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.

Background Report Reference

AP-42 Section Number: 11.6

Background Chapter: 4

Reference Number: 72

Title: NSPS Particulate Emission Compliance Test on the No.8 Kiln at the Lehigh Portland Cement Plant in Mason City, Iowa

Interpoll, Inc

Interpoll, Inc

July 1983

AP-42 Section 11.6
Reference NOT USED
Report Sect. 4
Reference 72

Interpoll Inc.
4500 Ball Road N.E.
Circle Pines, Minnesota 55014

Telephone (612) 786-6020
Telex 297095

RECEIVED
JUL 25 1983
MANUFACTURING

RESULTS OF THE JUNE 22-24, 1983, NSPS PARTICULATE EMISSION COMPLIANCE TEST ON THE NO. 8 KILN AT THE LEHIGH PORTLAND CEMENT PLANT IN MASON CITY, IOWA

Submitted to:

LEHIGH PORTLAND CEMENT COMPANY
P. O. Box 1068
Mason City, Iowa 50401

Attention: Mr. James Powell

Approved by:

Perry Lonnes, Ph.D.
President

Report Number 3-1554
July 13, 1983

Reference 47:
(1) Coal-fired, dry Process kiln w/ parallel ESP and bhouses

Delete data due to unusual combination of control devices.

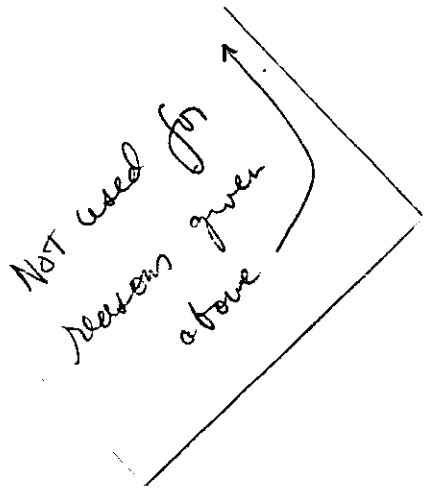

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TABLE OF CONTENTS

ABBREVIATIONS

ACFM	actual cubic feet per minute
cc (ml)	cubic centimeter (milliliter)
DSCFM	standard cubic foot of dry gas per minute
DSML	dry standard milliliter
DEG-F (^{o}F)	degrees Fahrenheit
DIA.	diameter
FT/SEC	feet per second
GPM	gallons per minute
GR/ACF	grains per actual cubic foot
GR/DSCF	grains per dry standard cubic foot
g	gram
HP	horsepower
HRS	hours
IN.	inches
IN. HG.	inches of mercury
IN. WC.	inches of water
LB	pound
LB/DSCF	pounds per dry standard cubic foot
LB/HR	pounds per hour
LB/10^{6}BTU	pounds per million British Thermal Units heat input
LB/MMBTU	pounds per million British Thermal Units heat input
MW	megawatt
mg/DSCM	milligrams per dry standard cubic meter
microns (µm)	micrometer
MIN.	minutes
ohm-cm	ohm-centimeter
PPH	pounds per hour
PPM	parts per million
PSI	pounds per square inch
SQ. FT.	square feet
v/v	percent by volume
w/w	percent by weight

Standard conditions are defined as 68 ^{o}F (20 ^{o}C) and 29.92 IN. of mercury pressure.

1 INTRODUCTION

During the period June 22-24, 1983, Interpoll Inc. personnel conducted an NSPS particulate emission test on the No. 8 Cement Kiln at the Lehigh Portland Cement Company Plant in Mason City, Iowa. On-site testing was performed by a five-man team under the direction of J. Stock. Coordination between testing activities and plant operation was provided by Bill Volk of Lehigh. The test was witnessed by Bill Youngquist of the Iowa Department of Environmental Quality (DEQ).

The No. 8 Cement Kiln is a continuous 13'-0 diameter rotary kiln with a rated capacity of 130 TONS/HR. Particulates entrained in the process are collected by a series of baghouses and a Wheelabrator-Frye electrostatic precipitator operated in parallel. Feed to the No. 8 Kiln during the emission test remained essentially constant throughout the emission test. The approximate feed composition (by weight) was 79.5% limestone, 14.8% alumina, 0.0% silica clay, 0.5% iron, 5.2% sand and 0.5% water. 85.1% of the feed passed a 200 mesh sieve. The wet feed rate to the kiln averaged 133.9 TONS/HR for the emission compliance test. The kiln was coal fired during the test.

Evaluations were conducted in accordance with EPA Methods 1-5, CFR Title 40, Part 60, Appendix A (Revised July 1, 1982). The selection of the appropriate nozzle diameter required for isokinetic sampling at each source was made based on the results of previous tests on the same sources. Interpoll sampling trains which meet or exceed specifications in the above-cited reference were used to extract representative particulate samples by means of a heated glass-lined probe on the No. 7 and 11 Baghouse Outlets and a stainless steel-lined probe on the electrostatic precipitator discharge (due to the large stack diameter). The use of a stainless steel liner was approved by Bill Youngquist of the Iowa DEQ prior to the initiation of the test.

An integrated flue gas sample was extracted simultaneously with each particulate sample using a specially designed gas sampling system. Integrated flue gas samples were collected in 44-liter Tedlar bags. After sampling was complete, the bags were sealed and returned to the laboratory for Orsat analysis. The integrity of the sample bags was insured by reading the oxygen content of the bag in the field immediately after sampling and again in the laboratory immediately prior to Orsat analysis using a Teledyne 320P oxygen analyzer.

Exhaust gas streams which discharge from the No. 1, 2, 3 and 4 Baghouses on the No. 8 Kiln are combined into a common plenum and vented to the atmosphere by means of a 28-foot long, four-foot diameter radial steel stack. Two test ports located approximately 12 feet from a 45 degree elbow were used to extract particulate samples. The test ports are approximately 16 feet below the top of the stack. A 44-point traverse was used to collect particulate samples. Each traverse point was sampled two minutes to give a total sampling time of 88 minutes per run.

The stacks on the No. 7 and 11 Baghouses are identical and rest directly on top of the I.D. fans. Two ports oriented at approximately 90 degrees were used to collect representative particulate samples. The test ports are approximately six diameters downstream of the I.D. fan outlet and four diameters upstream of the stack outlet. A 24-point traverse was utilized on both sources to extract particulate samples. Each traverse point was sampled 2.5 minutes to give a total sampling time of 60 minutes per run.

Testing on the No. 8 Kiln ESP Discharge (Main Stack) Main Stack was conducted from two test ports oriented at 90 degrees on the stack and located more than two diameters upstream of the stack outlet and more than eight diameters downstream of the last directional change in the stack (see Appendix B). A 12-point traverse was used to extract

particulate samples. Each traverse point was sampled five minutes to give a total sampling time of 60 minutes per run.

The important results of the tests are summarized in Section 2. Detailed results are presented in Section 3. Results of preliminary measurements, field data and all other supporting information are presented in the appendices.

2 SUMMARY AND DISCUSSION

The important results of the individual particulate emission tests on each of the various sources from the No. 8 Kiln are summarized in Tables I, 2 and 3. The concentrations and emission rates reported are based on the dry catch only of the Method 5 train since the No. 8 Kiln comes under federal new source performance standards. The emission factor for the No. 8 Kiln for this test was 0.277 LB/TON (see Appendix J). These results agree very well with the emission test performed June 1-2, 1983, when the emission factor was found to be 0.23 LB/TON. The higher emission factor for the June 22-24 test is due to higher emissions from the electrostatic precipitator. The exhaust gas streams from all of the baghouses were cleaner for the June 22-24 test. New source performance standards for sources of this type limit emissions to 0.30 LB/TON.

No difficulties were encountered in the field or in the laboratory evaluation of the particulate and flue gas samples. On the basis of this fact and a complete review of the entire data and results, it is our opinion that the values reported herein are accurate and closely reflect the actual values which existed at the time the tests were performed.

Table 1. Summary of the Results of the June 22, 1983 Particulate Emission Compliance Test on the No. 8 Main Stack at the Lehigh Cement Company Plant Located in Mason City, Iowa

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	1540/1648	1746/1850	1925/2028
Volumetric flow			
ACTUAL (ACFM)	117000	118000	115000
STANDARD (DSCFM)	69200	68700	66800
Gas temperature (DEG-F)	241	243	237
Moisture content (% v/v)	19.00	19.94	20.46
Gas composition (% v/v dry)			
carbon dioxide	26.27	27.79	26.77
oxygen	8.05	6.90	8.02
nitrogen	65.68	65.31	65.21
Oxygen analyzer (% v/v, dry)	5.04	5.00	4.97
Isokinetic variation (%)	106.3	99.7	98.8
Particulate mass rate (LB/HR)	31.9	29.4	24.6
Particulate concentration			
ACTUAL (GR/ACF)	.032	.029	.025
STANDARD (GR/DSCF)	.054	.050	.043

Table 2. Summary of the Results of the June 23, 1983 Particulate Emission Compliance Test on the No. 8 Main Stack at the Lehigh Cement Company Plant Located in Mason City, Iowa

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	1620/1724	1755/1857	1915/2018
Volumetric flow			
ACTUAL (ACFM)	117000	122000	122000
STANDARD (DSCFM)	68200	69500	69200
Gas temperature (DEG-F)	243	248	244
Moisture content (% v/v)	19.95	20.82	21.64
Gas composition (% v/v dry)			
carbon dioxide	27.65	26.88	26.35
oxygen	5.94	6.45	6.99
nitrogen	66.41	66.67	66.66
Oxygen analyzer (% v/v, dry)	5.03	5.05	5.13
Isokinetic variation (%)	100.9	102.1	102.6
Particulate mass rate (LB/HR)	37.9	31.5	37.7
Particulate concentration			
ACTUAL (GR/ACF)	.038	.030	.036
STANDARD (GR/DSCF)	.065	.053	.064

Table 3. Summary of the Results of the June 23, 1983 Particulate Emission Compliance Test on the No. 8 Main Stack at the Lehigh Cement Company Plant Located in Mason City, Iowa

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	2050/2154	2211/2315	2330/0032
Volumetric flow			
ACTUAL (ACFM)	125000	121000	123000
STANDARD (DSCFM)	72100	70100	74000
Gas temperature (DEG-F)	244	243	221
Moisture content (% v/v)	20.46	20.49	19.91
Gas composition (% v/v dry)			
carbon dioxide	22.40	26.00	25.60
oxygen	5.60	5.50	6.90
nitrogen	67.00	68.50	67.50
Oxygen analyzer (% v/v, dry)	5.15	5.14	5.48
Isokinetic variation (%)	101.4	100.6	100.6
Particulate mass rate (LB/HR)	27.1	27.6	42.5
Particulate concentration			
ACTUAL (GR/ACF)	.025	.027	.040
STANDARD (GR/DSCF)	.044	.046	.067

Table 4.— Summary of the Results of the June 22, 1983 Particulate Emission Compliance Test on the No. 1-4 Baghouse Stack at the Lehigh Cement Company Plant Located in Mason City, Iowa

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	1540/1709	1737/1906	1925/2054
Volumetric flow			
ACTUAL (ACFM)	55400	52500	52800
STANDARD (DSCFM)	30900	29400	29500
Gas temperature (DEG-F)	349	349	346
Moisture content (% v/v)	12.20	11.69	12.31
Gas composition (% v/v dry)			
carbon dioxide	6.68	5.42	5.35
oxygen	16.08	16.70	16.85
nitrogen	77.24	77.88	77.80
Oxygen analyzer (% v/v, dry)	18.49	16.59	16.27
Isokinetic variation (%)	105.2	101.2	102.1
Particulate mass rate (LB/HR)	2.6	2.2	1.8
Particulate concentration			
ACTUAL (GR/ACF)	.0055	.0049	.0041
STANDARD (GR/DSCF)	.0098	.0088	.0072

Table 5. Summary of the Results of the June 23, 1983 Particulate Emission Compliance Test on the No. 7 Baghouse Stack at the Lehigh Cement Company Plant Located in Mason City, Iowa

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	1620/1724	1755/1857	1915/2018
Volumetric flow			
ACTUAL (ACFM)	17800	17500	17900
STANDARD (DSCFM)	10700	10600	10600
Gas temperature (DEG-F)	323	321	323
Moisture content (% v/v)	8.64	8.56	8.46
Gas composition (% v/v dry)			
carbon dioxide	5.65	5.37	5.84
oxygen	16.74	16.98	16.90
nitrogen	77.61	77.65	77.26
Oxygen analyzer (% v/v, dry)	16.74	17.36	17.00
Isokinetic variation (%)	98.5	99.0	99.6
Particulate mass rate (LB/HR)	.76	.36	.43
Particulate concentration			
ACTUAL (GR/ACF)	.0050	.0024	.0028
STANDARD (GR/DSCF)	.0083	.0040	.0047

Table 6. Summary of the Results of the June 23, 1983 Particulate Emission Compliance Test on the No. 11 Baghouse Stack at the Lehigh Cement Company Plant Located in Mason City, Iowa

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	2050/2153	2211/2313	2330/0032
Volumetric flow			
ACTUAL (ACFM)	16000	16000	16000
STANDARD (DSCFM)	10100	10200	10200
Gas temperature (DEG-F)	295	284	283
Moisture content (% v/v)	7.56	8.26	8.50
Gas composition (% v/v dry)			
carbon dioxide	3.54	4.38	4.12
oxygen	18.11	17.61	17.78
nitrogen	78.35	78.01	78.10
Oxygen analyzer (% v/v, dry)	17.98	17.12	17.97
Isokinetic variation (%)	97.8	101.5	102.0
Particulate mass rate (LB/HR)	.53	.38	.40
Particulate concentration			
ACTUAL (GR/ACF)	.0039	.0028	.0030
STANDARD (GR/DSCF)	.0061	.0043	.0046

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Volumetric flow rate results are presented first, followed by gas composition results and the computer printout of particulate loading data. Preliminary measurements including traverse point description are given in Appendices A and B.

The results have been calculated on a DEC PDP-11 Computer using standard Fortran programs. EPA-published equations have been used as the basis of the calculation techniques in these programs. It should be noted in interpreting these results that the particulate emission rates have been calculated by both the "concentration x flow" and the "ratio of areas" methods and the average reported. The average is the best estimate of the true value, since the bias introduced by anisokinetic sampling is approximately equal but of opposite sign in the two calculation techniques and thus cancels in the average.

3.1 Results of Flow Determinations

Test No. 1
Baghouse Inlet

Results of Flow Determination -- Method 2

Time and date	1515 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	5
Total number of points sampled	30
Duct dimensions (IN)	60.0X 79.0
Cross sectional area (SQ FT)	32.92
Direction of flow	vertical, up
Static pressure (IN WC)	-4.13
Average gas temperature (DEG-F)	414
Absolute gas pressure (IN HG)	28.84
Average moisture content (% v/v)	12.20
Average linear velocity (FT/SEC)	57.7
(standard deviation, FT/SEC)	10.9
Volumetric flow	
actual (ACFM)	113957
dry standard (DSCFM)	58232
Mass flow of gas - wet (LB/HR)	292359

Test No. 2
Baghouse Inlet

Results of Flow Determination -- Method 2

Time and date	2040 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	5
Total number of points sampled	30
Duct dimensions (IN)	60.0X 79.0
Cross sectional area (SQ FT)	32.92
Direction of flow	vertical, up
Static pressure (IN WC)	-4.13
Average gas temperature (DEG-F)	420
Absolute gas pressure (IN HG)	28.84
Average moisture content (% v/v)	12.31
Average linear velocity (FT/SEC)	59.0
(standard deviation, FT/SEC)	10.2
Volumetric flow	
actual (ACFM)	116431
dry standard (DSCFM)	59017
Mass flow of gas - wet (LB/HR)	294862

Test No. 3
Baghouse Inlet

Results of Flow Determination -- Method 2

Time and date	1345 hrs. 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	5
Total number of points sampled	30
Duct dimensions (IN)	60.0X 79.0
Cross sectional area (SQ FT)	32.92
Direction of flow	vertical, up
Static pressure (IN WC)	-4.61
Average gas temperature (DEG-F)	420
Absolute gas pressure (IN HG)	28.80
Average moisture content (% v/v)	8.64
Average linear velocity (FT/SEC)	56.4
(standard deviation, FT/SEC)	10.6
Volumetric flow	
actual (ACFM)	111304
dry standard (DSCFM)	58707
Mass flow of gas - wet (LB/HR)	286168

Test No. 4
Baghouse Inlet

Results of Flow Determination -- Method 2

Time and date	0125 hrs, 06/24/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	5
Total number of points sampled	30
Duct dimensions (IN)	60.0X 79.0
Cross sectional area (SQ FT)	32.92
Direction of flow	vertical, up
Static pressure (IN WC)	-4.61
Average gas temperature (DEG-F)	426
Absolute gas pressure (IN HG)	28.80
Average moisture content (% v/v)	8.50
Average linear velocity (FT/SEC)	56.7
(standard deviation, FT/SEC)	10.8
Volumetric flow	
actual (ACFM)	111992
dry standard (DSCFM)	58760
Mass flow of gas - wet (LB/HR)	284289

Test No. 1
No.1-4 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	1750 hrs, 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.20
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	44
Duct or stack diameter (IN)	48.0
Cross sectional area (SQ FT)	12.57
Direction of flow	vertical, up
Static pressure (IN WC)	-.13
Average gas temperature (DEG-F)	380
Absolute gas pressure (IN HG)	29.19
Average moisture content (% v/v)	8.64
Average linear velocity (FT/SEC)	81.4
(standard deviation, FT/SEC)	6.9
Volumetric flow	
actual (ACFM)	61381
dry standard (DSCFM)	34375
Mass flow of gas - wet (LB/HR)	167564

Test No. 2
No.1-4 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	0100 hrs, 06/24/83
Barometric pressure (uncompensated, in. Hg)	29.20
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	44
Duct or stack diameter (IN)	48.0
Cross sectional area (SQ FT)	12.57
Direction of flow	vertical, up
Static pressure (IN WC)	-.13
Average gas temperature (DEG-F)	371
Absolute gas pressure (IN HG)	29.19
Average moisture content (% v/v)	8.50
Average linear velocity (FT/SEC)	81.1
(standard deviation, FT/SEC)	5.6
Volumetric flow	
actual (ACFM)	61117
dry standard (DSCFM)	34651
Mass flow of gas - wet (LB/HR)	167648

Test No. 1
No.6 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	1500 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	.11
Average gas temperature (DEG-F)	340
Absolute gas pressure (IN HG)	29.15
Average moisture content (% v/v)	12.20
Average linear velocity (FT/SEC)	63.2
(standard deviation, FT/SEC)	2.8
Volumetric flow	
actual (ACFM)	13710
dry standard (DSCFM)	7737
Mass flow of gas - wet (LB/HR)	38845

Test No. 2
No.6 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	2100 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	.11
Average gas temperature (DEG-F)	336
Absolute gas pressure (IN HG)	29.15
Average moisture content (% v/v)	12.31
Average linear velocity (FT/SEC)	67.2
(standard deviation, FT/SEC)	4.2
Volumetric flow	
actual (ACFM)	14583
dry standard (DSCFM)	8260
Mass flow of gas - wet (LB/HR)	41271

Test No. 3
No.6 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	1530 hrs, 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	-4.69
Average gas temperature (DEG-F)	329
Absolute gas pressure (IN HG)	28.80
Average moisture content (% v/v)	8.64
Average linear velocity (FT/SEC)	72.4
(standard deviation, FT/SEC)	7.7
Volumetric flow	
actual (ACFM)	15714
dry standard (DSCFM)	9242
Mass flow of gas - wet (LB/HR)	45053

Test No. 4
No.6 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	0110 hrs, 06/24/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	-4.69
Average gas temperature (DEG-F)	329
Absolute gas pressure (IN HG)	28.80
Average moisture content (% v/v)	8.50
Average linear velocity (FT/SEC)	77.8
(standard deviation, FT/SEC)	4.5
Volumetric flow	
actual (ACFM)	16885
dry standard (DSCFM)	9946
Mass flow of gas - wet (LB/HR)	48122

Test No. 1
No.10 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	1505 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	.86
Average gas temperature (DEG-F)	310
Absolute gas pressure (IN HG)	29.20
Average moisture content (% v/v)	12.20
Average linear velocity (FT/SEC)	74.5
(standard deviation, FT/SEC)	5.5
Volumetric flow	
actual (ACFM)	16157
dry standard (DSCFM)	9490
Mass flow of gas - wet (LB/HR)	47649

Test No. 2
No.10 Baghouse Outlet

Results of Flow Determination -- Method 2

Time and date	2110 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.850
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	.86
Average gas temperature (DEG-F)	342
Absolute gas pressure (IN HG)	29.20
Average moisture content (% v/v)	12.31
Average linear velocity (FT/SEC)	77.1
(standard deviation, FT/SEC)	5.9
Volumetric flow	
actual (ACFM)	16727
dry standard (DSCFM)	9422
Mass flow of gas - wet (LB/HR)	47074

3.2 Results of Orsat and Moisture Analyses

Test No. 1
No. 8 Main Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/22/83	06/22/83	06/22/83
Dry basis (orsat)			
carbon dioxide	26.27	27.79	26.77
oxygen	8.05	6.90	8.02
carbon monoxide	.00	.00	.00
nitrogen	65.68	65.31	65.21
Wet basis (orsat)			
carbon dioxide	21.28	22.25	21.29
oxygen	6.52	5.52	6.38
carbon monoxide	.00	.00	.00
nitrogen	53.20	52.29	51.87
Moisture content	19.00	19.94	20.46
Dry molecular weight	32.53	32.72	32.60
Wet molecular weight	29.77	29.79	29.62
Specific gravity (relative to air)	1.0282	1.0289	1.0230
Teledyne oxygen analyzer (velocity & time weighted avg.)	5.04	5.00	4.97
FO	.49	.50	.48

Test No. 2
No. 8 Main Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Dry basis (orsat)			
carbon dioxide	27.65	26.88	26.35
oxygen	5.94	6.45	6.99
carbon monoxide	.00	.00	.00
nitrogen	66.41	66.67	66.66
Wet basis (orsat)			
carbon dioxide	22.13	21.28	20.65
oxygen	4.75	5.11	5.48
carbon monoxide	.00	.00	.00
nitrogen	53.16	52.79	52.24
Moisture content	19.95	20.82	21.64
Dry molecular weight	32.66	32.56	32.50
Wet molecular weight	29.74	29.53	29.36
Specific gravity (relative to air)	1.0272	1.0199	1.0141
Teledyne oxygen analyzer (velocity & time weighted avg.)	5.03	5.05	5.13
FO	.54	.54	.53

Test No. 3
No. 8 Main Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Dry basis (orsat)			
carbon dioxide	27.40	26.00	25.60
oxygen	5.60	5.50	6.90
carbon monoxide	.00	.00	.00
nitrogen	67.00	68.50	67.50
Wet basis (orsat)			
carbon dioxide	21.79	20.67	20.50
oxygen	4.45	4.37	5.53
carbon monoxide	.00	.00	.00
nitrogen	53.29	54.46	54.06
Moisture content	20.46	20.49	19.91
Dry molecular weight	32.61	32.38	32.37
Wet molecular weight	29.62	29.43	29.51
Specific gravity (relative to air)	1.0231	1.0167	1.0193
Teledyne oxygen analyzer (velocity & time weighted avg.)	5.15	5.14	5.48
FO	.56	.59	.55

Test No. 1
No. 1-4 Baghouse Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/22/83	06/22/83	06/22/83
Dry basis (orsat)			
carbon dioxide	6.68	5.42	5.35
oxygen	16.08	16.70	16.85
carbon monoxide	.00	.00	.00
nitrogen	77.24	77.88	77.80
Wet basis (orsat)			
carbon dioxide	5.87	4.79	4.69
oxygen	14.12	14.75	14.78
carbon monoxide	.00	.00	.00
nitrogen	67.82	68.77	68.22
Moisture content	12.20	11.69	12.31
Dry molecular weight	29.71	29.54	29.53
Wet molecular weight	28.28	28.19	28.11
Specific gravity (relative to air)	.9770	.9736	.9710
Teledyne oxygen analyzer (velocity & time weighted avg.)	18.49	16.59	16.27
FO	.72	.77	.76

Test No. 2
No. 7 Baghouse Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Dry basis (orsat)			
carbon dioxide	5.65	5.37	5.84
oxygen	16.74	16.98	16.90
carbon monoxide	.00	.00	.00
nitrogen	77.61	77.65	77.26
Wet basis (orsat)			
carbon dioxide	5.16	4.91	5.29
oxygen	15.29	15.53	15.30
carbon monoxide	.00	.00	.00
nitrogen	70.91	71.00	69.95
Moisture content	8.64	8.56	9.46
Dry molecular weight	29.57	29.54	29.61
Wet molecular weight	28.57	28.55	28.51
Specific gravity (relative to air)	.9870	.9862	.9849
Teledyne oxygen analyzer (velocity & time weighted avg.)	16.74	17.36	17.00
F0	.74	.73	.68

Test No. 3
No. 11 Baghouse Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Dry basis (orsat)			
carbon dioxide	3.54	4.38	4.12
oxygen	18.11	17.61	17.78
carbon monoxide	.00	.00	.00
nitrogen	78.35	78.01	78.10
Wet basis (orsat)			
carbon dioxide	3.27	4.02	3.77
oxygen	16.74	16.16	16.27
carbon monoxide	.00	.00	.00
nitrogen	72.42	71.57	71.46
Moisture content	7.56	8.26	8.50
Dry molecular weight	29.29	29.41	29.37
Wet molecular weight	28.44	28.46	28.40
Specific gravity (relative to air)	.9823	.9832	.9811
Teledyne oxygen analyzer (velocity & time weighted avg.)	17.98	17.12	17.97
FD	.79	.75	.76

3.3 Results of Particulate Loading Determinations

Test No. 1
No. 8 Main Stack

Results of Particulate Loading Determinations -- Method 5(BE)

	Run 1	Run 2	Run 3
Date of run	06/22/83	06/22/83	06/22/83
Time run start/end (HRS)	1540/1648	1746/1850	1925/2028
Pitot tube coefficient	.856	.856	.856
Water in sample			
condensate (ml)	118.0	134.0	141.0
silica gel (grams)	79.0	61.0	53.0
Total particulate material collected (grams) *	.1380	.1194	.0989
Meter correction coefficient	.9989	.9989	.9989
Volume through gas meter			
at meter conditions...(CF)	43.07	40.13	38.65
standard conditions..(SCF)	39.57	36.88	35.52
Total sampling time (MIN)	60.0	60.0	60.0
Nozzle diameter (IN)	.250	.250	.250
Average stack gas temperature during determination (DEG-F)	241	243	237
Volumetric flow			
actual.....(CFM)	117327	118324	114804
standard.....(DSCFM)	69154	68726	66804
Isokinetic variation (%)	106.3	99.7	98.8
Particle concentration			
actual.....(GR/ACF)	.0318	.0291	.0251
dry standard.....(GR/DSCF)	.0538	.0500	.0430
Particle mass flow (LB/HR)	31.90	29.43	24.60

* Dry catch only

Test No. 2
No. 8 Main Stack

Results of Particulate Loading Determinations -- Method 5(BE)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Time run start/end (HRS)	1620/1724	1755/1857	1915/2018
Pitot tube coefficient	.856	.856	.856
Water in sample			
condensate (ml)	125.0	150.0	162.0
silica gel (grams)	71.0	63.5	62.0
Total particulate material collected (grams) *	.1556	.1310	.1574
Meter correction coefficient	.9989	.9989	.9989
Volume through gas meter			
at meter conditions...(CF)	40.59	41.96	41.72
standard conditions..(SCF)	37.03	38.23	38.21
Total sampling time (MIN)	60.0	60.0	60.0
Nozzle diameter (IN)	.250	.250	.250
Average stack gas temperature during determination (DEG-F)	243	248	244
Volumetric flow			
actual.....(CFM)	117231	121737	121634
standard.....(DSCFM)	68184	69541	69175
Isokinetic variation (%)	100.9	102.1	102.6
Particle concentration			
actual.....(GR/ACF)	.0379	.0303	.0363
dry standard.....(GR/DSCF)	.0648	.0529	.0636
Particle mass flow (LB/HR)	37.89	31.51	37.69

* Dry Catch Only

Test No. 3
No. 8 Main Stack

Results of Particulate Loading Determinations -- Method 5(BE)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Time run start/end (HRS)	2050/2154	2211/2315	2330/0032
Pitot tube coefficient	.856	.856	.856
Water in sample			
condensate (ml)	142.0	152.0	164.0
silica gel (grams)	73.0	56.0	47.5
Total particulate material collected (grams) *	.1118	.1131	.1741
Meter correction coefficient	.9989	.9989	.9989
Volume through gas meter			
at meter conditions...(CF)	42.40	40.63	42.32
standard conditions..(SCF)	39.37	38.00	40.05
Total sampling time (MIN)	60.0	60.0	60.0
Nozzle diameter (IN)	.250	.250	.250
Average stack gas temperature during determination (DEG-F)	244	243	221
Volumetric flow			
actual.....(CFM)	125039	121499	123160
standard:.....(DSCFM)	72139	70148	73987
Isokinetic variation (%)	101.4	100.6	100.6
Particle concentration			
actual.....(GR/ACF)	.0254	.0266	.0405
dry standard.....(GR/DSCF)	.0438	.0459	.0671
Particle mass flow (LB/HR)	27.09	27.61	42.54

