AP-42 Section Number: 1.8

Reference Number: 41

Title: Source Test Report for Particulate Emissions Twin Impingement Wet Scrubbers Boiler Number 3

November 1991

05W1-SCGC12

SOURCE TEST REPORT
for
PARTICULATE EMISSIONS

TWIN IMPINGEMENT WET SCRUBBERS
BOILER NUMBER 3

NOVEMBER 21, 1991

Prepared for:

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

Prepared by:

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236-91-03

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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

12/30/91

Date

1.0 INTRODUCTION

On November 21, 1991, Air Consulting and Engineering, Inc. (ACE), conducted particulate emission testing on the Wet Scrubber Outlet of Boiler 3 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 and Mr. Sterling Jordan 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 3 demonstrated compliance with the permit conditions.

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

Particulate emissions averaged 35.53 pounds per hour (lbs/Hr) and 0.181 pounds per million BTU (lbs/MMBTU) which is within the allowable emissions of 45.78 lbs/Hr and 0.233 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 3
Sugar Cane Growers Cooperative of Florida
Belle Glade, Florida
November 21, 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	58456	149	28.0	40.43	0.211	46.12	0.241
2	55686	157	27.1	30.79	0.159	44.16	0.228
3	54050	157	27.1	35.36	0.174	47.06	0.231
AVERAGE	56064	154	27.4	35.53	0.181	45.78	0.233

3.0 PROCESS DESCRIPTION AND OPERATION

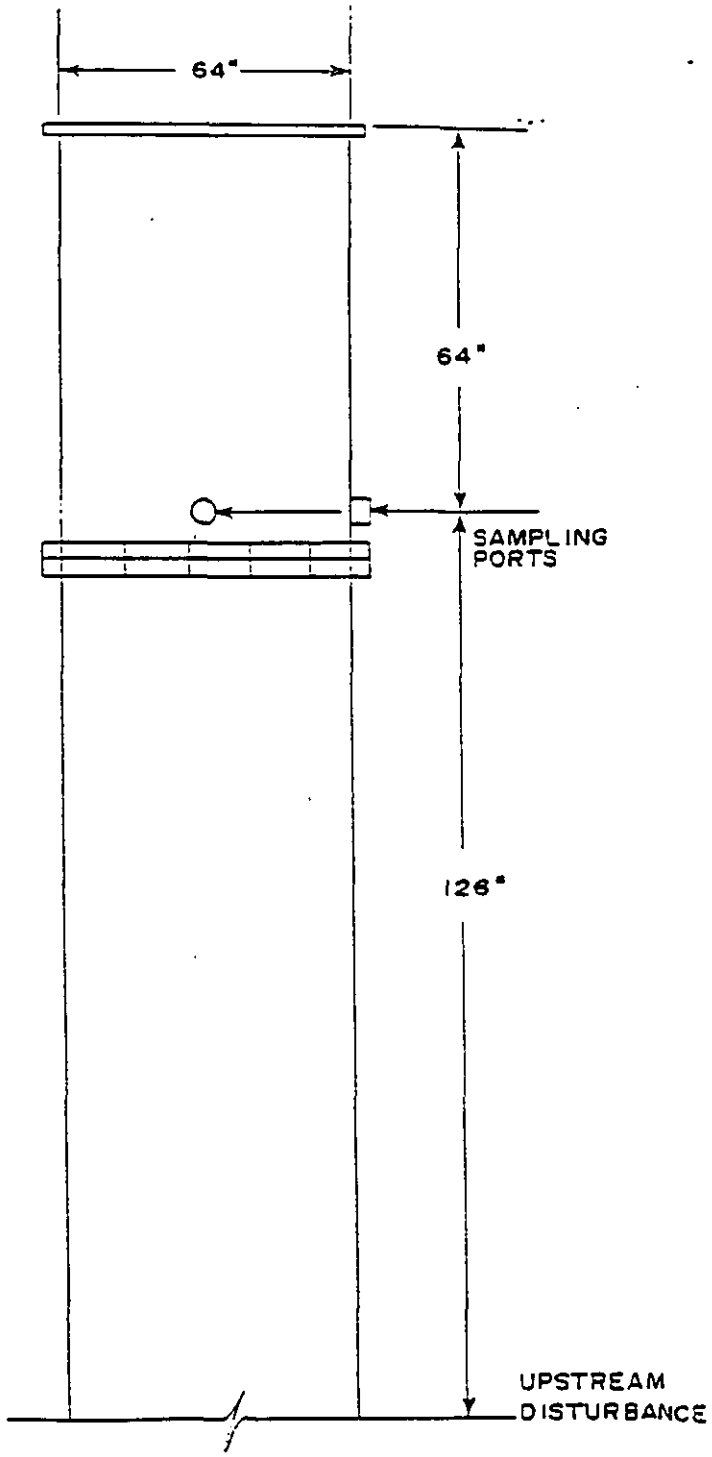
The Number 3 Boiler at Sugar Cane Growers is a spreader stoker design used primarily for residue fuel firing. Supplemental oil firing was also utilized for the emission test. The boiler averaged 102,676 lbs/Hr steam production over the three run test period.

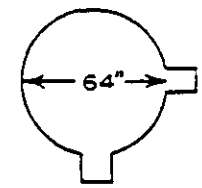
Oil meters, steam integrators, and other production monitoring devices were rigorously calibrated prior to the production season.

4.0 SAMPLING POINT LOCATION

The sampling point location (Figure 1) consists of dual scrubber outlet stacks, each 64" in diameter. Each stack has two sample ports 90 degrees apart. The ports on the south stack are located 126 from an upstream disturbance and 64" 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	1.4
2	4.3
3	7.6
4	11.3
5	16.0
6	22.8
7	41.2
8	48.0
9	52.7
10	56.4
11	59.7
12	62.6

NOTE: NOT TO SCALE

FIGURE 1.
SAMPLING POINT LOCATION
BOILER NO. 3
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

