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.

AP42 Section:	11.20
Reference:	15
Title:	Stack Test Report No. 85-1, Lehigh Lightweight Aggregate Plant, Dryer-Kiln No. 2, Woodsboro, Maryland, Division Of Stationary Source Enforcement, Maryland Department Of Health And Mental Hygiene, Baltimore, MD, February 1, 1985.

A-82-
II-D-2

AP-42 Section 1.20
Reference 15
Report Sect. 4
Reference 15

State of Maryland

OFFICE OF ENVIRONMENTAL PROGRAMS
DEPARTMENT OF HEALTH AND MENTAL HYGIENE

201 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201 • AREA CODE 301 • 225-5250

TTY FOR DEAF: Balto. Area 383-7555
D.C. Metro 565-0451

Adele Wilzack, R.N., M.S., Secretary

William M. Eichbaum, Assistant Secretary

October 22, 1985

DOCKET COPY

Mr. Randy Strait
Midwest Research Institute
Suite 202
4505 Creedmoor Road
Raleigh, North Carolina 27612

Dear Mr. Strait:

As per your request, please find enclosed copies of material you requested from our files. The payment due for services rendered is as follows:

40 single xerox copies @ 14¢ per copy . . . . . $ 5.60

Please make the check payable to the Department of Health and Mental Hygiene. Thank you.

Sincerely yours,

Ralph Hall

Ralph Hall
Division of Stationary Source
Enforcement
Air Management Administration

RHH:dk

Enclosures

cc: Mrs. Barbara Murphy

R. Strait
7702-246024
10/24/85

RECEIVED OCT 24 1985

850201
7.100003.4.1

Stack Test Report No. 85-1

Lehigh Lightweight Aggregate Plant
Dryer-Kiln No. 2
Woodsboro, Frederick Co.
January 1985

Division of Stationary Source Enforcement
Air Management Administration
Office of Environmental Programs
Department of Health and Mental Hygiene
State of Maryland

Douglas E. Frantz
Submitted by Douglas E. Frantz

Ronald E. Lipinski
Approved by Ronald E. Lipinski

Date: 2/1/85

ABSTRACT

Introduction:

The Woodsboro plant of the Lehigh Portland Cement Company produces lightweight aggregate from shale quarried on site. The shale is crushed and sized, then fed to a rotary dryer to preheat the material and drive off moisture. After being screened to remove fines, the shale is fed to the kiln where it is heated to 2100°F, using No. 2 oil at an average rate of 14 gallons per hour and coal at an average rate of 3,060 lbs. per hour. Expansion of the shale takes place in the kiln.

Emissions from this process are controlled by an electrostatic precipitator.

Particulate emission standards for this process are given in COMAR 10.18.06.03B. The maximum emission rate (lbs/hr.) allowed is determined by the table contained in that regulation or, if process weight exceeds 60,000 lbs/hr, the equation $E=55.0P^{0.11-40}$. When process weight exceeds 60,000 lbs/hr., the emission rate may exceed that given by the above formula, if the particulate concentration is below .05 gr/scfd.

Process weight includes the dryer feed plus the weight of coal used.

Procedure:

Method 1005, as contained in AMA Technical Memorandum 83-05, was followed during the testing. Oxygen and carbon dioxide levels for molecular weight determinations were measured using Fyrite equipment.

Results:

Process weight during the test was determined to be 29.53 tons per hour, based on a dryer feed rate of 28 tons per hour and the average coal feed rate of 3,060 lbs/hr. Interpolating from Table 1 in COMAR 10.18.06, the allowed emission rate is 39.46 lbs/hr. The average emission rate during the three tests was 22.0 lbs/hr., indicating compliance with Maryland regulations.

A summary of the test results is given in table 1-1. Raw data are contained in the appendix.

CONTACT : GEORGE BEERLI
(410) 631-3230

Table 1-1. Summary of Particulate Sampling Results For:

85-1 Lehigh Portland Cement, Woodsboro, #2 Kiln

Run ID	Process Weight (tons/hr)	Allowed Emission Rate (lbs/hr)	Average Stack Gas Data					Concentration* (grains/scfd)	Emission Rate* (lbs/hr)	Opacity (%)
			flow rate (scfm dry)	temp (^oF)	% O_2	% CO_2	% H_2O			
1/8/85	29.53	39.46	18847	453	13.3	6.5	8.6	0.12	18.7	13.3
1/9/85	29.53	39.46	20487	454	12.2	6.2	7.8	0.12	21.7	13.6
1/10/85	29.53	39.46	19494	448	13.8	6.5	8.3	0.15	25.6	-
			19,609		13.1			0.13	22.0	

*based on front half catch

APPENDIX:

Nomenclature
Calculated Results
Data Summaries
Laboratory Analyses
Primary Data
Calibration Data
Preliminary Stack Test Survey

MARYLAND STATE

Air Management Administration

STACK SAMPLING NOMENCLATURE

A_s	:	cross sectional area of stack at sample site, (ft^2)
B_w	:	mole fraction moisture in stack gas, (dimensionless)
C_d	:	concentration of front half catch, (grains/scfd)
C_{d12}	:	concentration at 12% CO2, front half catch, (grains/scfd)
C_{d50}	:	concentration at 50% EA, front half catch, (grains/scfd)
C_m	:	dry gas meter correction factor, (dimensionless)
C_p	:	pitot tube coefficient, (dimensionless)
C_t	:	concentration of total catch, (grains/scfd)
C_{t12}	:	concentration at 12%, CO2, total catch, (grains/scfd)
C_{t50}	:	concentration at 50% EA, total catch, (grains/scfd)
D_n	:	diameter of sampling nozzle inlet, (in)
EA	:	percent excess air in stack gas, (%)
E_d	:	emission rate, front half, (lbs/hr)
E_t	:	emission rate, total, (lbs/hr)
$\Delta H@$	:	orifice meter pressure differential that provides a flow rate of .75 ft^3/min at 70°F and 29.92 in. Hg, (in. H_2O)
ΔH_{avg}	:	average orifice pressure differential, (in. H_2O)
I	:	percent isokinetic, (%)
M_d	:	molecular weight of stack gas, dry basis, (lb/lb mole)
M_w	:	molecular weight of stack gas, wet basis, (lb/lb mole)
N_{ti}	:	normality of titrant for SO_x sample, (g-eq/l)
P_{bar}	:	barometric pressure, (in. Hg)
Psavg	:	average absolute stack pressure, (in. Hg)

