.22	490*
16	.22	500*
17	.21	513*
18	.20	525*
19	.17	530*
20	.19	535*
21	.19	540
22	[illegible]	[illegible]
		$\overline{\sqrt{\Delta pT}}$ = 13.066
AVERAGE	.18	

E

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
23	.12	[illegible]
24	.16	[illegible]
25	.06	260*
26	.2	265*
27	.23	290*
28	.20	295*
29	.20	310*
30	.18	330*
31	.18	355*
32	.17	380*
33	.18	400*
34	.19	425*
35	.19	450*
36	.18	465*
37	.17	475*
38	.16	490*
39	.16	500*
40	.16	505*
41	.16	515*
42	.17	520*
43	.15	525*
44	.13	[illegible]*
	18.227	
	$\sqrt{\ }$ = .414	
AVERAGE	.17	536

EPA (Dur) 233
4/72

* DUE TO SLOW RESPONSE OF DIAL THERMOMETER, THE VALUES SO MARKED CANNOT BE CONSIDERED CORRECT; AFTER STABILIZATION STACK TEMPERATURE (AVERAGE) ASSUMED TO BE ~~540~~°F, 536

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible]

Bar. Pressure 29.84 "Hg Stack Temperature see velocity traverse °F

Ambient Temp. 190 °F Stack Dimensions 50 3/4"

Run No. 2-A

Power Stat Setting 100

Filter Used: Yes ___ No X

Operator [illegible]

note: Isopropyl impinger bubbling out into 3rd impinger

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
6:50	275.277	4	24
~~6:50~~			
7:05	276.024	4	26

Impingers with ___ ml of ___

Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 9

Meter Box No. V-.9674

NCAP-35 (12/87)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible]

Bar. Pressure 29.54 "Hg Stack Temperature see velocity traverse °F

Ambient Temp. 17°F °F Stack Dimensions 80 7/8"

Run No. [illegible]

Power Stat Setting 100

Filter Used: Yes ___ No X

Operator [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
715	274.044	4	26°F
732	276.955	4	26°F

___ Impingers with ___ ml of ___

___ Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 8

Meter Box No. Y-[illegible]

NCAP-36 (12/67)

[illegible]

Location [illegible] Comments:

Test [illegible]

Date [illegible]

Operator [illegible]

By Absorption:

Barometric Pressure 29.84

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
6:50	972.469	1.77	29 29
7:20		1.77	57 36
7:30	998.602	1.77	56 40

Tube No.	Weight, grams		
	Final	Initial	Difference
1	106	100	6
2	132	100	32
3	0	0	0
Silica	209	200	9

(W) = weight of moisture collected = 47

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{375 \cdot V_m}{[illegible]}\right) + W}$

% Moisture by Volume = [illegible]

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. [illegible] °F

Dry Bulb Temp. [illegible] °F

% Moisture From Psychrometric Chart [illegible]

[illegible]

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible] Run 6-2
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O [illegible]
OPERATORS [illegible]

SCHEMATIC OF TRAVERSE POINT LAYOUT

W

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.08	190*
2	.20	190*
3	.15	180*
4	.16	190*
5	.19	205*
6	.20	225*
7	.23	250*
8	.22	270*
9	.22	295*
10	.23	320*
11	.22	370*
12	.23	390*
13	.24	410*
14	.25	430*
15	.24	450*
16	.24	460*
17	.27	470*
18	.27	480*
19	.29	490*
20	.28	495*
21	.33	502*
22	.22	510*
		$\sqrt{\Delta pT}$ = 14.255
AVERAGE	.23	

E

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
23	.20	255*
24	.17	220*
25	.15	200*
26	.19	205*
27	.19	230*
28	.22	280*
29	.23	295*
30	.21	305*
31	.19	315*
32	.18	320*
33	.17	330*
34	.21	395*
35	.20	405*
36	.20	420*
37	.19	450*
38	.18	470*
39	.19	495*
40	.18	495*
41	.17	500*
42	.17	500*
43	.17	505*
44	.19	510*
	19.875	
	$\sqrt{\Delta p}$ = 0.452	
AVERAGE	.19	536

*DUE TO SLOW RESPONSE OF DIAL THERMOMETER THE ABOVE STACKED VALUES CANNOT BE CONSIDERED CORRECT. AFTER STABILIZATION AVERAGE STACK TEMPERATURE WAS CALCULATED TO BE ~~532~~ 536 °F

EPA (Dur) 233
4 72

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible]

Bar. Pressure [illegible] "Hg Stack Temperature 305 °F

Ambient Temp. [illegible] °F Stack Dimensions

Run No. 6-[illegible]

Power Stat Setting 100

Filter Used: Yes ___ No X

Operator [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10.25	941.527	2	30°F
10:40	942.397	2	32°F

Impingers with ___ ml of ___

Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. [illegible]

Meter Box No. [illegible]

NCAP-35 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/28/76

Plant MM-O

Location K-6 INLET

Bar. Pressure 29.62 "Hg

Stack Temperature 375 °F

Ambient Temp. 19 °F

Stack Dimensions

Run No. 6-3-B

Power Stat Setting

Filter Used: Yes ___ No X

Operator S. Hrychuk

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
11:40	293.562	2	25°
11:45	294.052	2	25°F
11:55	294.306	2	27°F

Impingers with ___ ml of

Impingers with ___ ml of

Total number of Impingers

Sample Bottle No.

Impinger Bucket No. 1

Meter Box No. No. 2 Y-104

NCAP-35 (12/67)

Field Moisture Determination

Facility [illegible] Source No.:

Test [illegible]

Date [illegible]

Operator [illegible]

By Absorption:

Barometric Pressure 29.62

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
10:25	54.057	1.77	34 31
10:40		1.77	49 34
11:10	70.798		[illegible] 30

Tube No.	Weight, grams		
	Final	Initial	Difference
1	100	166	66
2	160	58	-42
3	0	0	0
Silica Gel	190	193.9	3.9

(W) = weight of moisture collected = 27.9

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{375 \cdot P_m \cdot V_m}{T_m + 460}\right) + W}$

% Moisture by Volume =

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp °F

Dry Bulb Temp °F

% Moisture From Psychrometric Chart

[illegible]

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta

DATE [illegible]

SAMPLING TIME (24-hr CLOCK) [illegible] 30 – 1155

SAMPLING LOCATION [illegible] 6-3

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Integrated Bag

ANALYTICAL METHOD

AMBIENT TEMPERATURE [illegible]

OPERATOR [illegible]

COMMENTS: Break in run prior to second [illegible]

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	15.4	15.4	15.1	15.1	15.0	15	15.17	44/100	6.675
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.8	10.4	25.7	10.6	25.8	10.8	10.6	32/100	3.392
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							74.23	28/100	20.78
								TOTAL	30.85

EPA (D
4/7

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O
OPERATORS [illegible]

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.92	170 *
2	.93	180 *
3	.94	185 *
4	.96	185 *
5	.94	225 *
6	.93	235 *
7	.94	300 *
8	.92	310 *
9	.91	330 *
10	.89	350 *
11	.93	395 *
12	.97	410 *
13	.98	410 *
14	1.1	420 *
15	1.2	440 *
16	1.4	450 *
17	1.1	455 *
18	1.2	460 *
19	1.0	460 *
20	1.3	445 *
21	.99	465 *
22	.97	465 *
AVERAGE	1.05	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
23	.3	140 *
24	.4	140 *
25	.4	140 *
26	.42	150 *
27	.42	160 *
28	.40	175 *
29	.41	195 *
30	.41	220 *
31	.44	260 *
32	.43	290 *
33	.46	315 *
34	.63	350 *
35	.62	375 *
36	.62	395 *
37	.62	415 *
38	.62	430 *
39	.59	450 *
40	.53	460 *
41	.54	470 *
42	.54	450 *
43	.59	450 *
44	.63	455 *
	37.928	
	$\sqrt{\Delta p} = .362$	$\sqrt{\Delta p T} = 27.205$
AVERAGE	.50	536

EPA (Dur) 233 DUE TO SLOW RESPONSE OF DIAL THERMOMETER, THE ABOVE TEMP.
4 72 VALUES CANNOT BE CONSIDERED CORRECT. AFTER STABILIZATION OF 536
TEMP PROBE THE AVERAGE STACK TEMP WAS CALCULATED TO BE ~~540~~ °F