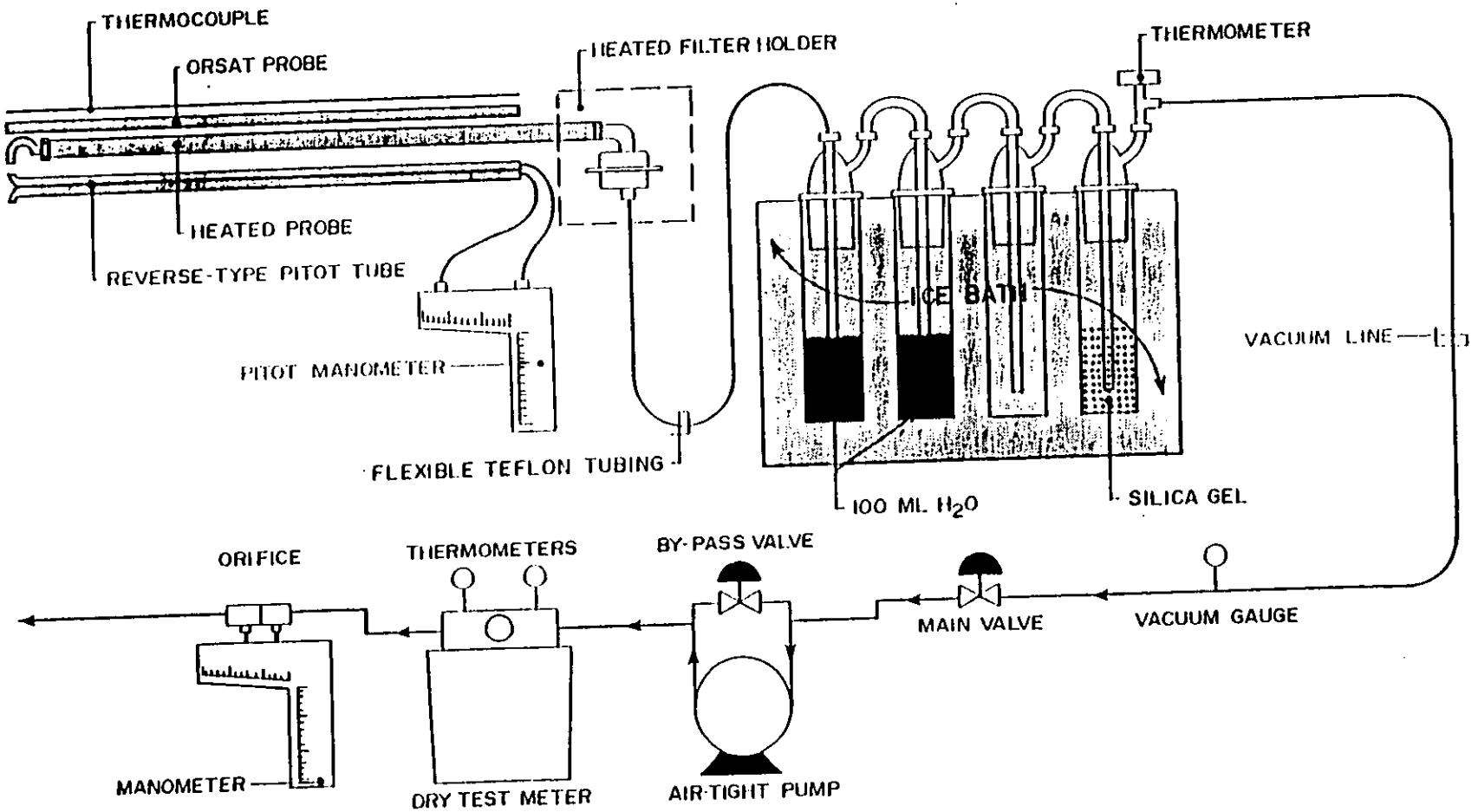

FIGURE 1.
EPA METHOD 5 SAMPLING TRAIN

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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

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COMPLETE EMISSION DATA

PLANT: SUGAR CANE GROWERS COOPERATIVE OF FLORIDA
SOURCE: NUMBER 3 BOILER SCRUBBER OUTLET
DATE: 11-21-91

RUN NO.:	1	IMPINGER ml	278
BEGIN TIME:	819	SILICA GEL gms.	9.6
END TIME:	922	PERCENT O2	10.2
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	10.0
BAROMETRIC PRESSURE:	30.30 "Hg	"F" FACTOR	N/A
STACK PRESSURE:	30.30 "Hg.		
NOZZLE DIAMETER:	.202 inches	PARTICULATE	
METER CORR. FACTOR:	1.004		
FINAL METER:	804.610 cubic ft.	FILTER mg.	113.1
INITIAL METER:	769.470 cubic ft.	WASH mg.	71.0
STACK AREA:	22.340 sq. ft.		

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.400	1.183	1.540	156	76
1-2	1.400	1.183	1.540	156	76
1-3	1.400	1.183	1.540	156	76
1-4	1.400	1.183	1.540	164	76
1-5	1.350	1.162	1.490	168	76
1-6	.850	0.922	.940	132	76
1-7	.870	0.933	.960	163	76
1-8	1.200	1.095	1.320	140	76
1-9	1.350	1.162	1.490	125	76
1-10	1.400	1.183	1.540	127	78
1-11	1.550	1.245	1.710	125	78
1-12	1.550	1.245	1.710	127	78
2-1	1.700	1.304	1.870	155	78
2-2	1.500	1.225	1.650	157	78
2-3	1.350	1.162	1.490	159	78
2-4	1.300	1.140	1.430	155	79
2-5	1.200	1.095	1.320	157	79
2-6	1.000	1.000	1.100	147	79
2-7	.790	0.889	.870	161	79
2-8	.850	0.922	.940	146	79
2-9	.950	0.975	1.05	155	79
2-10	1.100	1.049	1.210	160	79
2-11	1.100	1.049	1.210	140	79
2-12	1.100	1.049	1.210	149	79
AVERAGES	----------	1.106	1.375	149	78

RUN 1

NOZZLE AREA(SQ.FT.):	0.0002226		
AVG. VELOCITY HEAD :	--------	1.22 "H2O	VOL. FLOW ACFM : 92416
AVG. STACK TEMP.:	----------	149 F	VOL. FLOW SCFMD : 58456
AVG. METER TEMP.:	----------	78 F	
AVG. ORIFICE DIFFERENTIAL:	---	1.37 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:	---	35.206	
% H2O VAPOR:	:--------	28.0	POUNDS PER HOUR: 40.434
GAS MOL. WT. DRY:	----------	30.01	POUNDS PER SCF : 0.0000115
GAS MOL. WT. WET:	----------	26.65	GRAINS/SCF: 0.081
% EXCESS AIR:	----------	94.87	GRAINS/SCF @ 8% O2 0.098
AVG. STACK VEL.(FPS)	----------	68.95	GRAINS/SCF @50% EA 0.105
MMBTU INPUT:	----------	191.32	POUNDS PER MMBTU: 0.211
PERCENT ISOKINETIC :	----------	100.76	LBS/MMBTU"F"FACTOR 0.000

SAMPLE CALCULATIONS - RUN 1

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000223
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	68.95
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./ 13.6))/29.92)x(528/(Tm+460))	35.206
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+ SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	30.01
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.65
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)* 100	94.87
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts +460)/(PsxMwWET))!.5	68.95
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	100.76
VOL. FLOW (ACFM):	FPS x 60 x As	92416
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x (Ps/29.92)	58456
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/ SCF) x 60	40.434
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000115
GRAINS/SCF:	LB/SCF x 7000	0.0807
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0977
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.1048
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.211
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9 /20.9-%O2)	0.000

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: SUGAR CANE GROWERS COOPERATIVE OF FLORIDA
SOURCE: NUMBER 8 BOILER SCRUBBER OUTLET
DATE: 11-21-91

RUN NO.:	2	IMPINGER ml	241
BEGIN TIME.	1026	SILICA GEL gms.	7.4
END TIME:	1139	PERCENT O2	10.0
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	10.0
BAROMETRIC PRESSURE'	30.30 "Hg	"F" FACTOR	N/A
STACK PRESSURE:	30.30 "Hg.		
NOZZLE DIAMETER:	.202 inches	PARTICULATE	
METER CORR. FACTOR:	1.004	----------	
FINAL METER:	835.660 cubic ft.	FILTER mg.	77.1
INITIAL METER:	804.810 cubic ft.	WASH mg.	85.8
STACK AREA:	22.840 sq. ft.		