NOMENCLATURE

$\triangle P$	:	velocity pressure differential, (in. H_2O)
Q_{alq}	:	volume of SO_x sample aliquot titrated, (ml)
Q_m	:	net dry sample gas volume, (acfd)
Qmstd	:	standard dry gas sample volume, (scfd)
Q_s	:	actual stack gas volumetric flow rate, dry basis, (asfm dry)
Q_{soln}	:	total volume of SO_x sample solution, (ml)
Q_{sstd}	:	standard stack gas volumetric flow rate, dry basis, (scfm dry)
Q_{ti}	:	volume of titrant required to neutralize SO_x sample aliquot, (ml)
Q_{tib}	:	volume of titrant requiued to neutralize blank solution, (ml)
Q_{tstd}	:	total standard sample volume, (scf)
Q_w	:	total volume of water collected, (ml)
Q_{wstd}	:	standard vapor volume of water collected, (scf)
T_{mavg}	:	average dry gas meter temperature, (^oF)
T_{savg}	:	average stack temperature, (^oF)
V_s	:	average velocity of stack gas at sample site, (ft/sec)
W_d	:	front half particulate catch, (mg)
W_t	:	total particulate catch, (mg)
θ	:	sampling time, (min.)

MARYLAND STATE
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PARTICULATE STACK SAMPLING CALCULATED RESULTS

Plant Lehigh Cement, Woodsboro Frederick County

Source No. 2 Kiln

RUN ID	1-8-85	1-9-85	1-10-85		
1. Q_{mstd}	44.282	53.450	46.009		
2. Q_{wstd}	4.170	4.492	4.151		
3. Q_{tstd}	48.452	57.941	50.160		
4. B_w	0.086	0.078	0.083		
5. M_d	29.57	29.474	29.599		
6. M_w	28.574	28.585	28.639		
7. EA	163.7	127.4	187.2		
8. V_s	38.88	41.12	39.11		
9. Q_s actual dry	32,665	34,870	32,973		
10. Q_{sstd} std dry	18,847	20,487	19,494		
11. C_d	0.1158	0.1235	0.1534		
12. C_t	0.1227	0.1260	0.1579		
13. C_{d12}	0.2138	0.2402	0.2814		
14. C_{t12}	0.2266	0.2451	0.2897		
15. C_{d50}	0.2035	0.1873	0.2936		
16. C_{t50}	0.2157	0.1911	0.3024		
17. E_d	18.71	21.69	25.62		
18. E_t	19.83	22.13	26.39		
19. I	96.6	107.3	97.1		

*Not Applicable

MARYLAND STATE
AIR MANAGEMENT ADMINISTRATION

PARTICULATE STACK SAMPLING DATA SUMMARY

Plant Lehigh Cement, Woodsboro Frederick County

Source No. 2 Kiln

RUN ID	1-8-85	1-9-85	1-10-85		
1. Cp	.84	.84	.84		
2. Q_m	42.666	50.599	43.371		
3. T_{mavg}	49.9	51.3	48.5		
4. P_{bar}	29.39	29.96	29.95		
5. ΔH_{avg}	1.309	1.81	1.43		
6. Q_w	86.9	93.6	86.5		
7. W_d	332.3	427.8	457.2		
8. W_t	352. 2	436.5	470.8		
9. $\%CO_2$	6.5	6.17	6.54		
10. $\%O_2$	13.25	12.17	13.81		
11. T_{savg}	453 F	454	448		
12. $(\Delta P)^{1/2}_{avg}$	.519	.554	.529		
13. P_{savg}	29.35	29.92	29.91		
14. A_s	15.32	15.32	15.32		
15. D_n	.308	.308	.308		
16. θ	72	72	72		
actual wet	35,439 acfm	37,820 acfm	35,957	avg = 36,505	

#3,4

MARYLAND STATE
BUREAU OF AIR QUALITY & NOISE CONTROL
AND BUREAU OF LABORATORIES

PARTICULATE STACK SAMPLING LABORATORY RESULTS

Plant: Lehigh Woodsboro — Completed: 1/22/85

Facility Tested: #2 Kiln stack — By: Sheila D. Hayfield

Test Date: 1/8/85

Run ID: 1/8/85.1 — #

WEIGHT OF PARTICULATE COLLECTED

Container		Final Weight (grams)	Initial Weight (grams)	Weight Gain (mg)
Probe	81	146.7812	146.7240	57.2
Filter	W	140.3338 139.3940	.9398 .6939	245.9
Cyclone	36	146.3275	146.2983	29.2
			Subtotal, (mg)	332.3
Water Soluble	1	151.6314	151.6213	10.1
Organics	35	151.8312	151.8265	04.7
Acetone Wash	28	148.4076	148.4025	05.1
			Subtotal, (mg)	19.9

Total Weight of Particulate Collected, (mg) 352.2

	Sulfate	Acidity
Probe	_____ mg.	_____ meq. N_aOH
Filter	_____ mg.	_____ meq. N_aOH

VOLUME OF MOISTURE COLLECTED

		Final Volume (ml)	Initial Volume (ml)	Volumetric Gain (ml)
Impingers		267.5	200.0	67.5
Silica Gel	34	421.9	402.5	19.4
			Total Gain, (ml)	86.9

