AP42 Section:	11.20
Reference:	10
Title:	Summary Of Particulate Matter Emission Measurements, No. 5 Kiln Outlet, Florida Solite Corporation, Green Cove Springs, Florida, Sholtes and Koogler Environmental Consultants, Gainesville, FL, June 19, 1981.

AP-42 Section 11.20
Reference 10
Report Sect. 4
Reference 8

Received from State of Florida
Dept. of Environmental Regulation,
October 22, 1981.

SUMMARY OF

PARTICULATE MATTER EMISSION MEASUREMENTS

NO. 5 KILN OUTLET

FLORIDA SOLITE CORPORATION
GREEN COVE SPRINGS, FLORIDA

JUNE 19, 1981

Mis Cover in Ref 2.

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS
1213 NW 6TH STREET
GAINESVILLE, FLORIDA 32601
904/377-5822

SHOLTES & KOOGLER

TABLE OF CONTENTS

To the best of my knowledge, all applicable field and analytical procedures comply with FDER requirements and all test data and plant operating data are true and correct.

Signature

July 3, 1981
Date

1.0 INTRODUCTION

The Florida Solite Corporation own and operate a mining and material processing facility located near Green Cove Springs, Florida. The material that is mined is a clay mineral which is then dried into a lightweight, very strong aggregate called solite.

On June 19, 1981 Sholtes & Koogler Environmental Consultants (SKEC) of Gainesville, Florida conducted particulate matter emission measurements on the scrubber outlet stack serving the No. 5 kiln. The purpose of the testing was to satisfy provisos attached to the air pollution operating permit for this source. The provisos state that this source shall be tested annually for total particulte matter emissions.

Prior to the test data, the regional office of the Florida Department of Environmental Regulation in Jacksonville, Florida, was notified of the test schedule. All testing and analytical procedures were Method 5 as outlined in Chapter 17-2, Florida Administrative code.

During the period of testing the process weight rate to the dryer was 15.23 tons/hour. The breakdown of material is as shown in Table 1 of this report. The allowable particulate matter mass emission rate corresponding to this process wieght rate (Chapter 17-2, Florida Administrative Code) is ~~19.4~~ 16.1 pounds/hour. The actual average measured mass emission rate of particulate matter was 13.4 pounds/hour. Thus, it can be noted that during the period of testing, this plant was well in compliance with guidelines and emission regulations set forth by FDER and the Florida Administrative Code.

Run 1. 9 #/hr.
Run 2 14 #/hr
Run 3 13 #/hr.

1.8 Tons Coal / hr.
+ 13.43 Tons Clay (dry) / hr.
15.23

2.0 PROCESS DESCRIPTION

Clay is mined mechanically and transported to the process site utilizing earthmovers. The clay is then mechanically transported to the rotary type kilns where it is expended by burning coal, coke or oil to form a strong lightweight aggregate. The aggregate is used in building construction and septic tank base throughout the southeast.

Particulate matter emissions from the kiln consist of small particles being carried by the combustion gases as they are exhausted from the dryer. The gases leaving the dryer pass through a two stage mechanical collector, then through a wet scrubber, separator, and are then discharged to the atmosphere through a 36" diameter stack with a height of approximately 100' above grade.

TABLE 1

PROCESS WEIGHT DETERMINATION

NO. 5 KILN

FLORIDA SOLITE CORPORATION

JUNE 19, 1981

39,504 pounds of material/hour to dryer at 32.0 percent H_2O

3,600 pounds per hour coke

Product contains 0 percent H_2O

39,504 x 0.680 = 26,863 13.4 tph

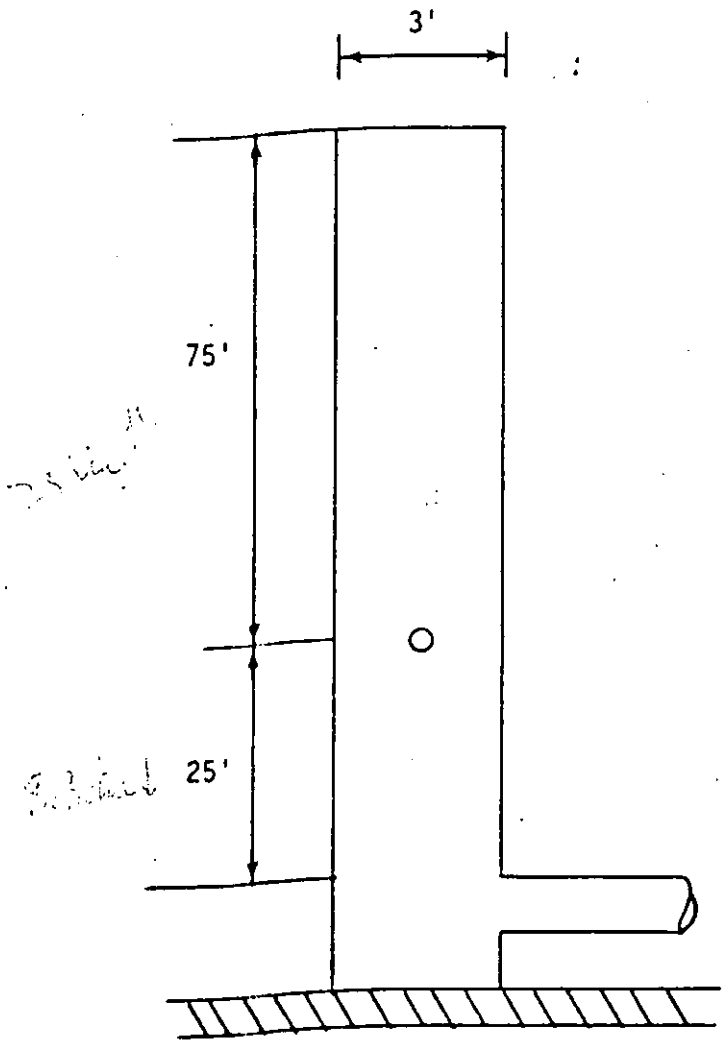
\+ 3,600

TOTAL FEED 30,463 pounds per hour = 15.23 tons/hr

Do not include coke.