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location K-5 INLET

Bar. Pressure 29.30 "Hg Stack Temperature _____ °F

Ambient Temp. 15 °F Stack Dimensions _____

Run No. ~~[illegible]~~ 6-X-1

Power Stat Setting _____

Filter Used: Yes ___ No X

Operator DPH

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
~~2:10~~	~~294.565~~	~~4~~	~~28°F~~
2:12	294.660	4	28°F
2:25	295.315	4	29°F
2:30	295.563	4	30°F

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 5

Meter Box No. Train No. 1 Y-9174

NCAP-35 (12/87)

leaky bag

DRY CULAR WEIGHT DETERMINATION

PLANT: MMO
DATE: 1-29-76
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: Stack 6 - Inlet Run 6-4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: DWD

COMMENTS:
4 CFH
operating @ 2 CFH
Dry Rite Tube [illegible]
removed & cleaned [illegible]
without [illegible] at the rate of
30 min

GAS \ RUN	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	1.3	1.3					1.3	44/100	.572
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.0	19.7					19.7	32/100	6.304
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							79.0	28/100	22.12
								TOTAL	29.0

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT ____________________

DATE ____________________

LOCATION ____________________

STACK I.D. ____________________

BAROMETRIC PRESSURE, in. Hg ____________________

STACK GAUGE PRESSURE, in. H_2O ____________________

OPERATORS ____________________

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	.32	540
10	.35	530
20	.37	530
30	.36	530
40	.31	530
50	.26	530
60	39	520
		530
AVE.	.35	~~540~~
0	.37	520
10	.51	530
20	.36	540
30	.31	545
40	.72	540
47	1.1	540
AVE	[illegible]	[illegible]
AVERAGE		

Run 6-4

Run 6-5

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: MMO
DATE: 1-27-74
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: Inlet No 6 Sample H2
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS): Run 6-5
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: WDB

COMMENTS: Run 6 [illegible] switch bags at 6 min after 20 min 4 CFH

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	18.0	18.0	17.8	17.8	17.6	17.6	17.8	44/100	7.832
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	24.8	6.8	26.8	9.0	26.7	9.1	8.3	32/100	2.656
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.9	28/100	20.692
								TOTAL	31.18

EPA (Dur) 230
4/72

Location [illegible]

Test

Date 1-27-76

Operator [illegible]

Comments:

by Absorption:

Barometric Pressure 29.40

Run 6 - 4/5

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
5:04	131.893	1.77	80 62
5:16		1.77	74 57
5:23		1.77	76 57
5:39	155.559	1.77	73 56

Tube No.	Weight, grams		
	Final	Initial	Difference
1	105	100	5
2	96	100	-4
3	0	0	0
Silica	217.9	200	17.9

(W) = weight of moisture collected = 18.9

% Moisture by Volume = 100 W / [illegible]

% Moisture by Volume =

by Wet and Dry Bulb Temperatures:

Wet Bulb Temp. °F

Dry Bulb Temp. °F

% Moisture From Psychrometric Chart

Notes (optional)

sheet 1

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]

DATE [illegible]

LOCATION [illegible]

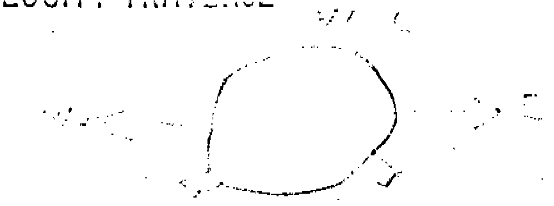
STACK I.D. [illegible]

BAROMETRIC PRESSURE, in. Hg [illegible]

STACK GAUGE PRESSURE, in. H_2O

OPERATORS BURBANK/BIDDY

Run 6-4/5



SCHEMATIC OF TRAVERSE POINT LAYOUT

WEST PORT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.19	
2	.17	
3	.26	
4	.23	230 *
5	.30	
6	.31	
7	.32	
8	.32	300 *
9	.33	
10	.32	350 *
11	.31	
12	.32	
13	.31	400 *
14	.31	
15	.32	
16	.33	430 *
17	.33	
18	.33	
19	.3[illegible]	
20	.34	450 *
21	.34	
22	.32	490 *
AVERAGE	[illegible]	[illegible]

max 490

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

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4/72

12.0531
.547

* SEE SECOND SHEET

sheet 2

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE 1-30-76
LOCATION [illegible]
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.40
STACK GAUGE PRESSURE, in. H_2O -7.3"
OPERATORS [illegible]

Run 6-4/5

SCHEMATIC OF TRAVERSE POINT LAYOUT

EASY PORT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F	TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.27		23		
2	.27	200	24		
3	.27	200	25		
4	.28	200	26		
5	.26	200	27		
6	.25	210	28		
7	.27	240	29		
8	.29	260	30		
9	.31	280	31		
10	.32	290	32		
11	.33	340	33		
12	.33	375	34		
13	.32	400	35		
14	.31	410	36		
15	.30	430	37		
16	.29	440	38		
17	.27	450	39		
18	.26	460	40		
19	.25	470	41		
20	.24	480	42		
21	.22	480	43		
22	.21	480	44		
	23.693				
	$\sqrt{\Delta p}$ = 0.538		$\sqrt{\Delta p_T}$ =	16.979	
AVERAGE			AVERAGE		536

EPA (Dur) 233
4 72

11.638 * DUE TO SLOW RESPONSE OF DIAL THERMOMETER,
.529 THE ABOVE TEMP. VALUES CANNOT BE CONSIDERED CORRECT
AFTER STABILIZATION AVERAGE STACK TEMP CALCULATED TO BE 550 °F

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO
DATE 1-30-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Inlet 6
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR D.O.H.

Run 1

COMMENTS:
operating @ 2 CFH
Sweeping dust off line
Run 6-6

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	15.6	15.6	15.6	15.6	15.4	15.4	15.53	44/100	6.833
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.7	12.1	27.8	12.2	28.0	12.6	12.3	32/100	3.936
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.17	28/100	20.208
								TOTAL	30.98

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT
DATE
LOCATION
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 29.17
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

TRAVERSE POINT NUMBER Min.	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	.30	550
10		5
20		
30		
40		
50		
60		
0	.35	540
10	.48	540
18	.54	540
30		545
40		
50		
60		
AVERAGE	[illegible]	[illegible]

Run 6-6

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

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DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO
DATE 1-30-74
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Inlet ESP 6
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR OPA

COMMENTS: Test No 2 for today
Run 6-7

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	19.2	19.2	19.1	19.1			19.15	44/100	8.420
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.4	8.2	27.6	8.6			8.4	32/100	2.688
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.45	28/100	20.286
								TOTAL	31.40

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4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT ______
DATE [illegible]
LOCATION [illegible]
STACK I.D. ______
BAROMETRIC PRESSURE, in. Hg 29.20
STACK GAUGE PRESSURE, in. H_2O ______
OPERATORS [illegible]

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	.7	550
10	.63	545
20	.64	545
30	.73	545
36	.67	545
AVERAGE	.66	[illegible]

Run 6-7 stop

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4 72

PRELIMINARY VELOCITY TRAVERSE

PLANT
DATE
LOCATION
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

Run 6-6/7

SCHEMATIC OF TRAVERSE POINT LAYOUT

West

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.28	1 *
2	.31	350 *
3	.28	350 *
4	.28	350 *
5	.31	350 *
6	.32	350 *
7	.35	350 *
8	.36	350 *
9	.31	350 *
10	.31	[illegible] *
11	.34	360 *
12	.42	460 *
13	.42	475 *
14	.40	490 *
15	.43	500 *
16	.39	510 *
17	.39	[illegible] *
18	.38	[illegible] *
19	.29	[illegible] *
20	.32	535
21	.32	540
22	.34	[illegible]
AVERAGE	.34	[illegible]

East

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
23	.48	350 *
24	.39	350 *
25	.42	350 *
26	.41	350 *
27	.34	350 *
28	.35	350 *
29	.35	350 *
30	.33	350 *
31	.34	350 *
32	.34	[illegible] *
33	[illegible]	[illegible] *
34	.32	350 *
35	.33	365 *
36	.33	375 *
37	.33	405 *
38	.32	[illegible] *
39	[illegible]	[illegible] *
40	.32	[illegible] *
41	.31	[illegible] *
42	.31	[illegible] *
43	.31	[illegible] *
44	.26	445 *
	25.633	
$\sqrt{\Delta p}$ = 0.553 $\sqrt{\Delta p T}$ =	18.399	536
AVERAGE	[illegible]	

* DUE TO SLOW RESPONSE OF DIAL THERMOMETER, THE ABOVE TEMP. VALUES CANNOT BE CONSIDERED CORRECT. AFTER STABILIZATION THE AVG. STACK TEMP WAS CALCULATED TO BE ~~540~~ 536 °F.