* Dry Catch Only

Test No. 1
No. 1-4 Baghouse Stack

Results of Particulate Loading Determinations -- Method 5(BE)

	Run 1	Run 2	Run 3
Date of run	06/22/83	06/22/83	06/22/83
Time run start/end (HRS)	1540/1709	1737/1906	1925/2054
Pitot tube coefficient	.853	.853	.853
Water in sample			
condensate (ml)	76.0	88.0	86.0
silica gel (grams)	52.0	24.0	34.0
Total particulate material collected (grams) *	.0275	.0227	.0189
Meter correction coefficient	1.0051	1.0051	1.0051
Volume through gas meter			
at meter conditions...(CF)	47.65	43.53	43.90
standard conditions..(SCF)	43.41	39.84	40.25
Total sampling time (min)	88.0	88.0	88.0
Nozzle diameter (IN)	.187	.187	.187
Average stack gas temperature during determination (DEG-F)	349	349	346
Volumetric flow			
actual.....(CFM)	55351	52547	52786
standard.....(DSCFM)	30853	29444	29486
Isokinetic variation (%)	105.2	101.2	102.1
Particle concentration			
actual.....(GR/ACF)	.0055	.0049	.0041
dry standard.....(GR/DSCF)	.0098	.0088	.0072
Particle mass flow (LB/HR)	2.59	2.22	1.83

* Dry catch only

Test No. 2
No. 7 Baghouse Stack

Results of Particulate Loading Determinations -- Method 5(BE)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Time run start/end (HRS)	1620/1724	1755/1857	1915/2018
Pitot tube coefficient	.853	.853	.853
Water in sample			
condensate (ml)	68.0	72.0	86.0
silica gel (grams)	48.0	42.0	43.0
Total particulate material collected (grams) *	.0309	.0147	.0178
Meter correction coefficient	1.0051	1.0051	1.0051
Volume through gas meter			
at meter conditions...(CF)	64.02	63.20	64.27
standard conditions..(SCF)	57.79	57.33	58.12
Total sampling time (MIN)	60.0	60.0	60.0
Nozzle diameter (IN)	.246	.246	.246
Average stack gas temperature during determination (DEG-F)	323	321	323
Volumetric flow			
actual.....(CFM)	17814	17515	17862
standard.....(DSCFM)	10703	10561	10647
Isokinetic variation (%)	98.5	99.0	99.6
Particle concentration			
actual.....(GR/ACF)	.0050	.0024	.0028
dry standard.....(GR/DSCF)	.0083	.0040	.0047
Particle mass flow (LB/HR)	.76	.36	.43

* Dry catch only

Test No. 3
No. 11 Baghouse Stack

Results of Particulate Loading Determinations -- Method 5(BE)

	Run 1	Run 2	Run 3
Date of run	06/23/83	06/23/83	06/23/83
Time run start/end (HRS)	2050/2153	2211/2313	2330/0032
Pitot tube coefficient	.853	.853	.853
Water in sample			
condensate (ml)	62.0	75.0	77.0
silica gel (grams)	32.0	33.0	35.0
Total particulate material collected (grams) *	.0215	.0159	.0171
Meter correction coefficient	1.0051	1.0051	1.0051
Volume through gas meter			
at meter conditions...(CF)	59.48	61.57	61.56
standard conditions..(SCF)	54.10	56.52	56.78
Total sampling time (MIN)	60.0	60.0	60.0
Nozzle diameter (IN)	.246	.246	.246
Average stack gas temperature during determination (DEG-F)	295	284	283
Volumetric flow			
actual.....(CFM)	15989	16004	16004
standard.....(DSCFM)	10090	10163	10156
Isokinetic variation (%)	97.8	101.5	102.0
Particle concentration			
actual.....(GR/ACF)	.0039	.0028	.0030
dry standard.....(GR/DSCF)	.0061	.0043	.0046
Particle mass flow (LB/HR)	.53	.38	.40

* Dry catch only

APPENDIX A

RESULTS OF PRELIMINARY MEASUREMENTS

Test No. 1
No. 8 Main Stack

Results of Flow Determination -- Method 2

Time and date	1540 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	28.94
Pitot tube coefficient	.856
Number of sampling ports	2
Total number of points sampled	12
Duct or stack diameter (IN)	83.5
Cross sectional area (SQ FT)	38.03
Direction of flow	vertical, up
Static pressure (IN WC)	-.19
Average gas temperature (DEG-F)	241
Absolute gas pressure (IN HG)	28.93
Average moisture content (% v/v)	19.80
Average linear velocity (FT/SEC)	51.5
(standard deviation, FT/SEC)	4.7
Volumetric flow	
actual (ACFM)	117414
dry standard (DSCFM)	68521
Mass flow of gas - wet (LB/HR)	395779

Test No. 1
No. 8 Main Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
A/ 1	240	42.8
A/ 2	245	52.1
A/ 3	240	52.4
A/ 4	240	53.6
A/ 5	240	54.8
A/ 6	240	52.4
B/ 1	240	44.8
B/ 2	240	44.8
B/ 3	245	52.6
B/ 4	240	56.0
B/ 5	240	56.0
B/ 6	245	55.4

Test No. 2
No. 8 Main Stack

Results of Flow Determination -- Method 2

Time and date	1620 hrs, 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.00
Pitot tube coefficient	.856
Number of sampling ports	2
Total number of points sampled	12
Duct or stack diameter (IN)	83.5
Cross sectional area (SQ FT)	38.03
Direction of flow	vertical, up
Static pressure (IN WC)	-.40
Average gas temperature (DEG-F)	243
Absolute gas pressure (IN HG)	28.97
Average moisture content (% v/v)	20.80
Average linear velocity (FT/SEC)	51.6
(standard deviation, FT/SEC)	3.8
Volumetric flow	
actual (ACFM)	117631
dry standard (DSCFM)	67689
Mass flow of gas - wet (LB/HR)	393516

Test No. 2
No. 8 Main Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
A/ 1	240	49.5
A/ 2	240	49.5
A/ 3	245	53.5
A/ 4	245	53.5
A/ 5	245	53.5
A/ 6	245	53.5
B/ 1	240	44.4
B/ 2	240	44.4
B/ 3	245	54.3
B/ 4	245	54.3
B/ 5	250	55.3
B/ 6	240	52.9

Test No. 3
No. 8 Main Stack

Results of Flow Determination -- Method 2

Time and date	2154 hrs, 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.00
Pitot tube coefficient	.856
Number of sampling ports	2
Total number of points sampled	12
Duct or stack diameter (IN)	83.5
Cross sectional area (SQ FT)	38.03
Direction of flow	vertical, up
Static pressure (IN WC)	-.40
Average gas temperature (DEG-F)	244
Absolute gas pressure (IN HG)	28.97
Average moisture content (% v/v)	20.29
Average linear velocity (FT/SEC)	54.9
(standard deviation, FT/SEC)	2.2
Volumetric flow	
actual (ACFM)	125242
dry standard (DSCFM)	72410
Mass flow of gas - wet (LB/HR)	417951

Test No. 3
No. 8 Main Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
A/ 1	250	51.6
A/ 2	245	51.4
A/ 3	250	52.5
A/ 4	250	55.7
A/ 5	240	56.1
A/ 6	240	55.4
B/ 1	240	53.3
B/ 2	240	56.5
B/ 3	245	58.6
B/ 4	245	55.6
B/ 5	245	55.6
B/ 6	245	56.3

Test No. 1
No. 1-4 Baghouse Stack

Results of Flow Determination -- Method 2

Time and date	1400 hrs, 06/22/83
Barometric pressure (uncompensated, in. Hg)	29.14
Pitot tube coefficient	.853
Number of sampling ports	2
Total number of points sampled	44
Duct or stack diameter (IN)	48.0
Cross sectional area (SQ FT)	12.57
Direction of flow	vertical, UP
Static pressure (IN WC)	-.12
Average gas temperature (DEG-F)	355
Absolute gas pressure (IN HG)	29.13
Average moisture content (% v/v)	12.07
Average linear velocity (FT/SEC)	78.2
(standard deviation, FT/SEC)	8.1
Volumetric flow	
actual (ACFM)	58958
dry standard (DSCFM)	32688
Mass flow of gas - wet (LB/HR)	163348

Test No. 1
No. 1-4 Baghouse Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
A/ 1	355	69.7
A/ 2	355	70.5
A/ 3	355	71.9
A/ 4	355	68.9
A/ 5	355	87.8
A/ 6	355	88.4
A/ 7	355	86.0
A/ 8	355	86.6
A/ 9	355	86.0
A/10	355	85.4
A/11	355	86.6
A/12	355	86.0
A/13	355	86.0
A/14	355	82.9
A/15	355	79.6
A/16	355	76.2
A/17	355	70.5
A/18	355	68.9
A/19	355	65.0
A/20	355	61.7
A/21	355	65.0
A/22	355	67.0
B/ 1	355	70.5
B/ 2	355	74.8
B/ 3	355	76.2
B/ 4	355	80.9
B/ 5	355	79.6
B/ 6	355	85.7
B/ 7	355	84.7
B/ 8	355	86.9
B/ 9	355	86.6
B/10	355	86.3
B/11	355	86.6
B/12	355	86.0
B/13	355	84.7
B/14	355	85.1
B/15	355	84.1
B/16	355	79.6

Test No. 1
No. 1-4 Baghouse Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
B/17	355	76.2
B/18	355	69.7
B/19	355	71.9
B/20	355	74.1
B/21	355	65.0
B/22	355	68.9

Test No. 2
No. 7 Baghouse Stack

Results of Flow Determination -- Method 2

Time and date	1600 hrs, 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.20
Pitot tube coefficient	.853
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	-.32
Average gas temperature (DEG-F)	332
Absolute gas pressure (IN HG)	29.22
Average moisture content (% v/v)	8.89
Average linear velocity (FT/SEC)	85.7
(standard deviation, FT/SEC)	3.9
Volumetric flow	
actual (ACFM)	18593
dry standard (DSCFM)	11026
Mass flow of gas - wet (LB/HR)	53841

Test No. 2
No. 7 Baghouse Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
A/ 1	332	81.0
A/ 2	332	83.8
A/ 3	332	82.9
A/ 4	332	84.1
A/ 5	332	84.1
A/ 6	332	89.3
A/ 7	332	89.3
A/ 8	332	89.9
A/ 9	332	90.5
A/10	332	92.1
A/11	332	92.7
A/12	332	87.1
B/ 1	332	79.2
B/ 2	332	79.8
B/ 3	332	81.7
B/ 4	332	84.1
B/ 5	332	84.1
B/ 6	332	85.6
B/ 7	332	87.6
B/ 8	332	87.9
B/ 9	332	88.8
B/10	332	88.2
B/11	332	81.7
B/12	332	91.0

Test No. 3
No. 11-Baghouse Stack

Results of Flow Determination -- Method 2

Time and date	2050 hrs, 06/23/83
Barometric pressure (uncompensated, in. Hg)	29.20
Pitot tube coefficient	.853
Number of sampling ports	2
Total number of points sampled	24
Duct or stack diameter (IN)	25.8
Cross sectional area (SQ FT)	3.62
Direction of flow	vertical, up
Static pressure (IN WC)	.29
Average gas temperature (DEG-F)	295
Absolute gas pressure (IN HG)	29.22
Average moisture content (% v/v)	8.11
Average linear velocity (FT/SEC)	73.7
(standard deviation, FT/SEC)	7.8
Volumetric flow	
actual (ACFM)	15988
dry standard (DSCFM)	10030
Mass flow of gas - wet (LB/HR)	48372

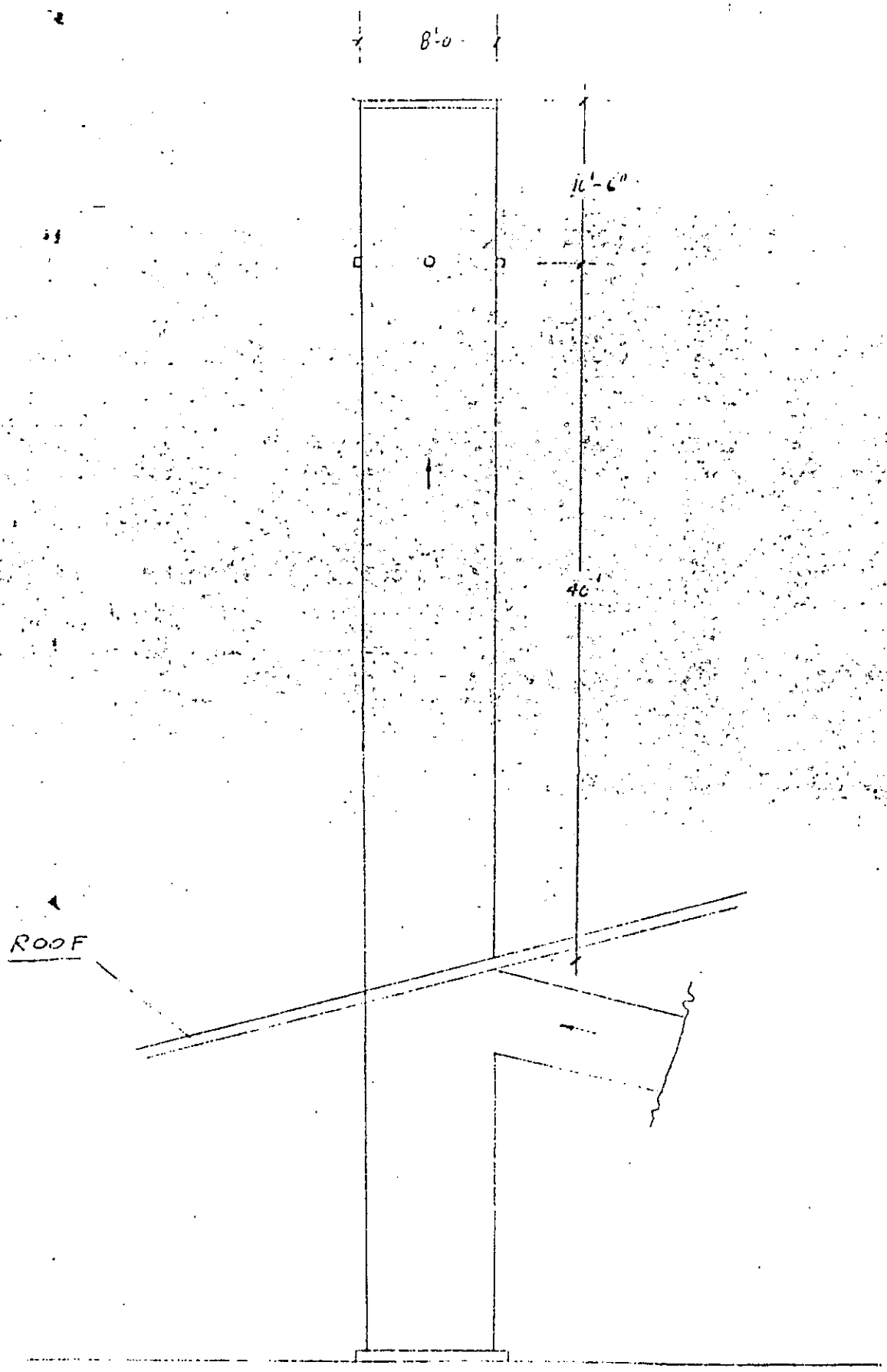
Test No. 3
No. 11 Baghouse Stack

Appendix A -- Point Velocity and Temperature Data

Port/Point	Gas Temperature (DEG-F)	Linear Velocity (FT/SEC)
A/ 1	284	61.7
A/ 2	286	61.8
A/ 3	284	70.7
A/ 4	286	75.7
A/ 5	287	65.6
A/ 6	288	84.8
A/ 7	296	74.6
A/ 8	326	76.1
A/ 9	326	63.5
A/10	326	79.3
A/11	326	77.7
A/12	340	75.1
B/ 1	286	66.3
B/ 2	286	69.1
B/ 3	286	66.3
B/ 4	283	72.4
B/ 5	285	72.4
B/ 6	285	61.8
B/ 7	285	78.8
B/ 8	285	83.2
B/ 9	286	84.7
B/10	284	81.7
B/11	287	80.4
B/12	288	84.8

APPENDIX B

LOCATION OF TEST PORTS AND TRAVERSE POINTS

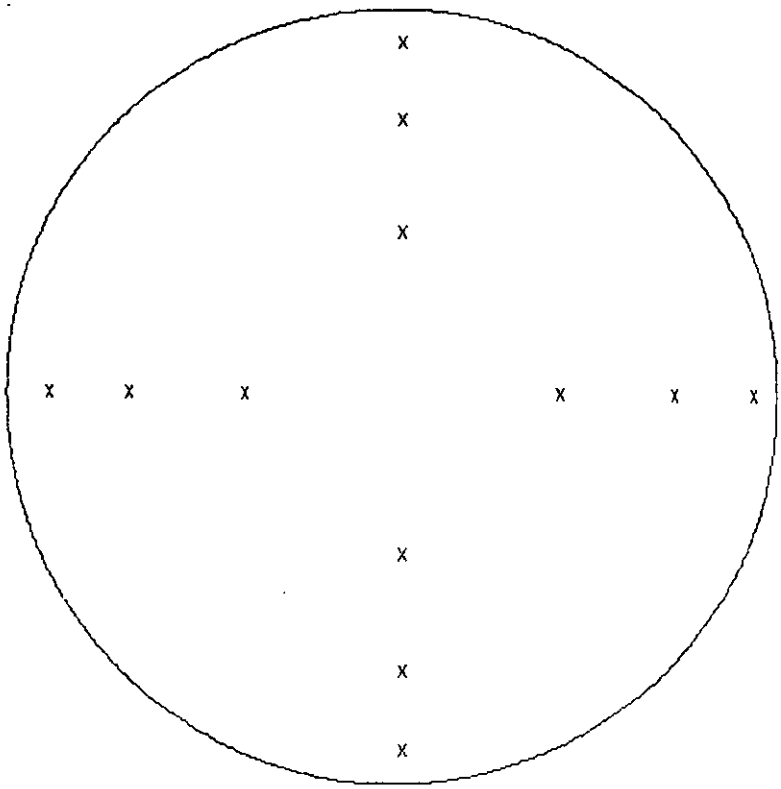


NO 8 KILN CLINKER COOLER STACK

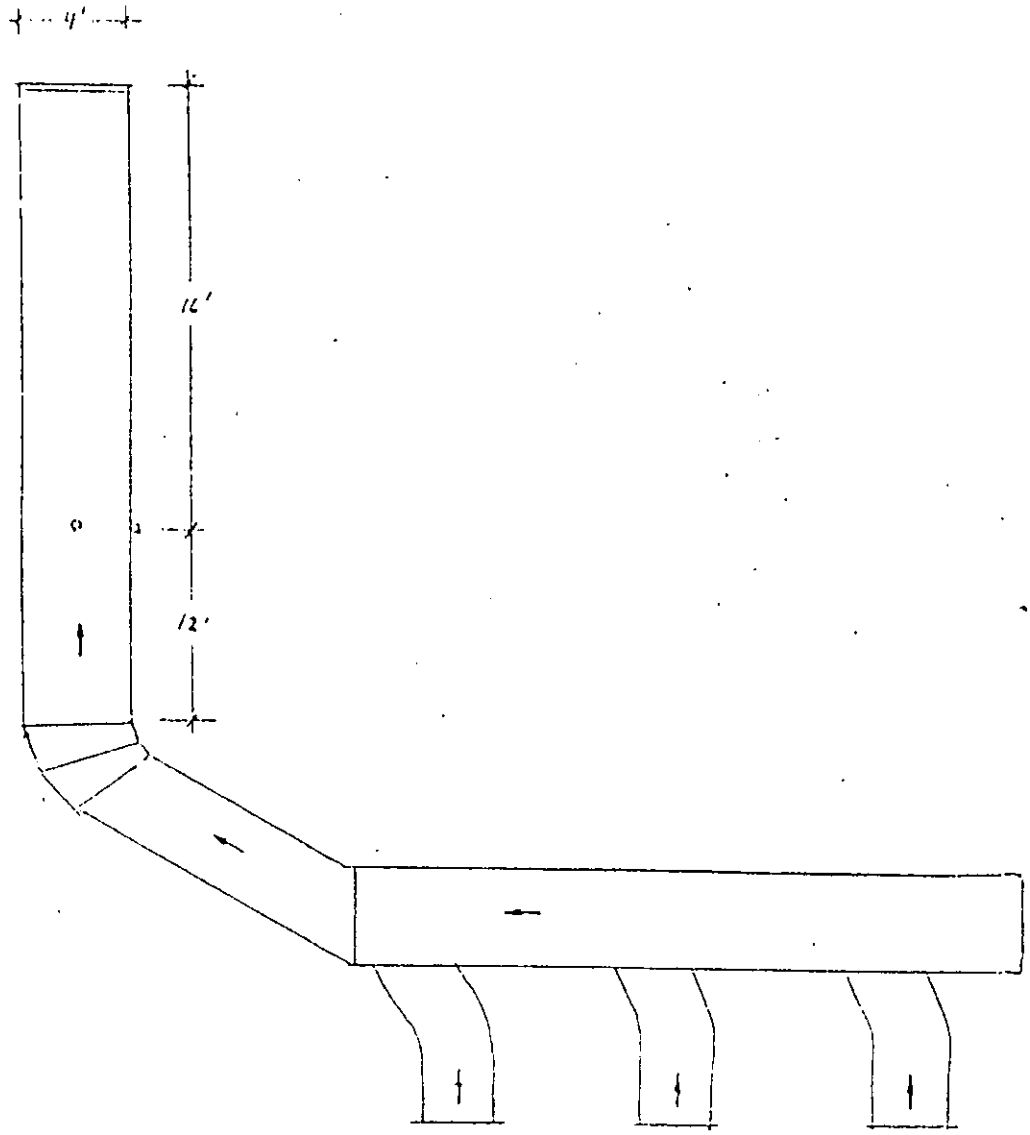
LOCATION OF TRAVERSE POINTS

TEST NO. 1

LOCATION - NO. 8 MAIN STACK



DIAMETER (IN.)	83.5
NUMBER OF PORTS	2
NUMBER OF POINTS TRAVERSED	12

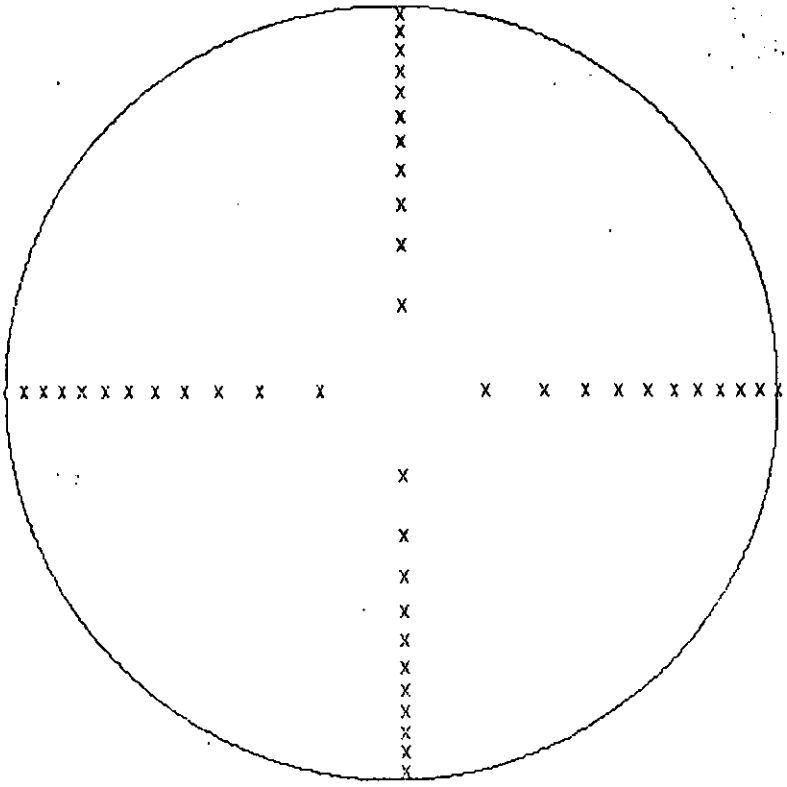


FLOW GEOMETRY NO 2 3 & 4 BAGHOUSE TEST SITE

LOCATION OF TRAVERSE POINTS

TEST NO. 1

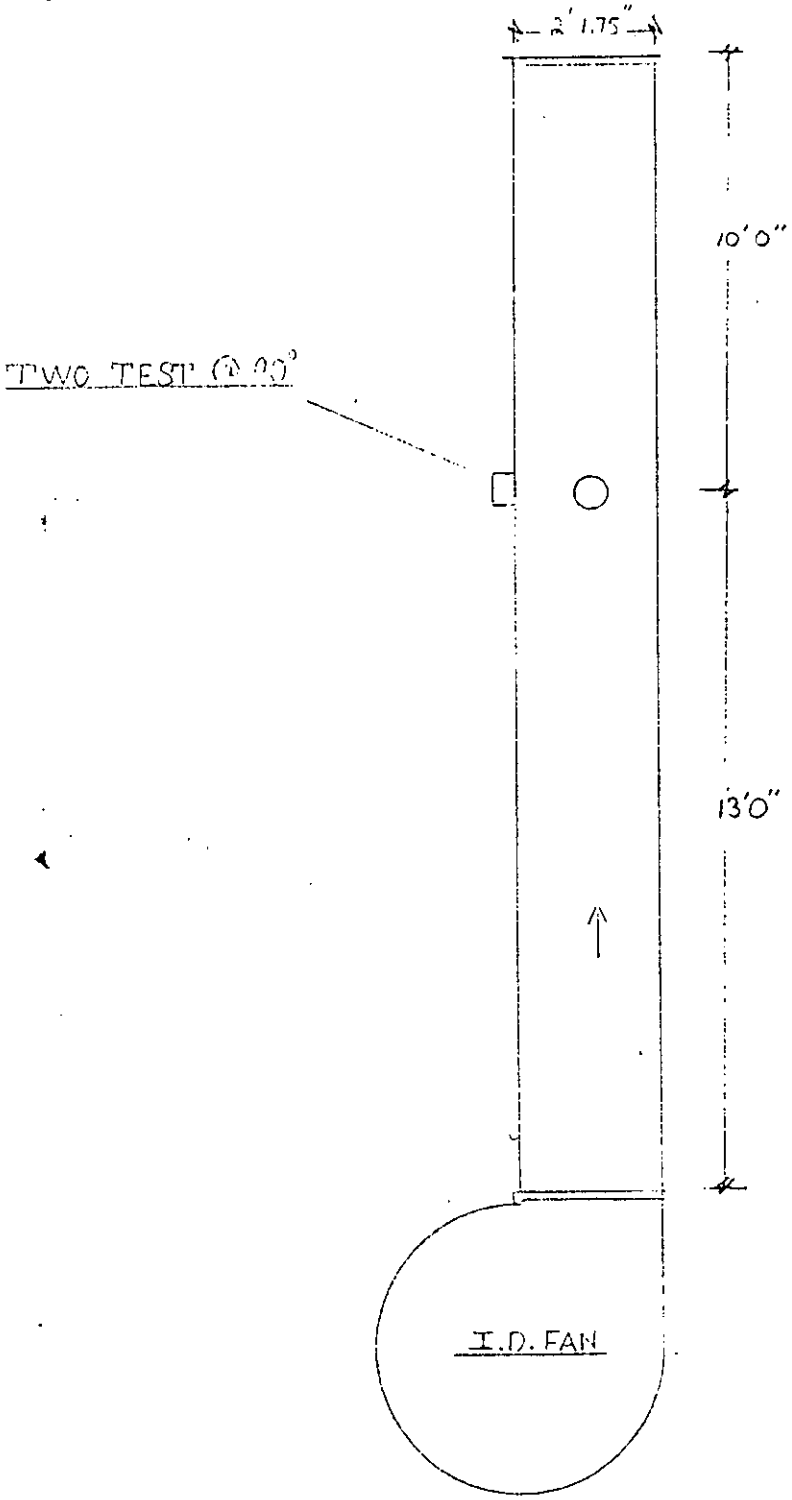
LOCATION - NO. 1-4 BAGHOUSE STACK



DIAMETER (IN.)	48.0
NUMBER OF PORTS	2
NUMBER OF POINTS TRAVERSED	44

LEHIGH CEMENT COMPANY

NO. 7 & 11 BAGHOUSE (STACKS)



