SOURCE TEST REPORT

DIXIE LIME AND STONE COMPANY
Sumterville, Florida

No. 2 Cooler Baghouse
No. 2 Kiln Exhaust Baghouse

Particulate and SO_2 Emissions

Prepared for:

Dixie Lime and Stone Company
Sumterville, Florida

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ESE No. 82 128 100
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1.0 INTRODUCTION

Particulate and SO_2 emission testing was performed by ESE at Dixie Lime and Stone Company in Sumterville, Florida. The No. 2 kiln exhaust baghouse was tested for particulate and SO_2 emissions. The No. 2 cooler baghouse stack was tested for particulate emissions.

All emission tests were conducted using the United States Environmental Protection Agency (EPA) Method 5 sampling train and procedures. A modification was made for kiln testing that substituted water for 100 ml of 3 percent hydrogen perioxide (H_2O_2) in the first two impingers.

Testing was coordinated by Ms. Doris Reynolds of Dixie Lime and Stone and observed by Mr. Louis Fernandez of the Florida Department of Environmental Regulation (FDER).

2.0 SUMMARY AND DISCUSSION OF RESULTS

Results of the particulate emission testing are summarized in Table 1. Complete emission data and stack gas parameters are included in Appendix A.

Average particulate emissions were equal to 8.86 and 0.96 pounds per hour (lb/hour) for the No. 2 kiln exhaust and No. 2 cooler stacks, respectively. The allowable emission rate was 28.08 lbs/hour for both the No. 2 kiln exhaust and No. 2 cooler stacks. Allowable emission rates were calculated based on the feed process rates as stated in the Rules of the FDER, Chapter 17-2.610(1).

Both units sampled were in compliance with particulate emission standards during the test period.

Kiln SO_2 emissions were evaluated for background data only and are presented in Table 2.

Table 1. Particulate Emission Summary: No. 2 Cooler and No. 2 Kiln, Baghouse Stacks, Dixie Lime and Stone Sumterville, Florida

Source Tested	Run Number	Date (1982)	Time (Start-Finish)		Volumetric Flow Rate ACFM	Volumetric Flow Rate SCFM	Stack Temp (°F)	O (%)	H20 (%)	ISO (%)	Emission Rate (lb/hr) Actual	Emission Rate (lb/hr) Allowable
Kiln	1	5-25	1100	1110	49,900	30,200	322	10.0	10.49	99.7	8.38	28.08
	2	5-25	1145	1247	49,800	29,600	327	10.2	11.58	100.8	10.33	28.08
	3	5-25	1320	1422	49,900	29,600	330	10.0	11.49	102.1	7.87	28.08
Average					49,900	29,800	326	10.1	11.20	101.0	8.86	28.08
Cooler	1	5-26	0845	0949	33,500	25,300	225	21.0	2.64	101.6	1.15	28.08
	2	5-26	1017	1120	33,700	25,100	230	21.0	3.04	99.9	1.11	28.08
	3	5-26	1153	1255	33,600	24,900	236	21.0	2.95	99.9	0.62	28.08
Average					33,600	25,100	230	21.0	2.88	100.5	0.96	28.08

Source: ESE, 1982

Table 2. SO_2 Emissions, No. 2 Kiln

Stack	Run Number	Date	Stack Temp (°F)	Flow Rate (SCFMD)	H O (%)	Emissions	
						ppm (wet)	lb/hr
Kiln	1*	5/25/82	322	30210	10.54	12	4.09*
No. 2	2	5/25/82	327	29627	11.64	45	14.89
	3	5/25/82	331	29578	11.55	48	15.84
Average			329	29602	11.59	46.5	15.36

*Sample loss in transit to lab voids Run 1 on kiln stack. Run 1 is not included in average.

Source: ESE, 1982

3.0 PROCESS DESCRIPTION AND OPERATION

The kiln system is used to calcine limerock. The hearth-type kiln and cooler schematic is presented in Figure 1. The system is designed to preheat the rock and the combustion air before they enter the kiln.

During the No. 2 kiln and the No. 2 cooler stack tests on May 25 and 26, 1982, the feed rate was 27.6 tons per hour (TPH), and the fuel rate was 452.7 gallons per hour (gal/hr) of No. 6 fuel oil.

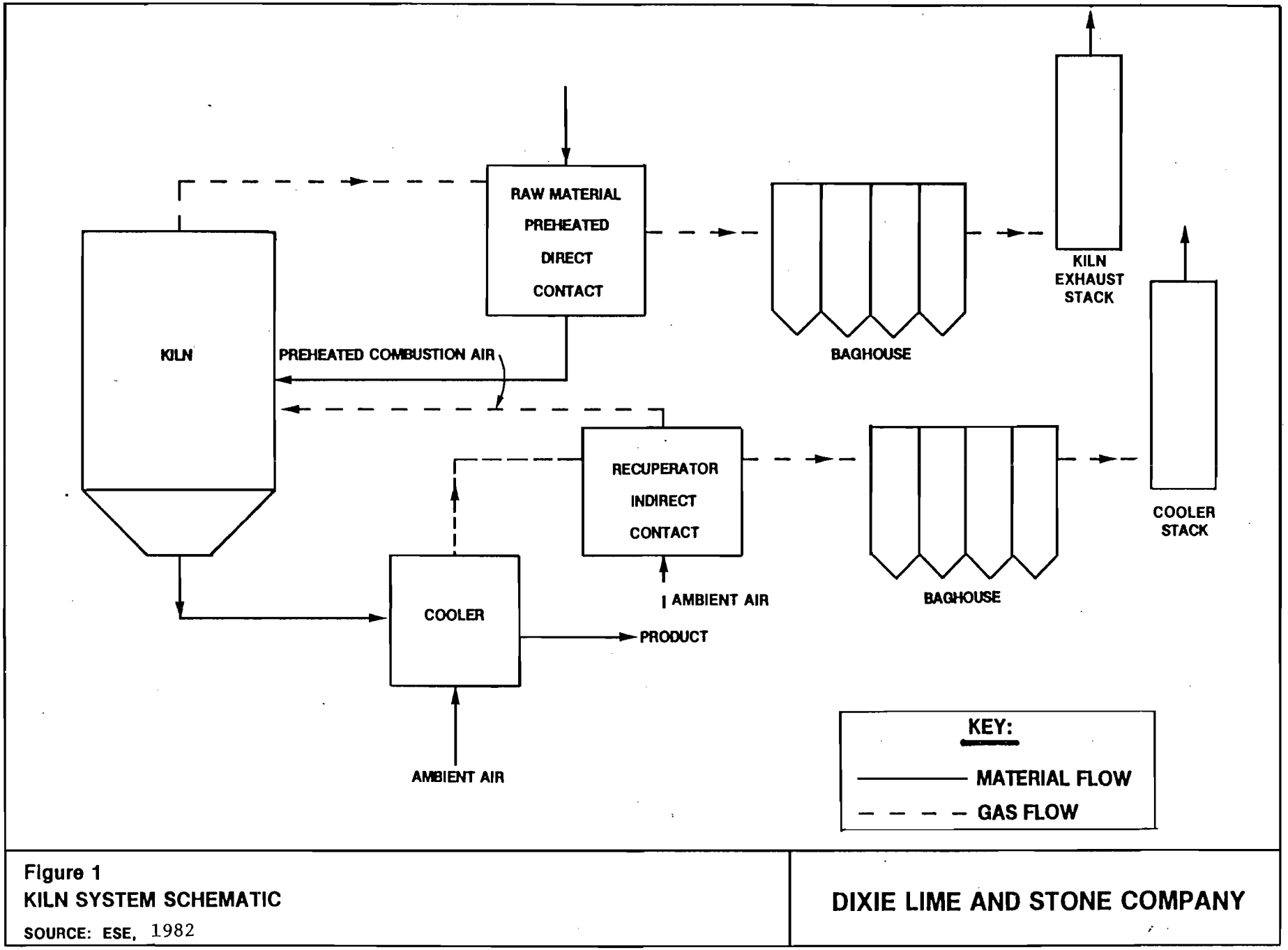
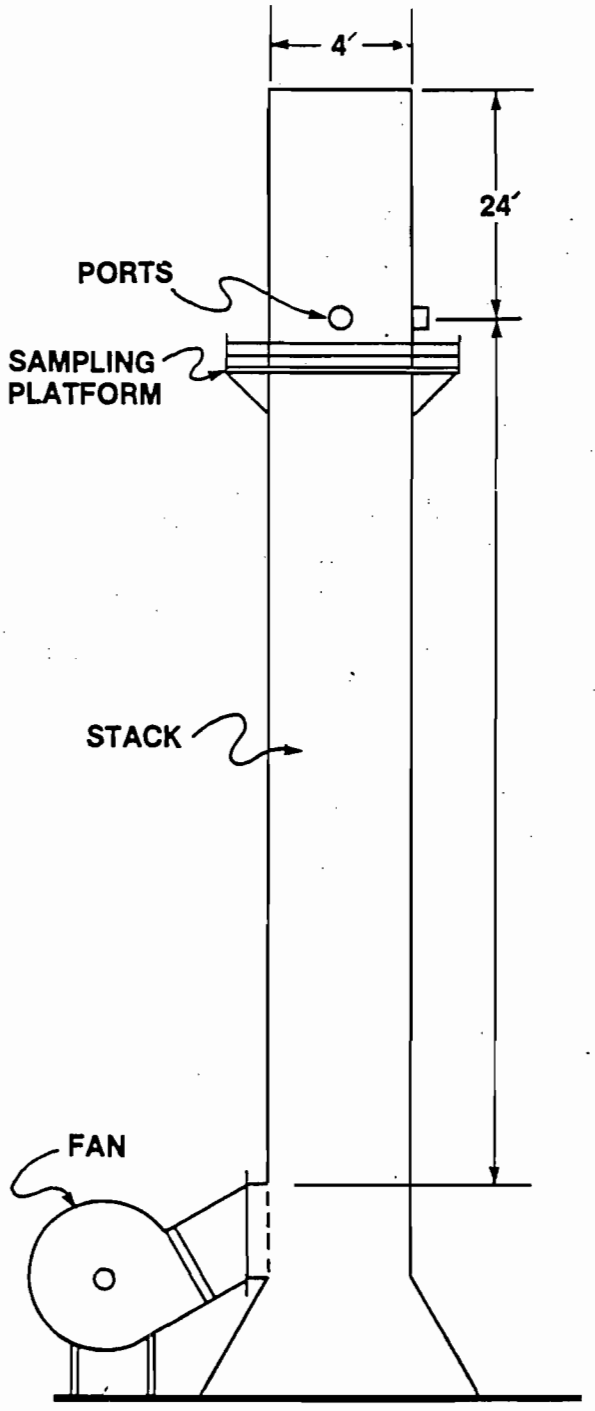


