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: 34

Title: Source Test Report for Particulate Emissions Boilers 3 and 4: Atlantic Sugar Association

November 1991

0501 - ASA 4

SOURCE TEST REPORT
for
PARTICULATE EMISSIONS

BOILERS 3 AND 4
ATLANTIC SUGAR ASSOCIATION
BELLEGLADE, FLORIDA

NOVEMBER 20 & 21, 1991

Prepared for:

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287-91-08

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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

12/19/91

Date

1.0 INTRODUCTION

On November 20 and 21, 1991, Air Consulting and Engineering, Inc. (ACE), conducted particulate emission testing on the Wet Scrubber Outlet of Boilers 3 and 4 at Atlantic Sugar Association in Belleglade, 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.

2.0 SUMMARY AND DISCUSSION OF RESULTS

Boilers 3 and 4 demonstrated compliance with the permit conditions.

Tables 1 and 2 are summaries of the emission results and flue gas parameters.

Particulate emissions averaged 49.90 pounds per hour (lbs/Hr) and 0.216 pounds per million BTU (lbs/MMBTU) and 49.83 lbs/hr and 0.213 lbs/MMBTU for Boilers 3 and 4, respectively.

Allowable emissions are 69.56 lbs/Hr and 0.300 lbs/MMBTU for Boiler 3 and 67.86 lbs/hr and 0.290 lbs/MMBTU for Boiler 4. No oil was used during compliance testing.

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 by Mr. Frank Kleeman of Kleeman Engineering.

Table 1 Emission Summary
Boiler 3
Atlantic Sugar Association
Belleglade, Florida
November 20, 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	66683	164	26.9	47.29	0.206	69.01	0.300
2	68650	157	27.3	54.57	0.240	68.57	0.300
3	67748	162	29.0	47.84	0.202	71.10	0.300
AVERAGE	67694	161	27.7	49.90	0.216	69.56	0.300

Avg O_2 = 8.8
MMBtu/hr = 231.51

Table 2 Emission Summary
Boiler 4
Atlantic Sugar Association
Belleglade, 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	68285	172	26.7	45.28	0.200	65.77	0.290
2	67603	174	28.8	49.80	0.218	66.31	0.290
3	68053	175	28.6	54.42	0.221	71.50	0.290
AVERAGE	67980	174	28.0	49.83	0.213	67.86	0.290

Avg O_2 = 9.6
mmBtu/hr = 233.99

3.0 PROCESS DESCRIPTION AND OPERATION

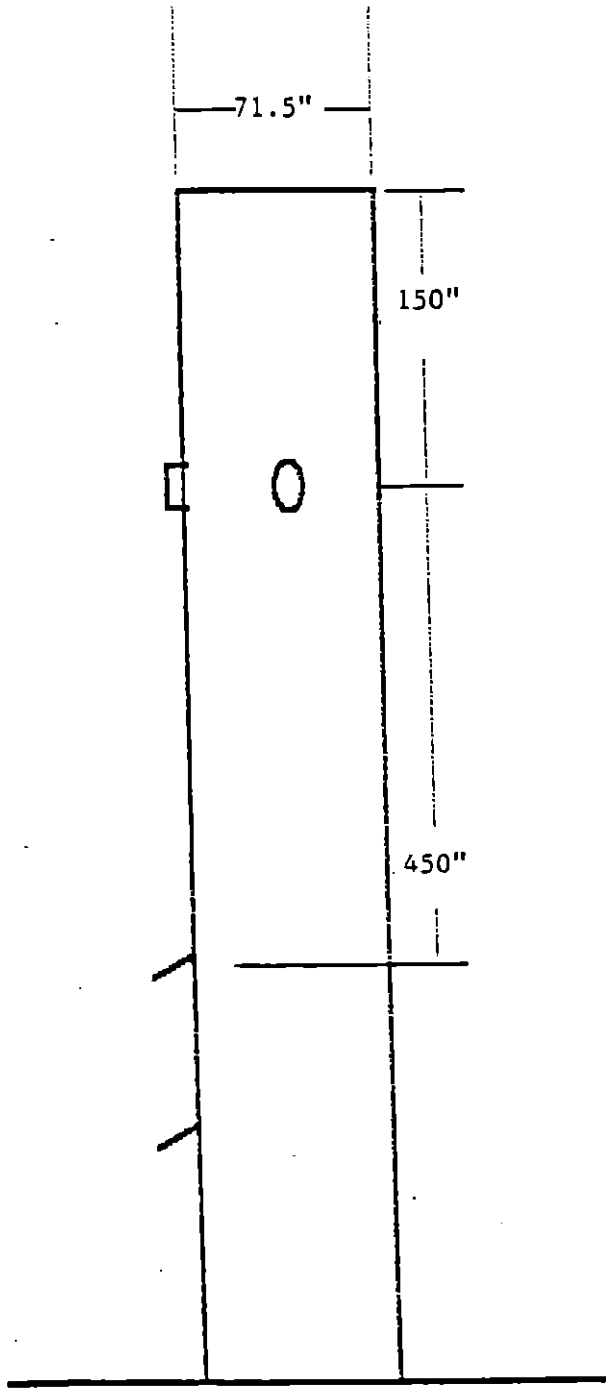
Boilers 3 and 4 at Atlantic Sugar Association are spreader stoker design used primarily for residue fuel firing. Supplemental oil firing may also be utilized but was not used during the emission test series.

Boilers 3 and 4 averaged 117,300 and 118,367 pounds per hour (lbs/Hr) steam production over the three test run period (see Appendix D for production data).

4.0 SAMPLING POINT LOCATION

The sampling point location consists of a scrubber outlet stack 71.5" in diameter. The stack has two sample ports 90 degrees apart. The ports were located 405" from an upstream disturbance and 150" from the outlet.

Twenty test points were sampled for each test run. The traverse points were located as shown in Figure 1. The stack configuration is such that there is no reason to evaluate the presence of cyclonic flow.



TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL
1	1.8
2	5.8
3	10.5
4	16.2
5	24.4
6	47.1
7	55.3
8	61
9	65.7
10	69.7

Figure 1

Sampling Point Location
Boilers 3 and 4
Atlantic Sugar Association
Belleglade, 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

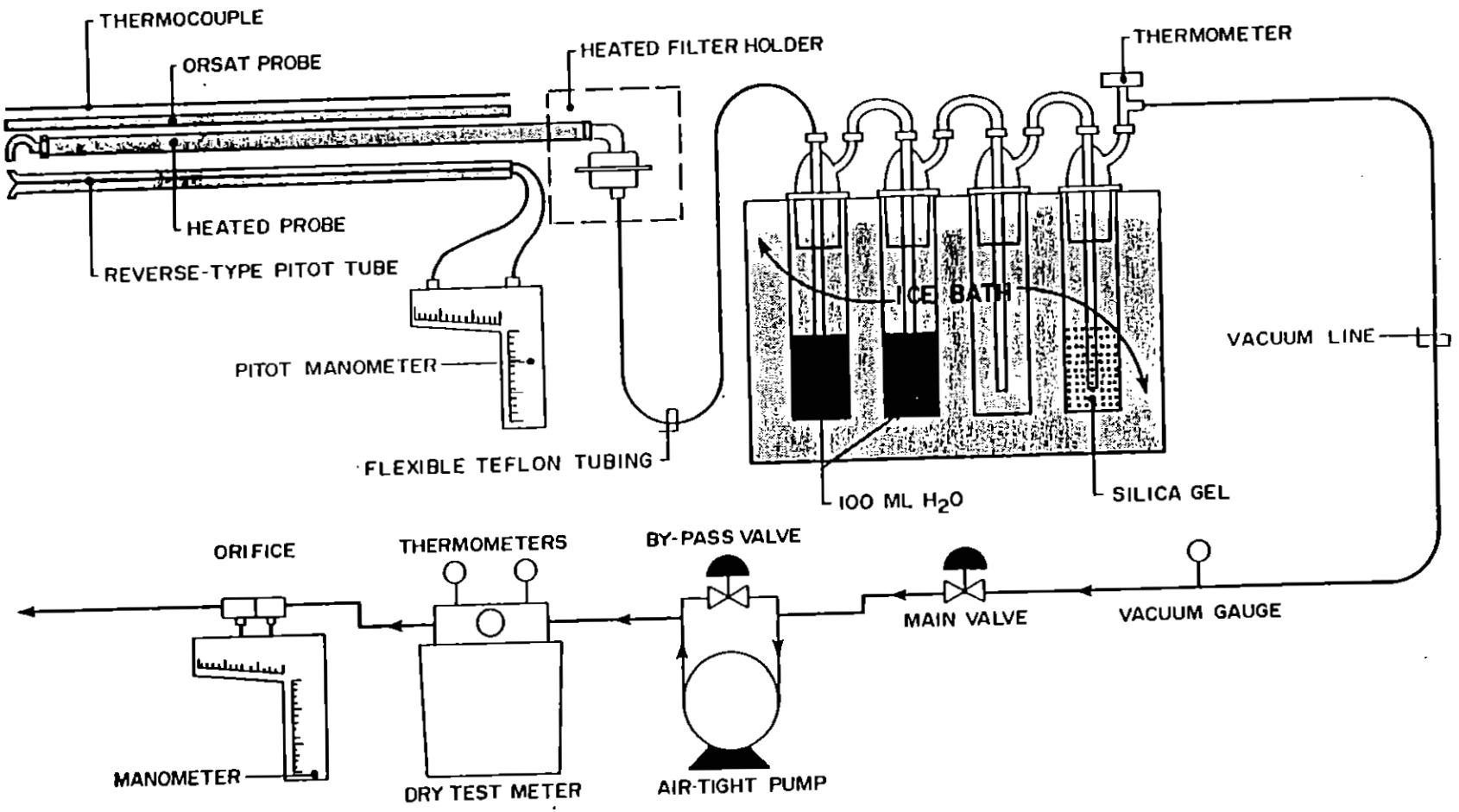

FIGURE 2
EPA METHOD 5 SAMPLING TRAIN

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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
AND
SAMPLE CALCULATIONS

BOILER 3

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COMPLETE EMISSION DATA

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 3 BOILER
DATE: 11-20-91

RUN NO.:	1	IMPINGER ml	305
BEGIN TIME:	0836	SILICA GEL gms.	7.3
END TIME:	0939	PERCENT O2	9.0
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	9.0
BAROMETRIC PRESSURE:	30.20 "Hg	"F" FACTOR	9366
STACK PRESSURE:	30.20 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	---	
FINAL METER:	230.331 cubic ft.	FILTER mg.	207.0
INITIAL METER:	189.954 cubic ft.	WASH mg.	9.2
STACK AREA:	27.883 sq. ft.		

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.150	1.072	1.800	165	77
1-2	1.150	1.072	1.800	175	76
1-3	1.150	1.072	1.800	172	76
1-4	1.100	1.049	1.700	173	77
1-5	1.100	1.049	1.700	168	77
1-6	1.050	1.025	1.700	168	78
1-7	1.000	1.000	1.700	163	79
1-8	.820	0.906	1.600	161	79
1-9	.730	0.854	1.300	159	80
1-10	.600	0.775	1.300	157	80
2-1	.950	0.975	1.500	156	81
2-2	1.050	1.025	1.700	157	82
2-3	1.100	1.049	1.700	156	82
2-4	1.100	1.049	1.700	157	83
2-5	1.150	1.072	1.800	162	83
2-6	1.150	1.072	1.800	163	84
2-7	1.150	1.072	1.800	168	84
2-8	1.150	1.072	1.800	168	85
2-9	.920	0.959	1.500	165	85
2-10	.920	0.959	1.500	165	85
AVERAGES	---	1.009	1.660	164	81

RUN 1

NOZZLE AREA(SQ.FT.):0.0002761

AVG. VELOCITY HEAD :--------	1.02 "H20	VOL. FLOW ACFM :	106767
AVG. STACK TEMP.: ---------	164 F	VOL. FLOW SCFMD :	86683
AVG. METER TEMP.: ---------	81 F		
AVG. ORIFICE DIFFERENTIAL:---	1.66 "H20	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:---	40.322	---	
% H20 VAPOR: :--------	26.9	POUNDS PER HOUR:	47.294
GAS MOL. WT. DRY: ---------	29.80	POUNDS PER SCF :	0.0000118
GAS MOL. WT. WET: ---------	26.63	GRAINS/SCF:	0.083
% EXCESS AIR: ---------	71.16	GRAINS/SCF @ 8% O2	0.090
AVG. STACK VEL.(FPS)---------	63.82	GRAINS/SCF @50% EA	0.094
MMBTUH HEAT INPUT: ---------	230.04	POUNDS PER MMBTU:	0.206
PERCENT ISOKINETIC :---------	101.77	LBS/MMBTU"F"FACTOR	0.194

SAMPLE CALCULATIONS - RUN 1

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	63.82
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.DRF.DIFF./13.6))/29.92)x(528/(Tm+460))	40.322
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.80
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.63
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	71.16
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))!.5	63.82
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	101.77
VOL. FLOW (ACFM):	FPS x 60 x As	106767
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	66683
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	47.294
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000118
GRAINS/SCF:	LB/SCF x 7000	0.0827
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0897
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.0944
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.206
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.194

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COMPLETE EMISSION DATA

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 3 BOILER
DATE: 11-20-91

RUN NO.:	2	IMPINGER ml	313
BEGIN TIME:	1024	SILICA GEL gms.	9.3
END TIME:	1126	PERCENT O2	9.0
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	9.0
BAROMETRIC PRESSURE:	30.20 "Hg	"F" FACTOR	9366
STACK PRESSURE:	30.20 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	---	
FINAL METER:	271.857 cubic ft.	FILTER mg.	227.9
INITIAL METER:	230.574 cubic ft.	WASH mg.	16.9
STACK AREA:	27.883 sq. ft.		