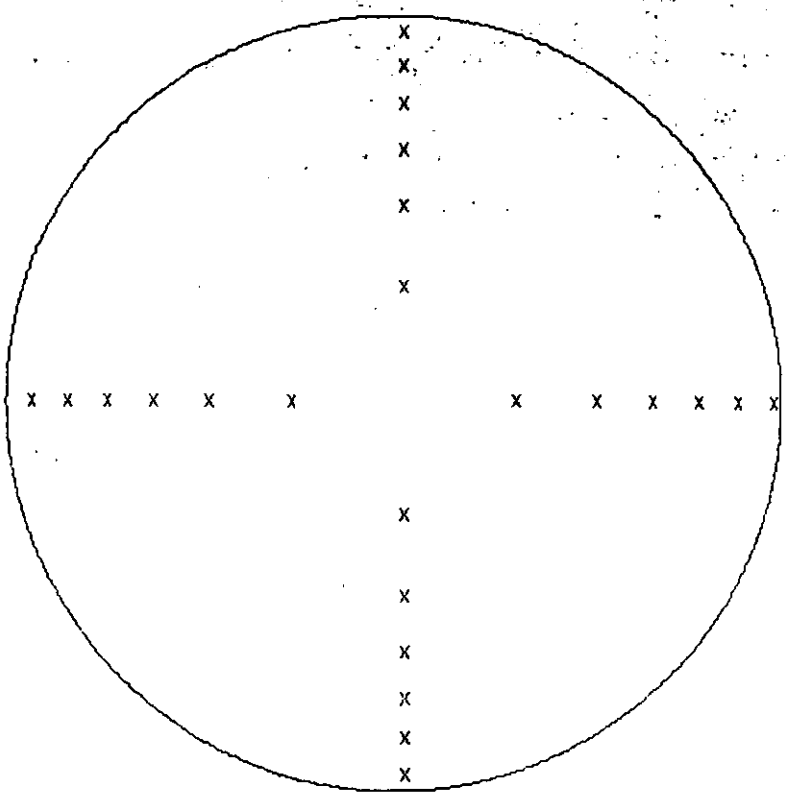
NOT TO SCALE

D.V.H. 8/82

LOCATION OF TRAVERSE POINTS

TEST NO. 2

LOCATION - NO. 7 BAGHOUSE STACK

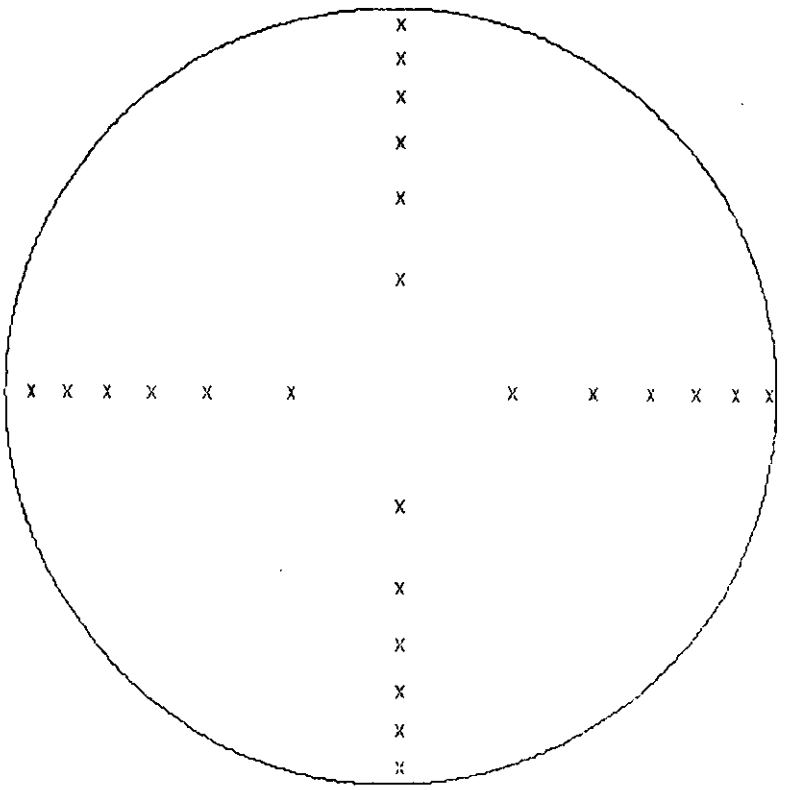


DIAMETER (IN.)	25.8
NUMBER OF PORTS	2
NUMBER OF POINTS TRAVERSED	24

LOCATION OF TRAVERSE POINTS

TEST NO. 3

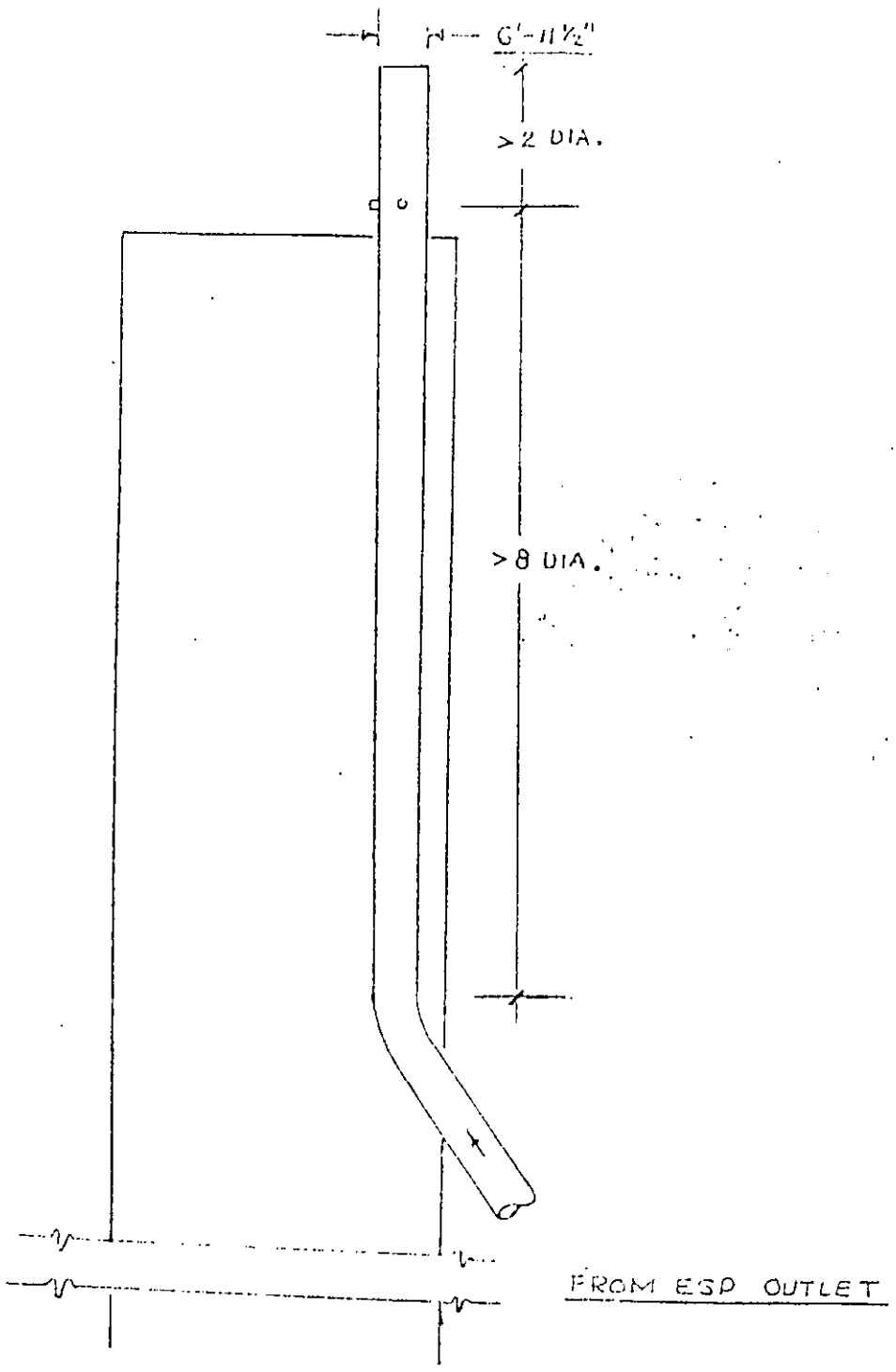
LOCATION - NO. 11 BAGHOUSE STACK



DIAMETER (IN.)	25.8
NUMBER OF PORTS	2
NUMBER OF POINTS TRAVERSED	24

LEHIGH PORTLAND CEMENT CO.

NOT TO SCALE



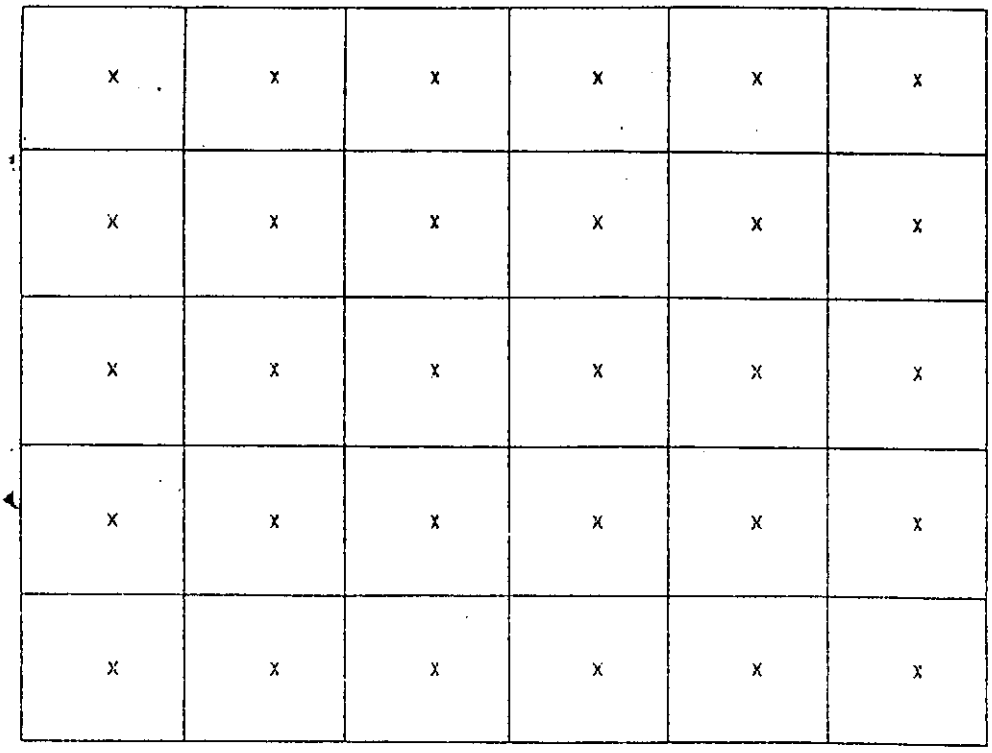
NO 8 KILN STACK

LP 9/80

LOCATION OF TRAVERSE POINTS

TEST NO. 1

LOCATION - BAGHOUSE INLET



NUMBER OF PORTS	5
NUMBER OF POINTS TRAVERSED	30

APPENDIX C

VOLUMETRIC FLOW RATE MEASUREMENT DATA SHEETS

Preliminary Data – Method 2

— Interpoll Inc. —

Job Lehigh Cement Co / No 8 Kiln

Source Baghouse Inlet Date 6-22-83

Test No. 1 Run No. 1

Stack dimensions: 60 x 79 in.

Dry bulb ____ °F Wet bulb ____ °F

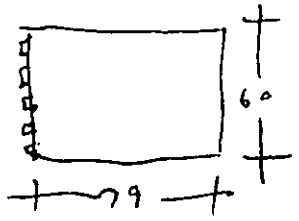
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) 29.14 in. Hg

Static pressure (P_g) -4.13 in. WC ____ in. Hg

Operators J Stock + C. Stock

Pitot No. 22 C_p ____ Port Length 3 1/2



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	(JS+CS 1515) Velocity Head (in. WC)	(SO+DM 2040) Temperature (°F)
A-1 E-1	6.58	10	.16 / .56	.20 / .54
2 2	19.74	23 1/4	.24 / .66	.26 / .66
3 3	32.90	35 3/8	.38 / .70	.38 / .73
4 4	46.06	49 1/2	.36 / .78	.39 / .78
5 5	59.22	62 5/8	.42 / .80	.46 / .84
6 6	72.38	75 7/8	.50 / .82	.60 / .81
B-1			.49	.47
2			.60	.61
3			.62	.66
4			.68	.74
5			.74	.82
6			.79	.76
C-1			.36	.39
2			.54	.59
3			.68	.66
4			.77	.74
5			.88	.82
6			.92	.94
D-1			.26	.30
2			.50	.51
3			.63	.63
4			.72	.74
5			.84	.89
6			.88	.82
25		t_s =	414	avg. 420

S-0034R

Preliminary Data – Method 2

— Interpoll Inc. —

Job Lehigh / No 8 Kiln

Source No 6 BH outlet Date 6-22-83

Test No. 1 Run No. 1

Stack dimensions: 25 3/4 in.

Dry bulb ____ °F Wet bulb ____ °F

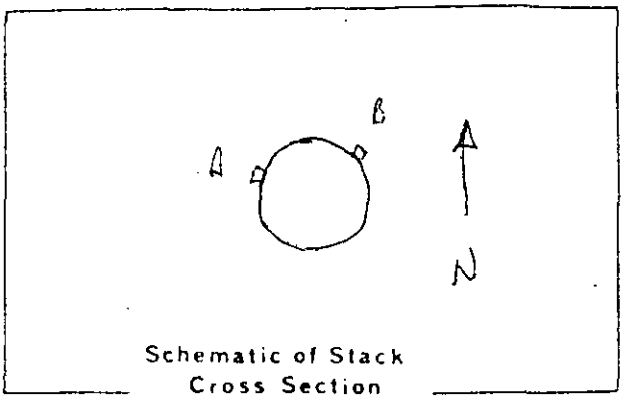
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) 29.14 in. Hg

Static pressure (P_g) +.11 in. WC ____ in. Hg

Operators J Stack & C Stack

Pitot No. ____ C_p ____ Port Length 1/4"



Schematic of Stack Cross Section

3 6-22-83

Traverse Point No.	Distance from Stack wall	Distance from End of Port	(1500)/(2100) Velocity Head (in. WC)	Temperature (°F)
A-1	.54		.76 / .86	
2	1.73		.72 / .76	
3	3.04		.74 / .80	
4	4.56		.76 / .90	
5	6.44		.79 / .96	
6	9.17		.82 / .94	
7	12.58		.87 / .92	
8	19.31		.86 / .96	
9	21.19		.79 / 1.02	
10	22.71		.82 / .84	
11	24.02		.80 / .80	
12	25.21		.75 / .79	
B-1			.68 / .69	
2			.70 / .78	
3			.72 / .77	
4			.74 / .79	
5			.80 / .86	
6			.84 / .95	
7			.66 / .94	
8			.87 / 1.02	
9			.88 / 1.20	
10			.85 / .91	
11			.70 / .94	
12			.64 / .96	
25		Σ_s =	340 / 336	avg.

S-0034 R

Preliminary Data – Method 2

— Interpoll Inc. —

Job Lehigh No 8 Kiln

Source No 10 BH outlet Date 6-22-83

Test No. 1 Run No. 1

Stack dimensions: 25 3/4 in.

Dry bulb ____ °F Wet bulb ____ °F

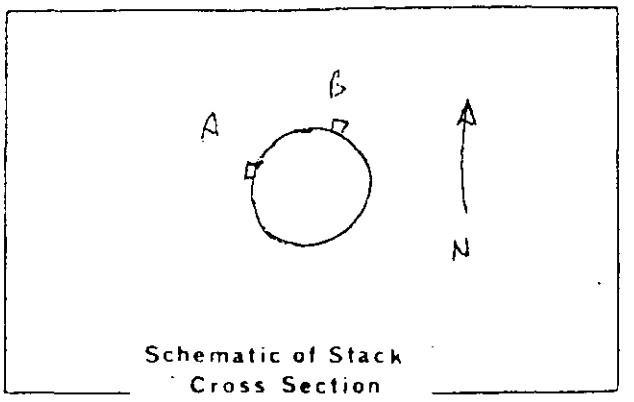
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) ____ in. Hg

Static pressure (P_g) -1.86 in. WC ____ in. Hg

Operators J Stock + C Stock

Pitot No. 12 C_p ____ Port Length 1/4"



Schematic of Stack Cross Section

6-22-83

Traverse Point No.	Distance from Stack wall	Distance from End of Port	(4505) / (2110) Velocity Head (in. WC)	Temperature (°F)
A-1	.54		.86 / .90	
2	1.73		1.10 / 1.15	
3	3.09		1.20 / 1.24	
4	4.56		1.30 / 1.22	
5	6.44		1.34 / 1.40	
6	9.17		1.26 / 1.41	
7	16.58		1.32 / 1.30	
8	19.31		1.30 / 1.36	
9	21.19		1.15 / 1.21	
10	22.71		1.10 / 1.00	
11	24.02		1.20 / 1.02	
12	25.21		.90 / .84	
B-1			.92 / .96	
2			.96 / .96	
3			1.00 / 1.02	
4			1.10 / 1.20	
5			1.24 / 1.26	
6			1.26 / 1.29	
7			1.10 / 1.32	
8			1.32 / 1.30	
9			1.24 / 1.30	
10			1.20 / 1.04	
11			1.10 / 1.20	
12			.84 / .90	
25		Σs	310 / 342	avg.

S-0034R

Preliminary Data – Method 2

— Interpoll Inc. —

Job Lehigh - No. 8 Kiln

Source No. 6 BH. Flt Date 6-23-83

Test No. 2 Run No. 1

Stack dimensions: 25 5/4 in.

Dry bulb ____ °F Wet bulb ____ °F

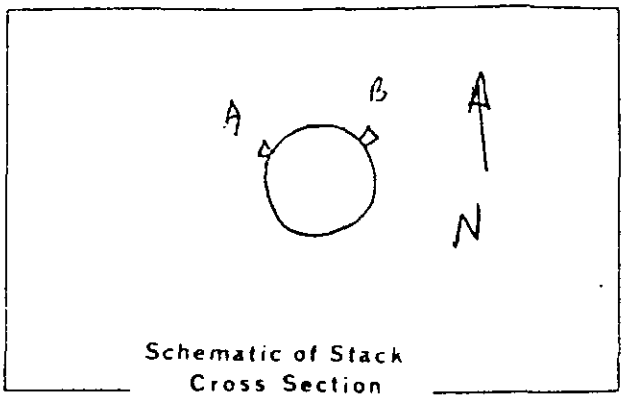
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) ____ in. Hg

Static pressure (P_g) -4.69 in. WC ____ in. Hg

Operators J Stack + C Stack

Pitot No. 22 C_p ____ Port Length 1/4



Schematic of Stack Cross Section

3 4

6-23-83 6-24-83

Traverse Point No.	Distance from Stack wall	Distance from End of Port	(.530) / (.0110) Velocity Head (in. WC)	Temperature (°F)
A-1	.54		.79 / 1.00	
2	1.73		.80 / .96	
3	3.04		1.20 / 1.20	
4	4.56		1.40 / 1.32	
5	6.84		1.32 / 1.40	
6	9.17		.90 / 1.20	
7	16.58		.92 / 1.10	
8	19.31		.91 / .98	
9	21.19		1.02 / 1.20	
10	22.71		1.64 / 1.04	
11	24.02		1.02 / 1.10	
12	25.21		.60 / 1.10	
B-1			1.20 / 1.20	
2			1.40 / 1.32	
3			1.36 / 1.40	
4			1.24 / 1.56	
5			1.20 / 1.30	
6			1.21 / 1.10	
7			1.09 / 1.20	
8			1.02 / 1.20	
9			1.04 / 1.24	
10			.82 / 1.20	
11			.86 / 1.30	
12			.80 / 1.10	
25		t_s =	329	avg.

S-0034R

— Interpoll Inc. —

Job Lehigh / No. 8 Kiln

Source Baghouse Inlet Date 6-23-83

Test No. 2 Run No. 1

Stack dimensions: 60 x 79 in.

Dry bulb ____ °F Wet bulb ____ °F

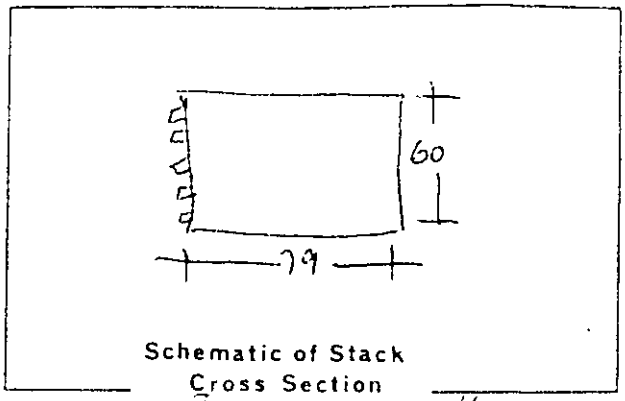
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) ____ in. Hg

Static pressure (P_g) -4.61 in. WC ____ in. Hg

Operators J Stock + C Stock

Pitot No. 22 C_p ____ Port Length ____



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	(1345) 6-23-83 Velocity Head (in. WC)	(0125) 6-24-83 Temperature (°F)
A-1 / E-1	6.58		.18 / .60	.20 / .58
2 / 2	19.75		.22 / .64	.24 / .62
3 / 3	32.91		.59 / .76	.36 / .69
4 / 4	46.08		.37 / .75	.36 / .82
5 / 5	59.25		.40 / .84	.42 / .84
6 / 6	72.41		.46 / .93	.40 / .80
B-1			.50	.45
2			.52	.56
3			.66	.72
4			.69	.72
5			.70	.70
6			.72	.68
C-1			.40	.45
2			.52	.50
3			.64	.66
4			.72	.79
5			.86	.99
6			.94	.86
D-1			.29	.30
2			.34	.36
3			.46	.42
4			.59	.49
5			.61	.66
6			.87	.90
25		Σs	= 420	avg. 426

S-0034R

— Interpoll Inc. —

Job Lehigh

Source No 1-4 BH outlet Date 6-23-85

Test No. 2 Run No. 1

Stack dimensions: 48 in.

Dry bulb ____ °F Wet bulb ____ °F

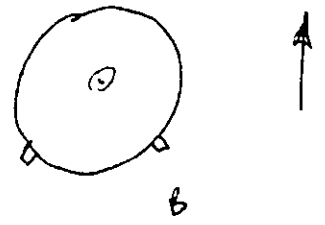
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) 29.20 in. Hg

Static pressure (P_g) -.13 in. WC ____ in. Hg

Operators J Stout & C Stout

Pitot No. 22 C_p ____ Port Length ____



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	6-23-85 (1750) Velocity Head (in. WC)	6-24-85 (0100) Temperature (°F)
A-1 / B-1			1.14 / 1.51	1.20 / 1.36
2 2			1.15 / 1.70	1.10 / 1.79
3			1.20 / 1.40	1.15 / 1.36
4			1.10 / 1.20	1.15 / 1.30
5			1.16 / 1.36	1.10 / 1.32
6			1.24 / 1.52	1.20 / 1.50
7			1.30 / 1.44	1.26 / 1.26
8			1.20 / 1.40	1.34 / 1.39
9			1.15 / 1.30	1.20 / 1.40
10			1.10 / 1.24	1.11 / 1.41
11			1.20 / .92	1.11 / 1.02
12			1.24 / .74	1.20 / .86
13			1.20 / 1.10	1.32 / 1.12
14			1.36 / .86	1.34 / .97
15			1.35 / .90	1.40 / 1.20
16			1.42 / .99	1.36 / 1.10
17			1.20 / 1.27	1.30 / 1.10
18			1.10 / 1.26	1.00 / 1.16
19			1.45 / 1.25	1.29 / 1.31
20			1.60 / 1.20	1.06 / 1.10
21			1.60 / 1.50	1.51 / 1.45
22 . 22			1.59 / 1.40	1.47 / 1.30
25		Eq°	380	avg. 371

S-0034R

APPENDIX D

EPA METHODS 3-5 DATA SHEETS
FOR THE MAIN STACK (ESP DISCHARGE)

Preliminary Data – Method 2

— Interpoll Inc. —

Job Lc High Cement

Source #8 Markstack Date 6-22-83

Test No. 9 Run No. 1-3

Stack dimensions: 835 in.

Dry bulb 243 °F Wet bulb 135 °F

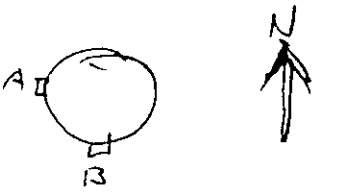
Rel. hum. ____ % B_{wo} 20 %

Barometric pressure (P_b) 28.94 in. Hg

Static pressure (P_g) -0.19 in. WC ____ in. Hg

Operators S.O. & D.M.

Pitot No. 20 C_p .856 Port Length 3"



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	Velocity Head (in. WC)	Temperature (°F)
A-1	3.67	6 5/8	0.58	240
2	12.19	15 1/4	0.60	240
3	24.72	27 3/4	0.66	238
4	58.78	61 3/4	0.64	238
5	71.3)	74 3/8	0.63	240
6	79.83	82 1/8	0.60	240
B-1				
2				
3				
4				
5				
6				
25				avg.

S-0034R

Sample Log Sheet

Job Lehigh Count Co

Unit and Sampling Location #8 Mainstack

Date 6-22-87 Test 1 Run 1

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 12 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3572			
Probe Wash			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	118	0	118
Drierite	1372.0	1293.0	79.0
Total (Mwo)			197.0 g

Integrated Flue Gas Sampling Data

FG Train No. B1 Box No. 4 Bag No. 1

Bag Material Tedlar Bag Volume 44 l. L

Pretest leak check ○ cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
1540	400		
	↓		
1648			

Operator S. Olson 320-P Reading 5.8 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Le High Cement Operators S.O. & D.M Pitot No. 20 C_p .856

Source #8 Main Stack Sampling Train No. 4 $\Delta H_@$ 1.77 Bar. Press. 28.94 in.Hg. B_{wo} 13 %

Date 6-22-83 Test 1 Run 1 Gasmeter coeff. .9989 Amb. Temp. 80 °F Nozzle No. _____ Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1540)	(286.12)			6.12			26				
A-6	3	289.75	0.63	1.52	3.66 / 378	1.5	240	260	265	5.2	96	92
5	10	293.62	0.69	1.67	383 / 361	2.0	240	260	265	5.0	100	94
4	15	297.37	0.66	1.60	3.74 / 735	2.0	240	260	260	4.9	100	94
3	20	301.02	0.63	1.52	366 / 101	2.0	240	260	260	5.2	100	94
2	25	304.61	0.62	1.50	362 / 463	2.0	245	260	260	5.0	100	94
1	30	307.62	0.42	1.02	299 / 262	2.0	240	260	265	4.9	100	94
B-6	35	310.42	0.70	1.69	384 / 146	2.5	245	260	265	4.9	100	94
5	40	315.35	0.72	1.74	391 / 537	3.0	240	265	265	5.0	100	96
4	45	319.30	0.72	1.74	391 / 928	3.0	240	265	265	5.2	100	96
3	50	322.91	0.63	1.52	365 / 293	3.0	245	265	265	5.2	100	96
2	55	326.05	0.46	1.11	313 / 606	3.0	240	260	255	5.0	100	96
1	60	329.19	0.46	1.11	313 / 919	3.0	240	260	255	5.0	100	96
	(1648)											
	ϕ = 60	V_m = 43.07									$\bar{t}_m$ = 97.17	

V_{std} = 39.61

— Interpoll Inc. —

D-3

S-D

Sample Log Sheet

Job Le High Cement

Unit and Sampling Location #8 Mainstack

Date 6-22-83 Test 1 Run 2

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒
posttest: 0 cfm at 6 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3178			
Probe Wash			
Total (M_n)			g

Impinger : ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	134	0	134
Dri-rite	1433.0	1372.0	61.0
Total (M_{wo})			195.0 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 2

Bag Material Tedlar Bag Volume 44 ℓ L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
1746	400		
1950			

Operator S. Olson 320-P Reading 5.7 % v/v

EPA Method 5 Field Data Sheet

Job La High Cement Operators S.O. + D.M. Pitot No. 20 C_p .856

Source #8 Main stack Sampling Train No. 4 ΔH_2 1.77 Bar. Press. 27.84 in.Hg. B_{wo} 19 %

Date 6-22-83 Test 1 Run 2 Gasmeter coeff. .9989 Amb. Temp. 90 °F Nozzle No. ____ Nozzle Dia. .252 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1746)	(329.47)			947		-					
B -6	5	332.78	0.61	1.27	333 280	2	240	250	250	5.2	96	94
5	10	336.24	0.66	1.38	344 624	2	250	250	260	5.1	98	94
4	15	339.73	0.69	1.44	362 976	2	250	250	260	5.0	100	94
3	20	343.13	0.62	1.30	334 310	2	250	250	260	5.0	100	94
2	25	346.39	0.58	1.21	325 635	2	240	250	260	5.0	100	94
1	30	349.37	0.50	1.05	302 937	2	240	260	265	4.8	100	94
A -6	35	352.81	0.66	1.38	346 283	2	245	250	265	4.7	100	94
5	40	356.36	0.68	1.42	351 634	2	245	250	260	4.7	100	94
4	45	359.87	0.68	1.42	351 985	2	245	260	260	4.8	100	94
3	50	363.21	0.63	1.32	339 324	2	240	260	265	5.0	100	94
2	55	366.39	0.54	1.13	315 639	2	235	250	265	5.3	100	94
1	60	369.60	0.56	1.17	317 959	2	240	255	265	5.4	100	94
	(1850)											
		V_m = 40.13									$\bar{T}_m$ = 76.75	

V_{std} = 36.94

Sample Log Sheet

Job Ga. High Cement

Unit and Sampling Location #8 Main Stack

Date 6-22-83 Test 1 Run 3

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 10 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3511			
Probe wash			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	141	0	141
Dry ice	1349.0	1296.0	53.0
Total (M_{wo})			194.0 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 3

Bag Material Tedlar Bag Volume 44 ℓ. L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
1746	400		
	↓		
1850			

Operator S. Olson 320-P Reading 5.8 % v/v

EPA Method 5 Field Data Sheet

Job Le High Cement — Operators S.O. & D.M. — Pitot No. 20 — C_p .856

Source #8 Main Stack — Sampling Train No. 4 — $\Delta H_@$ 1.77 — Bar. Press. 29.94 in.Hg. — B_{wo} 20 %

Date 6-22-93 — Test 1 — Run 3 — Gasmeter coeff. .9999 — Amb. Temp. 90°F — Nozzle No. — — Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in.WC)	Orifice Meter (in.WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (%v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1925)	(369.80)		▲	980		-				-	
B-6	5	373.22	0.65	1.33	340 320	2	240	250	240	5.0	98	94
5	10	376.61	0.65	1.33	340 660	2	240	250	240	4.9	100	94
4	15	380.01	0.65	1.33	340 000	2	240	255	250	4.9	100	94
3	20	389.47	0.66	1.35	344 344	2	235	255	260	4.8	100	94
2	25	386.63	0.56	1.14	317 661	2	235	260	260	4.8	100	94
1	30	389.60	0.50	1.02	249 960	2	235	260	265	5.0	100	94
A-6	35	392.84	0.60	1.22	298 298	2	235	260	265	5.0	100	94
5	40	396.24	0.64	1.31	337 625	2	240	265	265	5.0	100	92
4	45	399.48	0.59	1.20	324 949	2	240	265	255	5.3	100	92
3	50	402.55	0.52	1.06	304 253	2	240	260	255	5.0	100	92
2	55	405.47	0.49	1.00	296 549	2	235	260	255	5.0	100	92
1	60	408.45	0.49	1.00	296 845	2	235	265	250	4.9	100	92
	(2028)											
		V_m = 38.65										

D-7

S-0037R

Preliminary Data – Method 2

— Interpoll Inc. —

Job Le High Cement

Source #8 Main Stack Date 6-23-83

Test No. 2 Run No. 1-3

Stack dimensions: 83½ in.