3.0 SAMPLING POINT LOCATION

Two sampling ports are located in the 36" diameter stack 25' above the duct leading from the separator to the stack and approximately 75' below the outlet of the stack. The two points are 90° adjacent to one another. Using criteria established by FDER, it was determined that a minimum of number of points be sampled, thus, 12 total points or 6 on each traverse. Figure 1 is a schematic diagram of a sampling point location and a table of sampling point distances.



Sampling Point Distances

Point No.	Inches Inside Stack Wall
1	1.6
2	5.3
3	10.6
4	25.4
5	30.7
6	34.4

FIGURE 1

SAMPLING POINT LOCATIONS
NO. 5 KILN OUTLET
FLORIDA SOLITE CORPORATION
GREEN COVE SPRINGS, FLORIDA

4.0 FIELD AND ANALYTICAL PROCEDURES

Particulate matter samples were collected by the particulate matter emission measurement method adopted by the FDER in October, 1980. A schematic diagram of the sampling train used is shown in Figure 2. All particulate matter captured from the nozzle to and including the filter was included in the calculation of the emission rate of particulate matter.

Preparation of Equipment

1. Filters - Gelman type "A" filters were placed in a drying oven for two hours at 105°C, removed, and placed in a standard glass desiccator containing indicating silica gel and allowed to cool for two hours, and then weighed to the nearest 0.1 mg.

2. Nozzle, Filter Holder and Sampling Probe - The nozzle, filter holder and sampling probe were washed vigorously with soapy water and brushes, then rinsed with acetone and distilled water and dried prior to the test program. All openings on the sampling equipment were sealed while in transit to the test site.

3. Impingers - The Greenburg-Smith impingers were cleaned with a warm soapy water solution and brushes, then were rinsed with distilled water and acetone and dried. The impingers were sealed tightly during transit.

Test Procedure

Prior to performing the actual particulate matter sample runs, certain stack and stack gas parameters had to be determined. These preliminary data included the average temperature, velocity head, and moisture content, plus the stack dimensions at the point where the tests were being performed.

The stack gas temperature was determined by using an electronic thermocouple with instant readout.

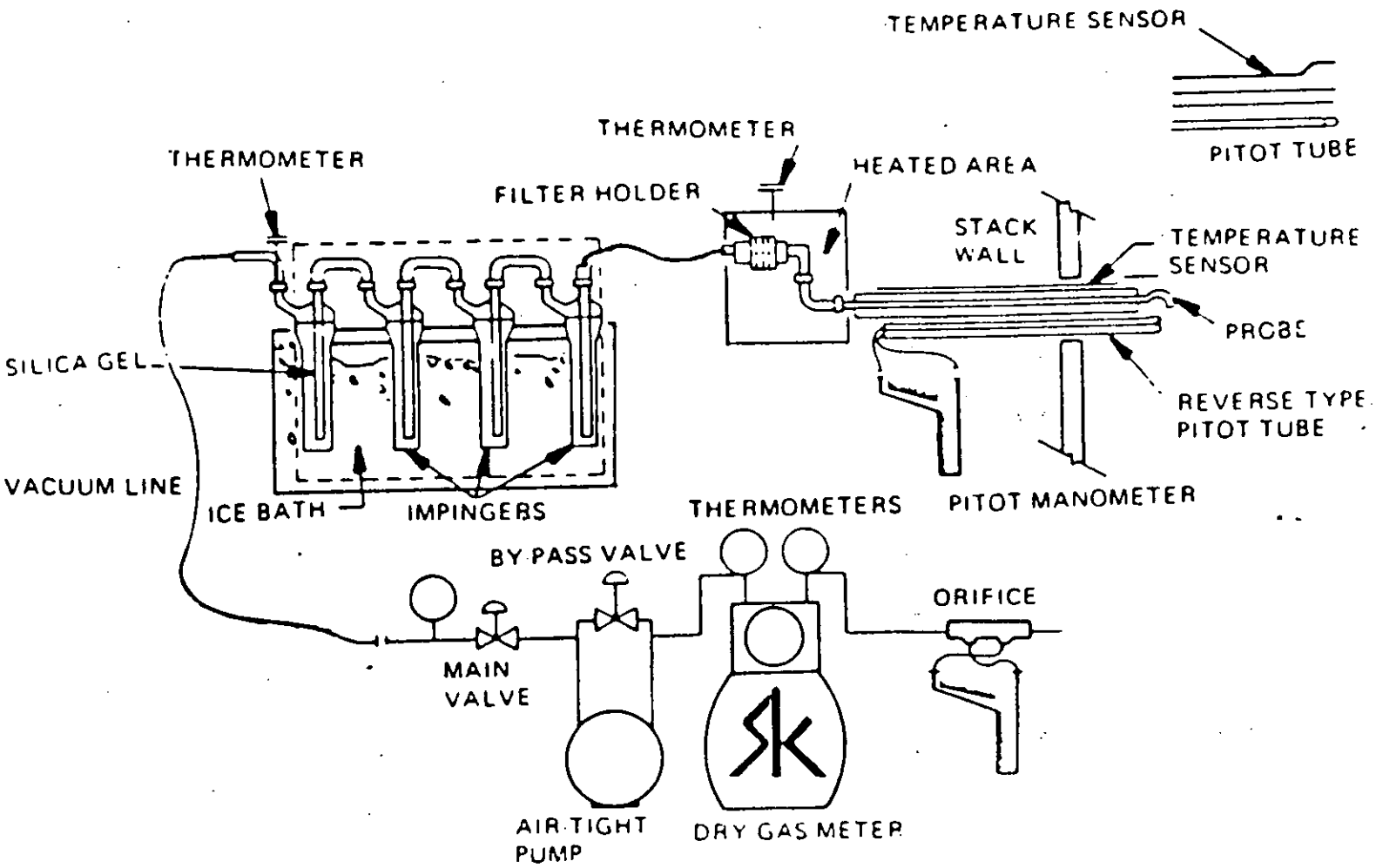


FIGURE 2

FDER PARTICULATE MATTER SAMPLING TRAIN

Velocity head measurements were determined across the stack by using a calibrated type "S" pitot tube with an inclined manometer.

