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

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

AP-42 Section 11.6
Reference 34
Report Sect. 4
Reference 28

LONESTAR FLORIDA HOLDING, INC.

STACK TESTS FOR PARTICULATE, SO_2, NOX AND VISIBLE EMISSIONS

REPORT 810-S

KILN NO. 3

AUGUST 30, 1985

Source category: Portland Cement
Plant name : Lonestar Florida Holding, Inc.
Test date : 8/30/85
Process : wet

Date: 01/15/93
Location: Miami, FL
Ref. No.: 28
Basis for process rate : feed/production
Ratio: 1.53

Source	Type of control	Pollutant	Run No.	Emission rate, lb/hr	Process rate, ton/hr	Emission factor kg/Mg	Emission factor lb/ton	Volumetric flow rate, DSCFM	Concen ppm
rotary kiln (coal-fired)	ESP	BASED ON FEED RATE							
		filt. PM	1	17.25	133	0.0648	0.130		
		filt. PM	2	19.97	133	0.0751	0.150		
		filt. PM	3	22.47	133	0.0845	0.169		
		AVERAGE				0.0748	0.150	RATING:	B
		SO2	1	380.86	133	1.43	2.86		
		SO2	2	367.01	133	1.38	2.76		
		SO2	3	393.62	133	1.48	2.96		
		AVERAGE				1.43	2.86	RATING:	B
		NOx	1	548.53	133	2.06	4.12		
		NOx	2	592.98	133	2.23	4.46		
		NOx	3	601.61	133	2.26	4.52		
		AVERAGE				2.18	4.37	RATING:	B
		CO2	1	195,722	133	736	1,472	154,672	18.5
		CO2	2	182,677	133	687	1,374	148,373	18.0
		CO2	3	175,430	133	660	1,319	146,558	17.5
		AVERAGE				694	1,388	RATING:	B
rotary kiln (coal-fired)	ESP	BASED ON CLINKER PRODUCTION RATE							
		filt. PM	1	17.25	86.7	0.0995	0.199		
		filt. PM	2	19.97	86.7	0.115	0.230		
		filt. PM	3	22.47	86.7	0.130	0.259		
		AVERAGE				0.115	0.229	RATING:	B
		SO2	1	380.86	86.7	2.20	4.39		
		SO2	2	367.01	86.7	2.12	4.23		
		SO2	3	393.62	86.7	2.27	4.54		
		AVERAGE				2.19	4.39	RATING:	B
		NOx	1	548.53	86.7	3.16	6.33		
		NOx	2	592.98	86.7	3.42	6.84		
		NOx	3	601.61	86.7	3.47	6.94		
		AVERAGE				3.35	6.70	RATING:	B
		CO2	1	195,722	86.7	1,129	2,257	154,672	18.5
		CO2	2	182,677	86.7	1,053	2,107	148,373	18.0
		CO2	3	175,430	86.7	1,012	2,023	146,558	17.5
		AVERAGE				1,065	2,129	RATING:	B

Reference 54:
(1) Coal-fired, wet
Process kiln w/ ESP

Data Rating: 3

DA HOLDING, INC.

~~STACK TESTS FOR PARTICULATE~~ SO_2, NOX AND VISIBLE EMISSIONS

REPORT 810-S

KILN NO. 3

AUGUST 30, 1985

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APPENDICES

Appendix A - Field Data Sheets
Appendix B - Laboratory Data Sheets
Appendix C - Process Data
Appendix D - Chain of Custody
Appendix E - Calibration Data
Appendix F - Project Participants

CALCULATIONS

I. INTRODUCTION

Lonestar Florida Pennsuco, Inc. operates a portland cement plant located in Miami, Florida. On August 30, 1985, tests for particulate, sulfur dioxide, oxides of nitrogen and opacity were performed on the exhaust stack servicing Kiln No. 3.

The tests were performed in order to comply with the operating permit conditions set forth by the U. S. Environmental Protection Agency Permit No. PSD FL 050, and to determine compliance with Chapter 17-2 of the Florida Administrative Code.

During the testing period, records of the process data were maintained by plant personnel and are presented in Appendix C.

The tests for particulate, sulfur dioxide and oxides of nitrogen were performed simultaneously. The visible emission test was performed one-half hour between runs 1 and 2, and one-half hour between runs 2 and 3.

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

STACK TESTS FOR PARTICULATE, SO2, NOX AND OPACITY EMISSIONS

Lonestar Florida Holding, Inc.
Post Office Box 122035
Hialeah, Florida 33012

Type Process - Portland Cement Manufacturing

Abatement Device - Electrostatic Precipitator

Compliance Stack Test

Report 810-S

August 30, 1985

Run Numbers 1, 2 and 3

Particulate Allowable Emissions - 39.90 Lbs./hr.
Particulate Emission Rate - 19.90 Lbs./hr.

Sulfur Dioxide Allowable Emissions - 398.82 lbs./hr.
Sulfur Dioxide Emission Rate - 380.50 lbs./hr.

Oxides of Nitrogen Allowable Emissions - 586.95 lbs./hr.
Oxides of Nitrogen Emission Rate - 581.04 lbs./hr.

Allowable Opacity - <20%
Opacity - 0%

All testing and analysis was performed in accordance with the Florida Department of Environmental Regulation, Florida Administrative Code, Chapter 17-2.

I hereby certify that to my knowledge all data submitted in this report is true and correct.

W. Arlington

William D. Arlington
Project Director

II. ALLOWABLE EMISSION DETERMINATION

The allowable emissions were determined by applying the allowable emission rates specified in the U.S. Environmental Protection Agency Permit No. PSD FL 050 to the process rates.

Pollutant	Emission Limits Standard	Allowable Emissions lbs./hr.
* Particulate	0.30 lb/Ton	39.90
** Sulfur Dioxide	4.60 lb/Ton	398.82
** Oxides of Nitrogen	6.77 lb/Ton	586.95
Opacity	< 20%	20%

* Pounds of TSP per ton of feed
** Pounds of pollutant per ton of clinker produced

III. CYCLONIC FLOW DETERMINATION

Due to the configuration of the system, cyclonic flow was considered to be non-existent at the sampling site.

IV. SUMMARY OF RESULTS
REPORT 810-S

PARTICULATE

Run	Emission Rate lbs./hr.	Allowable Emission Rate lbs./hr.
1	17.25	39.90
2	19.97	39.90
3	22.47	39.90
Average	19.90	39.90

SULFUR DIOXIDE

Run	Emission Rate lbs./hr.	Allowable Emisison Rate lbs./hr.
1	380.86	398.82
2	367.01	398.82
3	393.62	398.82
Average	380.50	398.82

OXIDES OF NITROGEN

Run	Emission Rate lbs./hr.	Allowable Emission Rate lbs./hr.
1	548.53	586.95
2	592.98	586.95
3	601.61	586.95
Average	581.04	586.95

OPACITY

Emission Rate	Allowable Emissions
0%	< 20%

TEST RESULTS - PARTICULATE
REPORT NUMBER 810-S

	RUN 1	RUN 2	RUN 3
AREA(SQ.FT.)=	158.74	158.74	158.74
SAMPLE VOLUME(CU.FT.)=	53.6	49.13	48.4
WATER VAPOR(CU.FT.)=	19.64	18.32	18.15
SAMPLE MOISTURE(%)=	26.82	27.16	27.27
SATURATION MOISTURE(%)=	100	100	100
MOLECULAR WEIGHT=	27.7	27.61	27.54
VELOCITY(FPM)=	2186	2090	2083
TOTAL FLOW RATE(ACFM)=	347000	331720	330680
TOTAL FLOW RATE(SCFM-DRY)=	154672	148373	146558
CONCENTRATION(GR/DSCF)=	.013	.0157	.0179
EMISSION RATE(LBS/HR)=	17.25	19.97	22.47
% ISOKINETIC=	100.71	96.21	95.98

V. TEST RESULTS
OXIDES OF NITROGEN

VSC = SAMPLE VOLUME AT STANDARD CONDITIONS, DRY BASIS, ML.

