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 Number: 1.8

Reference Number: 32

Title: Source Test Report for Particulate Emissions Twin Impingement Wet Scrubbers Boiler Number 2: Sugar Cane Growers Cooperative of Florida

November 1991

OSW1-SCGC9

SOURCE TEST REPORT
for
PARTICULATE EMISSIONS

TWIN IMPINGEMENT WET SCRUBBERS
BOILER NUMBER 2

NOVEMBER 15, 1991

Prepared for:

SUGAR CANE GROWERS
COOPERATIVE OF FLORIDA
AIRPORT ROAD
BELLE GLADE, FLORIDA 33430-0666

Prepared by:

AIR CONSULTING AND ENGINEERING, INC.
2106 N.W. 67TH PLACE, SUITE 4
GAINESVILLE, FLORIDA 32606
(904) 335-1889

236-91-02

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ACE
AIR CONSULTING
& ENGINEERING, INC.
2106 N.W. 67th Place • Suite 4 • Gainesville, Florida • 32606
(904) 335-1889 FAX (904) 335-1891

REPORT CERTIFICATION

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

Dagmar Neck

Dagmar Neck

12/27/91

Date

1.0 INTRODUCTION

On November 15, 1991, Air Consulting and Engineering, Inc. (ACE), conducted particulate emission testing on the Wet Scrubber Outlet of Boiler 2 at Sugar Cane Growers Cooperative of Florida (Sugar Cane Growers) located in Belle Glade, Florida.

Testing was performed to demonstrate compliance with the current Florida Department of Environmental Regulation (FDER) operating permit.

United States Environmental Protection Agency (EPA) Method 5 was utilized for the emission testing.

Mr. Ken Tucker of the FDER observed a portion of the testing.

Mr. Blas Marin of Sugar Cane Growers coordinated testing and provided production data.

2.0 SUMMARY AND DISCUSSION OF RESULTS

Boiler Number 2 demonstrated compliance with the permit conditions.

Table 1 is a summary of the emission results and flue gas parameters.

Particulate emissions averaged 36.24 pounds per hour (lbs/Hr) and 0.180 pounds per million BTU (lbs/MMBTU) which is within the allowable emissions of 46.73 lbs/Hr and 0.232 lbs/MMBTU.

Complete emission summaries, field data sheets and laboratory data are presented in Appendices A, B, and C, respectively.

Production rate summaries are provided in Appendix D. This data was obtained from control room recordings of steam flow, temperature, and pressure as well as feed water temperature and pressure. Residue integrator and oil meter readings were recorded at the beginning and end of each particulate run.

Table 1 Emission Summary
Boiler Number 2
Sugar Cane Growers Cooperative of Florida
Belle Glade, Florida
November 15, 1991

Run Number	Flow Rate SCFMD	Stack Temp. °F	Stack Moisture %	Particulate Emissions lbs/Hr	Particulate Emissions lbs/MMBTU	Allowable Emissions lbs/Hr	Allowable Emissions lbs/MMBTU
1	78140	140	17.5	41.32	0.206	46.46	0.232
2	80949	140	17.4	34.28	0.170	46.89	0.232
3	81767	139	17.4	33.12	0.164	46.84	0.232
AVERAGE	80285	140	17.4	36.24	0.180	46.73	0.232

O_2 = 13.2

3.0 PROCESS DESCRIPTION AND OPERATION

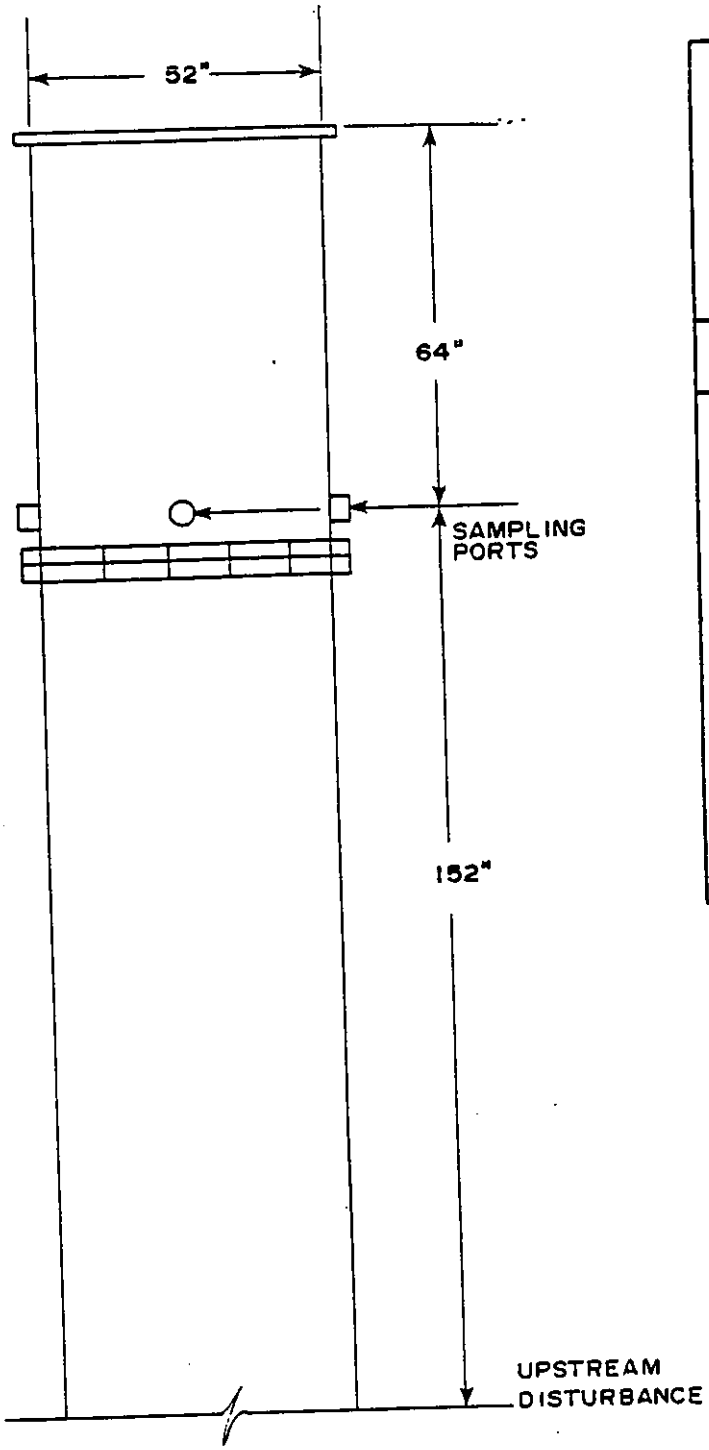
The Number 2 Boiler at Sugar Cane Growers is a spreader stoker design used primarily for residue fuel firing. Supplemental oil firing was also utilized for the emission test. The boiler averaged 119,433 lbs/Hr steam production over the three run test period.

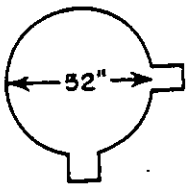
Oil meters, steam integrators, and other production monitoring devices were rigorously calibrated prior to the production season.

4.0 SAMPLING POINT LOCATION

The sampling point location (Figure 1) consists of dual scrubber outlet stacks, each 52" in diameter. Each stack has two sample ports 90 degrees apart. The ports on the south stack are located 166 from an upstream disturbance and 52" from the outlet while the north stack ports are 154" from an upstream disturbance and 53" from the outlet.

Twenty-four test points were sampled on each stack for each test run. The traverse were located as shown below. The stack configuration is such that there was no reason to evaluate the presence of cyclonic flow.





TRAVERSE POINT NUMBER	INCHES INSIDE STACK WALL
1	1.1
2	3.5
3	6.1
4	9.2
5	13.0
6	18.5
7	33.5
8	39.0
9	42.8
10	45.9
11	48.5
12	50.9

NOTE: NOT TO SCALE
BOTH STACKS ARE IDENTICAL.

FIGURE 1.
SAMPLING POINT LOCATION
BOILER NO. 2
SUGARCANE GROWERS COOP. OF FLORIDA

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5.0 FIELD AND ANALYTICAL PROCEDURES

5.1 Particulate Matter Sampling and Analysis--EPA Method 5 (Glass Probe)

Particulate matter samples were collected by the particulate matter emission measurement method specified by the United States Environmental Protection Agency. 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 degrees C, removed and placed in a standard desiccator containing indicating silica gel, allowed to cool for two hours, and weighed to the nearest 0.1 mg. The filters were then re-desiccated for a minimum of six hours and weighed to a constant weight (less than 0.5 mg change from previous weighing). The average of the two constant weights was used as the tare weight.

