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

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

AP-42 Section 11.17
Reference 25
Report Sect. 4
Reference 22

EMISSION TESTING REPORT

EMB Project No. 76-LIM-11

Kilns 1 and 2
J. E. Baker Company
Millersville, Ohio

United States
Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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I. INTRODUCTION

Under the Clean Air Act of 1970, as amended, the Environmental Protection Agency is charged with the establishment of standards of 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 two lime kilns at the J. E. Baker Company, Millersville, Ohio are equipped with water scrubbers for air pollution control and were selected by OAQPS for an emission testing program. Kiln No. 1 is a rotary unit producing 350 tons per day of dolomitic lime. Kiln No. 2 is a rotary unit producing 280 tons per day of dead-burned dolomite. Each kiln is equipped with an identical Air Pollution Industries water scrubber, nominally rated at 15 inches water pressure drop. The fuel used in both kilns is high sulfur (2.96 - 3.53 percent) coal.

Samples were collected before and after each scrubber to determine total gas flowrates, gas composition, and sulfur dioxide emission rates. Testing was conducted by Emission Measurement Branch personnel during December 2-9, 1975.

II. SUMMARY OF RESULTS

A. Kiln No. 1

A total of twelve (12) attempts at determining SO_2 concentration at the inlet and/or outlet of the No. 1 Kiln were made. Due to accumulation of lime dust in the sampling train, Runs 1-6 at the inlet were unsuccessful. Runs 1-6 at the outlet were completed without difficulty on December 3-6. Modifications were made to the sampling probe configuration and Runs 7-12 at the No. 1 Kiln inlet were successfully completed on December 8. The results of testing are presented in Tables 1 and 2 for the inlet and outlet respectively. Samples were collected for moisture determination, gas composition and flowrate calculations along with the SO_2 measurements as indicated in the tabular summaries of results.

At the No. 1 Kiln outlet, the average SO_2 concentration as determined by EPA Method 6 was 5 ppmv on a dry basis. A Dynasciences SO_2 analyzer was operated continuously at the outlet and at all times the SO_2 concentration was less than detectable on the lowest instrument range (0-500 ppm) available.

The stack temperature at the measurement point in the stack ranged from 146 to 156°F, and averaged 153°F. The moisture content after the scrubber ranged from 17.4 to 26.1 percent, and in all tests was slightly less than saturation at the measured gas temperature.

TABLE 1. SUMMARY OF RESULTS, NO. 1 KILN INLET

Run No.	1	2	3	4	5	6	7	8	9	10	11	12	Average
Date	12/3	12/4	12/5	12/5	12/6	12/6	12/8	12/8	12/8	12/8	12/8	12/8	
Time	1830-1900	1420-1432	1813-1823	1935-1945	1345-1355	1715-1725	1015-1025	1038-1048	1055-1105	1538-1548	1557-1607	1630-1640	
% Moisture	5.94	4.40	5.40	5.4	-	5.9	-	-	-	-	-	-	5.65
M_d, vol. fract. dry gas	0.941	0.956	0.946	0.946	-	0.940	-	-	0.944	-	-	-	
% CO_2	-	13.0	14.5	-	18.5	19.0	-	-	19.7	-	-	-	
% O_2	-	13.5	14.0	-	12.7	11.7	-	-	10.0	-	-	-	
% N_2	-	73.5	71.5	-	68.8	69.3	-	-	70.3	-	-	-	
CO, ppmv, dry	-	-	500	100	120	240	-	-	110	-	-	-	
MW_d, dry gas mol. wt.	-	-	-	-	-	-	-	-	31.55	-	-	-	
MW, act. gas mol. wt.	-	-	-	-	-	-	-	-	30.8	-	-	-	
T_s, stack temp., ^oF	-	-	-	950	1000	1000	-	-	980	-	-	-	
**V_s, gas velocity, FPM	-	-	-	-	-	-	-	-	4760[1]	-	-	-	
**Q_s, std. gas flow, SCFMD	-	51650	60360	59870	58340	58150	-	-	42630[1]	-	-	-	57610
**Q_a, actual flow rate, ACFM	-	-	-	-	-	-	-	-	125380[1]	-	-	-	
ppmv SO_2 Method 6	-	362	141***	79***	4***	-	526	532	432	416	376	420	450
ppmv SO_2 instrument	-	200	-	-	-	-	610	425	378	383	390	425	
C_{SO_2}, SO_2 concentration, lb/DSCF							8.94×10^{-5}	9.04×10^{-5}	7.34×10^{-5}	7.07×10^{-5}	6.39×10^{-5}	7.14×10^{-5}	7.65×10^{-5}
M_{SO_2}, SO_2 mass rate, lb/hr.							309	312	254	244	221	247	264
*Q_s, std. gas flow rate, DSCFM	43050	43260	41310	44110	44140				42630[1]				43080
*Q_a, actual gas flow rate, ACFM									125380				
M_{SO_2}, SO_2 mass rate, lb/hr.							231	234	190	183	165	185	198

*Calculated from outlet rate, using modified procedures

**Calculated from outlet rate, using standard procedures

***Lime Dust Interference

[1]actual inlet measurement

TABLE 2. Summary of Results, Kiln 1 Outlet

Run Number	1	2	3	4	5	6	AVG
Date	12/3	12/4	12/5	12/5	12/6	12/6	
Time	1830-1900	1615-1645	1800-1830	1925-2007	1309-1339	1540-1707	down 1554-1650
% M, percent moisture	17.4	20.6	-	23.9	26.1	25.3	
M_d, Vol. fraction dry gas	0.826	0.794	-	0.761	0.734	0.748	
% CO_2	-	-	17.5	15.4	16.6	18.5	
% O_2	-	-	11.2	12.2	11.3	12.7	
% N_2	-	-	71.3	72.4	72.1	68.8	
CO, ppm	-	-	680	250	140	215	321
MW_d, dry gas molecular wt.	-	-	31.25	30.95	31.11	31.47	
MW, gas molecular wt.	-	-	27.92	27.86	27.53	28.10	
T_s, stack temperature, ^oF	-	146	151	156	155	155	153
**V_s, gas velocity, FPM	-	2390	2502	2468	2467	2413	
**Q_s, standard gas flow rate, DSCFM	-	51650	60360	59870	58340	58150	57610
**Q_a, actual flow rate, ACFM	-	89800	94000	92710	92680	90660	91970
ppm SO_2, Method 6	2.4	3.6	14.5	4.9	3.8	0.6	5.0
ppm SO_2, instrument	***ND	ND	ND	ND	ND	ND	-
C_{SO_2}, concentration, lb/DSCF	0.041×10^{-5}	0.065×10^{-5}	0.247×10^{-5}	0.083×10^{-5}	0.06×10^{-5}	0.01×10^{-5}	0.084×10^{-5}
M_{SO_2}, SO_2 mass rate, lb/hr	1.3	2.0	8.9	3.0	2.1	0.35	2.9
Q_s* standard flow rate, DSCFM	-	43050	43260	41310	44110	44140	43170
Q_a* actual flow rate, ACFM	-	62940	67630	64220	69880	69180	66770
M_{SO_2}*, SO_2 mass rate, lb/hr	-	1.68	6.41	2.06	1.59	0.26	2.4

**Calculated using standard procedures of EPA Method 2
**ND = not detectible
*Calculated using modified cyclonic flow calculation

In attempting to determine the stack gas velocity, it was observed that cyclonic flow as present in the stack. Even though straightening vanes were present in the bottom of the stack, cyclonic flow was either not completely straightened, or it was reforming after the vanes. Thus, velocity pressure measurements were made by two methods. First, measurements were made assuming flow parallel with the stack walls as per the standard techniques. Then, as a second procedure, the angle of flow was determined at each traverse point, and velocity pressure was measured at this angle. Modified calculations were performed to compute the vertical component of flow at each traverse point and these were averaged to arrive at an average velocity for flowrate calculation.

The results of both calculations are presented in Table 2. The stack gas flowrate at standard conditions as calculated using the unmodified technique ranged from 51,600 to 60,400 DSCFM, averaging 57,600 DSCFM. At actual conditions, the average flow was 92,000 ACFM. Using the modified measurement and calculation procedure, the standard flowrate ranged from 41,300 to 44,100 DSCFM, with an average of 43,200 DSCFM. The actual flowrate averaged 66,800 ACFM. Since there is a considerable difference between the results, a copy of the design fan curve for the scrubber system was obtained. From this source, the design valve for flowrate at a stack temperature of 160°F, gas density of 0.06 lb/CF, and an inlet static pressure of 22" H_2O, is 68,420 ACFM. These conditions were approximately prevailing during testing. Thus, the flowrate calculated using modified techniques to account for cyclonic flow is much closer to the design flowrate than the results obtained using standard procedures.

Based on flowrates calculated using standard procedures, the average SO_2 mass emission rate is 2.9 lb/hr. If the modified calculation is used, which is confirmed by the design values, the average SO_2 mass emission rate is reduced to 2.4 lb/hr.

At the No. 1 Kiln scrubber inlet, SO_2 Runs 1-6 were for the most part invalid. During this period, lime dust accumulations were observed in the sampling probe and connecting glassware. In all cases where accumulations were observed, the SO_2 results by Method 6 were either zero or unreasonably low as compared to results obtained with the continuous instrument. Modifications were made to the sample interface system and experimental tests were run until it was confirmed that an acceptable configuration had been obtained. This configuration was used during Runs 7-12. One set of moisture, gas composition, and velocity determination measurements were made at the inlet during the SO_2 measurements. While the inlet measurements were not made simultaneously with the outlet measurements, there were no process changes to significantly change the emissions. Also, a continuous instrument was used to monitor the outlet emissions. No detectable emissions were measured with the instrument during the manual inlet testing.

The SO_2 concentration at the inlet using Method 6 ranged from 376 to 532 ppmv, dry, with an average of 450 ppmv, dry. Instrumental results, as shown in Figure 1 were generally in good agreement, and were usually slightly less than the manual measurements. This could be due either to the fact that the instrument sample was not completely dry, or to the cyclic nature of the SO_2 concentration in the stream. The instrumental results presented are integrated averages of continuous records over the Method 6 test period, and as such, a slight difference in integration times could effect the averages.

The comparative results are adequate to confirm that there was no lime dust/SO_2 reaction in the Method 6 sampling train to invalidate the inlet samples.

The moisture content and temperature of the inlet stream for the measurements made on December 8 are consistant with those made earlier during Runs 1-6. This supports the assumption that there was no major change in the process flows during the inlet and outlet testing. The only change that occurred was a decrease in the amount of ambient air leaking into the system after the kiln. During the day on December 4, plant maintenance personnel were closing several areas of leakage around the kiln exhaust.

The effect of this can be seen in the change in gas composition as measured on December 5-8 as compared to those obtained on December 4-5. The increased CO_2 concentration indicates that less ambient air was drafted after the kiln, and more of the flow was coming through the kiln itself.

The original test plan included the calculation of inlet flows based on outlet flowrate and a mass balance based on gas composition. However, the gas composition results obtained were too inconsistant to allow a reliable calculation on that basis. A visual inspection was made of the system between the inlet and outlet sampling locations and no sources of leakage in or out were found. On that basis, it can be validly assumed that the inlet standard flow equaled the outlet standard flow. The only possible exception would be a slight CO_2 absorption in the scrubber, which is suggested by some of the gas composition data. This effect will be neglected for the purposes of this report.

The actual measurement of inlet velocity during runs 7-12 resulted in

TABLE 3. Summary of Results, Kiln 2 Inlet

Run Number	13-A	13-B	14-A	14-B	15-A	15-B	AVG
Date	12/9	12/9	12/9	12/9	12/9	12/9	
Time	0950-1000	1011-1021	1222-1232	1241-1251	1617-1629	1647-1658	
%M, percent moisture		7.24				9.57	8.4
M_d, vol. fraction dry gas		.928				.904	
% CO_2		19.5				18.1	
% O_2		8.9				10.2	
% N_2		71.6				71.7	
CO, ppm		100				45	72
MW_d, dry gas molecular wt.		31.48				31.30	
MW, gas molecular wt.		30.5				30.0	
T_s, stack temperature, ^oF		1565				~1500	~1530
**V_s, gas velocity, FPM							
**Q_s, standard gas flow rate, DSCFM	←		50450				→
**Q_a, actual flow rate, ACFM							
ppm SO_2, Method 6	317	359	462	547	131	267	347
ppm SO_2, instrument	340		-	-	-	252	
C_{SO_2}, concentration, lb/DSCF	5.39×10^{-5}	6.10×10^{-5}	7.85×10^{-5}	9.30×10^{-5}	2.23×10^{-5}	4.54×10^{-5}	5.9×10^{-5}
M_{SO_2}, SO_2 mass rate, lb/hr	163.2	184.6	237.6	281.5	67.5	137.4	178.6
Assuming in = out, cyclonic flow							
Q_s* standard flow DSCFM	←						37060
M_{SO_2}*, SO_2 mass rate, lb/hr	119.9	135.6	174.6	206.8	49.6	101.0	131.2

*Calculated using modified cyclonic flow calculation; assuming inlet flow = outlet flow

**Calculated using standard EPA Method 2 procedures; assuming inlet flow = outlet flow

TABLE 4. Summary of Results, Kiln 2 Outlet

Run Number	13-A	13-B	14-A	14-B	15-A	15-B	AVG
Date	12/9	12/9	12/9	12/9	12/9	12/9	
Time	0950-1000	1010-1020	1222-1232	1241-1251	1615-1625	1635-1645	
% M, percent moisture		27.3			26.1		26.7
M_d, Vol. fraction dry gas		0.727			0.739		-
% CO_2		18.5			16.3		-
% O_2		9.9			11.6		-
% N_2		71.6			72.1		-
CO, ppm		93			90		92
MW_d, dry gas molecular wt.		31.36			31.07		-
MW, gas molecular wt.		27.71			27.66		-
T_s, stack temperature, ^oF		159			160		160
**V_s, gas velocity, FPM		2194			2183		2188
**Q_s, standard gas flow rate, DSCFM		50,250			50,650		50,450
**Q_a, actual flow rate, ACFM		82,410			81,990		82,200
ppm SO_2, Method 6	21	17	19	12	10	12	15
ppm SO_2, instrument	25	22	69	62	18	28	
C_{SO_2}, concentration, lb/DSCF	0.36×10^{-5}	0.29×10^{-5}	0.32×10^{-5}	0.20×10^{-5}	0.17×10^{-5}	0.20×10^{-5}	0.26×10^{-5}
M_{SO_2}, SO_2 mass rate, lb/hr	10.9	8.8	9.7	6.1	5.4	6.1	7.8
Q_s* standard flow rate, DSCFM	←	35740	→	←	38380	→	37060
Q_a* actual flow rate, ACFM							
M_{SO_2}*, SO_2 mass rate, lb/hr	7.72	6.22	6.86	4.61	3.91	4.61	5.78

*Calculated using modified cyclonic flow calculation.

**Calculated using standard EPA Method 2 procedures.

a standard flowrate of 42,600 DSCFM. This result is in very good agreement with the average flow of 43,200 DSCFM calculated assuming cyclonic conditions, during Runs 1-6 at the outlet.

Using an average of 43,000 DSCFM as the average inlet flowrate, the inlet SO_2 mass loading to the scrubber would be 198 lb/hr. If the standard flowrate calculations are used, the average inlet flow would be 57,600 DSCFM, with an SO_2 mass loading to the scrubber of 264 lb/hr.

Combining the inlet and outlet mass rates result in SO_2 removal efficiencies for the scrubber of 98.8 percent on a cyclonic flow basis and 98.9 percent on an unmodified flow calculation basis. Based on concentration reduction (assuming equal flows) the SO_2 removal efficiency is 98.9 percent.

Carbon monoxide results at the inlet and outlet of the No. 1 Kiln averaged 214 ppmv and 321 ppmv, dry, respectively. In many cases, the outlet CO concentration was higher than the inlet concentration. There is no immediate explanation for this occurrance. The CO measurements were made using an NDIR analyzer, but no prescrubbing was used to remove CO_2 interference. For the particular instrument used and the CO_2 concentrations present in the sample streams, the reported CO concentrations are approximately 10-15 ppm higher than would have been obtained if CO_2 interference had been removed.

B. Kiln No. 2

A total of six (6) SO_2 runs were made at the inlet and outlet of the Kiln No. 2 scrubber. Two gas composition, moisture, and velocity determinations were made at each location. All testing was completed on December 9, with test designations being Runs 13 to 15. The results of testing are

presented in Tables 2 and 3.

At the scrubber inlet, the SO_2 concentration as measured by Method 6 ranged from 131 to 547 ppmv, dry, and averaged 347 ppmv. Instrumental comparisons were essentially identical for compared runs. Since the sample pump for the sample line to the instrument had malfunctioned prior to Run 13, the SO_2 comparisons were made from the bag samples obtained for gas composition analysis at the inlet. Thus only two samples were collected.

The SO_2 concentration at the outlet of the No. 2 Scrubber ranged from 10 to 21 ppmv dry basis, with an average of 15 ppmv. The instrumental comparisons for this location were somewhat higher than the manual results. This is due to the fact that the analyzer-recorder system used was artificially set to a more sensitive range after calibration on the 0-500 ppmv scale. This most likely caused some baseline drift that would have significantly affected the results in the measured range. With the instrument in the instrument in the 0-500 ppm range, the deflection from the baseline when sample was introduced was almost imperceptible.

The outlet stack from Scrubber 2 was also found to have cyclonic flow. Measurements were made in a manner used for Kiln 1 to arrive at two calculated results. Using standard calculations, the flowrate averaged 50,400 DSCFM at the outlet. Using modifications for cyclonic flow, the flowrate averaged 37,100 DSCFM. The design fan curve for the No. 2 system is presented for several settings of the inlet damper. Since the damper setting during testing is not known (only that it was considerably closed down) an exact design flow cannot be determined.

The system was also visually inspected and no leakage between the inlet and outlet ports was found, therefore it can be assumed that the inlet flow (standard basis) equals the outlet flow.

The inlet and outlet SO_2 mass rates are 179 and 7.8 lb/hr, respectively, using standard flow calculations. For cyclonic flow modifications the inlet and outlet SO_2 mass rates are 131 and 5.8 lb/hr respectively.

Since the inlet and outlet flows are assumed equal the SO_2 removal efficiency can be calculated on a concentration basis. This results in a removal efficiency of 95.7 percent.

Carbon monoxide concentrations before and after the No. 2 Kiln scrubber averaged 72 and 92 ppmv, dry, respectively. The reason for the outlet average being higher than the inlet average is due to a low result obtained during Run 15 at the inlet. It is not known whether this was an invalid sample, or whether the difference could have been caused by sample collection over a slightly different time period. The CO_2 interference discussed earlier is also applicable to these results.

Grab samples were collected of the coal, feed, product and scrubber water used during testing at each kiln. Representative coal samples were analyzed for moisture and sulfur content, while the other process samples were retained in storage. The moisture content of the coal ranged from 1 to 2.2%, and the sulfur content ranged from 2.7 to 3.7%. Complete results are presented in Table 5.