M = MASS OF NOX AS NO2 IN GAS SAMPLE, MG.

C = CONCENTRATION OF NOX AS NO2, DRY BASIS, CORRECTED TO STANDARD CONDITIONS, LB./DSCF.

E = EMISSION RATE, LBS./HR.

RUN NO.	VSC	M	C	E
1	1748.7	1880.6	6.71E-05	603.68
2	1771.9	1817.4	6.4E-05	575.79
3	1811.9	1571.8	5.42E-05	486.98
4	1806.5	1698.1	5.87E-05	527.68
5	1763.5	1775.3	6.28E-05	565.13
6	1737.3	2041.9	7.34E-05	659.82
7	1731.8	1768.3	6.37E-05	573.2
8	1757.5	1796.4	6.38E-05	573.78
9	1775.9	1957.7	6.88E-05	618.85
10	1815	1971.8	6.78E-05	609.87
11	1783.4	1859.5	6.51E-05	585.34
12	1775.5	1873.5	6.59E-05	592.36
AVERAGE EMISSIONS				581.04

V. TEST RESULTS
SULFUR DIOXIDE

REPORT 810-S

$$WSO2 = K2(VT-VTB)N(VSOLN/VA)$$

$$CSO2 = (WSO2/VM)$$

$$E = CSO2 \times QS \times 60$$

WSO2 = SULFUR DIOXIDE CAPTURED IN SAMPLE, POUNDS

K2 = 7.061 X 10↑-5 LBS./MEG.

VT = VOLUME OF TITRANT (ML) SAMPLE

VTB = VOLUME OF TITRANT (ML) BLANK

N = NORMALITY OF TITRANT

VSOL = VOLUME OF SOLUTION

VA = VOLUME OF ALIQUOT TITRANTED

CSO2 = CONCENTRATION OF SULFUR DIOXIDE, (LB/DSCF)

VM = VOLUME AT THE METER (STD CU. FT.)

QS = VOLUMETRIC FLOW RATE (SCFM)

E = EMISSIONS (LBS./HR.)

BLANK (VTB) = .1

NORMALITY (N) = .011756

DATE	RUN	VT	VSOL	VA	VM	CSO2	QS	EMISSIONS
8-30-85	1	26.6	1000	10	53.6	4.1E-05	154672	380.86
8-30-85	2	24.5	1000	10	49.13	4.12E-05	148373	367.01
8-30-85	3	26.2	1000	10	48.4	4.48E-05	146558	393.62
AVERAGE EMISSION								380.5

VI. FIELD AND ANALYTICAL PROCEDURES
EPA METHOD 5
DETERMINATION OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES

This method is used in conjunction with Methods 1 through 4 and is applicable for the determination of Particulate Emissions from Stationary Sources.

SUMMARY

A gas sample is extracted isokinetically from the stack through a heated probe and filter. Particulate matter collected in the probe and on the filter and is measured gravemetrically. The mass of particulate matter includes any material that condenses at or above the specified temperature.

Volumetric flow rate, moisture and other pertinant parameters are determined simultaneous to particulate collection. Mass concentration and emission rate are then determined based on standard cubic feet of dry gas.

FIELD PROCEDURE

Stack dimensions are determined, including upstream and downstream distances. The number of sampling points and position of each point is layed out in accordance with Method 1. these positions are indicated in the report on the Sampling Point Determination Sheet.

The sampling train is assembled as depicted in the Diagram of Stack Sampling Equipment. Impingers are packed in ice to maintain a temperature of <70 degrees fahrenheit. in order to choose the appropriate nozzle size and K factor (sampling rate factor), assumptions are made of stack gas moisture, molecular weight and velocity (based on prior data or an initial traverse), A Cyclonic Flow Determination is performed, if required, according to Method 1.

A leak check of the sampling system and pitots is performed, correcting any leaks encountered.

After the appropriate warm-up of the heated components, the nozzle is unblocked and the probe inserted into the stack to the first sampling point. The pump is immediately turned on and the sampling rate adjusted to provide an isokinetic flow rate.

Each point is then sampled at an even interval of between two to five minutes, adjusting the flow rate and recording all indicated data on the Field Data Sheet.

A sample of the gas is extracted after leaving the orifice meter for analysis of CO_2, O_2 and CO, where applicable.

After all sampling points have been sampled, observing both minimum sampling time and sample volume as specified, the pump is shut off and the probe removed from the stack. A final leak check is performed on the system and the leakage rate recorded on the Field Data Sheet.

The probe and filter are removed from the sampling train to the clean-up area where all particulates are washed from the probe, nozzle and filter holder front half, and then sealed in a bottle marking the liquid level. The filter is removed and sealed in a separate container.

The impingers are removed from the ice bath, all moisture is measured volumetrically. The silica gel is removed and placed in a sealed plastic container.

The sampling procedure is then repeated twice more to provide three test runs per compliance test.

All samples, including a blank filter, are identified by report and run number or as a blank.

At the conclusion of the last test run a calibration check on the dry gas meter and orifice meter (Y/Yi) is performed. the result is logged on the Field Data Sheets.

LABORATORY PROCEDURES

Upon receipt of the samples, the liquid level is checked for any loss. These solutions are then quantatively transfered to pre-tared beakers and placed along with the filters in an oven at 105 degrees centigrade until dry, then placed in a desicator until cool and weighed to 0.1 mg.

The silica gel is weighed and reported to 0.1 gm.

Prior to field operations, all filters and beakers are pre-conditioned in the same manner as described above, numbered for identification, and weighed to the appropriate tolerance.

The silica gel is pre-dryed at 175 degrees centigrade, weighed to 200.0 g and placed in a sealed plastic bottle.

The balances are checked using Class-S Weights as specified in the U.S. EPA Quality Assurance Procedures.

Acetone residues are used as specified by the supplier (not to exceed .001%).

CALCULATIONS

All calculations are identical to those given in reference Methods 1 through 5.

FIELD SAMPLING EQUIPMENT

Probe Nozzle - 316 stainless steel, button hook configuration with sharp leading edge.

Probe - 316 stainless steel inner core wrapped with heating wire and insulation to maintain a temperature of 250 degrees fahrenheit.

Pitot Tube - Stainless steel, Type S, attached to the probe.

Filter Holder - Borosilicate glass with a stainless steel frit filter support and 28/15 joints attached directly to the probe.

Impingers - Glass with ball joint and glass U tube connectors connected in series. The first, third and fourth being modified Greenburg-Smith type. the second, Greenburg Smith with standard tip. the first and second impingers containing 100 mls. of distilled water, the third impinger left empty, and the fourth containing 200.0 g of silica gel.

Control Box - Contains a duel inclined manometer, Rockwell 175-S dry gas meter, orifice meter, vacuum gauge, thermocouples to measure the dry gas meter, impinger outlet, stack and filter temperatures, and the necessary tubing and valves to maintain leak-free sampling.

Pump - Sliding vane type, maintained leak free to move the sample gas through the system.

Thermocouple Probes - Copper constantan with stainless steel outer sheath. The stack thermocouple probe is attached directly to the main probe. The filter probe is inserted in the lower portion of the filter holder directly in the gas stream.

Umbilical Cord - Of sufficient length to connect the probe and filter to the control box and impingers, including all necessary wiring and tubing for temperature control, sample transfer, and pitot pressures. all tubing and fittings are leak-free.

Barometer - Aneroid type capable of measuring atmospheric pressure to plus or minus 0.1" hg.

Orsat Gas Analyzer - Capable of measuring CO_2, O_2 and CO to plus or minus 0.1%, maintained leak-free.

Fyrite Gas Analyzer - Used to determine CO_2 and O_2 when required for molecular weight determination and when Method 19 is not required. maintained leak-free.