2. NOZZLE, FILTER HOLDER, AND SAMPLING PROBE - The nozzle, filter holder, and sampling probe were washed vigorously with soapy water and brushes, rinsed with distilled water and acetone, 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, 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 were measured. These preliminary measurements

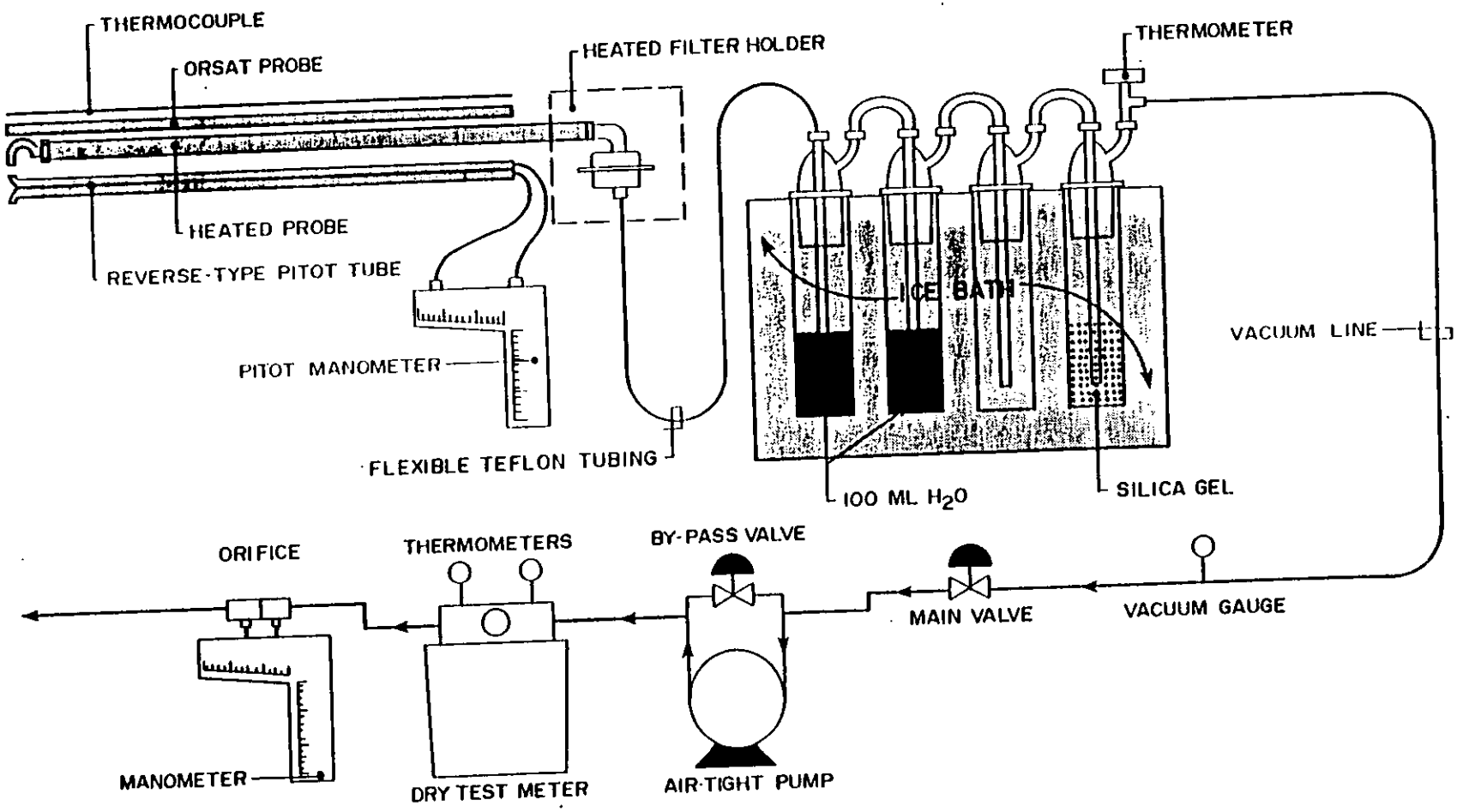

FIGURE 1.
EPA METHOD 5 SAMPLING TRAIN

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included the average gas temperature, the stack gas velocity head, the stack gas moisture content, and the stack dimensions at the point where the tests were being performed. The stack gas temperature was determined by using a bi-metallic thermocouple and calibrated pyrometer. Velocity head measurements were made with calibrated type "S" pitot tube and an inclined manometer. Velocity head measurements of 0.05 inches H_2O or less were measured utilizing a micromanometer.

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, the number of which were dependent upon the distance upstream and downstream from flow disturbances.

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

The gases sampled passed through the following components: a stainless steel nozzle and glass probe; a glass fiber filter; two impingers each with 100 ml

of distilled deionized water; one impinger dry; one impinger with 200 grams of silica gel; a flexible sample line; an air-tight pump; a dry test meter; and a calibrated orifice. The second impinger had a standard tip, while the first, third, and fourth impingers had modified tips with a 0.5 inch I.D. opening.

Sample recovery was accomplished by the following procedures:

1. The pre-tared filter was removed from its holder and placed in Container 1 and sealed. (This is usually performed in the lab.)
2. All sample-exposed surfaces prior to the filter were washed with acetone and placed in Container 2, sealed and the liquid level marked.
3. The volume of water from the first three impingers was measured for the purpose of calculating the moisture in the stack gas and then discarded.
4. The used silica gel from the fourth impinger was transferred to the original tared container and sealed.

LABORATORY ANALYSIS

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

1. The filter was dried at 105 degrees C for three hours, desiccated for a minimum of one hour, and weighed to the nearest 0.1 mg. A minimum of two such weighings six hours apart was made to determine constant weight.
2. The acetone from Container 2 was transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours, and weighed to the nearest 0.1 mg. A minimum of two such weighings six hours apart were made to determine constant weight.
3. The used silica gel in its tared container was weighed to the nearest 0.1 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 appendices of this report.

APPENDIX A
COMPLETE EMISSION DATA

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: SUGAR CANE GROWERS COOPERATIVE OF FLORIDA
SOURCE: NUMBER 2 BOILER
DATE: 11-15-91

RUN NO.:	1	IMPINGER ml	240
BEGIN TIME:	1004	SILICA GEL gms.	12.4
END TIME:	1146	PERCENT O2	13.50
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	7.00
BAROMETRIC PRESSURE:	30.35 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.35 "Hg.		
NOZZLE DIAMETER:	.200 inches	PARTICULATE	
METER CORR. FACTOR:	1.004	---	
FINAL METER:	200.021 cubic ft.	FILTER mg.	168.2
INITIAL METER:	143.229 cubic ft.	WASH mg.	57.2
STACK AREA:	29.469 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.500	1.225	2.030	136	76
1-2	1.500	1.225	2.030	136	76
1-3	1.300	1.140	1.760	136	76
1-4	1.400	1.183	1.890	135	76
1-5	1.600	1.265	2.160	135	76
1-6	1.400	1.183	1.890	136	76
1-7	.950	0.975	1.280	138	77
1-8	.880	0.938	1.190	138	78
1-9	.760	0.872	1.020	138	78
1-10	.680	0.825	.920	142	79
1-11	.590	0.768	.800	142	79
1-12	.560	0.748	.760	142	79
2-1	1.000	1.000	1.350	140	80
2-2	1.000	1.000	1.350	140	80
2-3	1.100	1.049	1.490	139	80
2-4	1.200	1.095	1.620	139	81
2-5	1.100	1.049	1.490	139	82
2-6	1.200	1.095	1.620	143	82
2-7	1.500	1.225	2.020	144	82
2-8	1.400	1.183	1.890	144	83
2-9	1.200	1.095	1.620	143	83
2-10	1.000	1.000	1.350	141	84
2-11	.850	0.922	1.150	140	84
2-12	.850	0.922	1.150	140	84
AVERAGES	1.105	1.041	1.493	139	80

EMISSION RESULTS

NOZZLE AREA(FT2)	:0.0002185		
AVG. VELOCITY HEAD	:--------	0.98 "H2O	VOL. FLOW ACFM : 106155
AVG. STACK TEMP.:	---------	140 F	VOL. FLOW SCFMD : 78140
AVG. METER TEMP.:	---------	83 F	
AVG. ORIFICE DIFFERENTIAL:	---	1.40 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:	---	56.383	---
% H2O VAPOR:	:--------	17.5	POUNDS PER HOUR: 41.320
GAS MOL. WT. DRY:	---------	29.66	POUNDS PER SCF : 0.0000088
GAS MOL. WT. WET:	---------	27.62	GRAINS/SCF: 0.062
% EXCESS AIR:	---------	180.29	GRAINS/SCF @ 8% O2 0.108
AVG. STACK VEL.(FPS)	---------	60.04	GRAINS/SCF @50% EA 0.115
MMBTU INPUT:	---------	200.29	POUNDS PER MMBTU: 0.206
PERCENT ISOKINETIC :	---------	101.38	

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	1.350	1.162	1.820	141	85
1-2	1.100	1.049	1.490	141	85
1-3	1.100	1.049	1.490	141	85
1-4	1.350	1.162	1.820	141	86
1-5	1.350	1.162	1.820	141	86
1-6	1.100	0.490	1.490	143	86
1-7	1.100	1.049	1.490	142	86
1-8	1.100	1.049	1.490	142	86
1-9	.740	0.860	1.000	142	87
1-10	.470	0.686	.630	142	87
1-11	.380	0.616	.510	140	87
1-12	.350	0.592	.470	140	88
2-1	1.200	1.095	1.620	138	88
2-2	1.200	1.095	1.620	141	88
2-3	1.200	0.780	1.620	140	88
2-4	1.200	1.095	1.620	140	88
2-5	1.100	1.049	1.490	141	88
2-6	1.100	1.049	1.490	141	88
2-7	1.100	1.049	1.490	142	88
2-8	1.100	1.049	1.490	141	89
2-9	.900	0.949	1.220	141	89
2-10	.740	0.860	1.000	140	89
2-11	.570	0.755	.770	140	89
2-12	.480	0.693	.650	140	90
AVERAGES	0.974	0.935	1.317	141	87

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: SUGAR CANE GROWERS COOPERATIVE OF FLORIDA
SOURCE: NUMBER 2 BOILER
DATE: 11-15-91