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AND BUREAU OF LABORATORIES

PARTICULATE STACK SAMPLING LABORATORY RESULTS

Plant LEHIGH CEMENT Completed 1/29/85

Facility Tested #2 KILN By S.D. Hanfield

Test Date 1/9/85

Run ID 1.9.85.1 #

WEIGHT OF PARTICULATE COLLECTED

Container		Final Weight (grams)	Initial Weight (grams)	Weight Gain (mg)
Probe	48	151.5476	151.4788	68.8
Filter	X	135.9763 135.0057	.9706 .6921	278.5
Cyclone	33	146.5798	146.4993	80.5
			Subtotal, (mg)	427.8
Water Soluble	66	146.4570	146.4557	1.3
Organics	26	147.3492	147.3460	3.2
Acetone Wash	18	140.6646	140.6604	4.2
			Subtotal, (mg)	8.7

Total Weight of Particulate Collected, (mg) 436.5

	Sulfate	Acidity
Probe	_____ mg.	_____ meq. N_aOH
Filter	_____ mg.	_____ meq. N_aOH

VOLUME OF MOISTURE COLLECTED

		Final Volume (ml)	Initial Volume (ml)	Volumetric Gain (ml)
Impingers		272.5	200.0	72.5
Silica Gel	113	411.8	390.7	21.1

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AND BUREAU OF LABORATORIES

PARTICULATE STACK SAMPLING LABORATORY RESULTS

Plant LEHIGH CEMENT Completed 1/29/85

Facility Tested #2 KILN By S.D. Hafnell

Test Date 1/10/85

Run ID 1.10.85.1 # _____

WEIGHT OF PARTICULATE COLLECTED

Container		Final Weight (grams)	Initial Weight (grams)	Weight Gain (mg)
Probe	261	152.1824	152.0989	83.5
Filter	5	170.7884 169.7890	.9994 .6770	322.4
Cyclone	2	146.2934	146.2421	51.3
			Subtotal, (mg)	457.2
Water Soluble	13	147.7685	147.7636	4.9
Organics	2	134.9873	134.9838	3.5
Acetone Wash	53	134.5349	134.5297	5.2
			Subtotal, (mg)	13.6

Total Weight of Particulate Collected, (mg) 470.8

	Sulfate	Acidity
Probe	_____ mg.	_____ meq. N_aOH
Filter	_____ mg.	_____ meq. N_aOH

VOLUME OF MOISTURE COLLECTED

	Final Volume (ml)	Initial Volume (ml)	Volumetric Gain (ml)
Impingers	274.0	200.0	74.0
Silica Gel	400.0	387.5	12.5

start .015 / .007

ΔP fluctuating slightly

ΔP = .40

T_m = 50°F

T_s = 450°F

pt. no.	TIME (min)	DRY GAS METER Volume (acfd)	Temp (°F) in	Temp (°F) out	VELOCITY HEAD ΔP (in. H_2O)	(ΔP) ½ (in. H_2O)½	ORIFICE DIFFERENTIAL (IN H_2O) actual	desired	PUMP VAC. "Hg.	TEMPERATURES °F stack (5)	probe	oven (3)
1	0	908.228	36	36	.30	.548	←	1.40	4	469		269
2	3	910.04	39	35	.35	.592	←	1.65	4	469		273
3	6	911.94	43	36	.35	.592	←	1.65	4	468		274
4	9	913.86	48	35	.28	.529	←	1.30	4	468		275
5	12	915.66	50	36	.25	.500	←	1.15	4	468		265
6	15	917.38	53	36	.25	.500	←	1.15	4	464		261
7	18	919.09	55	37	.23	.480	←	1.10	3.5	461		262
8	21	920.79	57	39	.32	.566	←	1.50	4	444		269
9	24	922.65	59	38	.29	.539	←	1.35	4	444		271
10	27	924.53	61	40	.27	.520	←	1.25	4	448		273
11	30	926.34	62	41	.22	.469	←	1.0	3.5	406		275
12	33	928.02	63	40	.22	.469	←	1.0	3.5	410		266
1	36	929.635	60	41	.46	.678	←	2.10	5	455		263
2	39	931.81	62	41	.50	.707	←	2.30	5	458		270
3	42	934.08	65	43	.48	.693	←	2.20	5	462		253
4	45	936.35	67	42	.46	.678	←	2.10	5	463		269
5	48	938.59	68	43	.41	.640	←	1.90	5	462		266
6	51	940.77	70	45	.30	.548	←	1.40	4	463		275
7	54	942.75	70	47	.18	.424	←	.85	3.5	461		268
8	57	944.40	69	45	.16	.400	←	.75	3.5	460		266
9	60	945.87	67	44	.13	.361	←	.63	3	455		265
10	63	947.21	67	46	.13	.361	←	.63	3	451		272
11	66	948.50	66	44	.11	.332	←	.53	3	435		271
12	69	949.74	64	42	.11	.332	←	.53	3	430		244
	72	950.937	1421	972		12.458		31.42		1274		
TOT		42.709										
AVG.			49.9			.519		1.31		453		

1.309

OFFICE OF ENVIRONMENTAL PROGRAMS
AIR MANAGEMENT ADMINISTRATION
STACK SAMPLING DATA

Plant: Lehigh Cement
Source: No. 2 Kiln
Run ID: 1/8/85 Operators: DF DRFS
Start: 1100 Finish: 1217
Sampling for: Particulate
Pitobe ID: 5-1 Cp: .84
Meter Box: green Cm: .999 H@1.84
DGM ID: 593235 C Factor: .85
Filter ID: .6939 Noz. ID: .308
Baro. (in. Hg.): 29.85
Ambient °F: 30°
Psavg: (in. H_2O): -.51
(in. Hg): -.04
Avg. % CO_2: 6.5 % O_2: 13.25
Leak Rate (acfm): Pre .008 @15"Hg. Post .007 @5"Hg.
Duct Dimensions: 53"
Area: 15.32 ft²
Diameters Upstream: 3
Diameters Downstream: 8
Assumed H_2O (%): 12

CO_2	6.5	6.0	O_2	14.0	12.0
	6.5			13.5
	6.5			13.5
	7.0			14.0
	6.5			12.5

NOTES
CORRECTED MR. VOL 42.666

post. .062 / .055 / .007
leak ok

DHMH 1630

START 951.418 STOP 001.09
951.398 0.005 @ 3.5" Hg
0.02 @ 15" Hg.