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.500	1.258	1.600	154	78
1-2	1.620	1.273	1.620	154	78
1-3	1.350	1.162	1.350	152	78
1-4	1.200	1.095	1.200	154	78
1-5	1.100	1.049	1.100	153	78
1-6	.900	0.949	.900	153	78
1-7	.600	0.775	.600	156	78
1-8	.730	0.854	.730	160	78
1-9	.870	0.933	.870	160	79
1-10	.910	0.954	.910	154	79
1-11	.930	0.964	.930	154	79
1-12	.930	0.964	.930	154	79
2-1	1.400	1.183	1.400	154	81
2-2	1.350	1.162	1.350	157	81
2-3	1.350	1.162	1.350	161	81
2-4	1.200	1.095	1.200	163	81
2-5	1.150	1.072	1.150	165	81
2-6	.730	0.854	.730	163	82
2-7	.800	0.894	.800	164	82
2-8	1.100	1.049	1.100	163	82
2-9	1.200	1.095	1.200	164	82
2-10	1.200	1.095	1.200	163	82
2-11	1.300	1.140	1.300	165	83
2-12	1.300	1.140	1.300	165	83
AVERAGES	----------	1.049	1.117	157	80

RUN 2

NOZZLE AREA(SQ.FT.):	0.0002226			
AVG VELOCITY HEAD :	---------	1.10 "H20	VOL. FLOW ACFM :	86105
AVG. STACK TEMP.:	---------	157 F	VOL. FLOW SCFMD :	55686
AVG. METER TEMP.:	---------	80 F		
AVG. ORIFICE DIFFERENTIAL:	---	1.12 "H20	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:	---	31.750	----------	
% H2O VAPOR:	---------	27.1	POUNDS PER HOUR.	30.786
GAS MOL. WT. DRY:	---------	30.00	POUNDS PER SCF :	0.0000092
GAS MOL. WT. WET:	---------	26.78	GRAINS/SCF:	0.064
% EXCESS AIR:	---------	99.93	GRAINS/SCF @ 8% O2	0.076
AVG. STACK VEL.(FPS)	---------	65.75	GRAINS/SCF @50% EA	0.082
MMBTU INPUT:	---------	193.78	POUNDS PER MMBTU:	0.159
PERCENT ISOKINETIC :	---------	98.39	LBS/MMBTU"F"FACTOR	0.000

SAMPLE CALCULATIONS - RUN 2

NOZZLE AREA (FT.2)	(Dn/12)^2x3.1416/4	0.000223
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)^2	65.73
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./13.6))/29.92)x(528/(Tm+460))	31.750
PERCENT H2O:	((IMF+SG)x(((IMF+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	30.00
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.75
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	89.93
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))^.5	65.73
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMExAn xPs x 60x(1-%O2/100)	95.39
VOL. FLOW (ACFM):	FPS x 60 x As	88105
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	55686
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	30.786
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000092
GRAINS/SCF:	LB/SCF x 7000	0.0645
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0783
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.0617
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.183
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.000

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: SUGAR CANE GROWERS COOPERATIVE OF FLORIDA
SOURCE: NUMBER 3 BOILER SCRUBBER OUTLET
DATE: 11-21-91

RUN NO..	3		IMPINGER ml	235
BEGIN TIME:	1241		SILICA GEL gms.	6.0
END TIME:	1346		PERCENT O2	9.7
TOTAL RUN TIME:	60.00	min.	PERCENT CO2	10.0
BAROMETRIC PRESSURE:	30.30	"Hg	"F" FACTOR	N/A
STACK PRESSURE:	30.30	"Hg.		
NOZZLE DIAMETER:	.202	inches	PARTICULATE	
METER CORR. FACTOR:	1.004			
FINAL METER:	868.727	cubic ft.	FILTER mg.	88.4
INITIAL METER:	837.620	cubic ft.	WASH mg.	63.8
STACK AREA:	22.340	sq. ft.		

Avg 10.0

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.300	1.140	1.300	161	61
1-2	1.300	1.140	1.300	161	61
1-3	1.300	1.140	1.300	161	61
1-4	1.300	1.140	1.300	160	61
1-5	1.200	1.095	1.200	164	61
1-6	.740	0.860	.740	164	61
1-7	.670	0.819	.670	163	62
1-8	1.000	1.000	1.000	159	62
1-9	1.200	1.095	1.200	158	62
1-10	1.200	1.095	1.200	154	64
1-11	1.300	1.140	1.300	163	64
1-12	1.300	1.140	1.300	161	64
2-1	1.450	1.204	1.450	164	66
2-2	1.400	1.183	1.400	155	66
2-3	1.200	1.095	1.200	156	65
2-4	1.100	1.049	1.100	161	66
2-5	1.000	1.000	1.000	163	65
2-6	.830	0.911	.830	155	66
2-7	.860	0.748	.860	160	66
2-8	.640	0.800	.640	158	66
2-9	.820	0.906	.820	147	66
2-10	.800	0.894	.800	153	67
2-11	.850	0.922	.850	163	67
2-12	.850	0.922	.850	155	67
AVERAGES	----------	1.018	1.055	157	64

RUN 3

Avg = 154

NOZZLE AREA(SQ.FT.):	0.0002226			
AVE. VELOCITY HEAD :	---------	1.04 "H2O	VOL. FLOW ACFM :	88826
AVG. STACK TEMP :	---------	157 F	VOL. FLOW SCFMD :	54050
AVG. METER TEMP.:	---------	64 F		
AVG. ORIFICE DIFFERENTIAL:	---	1.05 "H2O	PARTICULATE DATA :	
METER STANDARD CUBIC FEET.	---	30.776		
% H2O VAPOR:	:---------	27.1	POUNDS PER HOUR:	35.367
GAS MOL. WT. DRY:	---------	29.59	POUNDS PER SCF :	0.0000109
GAS MOL. WT. WET:	---------	26.74	GRAINS/SCF:	0.076
% EXCESS AIR:	---------	86.26	GRAINS/SCF @ 8% O2	0.098
AVG. STACK VEL.(FPS)	---------	63.81	GRAINS/SCF @50% EA	0.054
MMBTU INPUT:	---------	200.43	POUNDS PER MMBTU:	0.174
PERCENT ISOKINETIC	---------	96.26	LBS/MMBTU"F"FACTOR	0.000

Avg = 56,064

SAMPLE CALCULATIONS - RUN 3

NOZZLE AREA (FT.2)	(Dn/12)^2x3.1416/4	0.000223
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)^2	63.81
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.DRF.DIFF./13.6))/29.92)x(528/(Tm+460))	30.776
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.99
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.74
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	85.26
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))^.5	63.81
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	95.26
VOL. FLOW (ACFM):	FPS x 60 x As	68526
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	54050
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	38.357
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000109
GRAINS/SCF:	LB/SCF x 7000	0.0763
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0883
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E A.)/150)	0.0543
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.174
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-4O2)	0.000