Dry bulb 240 °F Wet bulb 146 °F

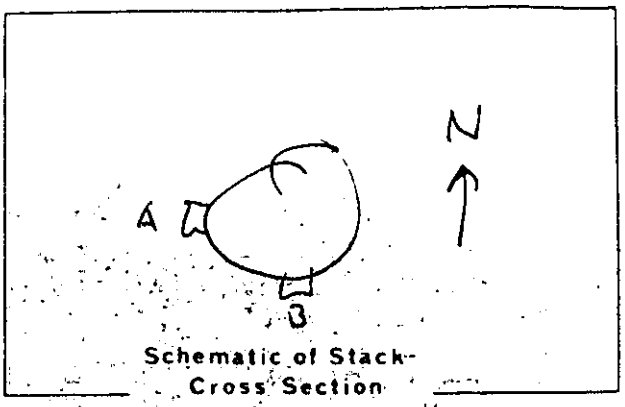
Rel. hum. — % B_{wo} 20 %

Barometric pressure (P_b) 29.00 in. Hg

Static pressure (P_g) -0.40 in. WC ____ in. Hg

Operators S.O. & D.M.

Pitot No. 20 C_p .856 Port Length 3"



Schematic of Stack-Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	Velocity Head (in. WC)	Temperature (°F)
A-6	3.67	6 5/8	0.70	240
5	12.14	15 1/4	0.67	240
4	24.72	27 3/4	0.66	245
3	51.78	61 3/4	0.68	250
2	71.31	74 3/8	0.56	245
1	79.83	82 5/8	0.60	245
B-6				
5				
4				
3				
2				
1				
25				avg.

S-0034R

Sample Log Sheet

Job La High Cement

Unit and Sampling Location

Date 6-23-83 Test 2 Run 1

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 10 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3598			
Probe wash			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	125	0	125
Silica Gel	1539.0	1468	71.0
Total (Mwo)			196.0 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 1

Bag Material Tedlar Bag Volume 44 L.

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No.

Time	cc/min.	Time	cc/min.
1620	400		
	↓		
1724			

Operator S. Olson 320-P Reading 5-2 % v/v

EPA Method 5 Field Data Sheet

Job La High Cement — Operators SO & DM — Pitot No. 20 — C_p .856

Source #8 Main-stack — Sampling Train No. 4 — $\Delta H_@$ 1.77 — Bar. Press. 29.00 in.Hg. — B_{wo} 20 %

Date 6-23-83 — Test 2 — Run 1 — Gasmeter coeff. .9989 — Amb. Temp. 88 °F — Nozzle No. S-2 — Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in.WC)	Orifice Meter (in.WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1620)	(408.72)		▲	372		-				▲	
13-6	5	412.21	0.64	1.38	350 222	2	240	240	250	4.9	100	96
5	10	415.80	0.69	1.49	361 583	2	250	240	250	4.8	104	98
4	15	419.38	0.67	1.45	357 940	2	245	240	250	5.2	104	98
3	20	422.97	0.67	1.45	357 297	2	245	240	250	5.0	106	98
2	25	425.90	0.45	0.97	293 590	2	240	240	250	5.0	106	98
1	30	428.83	0.45	0.97	293 593	2	240	245	260	5.0	106	98
A-6	35	432.33	0.65	1.40	351 234	2	245	240	255	5.2	106	98
5	40	435.87	0.65	1.40	351 585	2	245	240	255	5.1	106	100
4	45	439.37	0.65	1.40	351 936	2	245	250	260	5.0	106	100
3	50	442.87	0.65	1.40	361 287	2	245	250	260	5.0	106	100
2	55	446.14	0.56	1.21	327 614	2	240	255	265	5.0	106	100
1	60	449.41	0.56	1.21	327 941	2	240	250	260	5.1	106	100
	(1724)											
		V_m = 40.69									T_m = 101.9	

V_{std} = 39.20

D-10

S-0037R

Sample Log Sheet

Job Be High Cement

Unit and Sampling Location #8 Mainstack

Date 6-23-23 Test 2 Run 2

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 12 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3600			
Probe wash			
Total (M_n)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	150	0	150
Dry Ice	1379.0	1315.5	63.50
Total (M_{wo})			213.50 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 2

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
1755	400		
	↓		
1857			

Operator S. Olson 320-P Reading 5.6 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lc High Cement Operators S.O. & D.M. Pitot No. 20 C_p .856

Source #8 Mainstack Sampling Train No. 4 ΔH_a 1.77 Bar. Press. 29.00 in.Hg. B_{wo} 20 %

Date 6-23-83 Test 2 Run 2 Gasmeter coeff. .9989 Amb. Temp. 90°F Nozzle No. 5-2 Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp. (°F) 1	Probe Temp. (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1755)	(449.51)		▲	95)		-				-	
B-6	5	453.12	0.70	1.51	363 314	2	250	240	250	5.1	104	100
5	10	456.69	0.67	1.45	355 669	2	250	240	250	5.0	104	100
4	15	460,28	0.68	1.47	358 027	2	250	245	260	5.1	106	100
3	20	463.84	0.67	1.45	355 382	2	250	245	260	5.1	106	100
2	25	467.07	0.57	1.23	328 710	2	250	240	260	5.0	106	100
1	30	470.38	0.57	1.23	327 038	2	250	240	265	5.0	106	100
A-6	35	474.10	0.74	1.60	375 413	2	245	245	265	5.1	106	100
5	40	477.84	0.72	1.56	368 771	2	250	245	265	5.2	106	100
4	45	481.39	0.68	1.47	354 139	2	250	245	260	5.1	106	100
3	50	484.74	0.60	1.30	338 477	2	245	240	260	5.0	106	100
2	55	488.18	0.60	1.30	338 815	2	245	240	260	4.9	106	100
1	60	491.47	0.58	1.25	332 147	2	245	245	260	5.0	106	100
	(1857)											
		V_m = 41.96									T_m = 102.83	

$V_{m,c}$ = 38.30

Sample Log Sheet

Job La High Cement

Unit and Sampling Location #8 Waste stack

Date 6-23-83 Test 2 Run 3

Sample Train: Leak check pretest: < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 10 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter #3583			
Probe wash			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	162	0	162
Dry silica	1524.0	1462.0	62.0
Total (Mwo)			224.0 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 3

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
1915	400		
	↓		
2018			

Operator S. Olson 320-P Reading 5.2 % v/v

EPA Method 5 Field Data Sheet

Job Le High Council — Operators SO + DM — Pitot No. 20 — C_p .856

Source #8 Mainstack — Sampling Train No. 4 — $\Delta H_@$ 1.77 — Bar. Press. 29.00 in.Hg. — B_{wo} 21 %

Date 6-23-83 — Test 2 — Run 3 — Gasmeter coeff. .9949 — Amb. Temp. 85 °F — Nozzle No. 5-2 — Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1915)	(491.98)			198							
B-6	5	495.60	0.70	1.47	363 561	2	245	250	260	5.2	102	100
5	10	499.27	0.70	1.47	363 924	2	245	245	260	5.1	104	100
4	15	502.81	0.69	1.45	360 294	2	245	250	255	5.1	104	100
3	20	506.30	0.64	1.34	347 631	2	245	250	255	5.1	104	100
2	25	509.48	0.53	1.11	317 948	2	240	250	260	5.1	104	100
1	30	512.65	0.53	1.11	317 265	2	240	250	260	5.1	104	98
A-6	35	516.30	0.71	1.49	365 630	2	245	250	260	5.1	102	98
5	40	519.78	0.66	1.39	352 992	2	245	260	265	5.1	100	98
4	45	523.37	0.67	1.41	355 337	2	245	260	265	5.3	100	98
3	50	526.95	0.67	1.41	355 692	2	245	260	265	5.1	98	96
2	55	530.31	0.61	1.28	339 031	2	245	255	260	5.1	98	96
1	60	533.70	0.61	1.28	339 570	2	245	255	260	5.1	98	96
	(2018)											
		V_m = 41.72									$\bar{T}_m$ = 99.1	

D-14

32.27

S-0037R

Sample Log Sheet

Job: Lc High Cement

Unit and Sampling Location: #8 Main Stack

Date: 6-23-83 Test: 3 Run: 1

Sample Train: Leak check pretest: < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 10 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3585			
Probe Wash			
Total (M_n)			g

Impinger: ☐ Condenser: ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	142	0	142
Dri-rite	1335.5	1262.5	73.0
Total (M_{wo})			215.0 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 1

Bag Material Tedlar Bag Volume 44 ℓ. L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
2050	400		
	↓		
2054			

Operator S. Olsen 320-P Reading 5.2 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job La High Cement — Operators JO + DM — Pitot No. 20 — C_p .856

Source #8 Main Stack — Sampling Train No. 4 — ΔH_a 1.77 — Bar. Press. 29.00 in.Hg. — B_{wo} 21 %

Date 6-23-83 — Test 3 — Run 1 — Gasmeter coeff. .9999 — Amb. Temp. 78°F — Nozzle No. S-2 — Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(2050)	(533.81)		▲	381		▼				▼	
B-6	5	537.43	0.72	1.48	362 743	2	245	240	250	5.1	90	90
5	10	541.00	0.70	1.44	357 100	2	245	245	260	5.1	94	90
4	15	544.58	0.70	1.44	357 457	2	245	245	260	5.1	94	90
3	20	548.34	0.78	1.61	377 834	2	245	250	265	5.3	94	90
2	25	552.04	0.73	1.50	366 200	2	240	250	265	5.2	94	90
1	30	555.45	0.65	1.34	345 545	2	240	250	265	5.0	94	90
A-6	35	559.03	0.70	1.44	359 904	2	240	260	265	5.0	94	90
5	40	562.66	0.72	1.48	364 267	2	240	260	265	5.0	96	90
4	45	566.22	0.70	1.44	356 624	2	250	255	255	5.0	96	90
3	50	569.58	0.62	1.28	335 959	2	250	250	250	5.3	96	90
2	55	572.90	0.60	1.24	331 290	2	245	250	250	5.4	96	90
1	60	576.24	0.60	1.24	331 621	2	~~250~~	250	260	5.3	96	90
	(2054)											
		V_m = 42.40									T_m = 92.25	

V_{sl} = 39.40

Sample Log Sheet

Job Lc High Cement

Unit and Sampling Location #8 Main Stack

Date 6-23-83 Test 3 Run 2

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 10 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3586			
Probe Wash			
Total (M_n)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	152	0	152
Impinger	1501.5	1445.5	56.0
Total (M_{wo})			208.0 g

Integrated Flue Gas Sampling Data

FG Train No. B-1 Box No. 4 Bag No. 2

Bag Material Tedlar Bag Volume 44 L

Pretest leak check _____ cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
2211	400		
	↓		
2315			

Operator S. Olson 320-P Reading 5.2 % v/v

EPA Method 5 Field Data Sheet

Job Le High Cement Operators SO - DM Pitot No. 20 C_p .856

Source #8 Main Stack Sampling Train No. 4 $\Delta H_@$ 1.77 Bar. Press. 29.00 in.Hg. B_{wo} 20.4 %

Date 6-23-83 Test 3 Run 2 Gasmeter coeff. .9989 Amb. Temp. 80 °F Nozzle No. S-2 Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (in Hg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(2211)	(576.48)			64[illegible]							
B-6	5	580.00	0.70	1.44	354 002	2	240	260	255	5.0	90	88
5	10	583.58	0.70	1.44	354 356	2	240	255	260	5.2	92	88
4	15	587.10	0.70	1.44	354 710	2	240	250	260	5.2	92	88
3	20	590.41	0.63	1.30	335 045	2	245	250	260	5.2	92	88
2	25	593.69	0.60	1.24	327 372	2	245	250	260	5.2	90	88
1	30	596.94	0.58	1.19	322 699	2	245	255	255	5.2	90	88
A-6	35	600.38	0.67	1.38	346 040	2	245	255	250	5.2	90	86
5	40	603.88	0.68	1.40	348 388	2	245	255	250	5.1	90	86
4	45	607.28	0.65	1.34	340 728	2	245	250	250	5.1	90	84
3	50	610.70	0.65	1.34	340 068	2	245	250	245	5.1	88	84
2	55	613.95	0.60	1.24	327 395	2	245	250	245	5.1	88	84
1	60	617.11	0.56	1.15	316 711	2	245	250	250	5.1	88	84
	(2315)											
		V_m = 46.63									$\bar{t}_m$ = 88.17	

$\bar{t}_s$ = 38.08

Sample Log Sheet

Job Le High Cement

Unit and Sampling Location #8 Main Stack

Date 6-23-83 Test 3 Run 3

Sample Train: Leak check pretest: <0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 10 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3588			
Probe wash			
Total (Mn)			g

Impinger: ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	164	0	164
Dowanita	1357.5	1310.0	47.5
Total (Mwo)			211.5 g

Integrated Flue Gas Sampling Data

FG Train No. B.1 Box No. 4 Bag No. 3

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 6

Time	cc/min.	Time	cc/min.
	400		
	↓		

Operator S. Olson 320-P Reading 5.3 % v/v

EPA Method 5 Field Data Sheet

Job Lehigh County — Operators SO & PM — Pitot No. 20 — C_p .856

Source #8 Main Stack — Sampling Train No. 4 — $\Delta H_@$ 1.77 — Bar. Press. 29.00 in.Hg. — B_{wo} 20.4 %

Date 6-23-83 — Test 3 — Run 3 — Gasmeter coeff. .9989 — Amb. Temp. 75°F — Nozzle No. 5-2 — Nozzle Dia. .250 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(2330)	(617.26)			726							
3-6	5	620.81	0.70	1.45	356 082	2	240	250	250	5.2	84	80
5	10	624.45	0.72	1.49	367 449	2	245	250	250	5.3	84	80
4	15	628.18	0.72	1.49	367 816	2	245	255	255	5.3	86	80
3	20	631.70	0.70	1.45	365 171	2	245	255	255	5.3	86	80
2	25	635.16	0.67	1.39	348 514	2	250	260	260	5.3	86	80
1	30	638.80	0.72	1.49	361 880	2	240	260	265	6.0	86	80
A-6	35	642.06	0.60	1.24	329 209	2	240	260	265	5.9	84	80
5	40	645.45	0.63	1.30	338 547	2	240	260	265	5.6	82	80
4	45	649.03	0.70	1.45	356 903	2	240	250	260	5.6	82	80
3	50	652.56	0.69	1.43	353 256	2	240	250	260	5.4	82	80
2	55	656.07	0.68	1.41	351 607	2	240	250	255	5.5	82	80
1	60	659.58	0.68	1.41	351 958	2	240	260	260	5.7	82	80
	(0032)											
		V_m = 42.32										

APPENDIX E

EPA METHODS 3-5 DATA SHEETS FOR
NO. 1-4 BAGHOUSE DISCHARGE

Preliminary Data — Method 2

— Interpoll Inc. —

Job Lehigh - No. 8 Kiln

Source No 1-4 Baghouse Date 6-22-89

Test No. 1 Run No. 1

Stack dimensions: 48" in.

Dry bulb ____ °F Wet bulb ____ °F

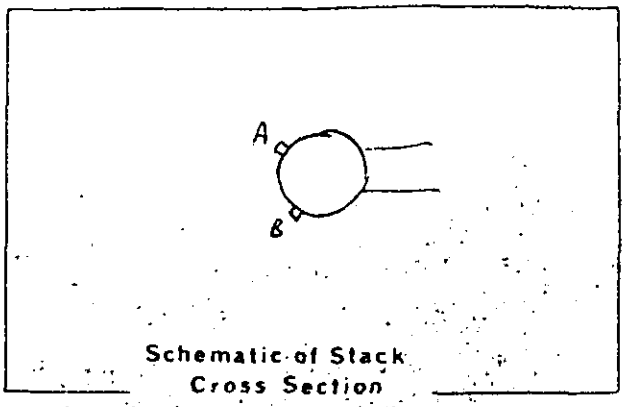
Rel. hum. ____ % B_{wo} 9 %

Barometric pressure (P_b) 29.14 in. Hg

Static pressure (P_g) -.12 in. WC ____ in. Hg

Operators J Stock & C Stock

Pitot No. 6 C_p .853 Port Length 3"



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	(.1400) Velocity Head (in. WC)	Temperature (°F)
A-1 / B-1	.53	4	.92 / .94	
2 2	1.68	4 5/8	.94 / 1.06	
3 3	2.88	5 7/8	.98 / 1.10	
4 4	4.38	7 3/8	.90 / 1.24	
5 5	5.57	8 1/2	1.46 / 1.20	
6 6	7.01	10	1.48 / 1.39	
7 7	8.64	11 5/8	1.40 / 1.36	
8 8	10.46	13 1/2	1.42 / 1.43	
9 9	12.58	15 1/2	1.40 / 1.42	
10 10	15.12	18 1/8	1.37 / 1.41	
11 11	18.86	21 7/8	1.42 / 1.42	
12 12	29.14	32 1/8	1.40 / 1.40	
13 13	32.80	35 7/8	1.40 / 1.36	
14 14	35.43	38 1/2	1.30 / 1.37	
15 15	37.54	40 1/2	1.20 / 1.34	
16 16	39.36	42 3/8	1.10 / 1.20	
17 17	40.99	44	.94 / 1.10	
18 18	42.43	45 1/2	.96 / .92	
19 19	43.82	46 7/8	.80 / .98	
20 20	45.12	48 1/8	.72 / 1.04	
21 21	46.32	49 3/8	.80 / .80	
22 22	47.47	50	.85 / .96	
25				avg. 355

S-0034R

Sample Log Sheet

Job Lehigh / No. 8 Kiln

Unit and Sampling Location Nos. 1-4 Baghouse Outlet

Date 6-22-85 Test / Run /

Sample Train: Leak check pretest: < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 8 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
F, Her# 3510			
PW			
Total (M_n)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	76	0	76
Direct	1381	1329	52
Total (M_{wo})			128 g

Integrated Flue Gas Sampling Data

FG Train No. _____ Box No. _____ Bag No. 1

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. _____

Time	cc/min.	Time	cc/min.
1540			
	906		
1709			

Operator JHocks 320-P Reading 18.6 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh - No 8 Kiln | Operators JS + CS | Pitot No. 6 | C_p .853

Source No 1-4 Baghouse Outlet | Sampling Train No. 6 | $\Delta H_@$ 1.80 | Bar. Press. 29.14 in.Hg. | B_{wo} 9 %

Date 6-22-85 | Test 1 | Run 1 | Gasmeter coeff. 1.0051 | Amb. Temp. 95 °F | Nozzle No. 4-1 | Nozzle Dia. .197 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1540)	(935.90)										
A-22	2	936.73	.60	.51	84 674	1.3	340	260	260	18.6	110	106
21	4	937.57	.60	.51	84 758		340			18.6	110	106
20	6	938.70	1.10	.94	113 871		340			18.7	110	106
19	8	939.71	1.00	.85	109 979		341			18.5	110	106
18	10	940.60	.65	.55	87 066		341			18.3	110	106
17	12	941.27	.38	.32	66 132	1.0	346			18.3	110	106
16	14	942.12	.63	.54	85 217		351			18.3	110	106
15	16	943.08	.76	.65	93 310		354			18.4	110	106
14	18	944.18	1.00	.85	107 418		354			18.2	110	106
13	20	945.14	.80	.68	96 514		354			18.4	110	106
12	22	946.10	.80	.75	96 610	1.9	354			18.6	110	106
11	24	947.21	1.10	1.05	112 722		354			18.5	110	106
10	26	948.40	1.20	1.14	117 839	2.4	354			18.4	110	106
9	28	949.62	1.30	1.24	122 961		355			18.6	110	106
8	30	950.92	1.50	1.43	131 092		355			18.6	110	106
7	32	952.26	1.53	1.45	132 224	3.0	355			18.6	110	106
6	34	953.26	.80	.76	96 320		355			18.6	110	106
5	36	954.08	.60	.57	83 403		352			18.5	110	106
4	38	955.12	1.06	1.01	110 513		352			18.5	110	106
3	40	956.31	1.21	1.15	118 631		352			18.2	110	106
2	42	957.46	1.12	1.06	113 744	2.4	354			18.4	110	106
1	44	958.57	1.12	1.06	113 857		354			18.2	112	106
B-22	46	959.50	.76	.72	93 950		354			18.6	112	106
21	48	960.58	1.00	.95	107 058		352			18.4	112	106

.81 .95 E-3

S-0037R

EPA Method 5 Field Data Sheet

Job Lehigh / Nor Main
Source No 1-4 B Header
Date 6-22-85 Test 1 Run 1

Operators _____ Pitot No. _____ C_p _____
Sampling Train No. _____ $\Delta H_@$ _____ Bar. Press. _____ in.Hg B_{wo} _____ %
Gasmeter coeff. _____ Amb. Temp. _____ °F Nozzle No. _____ Nozzle Dia. _____ in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in.WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	( )	(.)		▲			-				-	
K-20	50	961.88	1.50	1.43	131/89		351	260	260	18.6	112	106
19	52	963.23	1.62	1.54	136/325		350			18.5	112	106
18	54	964.49	1.34	1.27	124/849		350			18.4	112	106
17	56	965.54	.96	.91	105/554	2.1	350			18.6	112	106
16	58	966.47	.75	.71	93/647		350			18.6	112	106
15	60	967.61	1.15	1.09	115/762		350			18.6	112	106
14	62	968.87	1.34	1.27	124/886		350			18.5	112	106
13	64	970.14	1.34	1.27	124/010	2.8	351			18.4	112	106
12	66	971.44	1.48	1.41	130/140		350			18.3	112	106
11	68	972.33	.75	.71	93/233		350			18.6	112	106
10	70	973.45	1.10	1.05	112/345		346			18.5	112	106
9	72	974.56	1.10	1.05	112/457	2.2	346			18.4	112	106
8	74	975.79	1.30	1.24	122/579		349			18.4	112	106
7	76	977.06	1.40	1.33	127/706		348			18.3	112	106
6	78	978.28	1.30	1.24	122/828		347			18.6	112	106
5	80	979.13	.60	.57	83/911		349			18.7	112	106
4	82	980.17	1.00	.95	107/018		346			18.7	112	106
3	84	981.19	.90	.86	102/120	2.0	346			18.6	112	106
2	86	982.32	1.10	1.05	112/232		342			18.4	112	106
1	88	983.55	1.30	1.24	123/355		344			18.6	112	106
	(1109)											
	θ=88	V_m = 47.45		$\overline{\Delta H}$ =								$\overline{T_m}$ =

V_{st} = 43.06

Sample Log Sheet

Job Lehigh / No. 8 Kiln

Unit and Sampling Location No 1-4 Bleed

Date 6-22-89 Test 1 Run 2

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 7 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3505			
DW			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	88	0	88
Drierite	1360	1336	24
Total (Mwo)			112 g

$V_{std} = 39.82$

Integrated Flue Gas Sampling Data

FG Train No. B-2 Box No. 3 Bag No. 2

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
1737			
	400		
1906			

Operator [signature] 320-P Reading 16.6 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh / No 8 Kiln Operators JSVCS Pitot No. 6 C_p .853

Source No 1-4 BHouse Sampling Train No. 6 $\Delta H_@$ 1.80 Bar. Press 29.14 in.Hg. B_{wo} 19 %

Date 6-22-83 Test 1 Run 2 Gasmeter coeff. 1.0051 Amb. Temp. 95°F Nozzle No. 4-1 Nozzle Dia. .187 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in.WC)	Orifice Meter (in.WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1737)	(98390)		▲								
B-22	2	983.82	.80	.72	92 482		349	260	266	17.0	110	104
21	4	985.94	1.020	1.08	113 595		349			17.0	110	104
20	6	987.60	1.05	.95	105 700	2.1	349			16.4	110	104
19	8	988.65	1.00	.90	103 703		347			16.2	110	104
18	10	988.92	.75	.68	89 892		347			16.4	110	104
17	12	989.74	.60	.54	79 971		355			16.4	110	104
16	14	990.52	.60	.54	79 050		354			16.8	110	104
15	16	991.55	1.05	.95	107 155	2.2	355			16.8	110	104
14	18	992.76	1.35	1.22	119 274		355			16.8	110	104
13	20	993.99	1.40	1.26	121 395	2.8	355			16.6	110	104
12	22	995.13	1.30	1.17	117 512		354			16.8	110	104
11	24	996.03	.75	.68	89 601		354			16.8	110	106
10	26	996.98	.90	.91	97 697		354			17.0	110	106
9	28	998.06	1.10	.99	108 806	2.2	354			17.2	110	106
8	30	999.24	1.30	1.17	117 923		353			17.1	110	106
7	32	0.50	1.50	1.35	126 049		355			17.0	110	106
6	34	1.66	1.30	1.17	117 166		355			17.0	108	104
5	36	2.41	.50	.45	73 239	1.2	350			16.8	108	104
4	38	3.32	.83	.71	94 333		350			17.1	108	104
3	40	4.30	.90	.77	98 431		349			17.0	108	104
2	42	5.36	1.10	.99	108 539		342			16.6	108	104
1	44	6.46	1.10	.99	108 647		349			16.4	108	104
A-22	46	7.42	.90	.77	98 745		349			16.4	108	104
21	48	8.26	.60	.54	79 824		347			16.5	108	104

EPA Method 5 Field Data Sheet

Job Lehigh's / NO8 Kiln — Operators _____ — Pitot No. _____ — C_p _____

Source NO1-4 BH Outlet — Sampling Train No. _____ — $\Delta H_@$ _____ — Bar. Press. _____ in.Hg. — B_{wo} _____ %

Date 6-22-85 — Test 1 — Run 2 — Gasmeter coeff. _____ — Amb. Temp. _____ °F — Nozzle No. _____ — Nozzle Dia. _____ in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	( )	( )		▲	Y=4							
A-20	50	9.13	.75	.68	89 913		349	260	260	16.5	106	102
19	52	10.16	1.00	.90	103 016	2.4	349			16.4	106	102
18	54	11.19	1.00	.90	103 119		351			16.3	106	102
17	56	12.17	.90	.81	95 217		350			16.4	108	104
16	58	13.15	.90	.81	98 315		350			16.3	108	104
15	60	13.88	.50	.45	73 389	1.6	350			16.4	108	104
14	62	14.67	.60	.54	80 468		350			16.4	108	104
13	64	15.73	1.05	.95	105 573		348			16.5	106	102
12	66	16.82	1.10	.99	108 681		349			16.6	106	102
11	68	18.04	1.40	1.26	122 803	3.1	348			16.5	106	102
10	70	18.77	.50	.45	73 876		347			16.4	106	102
9	72	19.46	.50	.45	73 949		348			16.5	106	102
8	74	20.41	.80	.72	92 041		348			16.5	106	102
7	76	21.32	.80	.72	92 133		348			16.2	106	102
6	78	22.57	1.50	1.35	126 259	3.2	348			16.2	106	102
5	80	23.86	1.50	1.35	126 385		349			16.2	106	102
4	82	24.81	.75	.77	95 480		347			16.2	106	102
3	84	25.58	.60	.54	80 560	1.7	342			16.3	106	102
2	86	26.43	.65	.59	83 643		346			16.4	106	102
1	88	27.43	.95	.86	100 743		346			16.4	106	102
	(1906)											
	Θ=	Y_m=43.53		ΔH=								F_m=

39.82

Sample Log Sheet

Job Lehigh No 8 Kiln

Unit and Sampling Location No 1-4 Baghouse Outlet

Date 6-22-85 Test 1 Run 3

Sample Train: Leak-check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 7 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3516			
PW			
Total (M_n)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	86	0	86
Drierite	1360	1326	34
Total (M_{wo})			120 g