Table 5. SUMMARY OF COAL ANALYSIS RESULTS

Kiln	Run No.	Moisture, % (w/w)	Sulfur, % (w/w)
1	7-9	2.21	3.74
1	10-12	1.98	3.49
2	13	1.05	3.60
2	14	1.35	2.71
2	15	1.52	2.70

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 J. E. Baker Company has two rotary kilns at this location. Their Kiln No. 1 produces 340-350 tons per day of dolomitic lime for basic oxygen furnace use (BOFL) and Kiln No. 2 produces (about) 280 tons per day of dead burned dolomite (DBD) for use as a refractory material. Both kilns burn coal with a sulfur content of 2.5 to 4.0%. Both kilns have product coolers on the product end and settling chambers on the feed end for chip removal. From the settling chambers the hot gases pass to two new Air Pollution Industries venturi water scrubbers for particulate removal. The original pressure drop across the scrubbers was 10 IWC but with that drop the scrubbers did not meet the Ohio process weight particulate standard. The drop was

increased to 15 IWC by narrowing the venturi throat and the Ohio standard was met. Each scrubber is equipped with a recirculation tank and pump and about 1800 GPM are recirculated. About 300 GPM is removed from each recirculating system and pumped to a pond where the slurry solids settle out. The clarified water is returned from the pond to the recirculating system along with approximately 100 GPM of water required to make up evaporation losses. There has never been an overflow from the pond. From the scrubbers the gas passes to the induced draft fans and then to the atmosphere.

On December 5, 1975, the production capacity of the number 1 kiln was increased when plant personnel capped the stack that had been used before the scrubber was installed. Although the stack had been previously sealed there were still leaks into the system which allowed cool air to mix with the exhaust gases soon after they left the kiln. The capping of the old stack caused the induced draft (ID) fan to pull more air through the kiln so that (1) more coal could be fired to the kiln, increasing the capacity, (2) the hot gases were pulled farther along the kiln, giving better heat transfer, and (3) since more air was pulled through the kiln, more dust became entrained in the gas stream.

On the same day a feed elevator was shut down for repairs so there was no feed to the Number 1 kiln. The repairs were complete before 11:00 but the plant was not back up to capacity and stable enough for testing until 6:00. At this time the temperature in the kiln was still high but the operation was normal according to the operator so a test was performed. For the previous tests and all of the subsequent tests the plant was at normal operating conditions.

During testing the Number 2 kiln was producing 280 tons of dead burned dolomite per day. The kiln is fed a mixture of dolomitic limestone and

magnetite and the feed is dead burned at high temperatures (over 2000°F). The product is small pellets that are used for refractory material in steel furnaces.

The Number 2 kiln was making experimental products while the Number 1 kiln was being source tested. When the Number 2 kiln was tested, however, it was producing a regular product and the kiln was operating normally.

The operation of the kilns and scrubbers was monitored during the testing period and the process data that was collected is included in Appendix F. The process data collected during each test period is summarized in Table 6.

Table 6. SUMMARY OF KILN OPERATING DATA DURING SAMPLING

Test	Date	Stone Feedrate (TPH)	Coal Feedrate (TPH)	Natural Gas (SCFH)	Venturi Differential (IWC)
Inlet-Number 1 Kiln					
7	12/8/75	35.2	4.64	0	11.0
8	12/8/75	35.2	4.64	0	11.0
9	12/8/75	34.3	4.64	0	11.1
10	12/8/75	33.5	4.46	0	11.0
11	12/8/75	31.7	4.44	0	11.2
12	12/8/75	32.2	4.51	0	11.2
Outlet-Number 1 Kiln					
1	12/3/75	28.7	3.75	2465	12.5
2	12/4/75	28.3	3.74	2465	12.0
3	12/5/75	31.7	4.37	0	12.0
4	12/5/75	32.6	4.37	0	12.0
5	12/6/75	32.6	4.47	0	12.0
6	12/6/75	33.0	4.37	0	12.0
Inlet and Outlet-Number 2 Kiln					
13 A/B	12/9/75	24.1	2.98	0	12.0
14 A/B	12/9/75	22.5	2.98	0	12.2
15 A/B	12/9/75	23.5	2.89	0	12.0

IV. LOCATION OF SAMPLING POINTS

The sampling point at the No. 1 scrubber inlet was located in the 69½" I.D. duct from the kiln exhaust to the scrubber inlet. The nearest upstream and downstream disturbances (90^0 bends) were located 46' and 11', respectively, away from the sample location. Since this was a nearly ideal sample location, the crossection was divided into 12 equal areas according to Methods 1 and 2 (F.R. v 36 , n 247 December 23, 1971) for the purpose of a velocity traverse. Gaseous samples (SO_2, H_2O, integrated gas) were collected from a single point approximately 40" from the near duct wall.

The No. 1 scrubber outlet sampling point was located in the stack exhaust to the atmosphere. At the sampling plane, the stack inside diameter was 83 inches. The nearest upstream disturbance was a size reduction at the stack base, which was approximately 5 stack diameters away. The nearest downstream disturbance was the exhaust to atmosphere, which was 1½ stack diameters away. The stack crossection was divided into 32 equal areas as per Method 1 for velocity traverses. Gaseous samples were withdrawn from a single point approximately 36 inches into the stack.

The No. 2 scrubber inlet sampling point was located in the approximately 70 inch duct leading from the kiln exhaust to the scrubber. This port was approximately centered between upstream and downstream disturbances, which were approximately 1½ stack diameters away. A traverse point layout was not calculated since none was to be performed. Gaseous samples were collected

from a single point 30" into the duct.

The No. 2 scrubber outlet sampling point was located in an identical configuration to that of the No. 1 scrubber.

The stack crossection traverse point locations and gaseous sampling points were the same as for the No. 1 stack

Coal samples were collected prior to the coal mill for the kiln being tested. Feed samples were collected from the conveyor from storage to the kiln. Product samples were taken from the conveyor after the cooler. Exit scrubber water samples were collected from the scrubber discharge into the surge tank below the scrubber.

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. Additionally, a modified velocity procedure was used since there was evidence of cyclonic flow. In this procedure, the pitot tube is rotated until a zero pressure differential is obtained. The pitot tube is then rotated 90° and the angle and velocity pressure differential is recorded. The average gas velocity flowing parallel to the duct walls is calculated by computing the proper component of the angular velocities. This procedure has been reported to yield valid results in many types of cyclonic flow.[1]
2. Gas Composition: Oxygen and carbon dioxide concentrations were determined by collecting an integrated gas sample into a bag as per Method 3. Analysis was performed using a Fisher Model 29 Gas Partitioner. This instrument is a gas chromatograph equipped with a molecular sieve column for component separation and a thermal conductivity detector for component measurement.

[1] John L. Odom, "Testing Stacks with Cyclonic Flow", Stack Sampling News v3 n3 September 1975, Technomics Publishing Co., Westport Conn.

3. Moisture: The water vapor content of the gas streams was determined using 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 modifications:

   a. At the outlet locations, no glass wool filter was used in the sampling probe. Otherwise, the sampling train was unchanged.

   b. At the inlet locations, a probe specially designed to decrease particulate entrainment in the sample was used. This probe has shielded gas pickup ports to deflect particulates. No glass wool was used to filter out particulates.

For comparative purposes, a Dynasciences SO_2 analyzer was used. At the outlet locations, the sample was collected through a stainless steel probe and pumped to the analyzer through a ¼" ID heated teflon sample line with a teflon-coated diaphram pump. At the inlet locations, a similar sample line system was used early in the test program. However, the sample pump became inoperative after Run 12, and from that point onward, comparative SO_2 analysis were performed on the integrated bags used for CO_2 and O_2 determination.

5. Carbon Monoxide: CO was determined by using a Beckman Model 315A non-dispersive infrared analyzer, in a manner similar to that described in Method 10 (F.R. v39 n47 March 8, 1974). However, no ascarite scrubber was used to correct for CO_2 interference. In this case, the error attributable to CO_2 interference would be approximately + 10 to 15 ppm.

The process 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 CALCULATIONS

SO_2 EMISSION DATA

JE BAKER CO.; MILLERSVILLE, OHIO

KILN #1 OUTLET

Run No.	1	2	3	4	5	6
Date	12/3	12/4	12/5	12/5	12/6	12/6
mg SO_2	0.292	0.492	2.07	0538	.461	.077
T_m - Average Gas Meter Temperature, °F	43	(526) 66	(525) 65	(528) 68	(506) 46	(504) 44
P_b - Barometric Pressure, "Hg abs.	29.73	29.56	29.50	29.50	29.74	29.75
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	1.515	1.864	1.904	1.472	1.560	1.502
ppm SO_2	2.4	3.6	14.5	4.9	3.8	0.6
C_{SO_2}, lb/DSCF	0.041 $X10^{-5}$	0.065 $X10^{-5}$	0.247 $X10^{-5}$	1083 $X10^{-5}$	0.06 $X10^{-5}$	0.01 $X10^{-5}$
M_{SO_2}, lb/HR	1.3	2.0	8.9	3.0	~~2.2~~ 2.1	~~0.35~~ 0.35
@ ppm SO_2 by instrument	ND	ND	ND	ND	ND	ND

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

$$\text{mg } SO_2 = (V_t - V_{tb})\, N \left(\frac{V_{SOLN}}{V_a}\right) 3$$

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

50,000

ND = BELOW DETECTABLE, < 10 ppm

PLANT JE BAKER

ADDRESS MILLERSVILLE OHIO

SAMPLING LOCATION #1 Kiln outlet

Report No. 76 LIM 11

Run No.	1	2	3
Date		12/4	12/5
$\overline{\Delta H}$	1.8	1.8	1.8
$\overline{T}_m$ °F	62	78	72
$\overline{T}_m$ °R	522	538	532
P_b	29.73	29.56	29.55
V_m	21.61	22.394	21.452
$V_{m_{std}}$	21.89	21.89	21.20
V_w	97.6	119.8	46.9
$V_{w_{gas}}$	4.626	5.679	2.22
%M	17.45	20.60	* ~~25.1~~ 9.5?
M_d	0.826	0.794	* ~~.749~~ 0.905
%CO_2	—	8.2	17.5
%O_2	—	16.6	11.2
%CO	—	—	680 ppm
N_2		75.2	71.3
MW_d		29.98	31.25 ~~27.92~~
MW		27.51	* 27.92 ~~29.49~~
$\overline{T}_s$ °R	—	146 606	151 ~~151~~ 611
$\sqrt{\Delta P T_s}$ Factor	—	15.64	16.49
C_p	0.85 ~~0.85~~	0.85	0.85
P_s	29.73	29.58	29.57
V_s		2390	2502
Q_s		51650	60360
Q_a		89800	94000
** V_{sc}		1675.1	1799.8
Q_{sc}		43050	43261
Q_{ac}		62944	67630

	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		
×		
V_m		V_m
×		
x⇄y		
÷		$V_{m_{std}}$
	$V_{m_{std}}$	*
	↑	
0.0474		
↑		

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

	×	2nd, ..., nth set
	√	
	x⇄y	
	T_{s_2}	
	RCL (100)	
	+	
	↑	
	↑	
	+	
	↑	
	↑	
CLR	↑	
T_{s_1}	ΔP_2	
+	×	
T_{s_2}	√	
+	↑	
(etc)	↑	
	↑	
460	↑	
↑	+	
n	↑	
STO	↑	
×	↑	
+	n	
RCL (n)	STO	
÷	÷	$\overline{T}_s$ °R
√		
ΔP_1		
√		
↑		
ΔP_2		
√		
+		
(etc)		
×	↑	
RCL (n)	RCL (n)	
÷	÷	$\sqrt{\Delta P T_s}$ Factor
	$\sqrt{\Delta P T_s}$ Factor	*
	↑	
5128.8		
↑		
C_p		C_p
×		
×		
1		
↑		
P_s		P_s
√		
MW		
√		

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

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

A_s = 5411 in²

** V_{sc}, Q_{sc}, Q_{ac} : VALUES CALCULATED WITH CORRECTION FOR CYCLONIC FLOW

* ~~also~~ adjusted.

PLANT J E Baker

ADDRESS Millersville, Ohio

SAMPLING LOCATION Kiln 1 outlet

Report No. _____

Run No.	4	5	6
Date	12/5	12/6	12/6
ΔH	1.8	1.8	1.8
$\bar{T}_m$ °F	74	55	61
$\bar{T}_m$ °R	534	515	521
P_b	29.55 ~~29.74~~	29.74	29.75
V_m	20.756	20.153	22.029 ~~22.048~~
$V_{m_{std}}$	20.43	20.70	22.38
V_w	135.6	154.3	160.1 — *
$V_{w_{gas}}$	6.43	7.31	7.59*
%M	23.9	26.1	25.3*
M_d	0.761	0.734	0.748*
$\%CO_2$	15.4	16.6	18.5
$\%O_2$	12.2	11.3	12.7
%CO	250 ppm	140 ppm	215 ppm
N_2	72.4	72.1	68.8
MW_d	30.95	31.11	31.47
MW	27.86	27.53	28.10
$\bar{T}_s$ °R	(156) 616	(155) 615	(155) 615
$\sqrt{\Delta P \bar{T}_s}$ Factor	16.23	16.20	16.01
C_p	.85	.85	.85
P_s	29.51	29.77	29.77
V_s	2468	2467	2413
Q_s	59870	58540	58150
Q_a	92710	92680	90660
V_{sc}	1709.	1859.7	1841.0
Q_{sc}	41314	44113	44142
Q_{ac}	64217	69880	69177

* = adjusted by average

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

**. Velocity measured considering cyclonic flow ($V_{vertical}$) and resultant flow rates.

~~PRELIMINARY~~ VELOCITY TRAVERSE (#2)

+ Flow ~~cale~~ considering cyclonics

PLANT Baker
DATE 12/4/75
LOCATION Outlet (softburn)
STACK I.D. 6' 11"
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

	θ	Δp	cos θ	√Δp cos θ
TRAVERSE POINT NUMBER			VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	60	.45	.5	
2	0	.07	1.0	
3	45	.1	.707	
4	45	.18	.707	
5	60	.43	.5	
6	45	.45	.707	
7	30	.40	.866	
8	0	.45	1.0	
9	30	.51	.866	
10	30	.55	.866	
11	45	.57	.707	
12	30	.60	.866	
13	30	.50	.866	
14	30	.43	.866	
15	45	.52	.707	
16	45	.65	.707	
			~~2.52458 2278~~	
			7.869501608	
AVERAGE				

SCHEMATIC OF TRAVERSE POINT LAYOUT

	θ	Δp	cos θ	
TRAVERSE POINT NUMBER			VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	0	0	1.0	
2	60	.15	.5	
3	75	.15	.259	
4	75	.24	.259	
5	75	.31	.259	
6	60	.24	.5	
7	45	.13	.707	
8	0	.10	1.0	
9	30	.36	.866	
10	30	.45	.866	
11	30	.48	.866	
12	15	.57	.966	
13	30	.52	.866	
14	45	.54	.707	
15	15	.57	.966	
16	15	.50	.966	
			~~13.8919439~~	
			14.23686322	
AVERAGE			.44490	

EPA (Dur) 233
4/72

PRELIMINARY VELOCITY TRAVERSE (#3)

PLANT Baker
DATE 12/5
LOCATION
STACK I.D. 6' 11"
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

θ Δp Cos θ $\sqrt{\Delta p}$ Cos θ

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1 30 .43	.866	
2 45 .40	.707	
3 60 .44	.5	
4 45 .44	.707	
5 30 .50	.866	
6 45 .45	.707	
7 30 .44	.866	
8 15 .49	.966	
9 45 .40	.707	
10 60 .48	.5	
11 75 .59	.259	
12 45 .48	.707	
13 45 .45	.707	
14 30 .48	.866	
15 30 .46	.866	
16 15 .47	.966	
	total 7.959097661	
AVERAGE		

EPA (Dur) 233
4/72

SCHEMATIC OF TRAVERSE POINT LAYOUT

Cos θ

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
30 .29	.866	
45 .43	.707	
30 .40	.866	
30 .37	.866	
30 .33	.866	
45 .27	.707	
15 .14	.966	
0 .10	1.0	
45 .35	.707	
60 .46	.5	
45 .49	.707	
60 .51	.5	
45 .54	.707	
45 .52	.707	
30 .50	.866	
30 .48	.866	
	Total 15.35710989	
AVERAGE		.479909684

PRELIMINARY VELOCITY TRAVERSE

PLANT Baker
DATE 12/5 Run #4
LOCATION Outlet
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

	θ	ΔP	cos θ	√ΔP cos θ
TRAVERSE POINT NUMBER			VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	45	.38	.707	
2	30	.43	.866	
3	30	.41	.866	
4	30	.41	.866	
5	45	.42	.707	
6	45	.36	.707	
7	45	.37	.707	
8	60	.34	.5	
9	45	.40	.707	
10	45	.42	.707	
11	45	.51	.707	
12	60	.61	.5	
13	45	.42	.707	
14	30	.43	.866	
15	30	.50	.866	
16	15	.49	.966	
Total			7.832069555	
AVERAGE				

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER			VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	60	.48	.5	
2	75	.40	.259	
3	60	.37	.5	
4	75	.40	.259	
5	60	.32	.5	
6	30	.26	.866	
7	30	.20	.866	
8	0	.08	1.0	
9	45	.34	.707	
10	45	.41	.707	
11	45	.45	.707	
12	45	.45	.707	
13	30	.53	.866	
14	30	.55	.866	
15	30	.51	.866	
16	30	.45	.866	
	6.658275432			
total	~~[illegible]~~			
	14.49034499			
AVERAGE			.45282	

EPA (Dur) 233
4/72

~~PRELIMINARY~~ VELOCITY TRAVERSE

+ Flow rate calc.

PLANT Baker

DATE 12-6

LOCATION Outlet first of day (#5)

STACK I.D.

BAROMETRIC PRESSURE, in. Hg

STACK GAUGE PRESSURE, in. H_2O

OPERATORS

SCHEMATIC OF TRAVERSE POINT LAYOUT

	θ	ΔP	cos θ	$\sqrt{\Delta p}$ cos θ
	TRAVERSE POINT NUMBER		VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A	1	30 .42	.866	
	2	45 .46	.707	
	3	30 .45	.866	
	4	15 .42	.966	
	5	30 .39	.866	
	6	30 .37	.866	
	7	30 .33	.866	
	8	0 .27	1.0	
	9	60 .54	.5	
	10	60 .51	.5	
	11	60 .51	.5	
	12	45 .51	.707	
	13	30 .49	.866	
	14	30 .57	.866	
	15	30 .56	.866	
	16	30 .60	.866	
			8.497728047	
	AVERAGE			

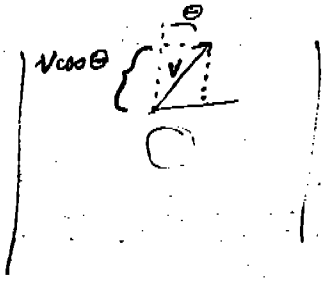
			cos θ	
	TRAVERSE POINT NUMBER		VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B-	1	45 .35	.707	
	2	45 .42	.707	
	3	45 .38	.707	
	4	30 .34	.866	
	5	30 .30	.866	
	6	0 .22	1.0	
	7	0 .15	1.0	
	8	0 .11	1.0	
	9	45 .35	.707	
	10	45 .39	.707	
	11	45 .44	.707	
	12	45 .47	.707	
	13	45 .53	.707	
	14	45 .50	.707	
	15	45 .49	.707	
	16	45 .42	.707	
			7.260740193	
			15.75846824	
	AVERAGE		.49245	

total

EPA (Dur) 233
4/72

~~PRELIMINARY VELOCITY TRAVERSE~~

Flow rate calc.



PLANT Baker

DATE 12-6 2nd of day #6

LOCATION Outlet

STACK I.D.