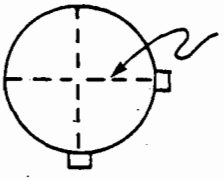
Figure 1
KILN SYSTEM SCHEMATIC
SOURCE: ESE, 1982

DIXIE LIME AND STONE COMPANY

4.0 SAMPLING POINT LOCATION

A schematic of the No. 2 cooler stack and No. 2 kiln exhaust stack is presented in Figure 2. The No. 2 cooler and No. 2 kiln exhaust stacks have identical dimensions.





SAMPLING POINTS

POINT NUMBER	INCHES FROM STACK WALL
1	2.112
2	7.008
3	14.304
4	33.792
5	40.992
6	45.888

Note: The No.2 cooler and No. 2 kiln exhaust stacks have identical dimensions.

Figure 2
SAMPLING POINT SCHEMATIC

SOURCE: ESE, 1982

DIXIE LIME AND STONE COMPANY

5.0 FIELD AND ANALYTICAL PROCEDURES

5.1 SAMPLING

The sampling and analytical procedures used follow the procedures as outlined in EPA Method 5, in the Code of Federal Regulations, Chapter I, Title 40, Part 60, Appendix A, Method 5, revised as of July 1, 1979. The sampling equipment consisted of the following:

1. Pitobe Assembly
   a. Nozzle--Stainless steel with a sharp, tapered leading edge.
   b. Probe--Stainless steel sheath with a 5/8-inch OD Pyrex® glass insert wrapped with nichrome wire; rheostat controlled and capable of maintaining a minimum temperature of 250°F.
   c. Pitot--Type "S" constructed and attached to probe according to specifications outlined in the Code of Federal Regulations, Chapter I, Title 40, Part 60, Appendix A, Method 2.
   d. Orsat Probe--Stainless steel 1/4-inch tubing attached to pitot tube in an interference-free arrangement.
   e. Thermocouple--Type "K" attached to the pitot tube such that the tip has no contact with metal and does not interfere with the pitot tube face openings.
2. Filter Holder--Pyrex® glass with fritted glass filter support.
3. Filter Heating Assembly--Controlled heating element in aluminum module attached to end of probe; capable of maintaining 250°F±25°F.
4. Impingers--Four impingers connected in series with glass ball joint fittings and placed in an ice bath. The first, third, and fourth impingers are the modified Greenburg-Smith design. The second impinger is the Greenburg-Smith design with a standard tip. Final gas exit temperature is measured to within ±5° with a dial thermometer immersed in the gas stream.
5. Control Box--Module containing vacuum gage, leak-free pump, thermometers capable of measuring temperature to within ±5°,

dry gas meter with a minimum of 2 percent accuracy, valves and related equipment as required to maintain an isokinetic sampling rate and to determine sample volume.

6. Nomograph--To determine isokinetic sampling rate.

A schematic of the sampling train is shown in Figure 3.

Prior to leaving the laboratory, glass fiber filters were numbered for identification, heated for 2 hours at 105 degrees C, desiccated for 2 hours, and preweighed to the nearest 0.1 mg. Silica gel (indicating type, 6-16 Mesh) was also preweighed to approximately 200 grams after drying for 2 hours.

Upon arrival at the sampling site, the control box was leak-checked from pump to orifice at 5 to 7 inches of water.

The sample train was prepared in the following manner: 100 ml of hydrogen peroxide was added to each of the first two impingers. The third impinger was left empty to act as a moisture trap, and the preweighed silica gel was added to the fourth impinger. After assembling the train with the pitobe as shown in the schematic, the system was leak-checked by plugging the inlet to the probe nozzle and pulling a 15-inch Hg vacuum. A leakage rate not in excess of 0.02 cfm was considered acceptable. The pitot tube system was also leak-checked at 2 - 3 inches of water, and any leaks found were corrected.

The inside dimensions of each stack were measured and recorded. The number of sampling points and the location of these points on a traverse were determined by the guidelines set forth in the Code of Federal Regulations, Chapter I, Title 40, Part 60, Appendix A, Method 1. These points were then marked on the probe for easy visibility.

A preliminary traverse was conducted to determine the range of velocity head and the pressure of the stack. An approximate stack temperature