RUN NO.:	2	IMPINGER ml	240
BEGIN TIME:	1300	SILICA GEL gms.	11.3
END TIME:	1440	PERCENT O2	13.20
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	7.50
BAROMETRIC PRESSURE:	30.35 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.35 "Hg.		
NOZZLE DIAMETER:	.200 inches	PARTICULATE	
METER CORR. FACTOR:	1.004	---	
FINAL METER:	257.479 cubic ft.	FILTER mg.	146.6
INITIAL METER:	200.239 cubic ft.	WASH mg.	35.0
STACK AREA:	29.469 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.800	1.342	2.430	133	82
1-2	1.500	1.225	2.020	135	82
1-3	1.600	1.265	2.160	135	82
1-4	1.600	1.265	2.160	135	82
1-5	1.800	1.342	2.430	136	82
1-6	1.000	1.000	1.350	139	82
1-7	.850	0.922	1.150	138	82
1-8	.680	0.825	.920	138	82
1-9	.600	0.775	.810	140	82
1-10	.570	0.755	.770	140	82
1-11	.600	0.775	.810	141	82
1-12	.600	0.775	.810	142	82
2-1	1.100	1.049	1.490	138	83
2-2	1.100	1.049	1.490	138	83
2-3	1.200	1.095	1.620	140	83
2-4	1.200	1.095	1.620	140	83
2-5	1.100	1.049	1.490	139	83
2-6	1.200	1.095	1.620	140	84
2-7	1.500	1.225	2.020	140	84
2-8	1.400	1.183	1.890	143	84
2-9	1.200	1.095	1.620	143	84
2-10	1.100	1.049	1.490	144	84
2-11	.950	0.975	1.280	141	85
2-12	.850	0.922	1.150	141	85
AVERAGES	1.129	1.048	1.525	139	83

EMISSION RESULTS

NOZZLE AREA(FT2)	:0.0002185		
AVG. VELOCITY HEAD	:--------	1.05 "H2O	VOL. FLOW ACFM : 109674
AVG. STACK TEMP.:	---------	140 F	VOL. FLOW SCFMD : 80949
AVG. METER TEMP.:	---------	84 F	
AVG. ORIFICE DIFFERENTIAL:	---	1.43 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:	---	56.729	---
% H2O VAPOR:	:--------	17.4	POUNDS PER HOUR: 34.277
GAS MOL. WT. DRY:	---------	29.73	POUNDS PER SCF : 0.0000071
GAS MOL. WT. WET:	---------	27.69	GRAINS/SCF: 0.049
% EXCESS AIR:	---------	170.65	GRAINS/SCF @ 8% O2 0.083
AVG. STACK VEL. (FPS)	---------	62.03	GRAINS/SCF @50% EA 0.089
MMBTU INPUT:	---------	201.80	POUNDS PER MMBTU: 0.170
PERCENT ISOKINETIC :	---------	98.47	

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	.920	0.959	1.240	142	85
1-2	.950	0.975	1.280	140	85
1-3	1.100	1.049	1.490	141	85
1-4	1.100	1.049	1.490	139	85
1-5	1.300	1.140	1.760	140	85
1-6	1.300	1.490	1.760	139	86
1-7	1.200	1.095	1.620	141	86
1-8	1.000	1.000	1.350	141	86
1-9	1.000	1.000	1.350	140	86
1-10	.850	0.922	1.150	140	86
1-11	.470	0.686	.630	139	86
1-12	.470	0.686	.630	139	86
2-1	1.500	1.225	2.020	140	86
2-2	1.200	1.095	1.620	139	86
2-3	1.200	1.095	1.620	140	86
2-4	1.200	1.095	1.620	140	86
2-5	1.200	1.095	1.620	140	86
2-6	1.200	1.095	1.620	140	86
2-7	1.200	1.095	1.620	142	87
2-8	1.000	1.000	1.350	141	87
2-9	.710	0.843	.960	140	87
2-10	.630	0.794	.850	140	87
2-11	.530	0.728	.720	140	87
2-12	.530	0.728	.720	140	87
AVERAGES	0.990	0.997	1.337	140	86

1.

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: SUGAR CANE GROWERS COOPERATIVE OF FLORIDA
SOURCE: NUMBER 2 BOILER
DATE: 11-15-91

RUN NO.:	3	IMPINGER ml	240
BEGIN TIME:	1521	SILICA GEL gms.	12.7
END TIME:	1704	PERCENT O2	13.00 - Avg = 13.2
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	7.00
BAROMETRIC PRESSURE:	30.35 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.35 "Hg.		
NOZZLE DIAMETER:	.200 inches	PARTICULATE	
METER CORR. FACTOR:	1.004	---	
FINAL METER:	315.162 cubic ft.	FILTER mg.	148.1
INITIAL METER:	257.749 cubic ft.	WASH mg.	25.8
STACK AREA:	29.469 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.600	1.265	2.160	133	83
1-2	1.600	1.265	2.160	133	83
1-3	1.600	1.265	2.160	133	83
1-4	1.700	1.304	2.300	135	83
1-5	1.700	1.304	2.300	136	83
1-6	1.700	1.304	2.300	136	83
1-7	1.100	1.049	1.490	137	83
1-8	1.100	1.049	1.490	138	83
1-9	.750	0.866	1.010	138	83
1-10	.650	0.806	.880	138	83
1-11	.610	0.781	.820	139	84
1-12	.610	0.781	.820	140	84
2-1	.850	0.922	1.150	140	85
2-2	1.100	1.100	1.490	140	85
2-3	1.100	1.049	1.490	139	80
2-4	1.300	1.140	1.760	139	85
2-5	1.300	1.140	1.760	139	85
2-6	1.500	1.225	2.020	138	85
2-7	1.500	1.225	2.020	138	85
2-8	1.200	1.095	1.620	141	85
2-9	1.000	1.000	1.350	141	86
2-10	.850	0.922	1.150	140	86
2-11	.800	0.894	1.080	140	86
2-12	.800	0.894	1.080	140	86
AVERAGES	1.168	1.069	1.577	138	84

EMISSION RESULTS

NOZZLE AREA(FT2)	:0.0002185		
AVG. VELOCITY HEAD	:--------	1.06 "H2O	VOL. FLOW ACFM : 110758
AVG. STACK TEMP.:	---------	139 F	VOL. FLOW SCFMD : 81767
AVG. METER TEMP.:	---------	86 F	
AVG. ORIFICE DIFFERENTIAL:	---	1.44 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:	---	56.786	---
% H2O VAPOR:	:--------	17.4	POUNDS PER HOUR: 33.121
GAS MOL. WT. DRY:	---------	29.64	POUNDS PER SCF : 0.0000068
GAS MOL. WT. WET:	---------	27.61	GRAINS/SCF: 0.047
% EXCESS AIR:	---------	160.10	GRAINS/SCF @ 8% O2 0.077
AVG. STACK VEL.(FPS)	---------	62.64	GRAINS/SCF @50% EA 0.082
MMBTU INPUT:	---------	201.61	POUNDS PER MMBTU: 0.164
PERCENT ISOKINETIC :	---------	97.58	

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	1.000	1.000	1.350	138	86
1-2	1.100	1.049	1.350	138	86
1-3	1.200	1.095	1.620	138	86
1-4	1.200	1.095	1.620	139	86
1-5	1.300	1.140	1.760	140	86
1-6	1.100	1.490	1.490	140	86
1-7	1.100	1.049	1.490	141	86
1-8	1.100	1.049	1.490	141	86
1-9	.800	0.894	1.080	140	86
1-10	.600	0.775	.810	139	87
1-11	.600	0.775	.810	139	87
1-12	.600	0.775	.810	139	88
2-1	1.200	1.095	1.620	140	87
2-2	1.200	1.095	1.620	140	87
2-3	1.100	1.049	1.490	140	87
2-4	1.250	1.118	1.690	140	88
2-5	1.100	1.049	1.490	140	88
2-6	1.100	1.049	1.490	142	88
2-7	1.100	1.049	1.490	142	88
2-8	1.100	1.049	1.490	140	88
2-9	.850	0.922	1.150	141	88
2-10	.600	0.775	.810	143	
2-11	.520	0.721	.700	142	88
2-12	.520	0.721	.650	140	90
AVERAGES	0.973	0.995	1.307	140	87

APPENDIX B

FIELD DATA SHEETS

STACK SAMPLING FIELD DATA SHEET

ACE AIR CONSULTING & ENGINEERING, INC.
2106 N. W. 67th PLACE · Suites 9 & 10
GAINESVILLE, FLORIDA · 32606

TEST ID SC.2C.1A.C
PAGE 1 OF 3

PLANT Sugar Cane Growers Coop.
SOURCE Boiler #2
PLANT LOCATION Belle Glade, Fla
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES Particulate
DATE 11-15-91 RUN NO. 1
TIME START 1004 TIME END 1146
SAMPLE TIME 2 / 48 (min/pt) = 96 Total min
ASSUMED MOISTURE .18 % FDA .82
NOMOGRAPH C_f 1.35 PITOT CORR. .84
P_b 30.35 "Hg P_s 30.35 "Hg
WEATHER Clear TEMP. 75 °F
METER BOX NO. 1 H 2.15 Y 1.004
NOZZLE CAL. .200 .200 .200 = .200
STACK DIMENSIONS 52" X 2 stacks
STACK AREA 29.496 ft² EFFECTIVE ____ ft²
STACK HEIGHT ____ ft.
STACK DIAMETER: UPSTRM. ____ DNSTRM. ____
PORT SIZE ____ in. NIPPLE LENGTH ____ in.
U CORD LENGTH 200'
REMARKS:

MAT'L PROCESSING RATE ____
GAS METER READINGS: FINAL 200.021 ft.³
INITIAL 143.229 ft.³
NET 56.792 ft.³
FILTER NO. 3460 IMP. VOL. GAIN 240 ml.
SIL GEL NO. 96 WT. GAIN 12.4 ml.
TOTAL CONDENSATE 252.4 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2	6.5	7.0			7.0
% O_2	13.5	13.5			13.5
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST 0.01 cfm 15 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. 59 PRE-TEST OK
POST-TEST(+) .00 / 15 H_2O/Sec
POST-TEST(−) .01 / 15 H_2O/Sec
PYROMETER NO. 2
BOX OPERATOR Gauthreaux PROBE HOLDER Nack