EPA (Dur) 233
4.72

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O [illegible]
OPERATORS [illegible]

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	5.2	400
2	5.0	350
3	4.8	350
4	4.8	350
5	5.0	350
6	5.0	350
7	5.0	350
8	5.0	350
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
AVERAGE		

?

plugged pitot

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
AVERAGE		

EPA (Dur) 233
4 72

n-8

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: WMO
DATE: 1-31-76
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: Inlet Mon
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: CPH Kelly

COMMENTS: 2 CFH

GAS \ RUN	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	16.8	16.8	17.0	17.0			16.9	44/100	7.436
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.4	9.6	26.6	9.6			9.6	32/100	3.072
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.5	28/100	20.58
								TOTAL	31.09

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PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D.
BAROMETRIC PRESSURE, in. Hg 2942
STACK GAUGE PRESSURE, in. H_2O
OPERATORS [illegible]

9:00 Am Start

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	.33	520
10	.42	515
20	.39	510
30	.43	510
38½	.43	520
	98.620	515
	$\sqrt{\Delta PT}$ = 19.724	
	2nd test	start
	time	10:02
0	.44	530
10	.46	545
20	.47	540
30	.49	530
36½	.48	530
	.47	535
AVERAGE		

Run 6-8

Run 6-9 (~~6-10~~)

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4.72

6-9.

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO
DATE 1-31-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Inlet 1006
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR DPH Kelley

COMMENTS: 4 CFH

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	13.6	13.6	13.5	13.5			13.55	44/100	5.962
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.6	12.0	25.4	11.9			11.95	32/100	3.824
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							74.5	28/100	20.86
								TOTAL	30.65

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4/72

[illegible]

[illegible] _____ Comments:

Test _____

Date _____

Operator _____

By Absorption:

Barometric Pressure _____

Dwir 6-8/9

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
0	174.797	1.77	48 & 39
10		1.77	57 & 41
20	-- --	1.77	62 & 42
30	175.753	1.77	63 & 40

Tube No.	Weight, grams		
	Final	Initial	Difference
1	110	100	10
2	106	100	6
3	0	0	0
Si Gel	206.9	200	6.9

(W) = weight of moisture collected = 22.9

% Moisture by Volume = $\frac{100 \cdot W}{\left(\frac{530 \cdot P_c \cdot V}{T_m + 460}\right) + W}$

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

[illegible]

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O 3.1
OPERATORS [illegible]

Run 6-89

Max temp 545°F

West Port

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.19	350 *
2	.21	350 *
3	.20	350 *
4	.21	350 *
5	.23	350 *
6	.24	
7	.25	
8	.26	
9	.27	
10	.26	
11	.23	
12	.25	
13	.29	
14	.31	
15	.33	375 *
16	.36	390 *
17	.39	420 *
18	.39	440 *
19	.40	457 *
20	.39	470 *
21	.38	485 *
22	.38	500 *
AVERAGE	.29	393

SCHEMATIC OF TRAVERSE POINT LAYOUT

East Port

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
23	.26	350 *
24	.27	
25	.29	
26	.31	
27	.28	
28	.27	
29	.29	
30	.29	
31	.27	
32	.30	
33	.30	
34	.31	
35	.31	
36	.31	
37	.28	
38	.27	
39	.25	370 *
40	.25	375 *
41	.26	410 *
42	.25	430 *
43	[illegible]	[illegible]
44	.23	450 *
	23.311	$\sqrt{\Delta pT}$ = 16.720
	$\sqrt{\Delta p}$ = 0.530	536
AVERAGE	.28	~~[illegible]~~

EPA (Dur) 233 * DUE TO SECOND REQUIREMENT OF THE TEST METHOD, THE ABOVE 4.72 TEMP. VALUES CANNOT BE CONSIDERED CORRECT. AFTER CONSULTING WITH [illegible] AVG. STACK TEMP. WAS CALCULATED TO BE 536°F

6-10

DRY MOLECULAR WEIGHT DETERMINATION

PLANT MMO
DATE 1-31-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Inlet ND 6
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR DVB

COMMENTS:

4 cfit

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	5.4	5.4	4.8	4.8			5.1	44/100	2.244
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.6	17.2	21.9	17.1			17.15	32/100	5.488
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							77.75	28/100	21.77
								TOTAL	29.50

2 pm

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. ______
BAROMETRIC PRESSURE, in. Hg [illegible]
STACK GAUGE PRESSURE, in. H_2O ______
OPERATORS ______

Start time 2:15

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
0	.32	540
10	.32	545
20	.32	550
30	.30	545
35 1/2	.31	545
	88.814	
	$\sqrt{\Delta pT}$ = 17.763	545
	Start time	3:06
0	.72	540
10	.83	540
20	.92	540
30	1.1	540
	119.140	
	$\sqrt{\Delta pT}$ = 29.785	540
AVERAGE		

Run 6-10

Run 6-11

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
AVERAGE		

EPA (Dur) 233
4/72

6-11

DRY MOLECULAR WEIGHT DETERMINATION

PLANT: INMC
DATE: 1-31-76
SAMPLING TIME (24-hr CLOCK):
SAMPLING LOCATION: Inlet 100 C
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS):
ANALYTICAL METHOD:
AMBIENT TEMPERATURE:
OPERATOR: [illegible]

COMMENTS: 4 C F H

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	13.4	13.4	12.8	12.8	11.8	11.8	12.67	44/100	5.575
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	24.8	11.4	24.4	11.6	24.0	12.2	11.73	32/100	3.754
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							75.6	28/100	21.168
								TOTAL	30.50

Row 1

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/29/76

Plant [illegible]-C Location 2D [illegible]

Bar. Pressure 29.41 "Hg Comments:

Ambient Temp. _____ °F

Run No. 4

Power Stat Setting ——

Filter Used: Yes ___ No X

Operator Milsley / Fairbank

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:01	580.715	4	59
2:16	SHUTDOWN	FOR BAG	BACK FLUSH
2:18			
2:33	582.543	4.	64

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 7

Meter Box No. 10 Y / .95210

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible] 2L

Bar. Pressure 29.41 "Hg Comments:

Ambient Temp. _____ °F

Run No. 4 - 2L

Power Stat Setting _____

Filter Used: Yes ___ No X

Operator [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:02	383.849	4	64
2:32	385.610	4	71
	1.761		68 128

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 4

Meter Box No. 11 Y/ .91566

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO2

Date 1/29/76

Plant M-M

Location 1 ⅜K

Bar. Pressure 29.41 "Hg

Stack Temperature ____ °F

Ambient Temp. 55 °F

Stack Dimensions ____

Run No. 4

LEAK ✓: 2.001 CFM

Power Stat Setting ____

Filter Used: Yes ___ No ✓

Operator BIDDY

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:00 PM	222.400	4	53
2:10	223.2	4	53
2:20	223.6	4	56
2:30	224.154	4	58

____ Impingers with ____ ml of ____

____ Impingers with ____ ml of ____

Total number of Impingers ____

Sample Bottle No. ____

Impinger Bucket No. 1

Meter Box No. 9

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 4/20/76

Plant M-M Location [illegible]

Bar. Pressure 29.41 "Hg Stack Temperature ____ °F

Ambient Temp. 35 °F Stack Dimensions ____

Run No. 4 LEAK ✓ <.001 CFM

Power Stat Setting ____

Filter Used: Yes ____ No ✓

Operator Davis

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:00 PM	359.617	4	48
2:10	360.5	4	48
2:20	360.9	4	51
2:30	361.507	4	56

____ Impingers with ____ ml of ____

____ Impingers with ____ ml of ____

Total number of Impingers ____

Sample Bottle No. ____

Impinger Bucket No. 11

Meter Box No. 2

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible] 2A

Bar. Pressure 29.42 "Hg Comments:

Ambient Temp. 49 °F (min)

Run No. 4-2A

Power Stat Setting

Filter Used: Yes___ No___

Operator JWB

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
13:58	365.535	4.0	49
14:00	Stop for vacuf flushing		
14:04	Restart	4.0	50
14:16	366.245	4.0	50
14:25	366.810	4.0	52
14:30	367.120	4.0	52
14:35	367.501	Finish	55

Comments: Leak check OK

Impinger Bucket No. 3

Meter Box No. [illegible]

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1-29-76

Plant [illegible] Location Baghouse [illegible] - Stack # 1-A

Bar. Pressure 29.42 "Hg

Ambient Temp. [illegible] °F

Run No. 4

Power Stat Setting N.A.