Integrated Flue Gas Sampling Data

FG Train No. B- Box No. _____ Bag No. 3

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. _____

Time	cc/min.	Time	cc/min.
1925			
	400		
2054			

Operator _____ 320-P Reading 16.4 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh / No. 8 Kiln Operators J S & CS Pitot No. 6 C_p .1853

Source No 4 Baghouse Outlet Sampling Train No. C ΔH_a 1.80 Bar. Press. 29.14 in.Hg B_{wo} 12 %

Date 6-22-83 Test 1 Run 3 Gasmeter coeff. 1.0050 Amb. Temp. 85 °F Nozzle No. 4-1 Nozzle Dia. .187 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp. (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1925)	(27.60)										
A-22	2	28.34	.50	.45	73 813		349	260	260	17.1	106	102
21	4	29.27	.80	.68	92 925	1.4	351			16.7	106	102
20	6	30.21	.85	.72	95 020		351			16.4	106	102
19	8	31.19	.90	.77	98 118		345			16.4	106	102
18	10	31.92	.50	.45	73 191		345			16.3	106	102
17	12	32.64	.50	.45	72 264		346			16.4	106	102
16	14	33.42	.55	.47	77 341		346			16.3	106	102
15	16	34.13	.80	.68	92 413	1.4	346			16.5	106	102
14	18	35.05	.80	.68	92 505		347			16.4	106	102
13	20	36.04	.90	.77	99 604		346			16.5	106	102
12	22	37.02	.90	.77	98 702		346			16.4	106	102
11	24	38.05	1.00	.85	103 805	2.0	346			16.3	106	102
10	26	39.08	1.00	.85	103 907		346			16.5	106	102
9	28	40.15	1.15	.98	110 018		346			16.4	106	102
8	30	41.35	1.30	1.11	117 135		346			16.1	106	102
7	32	42.45	1.10	.93	104 243		346			16.2	106	102
6	34	43.45	.92	.78	99 342	1.9	347			16.1	108	102
5	36	44.38	.80	.68	92 434		351			16.6	108	102
4	38	45.23	.68	.58	85 519		350			16.2	108	102
3	40	46.35	1.25	1.06	115 634	2.1	350			16.2	108	102
2	42	47.30	.85	.72	95 729		350			15.9	108	102
1	44	48.32	1.00	.85	103 832		348			16.0	108	102
B-22	46	49.36	1.00	.85	103 935		348			16.0	108	102
21	48	50.37	.90	.77	98 033		348			16.1	108	102

6-3

S-0037R

EPA Method 5 Field Data Sheet

Job Lehigh / No. Bklyn Operators _____ Pitot No. _____ C_p _____

Source No 1-4 BH Stack Sampling Train No. _____ $\Delta H_@$ _____ Bar. Press. _____ in.Hg. B_{wo} _____ %

Date 6-22-83 Test 1 Run 3 Gasmeter coeff. _____ Amb. Temp. _____ °F Nozzle No. _____ Nozzle Dia. _____ in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	( )	( )		▲								
B-20	50	51.59	1.50	1.28	126 159		347	260	260	16.0	108	102
19	52	52.85	1.50	1.28	126 285		349			16.1	108	102
18	54	54.11	1.50	1.28	126 411	2.6	346			16.0	108	102
17	56	55.06	.85	.72	95 506		346			16.2	108	102
16	58	56.04	.85	.72	95 601		350			16.2	108	102
15	60	59.11	1.10	.94	108 709		346			16.0	108	102
14	62	58.12	1.00	.85	103 812		346			16.2	108	102
13	64	59.30	1.30	1.11	118 930		346			16.2	108	102
12	66	60.48	1.30	1.11	119 049		346			16.0	108	102
11	68	61.66	1.30	1.11	118 166	2.4	346			16.1	108	102
10	70	62.62	.80	.68	92 258		345			16.2	108	102
9	72	63.52	.80	.68	92 350		345			16.1	108	102
8	74	64.59	1.10	.94	108 458		342			16.2	108	102
7	76	65.65	1.10	.94	106 564	2.0	342			16.4	108	102
6	78	66.73	1.10	.94	108 672		346			16.3	108	102
5	80	67.52	.60	.51	80 752		349			16.4	108	102
4	82	68.38	.70	.60	86 838		345			16.3	108	102
3	84	69.25	.70	.60	86 924		346			16.2	108	102
2	86	70.37	1.20	1.02	113 037	2.2	347			16.4	108	102
1	88	71.50	1.20	1.02	113 150		342			16.2	108	102
	(2054)											
	Θ=88	V_m=43.90		ΔH=								t_m

V_{st} 40.16

APPENDIX F

EPA METHODS 3-5 DATA SHEETS
FOR NO. 7 BAGHOUSE DISCHARGE

Preliminary Data – Method 2

— Interpoll Inc. —

Job Lehigh Cement Co.

Source No. 7 Baghouse Outlet Date 6-23-83

Test No. 2 Run No. 1

Stack dimensions: 25 3/4 in.

Dry bulb _____ °F Wet bulb _____ °F

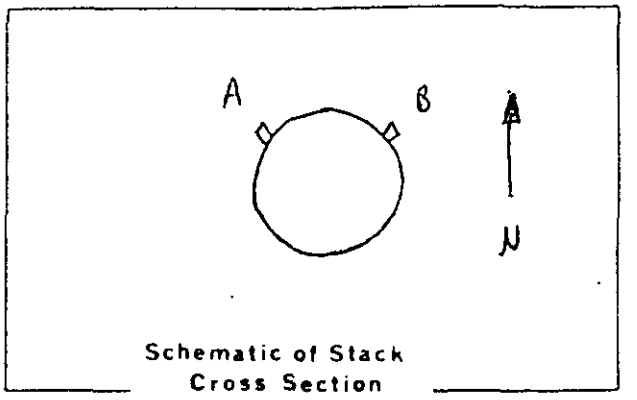
Rel. hum. _____ % B_{wo} _____ %

Barometric pressure (P_b) _____ in. Hg

Static pressure (P_g) -1.32 in. WC _____ in. Hg

Operators J Stack & C. Stack

Pitot No. 6 C_p .853 Port Length 5 1/2"



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	Velocity Head (in. WC)	Temperature (°F)
A-1	.54	6	1.30	
2	1.73	7 1/4	1.39	
3	3.04	8 1/2	1.36	
4	4.56	10	1.40	
5	6.44	12	1.40	
6	9.19	14 5/8	1.58	
7	16.58	22 1/8	1.58	
8	19.31	24 7/8	1.60	
9	21.19	26 5/8	1.62	
10	22.71	28 1/4	1.68	
11	24.02	29 1/2	1.70	
12	25.21	30 3/4	1.50	
B-1			1.24	
2			1.26	
3			1.32	
4			1.40	
5			1.40	
6			1.45	
7			1.52	
8			1.53	
9			1.56	
10			1.54	
11			1.32	
12			1.30	
25				avg.

S-0034R

Sample Log Sheet

Job Lehigh / No8 M Kiln

Unit and Sampling Location No 7 BH outlet

Date 6-22-87 Test 1 Run 1

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 8 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3519			
DW			
Total (M_n)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
condensate	68	0	68
Drierite	1376	1328	48
Total (M_{wo})			116 g

Integrated Flue Gas Sampling Data

FG Train No. B-2 Box No. 3 Bag No. 1

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
1020			
	400		
1724			

Operator [signature] 320-P Reading 16.7 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh Nor K/L — Operators JS + CS — Pitot No. 6 — C_p 1853

Source No 7 BH outlet — Sampling Train No. 6 — ΔH_a 1.80 — Bar. Press. 29.20 in.Hg — B_{wo} 10 %

Date 6-22-88 — Test 2 — Run 1 — Gasmeter coeff. 1.005 — Amb. Temp. 95 °F — Nozzle No. 7-2 — Nozzle Dia. .246 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp 1 (°F)	Probe Temp 2 (°F)	Oven Temp 3 (°F)	Oxygen 4 (% v/v)	Gasmeter temp 5 IN (°F)	Gasmeter temp 6 OUT (°F)
	(1620)	(71.80)										
A-12	2.5	74.51	1.40	3.50	271 451	5.6	332	260	260	16.6	116	112
11	5	77.38	1.55	3.88	287 738		324			16.2	116	112
10	7.5	80.16	1.50	4.00	291 019		328			16.9	120	116
Δ 9	10	82.61	1.10	2.97	242 261	4.9	324			17.2	120	116
8	12.5	85.50	1.60	4.32	287 553		324	261	264	18.5	120	116
7	15	88.53	1.70	4.59	301 854		318			16.5	120	116
6	17.5	91.56	1.75	4.73	304 158		327			16.4	120	116
Δ 5	20	93.40	.60	1.62	179 537		318			16.9	120	116
4	22.5	96.16	1.40	3.78	273 616	6.0	321			16.2	120	116
3	25	98.80	1.35	3.65	267 877		326			16.5	120	116
2	27.5	101.41	1.32	3.56	264 741		326			16.7	122	118
Δ 1	30	103.72	1.00	2.70	231 372		317			18.2	122	118
B-12	32.5	106.60	1.60	4.32	291 663		324			16.4	122	118
11	35	109.33	1.40	3.78	271 934	6.0	326			16.7	122	118
Δ 10	37.5	112.14	1.50	4.05	281 215		330			16.8	122	118
9	40	114.96	1.50	4.05	281 496		330			16.6	122	118
8	42.5	117.86	1.60	4.32	291 777		331			16.6	122	118
7	45	120.74	1.60	4.32	291 074		325			16.4	122	118
Δ 6	47.5	123.10	1.00	2.70	231 309		325			17.2	122	118
5	50	126.00	1.60	4.32	291 600	6.9	318			17.4	122	118
4	52.5	128.75	1.45	3.92	277 877		324			16.9	122	116
3	55	131.44	1.35	3.65	267 144		323			16.9	122	118
2	57.5	133.51	.80	2.16	207 251		314			17.1	122	118
1	60	135.82	1.00	2.70	231 582		312			17.4	122	113
	(1724)	V_m = 64.02		$\overline{\Delta H}$ = 3.65								$\overline{t_m}$ = 118.25

F-3

2.5
64.48
2.70

— Interpoll Inc. —

S-0037R

Sample Log Sheet

Job Lehigh / No. 8 Kiln

Unit and Sampling Location No 7 Bldg Stk

Date 6-23-83 Test 2 Run 2

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒
posttest: 0 cfm at 8 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
F, Hel # 3517			
DW			
Total (Mn)			g

Impinger : ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	72	0	72
Dricite	1372	1330	42
Total (Mwo)			114 g

Integrated Flue Gas Sampling Data

FG Train No. B-2 Box No. 3 Bag No. 2

Bag Material Tedlar Bag Volume 41 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
1755			
	400		
1951			

Operator J Stovall 320-P Reading 17.4 % v/v

EPA Method 5 Field Data Sheet

Job Lehigh / No8 Kiln Operators JS + CS Pitot No. 6 C_p .853

Source No7 BH outlet Sampling Train No. 6 $\Delta H_@$ 1.80 Bar. Press. 29.20 in.Hg. B_{wo} 10 %

Date 6-23-93 Test 1 Run 2 Gasmeter coeff. 1.005 Amb. Temp. 95°F Nozzle No. 2-2 Nozzle Dia. .246 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1755)	(136.20)		▲			-				▲	
B-12	2.5	139.00	1.50	4.05	291 901	6.0	332	260	260	17.2	110	108
11	5	141.76	1.45	3.92	277 178		332			17.2	120	110
10	7.5	144.59	1.50	4.05	291 459		332			17.4	120	110
9	10	147.49	1.60	4.32	291 750	6.4	324			17.7	120	110
8	12.5	150.36	1.50	4.05	281 031		319			17.2	120	110
7	15	153.22	1.55	4.19	287 318		320			16.7	120	110
6	17.5	156.19	1.70	4.59	301 619		320			17.3	120	110
5	20	159.12	1.60	4.32	291 910		321			17.9	120	110
4	22.5	161.75	1.30	3.51	262 172	5.4	320			17.0	120	112
3	25	164.13	1.10	2.97	241 413		329			16.8	120	112
2	27.5	166.42	.98	2.65	229 641		326			17.3	120	112
1	30	168.22	.60	1.62	180 821		310			19.0	120	112
A-12	32.5	171.22	1.70	4.59	301 122	7.0	310			17.0	120	114
11	35	173.98	1.45	3.92	276 398		329			17.1	120	114
10	37.5	176.29	1.00	2.70	230 628		328			17.9	120	114
9	40	179.29	1.70	4.59	301 929		316			18.4	120	114
8	42.5	182.24	1.65	4.46	295 224	7.0	316			16.6	120	114
7	45	185.24	1.70	4.59	301 525		324			16.9	120	114
6	47.5	187.05	.60	1.62	179 704		304			17.6	120	114
5	50	189.78	1.40	3.78	274 978		310			18.0	120	114
4	52.5	192.46	1.35	3.65	267 246		321			16.8	120	114
3	55	195.20	1.40	3.78	274 520	6.0	326			16.9	120	114
2	57.5	196.99	.60	1.62	179 699		326			17.4	120	114
1	60	199.40	1.10	2.97	241 940					18.0	120	114

(1857) V_m = 63.20 ΔH = 3.60 t_m = 115.92

Sample Log Sheet

Job Lehigh INO 8 Kiln

Unit and Sampling Location NO7 BH Outlet

Date 6-23-93 Test 2 Run 3

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 7.5 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3519			
PW			
Total (M_n)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condenser	86	0	86
Driertz	1333	1290	43
Total (M_{wo})			129 g

Integrated Flue Gas Sampling Data

FG Train No. B-2 Box No. 3 Bag No. 3

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
1915			
	400		
	↓		
2018			

Operator [signature] 320-P Reading 16.6 % v/v

EPA Method 5 Field Data Sheet

Job Lehigh Cement Co. Operators JS+CS Pitot No. 6 C_p .853

Source No 7 BH outlet Sampling Train No. C $\Delta H_@$ 1.80 Bar. Press 29.20 in.Hg. B_{wo} 9 %

Date 6-23-83 Test 2 Run 3 Gasmeter coeff. 1.0051 Amb. Temp 95°F Nozzle No. 7-2 Nozzle Dia. .246 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in.WC)	Orifice Meter (in.WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(1915)	(199.65)		▲								
A-12	2.5	202.26	1.30	3.51	262 227	5.0	324	260	260	16.8	118	112
11	5	205.94	1.45	3.92	277 384		320			16.6	118	112
10	7.5	208.85	1.60	4.32	291 285		325			16.7	118	112
9	10	210.17	1.00	2.70	232 017		312			16.9	118	112
8	12.5	213.07	1.60	4.32	291 308		314			18.2	118	112
7	15	215.99	1.60	4.32	291 599	6.4	316			16.6	122	114
6	17.5	218.92	1.65	4.46	296 893		324			16.8	122	114
5	20	221.28	1.00	2.70	232 127		323			17.6	122	114
4	22.5	223.89	1.30	3.51	262 389		325			17.9	122	114
3	25	226.57	1.40	3.55	272 661		325			16.6	122	114
2	27.5	229.12	1.20	3.24	252 913		325			16.4	122	114
1	30	231.45	1.00	2.70	232 145	5.0	320			17.4	122	114
B-12	32.5	234.16	1.40	3.55	272 417		321			17.4	122	114
11	35	236.96	1.50	4.05	282 699	6.1	326			16.6	122	114
10	37.5	239.80	1.50	4.05	282 981		321			17.2	122	114
9	40	242.63	1.50	4.05	282 263		329			17.9	124	114
8	42.5	245.56	1.60	4.32	291 554	6.8	326			16.7	124	114
7	45	248.40	1.55	4.19	287 841		322			16.5	124	114
6	47.5	250.73	1.00	2.70	232 073	4.6	322			17.1	124	114
5	50	253.63	1.60	4.32	291 364	6.6	335			17.4	124	114
4	52.5	256.32	1.40	3.55	272 636		330			16.9	124	114
3	55	259.06	1.40	3.55	272 908		326			16.7	124	114
2	57.5	261.50	1.10	2.97	242 150		320			16.6	124	114
1	60	263.92	1.10	2.97	242 392		321			16.5	124	114

(2018) V_m = 64.27 $\overline{\Delta H}$ = 3.65 — Interpoll Inc. — $\overline{T_m}$ = 117.75

F-7

S-0037R

APPENDIX G

EPA METHODS 3-5 DATA SHEETS
FOR NO. 11 BAGHOUSE DISCHARGE

Preliminary Data — Method 2

— Interpoll Inc. —

Job Lehigh - No. 8 Kiln

Source Mill 3H outlet Date 6-23-83

Test No. 3 Run No. 1

Stack dimensions: 25.1/4 in.

Dry bulb ____ °F Wet bulb ____ °F

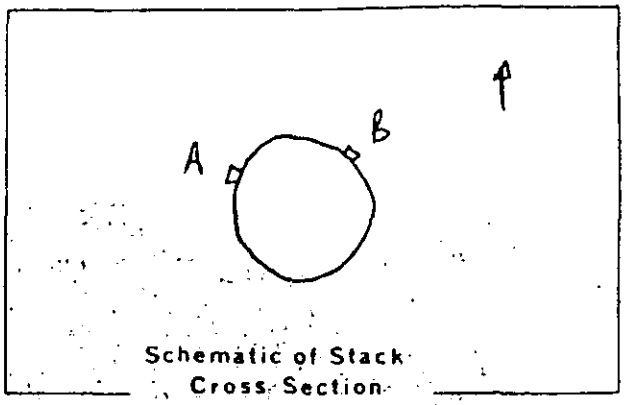
Rel. hum. ____ % B_{wo} ____ %

Barometric pressure (P_b) ____ in. Hg

Static pressure (P_g) -1.29 in. WC ____ in. Hg

Operators J Stock + C Stock

Pitot No. 6 C_p .853 Port Length 6'1/4



Schematic of Stack Cross Section

Traverse Point No.	Distance from Stack wall	Distance from End of Port	Velocity Head (in. WC)	Temperature (°F)
A-1	.54	6 3/4		
2	1.73	8		
3	3.04	9 1/4		
4	4.56	10 3/4		
5	6.44	12 3/4		
6	9.17	15 3/4		
7	16.58	22 3/4		
8	19.21	25 1/2		
9	21.19	27 3/8		
10	22.71	29		
11	24.102	30 1/4		
12	25.21	31 1/2		
B-1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
25				avg.

S-0034R

Sample Log Sheet

Job Lehigh No. 8 Kiln

Unit and Sampling Location No 11 BH outlet

Date 6-25-85 Test 3 Run 1

Sample Train: Leak check pretest : < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 7 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter #			
PW			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	62	0	62
Drierite	1330	1298	32
Total (M_{wo})			94 g

Integrated Flue Gas Sampling Data

FG Train No. B-L Box No. 3 Bag No. 1

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
2050			
	406		
	↓		
2153	↓		

Operator [signature] 320-P Reading 18.0 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh - No. 8 Kiln Operators JS+CS Pitot No. 6 C_p .853

Source No 11 BH outlet Sampling Train No. 6 $\Delta H_@$ 1.90 Bar. Press. 29.20 in.Hg. B_{wo} 10 %

Date 6- -83 Test 3 Run 1 Gasmeter coeff. 1.0051 Amb. Temp. 90°F Nozzle No. 7.2 Nozzle Dia. .246 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(2050)	(264.20)		▲								
A-12	2.5	266.57	1.10	2.97	239 659		340	260	280	18.1	112	108
11	5	269.12	1.20	3.24	252 911	5.0	326			17.6	112	108
10	7.5	271.68	1.25	3.38	257 168		326			17.6	112	108
9	10	279.80	.80	2.16	206 975		326			17.5	116	110
8	12.5	278.20	1.15	3.11	247 583		326			14.2	118	110
7	15	277.74	1.15	3.11	253 574	4.9	296			18.0	118	110
6	17.5	281.60	1.50	4.05	288 163		288			17.9	118	110
5	20	283.86	.90	2.43	224 387		287			18.2	118	110
4	22.5	286.39	1.20	3.24	252 639		286			18.0	119	110
3	25	288.81	1.05	2.84	242 981	4.4	284			18.0	118	110
2	27.5	290.27	.80	2.16	206 087		286			17.7	118	110
1	30	292.93	.80	2.16	206 293		284			18.2	118	110
B-12	32.5	295.70	1.50	4.05	289 582	6.0	288			19.7	119	110
11	35	298.56	1.35	3.65	274 856		287			17.9	118	110
10	37.5	301.35	1.40	3.78	279 135		284			18.2	118	112
9	40	304.24	1.50	4.05	279 424		286			17.7	118	112
8	42.5	307.04	1.45	3.92	284 707		285			18.0	118	112
7	45	309.75	1.30	3.64	269 977	5.1	285			17.9	118	112
6	47.5	311.90	.80	2.24	206 183		285			18.2	116	112
5	50	314.36	1.10	3.08	247 430		285			18.1	116	112
4	52.5	316.77	1.10	3.08	247 677		283			18.1	116	112
3	55	319.05	.92	2.58	227 904	4.2	286			18.0	116	112
2	57.5	321.40	1.00	2.80	286 140		286			18.0	116	112
1	60	323.68	.92	2.58	227 367		286			17.9	116	112

(2153) V_m 59.48 $\overline{\Delta H}$ = — Interpoll Inc — $\overline{T_m}$

G-3

S-0037R

Sample Log Sheet

Job: Lehigh Cement / No 8 Kiln
Unit and Sampling Location: No 11 BH outlet
Date: 6-[illegible]-80 Test: 3 Run: 2

Sample Train: Leak check pretest: < 0.02 cfm at 15 in. Hg. (vac.) ☒
posttest: .004 cfm at 8 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3520			
PW			
Total (M_n)			g

Impinger ☐ Condenser ☑

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	75	0	75
Drierite	1359	1326	33
Total (M_{wo})			108 g

Integrated Flue Gas Sampling Data

FG Train No. B-L Box No. 3 Bag No. 2
Bag Material Tedlar Bag Volume 4/4 L
Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
2211			
	400		
2313			

Operator [signature] 320-P Reading 18.0 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh - No 8 Kiln Operators JS+CS Pitot No. 6 C_p .853

Source No11 BH outlet Sampling Train No. 6 $\Delta H_@$ 1.80 Bar. Press. 29.26 in.Hg. B_{wo} 8 %

Date 6-23-85 Test B Run 1 Gasmeter coeff. 1.0051 Amb. Temp. 80°F Nozzle No. 7-2 Nozzle Dia. .246 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(22.11)	(323.92)		▲								
B-12	2.5	326.66	1.30	3.77	274 666		288	260	260	18.0	110	104
11	5	329.48	1.40	4.06	283 949		288			18.0	112	106
10	7.5	332.32	1.40	4.06	283 232		287			18.0	112	106
9	10	335.32	1.55	4.65	299 531	6.9	284			17.9	112	106
8	12.5	538.20	1.40	4.20	293 814		285			17.9	112	106
7	15	340.98	1.35	4.05	279 093		283			17.5	114	106
6	17.5	343.77	1.35	4.05	279 372		286			17.7	114	106
5	20	346.24	1.10	3.30	252 624		286			18.1	114	106
4	22.5	348.76	1.10	3.30	252 876		284			18.0	114	106
3	25	351.33	1.10	3.30	252 828	5.0	284			18.1	114	106
2	27.5	353.43	.80	2.32	215 343		284			18.0	114	106
1	30	355.58	.80	2.32	215 558		284			18.0	114	106
A-12	32.5	357.73	.80	2.32	215 773		284			18.0	114	106
11	35	360.35	1.20	3.48	262 035		289			18.0	114	106
10	37.5	363.03	1.25	3.63	268 303		286			18.1	114	106
9	40	365.78	1.30	3.77	275 579	5.8	280			18.0	114	106
8	42.5	367.66	.60	1.74	186 767		283			18.0	114	106
7	45	370.27	1.20	3.48	263 027		282			18.0	110	104
6	47.5	373.11	1.40	4.06	284 311		282			18.0	110	104
5	50	375.94	1.40	4.06	284 595	6.0	286			17.8	110	104
4	52.5	377.81	.60	1.74	186 781		285			17.8	110	104
3	55	380.44	1.20	3.48	263 044		286			17.9	110	104
2	57.5	382.96	1.10	3.19	252 296		286			17.8	110	104
1	60	385.49	1.10	3.19	252 548	4.9	280			17.6	110	104

(2313) Y_m=61.57 ΔH= 3.40 — Interpoll Inc. — T_m=108.83

S-0037R

G-5

Sample Log Sheet

Job Lehigh - No 8 Kiln

Unit and Sampling Location No 11 BH Outlet

Date 6-23-85 Test 3 Run 3

Sample Train: Leak check pretest: < 0.02 cfm at 15 in. Hg. (vac.) ☒

posttest: 0 cfm at 8 in. Hg. (vac.)

Particulate Sample Type and Number	Weights		
	Final	Tare	Difference
Filter # 3525			
PW			
Total (Mn)			g

Impinger ☐ Condenser ☒

Impinger Number	Weights		
	Final	Tare	Difference
Condensate	77	0	77
PW	1359	1324	35
Total (Mwo)			112 g

Integrated Flue Gas Sampling Data

FG Train No. B- Box No. _____ Bag No. _____

Bag Material Tedlar Bag Volume 44 L

Pretest leak check 0 cc/min at 15 in. Hg. 320-P No. 7

Time	cc/min.	Time	cc/min.
2330			
	1400		

Operator J Nash 320-P Reading 17.9 % v/v

S-0046R

EPA Method 5 Field Data Sheet

Job Lehigh / No. 8 Kiln Operators CS + JS Pitot No. 6 C_p .853

Source No. 11 BH outlet Sampling Train No. 6 $\Delta H_@$ 1.50 Bar. Press. 29.26 in.Hg. B_{wo} 8 %

Date 6- -83 Test 3 Run 3 Gasmeter coeff. 1.0051 Amb. Temp. 80°F Nozzle No. 7-2 Nozzle Dia. .246 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (ft^3)	Velocity Head (in. WC)	Orifice Meter (in. WC)	ΔV (mcf)	Vac. (inHg)	Stack Temp (°F) 1	Probe Temp (°F) 2	Oven Temp (°F) 3	Oxygen (% v/v) 4	Gasmeter temp IN (°F) 5	Gasmeter temp OUT (°F) 6
	(2330)	(385.70)		▲			-					
A-12	2.5	388.33	1.20	3.48	263 833		283	260	260	18.3	110	100
11	5	390.90	1.20	3.48	263 096	5.0	283			18.0	110	100
10	7.5	393.10	.80	2.32	214 310		282			14.6	110	100
9	10	395.80	1.30	3.77	274 584		282			18.0	110	100
8	12.5	398.55	1.30	3.77	274 858		286			18.1	112	102
7	15	401.26	1.25	3.63	268 126	5.3	280			18.0	112	102
6	17.5	403.64	1.00	2.90	240 366		280			17.5	112	102
5	20	406.40	1.30	3.77	274 640		284			17.8	112	102
4	22.5	409.03	1.20	3.48	263 903		286			17.9	112	102
3	25	411.60	1.20	3.48	263 166		284			17.9	112	102
2	27.5	413.80	.80	2.32	214 380		284			17.9	112	102
1	30	416.73	1.20	3.48	263 643		280			18.1	112	102
B-12	32.5	419.27	1.40	4.06	284 927		285			18.0	112	102
11	35	422.08	1.40	4.06	284 211		295			18.0	112	102
10	37.5	425.00	1.45	4.21	289 500	6.2	285			18.0	112	102
9	40	427.81	1.40	4.06	284 764		289			18.0	112	102
8	42.5	430.52	1.25	3.63	268 052		286			17.9	110	100
7	45	433.36	1.45	4.21	289 341		282			17.8	110	100
6	47.5	435.92	1.10	3.19	252 593		281			17.9	110	100
5	50	438.27	.95	2.76	234 827		285			17.8	110	100
4	52.5	440.61	.95	2.76	234 061		282			18.0	110	100
3	55	442.84	.85	2.47	221 282		282			17.9	110	100
2	57.5	445.03	.85	2.47	221 503		280			17.9	110	100
1	60	447.26	.85	2.47	221 724		281			17.9	110	100

6-24-83 (0032) V_m = 61.56 ΔH = 3.34 — Interpoll Inc - T_m = 106.0 S-0037R

G-7

APPENDIX H

LABORATORY DATA SHEETS

SAMPLE DEPOSITION SHEET

Job Lehigh Cement Site Mason City / #8 Mainstack

Team Leader J Stock Priority

Date Submitted 6/22/83

Test No(s). 1 Number of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Date Analyzed	Other Information or Special Instructions
3	Probe Wash	☐ As per EPA 5 ☐ _____ _____		
3	Filter: ☑ 4" glass fiber ☐ Stainless steel ☐ ERC	☐ As per EPA 5 ☐ _____ _____		
0	Wet Catch	☐ Organic ☐ Inorganic ☐ SO_2 Other: _____ _____		
3	Orsat	O_2 + CO_2		
0	SO_2			
0	NO_x			
0	Fuel Sample			

Source Information

1) Type of source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☐ Other _____

2) Fuel: ☐ Coal ☐ Wood ☐ Gas ☐ Oil ☐ Other _____

3) Is sample combustible? ☐ No ☐ Yes

4) Does sample need special desiccating? ☐ No ☐ Yes If yes, explain _____

5) Is particle size analysis required ☐ No ☐ Yes If yes, how many run(s)? _____
run preference _____

S-278R

(EPA Method 5) Probe Wash.
Gravimetric Analysis Lab
Data Sheet
FR 12(160)