BAROMETRIC PRESSURE, in. Hg

STACK GAUGE PRESSURE, in. H_2O

OPERATORS

TRAVERSE POINT NUMBER	θ and angle Δp	cos θ	√Δp	√Δp cos θ
1	60	.34	.5	.2915
2	60	.46	.5	.6306
3	30	.42	.866	1.19
4	30	.38	.866	1.72
5	30	.35	.866	2.238
6	30	.28	.866	
7	60	.17	.5	2.902
8	30	.11	.866	
9	45	.45	.707	
10	60	.69	.5	
11	60	.60	.5	
12	45	.52	.707	
13	45	.74	.707	
14	30	.56	.866	
15	30	.57	.866	
16	15	.55	.966	
			total →	6.296087
				8.0182
				7.60287
AVERAGE				

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	cos θ	√Δp cos θ
B1	60 .35	.5
2	30 .39	.866
3	30 .35	.866
4	15 .35	.966
5	15 .26	.966
6	30 .22	.866
7	15 .15	.966
8	15 .16	.966
9	15 .32	.966
10	30 .42	.866
11	30 .43	.866
12	30 .45	.866
13	45 .53	.707
14	30 .47	.866
15	30 .46	.866
16	15 .42	.966
	total	8.1580138
AVERAGE	.49253	

EPA (Dur) 233
4/72

SO_2 EMISSION DATA

JE BAKER CO MILLERSVILLE OHIO

#1 KILN INLET

	1830-1900	1420-1432	1813-1823	1935-1945	1345-1355	1715-1725
Run No.	1	2	3	4	5	6
Date	12/3	12/4	12/5	12/5	12/6	12/6
mg SO_2	0	17.82	4.99	3.07	.154	.023
T_m - Average Gas Meter Temperature, °F	55 (55)	58 (518)	(526) 66	(537) 77	(521) 61	(514) 54
P_b - Parometric Pressure, "Hg abs.	29.73	29.56	29.50	29.50	29.74	29.74
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	1.462	0.647	0.473	0.513	0.508	0.678
ppm SO_2	0	362	141	79	4	0.4
C_{SO_2}, lb/DSCF	0	6.6 $\times 10^{-5}$	2.4 $\times 10^{-5}$	1.3 $\times 10^{-5}$	0.068 $\times 10^{-5}$	.007 $\times 10^{-5}$
M_{SO_2}, lb/hR	0					
ppm SO_2 by instrument		190				

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

DD 086.1

12/72
11/83

SO_2 EMISSION DATA

JE BAKER MILLERSVILLE OHIO

#1 KILN, EXPERIMENTAL TESTS 0950-1000 1208-1218

Run No.	X-1	X-2				
Date	12/3	12/3				
mg SO_2	~~13.54~~ 9.06	13.59				
T_m - Average Gas Meter Temperature, ^oF	48	53				
P_b - Barometric Pressure, "Hg abs.	29.58	29.58				
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	0.478	0.485				
ppm SO_2	244	365				
ppm SO_2 by instrument		~200				

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

SO_2 EMISSION DATA

JE Baker
Kiln 1 Inlet

	1015-1025	1038-1048	1055-1105	1538-1548	1557-1607	1630-1640
Run No.	7	8	9	10	11	12
Date	12/8	12/8	12/8	12/8	12/8	12/8
mg SO_2	24.50	23.27	16.51	17.74	15.59	17.13
T_m - Average Gas Meter Temperature, ^oF	49 509	54 514	58 518	55 515	58 518	62 522
P_b - Barometric Pressure, "Hg abs.	29.57	29.57	29.57	29.57	29.57	29.57
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	0.601	0.570	0.502	0.557	0.544	0.540
ppm SO_2	526	532	432	416	376	420
C_{SO_2} lb/DSCF	8.94×10^{-5}	9.04×10^{-5}	7.34×10^{-5}	7.07×10^{-5}	6.39×10^{-5}	7.14×10^{-5}
M_{SO_2} lb/hr	317.4	321.0	260.6	251.0	226.9	253.5
ppm SO_2 by instrument	~~~610 570~~~	425	378	383	390	425

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

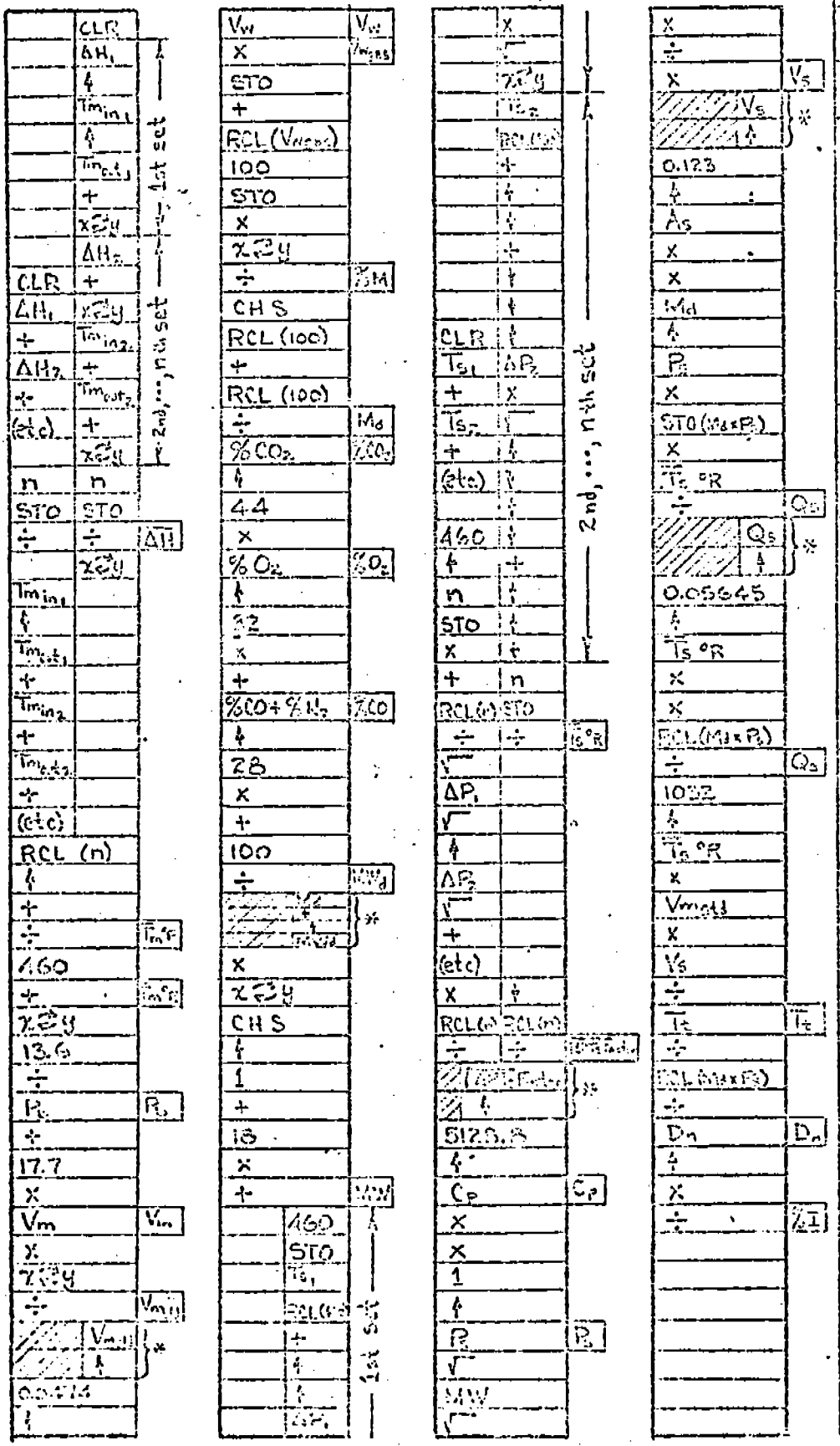
PLANT J.E BAKER CO

ADDRESS MILLERSVILLE OHIO

SAMPLING LOCATION Kiln #1 INLET

Report No. 76 LIM 11

Run No.	1	2	3
Date	12/3	12/4	12/5
$\overline{\Delta H}$	1.8	1.8	1.8
$\overline{T_m}$ °F	72	74	86
$\overline{T_m}$ °R	532	534	546
P_b	29.73	29.56	29.50
V_m	20.300	21.341	20.954
$V_{m_{std}}$	20.18	20.99	20.14
V_w	26.9	20.4	24.2
$V_{w_{gas}}$	1.275	0.967	1.15
%M	5.94	4.40	5.4
M_s	0.941	0.956	0.946
$\%CO_2$	—	13.0	14.5
$\%O_2$	—	13.5	14.0
%CO	—	—	500 ppm
MW_d			
MW			
$\overline{T_s}$ °R			
$\sqrt{\Delta P_s}$ Factor			
C_p			
P_s	~~29.73~~		
V_s			
Q_s		(32580) ?	
Q_d			
I			
~~D_n~~			
~~%I~~			



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

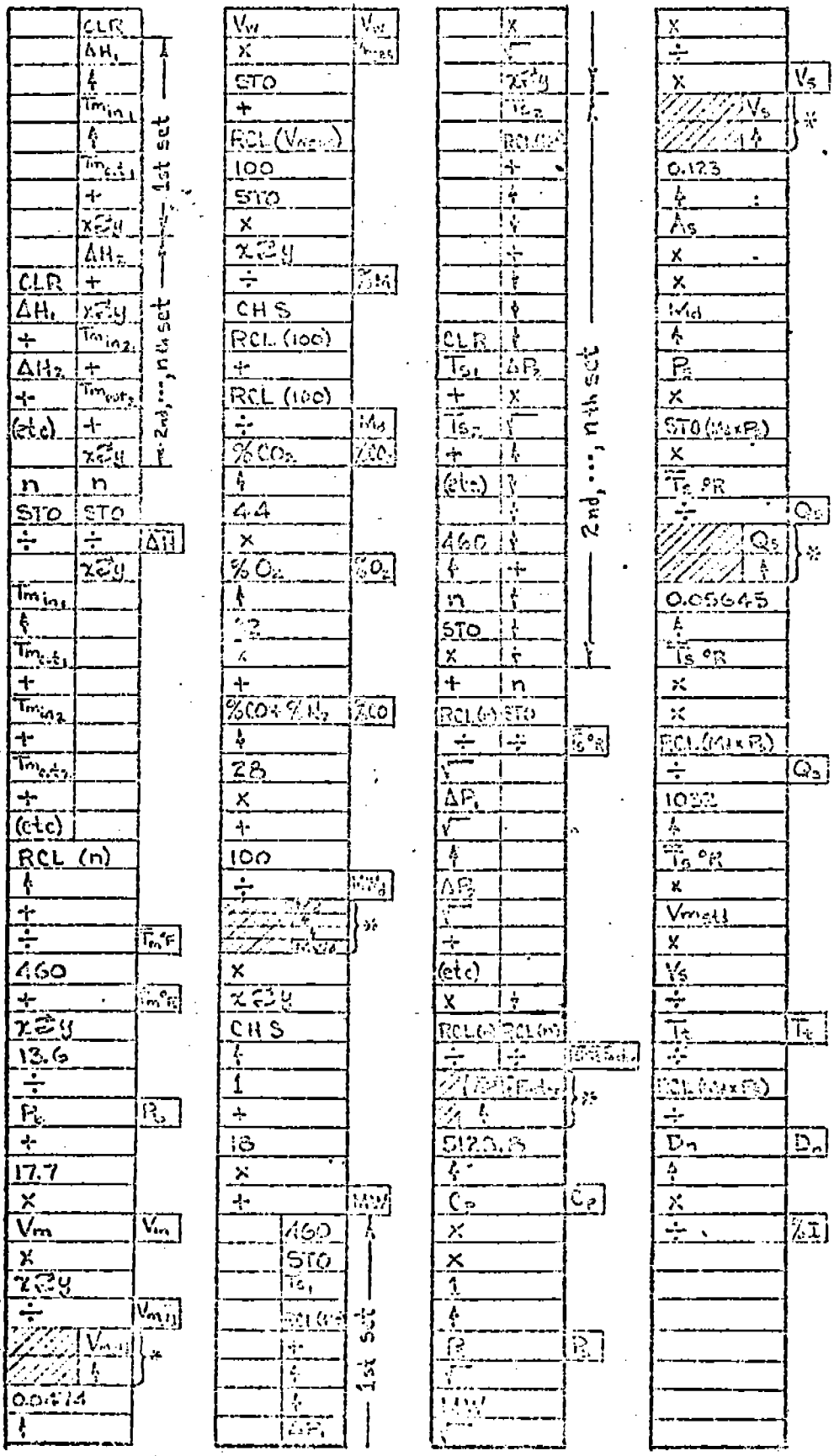
PLANT J.E. Baker

ADDRESS

SAMPLING LOCATION Kiln 1 Inlet

Report No.

Run No.	4	5	6
Date	12/5	12/6	12/6
$\overline{\Delta H}$	1.8	1.8	1.8
$\overline{T_m}$ °F	97	65	60
$\overline{T_m}$ °R	557	525	520
P_b	29.50	29.74	29.74
V_m	20.593	15.423 **	26.435 ~~35.5~~
$V_{m_{std}}$	19.56	15.54	26.89
V_w	23.5	19.6*	35.8
$V_{w_{gas}}$	1.11	0.93*	1.70
%M	5.4	5.6*	5.9
M_d	0.946	0.944*	0.940
$\%CO_2$	5.6	18.5	19.6
$\%O_2$	19.8	12.7	11.7
%CO	100 ppm	120 ppm	240 ppm
$\%N_2$			
MW_d			
MW			
$\overline{T_s}$ °R	950	1000	1000
$\sqrt{\Delta P \cdot T_s}$ Factor			
C_p			
P_s			
V_s			
Q_s			
Q_d			
I			
I_0			



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

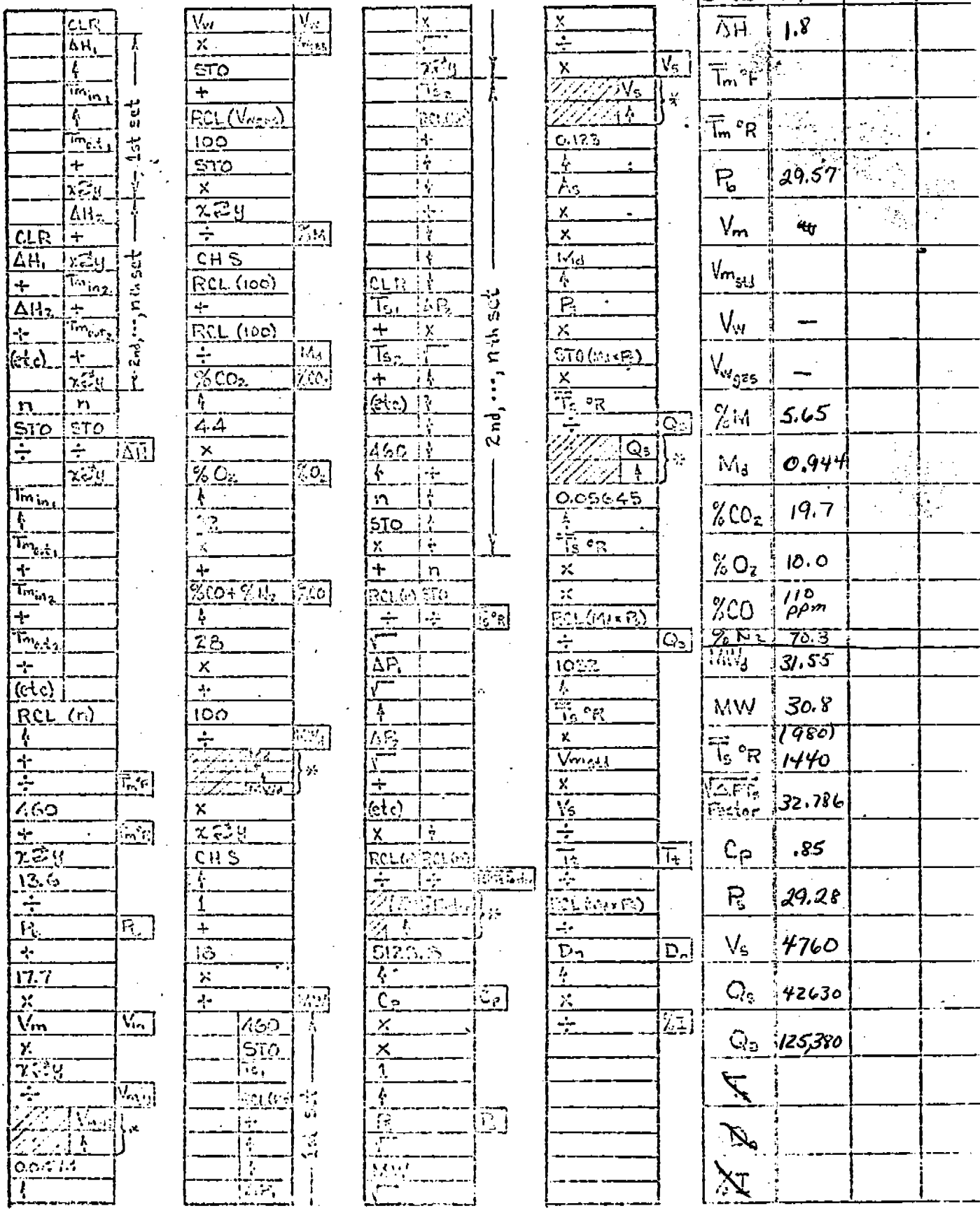
**estimated

PLANT J. E. Baker

ADDRESS

SAMPLING LOCATION Kiln 1 inlet

Report No.