*** All equipment is designed in accordance with "Maintenance, Calibration, and Operation of Source-Sampling Equipment," (APTD-0576).

CALIBRATION

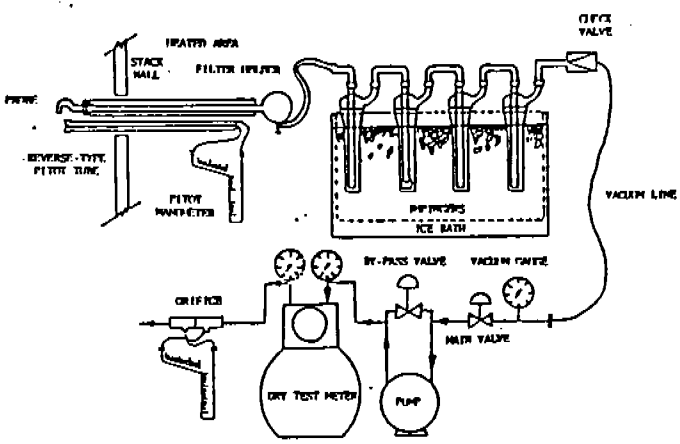
All equipment calibrations are performed in accordance with the procedures outlined in EPA - Quality Assurance Manual Volume III and logged in the Calibration Log Book.

Calibrations are performed periodically to comply with the frequency of calibrations specified by the State of Florida Department of Environmental Regulation and the appropriate reference method. Additional calibrations are performed whenever equipment is damaged.

The latest calibrations are included in this report.

*** The procedures described above are not to be considered as complete test procedures used, but as a general overview of the methods employed.

Diagram Method 5 Sampling Train



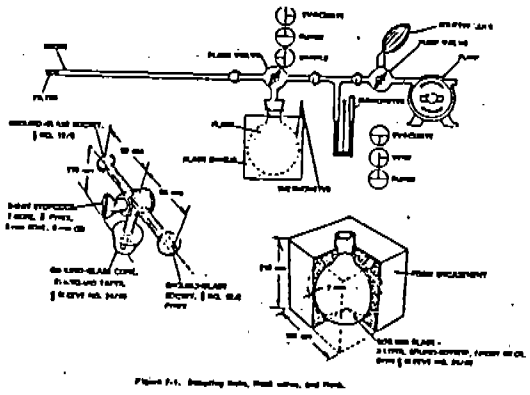
VI. FIELD AND ANALYTICAL PROCEDURES
EPA METHOD 6
DETERMINATION OF SULFUR DIOXIDE EMISSIONS FROM STATIONARY SOURCES

Determination of Sulfur Dioxide was accomplished by utilizing the option of simultaneous determination with Method 5. The water in the impingers was replaced with 3% H_2O_2 as specified in the reference method. Upon completion of each test run, the H_2O_2 solution was removed from the impingers, measured and diluted to one liter for analysis as descrubed in Method 6.

VI. FIELD AND ANALYTICAL PROCEDURES
EPA METHOD 7
DETERMINATION OF NITROGEN OXIDE EMISSIONS
FROM STATIONARY SOURCES

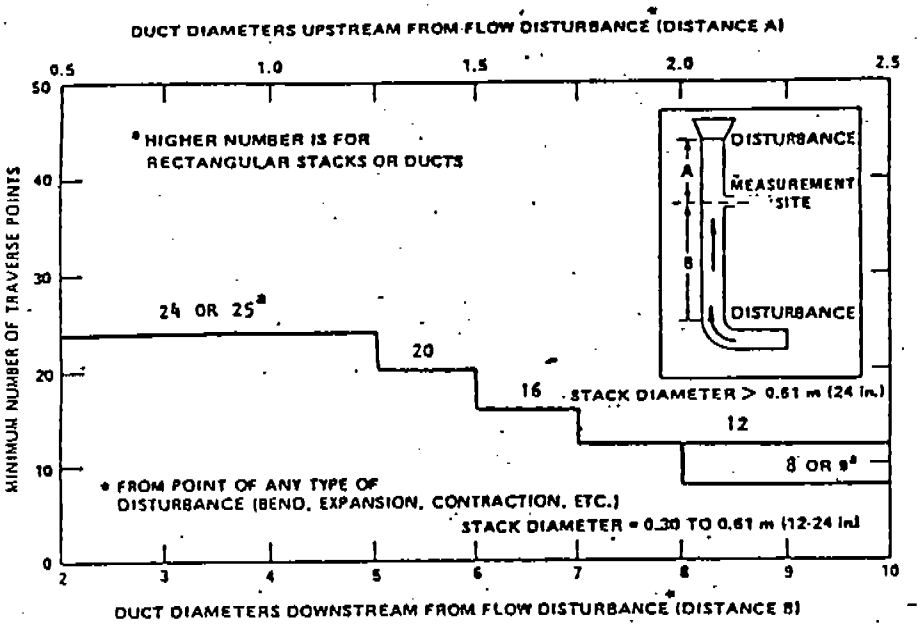
All laboratory and field procedures were performed in accordance with EPA Reference Method 7. Calibrations and Quality Assurance was performed as described in the EPA Quality Assurance Handbook III.

Nox Sampling Train



III-Appendix A-30

Sampling Point Determination



Circular Stacks

Number of points equal next higher multiple of four.

Rectangular Stacks

Number of traverse points	Subarea layout matrix
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5
30	6 x 5
36	6 x 6
42	7 x 6
49	7 x 7

II. SAMPLING POINT DETERMINATION

CIRCULAR STACK

AMETER =	170.6 IN.
STANCE A =	444 IN.
STANCE B =	1248 IN.
NO.OF SAMPLING POINTS	36
NO.OF PORTS	3
WALL	28 IN.

INT LOCATION ON A TRAVERSE

POINT NO.	IN.TO WALL
1	29.8
2	33.5
3	37.4
4	41.5
5	45.9
6	50.5
7	55.6
8	61.1
9	67.2
10	74.4
11	83.1
12	95.9

* NOTE:THREE PORTS USED AS PER AGREEMENT WITH E.P.A.

SUMMARY OF FIELD AND LABORATORY DATA
REPORT NUMBER 810-S

	RUN 1	RUN 2	RUN 3
DATE	8-30-85	8-30-85	8-30-85
START TIME	0845	1047	1253
STOP TIME	1003	1206	1414
CP FACTOR	.827	.827	.827
	.9991	.9991	.9991
Y/YI	.9868	.9868	.9868
HA	1.737	1.737	1.737
DIAMETER OF NOZZLE-DN(IN)	.373	.373	.373
DIAMETER OF STACK-DS(IN)	170.6	170.6	170.6
NO. STACKS	1	1	1
STATIC PRES.-SP(IN H2O)	-.34	-.34	-.34
BAROMETRIC PRES.-PB(IN HG)	30.12	30.12	30.12
TEST TIME-O(MIN.)	72	72	72
METER VOLUME-VM(CU.FT.)	54.38	50.61	50.31
DGR.↑P	.504	.483	.479
ORFICE PRES.-↑H(IN.H2O)	1.97	1.728	1.7
AVG.METER TEMP.-TM(DEG.F)	81.14	89.19	94.03
AVG.STACK TEMP.-TS(DEG.F)	411.6	404.5	411.22
TOTAL PARTICULATE WT.-TPW(GM)	.0452	.05	.0561
WATER COLLECTED-WC(ML)	417.3	389.2	385.5
% CO2	18.5	18	17.5
O2	7.5	8	8
% N2	74	74	74.5
MOLECULAR WT.-MD(DRY)	31.26	31.2	31.12
SATURATION MOISTURE-SM(%)	100	100	100