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. F	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
South Stack 1-1		1006	144.63	1.50	2.03	2.03	136	234	51	76	8
2		1008	145.90	1.50	2.03	2.03	136	235	50	76	8
3		1010	147.59	1.30	1.76	1.76	136	230	48	76	8
4		1012	148.80	1.40	1.89	1.89	135	232	47	76	8
5		1014	150.12	1.60	2.16	2.16	135	231	49	76	8
6		1016	151.66	1.40	1.89	1.89	136	238	49	76	8

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC2C1AS

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft^3)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	METER ORIFICE PRESS. DIFF. ("H_2O) ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-7		1018	152.90	.95	1.28	1.28	138	237	49	77	7.5
8		1020	153.89	.88	1.19	1.19	138	237	49	78	7.0
9		1022	154.90	.76	1.02	1.02	138	238	49	78	6.5
10		1024	155.98	.68	.92	.92	142	242	49	79	6.0
11		1026	156.87	.59	.80	.80	142	240	49	79	5.5
12		1028	157.78	.56	.76	.76	142	240	49	79	5.5
2-1		1032	158.90	1.00	1.35	1.35	140	250	49	80	9.0
2		1034	160.01	1.00	1.35	1.35	140	253	50	80	9.0
3		1036	161.22	1.10	1.49	1.49	139	256	50	80	9.0
4		1038	162.55	1.20	1.62	1.62	139	256	50	81	9.0
5		1040	163.65	1.10	1.49	1.49	139	258	50	82	10.0
6		1042	164.81	1.20	1.62	1.62	143	256	52	82	10.0
7		1044	166.31	1.50	2.02	2.02	144	256	52	82	12.0
8		1046	167.69	1.40	1.89	1.89	144	250	54	83	13.5
9		1048	168.80	1.20	1.62	1.62	143	248	54	83	11.5
10		1050	170.00	1.00	1.35	1.35	141	246	55	84	10.0
11		1052	171.33	.85	1.15	1.15	140	245	55	84	9.5
12		1054	172.39	.85	1.15	1.15	140	246	55	84	9.5
North St. 1-1		1057	173.51	1.35	1.82	1.82	141	261	54	85	13.0
2		1059	174.92	1.10	1.49	1.49	141	260	53	85	12.0
3		1101	176.09	1.10	1.49	1.49	141	275	54	85	12.0
4		1103	177.54	1.35	1.82	1.82	141	270	54	86	13.5
5		1105	178.78	1.35	1.82	1.82	141	269	54	86	13.5
6		1107	180.21	1.10	1.49	1.49	143	270	55	86	13.0
7		1109	181.51	1.10	1.49	1.49	142	275	55	86	13.0
8		1111	182.65	1.10	1.49	1.49	142	274	55	86	12.5
9		1113	184.00	.74	1.00	1.00	142	275	56	87	10.0

AGEC AIR CONSULTING & ENGINEERING, INC.

TEST ID SC.2C.1AS

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	METER ORIFICE PRESS. DIFF. ("H_2O) ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
NORTH											
1-10		1115	184.72	.47	.63	.63	142	275	57	87	7.0
11		1117	185.34	.38	.51	.51	140	275	57	87	7.0
12		1119	186.90	.35	.47	.47	140	275	58	88	7.0
2-1		1124	187.21	1.20	1.62	1.62	138	261	58	88	11.0
2		1126	188.46	1.20	1.62	1.62	141	257	55	88	13.0
3		1128	189.70	1.20	1.62	1.62	140	254	54	88	14.0
4		1130	191.10	1.20	1.62	1.62	140	252	55	88	14.0
5		1132	192.31	1.10	1.49	1.49	141	256	56	88	14.0
6		1134	193.56	1.10	1.49	1.49	141	256	56	88	14.0
7		1136	194.81	1.10	1.49	1.49	142	256	56	88	14.0
8		1138	196.30	1.10	1.49	1.49	141	258	56	89	14.0
9		1140	197.51	.90	1.22	1.22	141	256	58	89	14.0
10		1142	198.31	.74	1.00	1.00	140	254	58	89	12.0
11		1144	199.32	.57	.77	.77	140	252	58	89	9.5
12		1146	200.02	.48	.65	.65	140	253	57	90	9.0

STACK SAMPLING FIELD DATA SHEET

ACE AIR CONSULTING & ENGINEERING, INC.
2106 N. W. 67th PLACE · Suites 9 & 10
GAINESVILLE, FLORIDA · 32606

TEST ID SC2C2AS
PAGE 1 OF 3

PLANT Sugar Cane Growers Coop.
SOURCE Boiler #2.
PLANT LOCATION Belle Glade, Fla.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PARTICULATE (PM)
DATE 11-15-91 RUN NO. 2
TIME START 1300 TIME END 1440
SAMPLE TIME 2.48 (min/pt) = 96 Total min
ASSUMED MOISTURE 18 % FDA 82
NOMOGRAPH C_f 1.35 PITOT CORR. .84
P_b 30.35 "Hg P_s 30.35 "Hg
WEATHER Clear TEMP. 78 °F
METER BOX NO. 1 H 2.15 Y 1.004
NOZZLE CAL. .200 .200 .200 = .200
STACK DIMENSIONS 52" X 2 stacks
STACK AREA 29.496 ft.² EFFECTIVE ____ ft.²
STACK HEIGHT ____ ft.
STACK DIAMETER: UPSTRM. ____ DNSTRM. ____
PORT SIZE ____ in. NIPPLE LENGTH ____ in.
U CORD LENGTH 200'
REMARKS:

MAT'L PROCESSING RATE ____
GAS METER READINGS: FINAL 257.479 ft.³
INITIAL 200.239 ft.³
NET 57.240 ft.³
FILTER NO. 3462 IMP. VOL. GAIN 240.0 ml.
SIL GEL NO. 12 WT. GAIN 11.3 ml.
TOTAL CONDENSATE 251.3 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2	7.0	8.0			7.5
% O_2	13.5	13.0			13.2
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST 0.015 cfm 15 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. 59 PRE-TEST OK
POST-TEST(+) 0.00 / 15 H_2O/Sec
POST-TEST(−) 0.00 / 15 H_2O/Sec
PYROMETER NO. 2
BOX OPERATOR Gauthreaux PROBE HOLDER Neck

PORT AND TRAVERSE POINT NUMBER 90° STACK	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. F	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-1		1302	201.81	1.80	2.43	2.43	133	237	52	82	10.0
2		1304	203.12	1.50	2.02	2.02	135	237	52	82	10.0
3		1306	204.40	1.60	2.16	2.16	135	238	48	82	10.0
4		1308	206.11	1.60	2.16	2.16	135	240	49	82	10.0
5		1310	207.75	1.80	2.43	2.43	138	246	50	82	11.0
6		1312	208.91	1.00	1.35	1.35	139	248	50	82	8.0

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC.2C.2A

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
South 1-7		1314	210.00	.85	1.15	1.15	138	249	53	82	7.0
8		1316	211.10	.68	.92	.92	138	250	54	82	6.0
9		1318	212.01	.60	.81	.81	140	251	54	82	5.5
10		1320	213.00	.57	.77	.77	140	251	54	82	5.5
11		1322	213.81	.60	.81	.81	141	250	54	82	5.5
12		1324	214.71	.60	.81	.81	142	250	54	82	5.5
2-1		1327	215.80	1.10	1.49	1.49	138	252	55	83	8.0
2		1329	217.00	1.10	1.49	1.49	138	252	53	83	8.0
3		1331	218.31	1.20	1.62	1.62	140	257	53	83	10.0
4		1333	219.75	1.20	1.62	1.62	140	257	53	83	10.0
5		1335	220.83	1.10	1.49	1.49	139	252	54	84	10.0
6		1337	222.15	1.20	1.62	1.62	140	252	54	84	10.0
7		1339	223.51	1.50	2.03	2.03	140	252	54	84	11.0
8		1341	224.97	1.40	1.89	1.89	143	248	54	84	11.5
9		1343	226.20	1.20	1.62	1.62	143	252	55	84	10.0
10		1345	227.11	1.10	1.49	1.49	144	253	56	84	10.0
11		1347	228.72	.95	1.28	1.28	141	252	57	85	8.5
12		1349	229.82	.85	1.15	1.15	141	252	57	85	8.5
North 1-1		1353	230.81	.92	1.24	1.24	142	257	58	85	9.0
2		1355	232.00	.95	1.28	1.28	140	263	58	85	9.5
3		1357	233.21	1.10	1.49	1.49	142	265	57	85	10.0
4		1359	234.51	1.10	1.49	1.49	139	269	57	85	10.0
5		1401	235.61	1.30	1.76	1.76	140	264	58	85	10.0
6		1403	236.90	1.30	1.76	1.76	139	261	57	86	11.0
7		1405	238.10	1.20	1.62	1.62	141	260	57	86	11.0
8		1407	239.31	1.00	1.35	1.35	141	258	58	86	11.0
9		1409	240.56	1.00	1.35	1.35	140	259	58	86	10.0

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC2C2AS

PORT AND TRAVERSE POINT NUMBER North	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	METER ORIFICE PRESS. DIFF. ("H_2O) ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-10		1411	241.61	.35	1.15	1.15	140	261	58	86	9.5
11		1413	242.61	.47	.63	.63	139	260	58	86	7.0
12		1415	243.47	.47	.63	.63	139	260	58	86	7.0
2-1		1418	244.62	1.50	2.02	2.02	140	260	59	86	14.0
2		1420	246.01	1.20	1.62	1.62	139	257	57	86	12.5
3		1422	247.22	1.20	1.62	1.62	140	255	58	86	12.5
4		1424	248.61	1.20	1.62	1.62	140	256	58	86	12.5
5		1426	249.90	1.20	1.62	1.62	140	256	59	86	12.5
6		1428	251.10	1.20	1.62	1.62	140	255	58	86	12.5
7		1430	252.42	1.20	1.62	1.62	142	255	59	87	13.0
8		1432	253.65	1.00	1.35	1.35	141	258	59	87	11.5
9		1434	254.75	.71	.96	.96	140	260	59	87	9.5
10		1436	255.61	.63	.85	.85	140	261	59	87	9.0
11		1438	256.51	.53	.72	.72	140	260	59	87	8.0
12		1440	257.47	.53	.72	.72	140	260	59	87	8.0