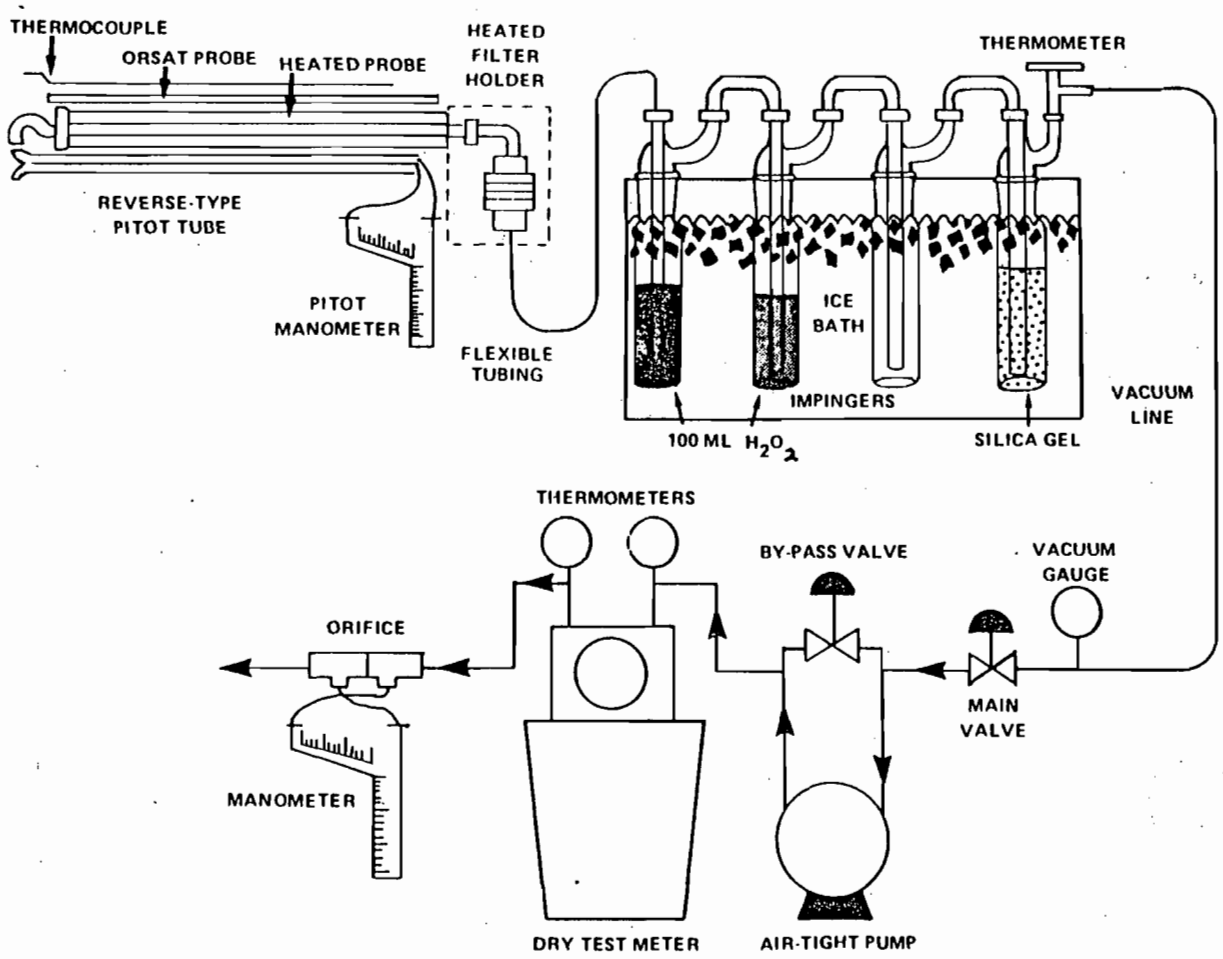


Figure 3
EPA METHOD 5 SAMPLING TRAIN (MOD.)
SOURCE: ESE, 1982

DIXIE LIME AND STONE COMPANY

was obtained taking a traverse, and an approximate moisture content was estimated based on prior testing experience. From these data, the correct nozzle size and the nomograph correction factor were determined.

The probe was attached and the heater was adjusted to provide a gas temperature of approximately 250 degrees F. The filter heating system was turned on, and crushed ice was placed around the impingers. After a suitable warmup period, the nozzle was placed on the first traverse point with the tip pointing directly into the gas stream. The pump was started and the flow adjusted to isokinetic conditions. After the required time interval had elapsed, the probe was repositioned to the next traverse point, and isokinetic sampling was reestablished. This was done for each point on the traverse until the run was completed. Readings were taken at least every 5 minutes or when significant changes in stack conditions necessitated additional adjustments in flow rate. At the conclusion of each run, the pump was turned off and the final readings were recorded. A final leak check of the system was performed as previously described at the highest vacuum encountered during testing, and a leak check of the pitot system was repeated.

5.2 SAMPLE RECOVERY

The collection train was carefully moved to a convenient sample recovery area in order to minimize the loss of collected sample or the gain of extraneous particulate matter. The volume of condensate in the first three impingers was measured and recorded on the field data sheet. The contents were then placed in a clean sample bottle and the impingers were washed with distilled water. The washings were added and the level of sample marked to insure none would be lost in transit. The probe, nozzle, and all sample-exposed surfaces were washed with reagent grade acetone and put into a clean sample bottle marked "prefilter". A brush was used to loosen any adhering particulate matter, and subsequent washings were put into the "prefilter" container. The filter was carefully removed from the fritted glass support and placed in its original container. The silica gel was removed from the fourth impinger and transferred to its original container. A sample of the acetone used in washing the probe was saved for a blank laboratory analysis.

5.3 ANALYTICAL PROCEDURES

The filter and any loose particulate matter were transferred from the sample bottle to a clean, tared glass weighing dish. The filter was placed in an oven at 105 degrees C for 2 hours, desiccated for 2 hours, and then weighed. The original weight of the filter was deducted, and the weight gain was recorded to the nearest 0.1 mg.

The "prefilter" and blank solutions were transferred to clean, tared beakers, then evaporated to dryness and desiccated to a constant weight. The blank correction was made, and the weight gain was recorded to the nearest 0.1 mg. The silica gel was weighed, and the weight gain was recorded to the nearest 0.1 gram.

The impinger sample was carefully transferred to the laboratory site and the volume checked. A suitable aliquot was added to 100 percent isopropanol with two to four drops of thorin indicator. The solution was then titrated with nominal 0.0100 N barium perchlorate to a pink end point. This was repeated until samples agreed within 1 percent.

5.4 CO2 and O2 SAMPLING AND ANALYSIS

For sources requiring an "F" factor calculation or emission adjustment, CO2 and O2 samples were collected by an integrated bag system. The Orsat sampling system consisted of a stainless steel probe, sample line from probe to a condenser, a small vacuum pump with a rotometer, and a Tedlar bag enclosed in a 13-gallon plastic bottle.

The Orsat sampling procedure consists of the following leak-check and sampling techniques. Prior to sampling, the bag was leak-checked at 2 to 4 inches of water. The inlet to the condenser was plugged, and a vacuum of 10 inches of Hg was pulled. The outlet of the pump was then plugged and the pump shut off. The vacuum held steady for at least 30 seconds. The sample line was then purged with stack gas and the bag was connected. Sampling was conducted at an appropriate constant rate at the same points and for the same length of time as the particulate sampling. At the conclusion of the run, the pump was shut off and the bag secured.

After leak checking the Orsat gas analyzer, an average value for each gas was determined. The gas was measured until two values were obtained that fell within the specified variance of the gas tested. Data were recorded on the field data sheet, and the bag was evacuated for the next sample run.

APPENDIX A

COMPLETE EMISSION DATA

EPA PARTICULATE NOMENCLATURE SHEET

VIC--total volume of condensate collected in impingers and silica gel, ml

VWSTD--total volume of water collected in standard gas phase, scf

VM--volume of dry gas sampled, acf

PB--barometric pressure, in Hg

ΔH--average pressure drop across the meter orifice, in H_2O

Y-factor--dry gas meter correction factor

VMSTD--volume of dry gas sampled at standard conditions, scf

BWO--proportion by volume of water vapor in gas stream

$\%CO_2$--percent carbon dioxide by volume, dry basis

$\%O_2$--percent oxygen by volume, dry basis

%CO--percent carbon monoxide by volume, dry basis

$\%N_2$--percent nitrogen by volume, dry basis

MD--stack gas molecular weight, dry basis, lb/lb-mole

MS--stack gas molecular weight, wet basis, lb/lb-mole

%EA--percent of excess air in stack gas

$\sqrt{\Delta P}$--average square root of velocity head of stack gas, $(\text{in } H_2O)^{1/2}$