APPENDIX A

Field Data Sheets

PARTICULATE FIELD DATA

REPORT 810.5.1 ASSUMED MOISTURE % 25 Cp .827 (25) DIAMETER 170.6 METERED VOL. 54.38

DATE 8-30-85 DRY GAS METER NO. 4 Y .9991 NO. DUCT 1 AVE. $\sqrt{\Delta p}$ .504

OPERATOR GA PROBE TIP DIA., IN. 3/8 A Y/Y_i .9868 STATIC PRES. -.34 AVG. ΔH 1.97

TIME 0845-1003 WET BULB TEMP. ____ ΔHa 1.737 BAR. PRES. "in. Hg" 30.12 AVG. METER TEMP. 81.14

K FACTOR 7.69 POST LEAK CHECK 000 ccm @ 30" Dn .3730 TEST TIME 72 AVG. STACK TEMP. 411.6

Lonestar - Kiln No. 3 CO_2 - 18.5 O_2 - 7.5

POINT	IN FROM WALL	SAMPLING TIME	DRY GAS METER CU. FT.	PITOT MANOMETER (Δp) in. H_2O Δp	$\sqrt{\Delta p}$	ORIFICE MANOMETER (ΔH)	DRY GAS TEMP. °F	PUMP VACUUM "in. Hg"	IMPINGER	FILTER TEMP. °F	STACK TEMP. °F
East Port			41.83 START								
1	29.8	20 min	43.15	.19		1.46	79	10	55	218	405
2	33.5		44.42	.23		1.77	80	12	50	220	410
3	37.4		45.81	.22		1.69	79	12	48	222	410
4	41.5		47.10	.24		1.85	80	12	48	227	410
5	45.9		48.61	.25		1.92	80	13	48	229	414
6	50.5		50.35	.28		2.15	80	13	51	230	414
7	55.6		52.13	.29		2.23	80	13	51	228	412
8	61.1		53.82	.28		2.15	80	12	53	227	413
9	67.2		55.41	.28		2.15	80	12	53	225	414
10	74.4		56.92	.28		2.15	80	12	54	232	413
11	83.1		58.47	.28		2.15	80	12	53	242	413
12	95.9		60.17	.27		2.07	80	11	53	250	413
	—	—	—	—	—	—	—	—	—	—	—
1	29.8	20 min	61.42	.12		.92	80	7	55	233	380
2	33.5		62.42	.17		1.31	80	7	54	240	378
3	37.4		63.79	.21		1.61	80	9	53	240	406
4	41.5		65.18	.27		2.08	80	10	53	240	417
5	45.9		66.71	.29		2.23	80	11	53	235	417
6	50.5		68.22	.31		2.38	81	11	53	234	418
7	55.6		69.91	.30		2.31	81	12	54	238	418
8	61.1		71.52	.31		2.39	82	12	54	239	418
9	67.2		73.12	.30		2.31	82	12	54	243	415
10	74.4		74.78	.30		2.31	82	12	55	252	416
11	83.1		76.32	.28		2.15	82	12	54	257	418
12	95.9		78.22	.27		2.08	82	13			

PARTICULATE FIELD DATA

REPORT 5105-1 ASSUMED MOISTURE % _____ Cp _____ DIAMETER _____ METERED VOL. _____

DATE 8-30-85 DRY GAS METER NO. _____ Y _____ NO. DUCT _____ AVE. $\sqrt{\Delta p}$ _____

OPERATOR [illegible] PROBE TIP DIA., IN. _____ Y/Y_i _____ STATIC PRES. _____ AVG. ΔH _____

TIME 0910 WET BULB TEMP. _____ ΔHa _____ BAR. PRES. "in. Hg" _____ AVG. METER TEMP. _____

K FACTOR 1.69 POST LEAK CHECK _____ Dn _____ TEST TIME _____ AVG. STACK TEMP. _____

POINT	IN FROM WALL	SAMPLING TIME	DRY GAS METER CU. FT. START	PITOT MANOMETER (Δp) In. H_2O Δp	$\sqrt{\Delta p}$	ORIFICE MANOMETER (ΔH)	DRY GAS TEMP. °F	PUMP VACUUM "in. Hg"	IMPINGER	FILTER TEMP. °F	STACK TEMP. °F
1		2.5 min	80.07	.18		1.38	82	10	62	232	402
2	S		81.36	.21		1.61	82	10	57	243	413
3			82.71	.24		1.85	82	10	57	229	414
4	A		84.07	.27		2.07	82	15	57	236	415
5			85.72	.27		2.08	82	15	57	231	415
6	B		87.72	.27		2.08	83	15	57	232	415
7			88.72	.27		2.08	83	15	56	228	414
8	A		90.27	.26		1.99	83	16	56	231	414
9			91.71	.27		2.07	83	16	56	235	414
10			93.16	.27		2.07	83	16	57	248	414
11			94.69	.25		1.92	83	16	57	255	414
12			96.21	.25		1.92	83	16	58	264	414

PARTICULATE FIELD DATA

REPORT 810522 ASSUMED MOISTURE % .27 Cp .827 (28) DIAMETER 170.6 METERED VOL. 50.61

DATE 8-30-85 DRY GAS METER NO. 4 Y .9991 NO. DUCT 1 AVE. $\sqrt{\Delta p}$ .483

OPERATOR [illegible] PROBE TIP DIA., IN. 3/8A Y/Y_i .9868 STATIC PRES. -.34 AVG. ΔH 1.728

TIME 1047-1206 WET BULB TEMP. ____ ΔHa 1.737 BAR. PRES. "in. Hg" 30.12 AVG. METER TEMP. 89.19

K FACTOR ~~[illegible]~~ 7.32 POST LEAK CHECK [illegible] 20" Dn .373 TEST TIME ~~[illegible]~~ 72 AVG. STACK TEMP. 404.5

CO_2 - 18.0 O_2 - 8.0

POINT	IN FROM WALL	SAMPLING TIME	DRY GAS METER CU. FT. 96.66 START	PITOT MANOMETER (Δp) in. H_2O Δp	$\sqrt{\Delta p}$	ORIFICE MANOMETER (ΔH)	DRY GAS TEMP. °F	PUMP VACUUM "in. Hg"	IMPINGER	FILTER TEMP. °F	STACK TEMP. °F
1		20 min	97.85	.14		1.02	88	9	68	193	395
2	S		99.00	.15		1.10	87	10	68	213	353
3			100.21	.19		1.39	87	11	67	225	402
4	A		101.57	.22		1.61	87	11	66	227	412
5			102.87	.19		1.39	87	12	67	227	418
6	M		104.42	.27		1.97	87	14	67	227	418
7			105.72	.28		2.05	88	14	66	227	415
8	Σ		107.24	.27		1.98	88	15	66	223	415
9			108.72	.27		1.98	88	15	65	237	415
10			110.20	.27		1.98	88	15	66	240	414
11			111.62	.26		1.90	88	15	66	260	424
12			113.20	.26		1.90	88	15	66	259	420
	—	—	—	—	—	—	—	—	—	—	—
1		20 min	114.22	.11		.81	89	8	68	240	309
2	S		115.22	.17		1.24	88	8	67	249	350
3			116.52	.22		1.61	89	10	67	245	414
4	A		117.93	.26		1.90	89	13	66	246	417
5			119.42	.28		2.05	89	13	66	243	418
6	M		121.00	.30		2.20	90	15	66	242	419
7			122.72	.31		2.27	90	16	66	240	417
8	Σ		124.41	.29		2.12	90	16	66	238	418
9			126.11	.29		2.12	90	16	66	238	417
10			127.71	.28		2.05	90	14	65	238	417
11			129.36	.28		2.05	90	15	65	242	421
12			130.90	.25		1.83	90	12	65	243	421

PARTICULATE FIELD DATA

REPORT 5105-2 ASSUMED MOISTURE % _____ Cp _____ DIAMETER _____ METERED VOL. _____

DATE 5-30-85 DRY GAS METER NO. _____ Y _____ NO. DUCT _____ AVE. $\sqrt{\Delta p}$ _____