Batch #
Date rec'd

Date of Analysis 6-23-83

Technician RCV

6027 is

interpoll

Job Le High Cement Date 6-22-83
City/State Mason City, Ia. J/N
Source #8 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 1/1
of

Special Handling Required
Sample No. 6027
Evaporating Dish No. 7
Volume of acetone 135
E. Dish Tare Wt. 98.1907
E. Dish + Sample Wt. 98.2882
Comments

6030

interpoll

Job Le High Cement Date 6-22-83
City/State J/N
Source #8 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 1/2
of

Special Handling Required
Sample No. 6030
Evaporating Dish No. 8
Volume of acetone 145
E. Dish Tare Wt. 101.7362
E. Dish + Sample Wt. 101.8076
Comments

6033

interpoll

Job Le High Cement Date 6-22-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 1/3
of

Special Handling Required
Sample No. 6033
Evaporating Dish No. 9
Volume of acetone 135
E. Dish Tare Wt. 103.8232
E. Dish + Sample Wt. 103.8899
Comments

RESULTS:

1/.0975 H-2 2/.0714 3/.0667

L-0185/Y

(EPA Method 5) Filter
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Laboratory Client #1000
Batch
Date rec'd

Date of Analysis 6-23-83
Technician RCV

---

(1)

interpoll

Job LaHigh — Date 6-22-83
City/State — J/N
Source #8 Main Stack
Test Site
Sample type — Tech S.O.
Remarks: — Test/Run 1/1
1 of 1

Special Handling Required
Sample No. 6028
Filter No. 3522
Filter Type 4"G
Filter Tare Wt. 0.69385
Filter + Sample Wt. 0.73431 (2)
Comments

---

(2)

interpoll

Job LaHigh — Date 6-22-83
City/State — J/N
Source #8 Main Stack
Test Site
Sample type — Tech S.O.
Remarks: — Test/Run 1/2
1 of 1

Special Handling Required
Sample No. 6031
Filter No. 3178
Filter Type 4"G
Filter Tare Wt. 0.67594
Filter + Sample Wt. 0.72394 (2)
Comments

---

(3)

interpoll

Job LaHigh — Date 6-22-83
City/State — J/N
Source #8 Main Stack
Test Site
Sample type — Tech S.O.
Remarks: — Test/Run 1/3
1 of 1

Special Handling Required
Sample No. 6034
Filter No. 3511
Filter Type 4"G
Filter Tare Wt. 0.68440
Filter + Sample Wt. 0.71664 (2)
Comments

RESULTS:

1	2	3
.0405	.0480	.0322
.1380	.1194	.0989

Dry Catch Only

H-3

L-0186/P

Laboratory client #1000
Batch # 560
Date received 6-22-83

EPA METHOD 3
LABORATORY REPORT
SUMMARY OF ORSAT DATA

Job: Lehigh Cement
Sampling Location: No. 8 Main Stack
Sampling Date: 6-22-83
Analysis Date: 6-22-83
Technician: RCW

Sample No. TEST NO. AND DATE	RUN NO.	RESULTS - INTEGRATED (BAG)			GRAB (BULB)			O_2 ANALYZER
		% CO_2	% O_2	% CO	% CO_2	% O_2	% CO	% O_2
6029 1 6-22-83	1	26.29	8.05					(5.8)f
6032 6-22-83	2	27.79	6.90					(5.7)f
6035 1 6-22-83	3	26.77	8.02					(5.8)f

Form #L-200 R

ORSAT METHOD 3
DATA SHEET FR 42(160)

Laboratory Client # 100
Batch # -560
Date rec'd 6-22-83

Date of Analysis 6-22-83
Technician RCV

Project Number

B.P. 29.18 Temp 24°C

interpoll

Job Ambient Air
City/State
Source
Test Site
Sample type
Remarks:

Date 6-22-83
J/N
Tech
Test/Run
of

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 0 cc	O_2RD 21.0 cc
	CO_2Vol 0 cc	O_2Vol 21.0 cc
Samp. Vol 100 cc	% CO_2 0 %	% O_2 21.0 %

BULB ☐ INTEGRATED ☐

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. ___ cc	CO_2RD ___ cc	O_2RD ___ cc
	CO_2Vol ___ cc	O_2Vol ___ cc
Samp. Vol ___ cc	% CO_2 ___ %	% O_2 ___ %

BULB ☐ INTEGRATED ☐

6029

interpoll

Job Le High Cement
City/State Mason City, IA.
Source #8 Mainstack
Test Site
Sample type Orsat
Remarks: 5.8%

Date 6-22-83
J/N
Tech SO
Test/Run 1/1
of

Sample No. 6029

Sample Vol.	CO_2	O_2
Zero Pt. 5.6 cc	CO_2RD 30.4 c	O_2RD 38.0 cc
	CO_2Vol 24.8 cc	O_2Vol 7.6 cc
Samp. Vol 94.4 c	% CO_2 26.27	% O_2 8.05

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 5.6 cc	CO_2RD 30.4 c	O_2RD 38.0 c
	CO_2Vol 24.8 cc	O_2Vol 7.6 cc
Samp. Vol 94.4 c	% CO_2 26.27	% O_2 8.05

BULB ☐ INTEGRATED ☑

ORSAT METHOD 3
DATA SHEET FR 42(160)

Laboratory [illegible]
Batch # 560
Date rec'vd 6-22-83

Date of Analysis 6-22-83
Technician RCV

Project Number

6032

interpoll

Job Le High Cement
City/State Iowa City
Source #8 Main Stack
Test Site
Sample type Onset
Remarks: 5.7%

Date 6-22-83
J/N
Tech 50
Test/Run 1/2
of

Sample No. 6032

Sample Vol.	CO_2	O_2
Zero Pt. 5.8cc	CO_2RD 32.0c	O_2RD 38.5c
	CO_2Vol 26.2c	O_2Vol 6.5 cc
Samp. Vol 94.2c	% CO_2 27.81	%O_2 6.9%

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 3.0cc	CO_2RD 29.2c	O_2RD 36.8cc
	CO_2Vol 27.2c	O_2Vol 6.6 cc
Samp. Vol 98.0c	% CO_2 27.76	%O_2 6.9%

BULB ☐ INTEGRATED ☑

6035

interpoll

Job Le High Cement
City/State Iowa City
Source #8 Main Stack
Test Site
Sample type Onset
Remarks: 5.8%

Date 6-22-83
J/N
Tech 50
Test/Run 1/3
of

Sample No. 6035

Sample Vol.	CO_2	O_2
Zero Pt. 5.0cc	CO_2RD 30.4c	O_2RD 38.0c
	CO_2Vol 25.4c	O_2Vol 7.6cc
Samp. Vol 95.0c	% CO_2 26.73	%O_2 8.0%

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 3.0cc	CO_2RD 29.0cc	O_2RD 37.8cc
	CO_2Vol 26.0cc	O_2Vol 7.8 cc
Samp. Vol 97.0c	% CO_2 26.80	%O_2 8.0%

BULB ☐ INTEGRATED ☑

SAMPLE DEPOSITION SHEET

Job Lehigh / NoV Kiln Site No. 8 Main stack

Team Leader JS Priority ASAP

Date Submitted 6-24-85

Test No(s). 2+3 Number of Runs Completed 6

No. of Samples	Type of Sample	Analysis Required	Date Analyzed	Other Information or Special Instructions
6	Probe Wash	☑ As per EPA 5 ☐ _____ _____		
6	Filter: ☑ 4" glass fiber ☐ Stainless steel ☐ ERC	☑ As per EPA 5 ☐ _____ _____		
6	Wet Catch	☐ Organic ☐ Inorganic ☐ SO_2 Other: _____ _____		
6	Orsat	O_2 + CO_2		
0	SO_2			
0	NO_x			
0	Fuel Sample			

Source Information

1) Type of source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☑ Other Kiln

2) Fuel: ☑ Coal ☐ Wood ☐ Gas ☐ Oil ☐ Other _____

3) Is sample combustible? ☑ No ☐ Yes

4) Does sample need special desiccating? ☑ No ☐ Yes If yes, explain _____

_____

5) Is particle size analysis required ☑ No ☐ Yes If yes, how many run(s)? _____

run preference _____

S-278R

(EPA Method 5) Probe Wash
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No 1000
Batch No 564
Date Rec'd 6-23

Date of Analysis 6/24/83

Technician Rcv

---

(1)

interpoll

Job Le High Cement Date 6-23-83
City/State Mason City, IA. J/N
Source #8 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 2/1
of

Special Handling Required
Sample No. 6060
Evaporating Dish No. 13
Volume of acetone 135
E. Dish Tare Wt. 99.2283
E. Dish + Sample Wt. 99.3467
Comments

---

(2)

interpoll

Job Le High Cement Date 6-23-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 2/2
of

Special Handling Required
Sample No. 6063
Evaporating Dish No. 14
Volume of acetone 85
E. Dish Tare Wt. 97.6713
E. Dish + Sample Wt. 97.7572
Comments

---

(3)

interpoll

Job Le High Cement Date 6-23-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 2/3
of

Special Handling Required
Sample No. 6066
Evaporating Dish No. 15
Volume of acetone 145
E. Dish Tare Wt. 97.5839
E. Dish + Sample Wt. 97.6996
Comments

RESULTS:

1	2	3
.1184	.0859	.1157

L-0185/Y

(EPA Method 5) Filter
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd

Date of Analysis 6-24-83

Technician RCV

1

interpoll

Job Lehigh Cement Date 6-23-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type Tech S.O
Remarks: Test/Run 2/1
1 of 1

Special Handling Required
Sample No. 6061
Filter No. 3598
Filter Type 4"G
Filter Tare Wt. 0.68510
Filter + Sample Wt. 0.72229
Comments Light Tan color

2

interpoll

Job Lehigh Cement Date 6/23/83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type Tech S.O
Remarks: Test/Run 2/2
1 of 1

Special Handling Required
Sample No. 6064
Filter No. 3600
Filter Type 4"G
Filter Tare Wt. 0.68561
Filter + Sample Wt. 0.73036
Comments Light Tan color

3

interpoll

Job Lehigh Cement Date 6/23/83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type Tech S.O
Remarks: Test/Run 2/3
1 of 1

Special Handling Required
Sample No. 6067
Filter No. 3583
Filter Type 4"G
Filter Tare Wt. 0.68648
Filter + Sample Wt. 0.72816
Comments Light Tan color

RESULTS:

1	2	3
.0372	.0451	.0417

Dry Catch only

1	2	3
.1556	.1310	.1574

-9

L-0186/P

EPA METHOD 3

LABORATORY REPORT

SUMMARY OF ORSAT DATA

Job: Lehigh
Sampling Location: No. 8 Main Stack
Sampling Date: 6-23-83
Analysis Date: 6-23-83
Technician: RCV

Client No. 1000
Batch No 564
Date Recd 6-23-83

Sample No. TEST NO. AND DATE	RUN NO.	RESULTS						
		INTEGRATED (BAG) Transfered to Bulb			GRAB (BULB)			O_2 ANALYZER
		% CO_2	% O_2	% CO	% CO_2	% O_2	% CO	% O_2
6062 2 6-23-83	1	27.65	5.94					(5.2)f
6065 2 6-23-83	2	26.88	6.45					(5.6)f
6068 2 6-23-83	3	26.35	6.59					(5.2)

Form #L-200 R

ORSAT METHOD 3
DATA SHEET FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd 6-23

Date of Analysis 6-23-83
Technician RCV
Project Number

B.P. 29.08 Temp 21°C

interpoll

Job Ambient Air
City/State
Source
Test Site
Sample type
Remarks:

Date 6-23-83
J/N
Tech
Test/Run
of

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 0.0 cc	O_2RD 21.0 cc
	CO_2Vol 0.0 cc	O_2Vol 21.0 cc
Samp. Vol 100 cc	% CO_2 0.0%	% O_2 21.0

BULB ☐ INTEGRATED ☐

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. ____ cc	CO_2RD ____ cc	O_2RD ____ cc
	CO_2Vol ____ cc	O_2Vol ____ cc
Samp. Vol ____ cc	% CO_2 ____ %	% O_2 ____ %

BULB ☐ INTEGRATED ☐

6062

interpoll

Job Le High Cement
City/State Mason City
Source #2 Main Stack
Test Site
Sample type Orsat
Remarks: 5.2 %

Date 6-23-83
J/N
Tech SO
Test/Run 2/1
____ of ____

Sample No. 6062

Sample Vol.	CO_2	O_2
Zero Pt. 6.6 cc	CO_2RD 32.5 cc	O_2RD 38.0 cc
	CO_2Vol 25.9 cc	O_2Vol 5.5 cc
Samp. Vol 93.4 cc	% CO_2 27.73	% O_2 5.88

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 8.2 cc	CO_2RD 33.5 cc	O_2RD 39.0 cc
	CO_2Vol 25.3 cc	O_2Vol 5.5 cc
Samp. Vol 91.8 cc	% CO_2 27.56	% O_2 5.99

BULB ☐ INTEGRATED ☑

ORSAT METHOD 3-
DATA SHEET FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd 6-23-83

Date of Analysis 6-23-83
Technician RCV

Project Number

6065

interpoll

Job Le High Cement
City/State
Source #8 Main Stack
Test Site
Sample type Orsat
Remarks: 5.67

Date 6-23-83
J/N
Tech S.O.
Test/Run 2/2
of

Sample No. 6065

Sample Vol.	CO_2	O_2
Zero Pt. 7.0 cc	CO_2 RD 32.0 cc	O_2 RD 38.0 cc
	CO_2 Vol 25.0 cc	O_2 Vol 6.0 cc
Samp. Vol 93.0 cc	% CO_2 26.8%	% O_2 6.4%

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 2.00 cc	CO_2 RD 32.0 cc	O_2 RD 38.0 cc
	CO_2 Vol 25.0 cc	O_2 Vol 6.00 cc
Samp. Vol 8.00 cc	% CO_2 26.8%	% O_2 6.4%

BULB ☐ INTEGRATED ☑

6068

interpoll

Job Le High Cement
City/State Mason City
Source #8 Main Stack
Test Site
Sample type Orsat
Remarks: 5.29

Date 6-23-83
J/N
Tech SO
Test/Run 2/3
of

Sample No. 6068

Sample Vol.	CO_2	O_2
Zero Pt. 7.0 cc	CO_2 RD 31.5 cc	O_2 RD 38.0 cc
	CO_2 Vol 24.5 cc	O_2 Vol 6.5 cc
Samp. Vol 93.0 cc	% CO_2 26.3%	% O_2 6.9%

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 4.0 cc	CO_2 RD 29.3 cc	O_2 RD 36.0 cc
	CO_2 Vol 25.3 cc	O_2 Vol 6.7 cc
Samp. Vol 96.0 cc	% CO_2 26.3%	% O_2 6.9%

BULB ☐ INTEGRATED ☑

(EPA Method 5) Probe Wash
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd 6-24-83

Date of Analysis 6/24/83
Technician RCV

(1)

interpoll

Job Le High Cement Date 6-23-83
City/State Mason City J/N
Source #5 Main Stack
Test Site
Sample type P.W. Tech
Remarks: Test/Run 3/1
of

Special Handling Required
Sample No. 6069
Evaporating Dish No. 16
Volume of acetone 130
E. Dish Tare Wt. 101.9049
E. Dish + Sample Wt. 101.9668
Comments

(2)

interpoll

Job Le High Cement Date 6-23-83
City/State Mason City J/N
Source #5 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 3/2
of

Special Handling Required
Sample No. 6072
Evaporating Dish No. 17
Volume of acetone 115
E. Dish Tare Wt. 97.9854
E. Dish + Sample Wt. 98.0577
Comments

(3)

interpoll

Job Le High Cement Date 6-23-83
City/State J/N
Source #5 Main Stack
Test Site
Sample type P.W. Tech SO
Remarks: Test/Run 3/3
of

Special Handling Required
Sample No. 6075
Evaporating Dish No. 18
Volume of acetone 125
E. Dish Tare Wt. 96.7907
E. Dish + Sample Wt. 96.9255
Comments

RESULTS:

1	2	3
.0619	.0723	.1285

L-0185/Y

(EPA Method 5) Filter
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No 1000
Batch No 564
Date Rec'd 6-24-83

Date of Analysis 6-24-83
Technician RCV

---

(1)

interpoll

Job Lehigh Cement Date 6-23-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type Tech SO
Remarks: Test/Run 3/1
1 of 1

Special Handling Required
Sample No. 6070
Filter No. 3585
Filter Type 4"G
Filter Tare Wt. 0.69539
Filter + Sample Wt. 0.74533
Comments Light Tan color

---

(2)

interpoll

Job Lehigh Cement Date 6-23-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type Tech S.O
Remarks: Test/Run 3/2
1 of 1

Special Handling Required
Sample No. 6073
Filter No. 3586
Filter Type 4"G
Filter Tare Wt. 0.68561
Filter + Sample Wt. 0.72642
Comments Light Tan color

---

(3)

interpoll

Job Lehigh Cement Date 6-23-83
City/State Mason City J/N
Source #8 Main Stack
Test Site
Sample type Tech S.O
Remarks: Test/Run 3/3
of

Special Handling Required
Sample No 6076
Filter No. 3588
Filter Type 4"G
Filter Tare Wt. 0.68730
Filter + Sample Wt. 0.73293
Comments Light Tan Color

RESULTS:

1	2	3
.0499	.0408	.0456

Dry Catch only

1	2	3
.1118	.1131	.1741

H-14

L-0186/P

EPA METHOD 3

LABORATORY REPORT

SUMMARY OF ORSAT DATA

Job: Lehigh
Sampling Location: No. 8 Main Stack
Sampling Date: 6-23-83
Analysis Date: 6-23-83
Technician: Rcw

Client No. 1000
Batch No. 564
Date Recd 6-23-83

Sample No. TEST NO. AND DATE	RUN NO.	RESULTS						
		INTEGRATED (BAG) Bag Box #4			GRAB (BULB)			O_2 ANALYZER
		% CO_2	% O_2	% CO	% CO_2	% O_2	% CO	% O_2
6071 3 6-23-83	1	27.4	5.6					(5.2) f (5.4) L
6074 3 6-23-83	2	26.0	5.5					(5.2) f (5.4) L
6077 3 6-23-83	3	25.6	6.9					(5.2) f (6.9) L

Form #L-200 R

ORSAT METHOD 3
DATA SHEET FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd 6-23-83

Date of Analysis 6-23-83
Technician RCV

Project Number

B.P - 29.08 Temp 21°C

interpoll

Job Ambient Air
City/State
Source
Test Site
Sample type
Remarks:

Date 6-23-83
J/N
Tech RCV
Test/Run
of

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 0 cc	O_2RD 21.0 cc
	CO_2Vol 0 cc	O_2Vol 21.0 cc
Samp. Vol 100 cc	% CO_2 0 %	% O_2 21.0 %

BULB ☐ INTEGRATED ☐

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. ___ cc	CO_2RD ___ cc	O_2RD ___ cc
	CO_2Vol ___ cc	O_2Vol ___ cc
Samp. Vol ___ cc	% CO_2 ___ %	% O_2 ___ %

BULB ☐ INTEGRATED ☐

---

interpoll

Job Lehigh Cement
City/State
Source #8 Main Stack
Test Site
Sample type
Remarks:
Field Teledyne O_2 = 5.2
Lab Teledyne O_2 = 5.4

Date 6-23-83
J/N
Tech S.O.
Test/Run 3/1
1 of 1

Sample No. 6071

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 27.4 cc	O_2RD 33.0 cc
	CO_2Vol 27.4 cc	O_2Vol 5.6 cc
Samp. Vol 100 cc	% CO_2 27.4 %	% O_2 5.6 %

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 27.4 cc	O_2RD 33.0 cc
	CO_2Vol 27.4 cc	O_2Vol 5.6 cc
Samp. Vol 100 cc	% CO_2 27.4 %	% O_2 5.6 %

BULB ☐ INTEGRATED ☑

ORSAT METHOD 3
DATA SHEET: FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd 6-23-83

Date of Analysis 6-23-83
Technician RAV

Project Number

interpoll

Job Lehigh Cement
City/State
Source #8 Main Stack
Test Site
Sample type
Tech S.O
Remarks: Field Teledyne O_2 = 5.2
Lab Teledyne O_2 = 5.4
Date 6-23-83
J/N
Test/Run 3/2
1 of 1

Sample No. 6074

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2 RD 26.0 cc	O_2 RD 31.5 cc
	CO_2 Vol 26.0 cc	O_2 Vol 5.5 cc
Samp. Vol 100 cc	% CO_2 26.0	% O_2 5.5

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2 RD 26.0 cc	O_2 RD 31.5 cc
	CO_2 Vol 26.0 cc	O_2 Vol 5.5 cc
Samp. Vol 100 cc	% CO_2 26.0	% O_2 5.5

BULB ☐ INTEGRATED ☑

interpoll

Job Lehigh Cement
City/State
Source #8 Main Stack
Test Site
Sample type
Tech S.O.
Remarks:
Field Teledyne O_2 = 5.2
Lab Teledyne O_2 = 6.9
Date 6-23-83
J/N
Test/Run 3/3
1 of 1

Sample No. 6077

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2 RD 25.6 cc	O_2 RD 32.5 cc
	CO_2 Vol 25.6 cc	O_2 Vol 6.9 cc
Samp. Vol 100 cc	% CO_2 25.6	% O_2 6.9

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2 RD 25.6 cc	O_2 RD 32.5 cc
	CO_2 Vol 25.6 cc	O_2 Vol 6.9 cc
Samp. Vol 100 cc	% CO_2 25.6	% O_2 6.9

BULB ☐ INTEGRATED ☑

SAMPLE DEPOSITION SHEET

Job Lehigh Cement Site Mason City / No 1-4 BH Outlet

Team Leader J S Stack Priority

Date Submitted 6/22/83

Test No(s). 1 Number of Runs Completed 3

No. of Samples	Type of Sample	Analysis Required	Date Analyzed	Other Information or Special Instructions
3	Probe Wash	☐ As per EPA 5 ☐ _____		
3	Filter: ☒ 4" glass fiber ☐ Stainless steel ☐ ERC	☐ As per EPA 5 ☐ _____		
0	Wet Catch	☐ Organic ☐ Inorganic ☐ SO_2 Other: _____		
3	Orsat	O_2 + CO_2		
0	SO_2			
0	NO_x			
6	Fuel Sample			

Source Information

1) Type of source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☐ Other _____

2) Fuel: ☐ Coal ☐ Wood ☐ Gas ☐ Oil ☐ Other _____

3) Is sample combustible? ☐ No ☐ Yes

4) Does sample need special desiccating? ☐ No ☐ Yes If yes, explain _____

5) Is particle size analysis required ☐ No ☐ Yes If yes, how many run(s)? _____
run preference _____

S-278R

Laboratory Client #/60.

(EPA-Method 5) Probe Wash
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Batch # 560
Date recived 6-23-83

Date of Analysis 6-23-83
Technician RCV

6018-

interpoll

(1)

Job Lehigh / Nor Kln
City/State
Source No 1-4 BH
Test Site outlet
Sample type PW
Remarks:

Date 6-22-83
J/N
Tech JS
Test/Run 111
of

Special Handling Required
Sample No.
Evaporating Dish No. 1
Volume of acetone 95
E. Dish Tare Wt. 107.1/2/3 6651
E. Dish + Sample Wt. 107.2/2/3 6857
Comments

6021

interpoll

(2)

Job Lehigh / Nor Kln
City/State
Source No 1-4 Baghouse
Test Site Stack
Sample type PW
Remarks:

Date 6-22-83
J/N
Tech JS
Test/Run 112
of

Special Handling Required
Evaporating Dish No. 2
Volume of acetone 15
E. Dish Tare Wt. 103.1/2/3 5621
E. Dish + Sample Wt. 103.1/2/3 5441
Comments

6024

interpoll

(3)

Job Lehigh
City/State
Source No 1-4 OH
Test Site outlet
Sample type PW
Remarks:

Date 6-22-83
J/N
Tech JS
Test/Run 113
1 of 1

Special Handling Required
Evaporating Dish No. 3
Volume of acetone 95
E. Dish Tare Wt. 97.4130
E. Dish + Sample Wt. 97.1/2/3 4263
Comments

RESULTS:

1		2		3
.0206	PH-19	.0180		.0133

L-0185/Y

(EPA-Method 5) Filter
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Laboratory Client 1000
Batch # 560
Date recvd 6-23-83

Date of Analysis 6/23/83
Technician RCV

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interpoll

(1)
Job La High
City/State
Source NO 1-4 BH outlet
Test Site
Sample type
Remarks:
Date 6/23/83
J/N
Tech J.S.
Test/Run 1/1
1 of 1

Special Handling Required
Sample No. 6019
Filter No. 3510
Filter Type 4"G
Filter Tare Wt. 0.69105
Filter + Sample Wt. 0.69798
Comments

---

interpoll

(2)
Job La High
City/State
Source NO 1-4 BH outlet
Test Site
Sample type
Remarks:
Date 6/23/83
J/N
Tech J.S.
Test/Run 1/2
1 of 1

Special Handling Required
Sample No. 6024
Filter No. 3505
Filter Type 4"G
Filter Tare Wt. 0.69925
Filter + Sample Wt. 0.69892
Comments

---

interpoll

(3)
Job La High
City/State
Source NO 1-4 BH outlet
Test Site
Sample type
Remarks:
Date 6/23/83
J/N
Tech J.S.
Test/Run 1/3
1 of 1

Special Handling Required
Sample No. 6025
Filter No. 3516
Filter Type 4"G
Filter Tare Wt. 0.69033
Filter + Sample Wt. 0.69601
Comments

RESULTS:

1	2	3
.0069	.0047	.0056
.0275	.0227	.0189

Dry Catch Only

L-0186/P

Laboratory Client # 1000
Batch 560
Date received 6-22-83

EPA METHOD 3
LABORATORY REPORT
SUMMARY OF ORSAT DATA

Job: Lehigh Cement
Sampling Location: No. 1-4 BH Outlet
Sampling Date: 6-22-83
Analysis Date: 6-22-83
Technician: RCJ

Sample No. TEST NO. AND DATE	RUN NO.	RESULTS						
		INTEGRATED (BAG) Transfered to Bulb			GRAB (BULB)			O_2 ANALYZER
		% CO_2	% O_2	% CO	% CO_2	% O_2	% CO	% O_2
6020 1 6-22-83	1	6.68	16.08					(18.6)f
6023 1 6-22-83	2	5.42	16.70					(16.4)f
6026 1 6-22-83	3	5.35	16.85					(16.5)f

Form #L-200 R

ORSAT METHOD - 3 -
DATA SHEET FR 42(160)

Calibration Circuit 1000
Batch - 560
Date received 6-22-83

Date of Analysis 6-22-83
Technician RCV
Project Number

B. P. 29.18 Temp 24 °C

interpoll

Job Ambient Air Date 6-22-83
City/State J/N
Source
Test Site
Sample type Tech RCV
Remarks: Test/Run
of

Sample Vol.	CO_2	O_2
Zero Pt. cc	CO_2RD cc	O_2RD cc
	CO_2Vol cc	O_2Vol cc
Samp. Vol cc	% CO_2 %	% O_2 %

BULB ☐ INTEGRATED ☐

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. cc	CO_2RD cc	O_2RD cc
	CO_2Vol cc	O_2Vol cc
Samp. Vol cc	% CO_2 %	% O_2 %

BULB ☐ INTEGRATED ☐

6020

interpoll

Job Lehigh INo 8 Kiln Date 6-22-83
City/State J/N
Source No 1-4 BH
Test Site outlet
Sample type Inlet Tech JS
Remarks: Test/Run 1 1 1
Tdb = 18.4 of

Sample No. 6020

Sample Vol.	CO_2	O_2
Zero Pt. 6.8 cc	CO_2RD 13.2 cc	O_2RD 28.2 cc
	CO_2Vol 6.4 cc	O_2Vol 15.2 cc
Samp. Vol 93.2 cc	% CO_2 6.65	% O_2 16.09

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 6.0 cc	CO_2RD 12.3 cc	O_2RD 27.4 cc
	CO_2Vol 6.30 cc	O_2Vol 15.1 cc
Samp. Vol 94.2 cc	% CO_2 6.70	% O_2 16.06

BULB ☐ INTEGRATED ☑

ORSAT METHOD 3-
DATA SHEET TR 42(160)

Laboratory Client # 1006
Batch # 560
Date received 6-22-83

Date of Analysis 6-22-83
Technician RoV

Project Number

6023

interpoll

Job Lehigh #5 Date 6-22-83
City/State J/N
Source No 1-4 BH
Test Site outlet
Sample type Integrated Tech JS
Remarks: Test/Run 1/2
Tedlar = 16.4 ___ of ___

Sample No 6023

Sample Vol.	CO_2	O_2
Zero Pt. 6.0 cc	CO_2RD 11.1 cc	O_2RD 26.8 cc
	CO_2Vol 5.1 cc	O_2Vol 15.2 cc
Samp. Vol 94.0 cc	% CO_2 5.42	% O_2 16.70

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 6.0 cc	CO_2RD 11.1 cc	O_2RD 26.8 cc
	CO_2Vol 5.1 cc	O_2Vol 15.7 cc
Samp. Vol 94.0 cc	% CO_2 5.42	% O_2 16.70

BULB ☐ INTEGRATED ☑

6026

interpoll

Job Lehigh Cement Date 6-22-83
City/State J/N
Source No 1-4 BH
Test Site outlet
Sample type Integrated Tech JS
Remarks: Test/Run 1/3
Tedlar = 16.5 ___ of ___

Sample No. 6026

Sample Vol.	CO_2	O_2
Zero Pt. 6.0 cc	CO_2RD 11.0 cc	O_2RD 26.8 cc
	CO_2Vol 5.0 cc	O_2Vol 15.8 cc
Samp. Vol 94.0 cc	% CO_2 5.32	% O_2 16.8

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 7.0 cc	CO_2RD 12.0 cc	O_2RD 27.8 cc
	CO_2Vol 5.0 cc	O_2Vol 15.8 cc
Samp. Vol 93.0 cc	% CO_2 5.38	% O_2 16.9

BULB ☐ INTEGRATED ☑

SAMPLE DEPOSITION SHEET

Job Lehigh / No 8 Kiln Site No. 7 + No. 11 BH outlet

Team Leader _____ Priority ASAP

Date Submitted 6-24-85

Test No(s). 2+3 Number of Runs Completed 3 per site

No. of Samples	Type of Sample	Analysis Required	Date Analyzed	Other Information or Special Instructions
6	Probe Wash	☒ As per EPA 5 ☐ _____		
6	Filter: ☒ 4" glass fiber ☐ Stainless steel ☐ ERC	☒ As per EPA 5 ☐ _____		
0	Wet Catch	☐ Organic ☐ Inorganic ☐ SO_2 Other: _____		
6	Orsat	O_2 + CO		
0	SO_2			
0	NO_x			
0	Fuel Sample			

Source Information

1) Type of source: ☐ Boiler ☐ Asphalt Plant ☐ Incinerator ☒ Other Kiln

2) Fuel: ☒ Coal ☐ Wood ☐ Gas ☐ Oil ☐ Other _____

3) Is sample combustible? ☒ No ☐ Yes

4) Does sample need special desiccating? ☒ No ☐ Yes If yes, explain _____

5) Is particle size analysis required ☒ No ☐ Yes If yes, how many run(s)? _____

run preference _____

S-278R

Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No. 1000
Batch No. 564
Date Recvd 6-24

Date of Analysis 6/24/83
Technician RCV

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(1)

6042

interpoll

Job Lehigh — Date 6-23-83
City/State — J/N
Source No 7 BH
Test Site Outlet
Sample type PW — Tech JS
Remarks: — Test/Run 2/1
of

Special Handling Required
Sample No. 6042
Evaporating Dish No. L.N.I
Volume of acetone 80 c
E. Dish Tare Wt. 96.0848 g
E. Dish + Sample Wt. 96.1098 g (3)
Comments

---

(2)

6045

interpoll

Job Lehigh — Date 6-23-83
City/State — J/N
Source No 7 BH
Test Site Outlet
Sample type PW — Tech JS
Remarks: — Test/Run 2/2
of

Special Handling Required
Sample No. 6045
Evaporating Dish No. F1L
Volume of acetone 95 c
E. Dish Tare Wt. 97.6854 g
E. Dish + Sample Wt. 97.6949 g (3)
Comments weight rechecked Rev, BD.