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	DRIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.000	1.000	1.600	154	84
1-2	1.050	1.025	1.700	155	84
1-3	1.150	1.072	1.800	156	84
1-4	1.150	1.072	1.800	156	84
1-5	1.150	1.072	1.800	155	85
1-6	1.150	1.072	1.800	157	85
1-7	1.150	1.072	1.700	156	86
1-8	1.100	1.049	1.700	157	86
1-9	1.000	1.000	1.600	158	87
1-10	1.000	1.000	1.600	155	87
2-1	1.150	1.072	1.800	155	88
2-2	1.150	1.072	1.800	165	88
2-3	1.100	1.049	1.700	164	88
2-4	1.100	1.049	1.700	165	88
2-5	1.100	1.049	1.700	159	89
2-6	1.100	1.049	1.700	157	90
2-7	1.150	1.072	1.800	155	90
2-8	1.000	1.000	1.600	158	90
2-9	.940	0.970	1.500	155	90
2-10	.900	0.949	1.450	156	91
AVERAGES	---	1.038	1.693	157	87

RUN 2

NOZZLE AREA(SQ.FT.):	0.0002761			
AVG. VELOCITY HEAD	:---	1.08 "H20	VOL. FLOW ACFM :	109402
AVG. STACK TEMP.:	---	157 F	VOL. FLOW SCFMD :	68650
AVG. METER TEMP.:	---	87 F		
AVG. ORIFICE DIFFERENTIAL:	---	1.69 "H20	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:	---	40.736	---	
% H2O VAPOR:	:---	27.3	POUNDS PER HOUR:	54.570
GAS MOL. WT. DRY:	---	29.80	POUNDS PER SCF :	0.0000132
GAS MOL. WT. WET:	---	26.58	GRAINS/SCF:	0.093
% EXCESS AIR:	---	71.16	GRAINS/SCF @ 8% O2	0.101
AVG. STACK VEL.(FPS)	---	65.39	GRAINS/SCF @50% EA	0.106
MMBTUH HEAT INPUT:	---	227.49	POUNDS PER MMBTU:	0.240
PERCENT ISOKINETIC :	---	99.87	LBS/MMBTU"F"FACTOR	0.218

SAMPLE CALCULATIONS - RUN 2

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	65.39
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./13.6))/29.92)x(528/(Tm+460))	40.736
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.80
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.58
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	71.16
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))!.5	65.39
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	99.87
VOL. FLOW (ACFM):	FPS x 60 x As	109402
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	68650
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	54.570
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000132
GRAINS/SCF:	LB/SCF x 7000	0.0927
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.1005
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.1058
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.240
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.218

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 3 BOILER
DATE: 11-20-91

RUN NO.:	3	IMPINGER ml	340
BEGIN TIME:	1225	SILICA GEL gms.	6.0
END TIME:	1351	PERCENT O2	8.5
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	9.0
BAROMETRIC PRESSURE:	30.20 "Hg	"F" FACTOR	9366
STACK PRESSURE:	30.20 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	---	
FINAL METER:	313.511 cubic ft.	FILTER mg.	204.6
INITIAL METER:	272.395 cubic ft.	WASH mg.	11.7
STACK AREA:	27.883 sq. ft.		

Avg O_2 = 8.8

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.100	1.049	1.760	158	87
1-2	1.200	1.095	1.920	161	87
1-3	1.200	1.095	1.920	163	87
1-4	1.200	1.095	1.920	165	87
1-5	1.100	1.049	1.760	163	87
1-6	1.100	1.049	1.760	165	86
1-7	1.200	1.095	1.920	161	86
1-8	1.100	1.049	1.760	158	86
1-9	1.000	1.000	1.600	160	87
1-10	.850	0.922	1.360	160	87
2-1	.900	0.949	1.440	150	88
2-2	.990	0.995	1.580	155	88
2-3	1.100	1.049	1.760	155	89
2-4	1.100	1.049	1.760	165	89
2-5	1.100	1.049	1.760	167	89
2-6	1.200	1.095	1.920	165	90
2-7	1.300	1.140	2.080	168	90
2-8	1.100	1.049	1.760	168	90
2-9	1.100	1.049	1.760	170	90
2-10	1.100	1.049	1.760	168	90
AVERAGES	---	1.049	1.763	162	88

RUN 3

NOZZLE AREA(SQ.FT.):0.0002761

AVG. VELOCITY HEAD :---	1.10 "H2O	VOL. FLOW ACFM :	111358
AVG. STACK TEMP.: ---	162 F	VOL. FLOW SCFMD :	67748
AVG. METER TEMP.: ---	88 F		
AVG. ORIFICE DIFFERENTIAL:---	1.76 "H2O	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:---	40.519	---	
% H2O VAPOR: :---	29.0	POUNDS PER HOUR:	47.837
GAS MOL. WT. DRY: ---	29.78	POUNDS PER SCF :	0.0000118
GAS MOL. WT. WET: ---	26.37	GRAINS/SCF:	0.082
% EXCESS AIR: ---	64.01	GRAINS/SCF @ 8% O2	0.086
AVG. STACK VEL.(FPS)---	66.56	GRAINS/SCF @50% EA	0.090
MMBTUH HEAT INPUT: ---	237.01	POUNDS PER MMBTU:	0.202
PERCENT ISOKINETIC :---	100.66	LBS/MMBTU"F"FACTOR	0.186

SAMPLE CALCULATIONS - RUN 3

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	66.56
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./13.6))/29.92)x(528/(Tm+460))	40.519
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.78
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.37
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	64.01
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))!.5	66.56
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	100.66
VOL. FLOW (ACFM):	FPS x 60 x As	111358
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	67748
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	47.837
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000118
GRAINS/SCF:	LB/SCF x 7000	0.0824
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0857
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.0901
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.202
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.186

BOILER 4

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 4 BOILER
DATE: 11-21-91

RUN NO.:	1	IMPINGER ml	305
BEGIN TIME:	0836	SILICA GEL gms.	9.3
END TIME:	0938	PERCENT O2	9.7
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	9.2
BAROMETRIC PRESSURE:	30.18 "Hg	"F" FACTOR	9366
STACK PRESSURE:	30.18 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	---	
FINAL METER:	354.077 cubic ft.	FILTER mg.	186.5
INITIAL METER:	313.701 cubic ft.	WASH mg.	18.6
STACK AREA:	27.889 sq. ft.		