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

A_s = 3794 in²

SO_2 EMISSION DATA

J E Baker
Dead Bern Dolomite
outlet

	0950-1000	1010-1020	1222-1232	1241-1251	1615-1625	1635-1645
Run No.	13-A	13-B	14-A	14-B	15-A	15-B
Date	12/9	12/9	12/9	12/9	12/9	12/9
mg SO_2	0.998	0.845	0.922	0.538	0.538	.384
T_m - Average Gas Meter Temperature, ^oF	54 514	56 516	55 515	59 519	62 522	63 523
P_b - Barometric Pressure, "Hg abs.	29.29	29.29	29.26	29.26	29.24	29.24
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	0.616	0.667	0.636	0.611	0.727	0.420
ppm SO_2	21	17	19	12	10	12
C_{SO_2}, lb/DSCF	0.36×10^{-5}	0.29×10^{-5}	0.32×10^{-5}	0.20×10^{-5}	0.17×10^{-5}	0.20×10^{-5}
M_{SO_2}, lb/HR	10.9	8.8	9.7	6.1	5.4	6.1
ppm SO_2 by instrument	25	22	69	62	18	28

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

PLANT J.E. Baker

ADDRESS

SAMPLING LOCATION Kiln 2 outlet

Report No.:

Run No.	#13	15
Date	12/9	12/9
$\overline{\Delta H}$	1.8	1.8
$\overline{T_m}$ °F	57	60
$\overline{T_m}$ °R	517	520
P_b	29.29	29.24
V_m	22.799	22.274
$V_{m_{std}}$	22.98	22.28
V_w	181.7	166.3 ~~160.3~~
$V_{w_{gas}}$	8.61	7.88
%M	27.3	26.1
M_d	0.727	0.739
$\%CO_2$	18.5	16.3
$\%O_2$	9.9	11.6
%CO	93ppm	90ppm
$\%N_2$	71.6	72.1
MW$_d$	31.36	31.07
MW	27.71	27.66
$\overline{T_s}$ °R	(739) 619	(160) 620
VAPS Factor	14.256	14.243
C_p	.85	.85
P_s	29.31	29.26
V_s	2194	2183
Q_s	50,250	50,650
Q_a	82,410	81,990
V_{sc}	1566	1660
Q_{sc}	35739	38376
Q_{Ac}	58831	62354

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

$A_s = 5410\ in^2$

V_{sc}, Q_{Ac}, Q_{sc} = CALCULATED WITH CONSIDERATION FOR CYCLONIC FLOW

PRELIMINARY VELOCITY TRAVERSE (#13)

+ cyclonic flow calculations

PLANT Baker
DATE 12/9
LOCATION Outlet : Deadburn Lime Kiln
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O
OPERATORS

SCHEMATIC OF TRAVERSE POINT LAYOUT

A

	TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
	⊖ Δp	cos⊖	√Δp cos⊖
1	30 .30	.866	
2	15 .35	.966	
3	60 .36	.5	
4	45 .39	.707	
5	45 .40	.707	
6	60 .39	.5	
7	45 .34	.707	
8	30 .30	.866	
9	0 .22	1.0	
10	15 .28	.966	
11	30 .34	.866	
12	30 .40	.866	
13	30 .38	.866	
14	45 .36	.707	
15	45 .39	.707	
16	45 .37	.707	
		7.295792973	
		~~6.87[illegible]~~	
AVERAGE			

B

	TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	45 .19	.707	
2	60 .15	.5	
3	75 .19	.259	
4	45 .35	.707	
5	45 .22	.707	
6	45 .18	.707	
7	30 .21	.866	
8	30 .19	.866	
9	30 .23	.866	
10	30 .28	.866	
11	30 .33	.866	
12	45 .34	.707	
13	45 .34	.707	
14	45 .35	.707	
15	45 .34	.707	
16	45 .33	.707	
		~~6.306968975~~	
		~~3.784467593~~	
		~~4.930745049~~	
		5.87107902	
AVERAGE		.41146	

EPA (Dur) 233
4/72

~~PRELIMINARY~~ VELOCITY TRAVERSE #15

calc. cyclones

PLANT Baker

DATE 12/9/75

LOCATION Outlet Deadburn Niles

STACK I.D. 6' 11"

BAROMETRIC PRESSURE, in. Hg

STACK GAUGE PRESSURE, in. H_2O

OPERATORS

SCHEMATIC OF TRAVERSE POINT LAYOUT

θ Δp cosθ

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1 30 .33	.866	
2 30 .35	.866	
3 45 .37	.707	
4 30 .39	.866	
5 30 .39	.866	
6 30 .38	.866	
7 30 .36	.866	
8 45 .28	.707	
9 0 .24	1.0	
10 15 .28	.966	
11 30 .31	.866	
12 30 .33	.866	
13 45 .37	.707	
14 45 .37	.707	
15 60 .34	.5	
16 45 .34	.707	
	7.493647224	
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1 60 .20	.5	
2 60 .29	.5	
3 45 .22	.707	
4 45 .18	.707	
5 15 .21	.966	
6 0 .16	1.0	
7 15 .21	.966	
8 0 .20	1.0	
9 15 .25	.966	
10 30 .28	.866	
11 30 .32	.866	
12 30 .36	.866	
13 45 .34	.707	
14 45 .33	.707	
15 45 .33	.707	
16 45 .31	.707	
	6.425897452	
	~~6.421876258~~	
	~~8.576562259~~	
AVERAGE	.43498	

EPA (Dur) 233
4/72

SO_2 EMISSION DATA

J.E. Baker
Dead Burn Dolomite
Inlet

	0950-1000	1011-1021	1222-1232	1241-1251	1617-1629	1647-1658
Run No.	13-A	13-B	14-A	14-B	15-A	15-B
Date	12/9	12/9	12/9	12/9	12/9	12/9
mg SO_2	15.28	12.21	18.82	21.81	2.07	4.22
T_m - Average Gas Meter Temperature, ^0F	45 505	49 509	50 510	53 513	50 510	54 514
P_b - Barometric Pressure, "Hg abs.	29.24	29.24	29.24	29.24	29.24	29.24
V_m - Volume of dry gas sampled @ meter conditions, $ft.^3$	0.625	0.444	0.533	0.524	0.206	0.208
ppm SO_2	317	359	462	547	131	267
C_{SO_2} lb/DSCF	5.39×10^{-5}	6.10×10^{-5}	7.85×10^{-5}	9.30×10^{-5}	2.23×10^{-5}	4.54×10^{-5}
M_{SO_2} lb/HR	163.2	184.6	237.6	281.5	67.5	137.4
ppm SO_2 by instrument	340		bad sample		-	252

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

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

PLANT J.E. Baker

ADDRESS

SAMPLING LOCATION Kiln 2 inlet

Report No.

Run No.	13	15
Date	12/9	12/9
$\overline{\Delta H}$	1.8	1.8
$\overline{T_m}$ °F	55	75
$\overline{T_m}$ °R	515	535
P_b	29.29	29.24
V_m	14.107	20.725
$V_{m_{std}}$	14.273	20.151
V_w	23.5	45
$V_{w_{gas}}$	1.114	2.133
%M	7.24	9.57
M_d	0.928	0.904
$\%CO_2$	19.5	18.1
$\%O_2$	8.9	10.2
%CO	100 ppm	45 ppm
$\%N_2$	71.6	71.7
MW_d	31.48	31.30
MW	30.5	30.0
$\overline{T_s}$ °R	2025 (1565)	~1500
$\sqrt{\Delta P}$ Factor		
C_p		
P_s		
V_s		
Q_s		
Q_a		
T_t		
D_n		
%I		

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

SS-63 FR1-0004

No. [redacted]

AIR POLLUTION IND.

For:

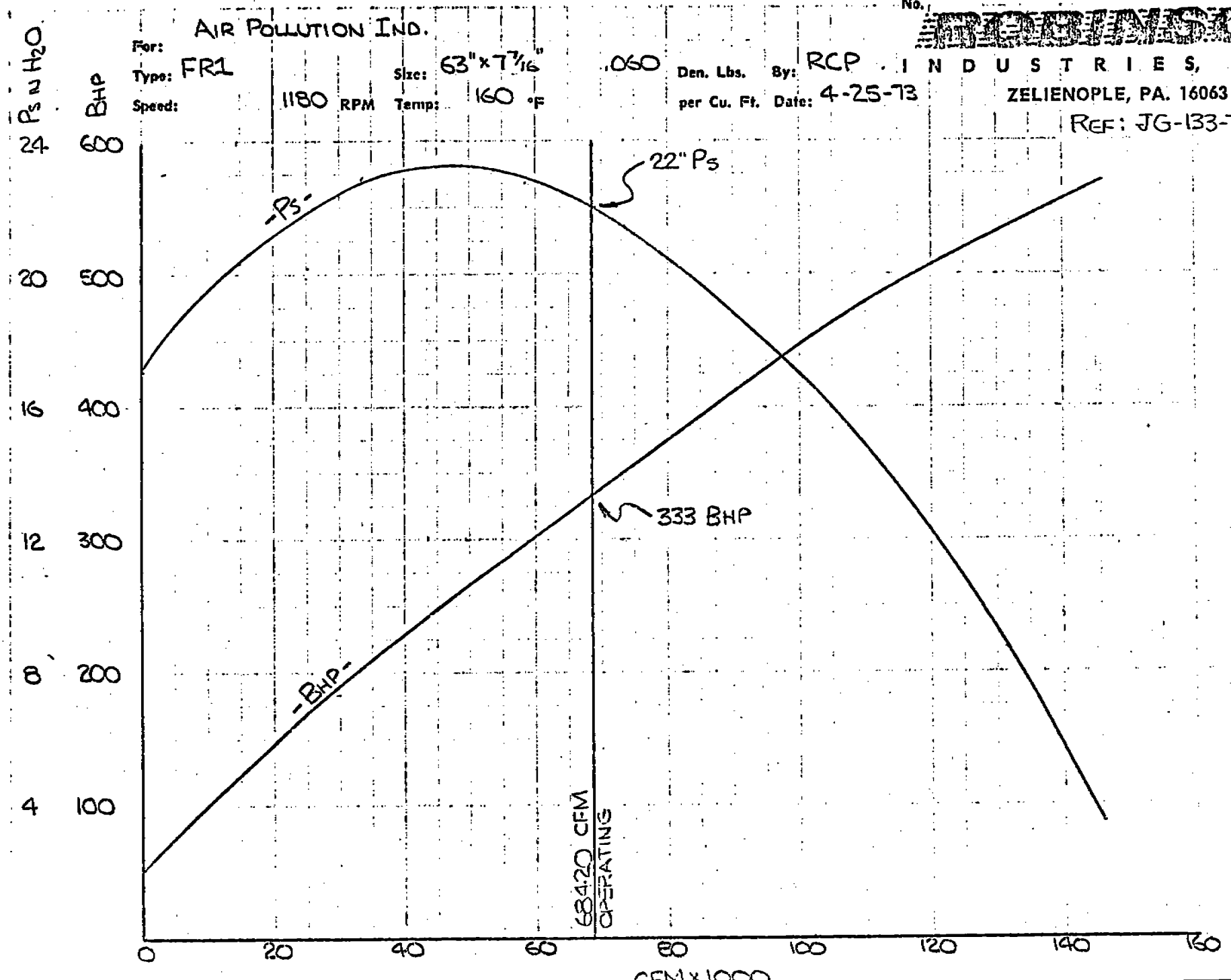
Type: FR1 Size: 63" x 7 7/16" .060 Den. Lbs. By: RCP

Speed: 1180 RPM Temp: 160 °F per Cu. Ft. Date: 4-25-73

INDUSTRIES, INC.

ZELIENOPLE, PA. 16063

REF: JG-133-73



#1 KILN I.D. FAN

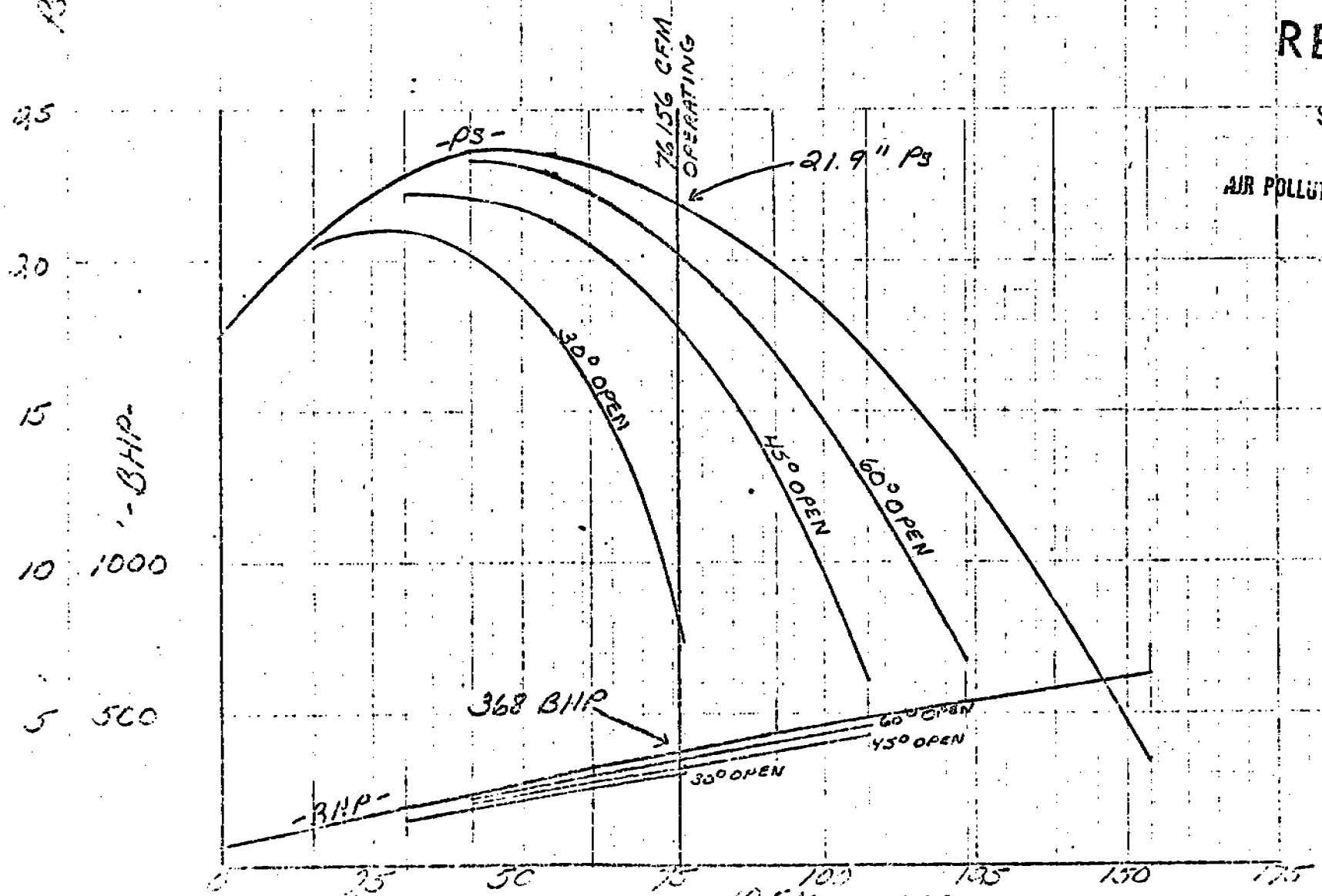
No. SS-64FR-0021

ROBINSON INDUSTRIES INC.
ZELIENOPLE, PA. 16063

For: AIR POLLUTION IND.
Type: FR Size: 64½ X 7½ .075 Den. Lbs. By: EZ
Speed: 1180 RPM Temp: 70 °F per Cu. Ft. Date: 9-8-75

NOTE: DAMPER CONDITIONS ARE APPROXIMATE REF: F.O# 53574

RECEIVED
SEP 10 1975
AIR POLLUTION INDUSTRIES, INC.



#2 Kiln I.D. Fan

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

Run 4

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

$$V_{m_{std}} = \frac{17.7 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)} = \frac{17.7 \times 20.756 \left(29.55 + \frac{1.8}{13.6}\right)}{(74 + 460)} = 20.43 \text{ DSCF}$$

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

$$V_{w_{gas}} = 0.0474 \times V_w = 0.0474 \times 135.6 = 6.43 \text{ SCF}$$

3. Percent moisture in stack gas

$$\%\ M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} = \frac{100 \times 6.43}{20.43 + 6.43} = 23.9\ \%$$

4. Mole fraction of dry gas

$$M_d = \frac{100 - \%\ M}{100} = \frac{100 - 23.9}{100} = 0.761$$

5. Molecular weight of dry stack gas

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

$$(15.4 \times \tfrac{44}{100}) + (12.2 \times \tfrac{32}{100}) + (72.4 \times \tfrac{25}{100}) = 30.95$$

6. Molecular weight of wet stack gas

$$MW = MW_d \times M_d + 18\,(1-M_d) = 30.95 \times 0.761 + 18\,(1 - 0.761) = 27.86$$

7a. Stack gas velocity at stack conditions, fpm

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

$$5128.8 \times 0.85 \times 16.23 \left(\frac{1}{29.51 \times 27.86}\right)^{1/2} = 2468 \text{ fpm}$$

7b. Stack gas velocity of stack conditions using cyclonic flow procedure; fpm

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

$$V_s = 5128.8 \times 0.85 \times 11.23 \left(\frac{1}{29.51 \times 27.86}\right)^{1/2} = 1709 \text{ fpm}$$

θ = angle of flow with respect to vertical plane.

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

$$Q_s = \frac{0.123 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)} = \frac{0.123 \times 2468 \times 5411 \times 0.761 \times 29.51}{(156 + 460)} = 59870 \text{ DSCFM}$$

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

$$Q_a = \frac{.05645 \times Q_s\,(T_s + 460)}{P_s \times M_d} = \frac{.05645 \times 59870\,(156 + 460)}{29.51 \times 0.761} = 92710 \text{ ACFM}$$

---

[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

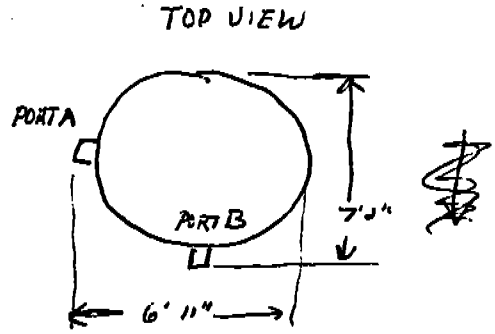
APPENDIX B

FIELD DATA

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

← N

PLANT J. E. BAKER MILLERSVILLE OH
DATE 10/3/75
SAMPLING LOCATION OUTLET, SOFTBURN LIME SCRUBBER (#)
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) ~~7'~~ 7'0½"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 1½"
STACK I.D., (DISTANCE A - DISTANCE B) 6'11"
NEAREST UPSTREAM DISTURBANCE >5 duct diameters
NEAREST DOWNSTREAM DISTURBANCE X 1½ duct diameters
CALCULATOR J. Burbicafe



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	1.6	83"	1.33 1 3/8	1½"	2 7/8
2	4.9		4.07 4		5½
3	8.5		7.06 7		8½
4	12.5		10.375 10 3/8		11 7/8
5	16.9		14.03 14		15½
6	22.0		18.26 18¼		19 3/4
7	28.3		23.49 23½		25
8	37.5		31.125 31⅛		32 5/8
9	62.5		51.875 51⅞		53 3/8
10	71.7		59.51 59½		61
11	78.0		64.75 64¾		66¼
12	83.1		68.97 69		70½
13	87.5		72.625 72⅝		74⅛
14	91.5		75.95 76		77½
15	95.1	↓	78.93 79	↓	80½
16	98.4		81.67 81⅝		83⅛
					use 8a on port 1

EPA (Dur) 232
4/72

①

①

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/3/75

Plant JE Baker

Location Outlet Softline J

Bar. Pressure 29.73 "Hg

Comments: its cold out.