Filter Used: Yes ___ No X

Operator Harrison

Comments: Leak ✓ ≈ 0.001 cfm/@ 4DSCFM
Started sample ≈ 3 min after baghouse was cleaned.

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
14:01	343.079	4	53 °F
14:11	343.671	4	55
14:21	344.265	4	57
14:31	344.942	✓	59
	1.863		

Comments: 5' Stainless steel probe, connected to impingers with teflon line (≈ 2ft).

Impinger Bucket No. 5

Meter Box No. 7

NCAP-36 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]
DATE [illegible]
LOCATION [illegible]
STACK I.D. [illegible]
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
2A		254
2B		~~225~~ TEST
2C		225
2D		275
2E		TEST
2F		291
2G		300
2H		~~305~~
2J		285
2K		TEST
2L		325
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1A		255
1B		TEST
1C		X
1D		290
1E		305
1F		286 (BF)
1G		321
1H		~~[illegible]~~ TEST
1J		TEST
1K		338
1L		
AVERAGE		290

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant MMC Location [illegible], Fan 2-B

Bar. Pressure _____ "Hg Comments:

Ambient Temp. 54 °F (water)

Run No. 5 - 2B

Power Stat Setting _____

Filter Used: Yes ___ No ___

Operator JWB

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
15:09	367.532	4.0	54
15:19	368.185	4.0	53
15:29	368.849	4.0	53
15:35	369.262	4.0	54
15:40	369.601	Finish	55

Leak check OK

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 12

Meter Box No. 12

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1-29-71

Plant Martin-Marietta

Location Bag Cabinet Stack # 1-B

Bar. Pressure _____ "Hg

Ambient Temp. 55 °F

Run No. 5

Power Stat Setting 11.9

Filter Used: Yes ___ No X

Operator Harrison

Comments: Leak rate ≈ 0.001 cfm @ 45 cfm
Bag Compartment cleaned @ ≈ 14:55

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
14:57	344.973	4	58
15:00	345.179	Stopped - Holding until rest of [illegible]	
Restarted 15:07	345.179	4	57
15:14	345.70	4	57
15:27	346.62	4	57
15:34	347.092	—	57

Comments: 5" stainless steel probe connected to impingers with 3' teflon tubing

Impinger Bucket No. 2

Meter Box No. 7

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/29/76

Plant M-M

Location 1-3

Bar. Pressure 29.41 "Hg

Stack Temperature _____ °F

Ambient Temp. 34 °F

Stack Dimensions _____

Run No. 5

LEAK ✓ = .0005 CFM

Power Stat Setting _____

Filter Used: Yes ___ No ___

Operator DAVIS

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:10PM	361.521	4	54
3:20	362.1	4	54
~~3:25~~			
3:30	362.73	4	55
3:31	362.856	CLEAN CYCLE ≤1 MIN	
3:41	363.348	4.5	56

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 8

Meter Box No. 1

NCAP-35 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 11/29/76

Plant M-M

Location 1-H

Bar. Pressure 29.41 "Hg

Stack Temperature _____ °F

Ambient Temp. 34 °F

Stack Dimensions _____

LEAK ✓: <.001 CFM

Run No. 5

Power Stat Setting _____

Filter Used: Yes ___ No ___

Operator BIDDY

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:10PM	224.252	4	57
3:20	224.82	4	57
3:25	225.164	STOP FOR CLEAN CYCLE ≈ 1MIN	
3:30	225.2	4	57
3:41	225.800	4	58

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 9

Meter Box No. 9

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2 (27-2c)

Date 1/20/76

Plant [illegible] Location 2K (OUTLET)

Bar. Pressure 29.41 "Hg Comments:

Ambient Temp. _____ °F

Run No. 5

Power Stat Setting —

Filter Used: Yes ___ No X

Operator C. Cardy / Pinkbrook

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:10	385.616	4	72
3:40	387.350	4	74

Comments:

Impinger Bucket No. 10

Meter Box No. 11 - 4/91506

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/29/95

Plant [illegible] Location 2 E (OUTLET)

Bar. Pressure 29.41 "Hg Comments:

Ambient Temp. _____ °F

Run No. 5

Power Stat Setting —

Filter Used: Yes ___ No X

Operator Marley / Burbank

STARTED 1 MIN AFTER BACKFLUSH on 2E

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:18	582.568	4	67
3:48	584.308	4	70

Comments:

Impinger Bucket No. 6

Meter Box No. 10 Y / .95210

NCAP-36 (12/67)

1F 333°F
1E ~~297°F~~ 297°F
1G 330
1H 346

DRY MOLECULAR WEIGHT DETERMINATION

1J : [illegible]

PLANT Martin Marietta, Woodville
DATE 1/29/76
SAMPLING TIME (24-hr CLOCK) see right
SAMPLING LOCATION Baghouse outlet A
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) integrated bag
ANALYTICAL METHOD
AMBIENT TEMPERATURE
OPERATOR

COMMENTS:

Run 0-4

GAS \ RUN	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	6.0	6.0	5.9	5.9			5.95	44/100	2.62
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	23.2	17.2	23.2	17.3			17.25	32/100	5.52
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	21.5
N_2 (NET IS 100 MINUS ACTUAL CO READING)							76.8	28/100	
								TOTAL	29.64

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT [illegible]
DATE [illegible]
SAMPLING TIME (24-hr CLOCK) [illegible]
SAMPLING LOCATION [illegible]
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) [illegible] Run 05
ANALYTICAL METHOD [illegible]
AMBIENT TEMPERATURE [illegible]
OPERATOR [illegible]

COMMENTS: 1D 1515
1E
1F
1G
1H
1J off 1600
5 min [illegible]

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	12.2	12.2	11.8	11.8			12.0	44/100	5.28
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.8	13.6	25.7	13.9			13.75	32/100	4.4
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							74.25	28/100	20.79
								TOTAL	30.47

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date [illegible]

Plant MM-C Location [illegible]

Bar. Pressure _____ "Hg Comments:

Ambient Temp. 28 °F (MIXED)

Run No. 6-2

Power Stat Setting _____

Filter Used: Yes___ No___

Operator DWB

[illegible] at 11:35 (3 min. fast then)

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:26	369.748	4.0	28
9:35	370.241	off	29
11:17	[illegible]	[illegible]	29
[illegible]	[illegible]	[illegible]	[illegible]
11:37	371.442	4.0	30
11:39	371.754	[illegible]	31

Leak check OK

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. 5

Meter Box No. 17

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date 1-[illegible]-[illegible]76

Plant Martin [illegible] Location [illegible] #1-B

Bar. Pressure 29.9 "Hg

Ambient Temp. 21 / °F

Run No. 6

Power Stat Setting N.A.

Filter Used: Yes ___ No X

Operator [illegible]

Comments: Leak ✓ ≈ 0.0015 cfm @ 4.5" Hg
D Bag cleaner [illegible] 2-C1 at start

Cleaning cycle on compartment 2-C1 at start of Run

347.386

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:25	~~574~~ 347.386	4	46
9:34	347.865	—	47
11:15	348.[illegible]	4	46
11:26	348.[illegible]	4	47
11:36	349.331	—	46

Stopped [illegible] cleaning

Comments: Time [illegible] 11:36

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 11/30/76

Plant MM-0 Location 2-5

Bar. Pressure 29.20 "Hg Comments: [illegible]

Ambient Temp. °F

Run No. 6

Power Stat Setting —

Filter Used: Yes ___ No X

Operator McCarley / Burbank

Note the starting time is 3 minutes fast.