OPERATOR [illegible] PROBE TIP DIA., IN. _____ Y/Y_i _____ STATIC PRES. _____ AVG. ΔH _____

TIME 1141 WET BULB TEMP. _____ ΔHa _____ BAR. PRES. "in. Hg" _____ AVG. METER TEMP. _____

K FACTOR 1.350 POST LEAK CHECK _____ Dn _____ TEST TIME _____ AVG. STACK TEMP. _____

POINT	IN FROM WALL	SAMPLING TIME	DRY GAS METER CU. FT. START	PITOT MANOMETER (Δp) in. H_2O Δp	$\sqrt{\Delta p}$	ORIFICE MANOMETER (ΔH)	DRY GAS TEMP. °F	PUMP VACUUM "in. Hg"	IMPINGER	FILTER TEMP. °F	STACK TEMP. °F
1		2.5 min	132.02	.14		1.02	90	7	67	228	354
2	S		133.21	.14		1.02	90	7	67	226	390
3			134.39	.19		1.39	90	9	67	235	412
4	A		135.62	.22		1.61	90	9	66	228	414
5			136.99	.22		1.61	90	9	66	230	415
6	B		138.47	.24		1.90	90	10	65	228	414
7			139.916	.25		1.83	91	11	64	230	414
8	E		141.31	.25		1.83	91	11	65	231	414
9			142.91	.26		1.90	91	11	65	232	414
10			144.31	.26		1.90	91	11	64	249	413
11			145.81	.25		1.83	91	12	64	250	417
12			147.27	.25		1.83	91	12	64	252	422

PARTICULATE FIELD DATA

REPORT 810.5.3 ASSUMED MOISTURE % 25 Cp .827 (P2) DIAMETER 170.6 METERED VOL. 50.31

DATE 8-30-85 DRY GAS METER NO. 4 Y .9991 NO. DUCT 1 AVE. $\sqrt{\Delta p}$ .479

OPERATOR [illegible] PROBE TIP DIA., IN. 3/8 A Y/Y_i .9868 STATIC PRES. -.34 AVG. ΔH 1.700

TIME 1253 1414 WET BULB TEMP. ΔHa 1.737 BAR. PRES. "in. Hg" 30.12 AVG. METER TEMP. 94.03

K FACTOR 7.32 POST LEAK CHECK 000 CFM @ 23" Dn .3730 TEST TIME 72 AVG. STACK TEMP. 411.2

CO_2 - 17.5 O_2 8.0

POINT	IN FROM WALL	SAMPLING TIME	DRY GAS METER CU. FT. 147.61 START	PITOT MANOMETER (Δp) in. H_2O Δp	$\sqrt{\Delta p}$	ORIFICE MANOMETER (ΔH)	DRY GAS TEMP. °F	PUMP VACUUM "in. Hg"	IMPINGER	FILTER TEMP. °F	STACK TEMP. °F
1		2 Ø min	148.72	.11		.81	94	7	69	225	345
2	S		149.91	.17		1.25	94	8	64	228	388
3			151.19	.20		1.46	93	9	62	229	409
4	A		152.61	.24		1.76	94	10	62	229	418
5			154.02	.24		1.76	93	11	63	229	415
6	M		155.51	.25		1.83	93	12	63	229	416
7			157.01	.26		1.90	93	12	64	236	416
8	Σ		158.42	.26		1.90	93	12	64	242	415
9			159.91	.26		1.90	93	13	65	248	414
10			161.42	.25		1.83	93	13	64	255	417
11			162.92	.25		1.83	93	13	64	260	417
12			164.42	.24		1.76	93	13	65	265	416
	—	—	—	—	—	—	—	—	—	—	—
1		2 Ø min	165.70	.14		1.02	94	9	68	250	377
2	S		166.78	.18		1.32	94	9	66	259	399
3			168.11	.23		1.68	94	10	65	254	416
4	A		169.51	.24		1.76	94	11	65	254	416
5			171.01	.27		1.98	94	14	65	250	418
6	M		172.52	.28		2.05	94	15	65	248	418
7			174.11	.29		2.12	94	15	65	249	418
8	Σ		175.61	.27		1.98	94	15	66	251	417
9			177.02	.28		2.05	94	15	65	253	416
10			178.61	.27		1.98	94	15	66	256	416
11			180.22	.27		1.98	95	15	65	258	416
12			181.73	.25		1.83	94	15	65	263	419

8/8

PARTICULATE FIELD DATA

REPORT 810-5-3 ASSUMED MOISTURE % _____ Cp _____ DIAMETER _____ METERED VOL. _____

DATE 3-30-25 DRY GAS METER NO. _____ Y _____ NO. DUCT _____ AVE. $\sqrt{\Delta p}$ _____

OPERATOR SA PROBE TIP DIA., IN. _____ Y/Y_i _____ STATIC PRES. _____ AVG. Δ H _____

TIME 1342 WET BULB TEMP. _____ Δ Ha _____ BAR. PRES. "in. Hg" _____ AVG. METER TEMP. _____

K FACTOR 1.32 POST LEAK CHECK _____ Dn _____ TEST TIME _____ AVG. STACK TEMP. _____

POINT	IN FROM WALL	SAMPLING TIME	DRY GAS METER CU. FT. START	PITOT MANOMETER (Δp) in. H_2O Δp	$\sqrt{\Delta p}$	ORIFICE MANOMETER (ΔH)	DRY GAS TEMP. °F	PUMP VACUUM "in. Hg"	IMPINGER	FILTER TEMP. °F	STACK TEMP. °F
1		20min	182.50	.14		1.02	95	8	68	225	413
2	S		183.60	.17		1.24	94	9	66	246	411
3			184.82	.18		1.32	94	9	65	250	413
4	A		186.12	.20		1.46	95	9	65	246	412
5			187.51	.24		1.76	95	10	64	246	414
6	M		188.92	.24		1.76	94	11	64	247	414
7			190.41	.25		1.82	95	11	64	241	413
8	S		191.91	.25		1.83	95	11	63	243	412
9			193.42	.26		1.90	95	13	63	243	413
10			194.89	.25		1.83	95	14	61	256	421
11			196.33	.25		1.83	95	14	61	258	418
12			197.91	.23		1.68	95	14	61	262	418

OXIDES OF NITROGEN

FIELD DATA

REPORT 810-5 OPERATOR WA SAMPLE LOCATION FAN OUTLET

DATE 8-30-85 INSTALLATION KILN #3 BAROMETRIC PRESSURE 30.12

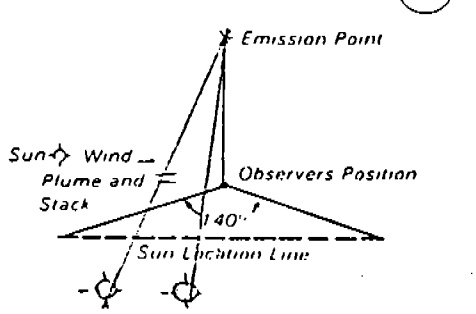
SAMPLE NUMBER	FLASK & VALVE NUMBER	SAMPLE TIME	PROBE TEMPERATURE	LEG A_i	LEG B_i	INITIAL PRESSURE	INITIAL TEMPERATURE
1	1	0857	410	31.4	2.4	1.12	82°F
2	2	0917	406	31.4	2.4	1.12	82°F
3	3	0938	414	31.4	2.4	1.12	83°F
4	4	0957	414	31.4	2.5	1.22	85°F
5	5	1104	415	31.4	2.4	1.12	86°F
6	6	1121	417	31.3	2.5	1.42	88°F
7	7	1137	417	31.3	2.7	1.52	89°F
8	8	1155	413	31.4	2.5	1.22	90°F
9	9	1305	416	31.4	2.6	1.32	90°F
10	10	1322	416	31.4	2.6	1.32	90°F
11	11	1340	419	31.3	2.7	1.52	90°F
12	12	1359	414	31.3	2.7	1.52	91°F
Blank	13	1420	91	31.3	2.7	1.52	91°F

South Florida Environmental Services, Inc.