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 SC3C1AS
PAGE 1 OF 2

PLANT Sugar Cane Growers Coop. of Fla.
SOURCE Boiler #3
PLANT LOCATION Belle Glade, Fla.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES P.M.
DATE 11-21-91 RUN NO. 1
TIME START 0819 TIME END 0922
SAMPLE TIME 2.5 / 24 (min/pt)= 60 Total min
ASSUMED MOISTURE 28 % FDA .72
NOMOGRAPH C_f 1.10 PITOT CORR. .84
P_b 30.30 "Hg P_s 30.30 "Hg
WEATHER PHy CLDY TEMP. 80 °F
METER BOX NO. 1 H 2.15 Y 1.004
NOZZLE CAL. .202 .202 .202 = .202
STACK DIMENSIONS 64"
STACK AREA 22.94 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 804.610 ft³
INITIAL 769.470 ft³
NET 35.140 ft³
FILTER NO. 3512 IMP. VOL. GAIN 278 ml.
SIL GEL NO. 20 WT. GAIN 9.6 ml.
TOTAL CONDENSATE 287.6 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2	10	10			10
% O_2	10.5	10			10.25
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST 0.005 cfm 15 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. ____ PRE-TEST OK
POST-TEST(+) 0.00 / 15 H_2O/Sec
POST-TEST(−) 0.00 / 15 H_2O/Sec
PYROMETER NO. 2
BOX OPERATOR Southerman PROBE HOLDER McFarland

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 1-1		0821	771.15	1.40	1.54	1.54	156	240	50	76	8.0
2		0824	772.50	1.40	1.54	1.64	156	240	50	76	8.0
3		0826	774.01	1.40	1.54	1.54	156	241	49	76	8.0
4		0829	775.66	1.40	1.54	1.54	164	238	51	76	9.0
5		0831	777.46	1.35	1.49	1.49	158	235	51	76	9.0
6		0834	778.50	.85	.94	.94	132	229	51	76	7.0

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC3C1AS

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)		STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP (°F)	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
1-7		0836	779.77	.87	.96	.96	163	243	50	76	7.0
8		0839	781.21	1.20	1.32	1.32	140	235	50	76	4.0
9		0841	783.20	1.35	1.49	1.49	125	233	56	76	10.0
10		0844	784.23	1.40	1.54	1.54	127	233	56	78	11.0
11		0846	785.81	1.55	1.71	1.71	125	237	56	78	12.0
12		0849	787.51	1.55	1.71	1.71	127	237	56	78	12.0
West											
2-1		0854	789.21	1.70	1.87	1.87	155	239	58	78	14.5
2		0857	790.91	1.50	1.65	1.65	157	237	59	78	13.5
3		0859	792.44	1.35	1.49	1.49	159	237	59	78	13.0
4		0802	793.91	1.30	1.43	1.43	155	234	59	79	12.5
5		0904	795.42	1.20	1.32	1.32	157	230	61	79	12.5
6		0907	796.81	1.00	1.10	1.10	147	230	61	79	11.0
7		0910	797.00	.79	.87	.87	161	234	60	79	10.0
8		0912	799.12	.85	.94	.94	146	234	61	79	10.0
9		0915	800.46	.95	1.05	1.05	155	233	61	79	11.0
10		0917	801.92	1.10	1.21	1.21	160	233	61	79	12.0
11		0920	803.20	1.10	1.21	1.21	140	233	61	79	12.5
12		0922	804.61	1.10	1.21	1.21	149	234	61	79	12.5

STACK SAMPLING FIELD DATA SHEET

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

TEST ID SC3C2AS
PAGE 1 OF 2

PLANT Sugar Cane Growers Coop. of Florida
SOURCE Boiler #3
PLANT LOCATION Belle Glade, Florida
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES P.M.
DATE 11-21-91 RUN NO. 2
TIME START 1026 TIME END 1129
SAMPLE TIME 2.5 / 24 (min/pt) = 60 Total min
ASSUMED MOISTURE 28 % FDA .72
NOMOGRAPH C_f 1.00 PITOT CORR. .84
P_b 30.30 "Hg P_g 30.30 "Hg
WEATHER PTLY CLDY TEMP. 80 °F
METER BOX NO. 1 H 2.15 Y 1.004
NOZZLE CAL. .202 .202 .202 = .202
STACK DIMENSIONS 64"
STACK AREA 22.34 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 836.660 ft³
INITIAL 804.810 ft³
NET 31.850 ft³
FILTER NO. 3513 IMP. VOL. GAIN 241.0 ml.
SIL GEL NO. 18 WT. GAIN 7.4 ml.
TOTAL CONDENSATE 248.4 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2	10.0	10.0			10.0
% O_2	10.0	10.0			10.0
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST 0.00 cfm 15 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. ____ 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 McFarland

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)
West											
1-1		1028	806.75	1.60	1.60	1.60	154	250	55	78 88	8.0
2		1031	808.15	1.62	1.62	1.62	154	252	53	78 88	8.5
3		1033	809.74	1.35	1.35	1.35	152	252	52	78	8.0
4		1036	810.88	1.20	1.20	1.20	154	260	52	78	7.5
5		1038	812.26	1.10	1.10	1.10	153	257	52	78	7.5
6		1041	813.45	.90	.90	.90	153	258	51	78	7.0

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC3C2AS

PAGE 2 OF 2

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)		STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP (°F)	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
West											
1-7		1044	814.32	.60	.60	.60	156	258	57	78	6.0
8		1046	815.42	.73	.73	.73	160	262	57	78	6.5
9		1048	816.73	.87	.87	.87	160	260	57	78	7.0
10		1051	817.90	.91	.91	.91	154	261	57	79	7.0
11		1054	819.10	.93	.93	.93	154	261	57	79	7.5
12		1056	820.26	.93	.93	.93	154	261	57	79	7.5
North											
2-1		1101	821.71	1.40	1.40	1.40	154	262	56	81	10.0
2		1104	823.22	1.35	1.35	1.35	157	263	56	81	10.0
3		1106	824.73	1.35	1.35	1.35	161	261	56	81	10.0
4		1109	826.10	1.20	1.20	1.20	163	258	56	81	9.5
5		1111	827.51	1.15	1.15	1.15	165	256	57	81	9.5
6		1114	828.56	.73	.73	.73	163	259	58	82	7.0
7		1116	829.60	.80	.80	.80	164	259	58	82	8.5
8		1119	830.99	1.10	1.10	1.10	163	263	57	82	8.9
9		1121	832.32	1.20	1.20	1.20	154	263	57	82	10.0
10		1124	833.75	1.20	1.20	1.20	153	264	57	82	11.0
11		1126	835.16	1.30	1.30	1.30	155	257	57	83	11.0
12		1129	836.66	1.30	1.30	1.30	155	256	57	83	12.0