Ambient Temp. 28 °F

Run No. One

Power Stat Setting 70

Filter Used: Yes ✓ No ___

Operator Burbank/Davis

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
6:30p	~~[illegible]~~ 221.985	4.0	42°
6:40	222.41	4.0	42°
6:45	222.75	4.0	44°
6:51	223.00	4.0	45°
7:00	223.50		

Comments:

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

①

FIELD MOISTURE DETERMINATION

Location Outlet N

Test Run 1 SOa

Date 12/3/75

Operator Burbank / Davis

Comments:

By Absorption:

Barometric Pressure 29.73

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
6:30p	229.99	ΔH = 1.8	57
6:42p	238.7	1.8	59
6:47	242.2	1.8	62
6:52	246.0	1.8	65
7:00	251.6	1.8	67

Tube No.	Weight, grams		
	Final	Initial	Difference
1st impinger	177	100	77
2nd impinger	114	100	14
Si Gel	206.6	200	6.6

(W) = weight of moisture collected = 97.6

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

% 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)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/4/75

J - Soft line

Plant J. E. Baker OH Location Outlet Run 2

Bar. Pressure 29.56 "Hg Comments:

Ambient Temp. 50 °F

Run No. 2

Power Stat Setting 70

Filter Used: Yes ___ No X (no glass wool used

Operator Burbank/Davis

STACK TEMP. 150°F

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
4:15PM	306.325	4	67°
4:25	306.98	4	65°
4:35	307.62	4	66°
4:45	308.189	4	66°

Comments: LEAK ✓ 0.0 CFM @ 10 CFH

15 MIN CHARCOAL FILTER PURGE AT END OF TEST

Impinger Bucket No. ___

Meter Box No. Gas #2

(2)

FIELD MOISTURE DETERMINATION

Location J E Baker's Outlet 5

Test #2

Date 12/4/75

Operator Davis / Burbank

Comments:
LEAK ✓
0.0 CFM @ 15" Hg VAC
METER BOX X6

By Absorption:

Barometric Pressure 29.56

STACK TEMP 150°F

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
4:15 PM	572.718	$\Delta H = 1.8$" H_2O	75°
4:25	580.5	1.8"	78°
4:35	587.5	1.8	79°
4:45	595.112	1.8" H_2O	80°
	22.394		78

Tube No.	Weight, grams		
	Final	Initial	Difference
SILICA GEL	217.4	206.6	10.8
3	0	0	0
2	118	100	18
1	191	100	91

(W) = weight of moisture collected = 119.8

$$\% \text{ Moisture by Volume} = \frac{100 \cdot W}{\left(\frac{375 \cdot P_b \cdot V_m}{T_m + 460}\right) + W} = \frac{100(119.8)}{\frac{(375)(29.56 + \frac{1.8}{13.6})(22.394)}{78 + 460} + 119.8}$$

% Moisture by Volume = 20.54 %

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 J E Baker

DATE 12/4/75

SAMPLING TIME (24-hr CLOCK) Run # 2

SAMPLING LOCATION Kiln #1 ~~inlet~~ outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD GAS PARTITIONER

AMBIENT TEMPERATURE _____

OPERATOR _____

COMMENTS:

RUN / GAS	1		2		3		AVERAGE ~~NET~~ VOLUME (percent of scale)	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	51		48.3		50		49.8	44/100	8.2%
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	65		63		67		65.0	32/100	16.6%
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0		0	28/100	0
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE # 1 (#2)

(2)

PLANT J E BAKER MILLERSVILLE OH.
DATE 12/3/75
LOCATION OUTLET, SOFTBURN LIME SCRUBBER(J)
STACK I.D. 6' 11"
BAROMETRIC PRESSURE, in. Hg ~~29.72~~ 29.56
STACK GAUGE PRESSURE, in. H_2O
OPERATORS Burbank / Davis

RUN # 2
(FIRST VELOCITY TRAVERSE)

A
B

SCHEMATIC OF TRAVERSE POINT LAYOUT

-90° (-90°)

90°

B north

A

static +.35 +.37

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O (90° from ↓)			STACK TEMPERATURE (T_s), °F
1	(90°) .41	-60°	.45	145
2	.07	0°		145
3	.13	-45°	.1	145
4	.45	-45	.18	150
5	.53	-60	.43	150
6	.44	-45	.45	150
7	.47	-30	.40	150
8	.45	0		150
9	.52	+30	.51	150
10	.65	+30	.55	150
11	.66	+45	.57	150
12	.66	+30	.60	150
13	.63	+30	.50	150
14	.67	+30	.43	150
15	.60	+45	.52	150
16	.61	+45	.65	150
AVERAGE				

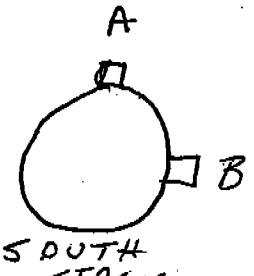
TRAVERSE POINT NUMBER	VELOCITY HEAD Δp_s (90° from ↓), in. H_2O			STACK TEMPERATURE (T_s), °F
1	~~.41~~	~~-60°~~	~~.45~~	115
2	.125	-60	.47	115
3	.15	-75	.15	145
4	.20	-75	.24	145
5	.19	-75	.31	145
6	.15	-60	.24	145
7	.13	-45	.13	145
8	.10	0		145
9	.40	+30	.36	150
10	.51	+30	.45	150
11	.60	+30	.48	150
12	.62	+15	.57	150
13	.69	+30	.52	150
14	.69	+45	.54	150
15	.61	+15	.57	150
16	.61	+15	.50	150
	50c.474			
AVERAGE				146

EPA (Dur) 233
4/72

Zero position fluctuates

PRELIMINARY VELOCITY TRAVERSE #2 (5)

PLANT J. E. BAKER
DATE 12/5/75
LOCATION MILLERSVILLE, OHIO
STACK I.D. 6' 11"
BAROMETRIC PRESSURE, in. Hg 29.55
STACK GAUGE PRESSURE, in. H_2O .38(A) .25(B)
OPERATORS DAVIS, BURBANIC
TIME OF RUN 9:55 - 11:10 AM



SCHEMATIC OF TRAVERSE POINT LAYOUT

1

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A & 2	.41 -30 .43	145
1	.40 -45 .40	145
3	.47 -60 .44	145
4	.48 -45 .44	145
5	.52 -30 .50	145
6	.50 -45 .45	150
7	.55 -30 .44	150
8	.47 -15 .49	150
9	.51 +45 .40	150
10	.62 +60 .48	150
11	.58 +75 .59	150
12	.64 +45 .48	150
13	.66 +45 .45	150
14	.68 +30 .48	150
15	.67 +30 .46	150
16	.70 +15 .47	150
AVERAGE		

+10" 90°

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	~~.35~~ -30 .29	145
2	.29 -45 .43	145
3	.29 -30 .40	150
4	.28 -30 .37	150
5	.28 -30 .33	150
6	.21 -45 .27	150
7	.16 -15 .14	155
8	.10 0 .10	155
9	.36 +45 .35	155
10	.50 +60 .46	155
11	.58 +45 .49	160
12	.62 +60 .51	160
13	.65 +45 .54	160
14	.66 +45 .52	160
15	.65 +~~45~~ 30 .50	160
16	.61 +30 .48	160
	527.691	
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/5/75

Plant J. E. BAKER

Location SCRUBBER SOUTH OUTLET

Bar. Pressure 29.50 "Hg

Stack Temperature 150 °F

Ambient Temp. 50 °F

Stack Dimensions DIA. 6'11"

Run No. 3

LEAK ✓ 0.0 CFM

Power Stat Setting 80

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
6:00PM	313.443	4	62° F
6:10	314.0	4	62°
6:20	314.7	4	66°
6:30	315.347	4	69°

_____ 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)

FIELD MOISTURE DETERMINATION

Location SOUTH ~~HEATER~~ SCRUBBER OUTLET

Test RUN #3

Date 12/5/75

Operator DAVIS, BURBANK

Comments:

LEAK ✓

0.0 CFM @ 15" Hg VAC

By Absorption:

Barometric Pressure 29.50

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
6:00 PM	605.762	$\Delta H = 1.8$ "H_2O	64°F
≈6:10 PM	613.4	1.8	69°
6:20 PM	620.7	1.8	76°
6:30 PM	627.214	1.8	78°

Tube No.	Weight, grams		
	Final	Initial	Difference
1	271	100	71
2	67	100	-33
3	0	0	0
Silica Gel	208.9	200	8.9

(W) = weight of moisture collected = _____

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

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/5/75

SAMPLING TIME (24-hr CLOCK) Run 3

SAMPLING LOCATION outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	64 x44		65.4 x44		63 x44		64.1	44/100	17.5%
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	44		44		43		43.7	32/100	11.2%
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	⊕		6		6.5		6.2 ~~+2~~	28/100	680 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/5/75

Plant J.E. BAKER

Location SOUTH SCRUBBER STACK

Bar. Pressure 29.50 "Hg

Stack Temperature 150 °F

Ambient Temp. 50 °F

Stack Dimensions 6'11"

Run No. #4

LEAK ✓ 0.0 CFM @

Power Stat Setting 47

POWER OUT FROM 7:40 ⇒ 7:55 & 8:07

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
7:25 PM	315.372	4	67°F
7:35	315.96	4	68°
7:55	316.2	4	68
8:07	316.844	4	68

___ 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)

FIELD MOISTURE DETERMINATION

Location SOUTH SCRUBBER STACK Comments:

Test RUN #4

Date 12/5/75

Operator DAVIS, BURBANK

LEAK ✓
0.0 CFM @ 15" Hg

POWER OUT FROM
7:40 → 7:55
& 8:07

By Absorption:

Barometric Pressure _____

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
7:25 PM	626.210	$\Delta H = 1.8$" H_2O	69°F
7:35	636.4	1.8	76°
7:55	639.8	1.8	77°
8:07	648.966	1.8	72°

Tube No.	Weight, grams		
	Final	Initial	Difference
1	259	100	159
2	68	100	-32
3	0	0	0
Sil Gel	208.6	200	8.6

(W) = weight of moisture collected = _____

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

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/5/75

SAMPLING TIME (24-hr CLOCK) Run 4

SAMPLING LOCATION outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

AMBIENT TEMPERATURE _____

OPERATOR _____

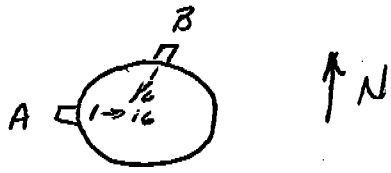
COMMENTS:

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	56. x44		57. x44		55.7 x44		56.2 x44	44/100	15.4 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	50		50		49.2		49.7	32/100	12.2 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	2.5		2.4		2.5		2.5	28/100	250 ppm
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE #4

PLANT J.E. BAKER
DATE 12/5/75
LOCATION SOUTH SCRUBBER OUTLET
STACK I.D. 6'11"
BAROMETRIC PRESSURE, in. Hg 29.50
STACK GAUGE PRESSURE, in. H_2O +.23 ; +11, +23
OPERATORS DAVIS, BURBANK



Δ = ANGLE FROM HORIZONTAL TO GET 0.0" θ.

SCHEMATIC OF TRAVERSE POINT LAYOUT

⊥ & 90°

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.43 -45 .38	150
2	.39 -30 .43	150
3	.45 -30 .41	155
4	.49 -30 .41	155
5	.48 -45 .42	155
6	.44 -45 .36	155
7	.45 -45 .37	155
8	.24 -60 .34	155
9	.51 +45 .40	155
10	.56 +45 .42	160
11	.49 +45 .51	160
12	.55 +60 .61	160
13	.59 +45 .42	160
14	.53 +30 .43	155
15	.52 +30 .50	155
16	.55 +15 .49	155
AVERAGE		

⊥ & 90°

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1 .35	-60 .48	155
2	.29 -75 .46	155
3	.32 -60 .37	155
4	.26 -75 .40	155
5	.29 -60 .32	155
6	.24 -30 .26	155
7	.15 -30 .20	155
8	0.08	155
9	.37 +45 .34	155
10	.50 +45 .41	155
11	.55 +45 .45	155
12	.57 +45 .45	155
13	.61 +30 .53	155
14	.64 +30 .55	155
15	.65 +30 .51	160
16	.62 +30 .45	160
	20.92	
	avg $\sqrt{\Delta p}$ = .654	156
AVERAGE		

EPA (Dur) 233
4/72

PRELIMINARY VELOCITY TRAVERSE

FIRST OF DAY

PLANT J.E. BAKER
DATE 12/6/75
LOCATION SOUTH SCRUBBER OUTLET
STACK I.D. 8'4"
BAROMETRIC PRESSURE, in. Hg 29.74
STACK GAUGE PRESSURE, in. H_2O .35
OPERATORS DAVIS, BURBANK

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.25 -30 .42	
2	.42 -45 .46	
3	.48 -30 .45	
4	.48 -15 .42	
5	.46 -30 .39	
6	.41 -30 .37	155
7	.35 -30 .33	
8	.27 0 .27	
9	.49 +60 .54	
10	.61 +60 .51	
11	.65 +60 .51	
12	.71 +45 .51	
13	.73 +30 .49	
14	.67 +30 .57	
15	.62 +30 .56	
16	.58 +30 .60	
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B1	.21 -45 .35	
B2	.29 -45 .42	
B3	.30 -45 .38	
B4	.28 -30 .34	
B5	.26 -30 .30	
B6	.22 0 .22	
B7	.15 0 .15	
B8	.11 0 .11	155
B9	.38 +45 .35	
B10	.45 +45 .39	
B11	.43 +45 .44	
B12	.58 +45 .47	
B13	.60 +45 .53	
B14	.58 +45 .50	
B15	.64 +45 .49	
B16	.59 +45 .42	
	20.898	155
	$\sqrt{\ }$ = .653	
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2 (#5)

Date 12/6/75

Plant J. E. BAKER

Location SOUTH SCRUBBER OUTLET

Bar. Pressure 29.74 "Hg

Ambient Temp. 34 °F

Run No. FIRST OF THE DAY

Power Stat Setting 48

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

Comments:
LEAK ✓ 0.0 CFM
POWER OFF x 2 MIN.

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
1:09 PM	318.868 ~~395~~	4	42
1:19 PM	319.4	4	44
1:29 PM	319.9	4	48
1:39	320.428	4	48

Comments:

Impinger Bucket No. ___

Meter Box No. ___

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J. E. BAKER

Test SOUTH BURNER OUTLET

Date 12/6/75 RUN: FIRST OF DAY (#5)

Operator BURBANK, DAVIS

Comments:

LEAK ✓

0.0 CFM @ 15" Hg

FIRST TEST OF THE DAY

POWER OFF ≈ 2 MIN

By Absorption:

Barometric Pressure 29.74

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
1:00 PM	658.697	$\Delta H = 1.8''$ H_2O	46°F
1:12 PM	665.5	1.8	50
1:22 PM	675.0	1.8	59
1:32	678.850	1.8	64

Tube No.	Weight, grams		
	Final	Initial	Difference
1	~~329~~ 235	100	~~229~~ 135
2	~~38~~ 113	100	~~62~~ 13
3	± 0	0	± 0
Si Gel	~~211.7~~ 206.3	200	~~11.7~~ 6.3

(W) = weight of moisture collected = 154.3

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

~~Note: train used for this run was used for Run~~

% 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 J.E. Baker

DATE 12/6/75

SAMPLING TIME (24-hr CLOCK) Run 5

SAMPLING LOCATION outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 - GAS PARTITIONAL CO - IR

AMBIENT TEMPERATURE _____

OPERATOR _____

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	60. x44		60.5 x44		62.3		60.9	44/100	16.6 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	45		45.		43.5		44.5	32/100	11.3 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	34		34		34		34	28/100	140 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/6/75

Plant J.E. BAKER

Location SOUTH SCRUBBER OUTLET

Bar. Pressure 29.75 "Hg

Comments: LEAK ✓ 0.0 CFM

Ambient Temp. 28 °F

Run No. 6

Power Stat Setting _____

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
3:40 PM	322.814	4	43°F
3:50	323.2	4	43
3:54	323.294	2	44
2	STOPPED RUN DUE TO PUMP FAILURE		
4:50	252.208	4	44
5:00	252.9	4	46
5:07	~~253.290~~	4	44

1ST PUMP

RESUME W/ NEW GAS PUMP #4

Comments:

0.48
1.022
1.502

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J.E. BAKER SOUTH SCRUBBER OUTLET

Test #6

Date 12/6/75

Operator DAVIS, BURBANK

Comments: LEAK ✓ 0.0 CFM (Ins. [illegible])

By Absorption:

Barometric Pressure 29.75

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
3:40 PM	732.516	$\Delta H = 1.8'' H_2O$	67°F
3:50	739.7	1.8	69°F
4:01	747.390	1.8	70°F
4:59	~~778.673~~ 779.006	1.8	48°F
5:09	786.161	1.8	49°F

STOPPED

RESUME

Tube No.	Weight, grams		
	Final	Initial	Difference
1	329	100	229
2	38	100	-62
3	0	0	1
Si Gel	211.7	200	11.7

(W) = weight of moisture collected = 179.7

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

% Moisture by Volume = _____

Note: this train was used for Runs @ inlet + was mistakenly used befor it was cleaned. Run invalid.

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 J.E. Baker

DATE 12/6/75

SAMPLING TIME (24-hr CLOCK) Run 6

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 – Gas Partitioner CO – IR

AMBIENT TEMPERATURE _____

OPERATOR _____

COMMENTS:

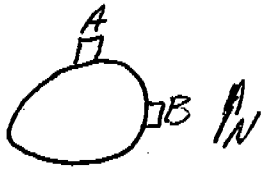
RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	70.2 x44		44.7 x44		66. x44		67.6	44/100	18.5 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	51. x44		50. x44		49. x44		50.	32/100	12.7 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	48		48		48		48	28/100	215 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

PRELIMINARY VELOCITY TRAVERSE

SECOND FOR DAY

PLANT J.E. BAKER
DATE 12/6/15
LOCATION SOUTH SCRUBBER OUTLET
STACK I.D. 60"
BAROMETRIC PRESSURE, in. Hg 29.75
STACK GAUGE PRESSURE, in. H_2O -.25
OPERATORS DAVIS, BURBANK



SCHEMATIC OF TRAVERSE POINT LAYOUT

± 2 90

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.36 -60 .34	
2	.41 -60 .46	
3	.43 -30 .42	
4	.44 -30 .38	
5	.43 -30 .35	
6	.36 -30 .28	155
7	.27 -60 .17	
8	.19 -30 .11	
9	.48 +45 .45	
10	.63 +60 .69	
11	.66 +60 .60	
12	.70 +45 .52	
13	.66 +45 .74	
14	.71 +30 .56	158
15	.64 +30 .57	
16	.63 +15 .55	158
AVERAGE		

1 ± 90

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B1	.13 -60 .39	155
2	.38 -30 .39	
3	.37 -30 .35	
4	.36 -15 .35	
5	.43 -15 .26	
6	.23 -30 .22	
7	.19 -15 .15	
8	.14 +15 .16	155
9	.33 +15 .32	
10	.42 +30 .42	
11	.22 +30 .43	
12	.56 +30 .45	
13	.50 +45 .53	
14	.58 +30 .47	
15	.56 +30 .46	
16	.52 +15 .42	160
	20.664	
	$\bar{T}$ = .646	155
AVERAGE		

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-3-75

Plant J E BAKER

Location "I"

Bar. Pressure 29.73 "Hg

Comments:

Ambient Temp. 28 °F

Run No. I-1

Power Stat Setting N.A.

Filter Used: Yes ___ No X

Operator Harrison / Shulby

Leak V'd @ 6 DSCFH read '0'

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
18:30 0	181.572	~~.075~~ (4DSCFH	52 ~~64~~ ~~60~~
18:35	181.83	4 DSCFH	53
18:40	182.07	4	54
18:45	182.325	4	56
18:50	182.544	4	57
18:55	182.82	4	57
Final → 19:00	~~18~~ 183.034		

Comments: Purged impingers for 15 min @ 4 DSCFH (Air thru charcoal filter)

Impinger Bucket No. ___

Meter Box No. Gas Train #1

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location BAKER Pt. 'I'

Test T-1

Date 12-3-75

Operator Harrison/Shulby

By Absorption:

Barometric Pressure 29.73

Comments:

Leak 0.00 cfm @ 15" Hg. (from front of impingers not probe.)

	Clock Time	Meter (Ft^3)	Flow Meter Setting (CFM)	Meter Temperature, Tm
18:30	~~8:00~~ 0	989.320	0.75	64 / 60
18:35	~~35~~ 5	992.28	0.75	73 / 60
18:40	10	996.23	0.75	80 / 60
18:45	15	999.69	0.75	84 / 61
18:50	20	1003.14	0.75	90 / 63
18:55	25	1006.63	0.75	94 64
Final 16:00	30	~~[illegible]~~ 1009.620		94 / 64
				72.2 Avg

20.300 net

Tube No.	Weight, grams		
	Final	Initial	Difference
Imp 1	096.0	100.0	-4.0
Imp 2	119.0	100.0	+19.0
Imp 3	0.0	0.0	0.0
Silka Gel	211.9	200.0	11.9

215.0

229.2
17.3
11

(W) = weight of moisture collected = 27 g

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

% Moisture by Volume = 5.97

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

(1)

GAS SAMPLING FIELD DATA

Material Sampled for SO$_2$

Date 12-4-73

Plant J E Baker Location "I"

Bar. Pressure 24.59 "Hg Comments: Pitot ok.