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	.950	0.975	1.520	163	65
1-2	1.100	1.049	1.760	170	66
1-3	1.100	1.049	1.760	172	66
1-4	1.100	1.049	1.760	173	66
1-5	1.200	1.095	1.920	170	68
1-6	1.200	1.095	1.920	170	69
1-7	1.100	1.049	1.760	170	70
1-8	1.100	1.049	1.760	170	71
1-9	1.100	1.049	1.760	170	71
1-10	.980	0.990	1.570	174	72
2-1	1.200	1.095	1.920	172	73
2-2	1.400	1.183	2.240	175	74
2-3	1.300	1.140	2.080	174	75
2-4	1.200	1.095	1.920	175	76
2-5	1.100	1.049	1.720	173	76
2-6	1.100	1.049	1.720	175	77
2-7	.950	0.975	1.520	175	78
2-8	.820	0.906	1.310	174	79
2-9	.830	0.911	1.330	176	79
2-10	.870	0.933	1.390	176	80
AVERAGES	---	1.039	1.732	172	73

RUN 1

NOZZLE AREA(SQ.FT.):0.0002761

AVG. VELOCITY HEAD	:---	1.08 "H20	VOL. FLOW ACFM :	110643
AVG. STACK TEMP.:	---	172 F	VOL. FLOW SCFMD :	68285
AVG. METER TEMP.:	---	73 F		
AVG. ORIFICE DIFFERENTIAL:	---	1.73 "H20	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:	---	40.914	---	
% H20 VAPOR:	:---	26.7	POUNDS PER HOUR:	45.279
GAS MOL. WT. DRY:	---	29.86	POUNDS PER SCF :	0.0000111
GAS MOL. WT. WET:	---	26.69	GRAINS/SCF:	0.077
% EXCESS AIR:	---	82.83	GRAINS/SCF @ 8% O2	0.089
AVG. STACK VEL.(FPS)	---	66.12	GRAINS/SCF @50% EA	0.094
MMBTUH HEAT INPUT:	---	226.78	POUNDS PER MMBTU:	0.200
PERCENT ISOKINETIC :	---	100.86	LBS/MMBTU"F"FACTOR	0.193

SAMPLE CALCULATIONS - RUN 1

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	66.12
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./13.6))/29.92)x(528/(Tm+460))	40.914
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.86
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.69
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	82.83
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))!.5	66.12
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	100.86
VOL. FLOW (ACFM):	FPS x 60 x As	110643
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	68285
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	45.279
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000111
GRAINS/SCF:	LB/SCF x 7000	0.0774
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0891
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.0943
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.200
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.193

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 4 BOILER
DATE: 11-21-91

RUN NO.:	2	IMPINGER ml	345
BEGIN TIME:	1018	SILICA GEL gms.	8.1
END TIME:	1149	PERCENT O2	9.2
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	9.7
BAROMETRIC PRESSURE:	30.18 "Hg	"F" FACTOR	9366
STACK PRESSURE:	30.18 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	---	
FINAL METER:	396.269 cubic ft.	FILTER mg.	219.9
INITIAL METER:	354.701 cubic ft.	WASH mg.	11.0
STACK AREA:	27.889 sq. ft.		

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.400	1.183	2.240	175	78
1-2	1.300	1.140	2.080	175	78
1-3	1.400	1.183	2.240	177	78
1-4	1.100	1.049	1.760	174	78
1-5	1.200	1.095	1.920	170	78
1-6	1.200	1.095	1.920	175	78
1-7	1.100	1.049	1.760	175	78
1-8	.900	0.949	1.440	175	80
1-9	.900	0.949	1.440	176	80
1-10	.900	0.949	1.440	176	80
2-1	1.300	1.140	2.080	170	81
2-2	1.200	1.095	1.920	176	82
2-3	1.200	1.095	1.920	175	83
2-4	1.200	1.095	1.920	175	83
2-5	1.100	1.049	1.760	176	84
2-6	1.100	1.049	1.760	175	84
2-7	1.100	1.049	1.760	170	84
2-8	.950	0.975	1.520	172	85
2-9	.950	0.975	1.520	172	85
2-10	.920	0.959	1.470	172	85
AVERAGES	----------	1.056	1.794	174	81

RUN 2

NOZZLE AREA(SQ.FT.):	0.0002761		
AVG. VELOCITY HEAD :	--------- 1.12 "H2O	VOL. FLOW ACFM :	113025
AVG. STACK TEMP.:	--------- 174 F	VOL. FLOW SCFMD :	67603
AVG. METER TEMP.:	--------- 81 F		
AVG. ORIFICE DIFFERENTIAL:	--- 1.79 "H2O	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:	--- 41.463	---	
% H2O VAPOR:	:--------- 28.8	POUNDS PER HOUR:	49.798
GAS MOL. WT. DRY:	--------- 29.92	POUNDS PER SCF :	0.0000123
GAS MOL. WT. WET:	--------- 26.49	GRAINS/SCF:	0.086
% EXCESS AIR:	--------- 75.35	GRAINS/SCF @ 8% O2	0.095
AVG. STACK VEL.(FPS)	--------- 67.54	GRAINS/SCF @50% EA	0.100
MMBTUH HEAT INPUT:	--------- 228.64	POUNDS PER MMBTU:	0.218
PERCENT ISOKINETIC :	--------- 103.25	LBS/MMBTU"F"FACTOR	0.205

SAMPLE CALCULATIONS - RUN 2

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	67.54
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./13.6))/29.92)x(528/(Tm+460))	41.463
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.92
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.49
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	75.35
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))!.5	67.54
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	103.25
VOL. FLOW (ACFM):	FPS x 60 x As	113025
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	67603
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	49.798
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000123
GRAINS/SCF:	LB/SCF x 7000	0.0859
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.0948
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.1005
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.218
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.205

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 4 BOILER
DATE: 11-21-91

RUN NO.:	3	IMPINGER ml	355
BEGIN TIME:	1245	SILICA GEL gms.	8.6
END TIME:	1348	PERCENT O2	10.0
TOTAL RUN TIME:	60.00 min.	PERCENT CO2	9.5
BAROMETRIC PRESSURE:	30.18 "Hg	"F" FACTOR	9366
STACK PRESSURE:	30.18 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	---	
FINAL METER:	439.874 cubic ft.	FILTER mg.	227.4
INITIAL METER:	396.703 cubic ft.	WASH mg.	32.7
STACK AREA:	27.889 sq. ft.		