The sampling traverse points were selected so that a representative sample could be extracted from the gas stream. The traverse points were located in the center of equal areas, which were dependent upon equivalent duct diameters downstream from flow disturbances.

One particulate test run consisted of sampling for a specified time at each traverse point. The type "S" pitot tube was connected adjacent to the sample probe so that an instantaneous velocity head measurement could be determined at each traverse point while making the test run. The stack gas temperature was also measured throughout each test. Nomographs were used to calculate the isokinetic sampling rate for each traverse point during each test run.

The gases sampled were collected through the following components: a stainless steel nozzle and probe; a glass fiber filter; two impingers with 100 ml of distilled water; one impinger dry; one impinger with 180 grams of silica gel (the second impinger had a standard tip, while the first, third and fourth impingers had modified tips with 1/2-inch I.D. openings); a flexible sample line; an air-tight pump; a dry test meter; and, finally, a calibrated orifice.

Sample recovery was accomplished by the following procedures:

1. The pretared filter was removed from its holder and placed in Container 1 and sealed.

2. All sample-exposed surfaces prior to the filter were washed with acetone and placed into Container 2.

3. The volume of water from the first three impingers was measured for the purpose of calculating the moisture in the stack gas, then discarded.

4. The used silica gel from the fourth impinger was transferred to the original tared container and sealed.

Laboratory Analysis

The two sample containers from each sample run were analyzed according to the following procedures:

1. The contents of Container 1 were transferred to a tared glass weighing dish, dried, and desiccated to a constant weight.

2. The acetone from Container 2 was transferred to a tared beaker and evaporated to dryness at 212°F. It was then desiccated to a constant weight.

The used silica gel in its tared container was weighed to the nearest gram.

The total sample weight included the weight of material collected on the filter plus the weight of material collected in the nozzle, sampling probe, and front half of the filter holder.

Data

The field data sheets, calculation sheets, and nomenclature definitions are included in the appendix of this report.

5.0 SUMMARY OF RESULTS

Summarized results of the particulate matter mass emission measurements conducted on June 19, 1981, are presented in Table 1. Complete emission data, including all gas flow data, are included in the Appendix of this report.

The mass emission rate of particulate matter ranged from 8.7 to 18.4 pounds/hour with an overall average of 13.4 pounds/hour. The corresponding concentration in the stack gas was 0.1092 grains/scf. The stack gas flow rate averaged 14,352 SCFMD. The stack gas temperature averaged 145°F and contained 22.0 percent moisture. During the period of testing, the process weight rate to the dryer was 15.23 tons/hour. The allowable particulate matter mass emission rate corresponding to this process weight rate (Chapter 17-2, Florida Administrative Code) is 19.4 pounds/hour.

Utilizing the above data it can be determined that during the period of testing the plant was operating within the guidelines of FDER and the Florida Administrative Code.

Complete emission data along with equation for calculating emission rates and source sampling nomenclature, field and analytical data sheets, necessary calibrations and a list of project participants are included in the Appendix of this report.

PARTICULATE MATTER EMISSION MEASUREMENTS

NO. 5 SCRUBBER OUTLET

FLORIDA SOLITE CORPORATION
GREEN COVE SPRINGS, FLORIDA

JUNE 19, 1981

Run No.	Process Weight Rate (tons/hr)	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (°F)	Stack Gas Moisture (%)	Particulate Matter Emissions	
					Concentration (gr/SCF)	Mass Emission Rate (lbs/hr)
1		15020	146	*22.9	0.0675	8.72
2		14611	141	*20.1	0.1464	18.37
3		13426	149	23.0	0.1136	13.10
Average	15.23	14352	145	22.0	0.1092	13.40

Allowable particulate matter emission rate (Chapter 17-2, Florida Administrative Code) = ~~19.4~~ lbs/hr.

*Stack gas saturated.

max allowed 18.1

APPENDIX

SOURCE SAMPLING NOMENCLATURE SHEET

PB - Barometric pressure, inches Hg
PS - Stack pressure, inches Hg
As - Stack area, sq. ft.
AS'- Effective area of positive stack gas flow, sq. ft.
NPTS - Number of traverse points where the pitot velocity head was greater than zero
TSTD - Standard temperature; °R
TS - Stack temperature, °R
TM - Meter temperature, °R
H - Average square root of velocity head, $\sqrt{\text{inches } H_2O}$
$\overline{H}$ - Average meter orifice pressure differential, inches H_2O
AN - Sampling nozzle area, square feet
CP - S-type pitot tube correction factor
VM - Recorded meter volume sample, cubic feet (meter conditions)
VC - Condensate and silica gel increase in impingers, milliliters
Po - Pressure at the dry test meter orifice, $\left[PB + \frac{\Delta H}{13.6}\right]$ inches Hg
STP - Standard conditions