TS--average absolute stack gas temperature, °R

PS--absolute stack gas pressure, in Hg

VS--average stack gas velocity, fps

AS--cross-sectional area of stack, sf

QA--volumetric flow rate at standard conditions, dry basis, scfmd

T--net time of test, min

AN--cross-sectional area of nozzle, sf

%I--average percent isokinetic sampling rate

MN--total net mass of particulate catch, mg

CA--particulate concentration, grains/acf

CS--particulate concentration at standard conditions, grains/scf

EM--particulate emission rate, lbs/hr

E--particulate emission rate, lbs/mm Btu

EQUATIONS FOR CALCULATING PARTICULATE EMISSIONS

$$VWSTD = (0.0472) \times (VIC)$$

$$VMSTD = (17.65) \times (VM) \times (PB + \frac{\Delta H}{13.6}) \times (Y\text{-factor})$$

$$BWO = [\frac{VWSTD}{VWSTD \times VMSTD}]$$

$$MD = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times \%CO) + (0.28 \times \%N_2)$$

$$MS = [MD \times (1 - BWO)] + (18 \times VIC)$$

$$EA = \frac{[100 \times (\%O_2 - \frac{\%CO}{2})]}{[(0.266 \times \%N_2) - (O_2 - \frac{\%CO}{2})]}$$

$$VS = (85.48) \times (CP) \times \sqrt{\Delta P} \times [\frac{TS}{(PS \times MS)}]^{1/2}$$

$$QA = (60) \times (VS) \times (AS)$$

$$QD = (QA) \times (1 - BWO)$$

$$QS = (17.65) \times (QD) \times (\frac{PS}{TS})$$

$$\%I = [\frac{(1.667) \times (TS) \times (0.00267 \times VIC \times \frac{VMSTD}{17.65})}{(T) \times (VS) \times (PS) \times (AN)}]$$

$$CS = (0.0154) \times (\frac{MN}{VMSTD})$$

$$CA = (17.65) \times (CS) \times (1 - BWO) \times (\frac{PS}{TS})$$

$$EM = (1.323 \times 10^{-4}) \times (\frac{MN}{VMSTD}) \times (QS)$$

$$E = \frac{(CS) \times (F\text{-factor})}{7,000} \times [\frac{20.9}{20.9 - \%O_2}]$$

PLANT NAME - DIXIE LIME & STONE LOCATION -

STACK ID - NO. 2 KILN EXHAUST BAGHO SAMPLING TRAIN - PARTICULATES

- E N G L I S H UNITS -

	RUN 1	RUN 2	RUN 3	AVG
DATE OF RUN	5/25/82	5/25/82	5/25/82	
STARTING TIME (HRS)	1000	1145	1320	
ENDING TIME (HRS)	1110	1247	1422	
NET TIME OF RUN (MIN)	60.	60.	60.	
NUMBER OF POINTS	12.	12.	12.	
BAROMETRIC PRESSURE (IN HG)	30.04	30.04	30.04	
STACK PRESSURE (IN HG)	30.01	30.01	30.01	
PITOT TUBE COEF.	0.840	0.840	0.840	
METER BOX NUMBER	5	5	5	
Y-FACTOR	1.0000	1.0000	1.0000	
STACK CROSS-SEC. AREA (SF)	12.57	12.57	12.57	
EFF. STACK CROSS-SEC. AREA (SF)	12.57	12.57	12.57	
NOZZLE DIAMETER (IN)	0.2450	0.2450	0.2450	
NOZZLE AREA (SF)	0.000327	0.000327	0.000327	
METER TEMP. (DEG F)	86.3	95.6	97.0	
STACK TEMP. (DEG F)	322.1	327.1	330.8	326.67
VOL. DRY GAS SMPL. (ACF)	48.251	48.665	49.310	
VOL. DRY GAS SMPL. STD. COND. (SCFD)	47.08	46.69	47.18	
CONDENSATE COLLECTED (ML)	117.0	129.7	130.0	
% H2O PRELIM. SPEC. (%)	0.00	0.00	0.00	
% H2O CALCULATED (%)	10.49	11.58	11.49	11.19
% H2O @ SATURATION (%)	100.00	100.00	100.00	100.00
% CARBON DIOXIDE (%)	12.5	12.5	12.6	12.53
% OXYGEN (%)	10.0	10.2	10.0	10.07
% CARBON MONOXIDE (%)	0.0	0.0	0.0	0.00
% EXCESS AIR	91.7	95.3	91.7	92.9
MOLECULAR WT., DRY (LB/LB-MOLE)	30.40	30.41	30.42	30.41
MOLECULAR WT., WET (LB/LB-MOLE)	29.10	28.97	28.99	29.02
DELTA H AVG, ORIFICE (IN H2O)	2.242	2.208	2.217	
SQRT DELTA P AVG, PITOT (IN H2O)	0.973	0.967	0.967	
AVG. VELOCITY, STACK GAS (F/S)	66.13	66.09	66.18	66.14
ACTUAL FLOW RATE (ACFM)	49864.	49830.	49900.	49865.
ACTUAL FLOW RATE, DRY (ACFMD)	44636.	44060.	44164.	44286.
VOL. FLOW RATE @ STD. COND. (SCFMD)	30225.	29646.	29575.	29815.
EFF. FLOW RATE @ STD. COND. (SCFMD)	30225.	29646.	29575.	
% ISOKINETIC	99.67	100.76	102.08	100.84
TOTAL FILTER CATCH (MG)	68.80	87.70	65.30	
TOTAL WASH CATCH (MG)	29.90	35.30	29.60	
TOTAL CATCH (MG)	98.70	123.00	94.90	
PARTICULATE CONCENTRATION (LB/SCFD)	4.62E-06	5.81E-06	4.43E-06	
PARTICULATE CONCENTRATION (GRAINS/ACF)	0.0196	0.0241	0.0184	0.0207
PARTICULATE CONCENTRATION (GRAINS/SCFD	0.0323	0.0406	0.0310	0.0346
PARTICULATE EMISSION RATE (LB/HR)	8.38	10.33	7.87	8.86

PLANT NAME - DIXIE LIME & STONE LOCATION -

STACK ID - NO. 2 COOLER BAGHOUSE SAMPLING TRAIN - PARTICULATES

- E N G L I S H UNITS -

	RUN 1	RUN 2	RUN 3	AVG
DATE OF RUN	5/26/82	5/26/82	5/26/82	
STARTING TIME (HRS)	845	1017	1153	
ENDING TIME (HRS)	949	1120	1255	
NET TIME OF RUN (MIN)	60.	60.	60.	
NUMBER OF POINTS	12.	12.	12.	
BAROMETRIC PRESSURE (IN HG)	30.04	30.04	30.04	
STACK PRESSURE (IN HG)	30.01	30.01	30.01	
PITOT TUBE COEF.	0.840	0.840	0.840	
METER BOX NUMBER	5	5	5	
Y-FACTOR	1.0000	1.0000	1.0000	
STACK CROSS-SEC. AREA (SF)	12.57	12.57	12.57	
EFF. STACK CROSS-SEC. AREA (SF)	12.57	12.57	12.57	
NOZZLE DIAMETER (IN)	0.2450	0.2450	0.2450	
NOZZLE AREA (SF)	0.000327	0.000327	0.000327	
METER TEMP. (DEG F)	74.4	80.3	82.5	
STACK TEMP. (DEG F)	224.5	230.0	235.8	230.11
VOL. DRY GAS SMPL. (ACF)	40.314	39.754	39.608	
VOL. DRY GAS SMPL. STD. COND. (SCFD)	40.13	39.14	38.84	
CONDENSATE COLLECTED (ML)	23.1	26.0	25.0	
% H2O PRELIM. SPEC. (%)	0.00	0.00	0.00	
% H2O CALCULATED (%)	2.64	3.04	2.95	2.87
% H2O @ SATURATION (%)	100.00	100.00	100.00	100.00
% CARBON DIOXIDE (%)	0.0	0.0	0.0	0.00
% OXYGEN (%)	21.0	21.0	21.0	21.00
% CARBON MONOXIDE (%)	0.0	0.0	0.0	0.00
% EXCESS AIR	N/A	N/A	N/A	
MOLECULAR WT., DRY (LB/LB-MOLE)	28.84	28.84	28.84	28.84
MOLECULAR WT., WET (LB/LB-MOLE)	28.55	28.51	28.52	28.53
DELTA H AVG, ORIFICE (IN H2O)	1.412	1.412	1.397	
SQRT DELTA P AVG, PITOT (IN H2O)	0.693	0.692	0.689	
AVG. VELOCITY, STACK GAS (F/S)	44.49	44.64	44.62	44.58
ACTUAL FLOW RATE (ACFM)	33544.	33661.	33643.	33616.
ACTUAL FLOW RATE, DRY (ACFMD)	32658.	32639.	32652.	32650.
VOL. FLOW RATE @ STD. COND. (SCFMD)	25267.	25051.	24851.	25056.
EFF. FLOW RATE @ STD. COND. (SCFMD)	25267.	25051.	24851.	
% ISOKINETIC	101.62	99.98	99.99	100.53
TOTAL FILTER CATCH (MG)	3.50	3.50	3.00	
TOTAL WASH CATCH (MG)	10.30	9.60	4.30	
TOTAL CATCH (MG)	13.80	13.10	7.30	
PARTICULATE CONCENTRATION (LB/SCFD)	7.58E-07	7.38E-07	4.14E-07	
PARTICULATE CONCENTRATION (GRAINS/ACF)	0.0040	0.0038	0.0021	0.0033
PARTICULATE CONCENTRATION (GRAINS/SCFD	0.0053	0.0052	0.0029	0.0044
PARTICULATE EMISSION RATE (LB/HR)	1.15	1.11	0.62	0.96