Avg O_2 = 9.6

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	1.100	1.049	1.760	167	79
1-2	1.200	1.095	1.920	176	79
1-3	1.300	1.140	2.080	176	79
1-4	1.100	1.049	1.760	178	79
1-5	1.200	1.095	1.920	177	80
1-6	1.200	1.095	1.920	178	80
1-7	1.300	1.140	2.080	177	81
1-8	1.100	1.049	1.760	176	81
1-9	1.000	1.000	1.600	176	81
1-10	1.000	1.000	1.600	174	82
2-1	1.400	1.183	2.240	174	82
2-2	1.400	1.183	2.240	176	83
2-3	1.400	1.183	2.240	176	83
2-4	1.200	1.095	1.920	177	83
2-5	1.200	1.095	1.920	176	83
2-6	.950	0.975	1.520	174	83
2-7	.950	0.975	1.520	174	83
2-8	.900	0.949	1.440	173	83
2-9	.900	0.949	1.440	175	84
2-10	.890	0.943	1.420	175	84
AVERAGES	---	1.062	1.815	175	82

RUN 3

NOZZLE AREA(SQ.FT.):	0.0002761		
AVG. VELOCITY HEAD :	1.13 "H20	VOL. FLOW ACFM :	113741
AVG. STACK TEMP.:	175 F	VOL. FLOW SCFMD :	68053
AVG. METER TEMP.:	82 F		
AVG. ORIFICE DIFFERENTIAL:	1.82 "H20	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:	43.024	---	
% H2O VAPOR:	28.6	POUNDS PER HOUR:	54.419
GAS MOL. WT. DRY:	29.92	POUNDS PER SCF :	0.0000133
GAS MOL. WT. WET:	26.51	GRAINS/SCF:	0.093
% EXCESS AIR:	88.87	GRAINS/SCF @ 8% O2	0.110
AVG. STACK VEL.(FPS)	67.97	GRAINS/SCF @50% EA	0.117
MMBTUH HEAT INPUT:	246.56	POUNDS PER MMBTU:	0.221
PERCENT ISOKINETIC :	106.43	LBS/MMBTU"F"FACTOR	0.239

SAMPLE CALCULATIONS - RUN 3

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	67.97
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./13.6))/29.92)x(528/(Tm+460))	43.024
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.92
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	26.51
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)*100	88.87
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts+460)/(PsxMwWET))!.5	67.97
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	106.43
VOL. FLOW (ACFM):	FPS x 60 x As	119741
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x(Ps/29.92)	68053
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/SCF) x 60	54.419
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000133
GRAINS/SCF:	LB/SCF x 7000	0.0933
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.1104
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.1175
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.221
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9/20.9-%O2)	0.239

APPENDIX B

FIELD DATA SHEETS

BOILER 3

STACK SAMPLING FIELD DATA SHEET

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

TEST ID _____
PAGE ____ OF ____

PLANT ATLANTIC SUGAR ASSOCIATION
SOURCE NUMBER 3 BOILER
PLANT LOCATION Belle GLADE FLORIDA
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES P.M.
DATE 11-20-91 RUN NO. 1
TIME START 0836 TIME END 0939
SAMPLE TIME 20, 3 (min/pt)= 60 Total min
ASSUMED MOISTURE 26 % FDA .74
NOMOGRAPH C_f 1.6 PITOT CORR. .84
P_b 30.20 "Hg P_s 30.20 "Hg
WEATHER OVERCAST TEMP. ____ °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. .225 .225 .225 .225
STACK DIMENSIONS 71.5" Φ
STACK AREA 27.883 ft² EFFECTIVE ____ ft²
STACK HEIGHT ____ ft.
STACK DIAMETER: UPSTRM. ____ DNSTRM. ____
PORT SIZE ____ in. NIPPLE LENGTH ____ in.
U CORD LENGTH ____
REMARKS: 100'

MAT'L PROCESSING RATE ____
GAS METER READINGS: FINAL 230.331 ft.³
INITIAL 189.954 ft.³
NET ____ ft.³
FILTER NO. 3445 IMP. VOL. GAIN 305 ml.
SIL GEL NO. 14 WT. GAIN 7.3 ml.
TOTAL CONDENSATE 312.3 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					9.0
% O_2					9.0
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER ____

LEAK CHECKS

PRE 0.005 cfm 15 "Hg POST .018 cfm 16 "Hg
METER BOX/PUMP ____ GAS SAMPLE SYST. ____
ORSAT BAG ____
PITOT TUBE NO. 75 PRE-TEST OK
POST-TEST(+) 5.21 0 H_2O/Sec
POST-TEST(−) 5.21 0 H_2O/Sec
PYROMETER NO. ATKINS 3
BOX OPERATOR NECK PROBE HOLDER HODGE

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)
1-1		0839	192.06	1.15	2.8	2.8	165	250	54	77	2
2		0842	194.11	1.15	1.8	1.8	175	240	46	76	2.5
3		0845	196.19	1.15	1.8	1.8	172	240	44	76	3
4		0848	198.23	1.1	1.7	1.7	173	240	46	77	5
5		0851	200.26	1.1	1.7	1.7	168	240	46	77	5.5
6		0854	202.31	1.05	1.7	1.7	168	240	47	78	6

.6230
.4090

2 30.04

AIR CONSULTING & ENGINEERING, INC.

TEST ID _____

PAGE ____ OF ____

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		0857	204.34	1.1	1.7	1.7	163	242	47	79	6.5
8		0900	206.32	1.0	1.6	1.6	161	244	47	79	6.5
9		0903	208.15	.82	1.3	1.3	159	248	48	80	6.5
10		0906	209.97	.82	1.3	1.3	157	248	48	80	6.5
2-1		0912	211.90	.95	1.5	1.5	156	241	50	81	7
2		0915	213.90	1.05	1.6	1.6	157	237	49	82	8
3		0918	215.—	1.1	1.7	1.7	156	238	50	82	9
4		0921	218.00	1.1	1.7	1.7	157	241	51	83	9.5
5		0924	220.10	1.15	1.8	1.8	162	243	51	83	10
6		0927	222.17	1.15	1.8	1.8	163	236	51	84	11
7		0930	224.25	1.15	1.8	1.8	168	243	52	84	11.5
8		0933	226.35	1.15	1.8	1.8	168	257	54	85	12
9		0936	228.34	.92	1.5	1.5	165	253	56	85	12
10		0939	230.331	.92	1.5	1.5	165	253	57	85	12

STACK SAMPLING FIELD DATA SHEET

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

3.6 3.2
200 CFM each

TEST ID _____
PAGE ____ OF ____

PLANT: ATLANTIC SUGAR ASSOCIATION
SOURCE: NUMBER 3 BOILER
PLANT LOCATION: Belle GLADE, FLORIDA
TYPE OF SAMPLING TRAIN: EPA-5
TYPE OF SAMPLES: PM
DATE: 11-20-91 RUN NO.: 2
TIME START: 1024 TIME END: 1126
SAMPLE TIME: 20, 3 (min/pt) = 60 Total min
ASSUMED MOISTURE: 27 % FDA: .73
NOMOGRAPH C_f: 1.6 PITOT CORR.: .84
P_b: 30.20 "Hg P_g: 30.20 "Hg
WEATHER: OVERCAST TEMP.: °F
METER BOX NO.: 6 H: 1.91 Y: 1.009
NOZZLE CAL.: _____ = .225
STACK DIMENSIONS: 71.5
STACK AREA: 27.883 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 277.857 ft.³
INITIAL 2[redacted]574 ft.³
NET _____ ft.³
FILTER NO. 3440 IMP. VOL. GAIN 313 ml.
SIL GEL NO. 2 WT. GAIN 9.3 ml.
TOTAL CONDENSATE 322.3 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					8.0
% O_2					9.0
% CO					
% N_2					