VWV - Converstion of condensate in milliliters to water vapor in cubic feet (STP)
VSTPD - Volume sampled, cubic feet (STP)
VT - Total water vapor volume and dry gas volume sampled, cubic feet (STP)
W - Moisture fraction of stack gas
FDA - Dry gas fraction
MD - Molecular weight of stack gas, lbs/lb-mole (dry conditions)
MS - Molecular weight of stack gas, lbs/lb-mole (stack conditions)
GS - Specific gravity of stack gas, referred to air
EA - Excess air, %
$\sqrt{H \times TS}$ - Average square root of velocity head times stack temperature
$\overline{U}$ - Stack gas velocity, feet per minute
QS - Stack gas flow rate, cubic feet per minute (stack conditions)
QD - Stack gas flow rate, cubic feet per minute (dry conditions)
QSTDP - Stack gas flow rate, cubic feet per minute (STP)
PISO - Percent isokinetic volume sampled (method described in Federal Register)
ESTP - Particulate concentration at standard and dry conditions, grains/scf
E_{12} - ESTP corrected to 12% CO_2, grains/scf
E_{50} - ESTP corrected to 50% excess Air, grains/scf
EM - Mass Emission Rate, lbs/hr

* - Stack Gas Saturated

EQUATIONS FOR CALCULATING PARTICULATE EMISSIONS

$$VWV = 0.0000893(TSTD)(VC)$$

$$VSTPD = (VM)(PB + \frac{\Delta H}{13.6})(\frac{TSTD}{TM})(\frac{.1}{29.92})$$

$$VT = (VWV) + (VSTPD)$$

$$W = (VWV) \div (VT)$$

$$FDA = (1.0) - (W)$$

$$FMOIST = \text{Assumed moisture fraction}$$

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

$$MS = (MD \times FDA) + (18 \times W)$$

$$GS = (MS) \div (28.99)$$

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

$$\underline{U} = 4{,}006(CP)\sqrt{H}\sqrt{(\frac{TS}{TSTD})(\frac{29.92}{PS})(\frac{1}{GS})}$$

$$QS = (\underline{U}) \times (AS)$$

$$QD = (QS) \times (FDA)$$

$$QSTPD = TSTD(QD)(PS) \div [TS(29.92)]$$

$$PISO = \left[(0.00267 \times VC \times TS) + (P_o \times TS \times VM \div TM)\right] \div \left[(Time \times \underline{U} \times PS \times AN)\right]$$

$$ESTP = \frac{(\frac{15.43\ grains}{gram})\ (y)}{VSTPD}$$

$$E_{12} = \frac{(ESTP)\ (12)}{(CO_2\ \%)}$$

$$E50 = \frac{(ESTP)\ (100 + EA)}{150}$$

$$EM = (ESTP)\ (QSTPD)\ (60\ \frac{min}{hr})\ (\frac{1b}{7000\ grains})$$

COMPUTER PRINTOUTS

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS
SOURCE SAMPLING CALCULATIONS

PLANT- FL. SOLITE GREEN COVE SPRINGS *DATE-* 6/19/81
STACK- NO. 5 SCRUBBER *RUN* 1 *FROM* 0841-0943
WEATHER CONDITIONS- CLEAR *PB-* 29.9 *IN HG* *PS-* 29.9 *IN HG*
AS'- 7.07 *SQ. FEET* $\overline{TS}$- 146.3 *DEGREES F* $\overline{TM}$- 89.8 *DEGREES F*
H- 0.84 *IN H2O* $\overline{\Delta H}$- 0.71 *IN H2O* *AN-* 0.000197 *SQ FT* *CP-* 0.84
$\overline{VM}$- 27.515 *CF* $\overline{VC}$- 166.6*ML* *TOTAL TIME-*60 *MINUTES*

1.	Volume Water Vapor	1. 7.847*	SCF
2.	Gas Volume Sampled - STPD	2. 26.452	SCFD
3.	Total Volume	3. 34.299*	SCF
4.	Moisture in Stack Gas - Volume Fraction	4. 0.229*	
5.	Dry Stack Gas - Volume Fraction	5. 0.771*	
6.	Assumed Moisture in Stack Gas - Volume Fraction	6. 0	
7.	Molecular Weight of Stack Gas - Dry Basis	7. 29	
8.	Molecular Weight of Stack Gas - Stack Conditions	8. 26.48*	
9.	Specific Gravity of Stack Gas Relative to Air	9. 0.91	
10.	Excess Air - Percent	10. 0	%
11.	Average of Factor ($\sqrt{H} \times TS$)	11. 20.689	
12.	Average Stack Velocity	12. 3165.4	FPM
13.	Actual Stack Gas Flow Rate	13. 22380	ACFM
14.	Actual Stack Gas Flow Rate Dry	14. 17259	CFMD
15.	Stack Gas Flow Rate - STPD	15. 15220	SCFMD
16.	Percent Isokinetic	16. 105.3*	%

	MG	GR/SCF	GR/ACF	LBS/HR
PROBE WASH-	33.40	0.0194	0.0131	2.51
FILTER -	82.70	0.0481	0.0325	6.21
TOTALS -	116.10	0.0675	0.0456	8.72

Comments: _____

Tests Conducted by: _____

SHOLTES & KOOGLER

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS
SOURCE SAMPLING CALCULATIONS

PLANT- FL. SOLITE GREEN COVE SPRINGS *DATE-* 6/19/81
STACK- NO. 5 *SCRUBBER* *RUN* 2 *FROM* 1013-1128
WEATHER CONDITIONS- CLEAR *PB-* 29.9 *IN HG* *PS-* 29.9 *IN HG*
AS'- 7.07 *SQ. FEET* *TS-* 141.3 *DEGREES F* *TM-* 106.6 *DEGREES F*
H- 0.791 *IN H2O* Δ*H-* 0.63 *IN H2O* *AN-* 0.000197 *SQ FT* *CP-* 0.84
$\overline{V}$*M-* 31.708 *CF* *VC-* 158.4**ML* *TOTAL TIME-*72 *MINUTES*