CF=1.0 C2 [illegible]
Ref. ΔP 0.33 @ 450 °F STK / 0.308 Noz

pt. no.	TIME (min)	DRY GAS METER Volume (acfd)	Temp (°F) out in	Temp (°F) in out	VELOCITY HEAD ΔP (in. H_2O)	VELOCITY HEAD $(\Delta P)^{1/2}$ (in. $H_2O)^{1/2}$	ΔH ORIFICE DIFFERENTIAL (IN H_2O) actual	ΔH ORIFICE DIFFERENTIAL (IN H_2O) desired	PUMP VAC. "Hg.	TEMPERATURES °F stack	TEMPERATURES °F probe	TEMPERATURES °F oven
W												
1	0	951.324	41	38	.54	.735	←	3.0	2.0	449		253
2	3	54.10	55	39	.56	.748	←	3.1	"	452		267
3	6	56.93	59	"	.55	.742	←	3.05	"	452		263
4	9	59.70	62	"	.54	.735	←	3.0	"	454		272
5	12	62.51	65	38	.45	.671	←	2.5	"	"		276
6	15	64.93	"	"	.34	.583	←	1.92	"	455		266
7	18	67.25	"	"	.17	.412	←	0.97	1.0	"		273
8	21	68.81	64	40	.15	.387	←	0.86	"	453		269
9	24	70.33	"	"	.15	.387	←	0.86	"	450		266
10	27	71.99	63	39	.13	.361	←	0.75	"	443		274
11	30	73.20	62	37	.12	.346	←	0.70	"	* 272		267
12	33	74.54	61	38	.12	.346	←	0.70	"	*		271
W 1	36	76.02	55	40	.44	.663	←	2.45	2.0	460		248
2	39	78.31	60	41	.44	.663	←	2.45	"	461		256
3	42	80.85	64	40	.40	.632	←	2.25	"	462		255
4	45	83.25	67	41	.37	.608	←	2.05	1.5	463		258
5	48	85.55	"	"	.31	.557	←	1.75	"	464		248
6	51	87.46	"	40	.25	.500	←	1.40	"	"		258
7	54	89.54	68	41	.30	.548	←	1.70	2.0	459		267
8	57	91.71	"	39	.33	.574	←	1.85	"	453		261
9	60	93.89	67	"	.32	.566	←	1.80	"	448		263
10	63	96.02	68	40	.32	.566	←	1.80	"	446		257
11	66	98.25	"	"	.25	.500	←	1.40	1.5	442		254
12	69	000.15	"	41	.22	.469	←	1.24	"	* 393		259
	72	001.974				13299		43.55		9539		
TOT		50.65	1513	947				1.81				
AVG.			51.3			.554		1.81		454		

NOTES CORRECTED 2460
MR VOL 50.599
* NOT USED IN AVGS.

FYRITES
O_2 13.0 12.0 11.5
CO_2 7.0 6.0 5.5

DHMH 1630

OFFICE OF ENVIRONMENTAL PROGRAMS
AIR MANAGEMENT ADMINISTRATION
STACK SAMPLING DATA

Plant Lehigh Cement
Source NO. 2 Kiln
Run ID 1/9/85 Operators D.R.&F.S
Start 1155 Finish
Sampling for: Particulate
Pitobe ID 5-1 Cp .84
Meter Box GRE. Cm .999 H@ 1.84
DGM ID 593235 C Factor 1.0
Filter ID 6921 Noz. ID .308
Baro. (in. Hg.) 30.42
Ambient °F 20
Psavg: (in. H_2O) -0.60
(in. Hg) -0.04
Avg. % CO_2 6.2 % O_2 12.2
Leak Rate (acfm) Pre. .02 @15"Hg.
Post .005 @3.5"Hg.
Duct Dimensions
Area 15.32 ft^2
Diameters Upstream 3
Diameters Downstream 8
Assumed H_2O (%) 2

.104
Post .050
.054

pt. no.	TIME (min)	DRY GAS METER Volume (acfd)	Temp (°F) ① in	Temp (°F) ② out	VELOCITY HEAD ΔP (in. H_2O)	VELOCITY HEAD $(\Delta P)^{1/2}$ (in. $H_2O)^{1/2}$	ORIFICE DIFFERENTIAL (IN H_2O) actual	ORIFICE DIFFERENTIAL (IN H_2O) desired	PUMP VAC. "Hg.	TEMPERATURES °F stack ③	TEMPERATURES °F probe	TEMPERATURES °F oven ⑤
1	0	010.000	31	28	.37	.608	←	1.80	3	459		274
2	3	011.85	35	30	.38	.616	←	1.85	3	458		280
3	6	013.83	40	32	.35	.592	←	1.70	3	457		286
4	9	015.90	46	34	.31	.557	←	1.50	3	456		288
5	12	017.66	50	35	.26	.510	←	1.30	3	455		290
6	15	019.43	53	37	.24	.490	←	1.20	3	454		294
7	18	021.17	56	38	.27	.520	←	1.30	3	449		296
8	21	022.90	58	40	.29	.539	←	1.40	3	443		236
9	24	024.78	60	41	.30	.548	←	1.50	3	441		260
10	27	026.50	62	42	.31	.557	←	1.50	3	437		276
11	30	028.34	63	43	.24	.490	←	1.20	3	437		228
12	33	030.13	64	44	.23	.480	←	1.15	3	437		253
1	36	031.881	51	39	.46	.678	←	2.25	3	444		294
2	39	033.97	54	40	.52	.721	←	2.50	3	449		222
3	42	036.62	60	42	.46	.678	←	2.25	3	450		259
4	45	038.87	63	43	.41	.640	←	2.00	3	450		273
5	48	040.63	65	44	.41	.640	←	2.00	3	450		235
6	51	042.72	67	44	.29	.539	←	1.40	3	451		263
7	54	044.64	68	45	.29	.539	←	1.40	3	450		278
8	57	046.81	68	46	.15	.387	.70	.75	2 1/2	448		292
9	60	049.22	67	46	.14	.374	←	.71	2 1/2	444		220
10	63	050.73	67	46	.12	.346	.70	.61	2 1/2	444		251
11	66	052.18	67	47	.12	.346	.70	.61	2 1/2	444		256
12	69	053.12	67	47	.09	.300	.70	.46	2 1/2	444		263
	72	053.414	1382	973								
TOT	72	43.414	57	40		12.695	34.71	34.34		10751		
AVG.			48.5			.529	1.45	1.43		448		