SAMPLE CALCULATIONS
STACK ID: NO. 2 COOLER BAGHOUSE

SULFUR DIOXIDE EMISSION DATA

PLANT NAME - DIXIE LIME & STONE
STACK ID - NO. 2 KILN EXHAUST BAGHO

RUN NO.	1	2	3
DATE	5/25/82	5/25/82	5/25/82
TIME OF SAMPLE	1008-1110	1145-1247	1320-1422
BAROMETRIC PRESSURE, "HG	30.74	30.04	30.04
VOLUME OF METER	48.251	48.665	49.310
AVERAGE STACK TEMP. DEG R	782.1	787.1	790.8
AVERAGE METER TEMP. DEG R	546.3	555.6	557.8
GAS VOLUME SAMPLED, FT^3, VSTPD	46.822	46.433	46.930
% MOISTURE AT SATURATION	100.00	100.00	100.00
% MOISTURE CALCULATED	10.54	11.64	11.55
% OXYGEN	10.00	10.20	10.00
SQRT DELTA P AVG	0.973	0.967	0.967
SO2 CONC., LB/FT^3	2.26E-05	8.38E-06	8.93E-06
SO2 CONC. DRY, PPM	13.64	50.60	53.93
SO2 CONC. WET, PPM	12.21	44.72	47.70
QS, (ACFM)	49870.	49832.	49934.
QS, (SCFMD)	30210.	29627.	29578.
SO2 EMISSION RATE, LB/HR	4.09	14.85	15.84

APPENDIX B

FIELD DATA SHEETS

98%

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

SOURCE SAMPLING FIELD DATA SHEET

Plant: Dixie Lime + Stone
Sampling Location: NO. 2 Kiln Exhaust Baghouse
Type of Sampling Train: EPA-5 SO2
Type of Samples: Particulate, SO2
Date: 5-25-82 Run No.: 1
Time Start: 1000 Time End: 1110
Sample Time: 5/12 min/pt: 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press.: 30.04 "Hg Stack Press.: 30.01 "Hg
Assumed Moisture: 10 %, FDA ___ Gas Density Factor ___
Weather: Slight Hazy
Temp.: 85 °F, W/D ___, Meter Box No.: 5
Meter V H@: 1.66 Pitot Corr. Factor: .84
Nozzle Dia.: 0.245 in Probe Length: 6 ft
Probe Heater Setting: 70 Nomograph C_f: 1.0 = 2.35
Stack Dimensions: 48 in
Stack Area: 12.566 ft^2
Effective Stack Area: 12.566 ft^2
Stack Height: ~50 ft

NOZ. 0.246, 0.244, 0.245

Mat'l Processing Rate: Raw Feed 33 TN/hr
Final Gas Meter Reading: 391.553 ft^3
Initial Gas Meter Reading: 343.302 ft^3
Net Gas Volume Sampled: 48.251 ft^3
Condensate Increase in Impingers: 104.0 ml
Moisture in Silica Gel: 13.0 gm
Total Condensate: 117.0 ml
Silica Gel Container No. ___ Filter No.: 068

Orsat:					
% CO_2	12.5				
% O_2	10.0				
% CO					
% N_2					
% Excess Air					

Test Conducted By: Reshard, Czarniak

Sample Train Leak Check @ 15" Hg: 0.000 CFM
Remarks: FINAL @ 10 " Hg, 0.000 CFM

Louis Fernandez O.E.R.

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (F°)	Gas Sample Temp. @Dry' Gas Meter (F°)		Sample Box Or Filter Temp. (F°)	Last Impinger Temp. (F°)	Vacuum On Sample Train ("Hg)
					Calc.	Actual		In	Out			
		1000	343.302									
W-1		1005	346.910	.75	1.8		315	8	0	275	55	5.0
2		1010	351.030	.90	2.1		325	8	0	275	55	4.8
3		1015	355.450	1.0	2.35		325	8	1	275	55	5.0
4		1020	360.025	1.1	[illegible]	2.6	330	8	3	275	55	5.6
5		1025	364.525	1.05	2.5		325	8	4	275	55	5.8
6		1030	368.909	1.0	2.35		325	8	6	275	55	5.9
				.98								

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ($"H_2O$)	Orifice Press. Diff. ($"H_2O$)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box or Filter Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
		1040			Calc.	Actual		In	Out			
N - 1		1045	372.760	.85	2.0		320	8	8	275	60	5.0
2		1050	376.840	.95	2.25		320	8	9	275	60	5.2
3		1055	381.110	1.0	2.35		320	8	9	275	60	5.5
4		1100	385.220	1.0	2.35		320	9	0	275	60	5.6
5		1105	388.960	1.0	2.35		320	9	2	275	60	5.6
6		1110	391.553	.80	1.9		320	9	3	275	60	5.0

Run No. 1 Page 2 of 2 pages

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

98 %

SOURCE SAMPLING FIELD DATA SHEET

Plant Dixie Lime + Stone
Sampling Location No. 2 Kiln Exhaust Baghouse
Type of Sampling Train EPA-5
Type of Samples Particulate, SO2
Date 5-25-82 Run No. 2
Time Start 1145 Time End 1247
Sample Time 5/12 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 30.04 "Hg Stack Press. 30.01 "Hg
Assumed Moisture 10 %, FDA ___ Gas Density Factor ___
Weather Overcast
Temp. 85 °F, W/D ___, Meter Box No. 5
Meter V H@ 1.66 Pitot Corr. Factor .84
Nozzle Dia. 0.245 in Probe Length 6 ft
Probe Heater Setting 70 Nomograph C$_f$ 1.0 = 2.35
Stack Dimensions 48 in
Stack Area 12.566 ft^2
Effective Stack Area 12.566 ft^2
Stack Height ~50 ft

Mat'l Processing Rate ___
Final Gas Meter Reading 447.870 ft^3
Initial Gas MeterReading 399.205 ft^3
Net Gas Volume Sampled 48.665 ft^3
Condensate Increase in Impingers 118.0 ml
Moisture in Silica Gel 11.7 gm
Total Condensate 129.7 ml
Silica Gel Container No. ___ Filter No. 066

Orsat:						
% CO_2	12.5					
% O_2	10.2					
% CO						
% N_2						
% Excess Air						

Test Conducted By: Reshard, Czarniak

Sample Train Leak Check @ 15" Hg 0.000 CFM
Remarks: FINAL @ 10 " Hg, 0.000 CFM

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (F°)	Gas Sample Temp. @Dry' Gas Meter (F°)		Sample Box Or Filter Temp. (F°)	Last Impinger Temp. (F°)	Vacuum On Sample Train ("Hg)
					Calc.	Actual		In	Out			
		1145	399.205									
N - 1		1150	403.065	.80	1.9		320	9	1	275	55	5.0
2		1155	406.990	.90	2.1		325	9	2	275	55	5.1
3		1200	411.140	1.0	2.35		325	9	3	275	55	5.5
4		1205	415.210	1.0	2.35		330	9	4	275	56	5.5
5		1210	419.165	.95	2.25		330	9	5	275	56	5.2
6		1215	422.950	.85	2.0		325	9	6	275	56	5.0

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ($"H_2O$)	Meter Orifice Press. Diff. ($"H_2O$)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box or Filter Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
W - 1		1222	426.810	.85	2.0		325	96		275	60	5.0
2		1227	430.775	.90	2.1		330	97		275	60	5.2
3		1232	435.010	1.0	2.35		330	98		275	60	5.4
4		1237	439.505	1.05	2.5		330	98		275	60	6.0
5		1242	443.960	1.05	2.5		330	98		275	60	6.1
6		1247	447.870	.90	2.1		325	99		275	60	6.0