1.	Volume Water Vapor	1. 7.461*	SCF
2.	Gas Volume Sampled - STPD	2. 29.574	SCFD
3.	Total Volume	3. 37.034*	SCF
4.	Moisture in Stack Gas - Volume Fraction	4. 0.201*	
5.	Dry Stack Gas - Volume Fraction	5. 0.799*	
6.	Assumed Moisture in Stack Gas - Volume Fraction	6. 0	
7.	Molecular Weight of Stack Gas - Dry Basis	7. 29	
8.	Molecular Weight of Stack Conditions ——>	8. 26.78•	27.59
9.	Specific Gravity of Stack Gas Relative to Air	9. 0.92	
10.	Excess Air - Percent	10. 0	%
11.	Average of Factor ($\sqrt{H} \times TS$)	11. 19.386	
12.	Average Stack Velocity	12. 2949.3	FPM
13.	Actual Stack Gas Flow Rate	13. 20852	ACFM
14.	Actual Stack Gas Flow Rate Dry	14. 16651	CFMD
15.	Stack Gas Flow Rate - STPD	15. 14611	SCFMD
16.	Percent Isokinetic	16. 100.9*	%

	MG	GR/SCF	GR/ACF	LBS/HR
PROBE WASH-	22.10	0.0115	0.0081	1.44
FILTER -	259.00	0.1349	0.0949	16.93
TOTALS -	281.10	0.1464	0.1030	18.37

Comments: ______________________

Tests Conducted by: ______________________

Ms = 30((.799)+18(.201) ≈ 27.59
MS = 30-12(.201) ≈ 27.59.

[illegible]

[illegible] Md = 29.
29-11(.201) = 26.789.

SHOLTES & KOOGLER

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS
SOURCE SAMPLING CALCULATIONS

PLANT- FL. SOLITE GREEN COVE SPRINGS DATE- 6/19/81
STACK- NO. 5 SCRUBBER RUN 3 FROM 1201-1317
WEATHER CONDITIONS- CLEAR PB- 29.9 IN HG PS- 29.9 IN HG
AS'- 7.07 SQ. FEET $\overline{TS}$- 149 DEGREES F $\overline{TM}$- 115.8 DEGREES F
H- 0.754 IN H2O $\overline{\Delta H}$- 0.57 IN H2O AN- 0.000197 SQ FT CP- 0.84
$\overline{VM}$- 30.531 CF $\overline{VC}$- 177.6 ML TOTAL TIME-72 MINUTES

1.	Volume Water Vapor	1.	8.365	SCF
2.	Gas Volume Sampled - STPD	2.	28.017	SCFD
3.	Total Volume	3.	36.382	SCF
4.	Moisture in Stack Gas - Volume Fraction	4.	0.23	
5.	Dry Stack Gas - Volume Fraction	5.	0.77	
6.	Assumed Moisture in Stack Gas - Volume Fraction	6.	0	
7.	Molecular Weight of Stack Gas - Dry Basis	7.	29	
8.	Molecular Weight of Stack Gas - Stack Conditions	8.	26.47	
9.	Specific Gravity of Stack Gas Relative to Air	9.	0.91	
10.	Excess Air - Percent	10.	0	%
11.	Average of Factor ($\sqrt{H}$ x TS)	11.	18.599	
12.	Average Stack Velocity	12.	2846.2	FPM
13.	Actual Stack Gas Flow Rate	13.	(20123)	ACFM
14.	Actual Stack Gas Flow Rate Dry	14.	14,96	CFMD
15.	Stack Gas Flow Rate - STPD	15.	13426	SCFMD
16.	Percent Isokinetic	16.	103.9	%

	MG	GR/SCF	GR/ACF	LBS/HR
PROBE WASH-	27.60	0.0152	0.0102	1.75
FILTER -	179.00	0.0984	0.0659	11.35
TOTALS -	206.60	0.1136	0.0761	13.10

Comments: _____

Tests Conducted by: _____

SHOLTES & KOOGLER

FIELD AND LAB DATA SHEETS

SHOLTES & KOOGLER ENVIRONMENTAL CONSULTANTS
GAINESVILLE, FLORIDA 32601
904-377-5822

SOURCE SAMPLING FIELD DATA SHEET

Plant: Solite [illegible]
Sampling Location: #5
Type of Control: scrubber
Type of Samples: Part
Date: 6-19-81 Run No. 1
Time Start: 0841 Time End: 0943
Sample Time: 5 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 29.9 "Hg, Stack Press. 29.9 "Hg
Moisture 23 %, FDA ___, Gas Density Factor ___
Weather: [illegible]
Temp. 78 °F, W/D E, W/S 5-10
Sample Box No. [illegible] Meter Box No. [illegible]
Meter ΔH@ 1.8 Pitot Corr. Factor 0.84
Nozzle Dia. 3/16 in., Probe Length [illegible] ft
Probe Heater Setting ___ Nomograph C_f 0.72
Stack Dimensions 36 in
Stack Area 7.07 ft^2
Effective Stack Area 7.07 ft^2
Stack Height ___ ft

Stack Dimensions: .45 - .9 / .8 - .8

Mat'l Processing Rate ___
Final Gas Meter Reading 69.115 ft^3
Initial Gas Meter Reading 41.620 ft^3
Condensate Increase in Impingers 196 ml
Moisture in Silica Gel 6.5 cm
Silica Gel Container No. 4 Filter No. ___
Orsat: $\%CO_2$ ___ $\%O_2$ ___ $\%CO$ ___ $\%N_2$ ___