Ambient Temp. 32° °F

Run No. ~~2~~ Experimental #1

Power Stat Setting _____

Filter Used: Yes ___ No X

Operator Harris / Shubey

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
1350 0	183.863	4.0	48
5	184.161	4.0	48
10	184.341	4.0	49

Comments: Purged impinger train with 'clean' air (thru charcoal) for 15 min. @ 4 DSCFH

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO2

Date 12-04-75

Plant E.C. Baker Location I

Bar. Pressure 29.58 "Hg Comments:

Ambient Temp. 34 °F

Run No. ~~I-3~~ Experimental #2

Power Stat Setting na

Filter Used: Yes ___ No X

Operator Harrison / Shalby

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
1208	185.187	4	52
12:13	185.430	4	54
12:18	185.672	4	54

Comments: Purged impingers for 15 min with ambient air thru charcoal filter.

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-04-75

Plant E.F. Baker

Location Perryville

Bar. Pressure 29.56 "Hg

Ambient Temp. 35 °F

Run No. I-2

Power Stat Setting 1.9

Filter Used: Yes ___ No X

Operator Harrison / Shelby

Comments: leak check ok (.000 cfm) @ 6 CFH flow rate

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
~~1418~~ 1420	186.447	4	~~60~~ ~~60~~ 58
1427	186.831	4	58
~~1433~~ 14:32	187.094	~~4~~	58

3
8
13
47

Comments: Purged impingers with charcoal cleaned air for 15 min.

Impinger Bucket No. ___

Meter Box No. Gas Train #1

FIELD MOISTURE DETERMINATION

Location E.F. Baker

Test I - 2

Date 12-04-75

Operator Harrison / Shulby

Comments:

leak ✓
.000 cfm
@ 15 in Hg

By Absorption:

Barometric Pressure 29.56

Clock Time		Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
16:18	0	42.888	.75 cfm	60 / 60
16:23	5	46.685	.75	72 / 60
16:28	10	50.20	.75	82 / 61
	15	53.499	.75	90 / 64
	20	57.400	.75	94 / 64
	25	60.600	.75	98 / 67
	30	64.229	—	101 / 69

[illegible] to 18 X
broke loose
[illegible] to 2" Hg
5"

Tube No.	Weight, grams		
	Final	Initial	Difference
I - 1	105	100	5
I - 2	108	100	8
I - 3	1.0	~~211.9~~ 0	1
S.G	~~235.8~~ 218.5	211.9	6.4

235.8
17.3
218.5

(W) = weight of moisture collected = _____

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

% 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 J.S. Baker

DATE 12/4/75

SAMPLING TIME (24-hr CLOCK) Run # 2

SAMPLING LOCATION #1 Kiln ~~outlet~~ inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	77.		82.		79.		79.3	44/100	13.7
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	51.5		54.8		53.		53.1	32/100	13.5
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0		0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-05-75

Plant T.E. Baker

Location Ohio

Bar. Pressure 29.50 "Hg

Comments: leak check .003 cfm @ flow rate of 6 DSCFH

Ambient Temp. 40 °F

Run No. T-3

Power Stat Setting n.a

Filter Used: Yes ___ No X

Operator Harrison / Shulby

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
18:13	188.001	4 DSCFH	64
18:18	188.249	4	65
18:23	188.474	—	68

Comments: purged impingers with charcoal cleaned ambient air for 15 min @ flow rate of 4 DSCFH.

Impinger Bucket No. ___

Meter Box No. 1

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J.E. Baker, Ohio Comments: Leak check .001 cfm @ 15" Hg

Test I-3

Date 12-05-75

Operator Harrison / Shulby RAC-6

By Absorption:

Barometric Pressure 29.50

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
18:11 0	66.622	.75 CFM	80 / 72
18:16 5	69.570	.75	84 / 73
18:21 10	73.250	.75	91 / 74
18:26 15	76.861	.75	101 / 76
18:31 20	80.70	.75	110 / 78
18:36 25	84.05	.75	115 / 81
18:41 30	87.576		

Var. 18" Hg var. ok

Tube No.	Weight, grams		
	Final	Initial	Difference
1	109	100	9
2	104	100	4
3	0	0	
S.G.	211.2	200	11.2

(W) = weight of moisture collected = _____

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

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F % Moisture From Psychometric Chart

Dry Bulb Temp. _____ °F _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/5/75

SAMPLING TIME (24-hr CLOCK) Run 3

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	91 x 12		92.5 x 12		91 x 12		91.5	44/100	14.5%
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	54		55.2		56		55.1	32/100	14.%
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	4		4.5		5		4.5	28/100	500
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
A/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-05-75

Plant JE Baker

Location Ohio

Bar. Pressure 29.50 "Hg

Comments: Leak check of .001 cfm @ flow rate of 6 DSCFH

Ambient Temp. 50 °F

Run No. I-4

Power Stat Setting n.a

Filter Used: Yes ___ No X

Operator Harrison / Shulby

Stack Temp 950°F

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
0	189.298	4 DSCFH	76
5	189.537	"	77
10	189.812	—	78

812
298
514

Comments: Purged impingers with charcoal cleaned ambient air for 15 min @ flow rate of 4 DSCFH

Impinger Bucket No. ___

Meter Box No. 1

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J.E. Baker

Test I-4

Date 12-05-75

Operator Harrison / Shelby

Comments: Leak check 0.000 cfm @ 15" Hg

By Absorption:

Barometric Pressure 29.50

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
1935 0	87.969	.75 cfm	90 / 82
1940 5	91.590	.75	99 / 82
10	95.200	.75	105 / 84
15	98.9	.75	112 / 85
20	102.75	.75	116 / 86
25	105.50	.75	118 / 89
~~30~~			~~114~~
30	108.562	—	114 / 90

Tube No.	Weight, grams		
	Final	Initial	Difference
I-1	110	100	10
I-2	101	100	1
3	0	0	0
Silica Gel	212.5	200	12.5
		Total	23.5

(W) = weight of moisture collected = 23.5

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

% 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 J.E. Baker

DATE 12/5/75

SAMPLING TIME (24-hr CLOCK) Run 4

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	34.4 x12		34.4 x12		33.5 x12		34.1	44/100	5.4 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	78.2		78.5		74.1		77.6	32/100	19.8 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	1		1		1		1.	28/100	100 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-06-75

Plant JE Baker Location Ohio

Bar. Pressure 29.74 "Hg Stack Temperature 1000 °F

Ambient Temp. 34 °F Stack Dimensions

Run No. I-5

Power Stat Setting n.a

Filter Used: Yes ___ No X

Operator Harrison / ~~[illegible]~~ Kelly

Leak check .000 cfm at 6 DSCFH

Purged train for 15 min with charcoal cleaned ambient air @ 4 DSCFH

.55
.73

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
~~0~~	~~190.647~~	~~4 DSCFH~~	~~55~~
1345 0	191.945		60
5	192.30	4	61
10	192.453	~~4~~	62
Avg	.508		61

1 Impingers with 15 ml of 80% TPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No.

Impinger Bucket No.

Meter Box No. 1

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J.E Baker

Test I-5

Date 12-06-75

Operator Harrison / Kelly

Comments: Leak check .000 cfm at 15" Hg

By Absorption:

Barometric Pressure 29.74

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm	
13:10	0	108.651 .75 cfm	58	53
	5	112.5		
	10	115.5	74	64
leave at to 20" Hg	15		80	58
	20	~~123.21~~		
	25	12321	76	60
		124.074		

Tube No.	Weight, grams		
	Final	Initial	Difference
1		100	
2	NO DATA	100	
3		0	
SG	NO	900	

(W) = weight of moisture collected = _____

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

% Moisture by Volume = _____

NOTE! Train was used for Run 6 @ outlet before cleanup.

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/6/75

SAMPLING TIME (24-hr CLOCK) Run 5

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD Co_2, O_2 - GAS PARTITIONER CO = IR

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	67.2 x44		68.5 x44		67. x44		67.5	44/100	18.5 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	49.4 x44		50.		49.5		49.6	32/100	12.7 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	29		29		29		29	28/100	120 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 10-06-75

Plant J E Baker Location _____

Bar. Pressure 29.74 "Hg Stack Temperature 1000 °F

Ambient Temp. 30 °F Stack Dimensions _____

Run No. I-6

Power Stat Setting 11.9

Filter Used: Yes ___ No X

Operator Harrison / Kelly

Leak checked at 6D CFH flow rate
leak rate 0.0

Taking sample from same line as contin monitor

Purged 15 min @ 3.5 CFM

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN (°F)
~~1510~~	~~193.252~~	~~4 DSCFH~~	
1515	193.568	2.5 #DSCFH	53
10	193 94	2.5	54
15	194.246	3.5	55
AVG →	0.678 ←		54

1.246
.568
.678

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. _____

Impinger Bucket No. _____

Meter Box No. 1

NCAP-35 (12/67)

FIELD MOISTURE DETERMINATION

Location J E Baker

Test I - 6

Date 12-06-75

Operator Harrison / Kelly

Comments: leak ✓ @ 15" Hg = .001 cfm

By Absorption:

Barometric Pressure 29.74

	Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm	
1720	0	155.099	.75 cfm	48	46
	10	159.510	.75 cfm	56	46
	~~15~~	~~169.980~~	~~.75 cfm~~	~~64~~	~~48~~
	~~20~~	~~166.150~~	~~.75~~	~~68~~	~~50~~
vac ≈ 14" Hg ~~[illegible]~~ back to ≈ 3.	25	169.510	.75	76	53
	~~30~~	~~179.93~~	~~.75~~	~~80~~	~~56~~
	~~35~~ 35	179.93	.75	84	57
	38	181.534			

Tube No.	Weight, grams		
	Final	Initial	Difference
1	117	100	17
2	107	100	7
3	2	0	2
SG	218.7	208.9	9.8

(W) = weight of moisture collected = 35.8

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

% 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 J.E. Baker

DATE 12/6/75

SAMPLING TIME (24-hr CLOCK) Run 6

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 - Gas Partitium CO - IR

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	71.3 x64		65. x64		69. x64	72. x64	69.3	44/100	19.9%
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	47. x64		42. ~~62.~~ x64		47. x64	46. x64	46.	32/100	11.7%
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	53.		53		53		53	28/100	240 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-08-75

Plant JE Baker

Location Mansville, Ohio

Bar. Pressure 29.57 "Hg

Stack Temperature 970 °F

Ambient Temp. 34 °F

Stack Dimensions

Run No. I-7

Power Stat Setting n.g

Filter Used: Yes ___ No X

Operator Harrison / Kelly

Leak check @ 0.001 cfm @ flow rate of 6 DSCFH

Purged with charcoal cleaned air (at van) for 15 min @ 4 DSCFH

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:15	195.114	4 DSCFH	48
10:20	195.41	4 DSCFH	~~50~~ 49
10:25	195.715	~~4~~	50

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 (ml) of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No.

Impinger Bucket No.

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-08-75

Plant J E Baker

Location Millersville Ohio

Bar. Pressure 29.57 "Hg

Stack Temperature 970 °F

Ambient Temp. 34 °F

Stack Dimensions

Run No. I-8

Power Stat Setting N.A

Filter Used: Yes ___ No X

Operator Harmon / Kelly

leak check 0.000 cfm @ flow rate of 6 DSCFH.

Purged with ambient charcoal cleaned air for 15 min @ flow rate of 4 DSCFH

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:38 0	195.739	4 DSCFH	53 °F
10:43 5	196.034	4	54 °F
10:48 10	196.309	—	56

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No.

Impinger Bucket No.

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-08-75

Plant J E Baker Location Milkersville Ohio

Bar. Pressure 29.57 "Hg Stack Temperature 980 °F

Ambient Temp. 36 °F Stack Dimensions

Run No. I-9

Power Stat Setting n.g

Filter Used: Yes No X

Operator Harrison/Kelly

Leak check 0.00 cfm @ flow rate of 6 DSCFH

Purged with charcoal cleaned ambient air for 15 min. @ 4 cfm.

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:55	196.328	4 DSCFH	57
11:00	196.570	4 DSCFH	58
11:05	196.830	—	59

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 (each) ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No.

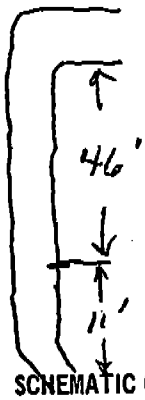
Impinger Bucket No.

Meter Box No. 1

NCAP-36 (12/67)

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT J E Baker
DATE 12/8/75
SAMPLING LOCATION #1 Kiln inlet
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 73"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 3½"
STACK I.D., (DISTANCE A - DISTANCE B) 69½
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR WK



SCHEMATIC OF SAMPLING LOCATION

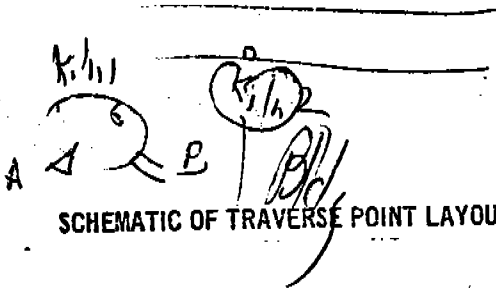
TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	4.4	69.5	3	6½	
2	14.7	"	10¼	13¾	
3	29.5	"	20½	24	
4	70.5	"	49	52½	
5	85.3	"	59¼	62¾	
6	95.6	"	66½	70	

EPA (Dur) 232
4/72

PRELIMINARY VELOCITY TRAVERSE

PLANT J E Baker
DATE 12-09-75
LOCATION
STACK I.D.
BAROMETRIC PRESSURE, in. Hg
STACK GAUGE PRESSURE, in. H_2O -4"
OPERATORS Harrison / Kelly

Time ~1315



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.41	980 °F
2	.78	
3	.82	
4	.86	
5	.82	
6	.74	
B 1	.43	avg $\sqrt{\Delta p}$ = 0.864
2	.81	
3	.98	
4	.84	
5	.84	
6	.75	
	(9)	(6)
1445 B-1	.52	.81
-2	.51	.83
-3	.60	.83
-4	.86	
-5	.88	
-6	.80	
AVERAGE		

(d)

TRAVERSE POINT NUMBER (C)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B-1	.71	
-2	.71	
-3	.73	
B-1	.51	
B-2	.82	
-3	.94	$\bar{T}$ = 0.896
-4	1.05	
-5	.92	
-6	.64	
	Stat ~ 4.0	
AVERAGE		

EPA (Dur) 233
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/8/75

SAMPLING TIME (24-hr CLOCK) Run 7

SAMPLING LOCATION Inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 Gas Partitioner CO, IR

AMBIENT TEMPERATURE _____

OPERATOR _____

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET ~~VOLUME~~ reading	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	80. x.44		81. x.44		81. x.44		80.6	44/100	19.7 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.1 x.124		25.5 x.124		25.1 x.124		25.2	32/100	10.0 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	25.3		25.3		25.3		25.3	28/100	110 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

FIELD MOISTURE DETERMINATION

Location J E Baker

Test ~~12-08-75~~ Run I - 7

Date 12-08-75

Operator Harrison / Kelly

By Absorption:

Barometric Pressure 29.57

Comments:

Stack Temp. 980°F

leak check 0.001 cfm @ 15" Hg

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm	
13:39 0	182.176	.75 cfm	60	52
13:44 5	187.60	.75	71	53
13:49 10	192.00	.75	82	56
13:44 15	194.8	.75	88	57
20	198.5	.75	93	60
25	201.5	.75	95	62
14:14	208.962	—	97	66

vac 10" Hg

Tube No.	Weight, grams		
	Final	Initial	Difference
1		100	
2	no data	100	
3		0	
SG		200	

(W) = weight of moisture collected = _____

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

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/9/75

SAMPLING TIME (24-hr CLOCK) Run 7

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

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	19.2		19.0		19.1		19.1	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	28	8.8	28.	9.	28.	8.9	8.9	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

.002
.05

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-08-75

Plant J E Baker

Location Millersville, Ohio

Bar. Pressure 29.57 "Hg

Stack Temperature 940 °F

Ambient Temp. 40 °F

Stack Dimensions 69½" I.D.

Run No. I-10

leak rate 0.002 cfm @ 6 dscfh.

Power Stat Setting n.a.

Filter Used: Yes ___ No X

Operator Harrison / Kelly

Purged impinger train 15 min with charcoal chamber air @ 4 DSCFH

.440
.217
.657

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
15:38	196.883	4 DSCFH	54
15:43	197.280	4 DSCFH	55
15:48	197.440	—	56

.002
x10
.02
.5

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. ___

Impinger Bucket No. ___

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-08

Plant JE Baker

Location Millersville, Ohio

Bar. Pressure 29.57 "Hg

Stack Temperature 940 °F

Ambient Temp. 40 °F

Stack Dimensions

Run No. I-11

Leak check 0.000 cfm @ flow rating 4 DSCFH.

Power Stat Setting N.A

Filter Used: Yes ___ No X

Purged sample line before run.

Operator Harrison / Kelly

purged impingers with charcoal charcoal air for 15 min @ 4 DSCFH

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
1557 0	197.458	4 DSCFH	57
5	197.740	4	58
.542 1607 10	198.000	—	59

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of

Total number of Impingers

Sample Bottle No.

Impinger Bucket No.

Meter Box No.

NCAP-35 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-08-75

Plant J E Baker Location Millersville, Ohio

Bar. Pressure 29.57 "Hg Stack Temperature ____ °F

Ambient Temp. 40 °F Stack Dimensions 69½" I.D.

Run No. I-12 Leak rate of 0.0015 cfm @ 40SCFH

Power Stat Setting n.a

Filter Used: Yes ___ No X

Purged sample line before running sample

Operator Harrison / Kelly

Purged impingers with charcoal cleaned air for 15 min @ 40SCFH

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
16:30	198.060	4 DSCFH	61
16:35	198.325	4	62
16:40	198.600	—	63

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. ____

Impinger Bucket No. ____

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/13/75

Plant J.E. BAKER Location NORTH SCRUBBER OUTLET

Bar. Pressure _____ "Hg Stack Temperature 160 °F

Ambient Temp. ~~55~~ 32 °F Stack Dimensions 6'11"

Run No. 13A

Power Stat Setting ~~29.29~~ 29.29 0.0 CFM LEAK ✓

Filter Used: Yes ___ No ✓

Operator DAVIS, BULKBANK

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:50AM	255.9~~56~~	4	52
9:55	~~256~~.23	4	54
10:00	256.572	4	55

_____ 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 SO_2

Date 12/9/75

Plant J. E. BAKER Location OUTLET KILN #2

Bar. Pressure 29.29 "Hg Comments:

Ambient Temp. 33 °F LEAK ✓ 0.00 CFM

Run No. 13B

Power Stat Setting MAX.

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:10	256.600	4	55
10:15	256.95	4	56
10:20	257.267	4	58

Comments:

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location NORTH SCRUBBER OUTLET Comments:

Test 13

Date 12/3/75

Operator DAVIS, BLEBAUK

LEAK V
.002 CFM @ 18" Hg VAC.