F_O = _____ F_O RANGE = _____
ORSAT ANALYZER: _____

LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST .016 cfm 17 "Hg
METER BOX/PUMP _____ GAS SAMPLE SYST. _____
ORSAT BAG _____
PITOT TUBE NO. 75 PRE-TEST OK
POST-TEST(+) 5.71, 0 H_2O/Sec
POST-TEST(−) 4.01, 0 H_2O/Sec
PYROMETER NO. ATKINS 3
BOX OPERATOR NICK PROBE HOLDER HODGE

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)
1-1		1027	232.60	1.0	1.6	1.6	154	225	60	84	2
2		1030	234.65	1.05	1.7	1.7	155	228	50	84	2
3		1033	236.96	1.15	1.8	1.8	156	247	50	84	5.5
4		1036	238.84	1.15	1.8	1.8	156	253	52	84	5.5
5		1039	240.93	1.15	1.8	1.8	155	254	53	85	6
6		1042	243.07	1.15	1.8	1.8	157	252	53	85	6

ACE AIR CONSULTING & ENGINEERING, INC.

.6350
.4131

227.49

TEST ID _____

PAGE ____ OF ____

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		1045	245.14	1.15	1.8	1.8	156	245	53	86	7
8		1048	247.17	1.1	1.7	1.7	157	252	53	86	7
9		1051	249.18	1.0	1.6	1.6	158	245	53	87	7.5
10		1054	251.—	1.0	1.6	1.6	155	248	53	87	8
2-1		1059	253.30	1.15	1.8	1.8	155	235	54	88	9.5
2		1102	255.41	1.15	1.8	1.8	165	231	54	88	9.5
3		1105	257.48	1.1	1.7	1.7	164	223	55	88	10
4		1108	259.53	1.1	1.7	1.7	165	223	55	89	10
5		1111	261.58	1.1	1.7	1.7	159	223	55	89	10
6		1114	263.65	1.1	1.7	1.7	157	218	56	90	10.5
7		1117	265.80	1.15	1.8	1.8	155	237	56	90	11
8		1120	267.85	1.0	1.6	1.6	158	239	57	90	11
9		1123	269.88	.94	1.5	1.5	155	244	57	90	11
10		1126	271.857	.90	1.45	1.45	156	243	56	91	11

STACK SAMPLING FIELD DATA SHEET

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

TEST ID 3
PAGE 1 OF 2

PLANT ATLANTIC SUGAR ASSOC.
SOURCE NO. 3 BOILER
PLANT LOCATION BELLE GLADE, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PM
DATE 11/20/91 RUN NO. 3
TIME START 1225 TIME END 1351
SAMPLE TIME 20 / 3 (min/pt)= 60 Total min
ASSUMED MOISTURE 27 % FDA .73
NOMOGRAPH C_f 1.00 PITOT CORR. .84
P_b 30.20 "Hg P_s 30.20 "Hg
WEATHER CLEAR TEMP. 80's °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. _____ _____ = .225
STACK DIMENSIONS 71.5
STACK AREA 27.88 ft² EFFECTIVE 27.88 ft²
STACK HEIGHT 70 ft. TO PLATFORM
STACK DIAMETER: UPSTRM. ✓ DNSTRM. ✓
PORT SIZE 4 in. NIPPLE LENGTH NA in.
U CORD LENGTH 100' - NEED 150' FOR TRAILER TEAM
REMARKS:
* - CONVEYOR (FUEL) DOWN
KEN FLICKER OBSERVING

MAT'L PROCESSING RATE _____
GAS METER READINGS: FINAL 313.511 ft.³
INITIAL 272.395 ft.³
NET 41.116 ft.³
FILTER NO. 344 IMP. VOL. GAIN 340 ml.
SIL GEL NO. 4 WT. GAIN 8.0 ml.
TOTAL CONDENSATE 348.0 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					9.0
% O_2					8.5
% CO					
% N_2					

F_O = _____ F_O RANGE = _____
ORSAT ANALYZER _____

LEAK CHECKS
PRE 1.00 cfm 10 "Hg POST 0.00 cfm 11 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG _____
PITOT TUBE NO. 75 PRE-TEST ok
POST-TEST(+) -5.8 / 15 H_2O/Sec
POST-TEST(-) 4.6 / 15 H_2O/Sec
PYROMETER NO. ATK-3
BOX OPERATOR HOOKE PROBE HOLDER NECK

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)
1-1	9/8	1228	274.65	1.1	1.76	1.76	158	236	67	87	4
2		1231	276.58	1.2	1.92	1.92	161	237	50	87	4
3	*	1234	278.73	1.2	1.92	1.92	163	232	45	87	5
4	↓ <14.1 min	1237	280.91	1.2	1.92	1.92	165	234	43	87	5
5	DOWN 1239 UP 1303	~~1240~~	283.02	1.1	1.76	1.76	163	230	43	87	6
	1304										

4.0% CO_2

ACE AIR CONSULTING & ENGINEERING, INC.

1.94 / 1.42 ✓

272.4

TEST ID 3

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) 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)
	98 →	(10.47	10.62)	(1.077)			(162)			(87)	
6	1307	1245	284.90	1.1	1.76	1.76	165	232	41	86	5
7	1310	1246	286.97	1.2	1.92	1.92	161	237	41	86	8
8	1313	1249	289.12	1.1	1.76	1.76	158	234	42	86	8
9	1316	1252	291.16	1.0	1.60	1.60	160	235	43	87	8
10	1319	1255	293.19	.85	1.36	1.36	160	234	43	87	8.7
	102 →	(20.37	20.79)	(1.027)			(161)			(86)	
2.1		1324	294.91	.90	1.44	1.44	160	243	42	88	9.0
2		1327	296.96	.99	1.58	1.58	155	252	42	88	9.0
3		1330	298.81	1.1	1.76	1.76	155	264	43	89	9.0
4	8/8.5	1333	300.84	1.1	1.76	1.76	165	250	44	89	10.0
5		1336	302.91	1.1	1.76	1.76	167	251	45	89	10.0
	102 →	(30.74	30.51)	(1.018)			(158)			(89)	
6		1339	304.99	1.2	1.92	1.92	165	246	46	90	11.0
7		1342	307.28	1.7	2.08	2.08	168	248	47	90	12.0
8		1345	309.40	1.1	1.76	1.76	168	251	48	90	12.0
9		1348	311.46	1.1	1.76	1.76	170	258	48	90	11.5
10		1351	313.51	1.1	1.76	1.76	168	255	48	90	11.5
	102	(30.70	41.116)	(1.026)			(168)			(90)	
		(1.049)(	.84)(	174	$\sqrt{.622}$) = (	3823.84	172.883 / 2.08) = (	16.66	) (272 / 622) (	) =	
	45.783										
								.4084			