Test Conducted By: R. Paul

Stack Test Observers: ___

Leak Check Meter Box: Initial 0.0 cfm @ 15 In Hg; Final 0.0 cfm @ [illegible] In Hg

Pitot Tubes: Impact 3 In H_2O For 15 sec. Stable, Leak; Static 3 In H_2O For 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O) Calc.	Meter Orifice Press. Diff. ("H_2O) Actual	Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F) In	Gas Sample Temp. @ Dry Gas Meter (°F) Out	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
1			39	.61	.61	.61	135	82	77	242	73	4
2			6.1	.73	.73	.73	139	86	77	[illegible]	66	4
3			[illegible]	.75	.75	.75	140	90	79	[illegible]	64	4
4			0.8	.75	.75	.75	[illegible]	91	80	[illegible]	[illegible]	4
5			3.1	.68	.68	.68	148	[illegible]	81	249	65	[illegible]
6			5.6	.78	.78	.78	149	[illegible]	82	[illegible]	[illegible]	[illegible]
1			7.7	.70	.70	.70	[illegible]	99	[illegible]	[illegible]	[illegible]	[illegible]
2			0.3	.80	.80	.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
3			2.7	.82	.82	.82	149	101	86	262	[illegible]	5
4			4.9	.40	.40	.40	155	103	87	272	[illegible]	4
5			6.9	.40	.40	.46	152	103	88	269	[illegible]	4
6				.62	.62	.62	150	105	90	265	[illegible]	4

SHOLTES & KOOGLER ENVIRONMENTAL CONSULTANTS
GAINESVILLE, FLORIDA 32601
904-377-5822

SK

SOURCE SAMPLING FIELD DATA SHEET

Plant: Dolite Iron Core
Sampling Location: #6
Type of Control: [illegible]
Type of Samples: Part
Date: 6-19-81 Run No. 2
Time Start: 1013 Time End: 1128
Sample Time: 6 min/pt 72 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 29.9 "Hg, Stack Press. 29.9 "Hg
Moisture 26 %, FDA ___, Gas Density Factor ___
Weather: [illegible]
Temp. 80 °F, W/D [illegible], W/S [illegible]
Sample Box No. [illegible] Meter Box No. [illegible]
Meter ΔH@ 1.8 Pitot Corr. Factor [illegible]
Nozzle Dia. 3/16 in., Probe Length [illegible] ft
Probe Heater Setting ___ Nomograph C_f 0.69
Stack Dimensions 36" in
Stack Area 7.07 ft^2
Effective Stack Area 7.07 ft^2
Stack Height ___ ft

D_i = [illegible]
A_n = [illegible]
D_s = 3'
A_s = 7.07 ft^2

Stack Dimensions

[illegible] 0.12
Calc C_{nomo} 0.767
[illegible]

Mat'l Processing Rate ___
Final Gas Meter Reading 101.208 ft^3
Initial Gas Meter Reading 69.500 ft^3
Condensate Increase in Impingers 164 ml
Moisture in Silica Gel 7.0 gm
Silica Gel Container No. 15 Filter No. ___

Orsat: %CO_2 ___
%O_2 ___
%CO ___
%N_2 ___

[illegible] 1.0183

Test Conducted By: R Paul

Stack Test Observers: ___

Leak Check Meter Box: Initial .00 cfm@ 15 In Hg; Final .00 cfm@ 4 In Hg

Pitot Tubes
Impact 3 In H_2O For 15 sec. Stable, Leak
Static 3 In H_2O For 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O) Calc.	Meter Orifice Press. Diff. ("H_2O) Actual	Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F) In	Gas Sample Temp. @ Dry Gas Meter (°F) Out	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
			69.5				[illegible]			[illegible]	[illegible]	
1			72.5	.73	.73	.73	139	101	95	241	73	7
2			75.2	.75	.75	.75	137	105	95	254	67	4
3			78.1	.75	.75	.75	137	108	96	264	64	4
4			80.9	.65	.65	.65	141	110	97	[illegible]	[illegible]	4
5			83.3	.57	.57	.57	143	111	98	257	67	4
6			85.7	.57	.57	.57	143	113	100	273	67	4
1			88.4	.60	.60	.60	141	114	101	270	68	4
2			[illegible]	.60	[illegible]	[illegible]	143	115	103	[illegible]	[illegible]	4

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft³)	Stack Velocity Head ("H_2O)	Orifice Press. Diff. ("H_2O) Calc	Orifice Press. Diff. ("H_2O) Actual	(°F)	Gas (°F) In	Gas (°F) Out	[illegible]	[illegible]	[illegible]
3			61	.60	.60	.60	143	117	104	267	[illegible]	4
4			87	.60	.60	.60	143	118	105	265	[illegible]	4
5			[illegible]	.53	.53	.53	143	119	106	262	[illegible]	4
6			[illegible]	.57	.57	.57	143	120	107	269	66	4

= 167°

Md = 30

Ms = [illegible] = 0.248

[illegible] = 0.92

K = [illegible]

ΔH req. [illegible] 1.14

Range .76 TO 1.52.