8211-6 Bama Lane West Palm Beach, Florida 33406 305 / 793-4481

SOURCE NAME	Lorillard Florida Holding Inc
ADDRESS	Greenlake Road
	Hialeah Florida
CITY	Miami
STATE	Fla
ZIP	
PHONE	823-8000
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Cigarette Manufacturer
OPERATING MODE	
CONTROL EQUIPMENT	Precipitators
OPERATING MODE	
DESCRIBE EMISSION POINT	START Circular Stack STOP Same
HEIGHT ABOVE GROUND LEVEL	START 200' STOP —
HEIGHT RELATIVE TO OBSERVER	START 180' STOP 180'
DISTANCE FROM OBSERVER	START 180' STOP 180'
DIRECTION FROM OBSERVER	START 270° STOP 270°
DESCRIBE EMISSIONS	START None STOP None
EMISSION COLOR	START None STOP
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☑ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 5' Above stack STOP Same
DESCRIBE BACKGROUND	START Blue/White Clouds STOP Gray Sky
BACKGROUND COLOR	START Blue/White STOP
SKY CONDITIONS	START Partly Cloudy STOP Same
WIND SPEED	START 0-10 STOP 0-10
WIND DIRECTION	START SW STOP SW
AMBIENT TEMP	START STOP
WET BULB TEMP	
RH,percent	

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
Aug 30 1985		1245

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE	0 % WERE 0
RANGE OF OPACITY READINGS	0 MINIMUM 0 MAXIMUM
OBSERVER'S NAME (PRINT)	Olivia Jane Arlington
OBSERVER'S SIGNATURE	Olivia T. Arlington
DATE	8-30-85
ORGANIZATION	S.F. Environmental Services, Inc
CERTIFIED BY	ETA
DATE	March 15, 1985
VERIFIED BY	
DATE	

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

DATE

APPENDIX B

Laboratory Data Sheets

LABORATORY DATA

REPORT NUMBER 810-S-1 DATE 9-03-85

FILTER NUMBER 2284

FINAL WEIGHT	.3932 GRAMS
TARE WEIGHT	.3744 GRAMS
DIFFERENCE	.0188 GRAMS

BEAKER NUMBER 21

FINAL WEIGHT	97.4881 GRAMS
TARE WEIGHT	97.4597 GRAMS
DIFFERENCE	.0284 GRAMS

FILTER BLANK NO 2314

FINAL WEIGHT	.3628 GRAMS
TARE WEIGHT	.3626 GRAMS
DIFFERENCE	2E-04 GRAMS

WASH DOWN BLANK

VOLUME OF RINSE	200 MLS
SOLUTION RESIDUE	1E-05 GR/ML
TOTAL RESIDUE	2E-03 GRAMS

TOTAL PARTICULATE WEIGHT .0452 GRAMS

WATER COLLECTED

TOTAL WATER	599 MLS
INITIAL WATER	200 MLS
FINAL SILICA	218.3 GRAMS
INITIAL SILICA	200 GRAMS

TOTAL WATER COLLECTED 417.3 MLS

ANALYST

LABORATORY DATA

REPORT NUMBER 810-S-2 DATE 9-03-85

FILTER NUMBER 2285

FINAL WEIGHT	.3945 GRAMS
TARE WEIGHT	.3835 GRAMS
DIFFERENCE	.011 GRAMS

BEAKER NUMBER 22

FINAL WEIGHT	83.6946 GRAMS
TARE WEIGHT	83.6541 GRAMS
DIFFERENCE	.0405 GRAMS

FILTER BLANK NO 2314

FINAL WEIGHT	.3628 GRAMS
TARE WEIGHT	.3626 GRAMS
DIFFERENCE	2E-04 GRAMS

WASH DOWN BLANK

VOLUME OF RINSE	150 MLS
SOLUTION RESIDUE	1E-05 GR/ML
TOTAL RESIDUE	1.5E-03 GRAMS

TOTAL PARTICULATE WEIGHT .05 GRAMS

WATER COLLECTED

TOTAL WATER	576 MLS
INITIAL WATER	200 MLS
FINAL SILICA	213.2 GRAMS
INITIAL SILICA	200 GRAMS

TOTAL WATER COLLECTED 389.2 MLS

ANALYST

LABORATORY DATA

REPORT NUMBER 810-S-3 DATE 9-03-85

FILTER NUMBER 2286

FINAL WEIGHT	.386 GRAMS
TARE WEIGHT	.3815 GRAMS
DIFFERENCE	4.5E-03 GRAMS

BEAKER NUMBER 23

FINAL WEIGHT	103.7174 GRAMS
TARE WEIGHT	103.664 GRAMS
DIFFERENCE	.0534 GRAMS

FILTER BLANK NO 2314

FINAL WEIGHT	.3628 GRAMS
TARE WEIGHT	.3626 GRAMS
DIFFERENCE	2E-04 GRAMS

WASH DOWN BLANK

VOLUME OF RINSE	175 MLS
SOLUTION RESIDUE	1E-05 GR/ML
TOTAL RESIDUE	1.8E-03 GRAMS

TOTAL PARTICULATE WEIGHT .0561 GRAMS

WATER COLLECTED

TOTAL WATER	572 MLS
INITIAL WATER	200 MLS
FINAL SILICA	213.5 GRAMS
INITIAL SILICA	200 GRAMS

TOTAL WATER COLLECTED 385.5 MLS

ANALYST GA

OXIDES OF NITROGEN

LABORATORY DATA

REPORT 810-5 ANALYST [illegible] kc 701.7

DATE 8-31-85 BAROMETRIC PRESSURE 30.16 Ph ADJUSTMENT MADE Yes

SAMPLE NUMBER	FLASK & VALVE NUMBER	TIME	LEG A_f	LEG B_f	FINAL PRESSURE P_f	FINAL TEMPERATURE T_f	FLASK VOLUME V_f	ABSORBANCE A	DILUTION FACTOR f
1	1	1330	15.6	18.4	27.36	77	2053	.268	5
2	2	1332	15.8	18.2	27.76		2049	.259	
3	3	1334	16.1	17.9	28.36		2049	.224	
4	4	1336	16.1	17.9	28.36		2050	.242	
5	5	1338	15.7	18.3	27.56		2054	.253	
6	6	1340	15.7	18.3	27.56		2048	.291	
7	7	1342	15.7	18.3	27.56		2047	.252	
8	8	1344	15.7	18.3	27.56		2054	.256	
9	9	1346	15.9	18.1	27.96		2052	.279	
10	10	1348	16.2	17.8	28.56		2051	.281	
11	11	1350	16.1	17.9	28.36		2045	.265	
12	12	1352	16.0	18.0	28.16		2051	.267	
Blank	13	1354	16.1	17.9	28.36		2048	0	

STANDARD SOLUTION AND CONTROL SAMPLE ANALYTICAL DATA FORM

Plant Longstar

Date 8-31-85

Analyst WA

Optimum Wavelength 404 nm

Blank used as reference? yes

Sample Number	Sample, Mg	Working solution	Control sample	Measured, absorbance OD	Calculated absorbance[a], OD	Absorbance comparison error, b%
A1	100	x		.145	--	--
A2	200	x		.298	--	--
A3	300	x		.423	--	--
A4	400	x		.566	--	--
S1	100		x	.143		
S2	200		x	.295		
S3	300		x	.420		
						Avg[c]

$$K_c = 100\left[\frac{A_1+2A_2+3A_3+4A_4}{A_1^2+A_2^2+A_3^2+A_4^2}\right] = 701.7.$$

[a] Calculated absorbance: OD = (mg)/K_c i.e., S1 calculated absorbance = 100/K_c

[b] Absorbance Comparison errors:

$$\% = 100 \times \frac{\text{(measured absorbance, OD)} - \text{(calculated absorbance, OD)}}{\text{calculated absorbance, OD}}$$

[c] Average of absolute values.