OFFICE OF ENVIRONMENTAL PROGRAMS
AIR MANAGEMENT ADMINISTRATION
STACK SAMPLING DATA

Plant Lehigh Cement
Source No. 2 Kiln
Run ID 1-10-85 Operators DR FS
Start 1203 Finish
Sampling for: Particulate
Pitobe ID 5-1 Cp .84
Meter Box — Cm .999 H@ 1.84
DGM ID 593235C Factor .91
Filter ID .6770 Noz. ID .308
Baro. (in. Hg.) 30.41
Ambient °F 18
Psavg: (in. H_2O) -.47
(in. Hg)
Avg. % CO_2 6.5 % O_2 13.8
Leak Rate (acfm) Pre .017 @15"Hg.
Post .054 @ 3"Hg.
Duct Dimensions 53"
Area 15.32 ft.²
Diameters Upstream 3
Diameters Downstream 8
Assumed H_2O (%) ~~[illegible]~~ 8

NOTES Δp = .38
CORRECTED
MR. VOL.
DHMH 1630 43371

stack pres. .47

Dryer feed 28 ton/hr.
Kiln feed 20 ton/hr.

#2 Precipitator Readings-Lehigh Woodsboro

date/time	inlet field			outlet field		
	AC volts	AC amps	DC mA	AC volts	AC amps	DC mA
1/8						
10:55	133	34	180	153	31	190
11:10	133	34	180	150	31	190
11:20	132	34	175	151	31	190
11:30	130	33	175	151	31	190
11:40	130	33	170	150	31	190
11:50	133	34	175	152	31	190
12:00	132	33	177	150	31	190
12:10	133	34	175	152	31	190
averages	132	34	176	151	31	190
1/9						
11:55	137	34	175	160	32	195
12:05	135	34	175	160	32	195
12:15	137	34	175	162	32	197
12:25	137	34	175	160	32	195
12:35	137	34	170	160	32	190
12:45	137	34	172	162	32	195
12:55	137	34	175	157	32	190
1:05	137	34	177	160	32	195
1:15	135	34	170	157	32	190
averages	137	34	174	160	32	194
1/10						
12:00	125	30	160	152	31	190
12:10	125	31	157	150	31	190
12:20	126	30	160	150	31	185
12:30	127	30	160	152	31	190
12:40	130	31	160	157	31	190
12:50	130	31	160	157	31	193
1:00	130	31	165	160	31	195
1:10	127	31	160	158	31	190
1:20	130	31	160	157	31	190
averages	128	31	160	155	31	190

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
Air Management Administration
O'Conor Building
201 W. Preston Street
Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

Date 1-8-85

Time At Start Of Observation 11:00 am

Premise Name Lehigh Portland Cement (Woodsboro)

Address Woodsboro

County Frederick

Type of Installation Cement Plant

Color of Plume Brown

Point of Discharge #2 stack

Steam Plume ☐ None ☐ Attached ☐ Detached

Point of Observation 150 yds. C of stack

Sky Conditions Clear

Ambient Temperature 35°F

Wind Direction W-NW

Wind Speed 20-30 mph

Min \ Sec	0	15	30	45	Min \ Sec	0	15	30	45	Min \ Sec	0	15	30	45
0	10	10	10	10	20	15	15	20	20	40	15	15	10	10
1	10	15	15	15	21	20	20	15	15	41	10	10	10	20
2	20	20	15	15	22	10	15	15	15	42	20	20	10	10
3	15	10	10	10	23	15	15	15	15	43	10	10	10	10
4	15	15	15	15	24	20	20	20	15	44	10	10	15	15
5	20	20	20	20	25	15	20	20	10	45	15	15	20	10
6	20	20	15	10	26	10	10	20	10	46	15	15	15	10
7	10	10	10	10	27	10	10	15	15	47	10	10	10	10
8	10	10	10	10	28	10	10	15	15	48	10	15	15	20
9	10	10	10	10	29	20	20	15	15	49	10	10	10	10
10	10	10	10	10	30	10	10	20	20	50	10	10	10	10
11	10	10	10	10	31	20	10	10	20	51	5	10	10	10
12	10	10	10	15	32	25	20	20	15	52	10	10	10	5
13	10	10	15	15	33	15	15	20	20	53	5	10	10	10
14	10	10	10	10	34	15	15	15	15	54	10	5	10	10
15	15	10	10	20	35	15	10	15	15	55	10	15	15	10
16	15	15	15	10	36	15	15	15	20	56	10	10	15	10
17	10	10	15	15	37	20	20	20	20	57	10	10	10	10
18	15	15	10	10	38	15	15	10	10	58	10	10	10	10
19	10	10	10	15	39	15	15	20	20	59	10	10	10	10

Remarks: Sun located to left and rear of pt. of observation. Trees located behind stack were used as a background
(Stack Test in progress during these observations)

Name of Observer [illegible]

average 13.25

HMH 1841
AMA-10 Revised 10-1-81

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
Air Management Administration
O'Conor Building
201 W. Preston Street
Baltimore, Maryland 21201

REPORT OF OBSERVATION OF VISIBLE EMISSIONS

Date 1-9-95

Time At Start Of Observation 11:35 Am

Premise Name Lehigh Portland Cement (Woodsboro)

Address Woodsboro

County Frederick Co.