[illegible] = 0.77

[illegible] .75 = .41 [illegible]

SHOLTES & KOOGLER ENVIRONMENTAL CONSULTANTS
GAINESVILLE, FLORIDA 32601
904-377-5822

SK

SOURCE SAMPLING FIELD DATA SHEET

Plant Solite Green Cove
Sampling Location #5
Type of Control Scrubber
Type of Samples Part
Date 6-17-81 Run No. 3
Time Start 1201 Time End 1317
Sample Time 6 min/pt 72 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 29.9 "Hg, Stack Press. 29.9 "Hg
Moisture 23 %, FDA ___, Gas Density Factor ___
Weather [illegible]
Temp. [illegible] °F, W/D [illegible], W/S [illegible]
Sample Box No. [illegible] Meter Box No. [illegible]
Meter ΔH@ 1.8 Pitot Corr. Factor [illegible]
Nozzle Dia. 3/16 in., Probe Length [illegible] ft
Probe Heater Setting ___ Nomograph C_f ___
Stack Dimensions [illegible] in
Stack Area 707 ft^2
Effective Stack Area 707 ft^2
Stack Height ___ ft

Stack Dimensions

Mat'l Processing Rate ___
Final Gas Meter Reading 132.231 ft^3
Initial Gas Meter Reading 101.700 ft^3
Condensate Increase in Impingers 172 ml
Moisture in Silica Gel 5.6 gm
Silica Gel Container No. 35 Filter No. ___

Orsat: $\%CO_2$ ___
$\%O_2$ ___
$\%CO$ ___
$\%N_2$ ___

Test Conducted By: R Paul
[illegible]

Stack Test Observers: ___

Leak Check
Meter Box Initial 0.0 cfm@15 In Hg
Final 0.0 cfm@4 In Hg

Pitot Tubes
Impact 3 In H_2O For 15 sec. Stable, Leak
Static 3 In H_2O For 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O) Calc.	Meter Orifice Press. Diff. ("H_2O) Actual	Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F) In	Gas Sample Temp. @ Dry Gas Meter (°F) Out	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
1			4.2	.53	.53	.53	146	116	110	242	76	4
2			6.7	.55	.55	.55	146	118	110	236	68	4
3			9.4	.60	.60	.60	142	120	110	262	65	4
4			2.0	.60	.60	.60	146	121	110	247	62	4
5			4.6	.60	.60	.60	141	122	111	236	61	4
6			6.9	.55	.55	.55	144	121	111	242	63	4
1			9.5	.52	.52	.52	148	119	111	241	63	4
2			2.0	.55	.55	.55	155	120	111	[illegible]	65	4

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Gas Sample Temp. @Dry Gas Meter (°F)		Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
3			3.4	.50	.50	.50	157	121	111	247	64	4
4			6.8	.50	.50	.50	159	123	112	252	65	4
5			9.5	.64	.64	.64	154	123	113	261	65	4
6				.69	.69	.69	150	123	113	257	66	4

SK

PROCESS WEIGHT RATE

Owner Ash Grove Cement

Date 6-19-81 Source #5

Permit No. _____ Permitted Rate _____

	Time		gal Input Rate
Run 1	From 941	To 943	150 LBM* + 1.2 Tons/hr coal
Run 2	From 1013	To 1128	39,500 wet lb/hr (lb/hr @ 32% moist.
Run 3	From 1201	To 1317	

* LBM - liquid burnable material

To the Best of my knowledge, the above data is true and correct.

Signature

Title

SHOLTES & KOOGLER

EMISSION MEASUREMENT SUMMARY

FLORIDA SOLITE COMPANY
PARTICULATE MATTER EMISSION MEASUREMENTS
GREEN COVE SPRINGS, FLORIDA
JUNE 19, 1981

Process Weight Rate

1.8 tons coal/hour
19.75 lbs/hr clay at 32% moisture

Dry Process Weight Rate

= 1.8 + 19.75 (1 - 0.32)
= 15.23 tons/hour

Allowable Emission Rate

= $3.59\ (15.23)^{0.62}$
= 19.43 lbs/hour

Measured Emission Rate

Run 1 = 8.72
Run 2 = 18.73
Run 3 = 13.10

Avg. = 13.40 lbs/hour

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS

PARTICULATE LAB DATA SHEET

Date 6-19-81 Project No. SOLITE #5

	Run 1	Run 2	Run 3	Blank
Container No.	SK-19	SK-21	SK-27	SK-6
Total Volume (ml)				
Aliquot Evaporated (ml)				
Final Weight (g)	93.7491	91.0596	89.2922	94.3414
Tare Weight (g)	-93.7157	-91.0375	-89.2646	-94.3382
Gross Weight Gained (g)	.0334	.0221	.0276	.0032
Average Blank (g)	-	-	-	-
Net Weight (g)				
Aliquot Factor	x	x	x	x
Total Net Weight (mg)	33.4	22.1	27.6	3.2

Container No.	1-K	2-K	3-K	BLANK
Filter No.	4150	4151	4152	
Final Weight (g)	.5063	.6797	.5985	
Tare Weight (g)	-.4236	-.4207	-.4195	-
Gross Weight Gained (g)	.0827	.2590	.1790	
Average Blank	-	-	-	-
Total Net Weight (mg)	82.7	259.0	179.0	
	116.1	281.1	266.6	

Analyzed by: ?

Acetone Rinse ?

CALIBRATIONS AND PROJECT PARTICIPANTS

METER CALIBRATION FORM

Date March 16, 1981

Box No. sk-1

Leak Check 0.0 cfm at 5 in. Hg.

Barometric Pressure 29.8 inches Hg

ΔHW	ΔHD	Gas Volume, Wet Gas Meter			Gas Volume, Dry Gas Meter			Temp. of Wet Meter	Temp. of Dry Meter	Time Minutes
		Initial	Final	Actual ft^3	Initial	Final	Actual ft^3			
.6	0.5	0.0	1.972	1.972	472.80	474.765	1.965	68	80	5
.8	1.0	0.0	2.84	2.84	480.10	482.955	2.855	68	83	5
1.0	1.5	0.0	3.37	3.37	475.40	478.825	3.425	68	81	5
1.4	2.0	0.0	3.787	3.787	483.50	487.398	3.898	68	85	5

Hh % 1.77 1.7 1.82 1.91
mean % 1.8
y % 1.02 1.02 1 0.99
mean % 1.01
scfm % 0.39 0.55 0.66 0.73