APPENDIX C

Process Data

PROCESS DATA

COMPANY Lonestar Florida INSTALLATION Kiln No 3

DATE 8-30-85 REPORT NO. 8105

TYPE OF INSTALLATION Cement Manufacture

TYPE OF MATERIAL PROCESSED Cement - Lime Slurry

TYPE(S) OF FUEL USED Coal

TYPE OF POLLUTION CONTROL SYSTEM Electrostatic Precipitator

GENERAL CONDITION OF CONTROL EQUIPMENT Normal

	NORMAL	RUN 1	RUN 2	RUN 3
FUEL USED T/hr	14-16	15.2	15.15	15.0
SCRUBBER WATER FLOW RATE	n/a	n/a	n/a	n/a
PRESSURE DROP (INCHES)	NA	NA	NA	NA
TOTAL OPERATING CURRENT	- See	attached -		
MATERIALS PROCESSED	132	133	133	133

COMPANY REPRESENTATIVE _____

TITLE _____

	Run #1	Run #2	Run #3
AY - FRIDAY - AUGUST 30, 1985			
IME	8:45AM 10:03AM	10:49AM 12:07PM	12:55PM 2:15PM
YPE OF FUEL	COAL	COAL	COAL
UEL FEED RATE (TPH)	15.2	15.15	15.0
ULFUR CONTENT OF FUEL	1.82	1.77	1.76
ILN FEED RATE (TPH)	133	133	133
ULFUR CONTENT OF KILN FEED SO_3	0.14	0.15	0.18
XYGEN CONTENT OF FLUE GASES	1.9	1.9	1.9
LINKER PRODUCTION RATE (TPH)	86.7	86.7	86.7

A S PRECIPITATOR POWER

[redacted]5	.6	.7	.8	.9	.10	.11	.12	.13	
[redacted]0	340	250	300	50	290	275	130	260	VOLT
[redacted]0	150	110	120	150	200	200	150	200	AM
[redacted]0	700	350	420	700	1000	1020	460	1040	M.AM
40	345	250	300	50	290	275	130	260	VOL
[redacted]0	150	110	125	150	200	200	150	200	AMP
[redacted]0	700	350	420	700	1000	1020	460	1040	M.A
40	340	250	300	50	295	270	130	260	VOLT
[redacted]	150	110	110	150	200	200	150	200	AMP
40	700	350	420	700	1010	1020	460	1070	M.AM
[redacted]0	340	250	300	50	290	275	130	260	VOLT
[redacted]	150	110	125	150	200	200	155	200	AMP
40	750	350	420	700	1000	1020	470	1070	M.A
[redacted]0	340	250	300	50	290	275	130	255	VOLT
40	150	110	125	145	200	200	160	190	AMPS
[redacted]0	700	350	420	680	1000	1020	465	1020	M.AM
[redacted]0	340	250	300	50	290	275	130	255	VOLT
40	150	110	130	145	200	200	160	190	AMP
[redacted]	750	350	420	680	1020	1040	470	1020	M.AM
[redacted]0	340	250	300	50	290	275	130	255	VOLT
[redacted]	145	110	130	140	200	200	160	190	AMPS
[redacted]0	650	350	430	680	1020	1020	470	1020	M.AM
40	340	250	300	50	290	275	130	255	VOLT
[redacted]	140	110	130	140	200	210	160	200	AMPS
[redacted]0	650	350	440	670	980	1040	480	1040	M.AM
240	340	250	300	50	285	275	135	255	VOLT
[redacted]	150	100	130	140	200	210	160	200	AMP
[redacted]0	700	350	450	660	1020	1040	480	1040	M.A
40	345	250	300	50	290	275	135	255	VOLT
[redacted]	155	100	125	140	200	215	160	200	AMPS
40	750	350	440	650	1000	1040	480	1050	

K 3 PRECIPITATOR POWER

.5	.6	.7	.8	.9	.10	.11	.12	.13	
[redacted]40	330	250	300	50	285	275	135	260	VOLT
[redacted]0	135	100	130	135	200	200	160	200	AMP
[redacted]0	600	350	450	640	1020	1040	480	1050	M.A.
[redacted]	340	250	300	50	290	270	130	250	VOLT
[redacted]40	125	100	110	145	200	200	150	200	AMP
[redacted]0	600	350	450	650	1000	1040	500	1040	M.A.
240	340	250	300	50	290	275	130	250	VOLT
[redacted]0	125	100	120	140	200	200	150	200	AMP
[redacted]0	700	300	420	650	1000	1040	500	1040	M.A.
[redacted]40	345	250	300	50	290	280	135	255	VOLT
[redacted]0	150	100	120	140	200	210	160	190	AMP
120	700	300	410	640	980	1040	480	1040	M.A.
[redacted]40	350	250	300	50	290	275	135	255	VOLT
[redacted]0	160	90	125	140	195	210	160	190	AMPS
[redacted]20	750	300	420	650	1000	1040	480	1020	M.A.
[redacted]40	350	250	300	50	290	275	135	260	VOLT
40	160	95	125	140	200	210	160	190	AMP
[redacted]0	800	300	420	650	1000	1040	500	1020	M.A.
[redacted]40	350	250	300	50	290	280	135	255	VOLT
[redacted]0	160	90	125	140	200	200	160	190	AMPS
[redacted]40	600	300	420	650	980	1020	480	1020	M.A.
[redacted]40	350	250	300	50	290	275	135	255	VOLT
[redacted]40	160	100	130	140	200	200	160	190	AMPS
[redacted]0	800	350	420	660	980	1040	480	1020	M.A.
240	345	250	300	50	290	275	135	255	VOLT
[redacted]0	155	95	130	140	200	210	160	190	AMP
[redacted]20	750	350	420	660	980	1040	480	1020	M.A.
240	345	255	300	50	290	280	135	255	VOLT
[redacted]0	150	90	130	150	190	210	160	190	AMPS
120	600	300	420	670	970	1040	480	1020	M.A.

.5	.6	.7	.8	.9	.10	.11	.12	.13	
240	350	250	300	50	290	275	135	255	VOLT
40	170	90	130	140	200	210	160	190	AMP
120	800	300	420	660	980	1040	480	1000	M.A.
40	340	250	300	50	290	280	130	250	VOL
0	140	90	110	140	200	200	150	195	AMP
100	650	300	410	650	1000	1020	500	1000	M.A.
210	340	250	300	50	290	290	130	250	VOLT
40	140	90	115	140	200	200	160	190	AMP
100	650	300	420	650	1000	1040	500	1000	M.A.
									VOLT
									AMP
									M.A.
									VOLT
									AMPS
									M.AM
									VOLT
									AMP
									M.A.
									VOLT
									AMPS
									M.AM
									VOLT
									AMPS
									MAM
									VOLT
									AMP
									M.A.
									VOLT
									AMPS
									M.AM

APPENDIX D

Chain of Custody

CHAIN OF CUSTODY

NAME [illegible] DATE 8/30/85

REPORT NO. 810-5 TIME 1500

REASON FOR CUSTODY sample Clean-up and analysis of SO_2 + NO_x

DISPOSITION

NAME Faye Barber DATE Aug. 30, 1985

REPORT NO. 810-5 TIME 1030

REASON FOR CUSTODY transport to lab - laboratory analysis of particulate sample

DISPOSITION

NAME DATE

REPORT NO. TIME

REASON FOR CUSTODY

DISPOSITION

NAME DATE

REPORT NO. TIME

REASON FOR CUSTODY

DISPOSITION

APPENDIX E

Calibration Data

DRY GAS METER CALIBRATION

Meter No. 4
November 1, 1984
Barometric Pressure 30.10

								Semi-Annual Check
ΔH (in. H2O)	0.1	0.3	0.5	1.0	2.0	4.0	8.0	2.0
CFw	2.49	2.49	4.98	4.98	9.92	9.99	10.10	9.79
CFd	2.50	2.50	5.00	5.00	10.00	10.00	10.00	10.00
Tw °F	86	86	87	87	87	87	87	82
Td °F	88	87	88	89	91	94	96	94
Time (min.)	13.17	7.64	12.12	8.72	12.51	8.94	6.43	12.37
Y	.9994	.9971	.9966	.9972	.9944	1.0020	1.0069	.9958
ΔHa	1.60	1.62	1.70	1.76	1.82	1.82	1.84	1.58