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
11:20	387.571	4.0	58
11:50	389.050	4.0	62

Switched at 11:22-11:24 backflush

Comments:

Impinger Bucket No. 3

Meter Box No. 11

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/30/76

Plant MM-8

Location 2-F

Bar. Pressure 29.20 "Hg

Comments: [illegible]

Ambient Temp. °F

Run No. 6

Power Stat Setting —

Filter Used: Yes ___ No X

Operator [illegible]

Maybe some lime dust in 1st impinger due to intake of ambient "air" following time check

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
11:20	584.590	4	48
11:50	586.232	4	52

Comments:

Impinger Bucket No. 7

Meter Box No. 10

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant M-M

Location 1-K

Bar. Pressure _____ "Hg

Ambient Temp. [illegible] °F

Run No. 1

Power Stat Setting _____

Filter Used: Yes ___ No ✓

Operator DAVIS

Comments:
LEAK ✓ - 2.501 CFM
[illegible]
[illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
	[illegible]		
9:27AM	[illegible]	4	[illegible]
9:41	[illegible]	STOP [illegible]	
11:20	RESUME [illegible]		
11:25	[illegible]	[illegible]	
[illegible]	[illegible]	4	78
[illegible]	[illegible]	4	[illegible]

Comments:

Impinger Bucket No. 1

Meter Box No. 2

KCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/3/76

Plant [illegible] Location [illegible]

Bar. Pressure _____ "Hg Comments: [illegible]

Ambient Temp. [illegible] °F 35 [illegible]

Run No. 6 [illegible]

Power Stat Setting _____ [illegible]

Filter Used: Yes ___ No ✓

Operator [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:19	226.224		
9:27	226.[illegible]	4	64
[illegible]	REGULAR RUN		
11:30	237.3	4	5[illegible]
[illegible]	22[illegible]		[illegible]

Comments:

Impinger Bucket No. _____

Meter Box No. 7

NCAP-36 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT M&M Rodville
DATE [illegible]
SAMPLING TIME (24-hr CLOCK) [illegible]
SAMPLING LOCATION [illegible] site Outlet 3 Run 0-6
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Integrated
ANALYTICAL METHOD [illegible], Orsat
AMBIENT TEMPERATURE [illegible]
OPERATOR [illegible]

COMMENTS: 12 11:22 AM
1E
1F SKIP
1G
1H
1J

8-CEM

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	13.6	13.6	13.4	13.4			13.5	44/100	5.94
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.5	12.9	26.5	13.1			13.0	32/100	4.16
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.5	28/100	20.58
								TOTAL	30.68

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 1/30/76

Plant Ni-Mn, Ohio

Location 1-H

Bar. Pressure 29.2 "Hg

Comments: LEAK ✓ < .001 CFM

Ambient Temp. 35 °F

Run No. 7

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator DAVIS

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:00	365.250	4	80
12:02	[illegible]	[illegible]	
12:12	366	4	84
12:20	366.5	4	90
12:30	367.058	4	92

Comments:

Impinger Bucket No. 8

Meter Box No. 2

RCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant MM-C

Location 2-6 [illegible]

Bar. Pressure 29-20 "Hg

Comments:

Ambient Temp. °F

Run No. 7

Power Stat Setting —

Filter Used: Yes ___ No X

Operator McCarley / Burdenko

Back flushing on 1 2 5 at 12:11

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:10	586.274	4	52
12:35	587.648	4	58

Comments:

Impinger Bucket No. 10

Meter Box No. 10

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO2

Date 1/30/70

Plant MM-O Location 2-H TAIL OUT

Bar. Pressure 29.20 "Hg Comments:

Ambient Temp. _____ °F

Run No. 7

Power Stat Setting —

Filter Used: Yes ___ No X

Operator McLarty/Fairbank

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:10	359.083	4	62
12:35	390.285	4	65

Comments:

Impinger Bucket No. 6

Meter Box No. 11

NCAP-35 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date _____

Plant _____ Location _____

Bar. Pressure _____ "Hg Comments:

Ambient Temp. _____ °F

Run No. _____

Power Stat Setting _____

Filter Used: Yes___ No___

Operator _____

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:01	371.831	4.0	32
12:11	372.328	4.0	32
12:21	372.918	4.0	33
12:27	[illegible]	[illegible]	34

_____ Impingers with _____ ml of _____

_____ Impingers with _____ ml of _____

Total number of Impingers _____

Sample Bottle No. _____

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location 1-6

Bar. Pressure 29.46 "Hg Comments:

~~Ambient Temp.~~ 82 °F INITIAL METER TEMP.

Run No. 8 LEAK ✓: 2.001 CFM

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator BUDDY

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
8:59AM	229.987	4	82
9:09	230.6	4	70
9:19	231.2	4	67
9:29	231.700	4	66

Comments:

Impinger Bucket No. 10

Meter Box No. 9

KCAP-36 (12/67)

[illegible] FIELD DATA

Material Sampled for SO_2

Date [illegible]

Plant [illegible] Location 2 L Blower

Bar. Pressure 29.46 "Hg Comments:

Ambient Temp. _____ °F

Run No. 8

Power Stat Setting —

Filter Used: Yes ___ No X

Operator Milsby/Burbank

RUN 8
BACKFLUSH
@ 2L
9:00 AM

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:03	390.588	4	70
9:33	392.616	4	74

Comments:

Impinger Bucket No. 4

Meter Box No. 11 Y/. 91506

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible]

Bar. Pressure [illegible] "Hg Comments: [illegible]

Ambient Temp. [illegible] °F

Run No. S-1-B

Power Stat Setting [illegible]

Filter Used: Yes ___ No X

Operator Harrison

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:00	351.444	4	31 °F
9:08	352.002	[illegible]	[illegible]
9:16	"	4	31
9:20	352.700	4	32
9:32	353.456	–	33

Comments:

Impinger Bucket No. [illegible]

Meter Box No. [illegible]

NCAP-36 (12/67)

B-8

DRY MOLECULAR WEIGHT DETERMINATION

Kalamazoo, MI

PLANT [illegible] Woodville, Ohio
DATE 1-31-76
SAMPLING TIME (24-hr CLOCK) [illegible]
SAMPLING LOCATION [illegible] Outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) [illegible]
ANALYTICAL METHOD [illegible]
AMBIENT TEMPERATURE [illegible]
OPERATOR [illegible] Kelly

COMMENTS:
AM
1K 907
1J
1L 5 min/stack
1F
1E
1D 955

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	16.8	16.8	16.8	16.8		16.8		44/100	7.392
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.9	11.1	28.0	11.2		11.15		32/100	3.568
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)						72.05		28/100	20.177
								TOTAL	31.13

EPA (Dur) 230
4.72

GAS SAMPLING FIELD DATA

Material Sampled for SO

Date 1/31/76

Plant 117-111,0416 Location 1 SIP F

Bar. Pressure 29.46 "Hg Comments:

LEAK ✓ <.001 CFM

INITIAL MOTOR TEMP

~~Ambient Temp.~~ 62 °F

Run No. 9

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator BIDDY

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:00 AM	231.741	4	54
10:10	232.4	4	52
10:20	232.9	4	52
10:22	232.986	STOP PRE CLEAN CYCLES =1 min PLUG AND SHUT DOWN	
10:26	RESUMED RUN	4	52
10:34	233.434	4	52

Comments:

Impinger Bucket No. 8

Meter Box No. 9

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/31/76

Plant [illegible] Location [illegible]

Bar. Pressure 30.44 "Hg Comments:

INITIAL METER TEMP

~~Ambient Temp.~~ 74 °F LEAK V: 0.001 CFM

Run No. 5

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator Davis

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:00 AM	368.941	4	69
10:10	369.5	4	68
10:20	370.0	4	66
10:30	370.593	4	66

Comments:

Impinger Bucket No. 7

Meter Box No. 2

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant MMO

Location [illegible] Inlet Fan 2A

Bar. Pressure [illegible] "Hg

Comments:

Ambient Temp. 52 °F (mixed)

Run No. 9-2A

Power Stat Setting

Filter Used: Yes ___ No ___

Operator JWB

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:03	375.014	4.0	50
10:13	375.541	4.0	49
10:23	376.087	4.0	52
10:33	376.632	Finish	50

Leak check OK

___ Impingers with ___ ml of ___

___ Impingers with ___ ml of ___

Total number of Impingers ___

Sample Bottle No. ___

Impinger Bucket No. 11

Meter Box No. 12

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/31/76

Plant MM-O

Location 2E BAG OUT

Bar. Pressure 27.46 "Hg

Comments:

Ambient Temp. °F

Run No. 9

Power Stat Setting —

Filter Used: Yes ___ No X

Operator McCarley/Burbank

BACK FLUSH @ 1-B 10:02 AM

apparent high neg press in duct - drain may have backed up into duct & dilution [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:02	590.112	4	74
10:18	SHUTDOWN		
10:21	BACKFLUSH		
10:27	SHUTDOWN	- FAN OFF	
10:31			
10:38	591.682	4	76