---

(3)

6048

interpoll

Job Lehigh — Date 6-23-83
City/State — J/N
Source No 7 BH
Test Site outlet
Sample type PW — Tech JS
Remarks: — Test/Run 2/3
of

Special Handling Required
Sample No. 6048
Evaporating Dish No. F20
Volume of acetone 85 c
E. Dish Tare Wt. 98.1267 g
E. Dish + Sample Wt. 98.1397 g (3)
Comments

RESULTS:

1	2	3
.0250	.0095	.0130

L-0185/Y

(EPA Method 5) Filter
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client/# 1000
Batch No. 564
Date Rec'd 6-24-83

Date of Analysis 6/24/83
Technician Rav

---

(1)

interpoll

Job Lehigh — Date 6/23/83
City/State — J/N
Source No 7 BH Outlet
Test Site
Sample type — Tech J.S
Remarks: — Test/Run 2/1
1 of 1

Special Handling Required
Sample No. 6043
Filter No. 3518
Filter Type 4"G
Filter Tare Wt. 0.69458 g
Filter + Sample Wt. 70050 g/in²
Comments White color

---

(2)

interpoll

Job Lehigh — Date 6/23/83
City/State — J/N
Source #7 BH Outlet
Test Site
Sample type — Tech J.S
Remarks: — Test/Run 2/2
1 of 1

Special Handling Required
Sample No. 6046
Filter No. 3517
Filter Type 4"G
Filter Tare Wt. 0.69432
Filter + Sample Wt. 0.69955 g/in²
Comments White color

---

(3)

interpoll

Job Lehigh — Date 6-23-83
City/State — J/N
Source #7 BHO
Test Site outlet
Sample type — Tech J.S.
Remarks: — Test/Run 3/3
1 of 1

Special Handling Required
Sample No. 6049
Filter No. 3519
Filter Type 4"G
Filter Tare Wt. 0.68714
Filter + Sample Wt. 0.69195 g/in²
Comments White color

RESULTS:

1	2	3
.0059	.0052	.0048
.0309	.0147	.0178

Dry Catch only

H-26

L-0186/P

(EPA Method 5) Probe Wash
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No. 1000
Batch No. 564
Date Rec'd 6-24-83

Date of Analysis 6/24/83
Technician RCV

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(1)

6051 — interpoll

Job Lehigh
City/State
Source No 11 BH
Test Site Outlet
Sample type PW
Remarks:

Date 6-23-83
J/N
Tech JS
Test/Run 3/1
___ of ___

Special Handling Required
Sample No. 6051
Evaporating Dish No. 4
Volume of acetone 65
E. Dish Tare Wt. 105.6987
E. Dish + Sample Wt. 105.7121
Comments

---

(2)

6054 interpoll

Job Lehigh
City/State
Source No 11 BH
Test Site Outlet
Sample type PW
Remarks:

Date 6-23-83
J/N
Tech JS
Test/Run 3/2
___ of ___

Special Handling Required
Sample No. 6054
Evaporating Dish No. 5
Volume of acetone 95
E. Dish Tare Wt. 104.0175
E. Dish + Sample Wt. 104.0289
Comments

---

(3)

6057 interpoll

Job Lehigh
City/State
Source No 11 BH
Test Site Outlet
Sample type PW
Remarks:

Date 6-23-83
J/N
Tech JS
Test/Run 3/3
___ of ___

Special Handling Required
Sample No. 6057
Evaporating Dish No. 6
Volume of acetone 75
E. Dish Tare Wt. 103.5740
E. Dish + Sample Wt. 103.5851
Comments

RESULTS:

1	2	3
.0134	.0114	.0111

L-0185/Y

(EPA Method 5) Filter
Gravimetric Analysis Lab
Data Sheet
FR 42(160)

Client No. 1000
Batch No. 5641
Date Rec'd 6-24-83

Date of Analysis 6/24/83
Technician Rcv

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(1)

interpoll

Job Lehigh — Date 6/23/83
City/State — J/N
Source No 11 BH
Test Site outlet
Sample type — Tech J.S.
Remarks: — Test/Run 3/1
1 of 1

Special Handling Required
Sample No. 6052
Filter No. 3521
Filter Type 4"G
Filter Tare Wt. 0.69029 g
Filter + Sample Wt. 0.69838 g
Comments Very light yellow color

---

(2)

interpoll

Job Lehigh — Date 6/23/83
City/State — J/N
Source No 11 BH
Test Site outlet
Sample type — Tech J.S
Remarks: — Test/Run 3/2
1 of 1

Special Handling Required
Sample No. 6055
Filter No. 3520
Filter Type 4"G
Filter Tare Wt. 0.69333 g
Filter + Sample Wt. 0.69784 g
Comments Very light yellow color

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(3)

interpoll

Job Lehigh — Date 6/23-83
City/State — J/N
Source No 11 BH
Test Site Outlet
Sample type — Tech JS
Remarks: — Test/Run 3/3
1 of 1

Special Handling Required
Sample No. 6058
Filter No. 3525
Filter Type 4"G
Filter Tare Wt. 0.68583 g
Filter + Sample Wt. 0.69187 g
Comments Very light yellow color

RESULTS:

1	2	3
.0081	.0045	.0060
.0215	.0159	.0171

Dry Catch only

L-0186/P

EPA METHOD 3

LABORATORY REPORT

SUMMARY OF ORSAT DATA

Job: Lehigh / No. 8 Kiln
Sampling Location: No. 11 Baghouse outlet
Sampling Date: 6-23-83
Analysis Date: 6-23-83
Technician: RCJ

Client No. 1000
Batch No. 564
Date Rec'd 6-23-83

Sample No. TEST NO. AND DATE	RUN NO.	RESULTS						
		INTEGRATED (BAG). Transfered to Bulbs			GRAB (BULB)			O_2 ANALYZER
		% CO_2	% O_2	% CO	% CO_2	% O_2	% CO	% O_2
6053 3 6-23-83	1	3.54	18.11					(18.0) F
6056 3 6-23-83	2	4.38	17.61					(18.0) F
6059 3 6-23-83	3	4.12	17.78					(17.9) F

Form #L-200 R

ORSAT METHOD 5
DATA SHEET FR 42(160)

Laboratory Client # 1000
Batch # 564
Date received 6-23-83

Date of Analysis 6-23-83
Technician RCV
Project Number

B.P. 29.05 Temp 21°C

interpoll

Job Ambient Air Date 6-23-83
City/State J/N
Source
Test Site
Sample type Tech RCV
Remarks: Test/Run
of

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 0.0 cc	O_2RD 21.0 cc
	CO_2Vol 0.0 cc	O_2Vol 21.0 cc
Samp. Vol 100 cc	% CO_2 0.0%	% O_2 21.0%

BULB ☐ INTEGRATED ☐

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. ____ cc	CO_2RD ____ cc	O_2RD ____ cc
	CO_2Vol ____ cc	O_2Vol ____ cc
Samp. Vol ____ cc	% CO_2 ____ %	% O_2 ____ %

BULB ☐ INTEGRATED ☐

6053

interpoll

Job Lehigh Date 6-23-83
City/State J/N
Source North BH
Test Site Outlet
Sample type 1st Oct Tech RS
Remarks: Test/Run 3/1
Tabs = 18.0 of

Sample No. 6053

Sample Vol.	CO_2	O_2
Zero Pt. 9.4 cc	CO_2RD 12.6 cc	O_2RD 29.0 cc
	CO_2Vol 3.2 cc	O_2Vol 10.4 cc
Samp. Vol 90.6 cc	% CO_2 3.53%	% O_2 18.10

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 4.0 cc	CO_2RD 7.4 cc	O_2RD 24.8 cc
	CO_2Vol 3.4 cc	O_2Vol 17.4 cc
Samp. Vol 96.0 cc	% CO_2 3.54%	% O_2 18.12

BULB ☐ INTEGRATED ☑

ORSAT METHOD 3
DATA SHEET FR 42(160)

Lab Client No. 1000
Batch No. 564
Date Recd 6-23-83

Date of Analysis 6-23-83
Technician Rec

Project Number

6056 **interpoll**

Job Lehigh
City/State
Source No 11 BH
Test Site Outlet
Sample type Int. Orst
Remarks: Teledyne = 19.0

Date 6-23-83
J/N
Tech JS
Test/Run 3/2
___ of ___

DUPLICATE

Sample No. 6056

Sample Vol.	CO_2	O_2
Zero Pt. 8.2 cc	CO_2 RD 12.2 cc	O_2 RD 28.4 cc
	CO_2 Vol 4.0 cc	O_2 Vol 16.2 cc
Samp. Vol 91.8 cc	% CO_2 4.35%	% O_2 17.64

BULB ☐ INTEGRATED ☑

Sample Vol.	CO_2	O_2
Zero Pt. 2.2 cc	CO_2 RD 6.4 cc	O_2 RD 23.6 cc
	CO_2 Vol 4.2 cc	O_2 Vol 17.2 cc
Samp. Vol 97.8 cc	% CO_2 4.29%	% O_2 17.58

BULB ☐ INTEGRATED ☑

6059 **interpoll**

Job Lehigh
City/State
Source No 11 BH
Test Site Outlet
Sample type Int Orsat
Remarks: Teledyne = 17.9

Date 6-23-83
J/N
Tech JS
Test/Run 3/3
___ of ___

DUPLICATE

Sample No. 6059

Sample Vol.	CO_2	O_2
Zero Pt. 7.8 cc	CO_2 RD 11.6 cc	O_2 RD 28.0 cc
	CO_2 Vol 3.8 cc	O_2 Vol 16.4 cc
Samp. Vol 92.2 cc	% CO_2 4.12%	% O_2 17.78

BULB ☐ INTEGRATED ☑

Sample Vol.	CO_2	O_2
Zero Pt. 7.8 cc	CO_2 RD 11.6 cc	O_2 RD 28.0 cc
	CO_2 Vol 3.8 cc	O_2 Vol 16.4 cc
Samp. Vol 92.2 cc	% CO_2 4.12%	% O_2 17.78

BULB ☐ INTEGRATED ☑

EPA METHOD-3

LABORATORY REPORT

SUMMARY OF ORSAT DATA

Job: Lehigh / No. 8 Kiln
Sampling Location: No. 7 Baghouse Outlet
Sampling Date: 6-23-83
Analysis Date: 6-23-83
Technician: Ecv

Client No. 1000
Batch No. 564
Date Rec'd 6-23-83

Sample No. TEST NO. AND DATE	RUN NO.	RESULTS						
		INTEGRATED (BAG) Transfered to Bulbs			GRAB (BULB)			O_2 ANALYZER
		% CO_2	% O_2	% CO	% CO_2	% O_2	% CO	% O_2
6044 2 6-23-83	1	5.65	16.74					(16.7)f
6047 2 6-23-83	2	5.37	16.98					(17.1)f
6050 2 6-23-83	3	5.84	16.90					(16.9)f

Form #L-200 R

ORSAT METHOD 3
DATA SHEET FR 12(160)

Laboratory Client Copy
Batch # 564
Date rec'd 6-23-83

Date of Analysis 6-23-83
Technician RCV

Project Number

B.P. 29.08 Temp 21°C

interpoll

Job Ambient Air Date 6-23-83
City/State J/N
Source
Test Site
Sample type Tech RCV
Remarks: Test/Run
of

Sample Vol.	CO_2	O_2
Zero Pt. 0 cc	CO_2RD 0 cc	O_2RD 21.0 cc
	CO_2Vol 0 cc	O_2Vol 21.0 cc
Samp. Vol 100 cc	% CO_2 0 %	% O_2 21.0 %

BULB ☐ INTEGRATED ☐

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. ____ cc	CO_2RD ____ cc	O_2RD ____ cc
	CO_2Vol ____ cc	O_2Vol ____ cc
Samp. Vol ____ cc	% CO_2 ____ %	% O_2 ____ %

BULB ☐ INTEGRATED ☐

6044

interpoll

Job Lehigh Date 6-23-83
City/State J/N
Source No 7 BH
Test Site Outlet
Sample type Integrat Tech JS
Remarks: Test/Run 2/1
Orsat CO_2 = 16.7 of

Sample No. 6044

Sample Vol.	CO_2	O_2
Zero Pt. 8.0 cc	CO_2RD 13.2 cc	O_2RD 28.6 cc
	CO_2Vol 5.2 cc	O_2Vol 15.4 cc
Samp. Vol 92.4 cc	% CO_2 5.65 %	% O_2 16.7 %

BULB ☐ INTEGRATED ☑

DUPLICATE

Sample Vol.	CO_2	O_2
Zero Pt. 8.0 cc	CO_2RD 13.2 cc	O_2RD 28.6 cc
	CO_2Vol 5.2 cc	O_2Vol 15.4 cc
Samp. Vol 92.4 cc	% CO_2 5.65 %	% O_2 16.7 %

BULB ☐ INTEGRATED ☑

ORSAT METHOD 3
DATA SHEET FR 42(160)

Laboratory client #'s
Batch # 564
Date rec'd 6-23-87

Date of Analysis 6-23-83
Technician RCV

Project Number

6047 interpoll

Job Lehigh
City/State
Source NOT BH
Test Site Outlet
Sample type Effluent
Remarks:
Tedlar = 17.1

Date 6-23-83
J/N
Tech FR
Test/Run 2/2
of

DUPLICATE

Sample No. 6047

Sample Vol.	CO_2	O_2
Zero Pt. 8.0 cc	CO_2RD 13.0 cc	O_2RD 28.6 cc
	CO_2Vol 5.0 cc	O_2Vol 15.6 cc
Samp. Vol 92.0 cc	% CO_2 5.43	% O_2 16.56

BULB ☐ INTEGRATED ☑

Sample Vol.	CO_2	O_2
Zero Pt. 5.80 cc	CO_2RD 10.8 cc	O_2RD 26.8 cc
	CO_2Vol 5.0 cc	O_2Vol 16.0 cc
Samp. Vol 94.2 cc	% CO_2 5.31	% O_2 16.99

BULB ☐ INTEGRATED ☑

6050 interpoll

Job Lehigh
City/State
Source NOT BH
Test Site outlet
Sample type Effluent
Remarks:
Tedlar = 16.9

Date 6-23-83
J/N
Tech JS
Test/Run 2/3
of

DUPLICATE

Sample No. 6050

Sample Vol.	CO_2	O_2
Zero Pt. 4.0 cc	CO_2RD 9.6 cc	O_2RD 25.8 cc
	CO_2Vol 5.6 cc	O_2Vol 16.2 cc
Samp. Vol 96.0 cc	% CO_2 5.83	% O_2 16.88

BULB ☐ INTEGRATED ☑

Sample Vol.	CO_2	O_2
Zero Pt. 6.0 cc	CO_2RD 11.5 cc	O_2RD 27.4 cc
	CO_2Vol 5.5 cc	O_2Vol 15.9 cc
Samp. Vol 94.0 cc	% CO_2 5.85	% O_2 16.9

BULB ☐ INTEGRATED ☑

APPENDIX I

IOWA DEQ CEMENT PLANT AND PC EQUIPMENT
OPERATING DATA SHEETS

1-2-3-4 STACK
MAINSTACK

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 1

Kiln No. 8 Date 22 JULY 85

Type of Kiln: _____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes _____ No X

Anticipated Fuel Usage: Coal X % of time.

Oil _____ % of time.

Gas _____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone	79.5 %
Silica Clay	0.0 %
Alumina	14.8 %
MOISTURE	0.5 %
IRON	0.5 %
SAND	5.2 %

Feed Size: 45.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 1350 tons/hr.

Kiln Speed 132 RPH

Fuel _____ Coal X Oil _____ Gas _____

Insufflation in Progress: Yes _____ No X

Person Responsible for Data R.W. VOLK

Signature [signature]

Title/Position KILN ENGINEER

DEQ 9/76

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #3 PRECIPITATOR Rated Production 130 TPH (FEED)

Date 2/20/85 Time 1538-1707 Actual Production 135.0

Run No. 1

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp ___ in. H_2O @ Gas Temp. ___ °F.

Observed Δp ___ in H_2O. Design ~~cfm/tube~~ @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	462	190	575	1205	0
2	390	185	510	1130	0

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___ No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K. W. Vock

Signature: [signature]

Title/Position: Kiln Engineer

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date [illegible] Time [illegible] Actual Production 135.0 [illegible]

Run No.

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -4 1/2 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 55.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOCK

Signature: [signature]

Title/Position: PLANT ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

12-34 STACK/ MAINSTACK

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 2

Kiln No. 8 Date 22 JULY

Type of Kiln: Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes ____ No X

Anticipated Fuel Usage: Coal X % of time.
Oil ____ % of time.
Gas ____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone	79.5 %
Silica Clay	0.0 %
Alumina	14.8 %
MOISTURE	0.5 %
IRON	0.5 %
SAND	5.2 %

Feed Size: 85.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 133.3 tons/hr.

Kiln Speed 132 RPH

Fuel ____ Coal X Oil ____ Gas ____

Insufflation in Progress: Yes ____ No X

Person Responsible for Data R.W. VOLK

Signature [signature]

Title/Position KILN ENGINEER

DEQ 9/76

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date [illegible] Time 1736 - 1906 Actual Production 123.5 TPH

Run No. 2

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	416	191	565	1205	0
2	393	145	507	1135	0

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K. W. York

Signature: [signature]

Title/Position: Kiln Operator

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 2/7/85 Time 1736 - 1906 Actual Production 125.5 TPH

Run No. 2

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp - 4 3/4 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 55.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. YOCK

Signature: [signature]

Title/Position: PLNT ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

1-2-3-4 STACK / MAIN STACK

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. [illegible]

Kiln No. 8 Date [illegible]

Type of Kiln: _____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes _____ No X

Anticipated Fuel Usage: Coal X % of time.
Oil _____ % of time.
Gas _____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone	79.5 %
Silica Clay	0.0 %
Alumina	14.6 %
MOISTURE	2.5 %
IRON	0.5 %
SAND	5.2 %

Feed Size: 84.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 134.0 tons/hr.

Kiln Speed 128 RPH

Fuel _____ Coal X Oil _____ Gas _____

Insufflation in Progress: Yes _____ No X

Person Responsible for Data R.W. Volk

Signature [signature]

Title/Position KILN ENGINEER

DEQ 9/76

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date 2-3-83 Time 1925 - 2054 Actual Production 134.0

Run No. 3

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	465	188	570	1200	0
2	405	188	535	1160	0

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. Vock

Signature: [signature]

Title/Position: KILN OPERATOR

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LENNOX LEHIGH CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 22 JUN 93 Time 1925-2054 Actual Production 134.0 TPH

Run No. 3

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___

Settling Tank Cleaning Interval ___

Baghouse:

Pressure-Positive ___ Negative X. No. Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -5 1/4 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 53.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. YOCK

Signature: [signature]

Title/Position: KIW ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

7 STACK / KILN STACK

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 1

Kiln No. 8 Date 23 JUN 83

Type of Kiln: ____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes ____ No X

Anticipated Fuel Usage: Coal X % of time.

Oil ____ % of time.

Gas ____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone 79.5 %

Silica Clay 0.[illegible] %

Alumina [illegible] %

MOISTURE [illegible] %

IRON [illegible] %

SAND [illegible] %

Feed Size: 85.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 1341 tons/hr.

Kiln Speed 126 RPH

Fuel ____ Coal X Oil ____ Gas ____

Insufflation in Progress: Yes ____ No X

Person Responsible for Data R.W. VOLK

Signature [signature]

Title/Position KILN ENGINEER

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY — 7 Stack / Main Stack

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date 23JUL88 Time 1620 - 1724 Actual Production 134.1

Run No. 1

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	455	197	557	1207	0
2	380	188	510	1115	0

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. Vock

Signature: [signature]

Title/Position: KILN OPERATOR

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 2/3/83 Time 1620-1724 Actual Production 134.1

Run No. 1

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -5 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 61.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: PLANT ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 2

Kiln No. 8 Date 23JUN83

Type of Kiln: _____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes _____ No X

Anticipated Fuel Usage: Coal X % of time.

Oil _____ % of time.

Gas _____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone 77 %

Silica Clay _____ %

Alumina _____ %

MOISTURE _____ %

IRON _____ %

SAND _____ %

Feed Size: _____ % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 134.2 tons/hr.

Kiln Speed 126 RPH

Fuel _____ Coal X Oil _____ Gas _____

Insufflation in Progress: Yes _____ No X

Person Responsible for Data R.W. VOLK

Signature _____

Title/Position KILN ENGINEER

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date 2/10/83 Time 1755-1857 Actual Production 134.2

Run No. 2

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design ~~cfm/tube~~ @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	455	186	560	1205	1
2	390	190	525	1120	1

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. Vock

Signature: [signature]

Title/Position: Kiln Engineer

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 2/20/83 Time 1755-1857 Actual Production 134.2

Run No. 2

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -4 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 62.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: KIW ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 2

Kiln No. 8 Date 23 JUN 85

Type of Kiln: ____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes ____ No X

Anticipated Fuel Usage: Coal X % of time.
Oil ____ % of time.
Gas ____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone 79.5 %
Silica Clay 7.2 %
Alumina 13.2 %
MOISTURE ____ %
IRON ____ %
SAND ____ %

Feed Size: ____ % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 133.3 tons/hr.

Kiln Speed 126 RPH

Fuel ____ Coal X Oil ____ Gas ____

Insufflation in Progress: Yes ____ No X

Person Responsible for Data K. W. VOLK

Signature [signature]

Title/Position KILN ENGINEER

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date 2/3/01 PM3 Time 1915 - 2012 Actual Production 133.3 TPH

Run No. 1

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ °F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	460	192	560	1205	1
2	395	195	505	1150	1

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: PLANT ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 2/3/03 Time 1715-2115 Actual Production 135.2

Run No. 2

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp ___ in. H_2O @ Gas Temp. ___ °F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitater:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -4 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 62.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOCK

Signature: [signature]

Title/Position: RIW ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

11 SACK / KILN SACK

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 1

Kiln No. 8 Date 2370 X 3

Type of Kiln: _____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes _____ No X

Anticipated Fuel Usage: Coal X % of time.

Oil _____ % of time.

Gas _____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone 77.5 %

Silica Clay 0.1 %

Alumina 14.2 %

MOISTURE 1.5 %

IRON _____ %

SAND _____ %

Feed Size: 85.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 133.6 tons/hr.

Kiln Speed 126 RPH

Fuel _____ Coal X Oil _____ Gas _____

Insufflation in Progress: Yes _____ No X

Person Responsible for Data R.W. VOLK

Signature _____

Title/Position KILN ENGINEER

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

11 SIRCH / 11 RH SIRCH

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date 23JUN83 Time 2050 - 2153 Actual Production 133.6

Run No. 1

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ ~~Gas Temp.~~ ___ F.

Observed Δp ___ in H_2O. ~~Design cfm/tube~~ @ Observed Δp ___ @ ___ °F.

~~Fan Rated H.P.~~ ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	452	185	560	1205	0
2	380	185	505	1125	0

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: MILL ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

11 SPARK / MANUFACT.

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 2370183 Time 2050-2183 Actual Production 133.6

Run No. 1

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -4 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 56.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: PLANT ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

#1 STACK/MAIN STACK

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 2

Kiln No. 8 Date 23 JULY 80

Type of Kiln: _____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes _____ No X

Anticipated Fuel Usage: Coal X % of time.
Oil _____ % of time.
Gas _____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone 77.5 %
Silica Clay 0.5 %
Alumina 14.4 %
MOISTURE 0.5 %
IRON 0.5 %
SAND 5.2 %

Feed Size: 86.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 132.2 tons/hr.

Kiln Speed 126 RPH

Fuel _____ Coal X Oil _____ Gas _____

Insufflation in Progress: Yes _____ No X

Person Responsible for Data R.W. VOLK

Signature [signature]

Title/Position KILN ENGINEER

DEQ 9/76

DEPARTMENT OF ENVIRONMENTAL QUALITY

POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date [illegible] Time 2211-2313 Actual Production 132.5

Run No. _____

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___ Design Δp ___ in. H_2O @ Gas Temp. ___ °F.

Observed Δp _____ in H_2O. Design cfm/tube @ Observed Δp _____ @ _____ °F.

Fan Rated H.P. _____ Operating Volts _____ Operating Amps _____

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	450	185	555	1205	0
2	390	185	510	1125	0

Scrubber:

Type _____ Δp (across scrubber) _____ in. H_2O.

Fan Rated H.P. _____ Operating Volts _____ Operating Amps _____

Liquid Circulation Rate _____ gal/min. % Make-up _____ Blowdown _____ gpm.

Scrubbing Water Change Interval _____

Settling Tank Cleaning Interval _____

Baghouse:

Pressure-Positive _____ Negative _____ No Compartments _____

Type Cleaning _____ Clean Cycle _____ min.

Avg. Baghouse Δp _____ in H_2O. Δp Range _____ in. H_2O.

Fan: Rated H.P. _____ Operating Volts _____ Operating Amps _____

Cyclone:

Type _____ Δp _____ in. H_2O. Diameter _____

Fan Rated H.P. _____ Operating Volts _____ Operating Amps _____

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: KILN OPERATOR

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

115 KILN/MILL EXHAUST

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date 2-20-92 Time 2211 - 2313 Actual Production 133.2

Run No. 3

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp ___ in. H_2O @ Gas Temp. ___ F

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -3 1/4 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps 59.

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOCK

Signature: [signature]

Title/Position: PLM ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

PARTICULATE EMISSIONS TEST REPORT
CEMENT PLANT OPERATING DATA

Owner LEHIGH PORTLAND CEMENT CO. Run No. 3

Kiln No. 8 Date [illegible]

Type of Kiln: _____ Wet X Dry (PREHEATER)

Kiln Diameter 13.0 ft.

Maximum Continuous Kiln Feed Rate (Manufacturer's Rating) 130 tons/hr.

Approximate Kiln Speed at Above Rating 150 rev./hr.

Historical Average Kiln Feed Rate (1979 TO DATE) 98 tons/hr.

Historical Maximum Kiln Feed Rate 135 tons/hr.

Insufflation Capability: Yes _____ No X

Anticipated Fuel Usage: Coal X % of time.

Oil _____ % of time.

Gas _____ % of time.

Approximate Feed Composition During Test Run by Weight

Limestone 77.5 %

Silica Clay 0.0 %

Alumina 14.6 %

MOISTURE 0.5 %

IRON 0.5 %

SAND 5.2 %

Feed Size: 80.1 % passing 200 mesh sieve.