STACK SAMPLING FIELD DATA SHEET

ACE AIR CONSULTING & ENGINEERING, INC.
2106 N. W. 67th PLACE · Suites 9 & 10
GAINESVILLE, FLORIDA · 32606

TEST ID SC2C3AS
PAGE 1 OF 3

PLANT Sugar Cane Growers Coop.
SOURCE Boiler #2
PLANT LOCATION Belle Glade, Fla
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PARTICULATE
DATE 11-15-91 RUN NO. 3
TIME START 1521 TIME END 1704
SAMPLE TIME 2, 48 (min/pt) = 96 Total min
ASSUMED MOISTURE 18 % FDA .82
NOMOGRAPH C_f 1.35 PITOT CORR. .84
P_b 30.35 "Hg P_s 30.35 "Hg
WEATHER Clear TEMP. 78 °F
METER BOX NO. 1 H 2.15 Y 1.004
NOZZLE CAL. .20 .20 .20 = .200
STACK DIMENSIONS 52" x 2 stacks
STACK AREA 29.496 ft² EFFECTIVE ____ ft²
STACK HEIGHT ____ ft.
STACK DIAMETER: UPSTRM. ____ DNSTRM. ____
PORT SIZE ____ in. NIPPLE LENGTH ____ in.
U CORD LENGTH ____
REMARKS: ____

MAT'L PROCESSING RATE ____
GAS METER READINGS: FINAL 315.162 ft.³
INITIAL 257.749 ft.³
NET 57.413 ft.³
FILTER NO. 3463 IMP. VOL. GAIN 2400 ml.
SIL GEL NO. 129 WT. GAIN 127 ml.
TOTAL CONDENSATE 2527 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2	7.0	7.0			7.0
% O_2	13.0	13.0			13.0
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS
PRE 0.01 cfm 15 "Hg POST 0.00 cfm 15 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. 59 PRE-TEST OK
POST-TEST(+) 0.01 / 15 H_2O/Sec
POST-TEST(−) 0.00 / 15 H_2O/Sec
PYROMETER NO. 2
BOX OPERATOR [illegible] PROBE HOLDER NECK

PORT AND TRAVERSE POINT NUMBER South	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. F	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-1	15	1423	259.40	1.60	2.16	2.16	133	230	53	83	10.0
2	↓	1425	260.31	1.60	2.16	2.16	133	230	53	83	10.0
3		1427	261.29	1.60	2.16	2.16	133	230	53	83	10.0
4		1429	262.00	1.70	2.30	2.30	135	248	53	83	10.0
5		1431	264.81	1.70	2.30	2.30	136	249	52	83	10.0
6		1433	266.54	1.70	2.30	2.30	136	250	52	83	11.0

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC2C3A5

PAGE 2 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
SOUTH 1-1	15	1435	267.83	1.10	1.49	1.49	137	272	58	83	8.5
2		1437	268.91	1.10	1.49	1.49	138	272	58	83	8.5
9		1439	270.21	1.75	1.01	1.01	138	275	58	83	8.0
10		1441	271.40	.65	.88	.88	138	275	58	83	8.0
11		1443	272.11	.61	.82	.82	139	274	59	84	6.0
12		1445	273.15	.61	.82	.82	140	274	59	84	6.0
2-1		1449	274.26	.85	1.15	1.15	140	275	59	85	7.0
2		1451	275.12	1.10	1.49	1.49	140	275	59	85	7.0
3		1453	276.31	1.10	1.49	1.49	140	278	59	85	7.0
4		1455	277.82	1.30	1.76	1.76	139	275	59	85	10.0
5		1457	279.00	1.30	1.76	1.76	139	275	59	85	10.0
6		1459	280.41	1.50	2.02	2.02	138	274	56	85	11.0
7		1501	282.01	1.50	2.02	2.02	138	273	56	85	11.0
8		1503	283.30	1.20	1.62	1.62	141	263	57	85	10.0
9		1505	284.51	1.00	1.35	1.35	141	263	57	86	10.0
10		1507	285.60	.85	1.15	1.15	140	258	57	86	9.0
11		1509	286.70	.80	1.08	1.08	140	258	58	86	8.5
12		1511	287.90	.80	1.08	1.08	140	258	58	86	8.5
NORTH 1-1		1617	288.81	1.00	1.35	1.35	138	268	58	86	10.0
2		1619	289.99	1.00	1.35	1.35	138	268	59	86	10.0
3		1621	291.10	1.00	1.35	1.35	138	268	59	86	10.0
4		1623	292.62	1.20	1.62	1.62	139	275	59	86	11.5
5		1625	293.86	1.30	1.76	1.76	140	275	60	86	12.0
6		1627	295.11	1.10	1.49	1.49	140	274	60	86	11.5
7		1629	296.41	1.10	1.49	1.49	141	273	60	86	11.5
8		1631	297.52	1.10	1.49	1.49	141	273	60	86	11.5
9		1633	298.61	.80	1.08	1.08	140	273	60	86	11.0

AGS AIR CONSULTING & ENGINEERING, INC.

TEST ID SC-2C3AS

PAGE 3 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	METER ORIFICE PRESS. DIFF. ("H_2O) ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
NORTH 1-10		1635	299.63	.60	.81	.81	139	275	59	87	7.0
11		1637	300.70	.60	.81	.81	139	274	60	87	7.0
12		1639	301.62	.60	.81	.81	139	273	60	87	7.0
2-1		1642	302.61	1.20	1.62	1.62	140	270	61	87	11.0
2		1644	303.90	1.20	1.62	1.62	140	269	61	87	11.0
3		1646	305.41	1.10	1.49	1.49	140	268	61	87	12.0
4		1648	306.32	1.25	1.69	1.69	140	266	61	88	13.0
5		1650	307.68	1.20	1.62	1.62	140	265	62	88	13.0
6		1652	308.96	1.10	1.49	1.49	140	264	62	88	12.5
7		1654	310.01	1.10	1.49	1.49	142	266	62	88	12.5
8		1656	311.41	1.10	1.49	1.49	140	265	62	88	12.5
9		1658	312.32	.85	1.15	1.15	141	265	60	88	10.0
10		1700	313.40	.60	.81	.81	143	267	60	88	9.5
11		1702	314.52	.53	.70	.70	142	267	60	88	8.5
12		1704	315.16	.52	.70	.70	142	266	60	88	8.5

APPENDIX C

LABORATORY ANALYSIS

AIR CONSULTING & ENGINEERING, inc.

PARTICULATE LAB DATA

SOURCE SUGAR GROWER'S CO-OP UNIT #2

PROBE RINSE	RUN 1	RUN 2	RUN 3	BLANK	
CONTAINER NUMBER	5-15	5-18	5-21	5-27	
TOTAL VOLUME (ml)	225	200	175	265	LIQUID LEVEL ✓
1st GROSS WEIGHT (g)	102.3578	105.3411	104.3310	104.8230	DATE & TIME: 11-18-91 07.30
2nd GROSS WEIGHT (g)	102.3580	105.3410	104.3310	104.8231	DATE & TIME: 11-13-91 15.15
AVERAGE GROSS WEIGHT (g)	102.3579	105.3410	104.3310	104.8230	
TARE WEIGHT (g)	102.3007	105.3060	104.3052	104.8229	
SUB NET WEIGHT (g)	0.0572	0.035	0.0258	0.0001	
ACETONE BLANK (g)	—	—	—	—	
TOTAL NET WEIGHT (mg)	57.2	35.0	25.8	.1	

NOTE: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

FILTER	RUN 1	RUN 2	RUN 3	BLANK	
FILTER NUMBER	3460	3462	3463	3464	
1st GROSS WEIGHT (g)	0.5885	0.5712	0.5722	0.4250	DATE & TIME: 11-19-91 09.30
2nd GROSS WEIGHT (g)	0.5881	0.5710	0.5720	0.4250	DATE & TIME: 11-19-91 16.15
AVERAGE GROSS WEIGHT (g)	0.5883	0.5711	0.5721	0.4250	
TARE WEIGHT (g)	0.4201	0.4245	0.4240	0.4253	
SUB NET WEIGHT (g)	0.1682	0.1466	0.1481	-.0003	
TOTAL NET WEIGHT (mg)	168.2	146.6	148.1	-.3	

TARE BALANCE CHECK

SEE LAB BOOK

1st GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓

0.5 g ✓ 100.0g ✓

%RH 65 DATE 11-18-91

Signature Christy L. Peck

2nd GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓

0.5g ✓ 100.0g ✓

%RH 62 DATE 11-18-91

Signature Christy L. Peck

APPENDIX D

PRODUCTION RATE CERTIFICATION

AIR CONSULTING & ENGINEERING, INC.
Complete Emission Data

PLANT:	SUGAR CANE GROWERS COOPERATIVE	DATE:	11-15-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	1
SOURCE:	NUMBER 2 BOILER, SCRUBBER OUTLET	TIME:	0957-1153