By Absorption:

Barometric Pressure 29.49

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
9:50 AM	794.698	ΔH IN IN. H_2O 2.1	48
10:02	800.0	1.9	56
10:11	806.3	1.7	60
10:20	813.497	1.9	64

Tube No.	Weight, grams		
	Final	Initial	Difference
SILICA GEL	189.0 ~~206.3~~	177.3	11.7
3	6.0	0	6
2	135	100	35
1	229	100	129

(W) = weight of moisture collected = 181.7

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

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/9/75

SAMPLING TIME (24-hr CLOCK) Run 13

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

AMBIENT TEMPERATURE _____

OPERATOR _____

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.		17.		16.9		16.9	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.4	8.4	25.6	8.6	25.8	8.9	8.6	.32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0		0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/9/75

SAMPLING TIME (24-hr CLOCK) Run 13

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD CO_2, O_2 Gas Container CO, IR

AMBIENT TEMPERATURE

OPERATOR

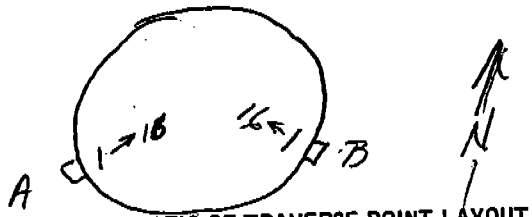
COMMENTS:

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	77. x.44		74.8		74.		75.9	44/100	14.5%
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	24. x.124		25.5		24.9		25.4	32/100	9.9%
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	22		22		22		22	28/100	93 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

PRELIMINARY VELOCITY TRAVERSE

FIRST OF DAY

PLANT J.E. BAKER
DATE 12/9/75
LOCATION OUTLET KILN #2
STACK I.D. 6'11"
BAROMETRIC PRESSURE, in. Hg 29.29
STACK GAUGE PRESSURE, in. H_2O
OPERATORS DAVIS, BURBANK



SCHEMATIC OF TRAVERSE POINT LAYOUT

11:00 → 11:40 AM

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.27 +30 .30	
2	.32 +15 .35	
3	.36 +60 .36	
4	.40 +45 .39	
5	.47 +45 .40	
6	.46 +60 .39	
7	.40 +45 .34	
8	.31 +30 .30	160
9	.22 0 .22	
10	.32 -15 .28	
11	.34 -30 .34	
12	.47 -30 .40	
13	.51 -30 .38	
14	.47 -45 .36	
15	.42 -45 .39	
16	.37 -45 .37	163
STACK GAUGE PRESSURE .29" H_2O		
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	.20 +45 .19	
2	.20 +60 .15	
3	.20 +75 .19	158
4	.14 +45 .35	
5	.20 +45 .22	
6	.16 +45 .18	
7	.18 +30 .21	
8	.20 +30 .19	
9	.31 -30 .23	
10	.39 -30 .28	
11	.43 -30 .33	
12	.46 -45 .34	
13	.52 -45 .34	
14	.46 -45 .35	
15	.43 -45 .34	160
16	.39 -45 .33	
	18.327	
	$\bar{\sqrt{}}$ = 0.573	
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/9/75

Plant J E BAKER

Location OUTLET KILN #2

Bar. Pressure 29.26 "Hg

Ambient Temp. 34 °F

Run No. 14 #A

Power Stat Setting MAX

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

Comments:
LEAK ✓ 0.0 CFM

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:22 PM	257.298	4	54
12:27	257.58	4	55
12:32	257.934	4	56

Comments:

Impinger Bucket No. ___

Meter Box No. 4

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12/9/75

Plant J.E. BAKER Location OUTLET KILN #2

Bar. Pressure 29.26 "Hg Stack Temperature 160 °F

Ambient Temp. 34 °F Stack Dimensions 6'11" DIA.

Run No. 14B LEAK @ 0.0 CFM

Power Stat Setting MAX

Filter Used: Yes ___ No ✓

Operator DAVIS, BURBANK

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:41 PM	257.952	4	58
12:46	258.26	4	59
12:51	258.563	4	60

1 Impingers with 15 ml of IPA

2 Impingers with 15 ml of H_2O_2

Total number of Impingers 4

Sample Bottle No. ___

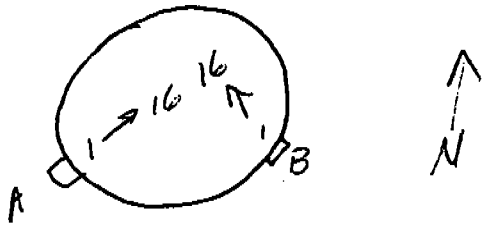
Impinger Bucket No. ___

Meter Box No. 4

NCAP-36 (12/67)

PRELIMINARY VELOCITY TRAVERSE

PLANT J.E. BAKER
DATE 12/9/75
LOCATION OUTLET KILN #2
STACK I.D. 6'11"
BAROMETRIC PRESSURE, in. Hg 29.24
STACK GAUGE PRESSURE, in. H_2O -3.5
OPERATORS DANK, BURBANK
Time: 15:45 approx.
1 X 90°



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A 1	.31 +30 .33	160
2	.35 +30 .35	
3	.35 +45 .37	
4	.37 +30 .39	
5	.43 +30 .39	
6	.43 +30 .38	
7	.39 +30 .36	
8	.34 +45 .28	
9	.24 0 .24	
10	.34 -15 .28	
11	.37 -30 .31	
12	.45 -30 .33	
13	.48 -45 .37	
14	.43 -45 .37	
15	.39 -60 .34	
16	.38 -45 .34	160
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B 1	.12 +60 .20	160
2	.11 +60 .29	
3	.12 +45 .22	
4	.13 +45 .18	
5	.21 +15 .21	
6	.16 0 .16	
7	.22 +15 .21	
8	.20 0 .20	
9	.28 -15 .25	
10	.40 -30 .28	
11	.45 -30 .32	160
12	.46 -30 .36	
13	.47 -45 .34	
14	.48 -45 .33	
15	.58 -45 .33	
16	.48 -45 .31	
STACK GAUGE PRESS.		.35 " H_2O
	18.305	
	$\overline{\sqrt{\Delta p}}$ = 0.572	
AVERAGE		

EPA (Dur) 233
4/72

GAS SAMPLING FIELD DATA

Material Sampled for Sulfur Dioxides

Date 12/9/75

Plant J. E. Baker Location Deadburn, Outlet

Bar. Pressure 29.24 "Hg Comments:

Ambient Temp. 30 °F

Run No. 15A

Power Stat Setting 75

Filter Used: Yes ___ No X

Operator Burbank / Davis

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
16:15	262.853	4.0 CFH	62
16:20	263.25	4.0	62
16:25	263.58	—	62

1 Impingers with 15 ml of 80% I.PA.

2 Impingers with 15 ml of H_2O

Total number of Impingers 4

Sample Bottle No. ___

Impinger Bucket No. D-15A

Meter Box No. 14?

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO2

Date 12/9/75

Plant J. E. Baker Location Outlet (Dearborn)

Bar. Pressure 29.24 "Hg Comments:

Ambient Temp. 30 °F

Run No. 15B

Power Stat Setting 75

Filter Used: Yes ___ No X

Operator Burbank/Davis

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
16:36	263.578	4 SCFM	63°F
16:40	263.85		
16:45	264.018		63°F

Comments:

Impinger Bucket No. _____

Meter Box No. _____

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location Deadmans Outlet

Comments:

Test Run #15

Date 12/9/75

Operator Burbank / Davis

By Absorption:

Barometric Pressure 29.24

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
16:15	829.523	$\Delta H = 1.84$ (ΔH_a)	60, 52
16:21	834.2	"	68, 53
16:33	842.35	"	70, 52
16:45 end	851.797	—	70, 54

Tube No.	Weight, grams		
	Final	Initial	Difference
1	311	100	211
2	49	100	-51
3	0	0	0
Si Gel	223.6	217.3	6.3

(W) = weight of moisture collected = 168.3 g

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

% Moisture by Volume = _____

By Wet and Dry Bulb Temperatures:

Wet Bulb Temp. _____ °F

Dry Bulb Temp. _____ °F

% Moisture From Psychometric Chart _____

NCAP-30 (12/67)

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/10/75

SAMPLING TIME (24-hr CLOCK) Run 14

SAMPLING LOCATION Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	15.2		15.		15.		15.0	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.8	10.6	25.6	10.6	25.6	10.6	10.6	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0		0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION.

PLANT J.E. Baker

DATE 12/10/75

SAMPLING TIME (24-hr CLOCK) Run 14

SAMPLING LOCATION outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 Gas partitioner CO_2 IR

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	65 x44		67 x44		66.8 x44		66.2	44/100	14.3
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	28.5 x1.24		29.5 x1.24		29.3 x1.24		29.2	32/100	11.6
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	10		10		10		10	28/100	90 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-09-75

Plant JE Baker

Location Millersville, Ohio

Bar. Pressure ~~29.29~~ 29.29 "Hg

Stack Temperature 1565 °F

Ambient Temp. 36 °F

Stack Dimensions

Run No. I-13A

Power Stat Setting 11.9

Filter Used: Yes ___ No X

Operator ~~Harrison~~ / Kelly

Leak check 0.000 cfm @ 4DSCFH
Purged probe before run
Purged impingers with line ... for 15 min.

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
9:50	198.615	4DSCFH	44
	198.943	4	45
10:05	199.240	—	46

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No.

Impinger Bucket No.

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2

Date 12-09-75

Plant J E Baker Location Millersville, Ohio

Bar. Pressure 29.29 "Hg Stack Temperature ____ °F

Ambient Temp. 36 °F Stack Dimensions ____

Run No. I-13-B Inlet Rin #2 Leak check 0.001 cfm at 6 DSCFH.

Power Stat Setting na Purged sample probe before run.

Filter Used: Yes ___ No X

Operator Harrison I Purged impingers 15 min.

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
10:11	199.258	4 DSCFH	48
10:16	199.560	4	49
10:21	199.702	—	50

2 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml each of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. ____

Impinger Bucket No. ____

Meter Box No. 1

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J E Baker

Test [illegible] 13

Date 12-09-75

Operator Harrison / Kelly

Comments: leak check 0.0000 cfm @ 15" Hg.

By Absorption:

Barometric Pressure ~~29.29~~ 29.29

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
9:53:0	209.041	.75 cfm	48 / 46
9:58 5	213.000	.75 cfm	55 / 46
10:03 10		.75	64 / 47
10:08 15	219.770	.75	70 / 49
10:13 20	222.50	≈ .5	72 / 51
10:16	223.148		

Qz vac 23" Hg

shut down from very little flow.

Tube No.	Weight, grams		
	Final	Initial	Difference
1	111	100	11
2	106	100	6
3	1	0	1
S.G.	222.8	217.3	5.5

(W) = weight of moisture collected = 23.5

% 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 J.E. Baker

DATE 12/9/75

SAMPLING TIME (24-hr CLOCK) Run 13

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	18.4		18.4		18.4		18.4	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.8	7.4	26.2	7.8	25.8	7.4	7.5	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0		0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/9/75

SAMPLING TIME (24-hr CLOCK) Run 13

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 Orsat Fisher CO IR

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	78.4 x44		80.0 x44		81.0 x44		79.8	44/100	19.5 %
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.0 x128		22.5 x128		23.0 x128		22.5	32/100	8.9 %
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	24		24		24		24	28/100	100 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EPA (Dur) 230
4/72

GAS SAMPLING FIELD DATA

Material Sampled for SO_2 Kiln #2

Date 12-09-75

Plant J. E. Baker Location Millersville, Ohio

Bar. Pressure 29.26 "Hg Stack Temperature _____ °F

Ambient Temp. 34 °F Stack Dimensions _____

Run No. T-14A

Power Stat Setting n.a.

Filter Used: Yes ___ No X

Operator Harrison / Kelly

Leak rate of 0.000 cfm @ flow ~~rate~~ of 6 DSCFH
Purged probe prior to run.
Purged impingers for 15 min with charcoal cleaned air @ 4 DSCFH after run.

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12:22 0	199.721	4 DSCFH	50
5	200.000	4	50
10	200.254	—	51

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml each of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. _____

Impinger Bucket No. _____

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Kiln #3

Material Sampled for SO_2

Date 12-09-75

Plant J E Baker

Location Millersville, Ohio

Bar. Pressure 29.26 "Hg

Stack Temperature _____ °F

Ambient Temp. 34 °F

Stack Dimensions _____

Run No. I-14B

Power Stat Setting n.9

Filter Used: Yes ___ No X

Operator Harrison / Kelly

Leak rate of - @

Sample probe purged before run

impingers purged with charcoal dried air for 15 min after run. @ 4 DSCFH

CLOCK TIME	METER (Ft.^{3})	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
12 41 0	200.270	4 DSCFH	52
5	200.530	4	53
10	200.794	—	55

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. _____

Impinger Bucket No. _____

Meter Box No. 1

NCAP-36 (12/67)

GAS SAMPLING FIELD DATA

Material Sampled for SO_2 Kiln #2

Date 12-09-75

Plant J.E Baker Location Millersville Ohio

Bar. Pressure 29.24 "Hg Stack Temperature ____ °F

Ambient Temp. 34 °F Stack Dimensions ____

Run No. I-15A leak check 0.000 cfm @ 60 DSCFH

Power Stat Setting n.a.

Filter Used: Yes ___ No X

Operator Harrison / Kelly

Purged probe prior to run
Purged impingers for 15 min with closed loop on 1 @ 4 DSCF.

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
1617	200.312	.5 Refl	50
	200.915	.5	50
1629	201.018	.5	

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2 each

Total number of Impingers 4

Sample Bottle No. ____

Impinger Bucket No. ____

Meter Box No. 1

GAS SAMPLING FIELD DATA

Material Sampled for SO_2 Kiln #2

Date 12-09-75

Plant J. E. Baker Location Millersville Ohio

Bar. Pressure 29.24 "Hg Stack Temperature ____ °F

Ambient Temp. 34 °F Stack Dimensions ____

Run No. I-15B Leak check 0.000cfm @ 6 Hg vac.

Power Stat Setting n.a Purged sample probe before run

Filter Used: Yes ___ No X

Operator Harrison / Kelly Purged impinger train 15 min. @ 3dscfh after run.

CLOCK TIME	METER ($Ft.^3$)	FLOW METER SETTING (CFH)	METER TEMPERATURE IN
16:47 ~~16:16~~	201.104	~~0~~ 3	54
1 :5		1	54
16:52 11	201.312	—	56

1 Impingers with 15 ml of 80% IPA

2 Impingers with 15 ml of 3% H_2O_2

Total number of Impingers 4

Sample Bottle No. ____

Impinger Bucket No. ____

Meter Box No. 1

NCAP-36 (12/67)

FIELD MOISTURE DETERMINATION

Location J E Baker

Test Inlet Kiln #2 Run I-15

Date 12-09-75

Operator Harrison / Kelly

Comments:

leak check 0.000 cfm @ 18" Hg

By Absorption:

Barometric Pressure 29.24

Clock Time	Meter (Ft^3)	Flow Meter Setting (CFH)	Meter Temperature, Tm
16.18 0	223.262	.75 cfm	74 / 66
5	227.20	.75 cfm	74 / 66
10	231.1		80 / 66
15			82 / 66
20	236.50	.75	84 / 66
25	241.90	.75	90 / 67
30	243.987	—	96 / 67

15" Hg vac

0 vac.

Tube No.	Weight, grams		
	Final	Initial	Difference
1	121	100	21
2	110	100	10
3	0	0	0
Sm.	214	200	14

2313 m.3 / 14.0

(W) = weight of moisture collected = 45

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

% 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 J.E. Baker

DATE 12/10/75

SAMPLING TIME (24-hr CLOCK) Run #4 15

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD _____

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	17		17.2		17.		17	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	25.8	8.8	26.2	9.0	26.2	9.0	8.9	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	0		0		0			28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

DRY MOLECULAR WEIGHT DETERMINATION

PLANT J.E. Baker

DATE 12/10/75

SAMPLING TIME (24-hr CLOCK) Run #15

SAMPLING LOCATION inlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD CO_2, O_2 Gas Partitioner CO, IR

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	75. x44		75.2 x44		74. 144		74.7	44/100	18.1%
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	24.2 x124		24.5 x124		26. x128		26.2	32/100	10.2%
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	11		11		11		11	28/100	45 PPM
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

APPENDIX C

LABORATORY REPORTS

Laboratory Report. J.E. Baker Co. Millersville, Ohio

Date	Location	Run ID	Total Sample Volume	Aliquot Volume	Initial Titrant Reading	Final Titrant Reading	Titrant Volume	Titrant Normality
12/3/75	Inlet Kiln 1	1	50 ml	10 ml	0.20 ml	0.20 ml	0.00 ml	0.0096
		X-1			0.15	6.05	5.90	
		X-2			6.05	14.90	8.85	
		Blank			-	-	0.05	
12/4/75		2			14.15	26.55	11.60	
12/5/75		3			30.40	33.70	3.30	
		4			35.10	37.10	2.00	
12/6/75		5			0.85	1.00	0.15	
		6			0.45	0.60	0.15	0.00096
12/8/75		7			7.10	23.10	16.00	0.0096
		8			23.10	38.30	15.20	
		9			0.80	11.60	10.80	
		10			11.60	21.30	9.70	
		11			21.40	31.60	10.20	
		12			31.60	42.80	11.20	
12/3/75	Kiln 1 Outlet	1	50	10	0.20	2.10	1.90	0.00096
12/4/75		2			26.60	26.95	0.35	0.0096
12/5/75		3			33.70	35.10	1.40	
		4			37.10	37.50	0.40	
12/6/75		5			1.00	1.35	0.35	
		6			1.35	1.40	0.05	

Laboratory Report. J.E. Baker Co. Millersville, Ohio (Continued)

Date	Location	Run ID	Total Sample Volume	Aliquot Volume	Initial Titrant Reading	Final Titrant Reading	Titrant Volume	Titrant Normality
12/9/75	Kiln 2 Inlet	13A	50	10	17.20	27.20	10.00	0.0096
		13B			27.20	34.30	7.10	
		14A			35.60	47.90	35.60	
		14B			0.60	14.85	14.25	
		15A			15.90	17.30	1.40	
		15B			18.00	20.80	2.80	
12/9/75	Kiln 2 Outlet	13A	50	10	34.30	35.00	0.70	0.0096
		13B			35.00	35.60	0.60	
		14A			14.85	15.50	0.65	
		14B			15.50	15.90	0.40	
		15A			17.30	17.70	0.40	
		15B			17.70	18.00	0.30	

(76LIM II) file

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

SUBJECT: Coal Analysis

DATE: January 13, 1976

Winton

FROM: Robert H. Jungers, Chief RHJ
SFMCS, ACB, EMSL/RTP (MD-78)

TO: Tom Bibb
ESED, OAQPS (MD-13)

Reference: Test No. 76LIM II
J. E. Baker Co.
Millersville, Ohio

The following coal samples were analyzed for moisture and sulfur content. The results are:

Sample Number	Moisture %	Sulfur %
S75-005-037	2.21	3.74
S75-005-041	1.98	3.49
S75-005-045	1.05	3.60
S75-005-050	1.35	2.71
S75-005-055	1.52	2.70

The methods used were ASTM D-271 for moisture and ASTM D-1552 (Hi-Temperature) for sulfur. If you have any questions, call at extension 2456.