Comments:

Impinger Bucket No. 3

Meter Box No. 10 Y/ - 95210

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/21/76

Plant MM-O Location 2K [illegible]

Bar. Pressure [illegible] "Hg Comments:

Ambient Temp. ____ °F

Run No. 9

Power Stat Setting ____

Filter Used: Yes ___ No X

Operator [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:03	392.635	4	78
10:33	394.386	4	74

Comments:

Impinger Bucket No. 5

Meter Box No. 11 4/.9150b

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date [illegible]

Plant [illegible] Location [illegible]

Bar. Pressure [illegible] "Hg Comments: [illegible]

Ambient Temp. [illegible] °F

Run No. [illegible]

Power Stat Setting [illegible]

Filter Used: Yes ___ No X

Operator Harrison

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
[illegible]	353.555	4	35
[illegible]	[illegible]	4	35
[illegible]	354.941	4	35
[illegible]	355.579	[illegible]	35

Comments:

Impinger Bucket No. [illegible]

Meter Box No. 7

NCAP-36 (12/67)

D-9

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Woodville
DATE 1-[illegible]
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Composite Outlet 7th
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Integrated Bag
ANALYTICAL METHOD Orsat Dynalab
AMBIENT TEMPERATURE 65
OPERATOR Jan Kelly

COMMENTS: 10:00 1E 1D 1B 1G 1H 1K
Leak 1M
Bag
3 min
5 min

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	4.8	4.8	4.0	4.0	4.0	4.0	4.27	44/100	1.88
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.8	18.0	22.2	18.2	22.2	18.2	18.13	32/100	5.80
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							77.6	28/100	21.73
								TOTAL	29.41

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date 1/31/70

Plant M-M C.H.C. Location 1E

Bar. Pressure 29.66 "Hg Comments:

~~Ambient Temp.~~ 33 °F

Run No. 10

Power Stat Setting _____

Filter Used: Yes ___ No ✓

Operator Bill

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:15	233.469	4	33
2:25	234.0	4	33
2:35	234.6	4	34
2:45	235.113	4	34

Comments:

Impinger Bucket No. 7

Meter Box No. 4

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date 1/31/77

Plant [illegible] Location [illegible]

Bar. Pressure [illegible] "Hg Comments:

INITIAL METER TEM ~~Ambient Temp.~~ 44 °F [illegible]

Run No. 10

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator [illegible]

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:15	370.608	4	45
2:16	CLEAN CYCLE	1 MIN	
2:25	371.2	4	44
2:36	372.1	6	44
2:45	372.743	4.5	44

Comments:

Impinger Bucket No. 3

Meter Box No. 7

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for [illegible]

Date [illegible]

Plant [illegible] Location [illegible]

Bar. Pressure [illegible] "Hg Comments:

Ambient Temp. 54 °F (water)

Run No. 16-2B

Power Stat Setting

Filter Used: Yes ___ No ___

Operator JWB

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
14:15	376.657	4.0	54
14:25	377.165	4.0	54
14:33	377.616	Stop for compartment cleaning	55
14:37	Restart	4.0	56
14:45	378.018	4.0	58
14:49	378.393	Finish	59

Leak check OK

Impingers with ___ ml of

Impingers with ___ ml of

Total number of Impingers

Sample Bottle No.

Impinger Bucket No. 11

Meter Box No. 12

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for Fe 2

Date 1/31/76

Plant MM-0 Location 2 F BAG OUT

Bar. Pressure 29.33 "Hg Comments:

Ambient Temp. °F

Run No. 10

Power Stat Setting —

Filter Used: Yes ___ No X

Operator McCarley / Burbank

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:15	591.706	4	62
2:45	593.645	4	65

Comments:

Impinger Bucket No. 10

Meter Box No. 10

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date 1/31/76

Plant MM-0 Location 2 J Bag out

Bar. Pressure 29.33 "Hg Comments:

Ambient Temp. _____ °F

Run No. 10

Power Stat Setting —

Filter Used: Yes ___ No X

Operator McCarley/Burbank

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
2:15	394.408	4	65
2:45	396.451	4	~~65~~ 68

Comments:

Impinger Bucket No. 12

Meter Box No. 11

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date _____

Plant [illegible] Location [illegible]

Bar. Pressure [illegible] "Hg Comments: [illegible] cycle @ 2.5 @ 277 [illegible]

Ambient Temp. 35 °F

Run No. [illegible] 1B

Power Stat Setting [illegible]

Filter Used: Yes ___ No X

Operator Harrison

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
14:15	355.601	4	39°F
14:25	356.320	4	37
14:32	356.713	— stopped [illegible]	[illegible] temperature [illegible] 1-B
Removed 14:30	"	4	37
14:43	357.348	4	37
14:49	357.599		

Comments:

Impinger Bucket No. 8

Meter Box No. 7

NCAP-36 (12/67)

D-10

DRY MOLECULAR WEIGHT DETERMINATION

PLANT [illegible] Ardmore
DATE [illegible] 1-31-76
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION [illegible] Outlet #7
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) [illegible]
ANALYTICAL METHOD [illegible] Orsat
AMBIENT TEMPERATURE
OPERATOR [illegible]

COMMENTS: 215
1J
1H
1G
1F
1D

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	17.0	17.0	17.2	17.2	17.0	17.0	17.07	44/100	7.51
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.8	10.8 ~~[illegible]~~	28.2	11.0	27.7	10.7	10.83	32/100	3.47
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.1 ~~[illegible]~~	28/100	20.19
								TOTAL	31.16

EPA (PH) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Martin Marietta Woodville Ohio

DATE 1/31/76

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION Baghouse Outlet 1-2

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) integrated bag

ANALYTICAL METHOD orsat

AMBIENT TEMPERATURE

OPERATOR Logan, Kelly

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	16.8	16.8	16.8			~~16.8~~	16.8	44/100	7.392
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	26.4	9.6	26.2	9.4			9.5	32/100	3.04
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	Ø
N_2 (NET IS 100 MINUS ACTUAL CO READING)							73.7	28/100	20.636
								TOTAL	31.07

EPA (Dun) 230
4-72

GAS SAMPLING FIELD DATA

Material Sampled for

Date 1/31/76

Plant M-M, OHIO

Location OUTLET 1-D

Bar. Pressure 29.46 "Hg

Comments: LEAK ✓: 2.00 CFM

Ambient Temp. 25 °F

Run No. 11

Power Stat Setting NA

Filter Used: Yes ___ No ✓

Operator BUDDY

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:05	235.174	4	34
3:15	235.8	4	35
3:25	236.3	4	35
3:35	236.832	4	35

Comments:

Impinger Bucket No. 6

Meter Box No. 9

NCAP-36 (12/67)

Material Sampled for [illegible]

Date 1/31/76

Plant [illegible] Location Cutlet L-11

Bar. Pressure 29.46 "Hg Comments: LEAK V. <.001 CFM

Ambient Temp. 26 °F

Run No. 11

Power Stat Setting

Filter Used: Yes ___ No ✓

Operator DAVIS

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:05PM	372.762	4.5	44
3:15	373.5	5.5	44
3:25	374.3	5	44
3:33	374.697	4	44

Comments: MOISTURE AND DUST NOTICED IN SAMPLING LINE TERMINATED RUN @ 3:33

Impinger Bucket No. 5

Meter Box No. 2

KCAP-36 (12/67)

Material Sampled for SO2

Date [illegible]

Plant [illegible]

Location [illegible]

Bar. Pressure [illegible] "Hg

Comments: (moist)

Ambient Temp. 60 °F

Run No. 11-2C

Power Stat Setting

Filter Used: Yes ___ No ___

Operator JWB

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATUPE IN
15:06	378.422	4.0	60
15:16	378.748	4.0	60
15:26	379.193	4.0	61
15:31	379.416	Stop for compartment cleaning	62
15:35	Restart	4.0	63
15:40	379.839	Finish	63

Leak check OK

Comments:

Impinger Bucket No. 1

Meter Box No. [illegible]

NCAP-36 (12/87)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date 11/31/76

Plant MM-0 Location 2-H BRC OUT

Bar. Pressure _____ "Hg Comments:

Ambient Temp. _____ °F

Run No. 11

Power Stat Setting ——

Filter Used: Yes ___ No X

Operator Mcarley/Dubenk

— BRC TRACK PLUGGED
1-J
3:05

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:05	396.473	4	67
3:35	398.509	4	70

Comments:

Impinger Bucket No. 9

Meter Box No. 11

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for _____

Date 1/31/76

Plant MA-0 Location 26 TAPE OUT

Bar. Pressure _____ "Hg Comments:

Ambient Temp. _____ °F

Run No. 11

Power Stat Setting ——

Filter Used: Yes ___ No X

Operator McCarley / Burbank

Sampling started at 1-5 @ 3:05

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:05	593.663	4	65
3:37	595.571	4	68

Comments:

Impinger Bucket No. 3

Meter Box No. 10

NCAP-36 (12/67)

[illegible]

Material Sampled for [illegible]

Date [illegible]

Plant [illegible]

Location [illegible] 1A

Bar. Pressure [illegible] "Hg

Comments:

Leak check [illegible]

1J compartment [illegible]

Ambient Temp. 35 °F

Run No. [illegible]

Power Stat Setting [illegible]

Filter Used: Yes ___ No X

Operator Harrison

	CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
	15.06	357.614	4	37°F
	15.16	358.351	4	39
	15:21	SSK shutdown while compartment 1A was cleaned		
restart	15.23	358.638	4	39
	15.27	358.915	4	40
	15.35	359.621	—	41

Comments:

Impinger Bucket No. 4

Meter Box No. 7

NCAP-36 (12/87)

0-11

DRY MOLECULAR WEIGHT DETERMINATION

PLANT [illegible] Hills Ohio
DATE [illegible] 1-31-78
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION [illegible] Outlet B Stack
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) Integrated bag
ANALYTICAL METHOD [illegible]
AMBIENT TEMPERATURE
OPERATOR [illegible]

COMMENTS: Rotameter 8 cf/hr
1517
1K
1J
1G
1F
1E
1D 1540
3 min
5 min

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	15.0	15.0	16.0	16.0	15.0	15.0	15.33	44/100	6.75
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	27.6	12.6	27.8	11.8	27.4	12.4	12.27	32/100	3.926
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							72.4	28/100	20.272
								TOTAL	30.94

EPA (Dur) 230
4/72

APPENDIX D

LABORATORY REPORT

Sulfur Dioxide Analysis Report
Martin Marietta, Woodville, Ohio

Date	Location	Run ID	Sample Volume	Aliquot Volume	Initial Titrant Reading	Final Titrant Reading	Titrant Volume	Titrant Normality
1/27/76	Blank		50	10	10.6	10.7	0.1	0.00969
	4 Inlet	4-1-A			10.8	10.7	0.1	
	5 Inlet	5-1-A			10.8	10.8	-0-	
	6 Inlet	6-1-A			10.8	47.0	36.2	
	4 Inlet	4-1-B			0.0	0.0	-0-	
	5 Inlet	5-1-B			0.0	0.0	-0-	
	6 Inlet	6-1-B			0.0	8.2	8.2	
	4 Inlet	4-2-A			8.2	8.2	-0-	
	5 Inlet	5-2-A			8.2	8.2	-0-	
	6 Inlet	6-2-A			8.3	9.4	1.1	
	4 Inlet	4-2-B			9.4	9.4	-0-	
	5 Inlet	5-2-B			9.4	9.4	-0-	
	6 Inlet	6-2-B			9.4	15.3	5.9	
1/28/76	4 Inlet	4-3-A			15.3	15.4	0.1	
	5 Inlet	5-3-A			15.4	15.4	-0-	
	6 Inlet	6-3-A			0.0	2.10	2.10	
	4 Inlet	4-3-B			2.10	2.10	-0-	
	5 Inlet	5-3-B			2.10	2.10	-0-	
	6 Inlet	6-3-B			2.10	4.40	2.30	
1/29/76	Outlet	0-4-1A			0.80	6.50	5.70	
	Outlet	0-4-2L			6.50	42.8	36.3	
	Outlet	0-4-2A			0.10	6.30	6.20	
	Outlet	0-4-2D			6.30	14.00	7.70	
	Outlet	0-4-1K			14.00	14.00	-0-	
	Outlet	0-4-1L			14.00	73.7	59.7	
	Outlet	0-5-1J			1.1	11.5	10.4	

Sulfur Dioxide Analysis Report
Martin Marietta, Woodville, Ohio (continued)

Date	Location	Run ID	Sample Volume	Aliquot Volume	Initial Titrant Reading	Final Titrant Reading	Titrant Volume	Titrant Normality
1/29/76	Outlet	0-5-1H	50	10	0.2	17.7	17.5	0.00969
	Outlet	0-5-2B			0.1	5.8	5.7	
	Outlet	0-5-2K			5.8	21.2	15.4	
	Outlet	0-5-1B			0.2	5.3	5.1	
1/30/76	Outlet	0-6-1F			8.0	26.3	18.3	
	Outlet	0-6-2C			1.6	5.9	4.3	
	Outlet	0-6-1K			6.0	47.4	41.4	
	Outlet	0-6-1B			1.0	13.1	12.1	
	Outlet	0-6-2F			13.1	32.3	19.2	
	Outlet	0-6-2J			7.3	31.9	24.6	
	Outlet	0-7-2H			0.0	18.3	18.3	
	Outlet	0-7-2G			0.6	19.7	19.1	
	Outlet	0-7-1D			0.2	1.8	1.6	
	Outlet	0-7-2A			1.8	3.2	1.4	
	Outlet	0-7-1H			3.2	33.3	31.1	
	Outlet	0-7-1A			8.3	20.1	11.8	
1/31/76	Outlet	0-8-2L			0.1	47.6	47.5	
	Outlet	0-8-1L			0.1	65.7	65.6	
	Outlet	0-8-2C			15.7	17.8	2.1	
	Outlet	0-8-1G			0.0	18.65	18.65	
	Outlet	0-8-2D			18.70	29.60	10.90	
	Outlet	0-8-1B			4.5	14.9	10.4	
	Outlet	0-9-1F			14.9	27.3	12.4	
	Outlet	0-9-1J			2.3	36.5	34.2	
	Outlet	0-9-2K			11.5	37.1	25.6	
	Outlet	0-9-2E			12.1	22.4	10.3	
	Outlet	0-9-2A			0.0	7.0	7.0	

Sulfur Dioxide Analysis Report
Martin Marietta, Woodville, Ohio (continued)

Date	Location	Run ID	Sample Volume	Aliquot Volume	Initial Titrant Reading	Final Titrant Reading	Titrant Volume	Titrant Normality
1/31/76	Outlet	0-9-1A	50	10	7.0	13.3	6.3	0.00969
	Outlet	0-10-2J	↓	↓	13.3	46.4	33.1	↓
	Outlet	0-10-1K			0.1	30.5	30.4	
	Outlet	0-10-2F			5.5	23.9	18.4	
	Outlet	0-10-1E			0.1	13.1	13.0	
	Outlet	0-10-2B			13.0	17.3	4.3	
	Outlet	0-10-1B			17.3	28.8	10.5	
	Outlet	0-11-1D			NOT	RECORDED	9.4	
	Outlet	0-11-1H			"	"	21.7	
	Outlet	0-11-2C			"	"	2.20	
	Outlet	0-11-2H			"	"	32.6	
	Outlet	0-11-2G			"	"	26.4	
	Outlet	0-11-1A			"	"	-0-	

Test Notes

Blue Inlet 4 Dupont (Long) Recorder 1
Red Inlet 6 Dynasci 0-150
Red Inlet 5 Dynasci 0-500 Recorder 2

For period 1805 to 1855 the Inlet Kiln (5)? data showed approx 25 ppm SO_2. Periodic increases were caused when the Method 6 train was disconnected allowing ambient air to be drawn into the probe.

In the period 1400 to 1855 the Inlet Kiln (5) A & think wrong data showed an average SO_2 concentration of approx 130 ppm on an approximate hourly interval peaks of slightly over 200 ppm were recorded.

In the period 1400 to 1600 the Inlet Kiln 6 data showed an extreme cyclic motion with peaks in excess of 1000 ppm. From 1515 to 1545 the average SO_2 was approximately 1000 ppm. For 1600 to 1615 the avg SO_2 was approx 500 ppm. The sample line was disconnected from 1600 to 1900. From 1900 to 1930 the SO_2 was cyclic and averaged only 100 ppm.