TIME INTERVAL	116	MINUTES
OIL:		
FINAL OIL	452	
BEGIN OIL	421	
FACTOR	10	
STEAM:		
FINAL STEAM	477333	
BEGIN STEAM	477189	
FACTOR	1600	
TEMPERATURE	560	DEGREES F
PRESSURE	428	PSIG
	443	PSIA
FEEDWATER:		
TEMPERATURE	260	DEGREES F
PRESSURE	600	PSIG
	615	PSIA
HEAT INPUT:		
STEAM	1279.0	BTU/LB
FEEDWATER	228.6	BTU/LB
NET STEAM	1050.4	BTU/LB
STEAM RATE	119172	LB/HR
BOILER EFFICIENCY	62.5	%
TOTAL FUEL HEAT INPUT	200.29	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	160.34	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	24.05	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	176.23	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.25	LB/MMBTU
TOTAL ALLOWABLE EMISSION	46.46	LB/HR
TOTAL ACTUAL EMISSION	41.32	LB/HR
TOTAL ALLOWABLE EMISSION	0.232	LB/MMBTU
TOTAL ACTUAL EMISSION	0.206	LB/MMBTU

AIR CONSULTING & ENGINEERING, INC.
Complete Emission Data

PLANT:	SUGAR CANE GROWERS COOPERATIVE	DATE:	11-15-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	2
SOURCE:	NUMBER 2 BOILER, SCRUBBER OUTLET	TIME:	1256-1446

TIME INTERVAL	110	MINUTES
OIL:		
FINAL OIL	499	
BEGIN OIL	470	
FACTOR	10	
STEAM:		
FINAL STEAM	477551	
BEGIN STEAM	477414	
FACTOR	1600	
TEMPERATURE	570	DEGREES F
PRESSURE	427	PSIG
	442	PSIA
FEEDWATER:		
TEMPERATURE	260	DEGREES F
PRESSURE	600	PSIG
	615	PSIA
HEAT INPUT:		
STEAM	1283.5	BTU/LB
FEEDWATER	228.6	BTU/LB
NET STEAM	1054.9	BTU/LB
STEAM RATE	119564	LB/HR
BOILER EFFICIENCY	62.5	%
TOTAL FUEL HEAT INPUT	201.80	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	158.18	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	23.73	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	178.08	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.25	LB/MMBTU
TOTAL ALLOWABLE EMISSION	46.89	LB/HR
TOTAL ACTUAL EMISSION	34.28	LB/HR
TOTAL ALLOWABLE EMISSION	0.232	LB/MMBTU
TOTAL ACTUAL EMISSION	0.170	LB/MMBTU

AIR CONSULTING & ENGINEERING, INC.
Complete Emission Data

PLANT:	SUGAR CANE GROWERS COOPERATIVE	DATE:	11-15-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	3
SOURCE:	NUMBER 2 BOILER, SCRUBBER OUTLET	TIME:	1519-1709

TIME INTERVAL	110	MINUTES
OIL:		
FINAL OIL	537	
BEGIN OIL	508	
FACTOR	10	
STEAM:		
FINAL STEAM	477727	
BEGIN STEAM	477590	
FACTOR	1600	
TEMPERATURE	560	DEGREES F
PRESSURE	428	PSIG
	443	PSIA
FEEDWATER:		
TEMPERATURE	260	DEGREES F
PRESSURE	600	PSIG
	615	PSIA
HEAT INPUT:		
STEAM	1282.5	BTU/LB
FEEDWATER	228.6	BTU/LB
NET STEAM	1053.9	BTU/LB
STEAM RATE	119564	LB/HR
BOILER EFFICIENCY	62.5	%
TOTAL FUEL HEAT INPUT	201.61	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	158.18	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	23.73	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	177.89	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.25	LB/MMBTU
TOTAL ALLOWABLE EMISSION	46.84	LB/HR
TOTAL ACTUAL EMISSION	33.12	LB/HR
TOTAL ALLOWABLE EMISSION	0.232	LB/MMBTU
TOTAL ACTUAL EMISSION	0.164	LB/MMBTU

Avg
158.90

23.84
177.40
201.24

BOILER OPERATION PARAMETERS

PLANT Sugar Cane Growers Coop. of Fla. BOILER NUMBER 2

DATE 11-15-91 RUN NUMBER 1 OIL METER FACTOR 10

STEAM INTEGRATOR FACTOR 1600 SCRUBBER(S) PRESS.DROP ___, ___

SCRUBBER(S) GPM _____, _____

OPERATOR SIGNATURE [illegible] SCRUBBER(S)H2O LEVEL _____, _____

Ph(if applicable) _____, _____

INITIAL INTEGRATOR 477189 FINAL INTEGRATOR 477333

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
0957 0957	04200	180 000	560	430	260	600
10:17		120 000	560	420	260	600
10:37		120 000	560	420	260	600
10:57		120 000	560	430	260	600
11:17		120 000	560	430	260	600
11:37		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1153	04520					

BOILER OPERATION PARAMETERS

PLANT Sugar Cane Growers Coop

BOILER NUMBER 2

DATE 11-15-91 RUN NUMBER 2

OIL METER FACTOR 10

STEAM INTEGRATOR FACTOR 1600

SCRUBBER(S) PRESS.DROP ____, ____

SCRUBBER(S) GPM _____, _____

OPERATOR SIGNATURE [illegible]

SCRUBBER(S)H2O LEVEL _____, ____

Ph(if applicable) _____, _____

INITIAL INTEGRATOR 477414

FINAL INTEGRATOR 477551

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
1256	0470	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2:46	0499					

BOILER OPERATION PARAMETERS

PLANT Sugar Cane Growers Coop

BOILER NUMBER 2

DATE 11-15-91 RUN NUMBER 3

OIL METER FACTOR 10

STEAM INTEGRATOR FACTOR 1600

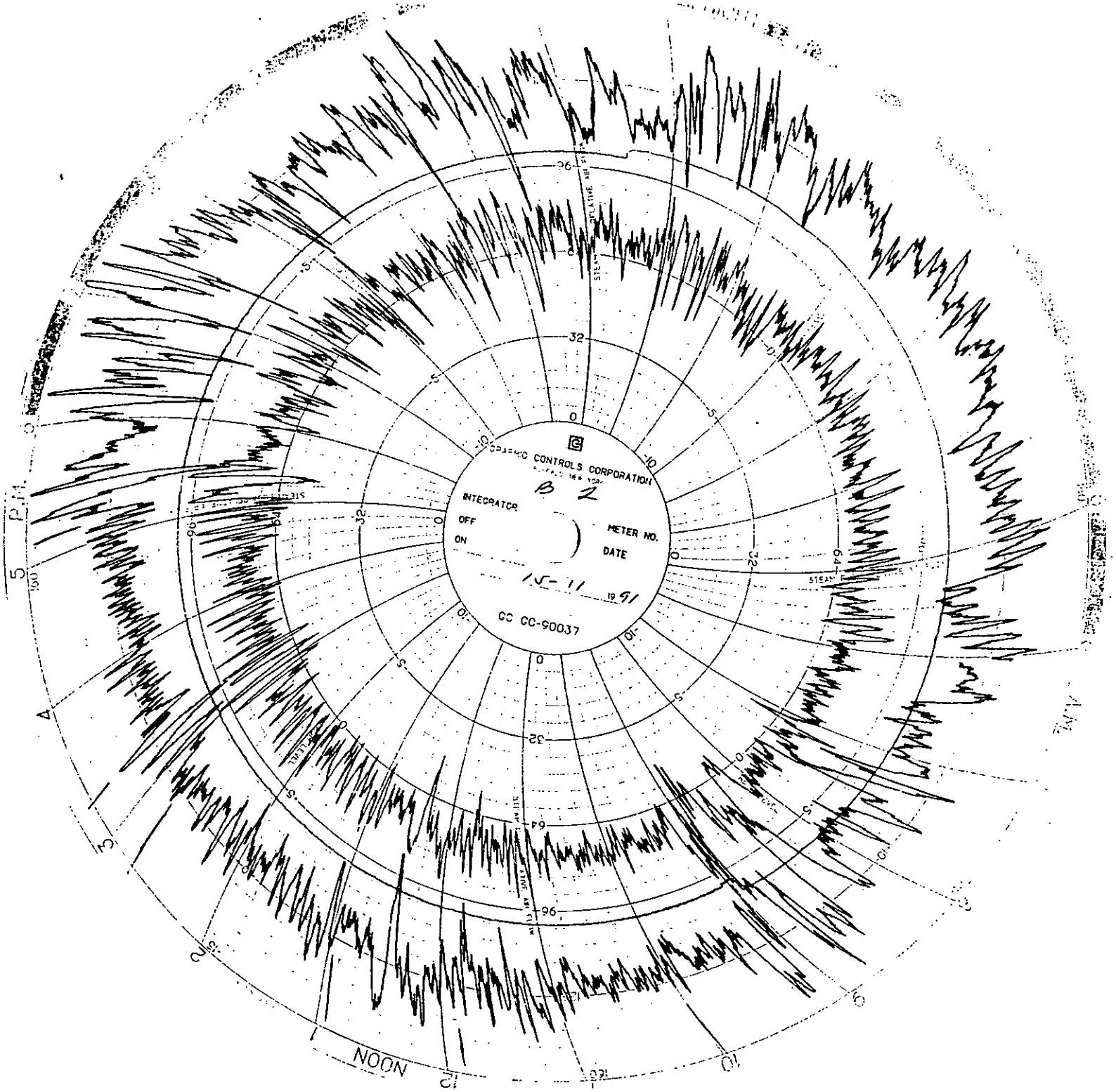
SCRUBBER(S) PRESS.DROP ____, ____
SCRUBBER(S) GPM _____, _____
SCRUBBER(S)H2O LEVEL _____, ____
Ph(if applicable) _____, _____

OPERATOR SIGNATURE [illegible]

INITIAL INTEGRATOR 477590

FINAL INTEGRATOR ~~477270~~ 477720 10 11-15

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
3:19	0508	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5:09	0537					


CONTROLS CORPORATION
B 2
INTEGRATOR
OFF
ON
METER NO.
DATE
15-11 1991
CC CC-90037
NOON
P.M.