BOILER 4

STACK SAMPLING FIELD DATA SHEET

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

TEST ID 1
PAGE 1 OF 2

PLANT ATLANTIC SUGAR ASSOCIATION
SOURCE NO. 4 BOILER
PLANT LOCATION BELLE GLADE, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PM
DATE 11/21/91 RUN NO. 1
TIME START 0836 TIME END 0936
SAMPLE TIME 20 / 3 (min/pt) = 60 Total min
ASSUMED MOISTURE .27 % FDA .73
NOMOGRAPH C_p 1.6 PITOT CORR. .84
P_b 30.18 "Hg P_g 30.18 "Hg
WEATHER P. CLEAR TEMP. 70's °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. .224 .225 .225 = .225
STACK DIMENSIONS 71.5"
STACK AREA 27.889 ft² EFFECTIVE 27.889 ft²
STACK HEIGHT ~70 ft (TO PLATFORM)
STACK DIAMETER: UPSTRM. ✓ DNSTRM. ✓
PORT SIZE 5 in. NIPPLE LENGTH NA in.
U CORD LENGTH 150' (TO REACH TRAILER)
REMARKS:
EDWARD PREZ - CONTD. ASA
FRANK KLEEMAN - BOILER DATA
JEFFERY F. KOERNER - HRS OBSERVING

ASH CLAS.WKS
ASH CLAB.WKS

MAT'L PROCESSING RATE
GAS METER READINGS: FINAL 354.077 ft.³
INITIAL 313.701 ft.³
NET 40.376 ft.³
FILTER NO. ~~7357~~ 3357 IMP. VOL. GAIN 305 ml.
SIL GEL NO. 3141 WT. GAIN 9.3 ml.
TOTAL CONDENSATE 314.3 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					9.2
% O_2					9.7
% CO					
% N_2					

F_O = _____ F_O RANGE = _____
ORSAT ANALYZER _____

LEAK CHECKS

PRE 0.00 cfm 10 "Hg POST 0.00 cfm 12 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG _____
PITOT TUBE NO. 75 PRE-TEST ok
POST-TEST(+) 5.7 / 15 H_2O/Sec
POST-TEST(−) 6.3 / 15 H_2O/Sec
PYROMETER NO. ATK-3
BOX OPERATOR HODGE PROBE HOLDER PRAWS

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)
1-1	CO_2/O_2	[illegible]	315.62	.95	1.52	1.52	163	249	63	65	2.0
2	e/a	[illegible]	317.64	1.1	1.76	1.76	170	251	58	66	2.5
3		[illegible]	319.62	1.1	1.76	1.76	172	255	58	66	2.5
4		0910	321.61	1.1	1.76	1.76	173	257	61	66	2.5
5		0925	323.71	1.2	1.92	1.92	170	257	62	68	4.0

AIR CONSULTING & ENGINEERING, INC.

313.7 1.86 ✓

TEST ID 1

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) CALC.	ACTUAL	STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP (°F)	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
	105% →	(10.01	/ 9.72)	(1.043)			(170)			(67)	
6	9.5/10	0854	325.90	1.2	1.92	1.92	170	267	63	69	4.0
7		0857	327.91	1.1	1.76	1.76	170	272	65	70	4.5
8		0900	329.95	1.1	1.72	1.776	170	271	67	71	5.0
9		0903	331.94	1.1	1.72	1.776	170	269	68	71	5.0
10		0906	333.88	.98	1.57	1.57	174	269	67	72	5.5
11		~~0909~~									
12		~~0912~~									
	102% →	(19.73	/ 20.18)	(1.079)			(171)			(71)	
2.1		0911	335.92	1.2	1.92	1.92	172	271	68	73	6.0
2	10/10	0914	338.14	1.4	2.24	2.24	175	266	64	74	8.0
3		0917	340.31	1.3	2.08	2.08	174	264	63	75	8.0
4		0920	342.45	1.2	1.92	1.92	175	262	52	76	8.0
5		0923	344.55	1.1	1.72	1.72	173	262	48	76	8.0
	103% →	(30.09	/ 30.85)	(1.113)			(174)			(75)	
6		0926	346.57	1.1	1.72	1.72	175	264	47	77	8.0
7	0929	~~0929~~	348.70	.95	1.52	1.52	175	264	46	78	8.0
8		0932	350.40	.82	1.31	1.31	174	263	47	79	8.0
9		0935	352.22	.83	1.33	1.33	176	250	48	79	8.0
10		0938	354.077	.87	1.39	1.39	176	255	53	80	8.0
11		—	—	(.955)							
12		—	—								
	104% →	(38.97	/ 40.376)	( )			(175)			(79)	
		(1.048	.84)(174)(√632)	= (		)(27.889) = (			(528/632)	(73) =	
											SCFM

STACK SAMPLING FIELD DATA SHEET

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

TEST ID X 2
PAGE 1 OF 2

PLANT ATLANTIC SUGAR ASSOCIATION
SOURCE NO. 4 BOILER
PLANT LOCATION BELLE GLADE, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES Pm
DATE 11/21/91 RUN NO. 2
TIME START 1018 TIME END 1149
SAMPLE TIME 20 / 3 (min/pt) = 60 Total min
ASSUMED MOISTURE 27 % FDA .73
NOMOGRAPH C_f 1.6 PITOT CORR. .84
P_b 30.18 "Hg P_s 30.18 "Hg
WEATHER O.CAST TEMP. 70's °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. _____ _____ _____ = .225
STACK DIMENSIONS 71.5
STACK AREA 27.889 ft² EFFECTIVE 27.889 ft²
STACK HEIGHT _____ ft
STACK DIAMETER: UPSTRM. _____ DNSTRM. _____
PORT SIZE _____ in. NIPPLE LENGTH _____ in.
U CORD LENGTH SEE R.1
REMARKS:

A54C2AS.WKS
A54C2AB.WKS

MAT'L PROCESSING RATE _____
GAS METER READINGS: FINAL 396.269 ft³
INITIAL 354.701 ft³
NET 41.568 ft³
FILTER NO. 3443 IMP. VOL. GAIN 345 ml.
SIL GEL NO. 100 WT. GAIN 8.1 ml.
TOTAL CONDENSATE 353.1 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2				9.7	~~10.7~~
% O_2				9.2	~~7.6~~
% CO					
% N_2					

F_O = _____ F_O RANGE = _____
ORSAT ANALYZER _____

LEAK CHECKS

PRE 0.00 cfm 10 "Hg POST 0.00 cfm 18 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG _____
PITOT TUBE NO. 75 PRE-TEST OK
POST-TEST(+) 4.7 / 15 H_2O/Sec
POST-TEST(−) 5.2 / 15 H_2O/Sec
PYROMETER NO. ATK-3
BOX OPERATOR HODGE PROBE HOLDER PRAWS

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)
1.1	9.2/9.2	1021	357.04	1.4	2.24	2.24	175	243	68	79	4.0
2		1027	359.22	1.3	2.08	2.08	175	251	61	68 78	4.0
3	Power out 1030 up 1056	1037	361.61	1.4	2.24	2.24	177	256	63	78	4.5
4		1050	363.52	1.1	1.76	1.76	174	260	54	78	5.0
5	1059	1055	365.70	1.2	1.92	1.92	170	250	47	78	5.0
		1100									

AIR CONSULTING & ENGINEERING, INC.