[illegible] 1-28-78

Inlet Kiln 5 Dynasciences spanned 0-500 ppm
Morning readings invalid as water trap
frozen, The remaining continuous data for the day was
felt to be invalid as the concentration was
averaging only 10 ppm SO_2. Since the temp was
low and the wind was strong it was believed
that the unions connecting the various components
of the sample system leaked.

1-31-76 afternoon

0 - 1500 ppm range

Zero 2 div

Span 29.5 = 409 ppm

1L Stack Reading 50 div

1-31-76 0 - 500 ppm range

Zero

7-31-76

Zero 1 div = 0

Span 83 div = 409 ppm

BAG #	EPA ID	Reading
14 Run 9:00 to 9:15		1 Div = 0 ppm
15 Run 9: to		31.5 div
16 Run 9:00 to 915		84 div
17 Run 1000 to 1015		1 div
18 Run 1000 to		5 div - Invalid Bag leak
19 Run 1000 to		14
20 Run 1000		1

(Please print or type)

FUEL ANALYSIS REQUEST

SAMPLE NUMBER [SAMPLE IDENT. NO. S-75-005-130 THRU 152] SAMPLED BY:

Name WINTON KELLY MD-13
FIELD TEST SECTION, EMB

TO: EPA, NERC DAS (SSFAB)
RESEARCH TRIANGLE, NORTH CAROLINA 27711

PHONE: FTS
COMMERCIAL
DATE:

FROM: (Region)

No.

Principal Contact

Phone (FTS)

SAMPLE SOURCE:
BRAND NAME:

☐ Service Station

☐ Refinery

☐ Other

ADDRESS: MARTIN-MARIETTA CORP.
(where sample was collected)

CITY: WOODVILLE

COUNTY:

STATE: OHIO

SAMPLE OF (CHECK ONE)

MOTOR VEHICLE GASOLINE	AVIATION GASOLINE	DIESEL FUEL	JET FUEL	OTHER
Brand Name				
☐ No Lead	☐ 80-87 (red or colorless)	☐ Grade 1 D	☐ Jet A	☐ Diesel Fuel, Grade
☐ Low Lead	☐ 100-130 (green)	☐ Grade 2 D	☐ Jet A-1	☐ Fuel Oil, Grade
☐ Regular	☐ 115-145 (purple)	☐ Grade 4 D	☐ Jet B	☐ Liquid Propane Gas
☐ Premium	☐ Other		☐ Other	☐ Crankcase Oil SAE viscosity No.
☐ Other				☐ Coat Type
				☐ Other

DATE OF REQUEST 2/6/76 DATE ANALYSIS REQUESTED 2/6/76 DATE RECEIVED 2/10/76

(TO BE FILLED IN BY SSFAB)

EPA(DUR)246

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of lident. No. when requesting all analysis on that line

Laboratory No.	Hg	[illegible]	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					[illegible]

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Laboratory No.	% MOISTURE	% SULFUR								
5-25-[illegible]-130	1.59	3.60								
131	1.25	3.38								
132	1.11	2.84								
146	1.63	2.92								
147	1.65	3.80								
148	1.50	2.43								
149	1.20	3.01								
150	1.99	3.43								
151	1.08	3.05								
152	0.95	<0.01								
Analyst	J.A.	J.A.								
Method	D-271	Hi-ICMP								

Comments:

(Please print or type)

FUEL ANALYSIS REQUEST

SAMPLE NUMBER S-75-005-153 THRU 173
SAMPLE IDENT. NO.

SAMPLED BY:

Name WINTON KELLY MD-13
EMB

TO: EPA, NERC DAS (SSFAB)
RESEARCH TRIANGLE, NORTH CAROLINA 27711

PHONE: FTS
COMMERCIAL
DATE:

FROM: (Region)

No.

Principal Contact

Phone (FTS)

SAMPLE SOURCE:
BRAND NAME:

☐ Service Station

☐ Refinery

☐ Other

ADDRESS: MARTIN MARIETTA CORP.
(where sample was collected)

CITY: WOODVILLE

COUNTY:

STATE: OHIO

SAMPLE OF (CHECK ONE)

MOTOR VEHICLE GASOLINE	AVIATION GASOLINE	DIESEL FUEL	JET FUEL	OTHER
Brand Name				
☐ No Lead	☐ 80-87 (red or colorless)	☐ Grade 1 D	☐ Jet A	☐ Diesel Fuel, Grade
☐ Low Lead	☐ 100-130 (green)	☐ Grade 2 D	☐ Jet A-1	☐ Fuel Oil, Grade
☐ Regular	☐ 115-145 (purple)	☐ Grade 4 D	☐ Jet B	☐ Liquid Propane Gas
☐ Premium	☐ Other		☐ Other	☐ Crankcase Oil SAE viscosity No.
☐ Other				☐ Cool Type
				☐ Other

DATE OF REQUEST 2/6/76 DATE ANALYSIS REQUESTED 2/6/76 DATE RECEIVED 2/10/76

(TO BE FILLED IN BY SSFAB)

EPA(DUR)246

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Lab. No. when requesting all analysis on that line

Laboratory No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba				

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Laboratory No.	MOISTURE %	% SULFUR								
S-2 025-153	0.02	0.01								
154	0.07	<0.01								
155	0.01	<0.01								
156	0.05	<0.01								
157	0.13	<0.01								
158	0.07	<0.01								
166	1.23	1.90								
167	1.05	3.48								
168	1.20	3.34								
173	1.60	2.43								
Analyst	J.H.	J.A.								
Method	D-271	HI TEMP								

Comments:

(Please print or type)

FUEL ANALYSIS REQUEST

SAMPLE NUMBER [SAMPLE IDENT. NO. S-73-006:174 THRU 178] SAMPLED BY:

Name WINTON KELLY MD-13
EMB

TO: EPA, NERC DAS (SSFAB)
RESEARCH TRIANGLE, NORTH CAROLINA 27711

PHONE: FTS
COMMERCIAL
DATE:

FROM: (Region)

No.

Principal Contact

Phone (FTS)

SAMPLE SOURCE:
BRAND NAME:

☐ Service Station

☐ Refinery

☐ Other

ADDRESS: MARTIN MARIETTA CORP.
(where sample was collected)

CITY: WOODVILLE

COUNTY:

STATE: OHIO

SAMPLE OF (CHECK ONE)

MOTOR VEHICLE GASOLINE	AVIATION GASOLINE	DIESEL FUEL	JET FUEL	OTHER
Brand Name				
☐ No Lead	☐ 80-87 (red or colorless)	☐ Grade 1 D	☐ Jet A	☐ Diesel Fuel, Grade
☐ Low Lead	☐ 100-130 (green)	☐ Grade 2 D	☐ Jet A-1	☐ Fuel Oil, Grade
☐ Regular	☐ 115-145 (purple)	☐ Grade 4 D	☐ Jet B	☐ Liquid Propane Gas
☐ Premium	☐ Other		☐ Other	☐ Crankcase Oil SAE viscosity No.
☐ Other				☐ Cool Type
				☐ Other

DATE OF REQUEST 2/6/76 DATE ANALYSIS REQUESTED 2/6/76 DATE RECEIVED 2/10/76

(TO BE FILLED IN BY SSFAB)

EPA(DUR)246

REPORT OF ANALYSIS
TRACE ELEMENTS
ppm - for solid samples
ug/ml - for liquid samples

Mark (x) for specific analysis
Mark (x) in block to left of Ident. No. when requesting all analysis on that line

Laboratory No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba					

Analysis Method: 1-NAA, 2-SSMS, 3-OES, 4-AA, 5-ASV, 6-XRF, and 7-other

Comments:

Other Analysis - Use Table B to fill analysis requested (above each column)

Mark (x) for specific analysis requested

Laboratory No.	% CHLORIDE	% SULFUR								
5-75005-174	1.64	2.66								
175	1.51	3.41								
176	1.58	4.06								
177	1.45	2.64								
178	1.43	2.40								
Analyst	J.H	J.H								
Method	D-271	HI-TEMP								

Comments:

APPENDIX E. TEST PARTICIPANTS

Winton Kelly	Test Leader
K. C. Hustvedt	Process Engineer
J. E. McCarley	Engineer
John Davis	Engineer
Jason Burbank	Engineer
John Brown	Engineer
Mark Minday	Technician
Fred Biddy	Technician
Dennis Holzschuh	Engineer
Tom Logan	Engineer
Gary McAllister	Chemist