APPENDIX E

QUALITY ASSURANCE AND CHAIN OF CUSTODY

STANDARD METER CALIBRATION
Meter Number 691751

Air Consulting and Engineering, Inc. (ACE) uses a dry gas meter for the calibration standard. This meter has been calibrated against a wet test meter in triplicate. This data was used to generate a standard meter calibration curve (see next page). Field meter calibrations are corrected to this curve using the following formula:

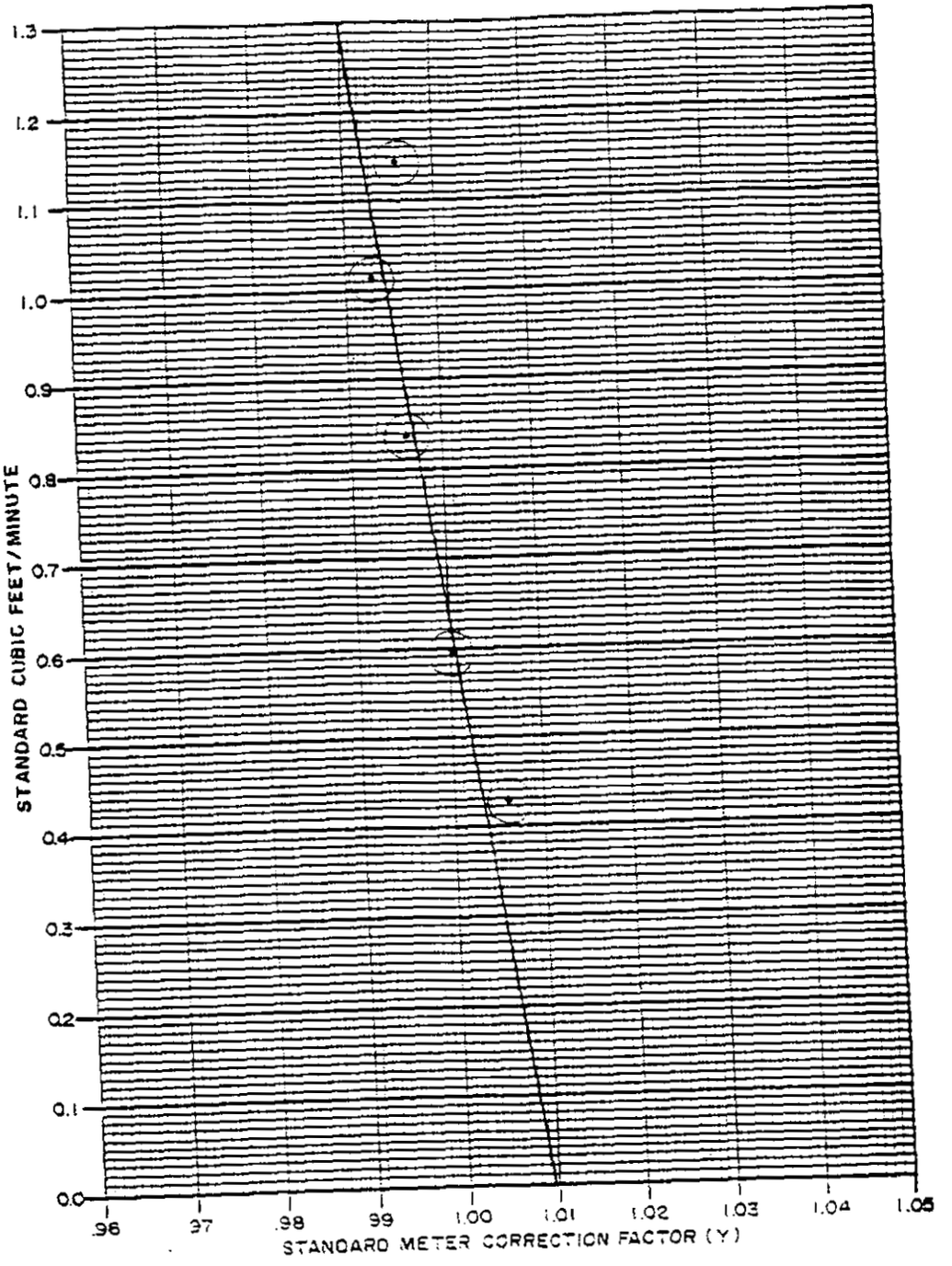
$$Y_a \times Y_s = Y$$

Y_a = actual ratio of field meter to standard meter

Y_s = ratio of standard meter to wet test meter at a given flow rate (from Calibration Curve)

Y = corrected ratio of field meter

The dry standard meter was calibrated on June 11, 1991, and is checked and/or recalibrated at least annually.



STANDARD METER CALIBRATION CURVE

JUNE 11, 1991

AIR CONSULTING and ENGINEERING

AIR CONSULTING & ENGINEERING — STANDARD METER CALIBRATION

DATE 6-11-91

LEAK CHECK 0.000 CFM at 12 In. Hg.

METER SERIAL NUMBER 691751

BAROMETRIC PRESSURE 30.14 In. Hg.

STD GAS METER TEMPERATURE 74 °F/ ASTM GLASS THERMOMETER TEMPERATURE 73 °F

WET ΔH	STD ΔH	GAS VOLUME, WET TEST METER			GAS VOLUME, STD GAS METER			TEMP. WET TEST METER (°F)	TEMP. OF STD METER (°F)	TIME (Minutes)
		INITIAL	FINAL	ACTUAL ft³	INITIAL	FINAL	ACTUAL ft³			
-.2	-.64	0.0	5.608	5.608	852.005	857.616	5.611	74	76	13
-.2	-.64	5.608	11.211	5.603	857.616	863.196	5.580	74	75	13
-.2	-.64	11.211	16.806	5.595	863.196	868.765	5.564	74	74	13
-.4	-1.02	0.0	6.029	6.029	871.027	877.049	6.042	74	73	10
-.4	-1.02	6.029	11.441	5.412	877.049	882.455	5.406	74	73	9
-.4	-1.02	11.441	16.834	5.393	882.455	887.858	5.403	74	73	9
-.5	-1.6	0.0	6.721	6.721	888.354	895.128	6.774	73	73	8
-.5	-1.6	6.721	11.750	5.029	895.128	900.193	5.065	73	73	6
-.5	-1.6	11.750	16.770	5.020	900.193	905.257	5.064	73	73	6
-.6	-2.2	0.0	5.071	5.071	905.727	910.862	5.135	73	73	5
-.6	-2.2	5.071	10.132	5.061	910.862	915.992	5.130	73	73	5
-.6	-2.2	10.132	15.192	5.060	915.992	921.117	5.125	73	73	5
-.7	-2.7	0.0	5.773	5.773	921.694	927.543	5.849	74	74	5
-.7	-2.7	5.773	11.512	5.739	927.543	933.343	5.800	74	74	5
-.7	-2.7	11.512	17.230	5.718	933.343	939.128	5.758	74	74	5

CALIBRATED BY: H. F. Hebel

	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM
Run 1	1.005	0.430	0.998	0.601	0.996	0.838	0.993	1.012	0.994	1.150
Run 2	1.008	0.429	1.002	0.599	0.997	0.836	0.992	1.010	0.996	1.143
Run 3	1.006	0.429	0.999	0.597	0.995	0.835	0.993	1.010	1.000	1.139
Average	1.006	0.429	1.000	0.599	0.996	0.836	0.993	1.011	0.996	1.144

air consulting and engineering

AIR CONSULTING & ENGINEERING — ANNUAL METER CALIBRATION

DATE 6-14-91

LEAK CHECK 0.000 CFM at 14 In. Hg.

METER BOX NUMBER #1

BAROMETRIC PRESSURE 30.10 In. Hg.

DRY GAS METER TEMPERATURE 87 °F/ASTM GLASS THERMOMETER TEMPERATURE 88 °F

ΔHS	AVERAGE ΔHD	GAS VOLUME, STANDARD METER			GAS VOLUME, DRY GAS METER			TEMP. STD METER	TEMP. OF DRY METER	TIME (Minutes)	TIMER
		INITIAL	FINAL	ACTUAL ft^3	INITIAL	FINAL	ACTUAL ft^3				
-.06	.5	977.651	983.301	5.650	884.756	890.239	5.483	87	88	15	15
-.12	1.0	971.708	977.548	5.840	878.739	884.547	5.808	86	87	11	11
-.16	1.5	985.835	993.630	7.795	892.764	900.523	7.759	88	89	12	12
-.23	2.0	993.630	1000.397	6.767	900.523	907.262	6.739	88	89	9	9
-.33	3.0	1000.397	1006.790	6.393	907.262	913.626	6.364	89	90	7	7
-.47	4.0	1007.008	1012.339	5.331	913.950	919.144	5.194	89	91	5	5

	DELTA H	Ya	SCFM	Ys	Y
	2.026	1.031	0.366	1.000	1.031
	2.036	1.005	0.516	0.998	1.003
	2.048	1.003	0.630	0.996	0.999
	2.038	1.001	0.729	0.994	0.995
	2.076	0.999	0.884	0.991	0.990
	2.027	1.020	1.032	0.988	1.008
MEAN:	2.042	1.010		0.995	1.004

CALIBRATED BY: Greg R. Brown

AIR CONSULTING & ENGINEERING, inc.

POST TEST CALIBRATION

DATE 11-28-91 METER BOX NUMBER 1 LEAK CHECK 0.000 CFM at 20 in. Hg.

CLIENT Sugar Cane Growers Co-op SOURCE All THERMOCOUPLE NUMBER ATK 2 PYROMETER NUMBER 88

FLIGHT SERVICE Pb 30.18 in. Hg. ACE BAROMETER Pb 30.30 in. Hg.