Average Y = .9991 Average ΔHa = 1.737

THERMOCOUPLE CALIBRATION

Calibrated September 30, 1984

	TC#1	TC #2	ASTM
Ice Bath	33 °F	31 °F	32 °F
Boiling Water	213 °F	211 °F	212 °F
Hot Oil	483 °F	480 °F	482 °F

BAROMETER CALIBRATION

Calibrated September 30, 1984 Aneroid - 30.04 Mercury - 30.04

PITOT CALIBRATION

Calibrated September 30, 1984 Pitot No. 8

	Run 1	Run 2	Run 3
ΔP STD (in. H2O)	.29	.30	.31
ΔPs (in. H2O) - Side A	.42	.43	.44
Side B	.42	.42	.43
CpS	.823	.827	.831
Deviation	.004	0	.004

Average CpS .827

NOZZLE CALIBRATION

Calibrated 8/30/85 3/8A = .373. .373, .373, .373 = .3730

APPENDIX F

Project Participants

PROJECT PARTICIPANTS

SOUTH FLORIDA ENVIRONMENTAL SERVICES, INC.

William D. Arlington	Project Director
R. L. Chartier	Field Techician
Kaye Barker	Laboratory Analyst

Lonestar Florida Holding, Inc.

A.L. Chiles, Jr.	Manager of Engineering and Projects

Calculations

NOMENCLATURE FOR CALCULATIONS

AS - AREA OF STACK
NS - NUMBER OF STACKS
Y - METER CORRECTION FACTOR
PB - BAROMETRIC PRESSURE
TM - METER TEMPERATURE (F)
WC - WATER COLLECTED
SM - SATURATION MOISTURE
PS - PRESSURE AT STACK
SP - STATIC PRESSURE
VS - VELOCITY OF STACK
TS - TEMPERATURE OF STACK
I - ISOKINETIC
AN - AREA OF THE NOZZLE
CS - CONC. OF POLLUTANT
DN - DIAMETER OF THE NOZZLE
O - TIME IN MINUTES
ND - NITROGEN
CD - CARBON DIOXIDE
OD - OXYGEN
CM - CARBON DIOXIDE
VP - VAPOR PRESSURE
P - VELOCITY HEAD OF STACK GAS, (INCHES H2O)

DS - DIAMETER OF STACK
Z - METER VOLUME AT STANDARD CONDITIONS
VM - METER VOLUME AT TEST CONDITIONS
H - ^H
VW - WATER VAPOR
IM - SAMPLE MOISTURE
BWS - MOISTURE USED IN CALCULATIONS
MS - MOLECULAR WEIGHT OF STACK GAS
MD - MOLECULAR WEIGHT OF DRY GAS
CP - PITOT TUBE COEFFICIENT
SQR - SQUARE ROOT
PW - TOTAL PARTICULATE WEIGHT
Q - VOLUMETRIC FLOW RATE (ACTUAL)
QS - VOLUMETRIC FLOW RATE (STD. COND.)
SX - SIDE 1 OF RECTANGULAR STACK
SY - SIDE 2 OF RECTANGULAR STACK
PMR - POLLUTANT MASS RATE
VP - VAPOR PRESSURE
SV - SAMPLE VOLUME
F - F-FACTOR EMISSIONS

```
REM  : PRE-CALCULATIONS
2405 ND(I) = 100-(CD(I)+OD(I)+CM(I))
2410 MD(I) = (CD(I)*.44)+(OD(I)*.32)+(CM(I)*.28)+(ND(I)*.28)
2415 AN(I) = ((DN(I)/24)^2)*3.1416
2420 TS = TS(I)
2430 SM(I) = 100*VP/(PB(I)+(SP/13.6))
2435 IF SM(I)>100 THEN SM(I) = 100
REM  : PRE-ROUND-OFF
2445 MX(I) = INT(MD(I)*100+.5)/100)
2450 SX(I) = INT(SM(I)*100+.5)/100)
REM  : CALCULATIONS
3245 FOR I = 1 TO R
3250 AS(I) = NS*(SX*SY)/144
3255 IF AS(I)<>O THEN 3265
3260 AS(I) = (DS/24)^2*3.1416*NS
3265 PS(I) = PB(I)+(SP/13.6)
3270 SV(I) = 17.64*Y*VM(I)*(PB(I);H(I)/13.6)/(TM(I)+460)
3275 VW(I) = .04707*WC(I)
3280 IM(I) = 100*VW(I)/(VW(I)+SV(I))
3285 IF IM(I)< =SM(I) THEN GOTO 3300
3290 BWS(I) = SM(I)/100
3295 GOTO 3305
3300 BWS(I) = IM(I)/100
3305 MS(I) = (MD(I)*(1-BWS(I)))+(18*BWS(I))
3310 VS(I) = 85.49*CP*60*P(I)*SQR((TS(I)+460)/(PS(I)*MS(I)))
3315 Q(I) = AS(I)*VS(I)
3320 QS(I) = 17.64 * Q(I)*PS(I)*(1-BWS(I))/(TS(I)+460)
3325 CS(I) = 15.43 * PW(I)/SV(I)
3330 PMR(I) = CS(I)*QS(I)*60/7000
3335 F(I) = PW(I)*424.45/(SV(I)*(20.9-OD(I)))
3340 I(I) = .0945*(TS(I)+460)*SV(I)*60/(PS(I)*VS(I)*AN(I)*O(I)*(1-BWS(I)))
3355 NEXT I
```

OXIDES OF NITROGEN

NOMENCLATURE AND CALCULATIONS

A - ABSORBANCE OF SAMPLE

C - CONCENTRATION OF NOX AS NO2, DRY BASIS, CORRECTED TO STANDARD CONDITIONS. LB./DSCF

F - DILUTION FACTOR (IE;25/5, 25/10, ETC) REQUIRED ONLY IF SAMPLE DILUTION WAS NEEDED TO REDUCE THE ABSORBANCE TO THE RANGE OF CALIBRATION

KC - SPECTROPHOTOMETER CALIBRATION FACTOR

M - MASS OF NOX AS NO2 IN GAS SAMPLE, MG

PF - VOLUMETRIC FLOW RATE, DSCF

PI - INITIAL ABSOLUTE PRESSURE OF FLASK, K ('R)

PSTD - STANDARD ABSOLUTE PRESSURE, 760 MM (29.92 IN.) HG.

TF - FINAL ABSOLUTE TEMPERATURE OF FLASK K ('R)

TI - INITIAL ABSOLUTE TEMPERATURE OF FLASK, K ('R)

TSTD - STANDARD ABSOLUTE TEMPERATURE, 293K (528'R)

VSC - SAMPLE VOLUME AT STANDARD CONDITIONS, DRY BASIS, ML

VF - VOLUME OF FLASK AND VALVE, ML.

VA - VOLUME OF ABSORBING SOLUTION, 25 ML.

E - EMISSION RATE, LBS./HR.

Q - VOLUMETRIC FLOW RATE, DSCF

CALCULATIONS

VS = 17.64 X (VF-25) X ((PF/(TF+460))-(PA/(TA+460))
M = 2 X KC X A X F
C = .00006243 X M/VS
E = 60 X Q X C