- C A L I B R A T I O N -

ATKINS NO. 1 THERMOCOUPLE

Date October 1, 1980

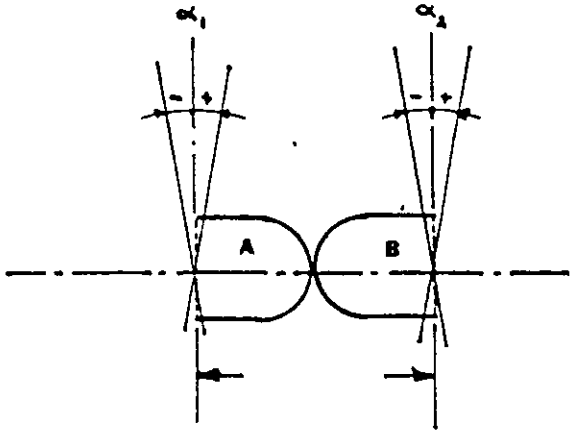
GLASS THEROMETER WITH NBS MERCURY (°F)	THERMOCOUPLE (°F)
32	32
123	122
212	211
304	303

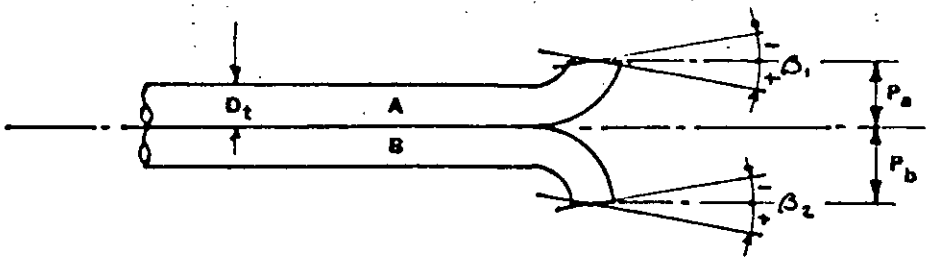
Calibrated By: [signature]

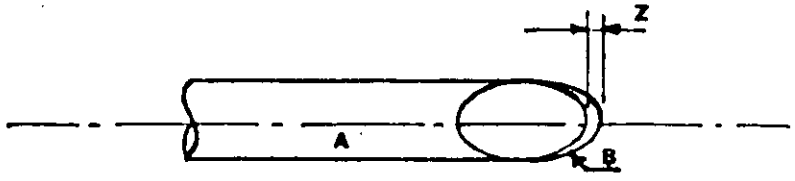
PITOT TUBE MEASUREMENTS

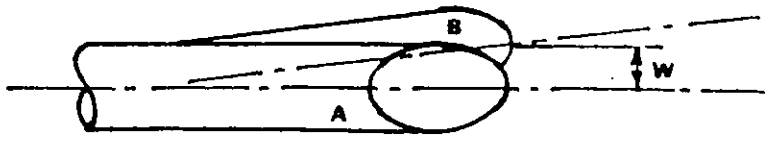
SK-6-2

α_1	0.76
α_2	0.76
β_1	0.58
β_2	0.57
P_a	0.452
P_b	0.514
D_t	0.377
Z	0.041
W	0.002









NOZZLE CALIBRATION

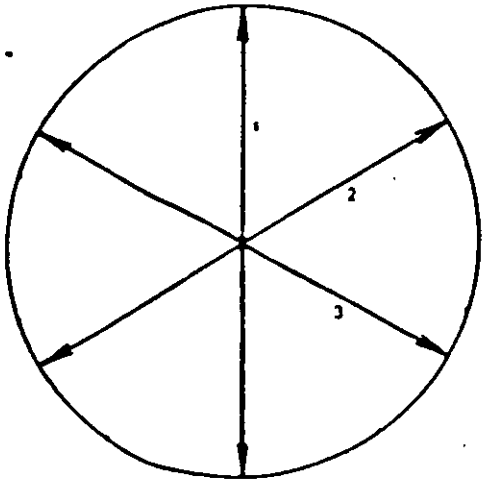
Nozzle 3/16 Date 6-19-81

Measurement No.	Inside Diameter (inches)
1	0.190
2	0.191
3	0.189

Average 0.190

Area of Nozzle 0.00197 Ft^2

Calibrated by: R C Paul



Nozzle X-section

SAMPLE CHAIN OF CUSTODY

PLANT NAME: FLA. SOLITE

SOURCE NAME: #5 KILN

DATE: 6-19-81 TYPE OF SAMPLE: PART.

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION
5-1	Probe Wash
5-2	"
5-3	"
Run 1	Filter
Run 2	"
Run 3	"

Sample Recovered By: _____

Particulate Analysis By: _____

SHOLTES & KOOGLER

METER ORIFICE CHECK

Meter Box No. 2b-7 Δ Ha of Box 1.8

Sys check. ____________

Date 10-19-81

Time for 10 ft^3 = 13 min. 19 sec. 10 ft^3 × 60 s/min / 799 sec = 0.751

10 ÷ 13.32 total minutes = .7509 Δ Ha_2

$\frac{0.75}{\Delta Ha_2}$ = 0.9988 x 100 = 99.9%

Tm = ____________

Pm = ____________

Vol = ____________

RC Paul
Signature

Procedure: Set flow rate of meter box at ΔHa of meter box--measure the amount of time required to sample 10.00 ft^3.

Note: If answer is within 5 percent meter is o.k. If not, recalibrate meter.

~~[illegible]~~
ΔH meter check = 0.751 ambient air cf per min @ meter Temp & Pressure conditions.

SHOLTES & KOOGLER

PROJECT PARTICIPANTS

John B. koogler, Ph.D., P.E.	Project Advisor
George F. Allen	Project Manager
George F. Gabel	Field Test Crew
Rodney C. Paul	Field Test Crew