Run No 2 Page 2 of 2 pages

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

98 %

SOURCE SAMPLING FIELD DATA SHEET

Plant Dixie Lime + Stone
Sampling Location No. 2 Kiln Exhaust Baghouse
Type of Sampling Train EPA-5
Type of Samples Particulate, SO2
Date 5-25-82 Run No. 3
Time Start 1320 Time End 14
Sample Time 5/12 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 30.04 "Hg Stack Press. 30.01 "Hg
Assumed Moisture 10 %, FDA ___ Gas Density Factor ___
Weather Partly Cloudy
Temp. 90 °F, W/D ___, Meter Box No. 5
Meter V H@ 1.66 Pitot Corr. Factor .84
Nozzle Dia. 0.245 in Probe Length 6 ft
Probe Heater Setting 70 Nomograph C_f 1.0 = 2.35
Stack Dimensions 48 in
Stack Area 12.566 ft^2
Effective Stack Area 12.566 ft^2
Stack Height ~50 ft

Mat'l Processing Rate ___
Final Gas Meter Reading 504.925 ft^3
Initial Gas Meter Reading 455.615 ft^3
Net Gas Volume Sampled 49.310 ft^3
Condensate Increase in Impingers 116.0 ml
Moisture in Silica Gel 14.0 gm
Total Condensate 130.0 ml
Silica Gel Container No. ___ Filter No. 067

Orsat:					
% CO_2	12.6				
% O_2	10.0				
% CO					
% N_2					
% Excess Air					

Test Conducted By: Reshard, Czarniak

Sample Train Leak Check @ 15" Hg 0.000 CFM
Remarks: FINAL @ 10.0 " Hg 0.000 CFM

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (F°)	Gas Sample Temp. @Dry' Gas Meter (F°)		Sample Box Or Filter Temp. (F°)	Last Impinger Temp. (F°)	Vacuum On Sample Train ("Hg)
					Calc.	Actual		In	Out			
		1320	455.615									
W - 1		1325	459.285	.75	1.8		330	9	5	275	60	5.0
2		1330	463.265	.80	1.9		330	9	5	275	60	5.0
3		1335	467.560	.95	2.25		335	9	6	275	60	5.2
4		1340	471.885	1.0	2.35		335	9	6	275	60	5.4
5		1345	476.340	1.05	2.5		330	9	7	275	60	6.0
6		1350	480.386	.90	2.1		325	9	7	275	60	5.4

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Inlet Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Gas Sample Temp. @Dry Gas Meter (°F)		Sample Box or Filter Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
N - 1		1354	484.280	.85	2.0		325	9	7	275	60	5.1
2		1402	488.505	.95	2.25		330	9	7	275	60	5.4
3		1407	492.950	1.0	2.35		330	9	8	275	60	5.8
4		1412	497.310	1.05	2.5		335	9	8	275	60	6.0
5		1417	501.960	1.1	2.6		335	9	9	275	60	6.3
6		1422	504.925	.85	2.0		330	9	9	278	60	5.3

Run No. 3 Page 2 of 2 pages

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

100 %

SOURCE SAMPLING FIELD DATA SHEET

Plant Dixie Lime + Stone
Sampling Location NO.2 Cooler Baghouse
Type of Sampling Train EPA-5
Type of Samples Particulate
Date 5-26-82 Run No. 1
Time Start 0845 Time End 0949
Sample Time 5/12 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 30.04 "Hg Stack Press. 30.01 "Hg
Assumed Moisture 2 %, FDA ___ Gas Density Factor ___
Weather Overcast
Temp. 70 °F, W/D ___, Meter Box No. 5
Meter V H@ 1.66 Pitot Corr. Factor .84
Nozzle Dia. 0.245 in Probe Length 6 ft
Probe Heater Setting 70 Nomograph C_f 1.0 = 2.85
Stack Dimensions 48 in
Stack Area 12.566 ft²
Effective Stack Area 12.566 ft²
Stack Height ~60 ft

Mat'l Processing Rate ___
Final Gas Meter Reading 552.768 ft³
Initial Gas Meter Reading 512.454 ft³
Net Gas Volume Sampled 40.314 ft³
Condensate Increase in Impingers 14.0 ml
Moisture in Silica Gel 9.1 gm
Total Condensate 23.1 ml
Silica Gel Container No. ___ Filter No. 069

Orsat:					
% CO_2	0				
% O_2	21				
% CO					
% N_2					
% Excess Air					

Test Conducted By: Reshard, Czarniak

Sample Train Leak Check @ 15" Hg 0.000 CFM
Remarks: FINAL @ 10.0 " Hg 0.000 CFM

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (F°)	Gas Sample Temp. @Dry Gas Meter (F°)		Sample Box Or Filter Temp. (F°)	Last Impinger Temp. (F°)	Vacuum On Sample Train ("Hg)
					Calc.	Actual		In	Out			
		0845	512.454									
S - 1		0850	515.570	.40	1.18		220	71	72	275	55	3.5
2		0855	518.845	.43	1.28		225	71	72	275	55	3.6
3		0900	522.250	.46	1.35		228	71	73	275	55	3.8
4		0905	525.950	.56	1.63		228	71	74	275	55	4.4
5		0910	529.225	.54	1.58		225	71	74	275	55	4.2
6		0915	533.086	.50	1.45		220	71	75	275	55	4.0

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box or Filter Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
W - 1		0924	536.170	.40	1.18		225	76		275	55	3.5
2		0929	539.510	.50	1.45		225	75		275	55	3.9
3		0934	542.980	.56	1.63		225	75		275	55	4.2
4		0939	546.410	.54	1.58		228	75		275	55	4.1
5		0944	549.890	.50	1.45		225	76		275	55	3.9
6		0949	552.768	.40	1.18		220	77		275	55	3.8

Run No. 1 Page 2 of 2 pages

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

100%

SOURCE SAMPLING FIELD DATA SHEET

Plant Dixie Lime & Stone
Sampling Location No. 2 Cooler Baghouse
Type of Sampling Train EPA-5
Type of Samples Particulate
Date 5-26-82 Run No. 2
Time Start 1017 Time End 1120
Sample Time ~~60~~ 5/12 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 30.04 "Hg Stack Press. 30.01 "Hg
Assumed Moisture 2 %, FDA ___ Gas Density Factor ___
Weather Overcast
Temp. 75 °F, W/D ___, Meter Box No. 5
Meter Y H@ 1.66 Pitot Corr. Factor .84
Nozzle Dia. 0.245 in Probe Length 6 ft
Probe Heater Setting 70 Nomograph C_f 1.0 = 2.85
Stack Dimensions 48 in
Stack Area 12.566 ft^2
Effective Stack Area 12.566 ft^2
Stack Height ≈ 60 ft

Mat'l Processing Rate ___
Final Gas Meter Reading 599.758 ft^3
Initial Gas Meter Reading 560.004 ft^3
Net Gas Volume Sampled 39.754 ft^3
Condensate Increase in Impingers 16.0 ml
Moisture in Silica Gel 10.0 gm
Total Condensate 26.0 ml
Silica Gel Container No. ___ Filter No. 070

Orsat:					
% CO_2	0				
% O_2	21				
% CO					
% N_2					
% Excess Air					

Test Conducted By: Reshard, Czarniak

Sample Train Leak Check @ 15" Hg 0.000 CFM
Remarks: FINAL @ 10 " Hg 0.000 CFM

Port end Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (F°)	Gas Sample Temp. @Dry' Gas Meter (F°)		Sample Box Or Filter Temp. (F°)	Last Impinger Temp. (F°)	Vacuum On Sample Train ("Hg)
					Calc.	Actual		In	Out			
		1017	560.004									
W - 1		1022	563.010	.36	1.08		225	77		275	60	3.2
2		1027	566.295	.46	1.35		225	78		275	60	3.6
3		1032	569.880	.54	1.58		230	78		275	60	4.0
4		1037	572.910	.54	1.58		230	79		275	60	4.0
5		1042	576.990	.53	1.55		230	79		275	60	3.9
6		1047	580.518	.50	1.45		225	80		275	60	3.8

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ($"H_2O$)	Orifice Press. Diff. ($"H_2O$)		Stack Gas Temp. (°F)	Gas Sample Temp. @Dry Gas Meter (°F)		Sample Box or Filter Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
		1050			Calc.	Actual		In	Out			
S - 1		1055	583.510	.38	1.12		230	8	1	275	60	3.3
2		1100	586.515	.43	1.28		230	8	1	275	60	3.5
3		1105	589.745	.46	1.35		235	8	2	275	60	4.0
4		1110	593.210	.56	1.63		235	8	2	275	60	4.3
5		1115	596.720	.56	1.63		235	8	3	275	60	4.3
6		1120	599.758	.46	1.35		230	8	3	275	60	3.8