Type of Installation Cement Plant

Color of Plume Brown/yellow

Point of Discharge #2 Stack

Steam Plume ☑ None ☐ Attached ☐ Detached

Point of Observation Roof top of stack

Sky Conditions Clear

Ambient Temperature 25°F

Wind Direction Out of NW

Wind Speed 25 mph

Min \ Sec	0	15	30	45	Min \ Sec	0	15	30	45	Min \ Sec	0	15	30	45
0	15	15	15	10	20	20	20	20	20	40	15	15	15	15
1	10	10	15	10	21	20	20	15	10	41	10	10	10	10
2	10	15	15	15	22	10	10	15	15	42	10	10	10	10
3	15	20	15	15	23	10	10	15	10	43	15	15	10	15
4	10	10	10	10	24	15	15	10	10	44	20	15	15	15
5	10	15	10	15	25	10	10	10	15	45	15	10	10	10
6	20	10	10	10	26	0	0	10	5	46	15	15	10	15
7	10	10	15	15	27	10	10	15	15	47	15	15	15	10
8	10	10	20	10	28	15	15	10	10	48	10	10	10	10
9	15	15	15	15	29	5	10	10	10	49	10	10	10	10
10	15	20	15	10	30	10	10	10	10	50	10	15	20	15
11	15	20	10	10	31	10	10	10	15	51	15	15	15	15
12	15	10	10	20	32	10	10	10	10	52	20	10	15	10
13	15	20	25	20	33	10	15	15	10	53	10	15	15	20
14	10	20	20	15	34	10	10	10	15	54	15	15	20	20
15	10	10	10	10	35	15	15	15	15	55	10	15	10	10
16	15	15	10	15	36	10	15	15	20	56	10	15	15	15
17	15	10	20	20	37	15	10	10	15	57	20	20	15	15
18	20	20	20	20	38	15	10	15	10	58	15	15	15	25
19	20	20	25	25	39	10	10	10	10	59	20	20	20	20

Remarks: Sun located to left and rear of pt. of observation. Blue sky used as background. (Stack test in progress during these observations)

average 13.55

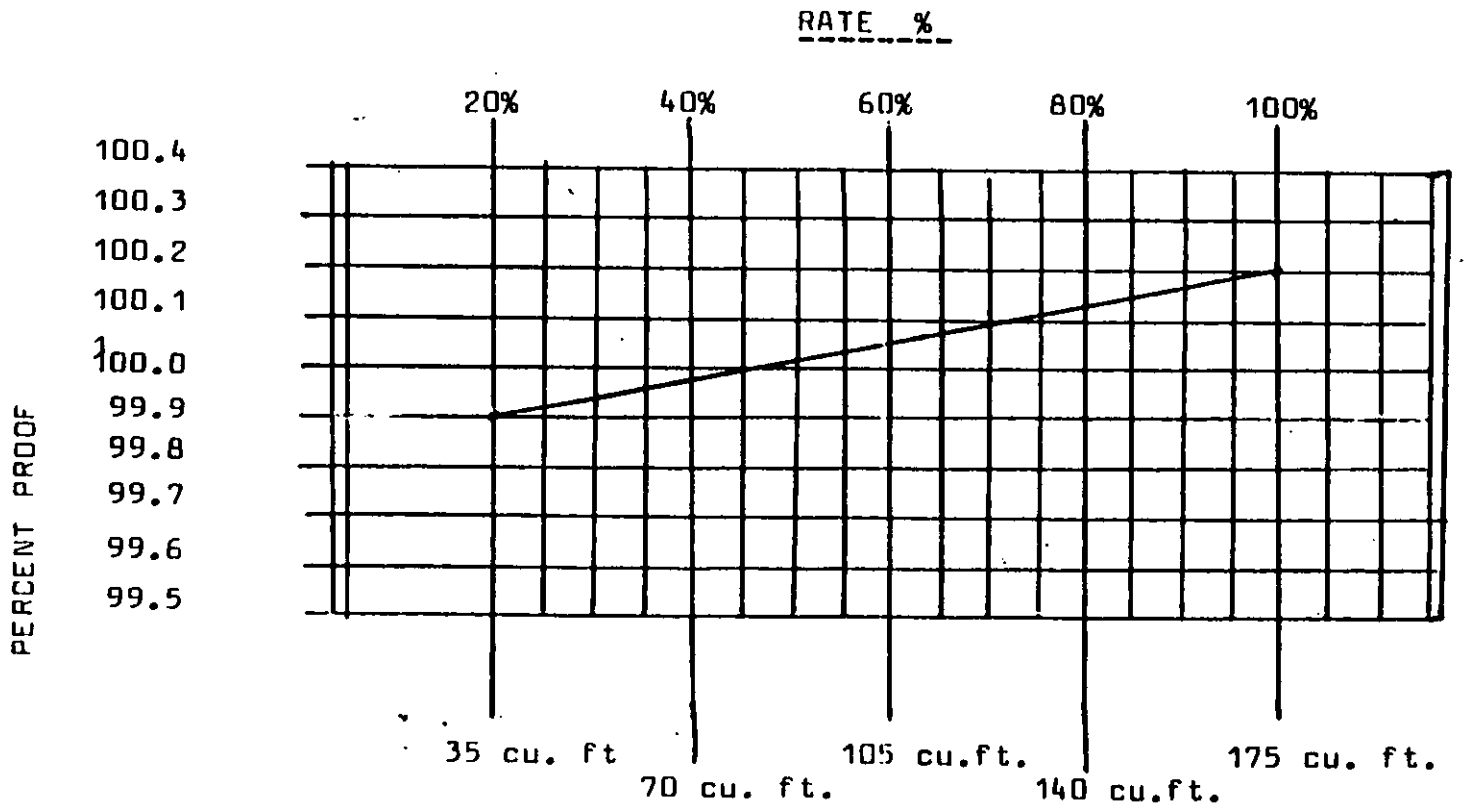
Name of Observer [illegible]

393-6776

DHMH 1001
AMA-10 Revised 10-1-91

UTILITIES & INDUSTRIES INC.