STACK SAMPLING FIELD DATA SHEET

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

TEST ID SC3C3AS
PAGE 1 OF 2

PLANT Sugar Cane Growers Coop. of Florida
SOURCE Boiler #3
PLANT LOCATION Belle Glade, Florida
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES P.M.
DATE 11-21-91 RUN NO. 3
TIME START 1241 TIME END 1346
SAMPLE TIME 2.5 / 24 (min/pt)= 60 Total min
ASSUMED MOISTURE 28 % FDA .72
NOMOGRAPH C_f 1.0 PITOT CORR. .84
P_b 30.30 "Hg P_s 30.30 "Hg
WEATHER PTLY CLDY TEMP. 80 °F
METER BOX NO. 1 H 2.15 Y 1.004
NOZZLE CAL. .202 .202 .202 = .202
STACK DIMENSIONS 64"
STACK AREA 22.34 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 868.727 ft³
INITIAL 837.620 ft³
NET 31.107 ft³
FILTER NO. 3514 IMP. VOL. GAIN 235 ml.
SIL GEL NO. 47 WT. GAIN 6.0 ml.
TOTAL CONDENSATE 241 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2	10.0	10.0			10.0
% O_2	9.5	10.0			9.75
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS
PRE 0.01 cfm 16 "Hg POST 0.017 cfm 15 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. ____ 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 McFarland

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT³)	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 1-1		1243	839.21	1.30	1.30	1.30	161	254	59	81	8.0
2		1246	840.55	1.30	1.30	1.30	161	254	59	81	8.0
3		1248	842.12	1.30	1.30	1.30	161	255	59	81	8.0
4		1251	843.61	1.30	1.30	1.30	160	256	60	81	8.0
5		1253	844.92	1.20	1.20	1.20	164	253	60	81	8.0
6		1256	845.93	.44	.44	.44	164	253	61	81	6.5

AIR CONSULTING & ENGINEERING, INC.

TEST ID SC3C3AS

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)		STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
1-7		1259	847.21	.67	.67	.67	163	262	62	82	6.5
8		1301	848.23	1.00	1.00	1.00	159	257	60	82	8.0
9		1304	849.76	1.20	1.20	1.20	159	259	58	82	9.0
10		1306	851.11	1.20	1.20	1.20	154	258	55	84	10.0
11		1312	852.61	1.30	1.30	1.30	153	268	54	84	10.0
12		1314	854.12	1.30	1.30	1.30	151	265	54	84	10.0
west											
2-1		1318	885.42	1.45	1.45	1.45	154	266	57	85	11.0
2		1321	856.91	1.40	1.40	1.40	159	271	54	85	11.0
3		1323	858.32	1.20	1.20	1.20	155	267	53	85	11.0
4		1326	859.81	1.10	1.10	1.10	151	268	54	86	11.0
5		1329	861.32	1.00	1.00	1.00	153	265	54	86	10.0
6		1332	862.21	.83	.83	.83	155	271	54	86	9.0
7		1333	863.10	.56	.56	.56	160	275	57	86	8.0
8		1336	864.11	.64	.64	.64	158	275	57	86	8.0
9		1338	865.21	.82	.82	.82	144	274	56	86	10.0
10		1341	866.30	.80	.80	.80	153	270	54	87	10.0
11		1343	867.47	.85	.85	.85	153	273	54	87	10.0
12		1346	868.72	.85	.85	.85	155	273	54	87	10.0

APPENDIX C

LABORATORY ANALYSIS

AIR CONSULTING & ENGINEERING, inc.

PARTICULATE LAB DATA

SOURCE Sugar Growers Co-Op Unit 3C

PROBE RINSE	RUN 1	RUN 2	RUN 3	BLANK	
CONTAINER NUMBER	S-7	S-13	S-17	S-34	
TOTAL VOLUME (ml)	199	230	235	198	LIQUID LEVEL ✓
1st GROSS WEIGHT (g)	104.7640	103.6145	102.7090	105.4311	DATE & TIME: 11-23-91 13:00
2nd GROSS WEIGHT (g)	104.7640	103.6148	102.7087	105.4309	DATE & TIME: 11-24-91 10:25
AVERAGE GROSS WEIGHT (g)	104.7640	103.6146	102.7088	105.4310	
TARE WEIGHT (g)	104.6930	103.5590	102.6450	105.4288	
SUB NET WEIGHT (g)	.0710	.0556	.0638	.0022	
ACETONE BLANK (g)	-	-	-	-	
TOTAL NET WEIGHT (mg)	71.0	55.6	63.8	2.2	

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	3512	3513	3514	3473	
1st GROSS WEIGHT (g)	0.5350	0.4980	0.5080	0.4222	DATE & TIME: 11-22-91 10:00
2nd GROSS WEIGHT (g)	0.5352	0.4980	0.5082	0.4221	DATE & TIME: 11-23-91 11:50
AVERAGE GROSS WEIGHT (g)	0.5351	0.4980	0.5081	0.4222	
TARE WEIGHT (g)	0.4220	0.4209	0.4197	0.4223	
SUB NET WEIGHT (g)	0.1131	0.0771	0.0884	-.0001	
TOTAL NET WEIGHT (mg)	113.1	77.1	88.4	-.1	