Run No. 2 Page 2 of 2 pages

99%

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

SOURCE SAMPLING FIELD DATA SHEET

Plant: Dixie Lime & Stone
Sampling Location: NO. 2 Cooler Baghouse
Type of Sampling Train: EPA-5
Type of Samples: Particulate
Date: 5-26-82 Run No.: 3
Time Start: 1153 Time End: 1255
Sample Time: 5/12 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP & DP ___ "Hg
Bar. Press.: 30.04 "Hg Stack Press.: 30.01 "Hg
Assumed Moisture: 2 %, FDA ___ Gas Density Factor ___
Weather: Overcast
Temp. 80 °F, W/D ___, Meter Box No. ___
Meter V H@ 1.66 Pitot Corr. Factor .84
Nozzle Dia. 0.245 in Probe Length 6 ft
Probe Heater Setting 70 Nomograph C_f 1.0 = 2.85
Stack Dimensions 48 in
Stack Area 12.566 ft²
Effective Stack Area 12.566 ft²
Stack Height ← 60 ft

Mat'l Processing Rate ___
Final Gas Meter Reading: 647.110 ft³
Initial Gas Meter Reading: 607.502 ft³
Net Gas Volume Sampled: 39.698 ft³
Condensate Increase in Impingers: 16.0 ml
Moisture in Silica Gel: 9.0 gm
Total Condensate: 25.0 ml
Silica Gel Container No. ___ Filter No. 071

Orsat:					
% CO_2	0				
% O_2	21				
% CO					
% N_2					
% Excess Air					

Test Conducted By: Reshard, Czarnjak

Sample Train Leak Check @ 15" Hg: 0.000 CFM
Remarks: FINAL @ 10.0" Hg 0.000 CFM

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (F°)	Gas Sample Temp. @Dry' Gas Meter (F°)		Sample Box Or Filter Temp. (F°)	Last Impinger Temp. (F°)	Vacuum On Sample Train ("Hg)
					Calc.	Actual		In	Out			
		1153	607.502									
S-1		1158	610.420	.36	1.08		230	8	2	275	60	3.2
2		1203	613.585	.43	1.28		235	8	2	275	60	3.5
3		1208	616.920	.48	1.4		240	8	2	275	60	4.0
4		1213	620.430	.54	1.58		240	8	3	275	60	4.2
5		1218	623.910	.53	1.55		240	8	3	275	60	4.2
6		1223	627.069	.46	1.35		235	8	3	275	60	4.0

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Gas Sample Temp. @Dry Gas Meter (°F)		Sample Box or Filter Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
		1225										
1		1230	630.075	.40	1.18		235	8	2	275	60	3.5
2		1235	633.280	.46	1.35		235	8	2	275	60	3.8
3		1240	636.640	.53	1.55		235	8	2	275	60	4.0
4		1245	640.015	.53	1.55		235	8	3	275	60	4.1
5		1250	643.320	.50	1.45		235	8	3	275	60	4.0
6		1255	647.110	.50	1.45		235	8	3	275	60	4.0

Run No. 3 Page 2 of 2 pages

APPENDIX C

LABORATORY ANALYSIS

LABORATORY ANALYSIS

Project Name: Dixie Lime Kiln
Project No.: 82 128 100

Date Sampled: 5-25-82
Date Analyzed: 6-4-82
Analyzed By: Reshard

All analysis performed within guidelines set by EPA
Federal Register, Thursday, August 18, 1977. Part II-

	Run No. 1	Run No. 2	Run No. 3	Run No. BLANK
Beaker No.	Z23	91	86	2
Beaker Vol.	200 ml	200 ml	200 ml	200 ml
Final Wt.	108.4267 g	107.5874 g	106.8208 g	105.5969 g
Tare Wt.	108.3936 g	107.5489 g	106.7880 g	105.5937 g
Wt. Gain	33.1 mg	38.5 mg	32.8 mg	3.2 mg
Blk. Corr.	3.2 mg	3.2 mg	3.2 mg	3.2 mg
Net Wt.	29.9 mg	35.3 mg	29.6 mg	mg
Filter No.	801068	801066	801067	
Final Wt.	0.4721 g	0.4832 g	0.4686 g	g
Tare Wt.	0.4033 g	0.3955 g	0.4033 g	g
Wt. Gain	68.8 mg	87.7 mg	65.3 mg	mg
Blk. Corr.	mg	mg	mg	mg
Net Wt.	68.8 mg	87.7 mg	65.3 mg	mg
Total Particulate Wts.				
Filter	68.8 mg	87.7 mg	65.3 mg	mg
Wash	29.9 mg	35.3 mg	29.6 mg	mg
Total	98.7 mg	123.0 mg	94.9 mg	mg

SO_2
LAB DATA

Plant Name Dixie Lime Date Analyzed 6-11 82

Analyzed By D. Fick

Stack	Sample No.	V.T.	V.T.B.	N.	V.Soln.	V.A.
Run 1	5-25-82	6.5/6.7	.1	.0096	48	2 ml
2		4.5/4.7	"	"	255	2 ml
3		10.3/10.5	"	"	240	2 ml

V.T. = Volume of Barium perchlorate titrant used for sample (ml)
V.T.B. = Volume of Barium perchlorate titrant used for blank (ml)
N. = Normality of Barium perchlorate
V.Soln. = Total solution volume
V.A. = Volume of sample aliquot titrated (ml)

APPENDIX D

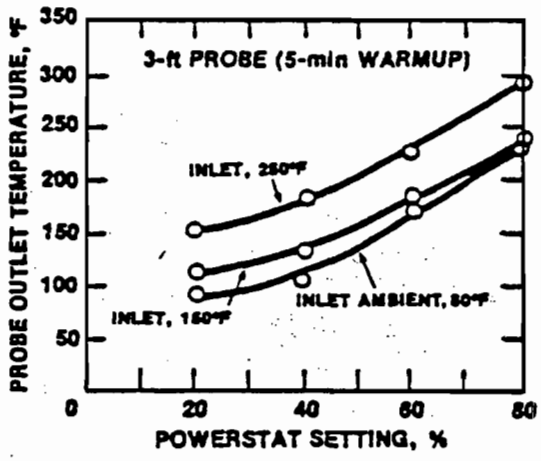
CALIBRATION DATA

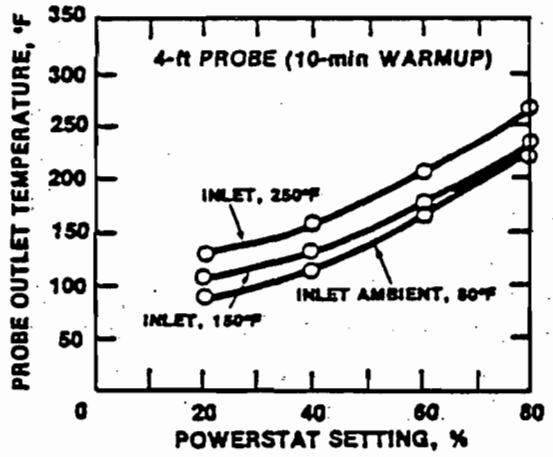
PROBE TEMPERATURE CALIBRATION

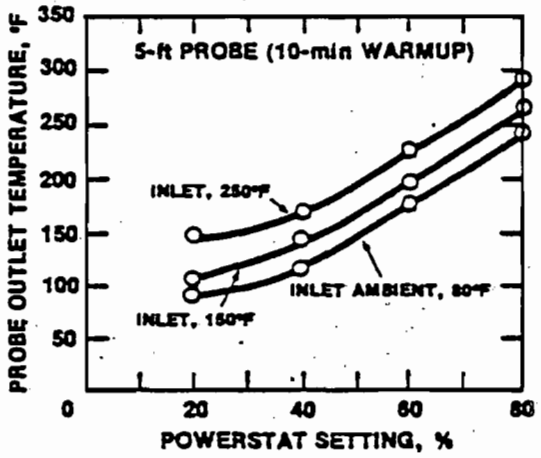
The sample probe used during the test was constructed as outlined in EPA Reference 1 of "Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment," March 1972. The probe heater setting was determined therefore by the graphs of Figure 21 of the reference method.