355 Main Street
P. O. Box 9
Reynoldsville, Pa. 15851
Ph. (814) 653-8269



meter number Rockwell #593235

date 7/4/84

MARYLAND STATE
AIR MANAGEMENT ADMINISTRATION

STACK SAMPLING PRELIMINARY SURVEY

I. General Information:

Plant Lehigh Woodsboro

Address Rt. 550 Woodsboro

Telephone _____ Survey Date _____

Source #2 kiln - lightweight agg plant

Contact(s):

Bob Lake Title plant manager Ext. _____

George Tucker Title _____ Ext. _____

Wilhelm Lotz Title _____ Ext. _____

Process Description (including type, operating schedule, feed composition and rates, production rate, maximum rated capacity, and type of fuel):

Air Pollution Control Equipment:

Notes:

MARYLAND STATE
AMA

PRELIMINARY SURVEY

Plant _____

Source _____

Survey Date _____

II. Stack Data:

Material of Construction . . . . . _____

Height of Sample Site from Ground Level, (ft). . . . . _____

Inside Cross Sectional Dimensions at Test Site . . . . . 53"

Inside Cross Sectional Area at Test Site, (ft^2). . . . . _____

Port Length, (in). 3 3/4

Straight Duct Distance Before Test Site (stack diameters). . . . 3

Straight Duct Distance After Test Site (stack diameters) 8

Number of Points to be Sampled 24

Point Identification:

57
− 3 3/4
53 1/4

MARYLAND STATE
AMA

PRELIMINARY SURVEY

Plant Lehigh Woodsboro

Source

Survey Date

III. Point Location

53"

Pt. No.	% of Diameter for Circular Stacks	Inches From Stack Wall	Inches From Previous Pt.
1	2.1	1 1/8	
2	6.7	3 1/2	
3	11.8	6 1/4	
4	17.7	9 3/8	
5	25.0	13 1/4	
6	35.5	18 7/8	
7	64.5	34 3/16	
8	75.0	39 3/4	
9	82.3	43 5/8	
10	88.2	46 3/4	
11	93.3	49 1/4	
12	97.9	51 7/8	

Calculated By:

Checked By:

MARYLAND STATE
AMA

PRELIMINARY SURVEY

Plant Lehigh - Woodsboro

Source #2 kiln stack

Survey Date 1/7/84

V. Velocity Traverse at Test Site:

Pitot Tube ID _____

Temperature Measuring ID dial

Pitot Tube Coefficient .84

Operator _____

-.56

Pt. No.	Port A ΔP (in. H_2O)	Port A Temp. (°F)	Port B ΔP (in. H_2O)	Port B Temp. (°F)	Port ____ ΔP (in. H_2O)	Port ____ Temp. (°F)	Port ____ ΔP (in. H_2O)	Port ____ Temp. (°F)
1	.12		.21					
2	.14		.30					
3	.16		.35					
4	.20	432	.35	470	⇒	451		
5	.18		.39					
6	.21		.37					
7	.32		.23					
8	.45		.24					
9	.47		.26					
10	.52		.31					
11	.54		.36					
12	.55		.31					
	3.86		3.68					
	.32		.31					
	.32							

MARYLAND STATE
AMA

PRELIMINARY SURVEY

Plant _____

Source _____

Survey Date _____

VI. Stack Gas Data at Test Site:

$\%CO_2$ _____ $\%O_2$ _____ $\%CO$ _____ $\%H_2O$ _____

Static Pressure: -.5 in. H_2O gauge = _____ in. Hg gauge

Minimum Velocity Pressure: .12 in. H_2O

Maximum Velocity Pressure: .55 in. H_2O

Average Velocity Pressure: .32 in. H_2O

Average Stack Temperature: 450 °F

VII. Notes: Recommended nozzle size: 5/16 in. -- Recommended sampling time per point: 3 min/pt. --

nozzle .306
.309
.308
.923 → .308

Survey by:

DRAFT/WP
d3006-4/971130
03/30/92 1

DATA PM : B
CO_2 : C (PYRITE)

REF 4 - 15
REF 15 (AP-42)

Emission Test Report
Review Checklist

Reviewer: R. MARINSHAW
Review Date: 11/18/92

A. Background Information

1. Facility name: LEHIGH PORTLAND CEMENT COMPANY

   Location: WOODSBORO, MD

2. Source category: LIGHTWEIGHT AGGREGATE

3. Test date: 1/8 - 1/10, 1985

4. Test sponsor: PLANT

5. Testing contractor: STATE OF MARYLAND ?

6. Purpose of test: COMPLIANCE

7. Pollutants measured

   (PM) PM-10 CO SO_2 NO_x VOC Pb (CO_2)

   Others (list):

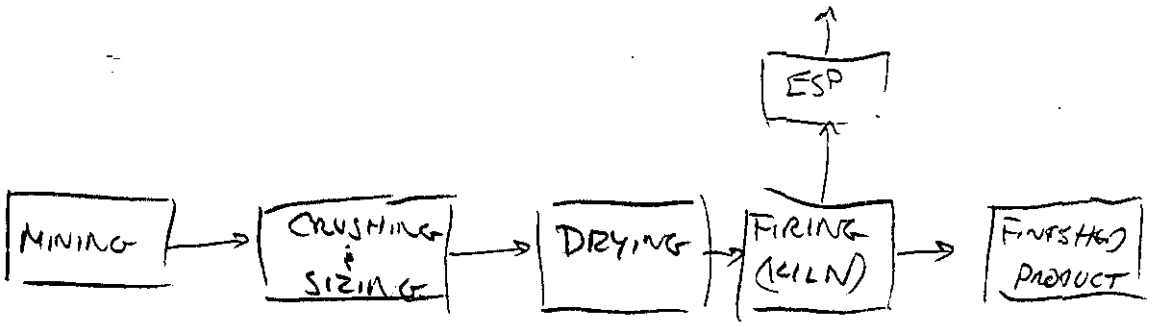
8. Process overview: On an attached page provide a block diagram of the unit operations and associated air pollution control systems at the facility. Identify process tested with letters from the beginning of the alphabet (A, B, C, etc.) and APC systems with letters from end of alphabet (V, W, X, etc.). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from that sketch complete the table below that identifies processes or unit operations tested.