SOURCE SAMPLE REQUEST & REPORT
(MUST BE FILLED OUT FOR EACH TEST RUN)

SAMPLING DATE: 75 (YR) | 12 (MO) | 8-9 (DAY)

FIRST IDENT. NO. USED: 575005 037

LAST IDENT. NO. USED: 575 005 055

not Consecutive

TEST NO: 76 LIM 11

RUN NO: several

INDUSTRY: LIME (USE TABLE A)

COMPANY: J.E. BAKER

ADDRESS: MILLERSVILLE OHIO

SAMPLING METHOD: GRAB PROCESS SAMPLES

UNIT PROCESS OPERATION: ~~KILN~~ KILN

AIR POLLUTION CONTROL: SCRUBBER

FUEL USED: coal

☐ INLET ☐ OUTLET

GAS VOLUME SAMPLED (METER VOL IN FT³): N/A

IDENT NO	DESCRIPTION OF SAMPLE OR SAMPLE FRACTION	SAMPLE WT (SOLID) MG	SAMPLE VOL (LIQUID) ML	ANALYSIS REQUESTED - GENERAL COMMENTS (APPROX CONCENTRATIONS - POSSIBLE INTERFERENCES ETC) (INDICATE SPECIFIC ANALYSIS ON BACKSIDE)
575005 037	coal			Percent moisture and Percent Sulfur on a weight basis
575005 041	"			
575005 045	"			
575005 050	"			
575005 055	"			

COMMENTS: Recommended Method: ASTM 271-70 Samples may require pulverization before analysis

SAMPLING CONTRACTOR: EPA (IF APPLICABLE)

PROJECT OFFICER: Winston Kelly

REQUEST REVIEWED BY: [signature] 12/29/75

DATE OF REQUEST: 12/26/75

DATE ANALYSIS REQUESTED: 1/15/76

DATE OF REQUEST (TO BE FILLED IN BY SSFAB)

EPA(DUR)245

[redacted] RE[redacted]F AN[redacted]
TR[redacted]LEMENTS
ppm - for solid samples
ug/ml - for liquid samples

[redacted] (x) fo[redacted]lic on[redacted]
Mark (x) in block to left of Ident. [redacted]hen
requesting all analysis on that line

Ident No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	No	K	Co	Si	Mg	Ba					Analyst's Initial

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

Ident No.	% Moisture	% Sulfur										
595 005 037	2.21	3.74										
041	1.98	3.49										
045	1.05	3.60										
050	1.35	2.71										
055	1.52	2.70										
Analyst	J.H.	McBRIDE										
Method	D-271	D-1552 NI-TEMP										

Comments:

APPENDIX D

TEST LOGS

SAMPLING TASK LOG

Plant J.E. Baker
Date 12/3/75

Plant Location Millersville, Ohio
Recorded by W Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
	1	K-1 outlet	SO_2	1830	1900	30	
	"	"	H_2O	1830	1900	30	
	"	"	integrated gas				
			~~veto~~				
	1	K-1 inlet	SO_2	1830	1900	30	
	"	"	H_2O	1830	1900	30	
	"	"	integrated gas				

SAMPLING TASK LOG

Plant JE Baker
Date 12/4/75

Plant Location Millersville, Ohio
Recorded by W. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
	EXP1	K1 inlet	SO_2	0950	1000	10	
	EXP2	"	"	1208	1218	10	
	2	"	SO_2	1620	1632	12	
	"	"	H_2O	1618	1648	30	
	"	"	int. gas	1618	1648	30	
	2	K1 outlet	velocity	1700	4900		
	"	"	SO_2	1615	1645	30	
	"	"	H_2O	1615	1645	30	
	"	"	integrated gas	~1615	~1645	30	

SAMPLING TASK LOG

Plant J.E. Baker Co. Plant Location Millersville, Ohio
Date 12/5/75 Recorded by D. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
	3	K1 outlet	velocity	0955	1110		
plant down 1100 ~ 1730							
	3	K1 outlet	SO_2	1500	1830	30	
	"	"	H_2O	1800	1830	30	
	"	"	int. gas	"	"	"	
Power loss 1940 ~ 1955	4	K1 outlet	SO_2	1925	2007		
"	"	"	H_2O	1925	2007		
"	"	"	int. gas	"	"		
	"	~~veloc~~ "	velocity	~~1925~~ 2010	~~1935~~	after 2007	
	3	K1 inlet	SO_2	1813	1823	10	
	"	"	H_2O	1811	1841	30	
	"	"	int. gas	~1811	~1840	~30	
	4	K1 inlet	SO_2	~1930	~1940	10	
	4	"	H_2O	1935	2005	30	
	4	"	int. gas	~1930	~2000	~30	

SAMPLING TASK LOG

Plant J.E. Baker
Date 12/6/75

Plant Location Millersville, Ohio
Recorded by W. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
	5	K1 outlet	velocity	1100	1150		
Lost power during run	"	"	SO_2	1309	1339	30	
"	"	"	H_2O	1300	1332	32	
"	"	"	int. gas	~1300	~1330		
Lost pump from 1554 to 1650	6	K1 outlet	SO_2	1540	1707		
Down from 1601 to 1659	"	"	H_2O	1540	1709		
"	"	"	int. gas	~1540	~1700		
	"	"	velocity	~1730	~1815		
	5	K1 inlet	SO_2	1345	1355	10	
	"	"	H_2O	1310	1340	30	
	"	~~int gas~~ "	int. gas	~1310	~1340	30	
	6	K1 inlet	SO_2	1715	1730	15	
	"	"	H_2O	1720	1758	38	
	"	"	int. gas	~1720	~1750	~30	

SAMPLING TASK LOG

Plant J.E. Baker
Date 12/8/75

Plant Location Millersville, Oh.
Recorded by W. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
	7	K1 inlet	SO_2	1015	1025	10	
	8	"	"	1038	1048	10	
	9	"	"	1055	1105	10	
		"	velocity	1300 1315	1330		
		"	H_2O	1339	1414	35	
		"	int. gas	~1340	~1410		
	10	"	SO_2	1538	1548	10	
	11	"	"	1557	1607	10	
	12	"	"	1630	1640	10	

SAMPLING TASK LOG

Plant J.E. Baker Co.
Date 12/9/75

Plant Location Millersville, Oh.
Recorded by W. Kelly

Comments	Run	Sampling location (Port)	Pollutant	Clock Time Began	Clock Time Ended	Elapsed Time (min)	Sample Nos.
	13A	K2 outlet	SO_2	0950	1000	10	
	13B	"	"	1010	1020	10	
	13	"	H_2O	0950	1020	30	
	13	"	int gas	0950	1020	30	
	13	"	velocity	1100	1140		
	14A	"	SO_2	1222	1232	10	
	14B	"	SO_2	1241	1251	10	
	15	"	velocity	1545			
	15A	"	SO_2	1615	1625	10	
	15B	"	SO_2	1635	1645	10	
	15	"	H_2O	1615	1645	30	
	15	"	int gas	1615	1645	30	
	13A	K2 inlet	SO_2	0950	1000	10	
	13B	"	"	1011	1021	10	
	13	"	H_2O	0953	1016	23	
	13	"	int gas	0950	1020	30	
	14A	"	SO_2	1222	1232	10	
	14B	"	SO_2	1241	1251	10	
	15A	"	"	1617	1629	10	
	15B	"	"	1647	1658	11	
	15	"	H_2O	1618	1648	30	
	15	"	int gas	1645	1658	13	

APPENDIX E

PROJECT PARTICIPANTS

PARTICIPANTS

Winton E. Kelly	Test Team Leader
Terry Harrison	Engineer
John Davis	Engineer
Jason Burbank	Engineer
Wayne Shulby	Technician
Gary McAllister	Chemist
Ray Mobley	Technician
K. C. Hustvedt	Process Engineer

APPENDIX F

COMPLETE PROCESS OPERATION DATA

Company J. E. Baker | Location Millersville, Ohio

Facility Dolomitic Lime Plant | Unit No. 1 BOF LIME

Operators

Date 3 DEC 75

Data Set No. 1 | Page

Key

	Units	3:00	4:00	5:00	6:00	7:00		
Venturi diff	IWC	12.2	12.5	12.5	12.5	12.5		
ID Fan Amps	Amps	395	390	390	390	390		
Kiln Amps	Amps	115	125	120	120	125		
Pressure Hood	IWC	0	+.05	+.05	+.05	+.04		
Pressure Feed	IWC	1.1	1.1	1.1	1.1	1.1		
Cooler Air Flow	IWC	3.2	3.2	3.2	3.0	3.1		
Cooler Air Lock	IWC	-.02	-.04	-.02	-.02	-.02		
Cooler Fan Pressure	IWC	4.5	4.0	4.0	4.0	4.0		
Bowl Mill Exh. Pressure	IWC	11.5	11.0	11.0	11.0	11.0		
Bowl Mill Amps	Amps	105	105	105	100	100		
Bowl Mill Inlet Temp.	°F	365	380	370	370	370		
Bowl Mill Exh. Temp.	°F	160	160	160	160	160		
% Oxy.		0.24	0.0	0.10	0.10	0.0		
[illegible]								
Coal/Hr	LB/HR	6600	6600	6500	6460	6250		
ID or Damper Setting	% OPEN	100	100	100	100	100		
Kiln Speed	RPM	69	68	68	67	67		
Feed Temp.	°F	1270	1280	1260	1240	1240		
Mid Temp.								
NATURAL GAS	SCF/HR	2465	—	—	—	2465		

Company J. E. Baker | Location Millersville, Ohio

Facility Dolomitic Lime Plant | Unit No. 1 BOF LIME

Operators

Date 4 DEC 75

Data Set No. 1 | Page 2

KCH

	Units	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:0
Venturi diff	IWC	12.0	12.2	13.0	12.0	11.9	11.9	12.0	12.
ID Fan Amps	AMPS	390	395	395	390	395	390	390	39
Kiln Amps	AMPS	125	125	125	125	125	125	125	120
Pressure Hood	IWC	+.10	+.10	+.08	+.10	+.10	+.08	+.08	+.
Pressure Feed	IWC	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.
Cooler Air Flow	IWC	3.2	3.3	3.2	3.2	3.1	3.1	3.2	3.
Cooler Air Lock	IWC	0	0	0	0	0	0	0	0
Cooler Fan Pressure	IWC	5.5	5.5	5.0	5.5	4.5	4.5	4.5	4.
Bowl Mill Exh. Pressure	IWC	11.5	11.0	11.5	11.5	11.5	11.0	11.0	11
Bowl Mill Amps	AMPS	105	104	104	103	101	102	100	10
Bowl Mill Inlet Temp.	°F	370	378	370	370	360	360	385	36
Bowl Mill Exh. Temp.	°F	160	160	160	160	160	160	160	16
% Oxy.		.10	.10	0	.10	.10	0	.10	.1
Coal/Hr	LB/HR	6770	6500	6690	6360	6390	6440	6210	62
ID or Damper Setting	% OPEN	100	100	100	100	100	100	100	1
Kiln Speed	RPM	69	66	66	66	68	69	68	6
Feed Temp.	°F	1270	1270	1280	1290	1280	1300	1280	12
Hood Temp.	°F X 100	17.8	17.6	17.6	18.2	17.7	18.1	18.1	18
% S		8:00 - 0.013			0.024				
Product/NATURAL GAS	SCF/HR	2465							2

Company J. E. Baker | Location Millersville, Ohio

Facility Dolomitic Lime Plant | Unit No. 1 BOF KILN

Operators

Date 4 & 5 DEC 75

Data Set No. 1 | Page 3

Kelly

	Units	12-4 5:00		12-5 9:00	10:00	11:00	12:00	1:00	2:00
Venturi diff	INC	12.0		12.2	12.0	11.8	11.9	11.5	11.5
ID Fan Amps	AMPS	385		395	390	385	375	385	375
Kiln Amps	AMPS	120		125	120	100	100	110	115
Pressure Hood	INC	0		-.08	+.08	+.14	+.38	+.18	+.12
Pressure Feed	INC	1.1		1.1	1.1	1.2	1.9	1.2	1.6
Cooler Air Flow	INC	3.2		3.1	3.1	3.1	3.2	2.4	2.6
Cooler Air Lock	INC	0		0	0	0	0	0	0
Cooler Fan Pressure	INC	3.5		6.0	5.5	5.5	5.0	3.5	6.5
Bowl Mill Exh. Pressure	INC	-77		11	11	11	11	11.5	11.0
Bowl Mill Amps	AMPS	100		105	107	110	108	105	105
Bowl Mill Inlet Temp.	°F	360		365	370	320	385	420	440
Bowl Mill Exh. Temp.	°F	160		162	162	160	160	180	160
~~% Oxy.~~									
% Oxygen		.10		.10	.24	.10	.10		.0
Coal/Hr	LB/HR	1370		6590	6920	6580	7260	7050	724
ID or Damper Setting	% OPEN	100		100	100	100	100	100	100
Kiln Speed	RPM	66		68	74	56	64	65	80
Feed Temp.	°F	1270		1260	1230	1380	1420	1360	142
Hood Temp.	°F x 100	18.6		19.7	19.9	17.6	19.5	20.4	—
Product %				.011 4:00am				6	
NATURAL GAS		2465		2465	2465	2465	2465	2465 OFF	C

pany J. E. Baker | Location Millersville, Ohio

cility Dolomitic Lime Plant | Unit No. 1 BOF KILN

erators

Date 6 DEC 75

Data Set No. 1 | Page

KCA

	Units	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00
Venturi diff	IWC	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
ID Fan Amps	Amps	380	370	370	370	370	370	375	380
Kiln Amps	Amps	120	125	120	120	120	120	115	120
Pressure Hood	IWC	0	0	-.05	-.10	-.05	0	0	0
Pressure Feed	IWC	1.8	1.7	1.8	1.8	1.8	1.9	1.9	2.0
Cooler Air Flow	IWC	4.0	3.6	3.7	3.6	3.6	3.6	3.7	3.6
Cooler Air Lock	IWC	-.0	0	0	0	0	0	0	0
Cooler Fan Pressure	IWC	8.5	7.6	8.0	7.0	7.0	7.0	8.0	7.5
Bowl Mill Exh. Pressure	IWC	11.0	10.5	11.0	11.0	11.0	11.0	11.0	11.0
Bowl Mill Amps	Amps	110	112	110	110	110	110	110	112
Bowl Mill Inlet Temp.	°F	390	405	405	400	400	395	400	400
Bowl Mill Exh. Temp.	°F	162	160	160	160	160	160	158	160
% Oxy.		124	.0	.0	.0	.0	.0	.0	.0
~~% Comb.~~									
Coal/Hr	lb/hr	7590	7550	7200	7580	7450	7300	7570	7570
ID or Damper Setting		100	100	100	100	100	100	100	100
Kiln Speed RPM		80	76	74	74	80	80	77	72
Feed Temp.	°F	1370	1370	1370	1370	1360	1340	1370	1350
Hood Temp.	°F x100	19.7	18.1	18.0	18.3	19.9	19.7	17.5	17.1
% S in Product		8.00	.021		0.01L				0.017

NO NATURAL GAS USED

JE BAKER CO
MILLERSVILLE, OHIO
DOLOMITIC LIMIT PLANT

KILN #1 BOF LIME
6, 8 DEC 75 KCH
DATA SET 1 PAGE

TIME	6-DEC 6:00	8 DEC 9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00
VENTURI DIFF - IWC	11.0	11.0	11.0	11.1	11.0	11.1	11.0	11.0	11.2	11.2
ID FAN AMPS	385	380	380	385	385	385	385	385	380	380
KILN AMPS	120	115	120	125	120	125	125	120	120	125
PRESSURE HOOD. IWC	+.10	-.05	-.05	-.05	-.05	-.08	0	0	-.05	0
PRESSURE FEED. IWC	2.1	2.1	2.1	2.1	2.0	2.1	2.0	1.9	2.1	2.0
COOLER AIR FLOW IWC	3.6	4.2	4.1	4.2	4.3	4.2	4.2	4.3	4.3	4.3
COOLER AIR LOCK IWC	0	-.05	+.02	0	0	0	0	0	0	0
COOLER FAN PRESSURE IWC	6.0	5.0	5.0	5.5	5.5	5.5	5.2	5.5	6.0	5.5
BOWL MILL EXHAUST PRESS. IWC	11.0	10.5	10.5	10.5	10.5	10.5	10.5	11.0	11.0	10.5
BOWL MILL AMPS	113	130	135	130	122	120	120	120	120	118
BOWL MILL INLET TEMP °F	430	460	450	440	410	410	408	430	405	450
BOWL MILL EXH. TEMP °F	160	160	155	160	158	155	159	160	158	160
% OXY	.10	.0	.0	.24	.10	.10	.10	.0	.10	.10
COAL RATE LB/HR	7240	8700	7860	7860	7820	7680	7650	7560	7520	778
ID DAMPER SETTING % OPEN	100	100	100	100	100	100	100	100	100	100
KILN SPEED RPH	74	78	82	80	78	75	76	78	74	76
FEED TEMP °F	1370	1360	1340	1330	1340	1350	1350	1320	1320	132
HOOD TEMP °F X 100	17.9	20.1	20.7	19.9	19.7	19.5	19.7	19.7	19.7	20.
% S IN PRODUCT										

NO GAS USED
MAKING HARD BURNED LIME

JE BAKER CO. KILN #2 DBD

Millersville, Ohio 9 Dec. 75

Dolomitic Lime Plant DATA SET 2 PAGE

TIME	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00
VENTURI DIFF (INW)	12.0	12.0	12.0	12.2	12.5	12.5	12.6	12.7	12.5	12.0
ID FAN (AMPS)	325	322	325	322	325	325	325	325	325	325
KILN (MAX AMPS)	170	170	170	170	170	170	170	170	170	170
OVERGATE PRESSURE (INW)	-.10	-.10	-.10	-.12	-.12	-.10	-.12	-.16	-.13	-.15
UNDERGATE PRESSURE (INW)	6.0	6.0	6.2	6.3	6.0	6.0	6.2	6.6	6.2	6.4
PRESSURE HOOD (INW)	-.12	-.12	-.10	-.14	-.12	-.12	-.14	-.14	-.16	-.14
PRESSURE FEED (INW)	.6	.6	.6	.6	.6	.6	.6	.7	.9	.8
FEED END TEMP (°F)	1180	1160	1200	1220	1260	1260	1340	1300	1230	1180
COAL MILL (AMPS)	105	105	105	105	105	105	105	105	105	105
COAL MILL DIFF PRESS. (INW)	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4
COAL MILL INLET TEMP (°F)	510	510	510	510	510	510	510	510	510	510
COAL MILL TEMP (°F)	178	177	177	178	177	176	177	177	174	170
% OXYGEN	.3	.6	.7	.7	.6	.7	.5	.6	.5	.5
COAL (LO/AR X 100)	52	47	45	47	47	45	48	46	45	46
ID DAMPER (% OPEN)	60	60	60	60	60	60	60	60	60	60
KILN SPEED (RPH)	46	46	46	43	43	45	45	45	45	45
FEED TEMP (°F)	1460	1460	1420	1400	1400	1400	1410	1390	1390	1390
MID TEMP (°F)	1600	1600	1600	1600	1600	1600	1610	1600	1610	1600

2:45 excess combustion

Company J. E. Baker | Location Millersville, Ohio

Facility Dolomitic Lime Plant | Unit No. 1 BOF KILN

Operators

Date 5 DEC 75

Data Set No. 1 | Page

KCH

12-5

	Units	3:00	4:00	5:00	6:00	7:00	8:00	9:00
Venturi diff	IWC	11.5	11.9	11.9	12.0	12.0	12.0	12.0
ID Fan Amps	AMPS	370	375	380	380	380	380	380
Kiln Amps	AMPS	115	120	125	120	125	125	125
Pressure Hood	IWC	+.0	+.12	+.0	0	0	0	0
Pressure Feed	IWC	1.6	+1.8	1.7	1.7	1.7	1.7	1.7
Cooler Air Flow	IWC	4.6	4.4	3.8	3.6	3.7	3.7	3.4
Cooler Air Lock	IWC	0	0	0	0	0	0	0
Cooler Fan Pressure	IWC	11.5	11.2	6.0	6.0	6.0	6.5	9.0
Bowl Mill Exh. Pressure	IWC	11.5	11.0	11.0	11.0	11.0	11.0	11.0
Bowl Mill Amps	AMPS	110	95	110	108	108	108	110
Bowl Mill Inlet Temp.	°F	405	362	340	370	360	365	370
Bowl Mill Exh. Temp.	°F	165	160	160	160	160	160	160
% Oxy.		.80		.10	.24	.24	.10	.10
~~% Comb.~~								
Coal/Hr	LB/HR	6810	5050	7370	7400	7280	7420	7280
ID or Damper Setting	% OPEN	100	100	100	100	100	100	100
Kiln Speed	RPM	70	76	72	74	76	74	71
Feed Temp.	°F	1320	1270	1310	1300	1320		
Hood Temp.	°F X100	—	—	20.1	20.5	19.7	19.7	19.5
NATURAL GAS	SCF/HR	OFF						