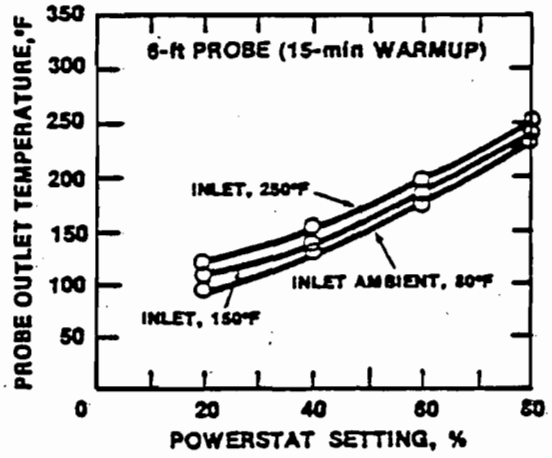
PITOT TUBE CALIBRATION

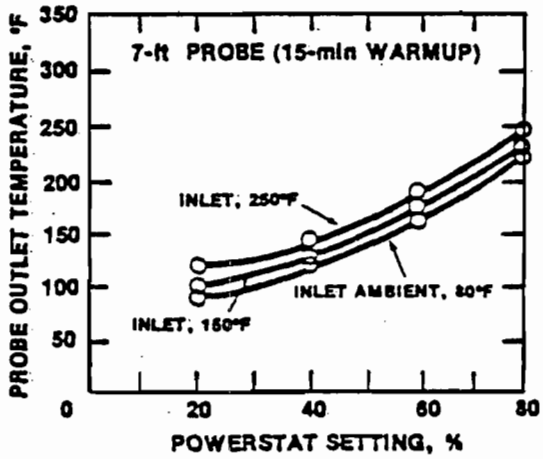
All ESE pitot tubes have been inspected and modified to correspond with requirements contained in the August 18, 1977 Edition of the Federal Register. Because the pitot tubes are within specified regulation, a coefficient (Cf) value of 0.84 has been assigned to them as per the Federal Register.





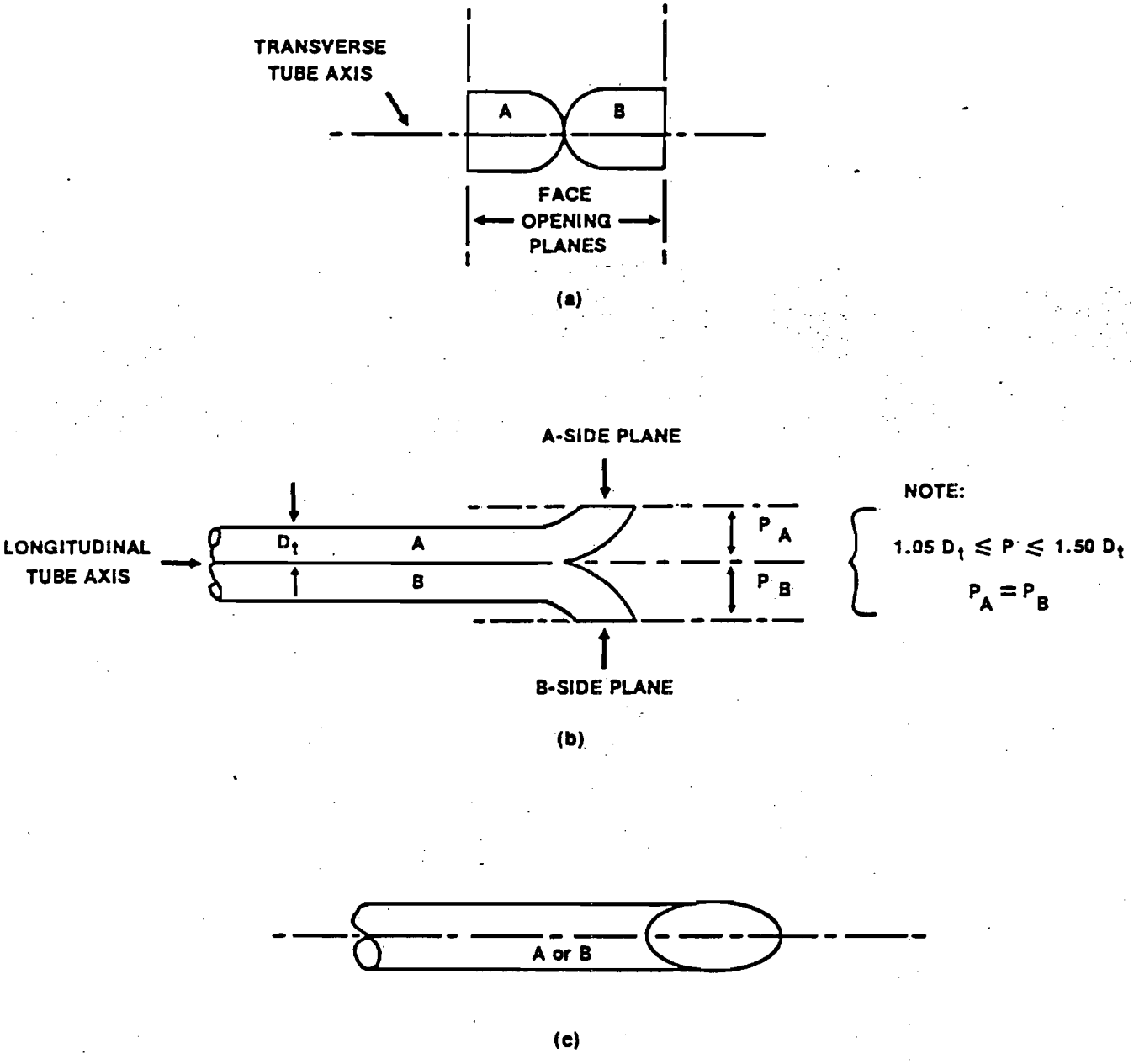






NOTE: Flow rate held constant at 0.75: 50% change in flow rate has little effect on probe temperature.

PROBE TEMPERATURES



PROPERLY CONSTRUCTED TYPE S PITOT TUBE, SHOWN IN: (a) END VIEW; FACE OPENING PLANES PERPENDICULAR TO TRANSVERSE AXIS; (b) TOP VIEW; FACE OPENING PLANES PARALLEL TO LONGITUDINAL AXIS; (c) SIDE VIEW; BOTH LEGS OF EQUAL LENGTH AND CENTERLINES COINCIDENT, WHEN VIEWED FROM BOTH SIDES. BASELINE COEFFICIENT VALUES OF 0.84 MAY BE ASSIGNED TO PITOT TUBES CONSTRUCTED THIS WAY

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 5 November 1981 Meter box number 5

Barometric pressure, P_b = 29.99 in. Hg Calibrated by J. Dickey

Orifice manometer setting (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Avg[a] (t_d), °F	Time (θ), min	Y_i	$\Delta H@_i$ in. H_2O
0.5	2.127	2.099	77.5			81.0	5	1.019	1.437
1.0	2.941	2.903	77.5			81.5	5	1.018	1.587
1.5	3.530	3.507	77.5			82.0	5	1.011	1.681
2.0	4.033	4.023	77.5			82.5	5	1.004	1.687
3.0	4.971	5.013	77.5			83.5	5.1	0.995	1.764
4.0	5.601	5.711	77.5			84.0	5	0.983	1.773
							Avg	1.005	1.655

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	$\Delta H@_i = \frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w} \right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number 82-128-100 Date 6-7-82 Meter box number 5 Plant Dixie Lime + Stone

Barometric pressure, P_b = 30.01 in. Hg Dry gas meter number 5 Pretest Y 1.0

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	Y_i $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 4$
3	5.288	5.306	75	—	—	78	5	4.5		.99488318
3	5.296	5.315	75	—	—	78	5	4.5		.99470111
3	5.301	5.310	75	—	—	78	5	4.5		.99657771
									Y =	.995

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d

where

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

APPENDIX E

PROJECT PARTICIPANTS

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ESE Source Testing Personnel

Charles Reshard	Laboratory Analysis/Report Preparation
Norman Czarniak	Environmental Technician

Dixie Lime and Stone Company Personnel

Doris Reynolds	Project Coordinator

Department of Environmenatal Regulation

Louis Fernandez	Observer