KILN OPERATION DURING RUN (AVERAGED)

Kiln Feed Rate 134.0 tons/hr.

Kiln Speed 176 RPH

Fuel _____ Coal X Oil _____ Gas _____

Insufflation in Progress: Yes _____ No X

Person Responsible for Data R.W. Volk

Signature [signature]

Title/Position KILN ENGINEER

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

Plant LEHIGH CEMENT CO. Location MASON CITY, IA.

Source Type #8 PRECIPITATOR Rated Production 130 TPH (FEED)

Date [illegible] Time 2330 - 0032 Actual Production 134.0

Run No. 3

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___ Design Δp ___ in. H_2O @ Gas Temp. ___ °F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ °F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)
1	455	187	560	1250	0
2	340	186	510	1120	0

Scrubber:

Type ___ Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative ___. No Compartments ___.

Type Cleaning ___. Clean Cycle ___ min.

Avg. Baghouse Δp ___ in H_2O. Δp Range ___ in. H_2O.

Fan: Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Cyclone:

Type ___. Δp ___ in. H_2O. Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOLK

Signature: [signature]

Title/Position: KILN OPERATOR

*Averages of operating data taken during actual test run unless requested otherwise.

IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR POLLUTION CONTROL EQUIPMENT OPERATING DATA*

11 STACK/MAINSTACK

Plant LEHIGH CEMENT CO. Location MASON CITY, IA

Source Type BAGHOUSE (BYPASS) Rated Production 130 TPH (FEED)

Date [illegible] Time 2320-0052 Actual Production 134.0

Run No. 3

Mechanical Collector:

Tube Diameter ___ in. No. of Tubes ___. Design Δp. ___ in. H_2O @ Gas Temp. ___ F.

Observed Δp ___ in H_2O. Design cfm/tube @ Observed Δp ___ @ ___ F.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Electrostatic Precipitator:

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (KV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber:

Type ___. Δp (across scrubber) ___ in. H_2O.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Liquid Circulation Rate ___ gal/min. % Make-up ___. Blowdown ___ gpm.

Scrubbing Water Change Interval ___.

Settling Tank Cleaning Interval ___.

Baghouse:

Pressure-Positive ___ Negative X. No Compartments 11.

Type Cleaning REVERSE AIR. Clean Cycle 1/4 min.

Avg. Baghouse Δp -3 in H_2O. Δp Range +8/-12 in. H_2O.

Fan: Rated H.P. 75. Operating Volts 575. Operating Amps [illegible].

Cyclone:

Type ___. Δp ___ in. H_2O Diameter ___.

Fan Rated H.P. ___. Operating Volts ___. Operating Amps ___.

Person Responsible for Data: K.W. VOCK

Signature: [signature]

Title/Position: PLANT ENGINEER

*Averages of operating data taken during actual test run unless requested otherwise.

APPENDIX J

CALCULATION OF THE KILN PARTICULATE EMISSION FACTOR

Calculation of the Kiln Particulate Emission Factor

The total emission factor for the No. 8 Kiln was calculated from the following expression:

$$E = \frac{\dot{m}_p}{\dot{m}_f} \qquad \text{Equation 1}$$

where E = emission factor of the kiln in LB particulate per TON of dry feed (LB/TON)

$\dot{m}_p$ = total particulate emission rate from all sources exhausting to the atmosphere from the kiln (LB/HR)

$\dot{m}_f$ = total average dry feed rate to the kiln (TONS/HR dry)

Since most kilns have more than one source exhausting to the atmosphere, the following equation is used to calculate $\dot{m}_p$:

$$\dot{m}_p = \sum_i \dot{m}_i \qquad \text{Equation 2}$$

where $\dot{m}_i$ = individual emission rate of source i (LB/HR)

In the June 22-24, 1983, compliance test on the No. 8 Kiln, the Main Stack (ESP outlet) was tested simultaneously with each of the baghouse tests. The average of the nine runs on the Main Stack $(\dot{m}_{ms})$avg was used to calculate the contribution of particulate emissions from the ESP. In the case of the emissions from the eight baghouse stacks, Baghouses 5, 8, 9 and 10 were off-line during the particulate emission tests on Baghouse 7 and 11. Baghouse 6 emissions were estimated to be 0.44 LB/HR using the average of two volumetric flow rate determinations

performed on June 23 and 24, 1983, (9594 DSCFM) and the average particulate concentration for the six particulate runs performed on Baghouses 7 and 11 (.0053 GR/DSCF).

Baghouses 1-4 (which vent into one stack) emissions were measured on June 22, 1983, when two additional baghouses were on-line. Since Lehigh announced that it was the plant's intent to run in the future with these two baghouses off-line, it was agreed (on-site meeting between Bill Volk of Lehigh and Bill Youngquist of Iowa DEQ) that the remainder of tests would be run with these two off-line, providing that the emissions from the Baghouse 1-4 Stack be calculated using the highest of the concentrations measured on June 22, 1983, together with the average of two flow rate determinations performed on June 23 and 24, 1983, when the two other baghouses were off-line.

As a result of the above described agreements, the emissions for Baghouses 1-4 was calculated to be 3.19 LB/HR using the highest particulate concentration measured on June 22, 1983 (.00977 GR/DSCF) and the average of the two volumetric flow rate determinations performed on June 23 and 24, 1983 (38101 DSCFM).

The wet feed rate to the No. 8 Kiln (133.86 TONS/HR) was calculated from the nine Iowa DEQ "Particulate Emission Test Report Cement Plant Operating Data" sheets submitted to Interpoll at the end of the test by Bill Volk. The arithmetic mean of the nine kiln wet feed rate values corrected to a dry basis was used (133.19 TONS/HR) as the best estimate of the dry kiln feed rate. A summary of the emission factor calculation follows:

$$\dot{m}_p = \sum_i \dot{m}_i = \dot{m}_{ms} + \dot{m}_{1-4} + \dot{m}_6 + \dot{m}_7 + \dot{m}_{11}$$

$$\dot{m}_p = 32.24 + 3.19 + 0.44 + 0.52 + 0.44 = 36.83 \text{ LB/HR}$$

$$E = \frac{\dot{m}_p}{\dot{m}_f} = \frac{36.83 \text{ LB/HR}}{133.19 \text{ TONS/HR}} = 0.2765 \text{ LB/~~HR~~ TON}$$

APPENDIX K

PROCEDURES

Particulate Loadings and Emission Rates

The particulate emission rates were determined per EPA Methods 1-5, CFR Title 40, Part 60, Appendix A (Revised July 1, 1982). In this procedure, a preliminary velocity profile of the gases in the flue is obtained by means of a temperature and velocity traverse. On the basis of these values, sampling nozzles of appropriate diameter are selected to allow isokinetic sampling, a necessary prerequisite for obtaining a representative sample.

The sampling train consists of a heated glass-lined* sampling probe equipped with a Type S pitot and a thermocouple. The probe is attached to a sampling module which houses the all-glass in line filter holder in a temperature controlled oven. In addition, the sampling module also houses the condenser case and a Drierite drying column. The sampling module is connected by means of an umbilical cord to the control module which houses the dry test gasmeter, the calibrated orifice, a leakless pump, two inclined manometers, and all controls required for operating the sampling train.

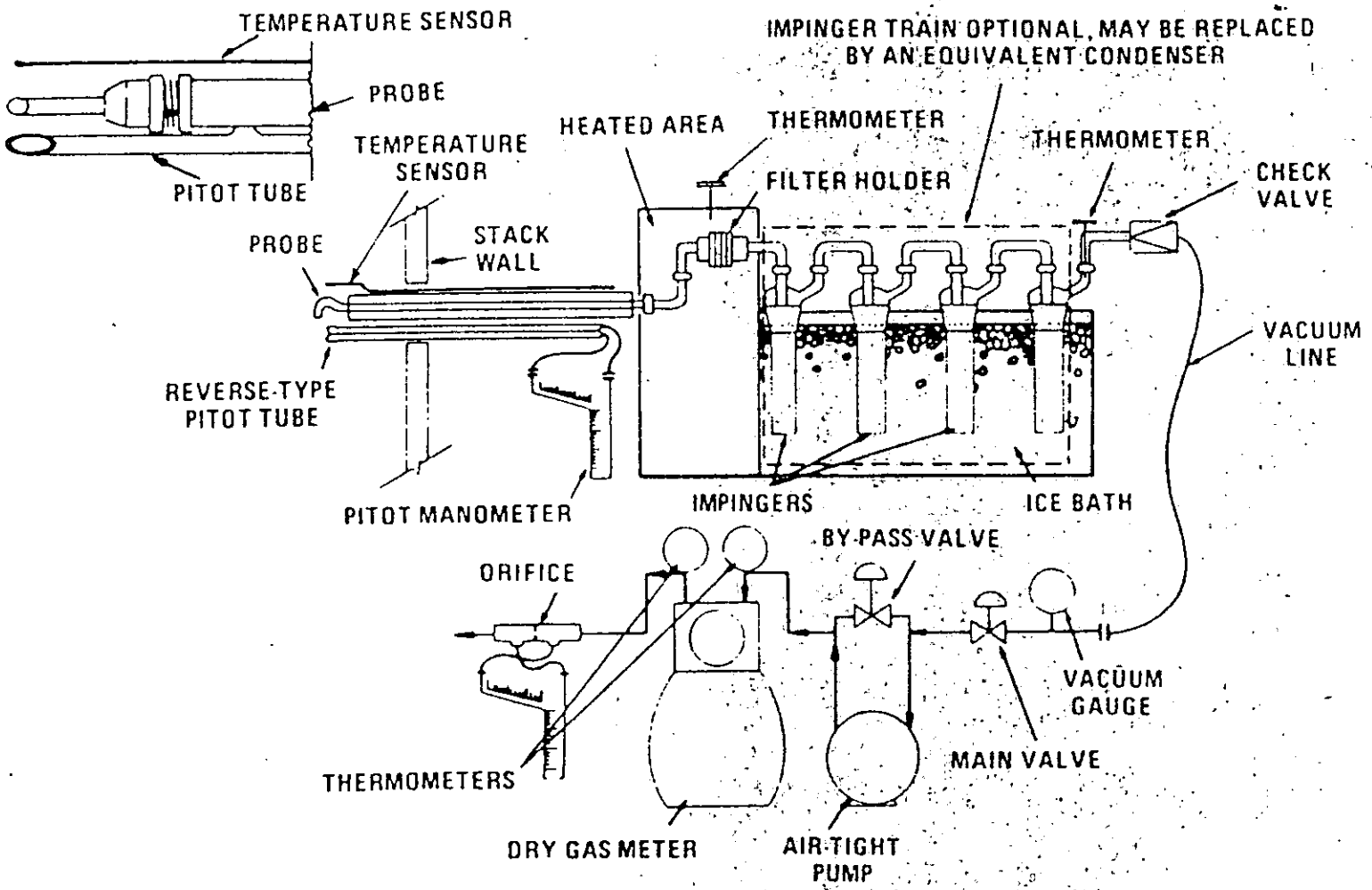
Particulate samples were collected as follows: The sample gas was drawn in through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter. The particulates were removed at this point and collected on the filter. The gases then passed through an ice-cooled condenser and a desiccant-packed drying column which quantitatively absorb all moisture from the sample gas stream after which the sample gas passes through the pump and the dry test gasmeter which integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gasmeter provides instantaneous flow rate data.

A representative particulate sample was acquired by sampling for equal periods of time at the centroid of a number of equal area regions in the duct. The sampling rate is adjusted at each site such that an isokinetic sampling condition prevails. Nomographs are used to aid in the rapid determination of the sampling rate.

*A stainless steel-lined probe was used at the ESP Discharge Stack test site.

After sampling is complete, the filter is removed and placed in a clean container. The nozzle and inlet side of the filter holder are quantitatively washed with acetone and the washings are stored in a second container. A brush is often used in the cleaning step to help dislodge deposits. The samples are returned to the laboratory where they are logged in and analyzed. The volume of the acetone rinse ("probe wash") is noted and then the rinse is quantitatively transferred to a tared 120 cc porcelain evaporating dish and the acetone evaporated off at 97-105 ^{o}F. This temperature is used to prevent condensation of atmospheric moisture due to the cooling effect induced by the evaporation of acetone. The acetone-free sample is then transferred to an oven and dried at 105 ^{o}C for 30 minutes, cooled in a desiccator over Drierite, and then weighed to the nearest .01 mg. The filter sample is quantitatively transferred to a 6-inch watch glass and dried in an oven at 105 ^{o}C for two hours. The filter and watch glass are then cooled in a desiccator and the filter weighed to the nearest .01 mg. All weighings are performed in a balance room where the relative humidity is hydrostatted to less than 50% relative humidity. Microscopic examination of the samples is performed if any unusual characteristics are observed. The weight of the acetone rinse is corrected for the acetone blank. The Drierite column is weighed on-site and the water collected by Drierite is added to the condensate so that the total amount of absorbed water may be ascertained.

Integrated flue gas samples for Orsat analysis were collected simultaneously from the stack and from the breeching at the inlet to the wet scrubber. The samples were collected in 44-liter Tedlar or teflon gas sampling bags at a constant flow rate throughout each particulate run. The bags were then returned to the laboratory and analyzed by Orsat analysis. Standard commercially prepared solutions were used in the Orsat analyzer (sat. KOH for carbon dioxide and reduced methylene blue for oxygen). In addition to the above, the oxygen content of the flue gas was measured at each traverse during the particulate determinations using a Teledyne Model 320P-4 Portable Oxygen Analyzer to sample the effluent from the Method 5 train.



Particulate-sampling train.

APPENDIX L

CALCULATION EQUATIONS

CALCULATION EQUATIONS

METHOD 2

$$\bar{V}_s = 85.48\, C_p \left(\sqrt{\Delta p}\right)_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}}$$

$$Q_{s,d} = 60(1 - B_{ws})\, \bar{V}_s\, A \left[\frac{528}{T_{s(avg)}}\right] \left[\frac{P_s}{29.92}\right]$$

$$Q_a = 60\, \bar{V}_s\, A$$

$$m_g = \frac{4.995\, Q_{s,d}\, G_d}{1 - B_{ws}}$$

$$RH^* = 100\, [vp_{twb} - 0.000364\, P_s\, (T_{db} - T_{wb})]/vp_{tdb}$$

$$B^*_{ws} = RH(vp_{tdb})/P_s$$

$$\rho = \frac{4.585 \times 10^{-2}\, P_s M_s}{T_{s\,(avg)}}$$

*Alternate equations for calculating moisture content from wet bulb and dry bulb data.

CALCULATION EQUATIONS

METHOD 3

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

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

$$M_s = M_d\ (1 - B_{ws}) + 0.18\ B_{ws}$$

$$B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

METHOD 5

$$V_{m(std)} = 17.65\ V_m\ \gamma\ \left[\frac{P_{bar} + \overline{\Delta H}/13.6}{T_{m(avg)}}\right]$$

$$V_{w(std)} = 0.0472\ V_{lc}$$

$$B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

$$I = 0.0944\ \left[\frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1 - B_{ws})}\right]$$

$$C_s = \frac{15.43\ M_p}{V_{m(std)}}$$

$$C_a = \frac{272.3\ M_p\ P_s}{T_{s(avg)}\ \left[V_{w(std)} + V_{m(std)}\right]}$$

$$(m_p)_1 = 8.5714 \times 10^{-3}\ C_s\ Q_{s,d}$$

$$(m_p)_2 = \frac{1.3228 \times 10^{-1}\ M_p\ A}{\theta\ A_n}$$

$$m_p = \frac{(m_p)_1 + (m_p)_2}{2}$$

SYMBOLS

A	=	Cross sectional area of stack, SQ. FT.
A_n	=	Cross sectional area of nozzle, SQ. FT.
B_{ws}	=	Water vapor in gas stream, proportion by volume
C_p	=	Pitot tube coefficient, dimensionless
C_a	=	Concentration of particulate matter in stack gas, wet basis, GR/ACF
C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, GR/DSCF
EA	=	Excess air, percent by volume
γ	=	Dry test meter correction factor, dimensionless
G_d	=	Specific gravity (relative to air), dimensionless
I	=	Isokinetic variation, percent by volume
M_d	=	Molecular weight of stack gas, dry basis, g/g - mole.
$\dot{m}_g$	=	Mass flow of wet flue gas, LB/HR
$\dot{m}_p$	=	Particulate mass flow, LB/HR
M_s	=	Molecular weight of stack gas, wet basis, g/g, mole.
M_p	=	Total amount of particulate matter collected, g
P_{bar}	=	Atmospheric pressure, IN. HG (uncompensated)
P_g	=	Stack static gas pressure, IN. W.C.
P_{std}	=	Standard absolute pressure, 29.92 IN. HG

Q_a = Actual volumetric stack gas flow rate, ACFM

$Q_{s,d}$ = Dry volumetric stack gas flow rate corrected to standard conditions, DSCFM

RH = Relative humidity, %

T_{db} = Dry bulb temperature of stack gas, ^{o}F

T_{wb} = Wet bulb temperature of stack gas, ^{o}F

$T_{m(avg)}$ = Absolute average dry gas meter temperature, ^{o}R

$T_{s(avg)}$ = Absolute average stack temperature, ^{o}R

T_{std} = Standard absolute temperature, 528 ^{o}F (68 ^{o}F)

θ = Total sampling time, min.

V_{lc} = Total volume of liquid collected in impingers and silica gel, ml

V_m = Volume of gas sample as measured by dry gas meter, CF

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter corrected to standard conditions, DSCF

$V_{w(std)}$ = Volume of water vapor in the gas sample corrected to standard conditions, SCF

$\overline{V}_s$ = Average actual stack gas velocity, FT/SEC

vp_{tdb} = Vapor pressure at T_{db}, IN. HG

vp_{twb} = Vapor pressure at T_{wb}, IN. HG

$\overline{\Delta H}$ = Average pressure differential across the orifice meter, IN. W.C.

ΔP = Velocity pressure of stack gas, IN. W.C.

γ = Dry test meter correction coefficient, dimensionless

ρ = Actual gas density, LB/ACF

APPENDIX M

SAMPLING TRAIN CALIBRATION DATA

Interroll Report No. 3-1554
Lehigh Cement Company
Mason City, Iowa

Meter Box Calibration Data Sheet

Date of Cal: June 8, 1983
Technician: D. Stock
Bar. Press.: 28.85

Meter Box No. 4
Dry Test Meter Ser. No. 614712
Wet Test Meter No. A1-20

Delta H Actual (in. WC)	Gas Volume Wet Test Meter	Cal. Index (%)	Diff. Wet Test Meter (in. WC)	Gas Volume Dry Test Meter Vde (cf)	Gas Volume Dry Test Meter Vdf (cf)	Gas Temperature of Meters Tw (deg-f)	Gas Temperature of Meters Tdi (deg-f)	Gas Temperature of Meters Tdo (deg-f)	Time (min)	Meter Coef.	Orifice Constant (in. WC)
0.50	5.0	99.90	0.01	724.28	729.28	70	74	67	12.20	0.99765	1.736
0.90	5.0	99.90	0.02	730.28	735.30	70	73	68	9.18	0.99402	1.770
1.40	10.0	99.90	0.04	736.55	746.58	70	76	69	14.75	0.99795	1.768
2.00	10.0	99.90	0.06	747.58	757.60	70	81	71	12.42	1.00263	1.779
3.00	10.0	99.91	0.09	758.76	768.78	70	83	72	10.20	1.00282	1.795
5.00	10.0	99.91	0.12	769.80	779.88	70	87	75	7.89	0.99841	1.778
									Average:	0.99891	1.771

M-1

Meter Box Calibration and Usage Status

Date of Report: June 23, 1983

Control Case No. 4 (Rockwell Dry Test Meter Serial No. 614712)

Date of Last Calibration: June 8, 1983
Calibration Technician: D. Stock
Wet Test Meter No.: American Meter A1-20

Date of Use	Job No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
June 14, 1983	82023261	948.40	117.11	168.71	168.71
June 16, 1983	83041261	153.70	285.14	131.44	300.15
June 22, 1983	83055261	286.12	408.45	122.33	422.48
June 23, 1983	83055261	408.82	533.70	124.88	547.36
June 23, 1983	83055261	533.81	659.58	125.77	673.13

*Total volume through meter since last calibration

Meter Box Calibration
Data Sheet

Date of Cal: June 20, 1983
Technician: J. Stock
Bar. Press.: 29.00

Meter Box No. 6
Dry Test Meter Ser. No. 6471
Wet Test Meter No. AL-20

Delta H Actual (in. WC)	Gas Volume Wet Test Meter	Cal. Index (%)	Diff. Wet Test Meter (in. WC)	Gas Volume Dry Test Meter Vde (cf)	Gas Volume Dry Test Meter Vdf (cf)	Gas Temperature of Meters Tw	Gas Temperature of Meters Tdi (deg-f)	Gas Temperature of Meters Tdo	Time (min)	Meter Coef.	Orifice Constant (in. WC)
0.51	3.0	99.90	0.01	910.99	914.02	72	86	80	7.26	1.00671	1.712
0.90	5.0	99.90	0.02	904.94	909.99	72	86	80	9.32	1.00570	1.790
1.40	7.0	99.90	0.03	896.91	903.94	72	88	78	10.35	1.01011	1.754
2.00	9.0	99.90	0.06	886.95	895.91	72	80	74	11.25	1.00687	1.806
3.00	10.0	99.91	0.09	915.02	925.12	72	88	80	10.38	1.00253	1.844
5.00	9.0	99.91	0.12	926.12	935.25	72	92	82	7.34	0.99854	1.886
									Average:	1.00508	1.799

Meter Box Calibration and Usage Status

Date of Report: June 23, 1983

Control Case No. 6 (Rockwell Dry Test Meter Serial No. 6471)

Date of Last Calibration: June 20, 1983
Calibration Technician: J. Stock
Wet Test Meter No.: American Meter AL-20

Date of Use	Job No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
June 22, 1983	83055261	935.90	71.50	135.60	135.60
June 23, 1983	83055261	71.80	263.92	192.12	327.72
June 23, 1983	83055261	264.20	447.26	183.06	510.78

*Total volume through meter since last calibration

Interroll Report No. 3-1554
Lehigh Cement Company
Mason City, Iowa

Pitot Tube Calibration Data Sheet

Date of Cal: December 18, 1982 Pitot Tube Number 6
Technician: J. Stock

Direction A

U* (fps)	H std* (in. wc)	Actual H std (in. wc)	H s-type (in. wc)	Coeff
20	0.09	0.09	0.12	0.8660
40	0.37	0.37	0.52	0.8435
60	0.82	0.79	1.11	0.8436
80	1.46	1.45	2.00	0.8515
100	2.29	2.30	3.21	0.8465

Average Coefficient: 0.8502

Direction B

U* (fps)	H std* (in. wc)	Actual H std (in. wc)	H s-type (in. wc)	Coeff
20	0.09	0.10	0.13	0.8771
40	0.37	0.36	0.50	0.8485
60	0.82	0.83	1.12	0.8609
80	1.46	1.47	2.03	0.8510
100	2.29	2.31	3.23	0.8457

Average Coefficient: 0.8566

Overall Average Coefficient: 0.8534

* Nominal or Desired

Pitot Tube Calibration
Data Sheet

Date of Cal: December 18, 1982 Pitot Tube Number 20
Technician: J. Stock

Direction A

V* (fps)	H std* (in. wc)	Actual H std (in. wc)	H s-type (in. wc)	Coeff.
20	0.09	0.09	0.12	0.8660
40	0.37	0.37	0.51	0.8518
60	0.82	0.80	1.13	0.8414
80	1.46	1.45	2.01	0.8493
100	2.29	2.30	3.19	0.8491

Average Coefficient: 0.8515

Direction B

V* (fps)	H std* (in. wc)	Actual H std (in. wc)	H s-type (in. wc)	Coeff.
20	0.09	0.09	0.12	0.8660
40	0.37	0.38	0.53	0.8467
60	0.82	0.82	1.12	0.8557
80	1.46	1.45	2.00	0.8515
100	2.29	2.35	3.05	0.8778

Average Coefficient: 0.8595

Overall Average Coefficient: 0.8555

* Nominal or Desired

Nozzle Calibration
Data Sheet

Date of Cal: June 23, 1983 Nozzle Number 5.2
Technician: S. Olson

Nozzle rotated by 36 degree increments and diameter measured to nearest 0.001 inch. Observed readings and average:

Position	Diameter (inches)
1	0.250
2	0.251
3	0.250
4	0.249
5	0.250
Average:	0.250

Nozzle Calibration
Data Sheet

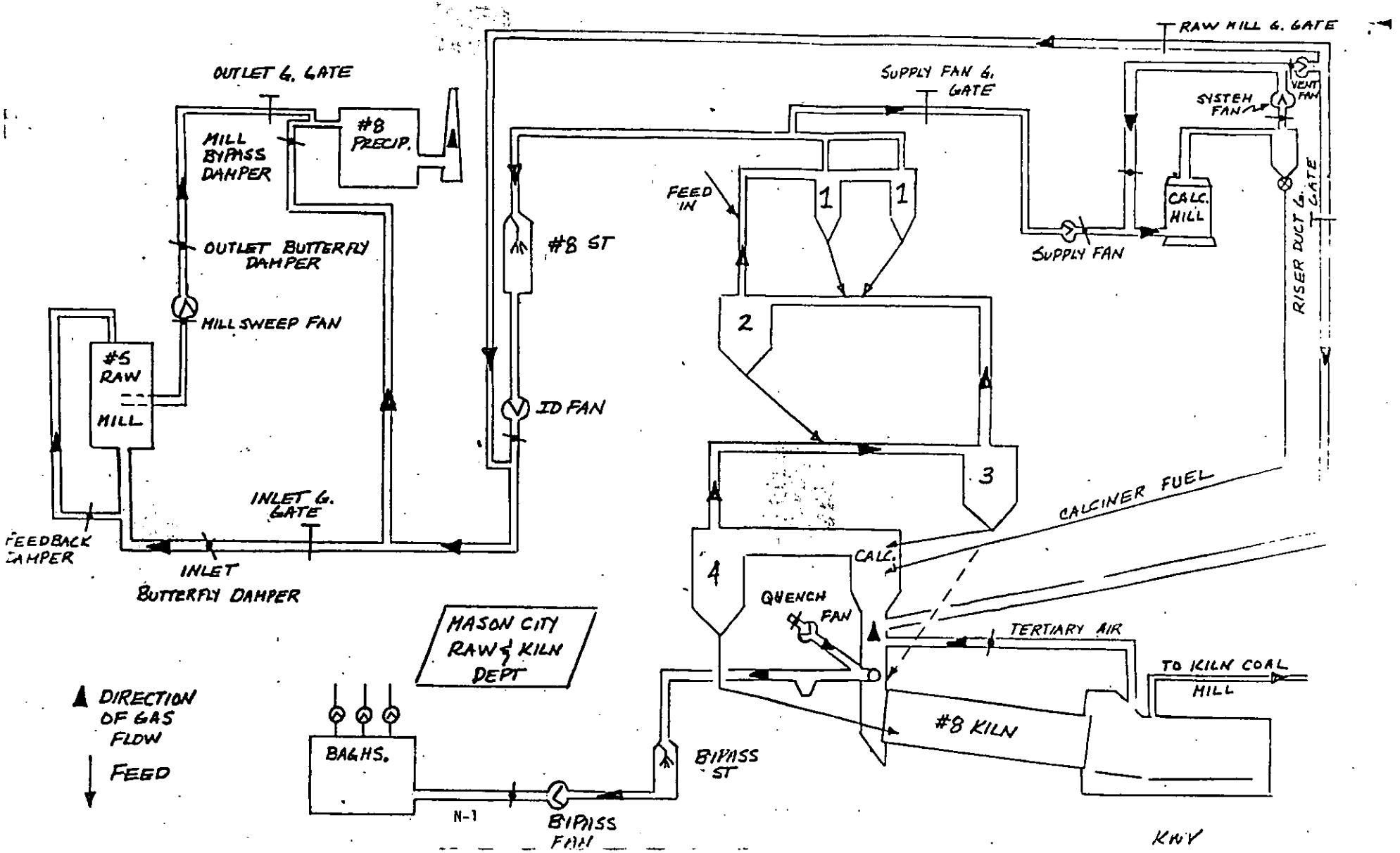
Date of Cal: June 23, 1983 Nozzle Number 7.2
Technician: J. Stock

Nozzle rotated by 36 degree increments and diameter measured to nearest 0.001 inch. Observed readings and average:

Position	Diameter (inches)
1	0.246
2	0.247
3	0.245
4	0.246
5	0.246
Average:	0.246

APPENDIX N

PROCESS SCHEMATIC


RAW MILL G. GATE
OUTLET G. GATE
SUPPLY FAN G. GATE
VENT FAN
SYSTEM FAN
#8 PRECIP.
MILL BYPASS DAMPER
FEED IN
1
1
CALC. HILL
RISER DUCT G. GATE
#8 ST
SUPPLY FAN
OUTLET BUTTERFLY DAMPER
2
MILL SWEEP FAN
#5 RAW MILL
ID FAN
3
CALCINER FUEL
INLET G. GATE
FEEDBACK DAMPER
INLET BUTTERFLY DAMPER
CALC.
4
QUENCH FAN
TERTIARY AIR
MASON CITY RAW & KILN DEPT
TO KILN COAL MILL
#8 KILN
DIRECTION OF GAS FLOW
FEED
BAGHS.
BYPASS ST
N-1
BYPASS FAN
KHV