Test ID	Process	Process ID	Emissions tested		APCD (controlled emissions only)
			Uncontrolled	Controlled	
1	KILN (COAL + NO. 2 OIL)	A		✓	ESP

B. Process Information

1. Provide a brief narrative description of the process. With as much detail as possible, (e.g., if a furnace or conveyor system is used, identify the type of unit) describe the equipment used for those operations tested. (Note: If process description provided in test report is adequate, attach copy or reproduce here.)

The Woodsboro plant of the Lehigh Portland Cement Company produces lightweight aggregate from shale quarried on site. The shale is crushed and sized, then fed to a rotary dryer to preheat the material and drive off moisture. After being screened to remove fines, the shale is fed to the kiln where it is heated to 2100°F, using No. 2 oil at an average rate of 14 gallons per hour and coal at an average rate of 3,060 lbs. per hour. Expansion of the shale takes place in the kiln.



2. For each process tested list feedstock materials and products. Indicate if activity factors are for feed (F) rate or product (P) rate.

Process ID	Feedstock materials	Products	Basis for activity factor	F/P
1	SHALE, NO 2 OIL, COAL	LWA	SHALE	F

Basis for data: ABSTRACT
(Indicate page/table Nos. in test report)

3. For each process or operation tested and each test run note process capacity and operating rate during test.

Process ID	Capacity	Units	Test run	Process rate	Units
			1	28 - (SHALE)	TONS/HR
			2	28 "	"
			3	28 "	"
			4		
			1	1.53 (COAL)	"
			2	"	"
			3	"	"
			4		
			1	14 (NO. 2 OIL)	GAL/HR
			2		
			3		
			4		
			1		
			2		
			3		
			4		

Basis for data: ABSTRACT

C. Air Pollution Control Systems Tested

1. For each air pollution control system pollution control system identified in A.8, note the following

ID	Type of APCD	Manufacturer	Model No.
2	ESP		

Note: Be as specific as possible in identifying APCD. For example, indicate "pulse jet fabric filter" rather than simply "fabric filter."

2. For each system identified above, provide a narrative description. For fugitive systems describe capture techniques as well as the removal techniques (use a separate page if necessary)

NO DATA

3. Using the attached parameter list for guidance complete the table below. (Use additional pages as needed.)

APCD ID	Parameter	Units	Readings			
			Run 1	Run 2	Run 3	Run 4
2	VOLTAGE	V	132	137	128	
Type of APCD:	CURRENT AC	A	34	34	31	
	CURRENT DC	mA	176	174	160	
ESP	OUTLET FIELD					
	VOLTAGE	V	151	160	155	
	CURRENT AC	A	31	32	31	
	" DC	mA	190	194	196	
Type of APCD:						
Type of APCD:						

NO DATA

D. Sampling and Analysis Methods

1. Complete the following table

Test location	Pollutant	S & A method	Reference/ conditional method	Deviations noted
1	PM	MARYLAND 1005 *	Y/(N)	Y/(N)
	CO_2	FYRITE	Y/(N)	Y/(N)
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N

* SAME AS EPA METHOD 5 EXCEPT
MIN. 50 ft^3 SAMPLE VOLUME REQ'D.
MIN. 3 MIN. SAMPLING @ EACH TRAVERSE POINT

2. If a method used was not a reference or conditional method, provide a narrative discussion including any data manipulation needed to make results correspond to reference or conditional method results.

SAME AS METHOD 5 EXCEPT THE MINIMUM SAMPLING VOLUME IS 50 ft^3 AND THE MINIMUM SAMPLING TIME / TRAVERSE POINT IS 3 MINUTES

3. Describe any deviations identified above.

NONE

E. Emission Data Documentation

1. Tabulate the following stack gas data from the test report. (Use additional pages as needed.)

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
	Stack temperature	°F	453	454	448	
	Moisture		8.6	7.8	8.3	
	Oxygen		13.3	12.2	13.8	
	Volumetric flow, actual					
	Volumetric flow, standard	SCFM	18847	20487	19494	
	Percent isokinetic		96.6	107.3	97.1	
	Pollutant concentration:					
	PM	gr/SCFD	0.12	0.12	0.15	
	CO_2	%	6.5	6.2	6.5	
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					

2. Tabulate pollutant mass flux rates

			Mass flux rates			
Test ID	Pollutant	Units	Run 1	Run 2	Run 3	Run 4
1	PM (FILT)	lbs/hr	18.7	21.7	25.6	
	CO_2	"	8446	8757	8735	

3. Present example emission factor calculations below.

PM (FILT.)

18.7/28 = 0.67
21.7/28 = 0.78
25.6/28 = 0.91
AVG = 0.79

PM (COND. INORG.)

(19.83 - 18.71)/28 = 0.040
(22.13 - 21.69)/28 = 0.016
(26.39 - 25.62)/28 = 0.028
AVG = 0.028

CO_2

8446/28 = 302
8757/28 = 313
8735/28 = 312
AVE = 309

4. Tabulate emission factors

Process	Pollutant	Units	Average emission factor	
			Uncontrolled	Controlled
1	PM (FILT)	lbs/ton		0.79
	CO_2	"	310	0.028
	PM (COND. ORG)	"		

ATTACHMENT A
APCD PARAMETERS

Type of APCD	Parameters
Fabric filter	Cleaning mechanism Bag type Cleaning frequency Air to cloth ratio (A/C) Pressure drop Inlet temperature
ESP	Type (wet or dry) Number of fields Rapping cycle (if dry) Specific Collection Area (SCA) Particulate resistivity (if known) Spark rate Current and power levels
Venturi (or other high energy) scrubber	Pressure drop Liquid/gas (L/G) ratio Mist eliminator type
Packed-bed scrubber	Packing depth L/G ratio Caustic use (Y/N) pH Mist eliminator type
Carbon absorber	Bed depth Superficial gas velocity Bed temperature Desorption mechanism (media) Flue-gas moisture Cycle length Time-on-line after breakthrough