TARE BALANCE CHECK

SEE LAB BOOK

1st GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓

0.5 g ✓ 100.0g ✓

%RH 64 DATE 11-23-91

Signature Christy L. Nick

2nd GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓

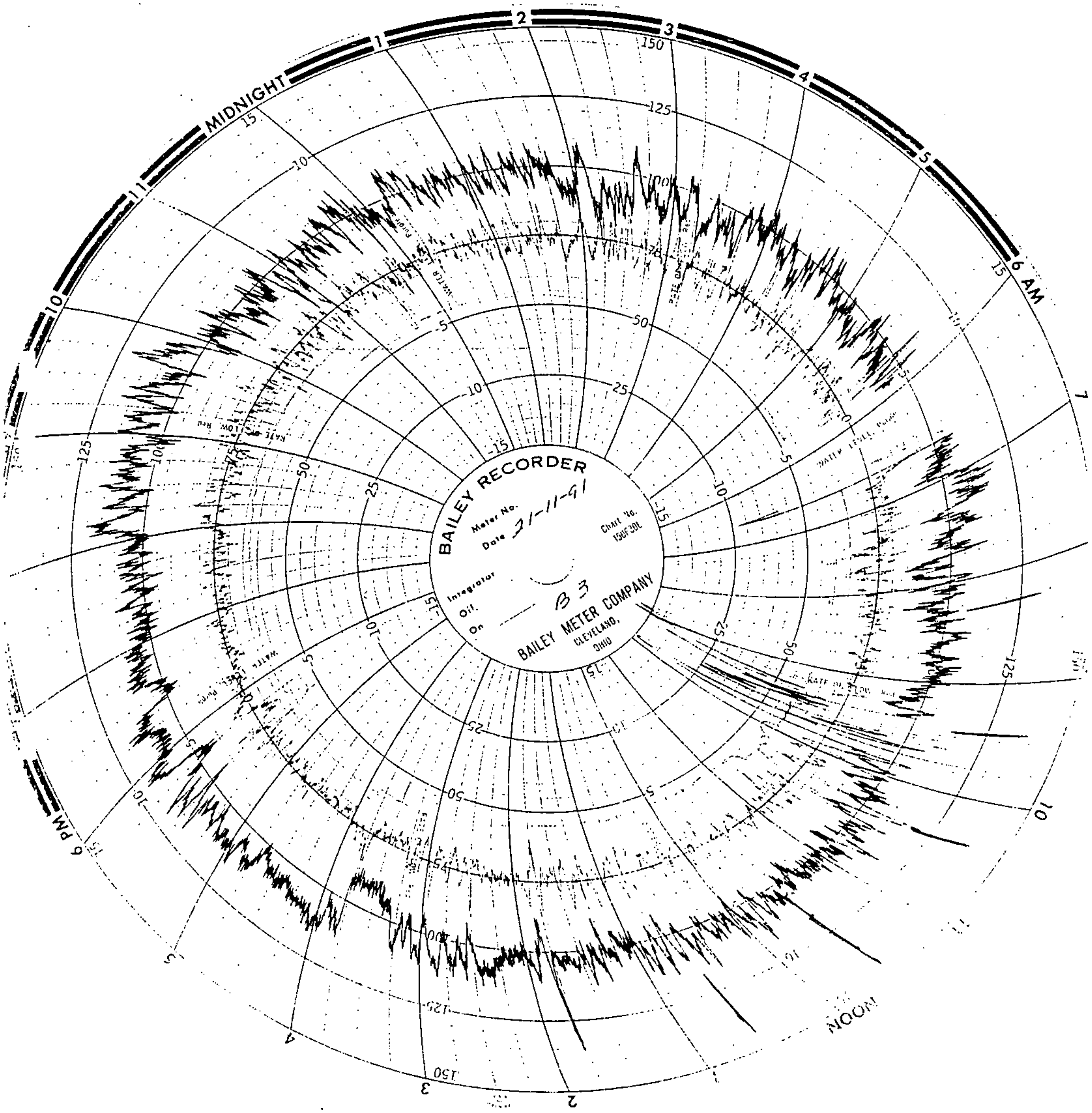
0.5g ✓ 100.0g ✓

%RH 66 DATE 11-24-91

Signature Christy L. Nick

APPENDIX D

PRODUCTION RATE CERTIFICATION



BAILEY RECORDER
Meter No.
Date 21-11-91
Integrator
Off
On
B3
BAILEY METER COMPANY
CLEVELAND, OHIO
MIDNIGHT
6 AM
NOON
6 PM
RATE OF FLOW
WATER LEVEL

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	SUGAR CANE GROWERS COOPERATIVE	DATE:	11-21-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	1
SOURCE:	NUMBER 3 BOILER, SCRUBBER OUTLET	TIME:	0816-927

TIME INTERVAL	71	MINUTES
OIL:		
FINAL OIL	1265	
BEGIN OIL	1175	
FACTOR	1	
STEAM:		
FINAL STEAM	716271	
BEGIN STEAM	714792	
FACTOR	1600	
TEMPERATURE	660	DEGREES F
PRESSURE	425	PSIG
	440	PSIA
FEEDWATER:		
TEMPERATURE	260	DEGREES F
PRESSURE	800	PSIG
	816	PSIA
HEAT INPUT:		
STEAM	1279.4	BTU/LB
FEEDWATER	228.6	BTU/LB
NET STEAM	1050.8	BTU/LB
STEAM RATE	100141	LB/HR
BOILER EFFICIENCY	88.0	%
TOTAL FUEL HEAT INPUT	191.32	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	76.06	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	11.41	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	179.92	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.25	LB/MMBTU
TOTAL ALLOWABLE EMISSION	46.12	LB/HR
TOTAL ACTUAL EMISSION	40.43	LB/HR
TOTAL ALLOWABLE EMISSION	0.241	LB/MMBTU
TOTAL ACTUAL EMISSION	0.211	LB/MMBTU

BOILER OPERATION PARAMETERS

PLANT Sugar Cane Growers Coop. of Fla. BOILER NUMBER 3

DATE 11-21-91 RUN NUMBER 1 OIL METER FACTOR 1

STEAM INTEGRATOR FACTOR 1500 SCRUBBER(S) PRESS.DROP ____, ___

SCRUBBER(S) GPM _____, _____

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

Ph(if applicable) _____, _____

INITIAL INTEGRATOR 715192 FINAL INTEGRATOR 715271

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS. FLOW	TEMP. °F	PRESSURE ----	TEMP.	PRESSURE
8:16	1175	100,000	~60	430	260	600
8:36		105,000	~60	430	260	600
8:56		100,000	~60	420	260	600
9:16		100 000	~60	420	260	600
9:27	1265					

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	SUGAR CANE GROWERS COOPERATIVE	DATE:	11-21-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	2
SOURCE:	NUMBER 3 BOILER, SCRUBBER OUTLET	TIME:	1023-1134

TIME INTERVAL	71	MINUTES
OIL:		
FINAL OIL	1890	
BEGIN OIL	1363	
FACTOR	1	
STEAM:		
FINAL STEAM	715397	
BEGIN STEAM	715317	
FACTOR	1500	
TEMPERATURE	560	DEGREES F
PRESSURE	425	PSIG
	440	PSIA
FEEDWATER:		
TEMPERATURE	260	DEGREES F
PRESSURE	600	PSIG
	615	PSIA
HEAT INPUT:		
STEAM	1279.4	BTU/LB
FEEDWATER	228.6	BTU/LB
NET STEAM	1050.8	BTU/LB
STEAM RATE	101408	LB/HR
BOILER EFFICIENCY	83.0	%
TOTAL FUEL HEAT INPUT	193.75	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	190.14	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	28.52	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	165.22	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.28	LB/MMBTU
TOTAL ALLOWABLE EMISSION	44.16	LB/HR
TOTAL ACTUAL EMISSION	30.79	LB/HR
TOTAL ALLOWABLE EMISSION	0.229	LB/MMBTU
TOTAL ACTUAL EMISSION	0.159	LB/MMBTU

BOILER OPERATION PARAMETERS

PLANT Sugar Cane Growers Coop. of Fla. BOILER NUMBER 3

DATE 11-21-91 RUN NUMBER 2 OIL METER FACTOR 1

STEAM INTEGRATOR FACTOR 1500 SCRUBBER(S) PRESS.DROP ____, ___

SCRUBBER(S) GPM _____, _____

OPERATOR SIGNATURE Maurice Bent SCRUBBER(S)H2O LEVEL _____, ____

Ph(if applicable) _____, _____

INITIAL INTEGRATOR 715317 FINAL INTEGRATOR 715397

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS. FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
~~10:13~~	~~1335~~	—	—	—	—	—
10:23	1365	100 000	560	420	260	600
10:43		110 000	560	430	260	600
11:03		120.000	560	420	260	600
11:23		110 000	560	430	260	600
11:34	1590					

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT: SUGAR CANE GROWERS COOPERATIVE DATE: 11-21-91
LOCATION: BELLE GLADE, FLORIDA RUN NUMBER 3
SOURCE: NUMBER 3 BOILER, SCRUBBER OUTLET TIME: 1240-1361