ASTM GLASS THERMOMETER 150 °F / THERMOCOUPLE 150 °F ASTM GLASS THERMOMETER 75 °F / METER TEMP 76 °F

ΔHS	AVERAGE ΔHD	GAS VOLUME, STANDARD METER			GAS VOLUME, DRY GAS METER			TEMP. STANDARD METER	TEMP. OF DRY METER	TIME (Minutes)	MAX. VACUUM In. Hg.
		INITIAL	FINAL	ACTUAL ft^3	INITIAL	FINAL	ACTUAL ft^3				
.82	1.2	396.050	410.553	14.503	589.332	604.342	15.010	75 76 75.5	75 79 77	27	23
1.1	1.8	411.948	447.738	35.99	605.777	642.838	37.061	77 79 78	79 91 85	56	15
1.2	2.0	448.113	484.770	36.657	643.230	681.586	38.356	79 79 79	91 93 92	52	18.5

CALIBRATED BY: S L [illegible]

RUN NUMBER	SCFM	STANDARD M.C.F.	DELTA Ha	M.C.F.
1	0.53	1.005	2.338	0.971
2	0.63	1.005	2.464	0.979
3	0.69	1.005	2.230	0.979
AVERAGES	0.62	1.005	2.344	0.976

air consulting and engineering

AIR CONSULTING & ENGINEERING, INC. — PITOT TUBE CALIBRATION

DATE CALIBRATED 10-7-91

PITOT TUBE 59

IS PITOT TUBE ASSEMBLY LEVEL YES

ARE PITOT TUBE OPENINGS DAMAGED NO

α_1 = 0 °(<10°), α_2 = 1 °(<10°), β_1 = 2 °(<5°), β_2 = 1 °(<5°)

γ = 1 ° θ = 1 ° A = 1.165 in. = (Pa + Pb)

z = A sin γ = 0.017 in.; <0.32/<1/8 in.

w = A sin θ = 0.017 in.; <0.08/<1/32 in.

P_a 0.583 in. P_b 0.582 in. D_t .375

WAS CALIBRATION REQUIRED no

THERMOCOUPLE CALIBRATION

SOURCE (SPECIFY)	ASTM GLASS THERMOMETER WITH MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	42	42	0	0
AMBIENT	78	78	0	0
HOT OVEN	402	400	2	0.38

FDER - MAXIMUM 5° DIFFERENCE

CALIBRATED BY: Lil Carter

EPA $\left[\frac{(\text{REF. TEMP. °F} + 460°) - (\text{PYROMETER TEMP. °F} + 460°)}{\text{REF. TEMP. °F} + 460°}\right] 100 \leq 1.5\%$

AIR CONSULTING & ENGINEERING, INC. PYROMETER CALIBRATION

DATE 10-1-90

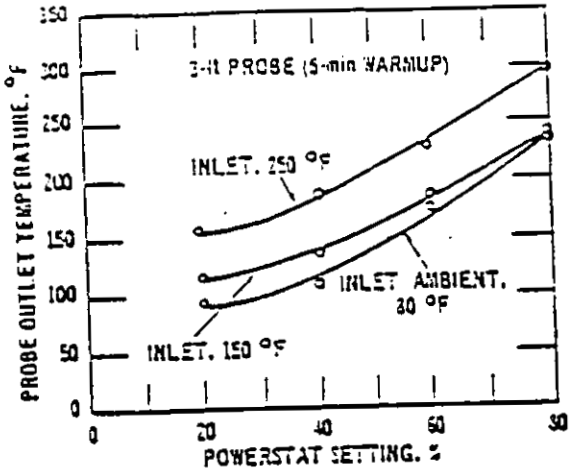
PYROMETER NUMBER Atkins #2

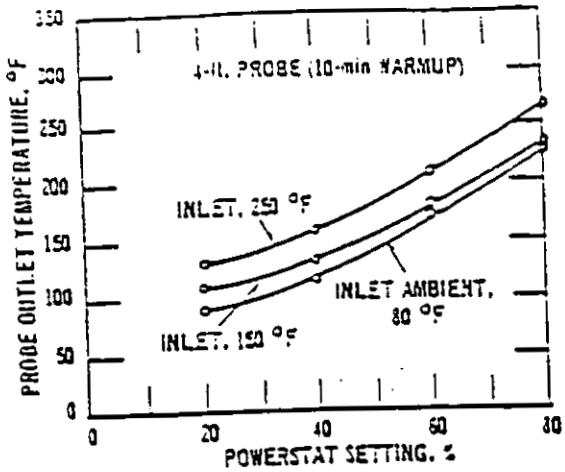
SOURCE (SPECIFY)	GLASS THERMOMETER WITH NBS MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	42	41	1	0.2
AMBIENT	88	88	0	0.0
HOT OVEN	345	344	1	0.2

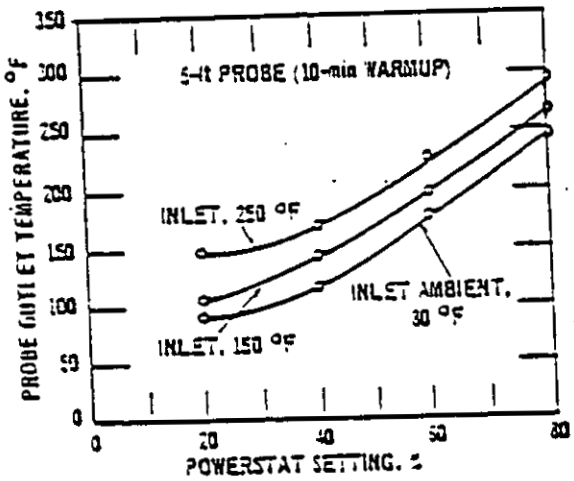
FDER - MAXIMUM 5° DIFFERENCE

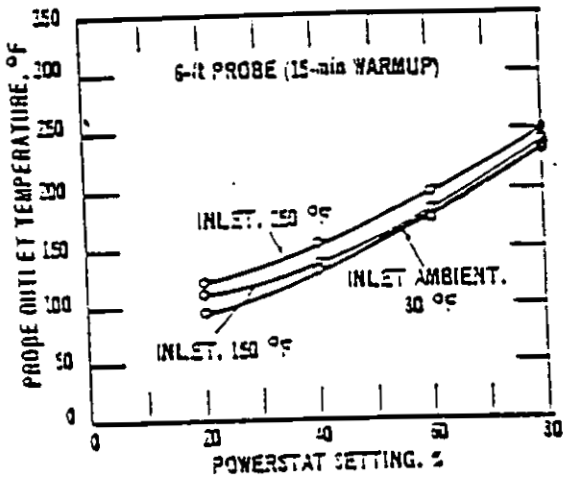
EPA $\left[\frac{(\text{REF. TEMP. °F} + 460°) - (\text{PYROMETER TEMP. °F} + 460°)}{\text{REF. TEMP. °F} + 460°}\right] 100 \leq 1.5\%$

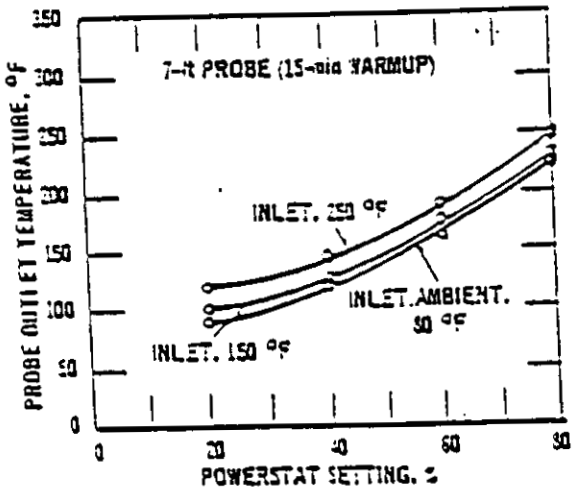
CALIBRATED BY: Sid Carter











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

Probe temperatures.

AIR CONSULTING AND ENGINEERING, Inc.

SAMPLE RECOVERY AND CHAIN OF CUSTODY

PLANT NAME SLGCL
TEST DATE 11/15/91
SOURCE NAME NO. 2 BOILER
SAMPLE RECOVERED BY G.G.
TYPE OF SAMPLE PM
PARTICULATE ANALYSES BY ~~G~~ CLH

SAMPLE RECOVERY

RUN NO.	CONTAINER NO.	LIQUID LEVEL MARKED	COLOR	COMMENTS
1	S-15	✓	MED.	
1	3460	–	BLACK	
2	S-18	✓	"	
2	2462	–	"	
3	S-21	✓	"	
3	3463	–	"	
ACETONE / WATER BLANK (CIRCLE)	S-27	✓	~~Y~~ CLEAR	
FILTER BLANK	3464	–	WH.	

SILICA GEL

RUN NO.	CONTAINER NO.	FINAL WT. (g)	INIT. WT. (g)	NET WT. (g)	COLOR
1	96	212.4	200.0	12.4	PINK
2	12	211.3	200.0	11.3	"
3	129	212.7	200.0	12.7	"
			200.0		
			200.0		
			200.0		
			200.0		
			200.0		

APPENDIX F

PROJECT PARTICIPANTS

PROJECT PARTICIPANTS

AIR CONSULTING AND ENGINEERING, INC.

Stephen L. Neck, P.E.
Project Manager
Field Testing

Gerard Gauthreaux
Field Participant

Christy Neck
Laboratory Analysis

Dagmar Neck
Report Preparation

Candace V. Taylor
Document Production

SUGAR CANE GROWERS

Jose Alvarez
Test Coordinator

Blas Marin
Test Coordinator

FDER

Ken Tucker
Test Observer

Sterling Jordan
Test Observer

PALM BEACH COUNTY

Jeffrey K. Koerner
Test Observer

David Brown
Test Observer