TIME INTERVAL	71	MINUTES
OIL:		
FINAL OIL	1990	
BEGIN OIL	1750	
FACTOR	1	
STEAM:		
FINAL STEAM	715558	
BEGIN STEAM	715474	
FACTOR	1800	
TEMPERATURE	560	DEGREES F
PRESSURE	425	PSIG
	440	PSIA
FEEDWATER:		
TEMPERATURE	260	DEGREES F
PRESSURE	600	PSIG
	615	PSIA
HEAT INPUT:		
STEAM	1279.4	BTU/LB
FEEDWATER	228.6	BTU/LB
NET STEAM	1050.8	BTU/LB
STEAM RATE	106479	LB/HR
BOILER EFFICIENCY	88.0	%
TOTAL FUEL HEAT INPUT	203.43	MMBTU/HR
STEAM CALIBRATION FACTOR	1.00	
OIL	169.01	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	25.35	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	47.06	LB/HR
TOTAL ACTUAL EMISSION	38.36	LB/HR
TOTAL ALLOWABLE EMISSION	0.231	LB/MMBTU
TOTAL ACTUAL EMISSION	0.174	LB/MMBTU

Avg
145.07
2.1.76
174.74
196.50

APPENDIX E

QUALITY ASSURANCE AND CHAIN OF CUSTODY

STANDARD METER CALIBRATION
Meter Number 1040616

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:

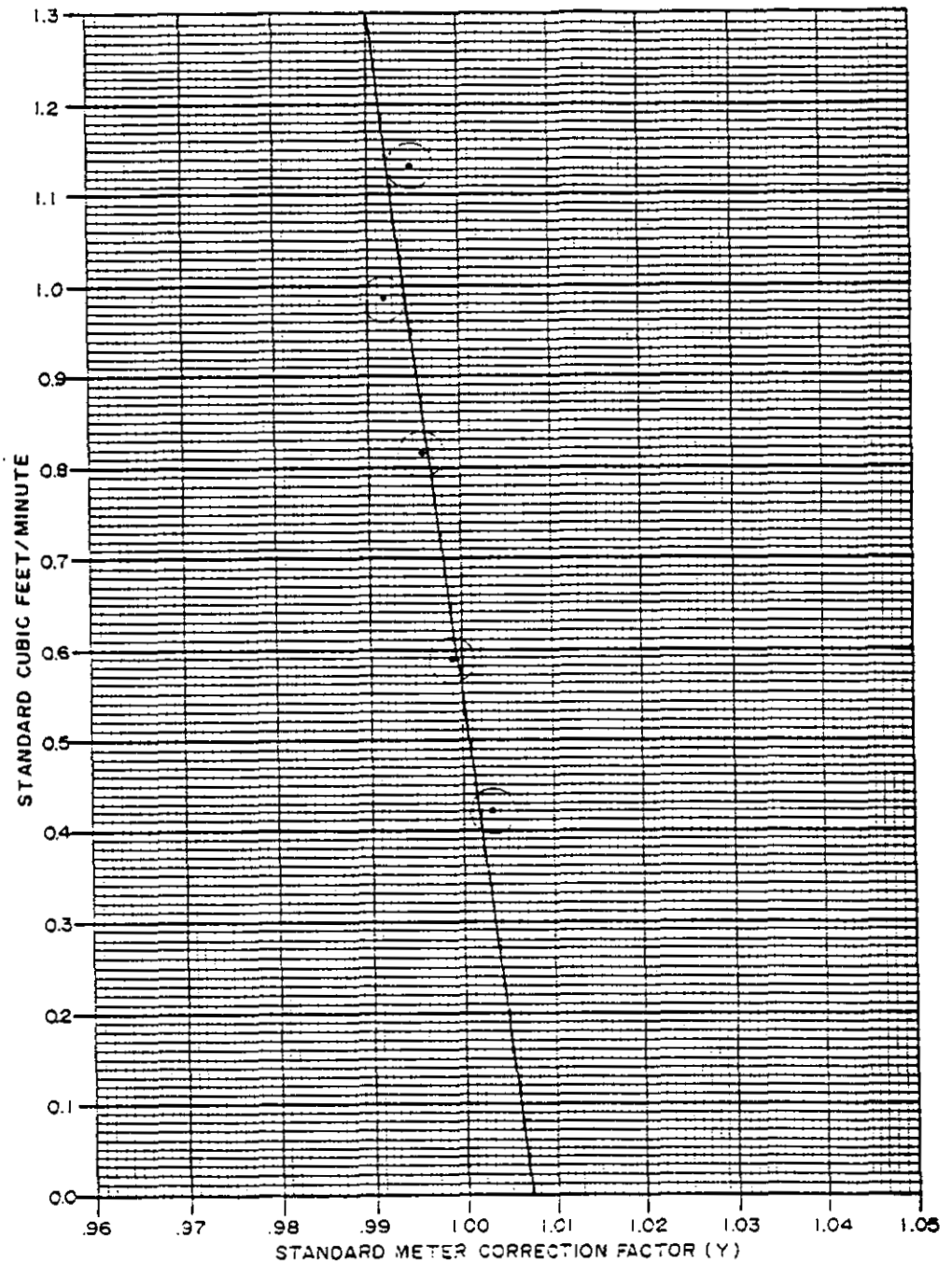
$$Y_a \times Y_s = Y$$

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 6-13-91 LEAK CHECK 0.000 CFM at 10 In. Hg.

METER SERIAL NUMBER 1041D616 BAROMETRIC PRESSURE 30.12 In. Hg.

STD GAS METER TEMPERATURE 74 °F/ ASTM GLASS THERMOMETER TEMPERATURE 74 °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			
.3	-.60	1.042	11.553	5.511	0.003	5.500	5.497	74	74	13
.2	-.60	1.553	7.032	5.479	5.500	10.979	5.479	75	75	13
.2	-.60	1.032	12.509	5.477	10.979	16.450	5.471	75	75	13
.3	-.95	2.363	8.143	5.290	16.801	22.127	5.323	75	76	9
.3	-.9	6.143	13.430	5.287	22.127	27.442	5.315	75	76	9
.3	-.96	3.430	3.703	5.273	27.442	32.753	5.311	75	77	9
-.4	-1.6	9.252	14.995	5.743	33.311	39.123	5.812	76	78	7
.4	-1.6	4.995	10.713	5.718	39.123	44.909	5.786	76	78	7
.4	-1.6	0.713	6.445	5.732	44.909	50.707	5.798	76	78	7
-.55	-2.1	6.941	12.917	5.976	51.214	57.292	6.078	76	78	6
-.55	-2.1	2.917	8.898	5.981	57.292	63.375	6.083	76	78	6
-.55	-2.1	8.898	14.873	5.975	63.375	69.452	6.077	76	78	6
.7	-2.7	5.278	10.988	5.710	69.866	75.663	5.797	76	78	5
-.7	-2.7	0.788	6.708	5.720	75.663	81.474	5.811	76	78	5
-.7	-2.7	6.708	12.386	5.678	81.474	87.247	5.773	76	78	5

CALIBRATED BY: M. F. Habel

	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM
Run 1	1.004	0.422	0.998	0.584	0.996	0.814	0.992	0.988	0.995	1.132
Run 2	1.001	0.419	0.999	0.584	0.996	0.810	0.992	0.989	0.995	1.134
Run 3	1.003	0.419	0.999	0.582	0.996	0.812	0.992	0.988	0.994	1.126
Average	1.003	0.420	0.999	0.583	0.996	0.812	0.992	0.988	0.995	1.131

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	411.942	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: SZ Dick

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

ace air consulting and engineering

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: S. L. Carter

AIR CONSULTING & ENGINEERING, INC. — PITOT TUBE CALIBRATION

DATE CALIBRATED 10-4-91 PITOT TUBE 88

IS PITOT TUBE ASSEMBLY LEVEL YES ARE PITOT TUBE OPENINGS DAMAGED no

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

γ = 2 ° θ = 1 ° A = 1.035 in. = (Pa + Pb)

z = A sin γ = 0.036 in.; <0.32/<1/8 in.

w = A sin θ = 0.018 in.; <0.08/<1/32 in.

P_a 0.512 in. P_b 0.512 in. D_t .375

WAS CALIBRATION REQUIRED no

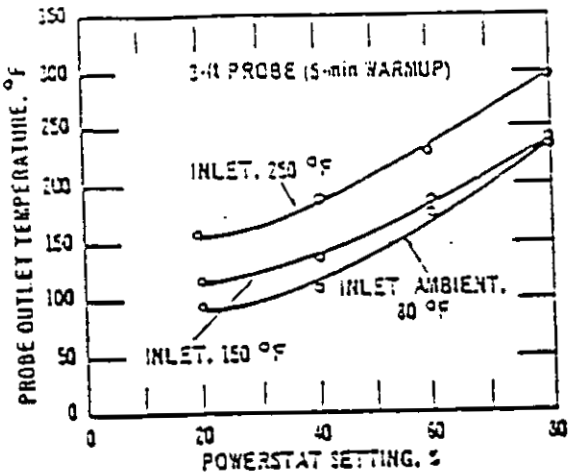
THERMOCOUPLE CALIBRATION

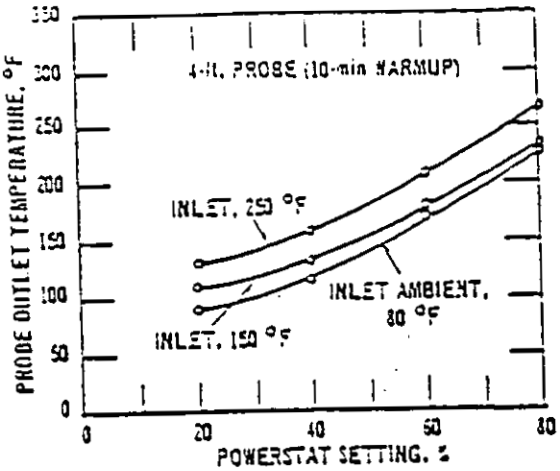
SOURCE (SPECIFY)	ASTM GLASS THERMOMETER WITH MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	44	45	1	0.19
AMBIENT	77	78	1	0.19
HOT OVEN	345	346	1	0.19

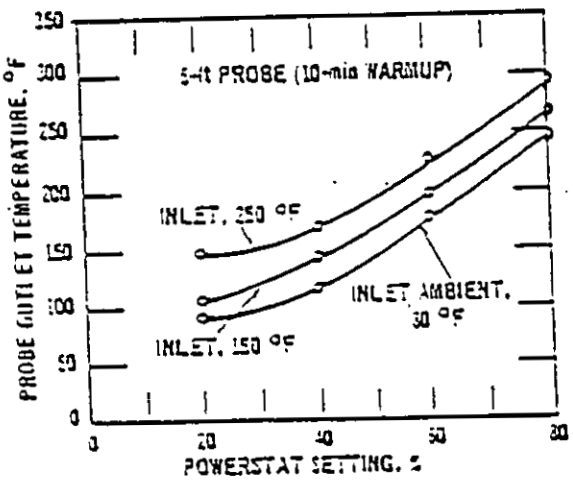
FDER - MAXIMUM 5° DIFFERENCE

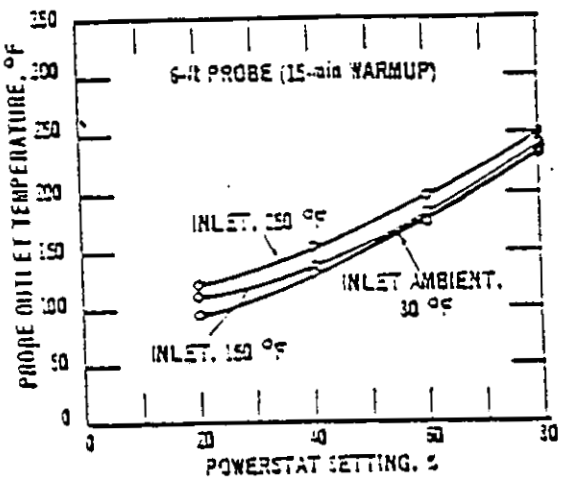
CALIBRATED BY: _____

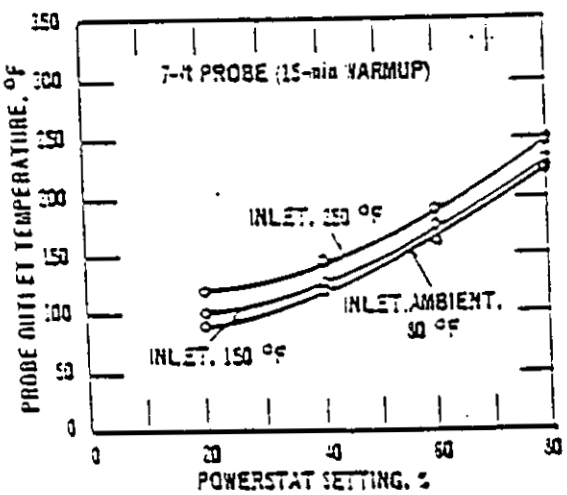
EPA $\left[\frac{(\text{REF. TEMP. °F} + 460°) - (\text{PYROMETER TEMP. °F} + 460°)}{\text{REF. TEMP. °F} + 460°}\right] 100 \leq 1.5\%$











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 Sugar Grower's Coop TEST DATE 11-21-91
SOURCE NAME Boiler #3 SAMPLE RECOVERED BY Gerard
TYPE OF SAMPLE Pm PARTICULATE ANALYSES BY Christy

SAMPLE RECOVERY

RUN NO.	CONTAINER NO.	LIQUID LEVEL MARKED	COLOR	COMMENTS
1	3512	—	Md. Gray	
1	S-7	✓	Clear	
2	3513	—	DK. Gray	
2	S-13	✓	Clear	
3	3514	—	DK. Gray	
3	S-17	✓	Clear	
(ACETONE) / WATER BLANK (CIRCLE)	S-34	✓	clear	
FILTER BLANK	3473	—	White	

SILICA GEL

RUN NO.	CONTAINER NO.	FINAL WT. (g)	INIT. WT. (g)	NET WT. (g)	COLOR
1	20	209.2	200.0	9.2	Pink
2	18	207.2	200.0	7.2	Pink
3	47	206.0	200.0	.60	Pink
			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

Gerard Gauthreaux
Field Testing

Early McFarland
Field Testing

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