1155
802528

TEST ID 2

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) 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)
		( )	( )	( )			( )			( )	
6		1102	367.91	1.2	1.92	1.92	175	274	49	78	6.0
7	(Power out)	1105	369.95	1.1	1.76	1.76	175	271	50	78	6.0
8	Down 1109	1108	372.01	.90	1.44	1.44	175	272	50	80	6.0
9	UP 1111	1114	373.75	.90	1.44	1.44	176	260	50	80	6.0
10	9.5/9.2	1117	375.96	.90	1.44	1.44	172	260	49	80	6.5
11											
12											
		( )	( )	( )			( )			( )	
2.1	12.0/10.5	1122	377.97	1.3	2.08	2.08	170	256	52.7	81	6.0
2		1125	379.92	1.2	1.92	1.92	176	246	50	82	8.0
3		1128	382.05	1.2	1.92	1.92	175	238	51	83	10.0
4		1131	384.15	1.2	1.92	1.92	175	236	52	83	10.0
5		1134	386.22	1.1	1.76	1.76	176		58	84	10.0
		( )	( )	( )			( )			( )	
6	11.5/9.5	1137	388.25	1.1	1.76	1.76	175	249	56	84	10.0
7		1140	390.50	1.1	1.76	1.76	170	250	52	84	12.0
8		1143	392.35	.95	1.52	1.52	172	249	53	85	12.0
9		1146	394.35	.95	1.52	1.52	172	252	53	85	12.0
10		1149	396.269	.92	1.47	1.47	172	255	53	85	11.5
		( )	( )	( )			( )			( )	

1.36
1.48

STACK SAMPLING FIELD DATA SHEET

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

TEST ID 3
PAGE 1 OF 2

PLANT ATLANTIC SUGAR ASSOCIATION
SOURCE No. 4 BOILER
PLANT LOCATION BELLE GLADE, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PM
DATE 11/21/91 RUN NO. 3
TIME START 1245 TIME END 1348
SAMPLE TIME 20 / 3 (min/pt) = 60 Total min
ASSUMED MOISTURE .27 % FDA .73
NOMOGRAPH C_p 1.6 PITOT CORR. .84
P_b 30.18 "Hg P_s 30.18 "Hg
WEATHER CLEAR TEMP. 70's °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. _____ _____ = .225
STACK DIMENSIONS 71.5"
STACK AREA 27.889 ft² EFFECTIVE 27.889 ft²
STACK HEIGHT _____ ft
STACK DIAMETER: UPSTRM. _____ DNSTRM. _____
PORT SIZE _____ in. NIPPLE LENGTH _____ in.
U CORD LENGTH SEE 12-1
REMARKS:

ASU4C3AS.WKS
ASU4C3AB.WKS

MAT'L PROCESSING RATE _____
GAS METER READINGS: FINAL 439.874 ft.³
INITIAL 396.703 ft.³
NET 43.171 ft.³
FILTER NO. 3448 IMP. VOL. GAIN 355 ml.
SIL GEL NO. 25 WT. GAIN 8.6 ml.
TOTAL CONDENSATE 363.6 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					9.5
% O_2					10
% CO					
% N_2					

F_O = _____ F_O RANGE = _____
ORSAT ANALYZER _____

LEAK CHECKS

PRE 0.00 cfm 12 "Hg POST 0.00 cfm 14 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG _____
PITOT TUBE NO. 75 PRE-TEST OK
POST-TEST(+) 4.8 / 15 H_2O/Sec
POST-TEST(−) 5.2 / 15 H_2O/Sec
PYROMETER NO. ATK-3
BOX OPERATOR HODGE PROBE HOLDER BROWS

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)
1.1		1248	—	1.1	1.76	1.76	167	272	68	79	3.5
2		1251	402.35	1.2	1.92	1.92	176	266	50	79	4.0
3		1254	403.80	1.3	2.08	2.08	176	265	51	79	5.0
4		1257	405.96	1.1	1.76	1.76	178	262	51	79	6.0
5		1300	408.15	1.2	1.92	1.92	177	269	53	80	6.0

AIR CONSULTING & ENGINEERING, INC.

TEST ID 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)
		( )	( )	( )			( )			( )	
6		1303	410.25	1.2	1.92	1.92	178	262	53	80	7.0
7		1306	412.35	1.3	2.08	2.08	177	256	55	81	9.0
8		1309	414.44	1.1	1.76	1.76	176	258	51	81	9.5
9		1312	416.56	1.0	1.60	1.6	176	257	47	81	9.5
10		1315	418.44	1.0	1.60	1.60	174	255	48	82	9.5
		( )	( )	( )			( )			( )	
2-1	9.5 ~~11.5~~ 10/10	1321	420.71	1.4	2.24	2.24	174	256	44	82	10.5
2		1324	423.15	1.4	2.24	2.24	176	262	42	83	12.0
3		1327	425.45	1.4	2.24	2.24	176	262	42	83	12.0
4		1330	427.57	1.2	1.92	1.92	177	268	44	83	12.0
5		1333	429.80	1.2	1.92	1.92	176	265	45	83	12.0
		( )	( )	( )			( )			( )	
6		1336	432.18	.95	1.52	1.52	174	257	45	83	12.0
7	11.5/10.5	1339	—	.95	1.52	1.52	174	257	46	83	12.0
8		1342	436.12	.90	1.44	1.44	173	245	47	83	12.0
9		1345	438.10	.90	1.44	1.44	175	242	47	84	12.0
10		1348	439.874	.89	1.42	1.42	175	251	46	84	12.0
		( )	( )	( )			( )			( )	
		( )	(.84)	(174)	( ) =	( )	(27.884) =	( )	(528)	( ) =	
											SCFMD

BOILER OPERATION PARAMETERS

PLANT ATLANTIC SUGAR ASSN. BOILER NUMBER 4

DATE 11-21-91 RUN NUMBER 3 OIL METER FACTOR No OIL

STEAM INTEGRATOR FACTOR X 100 SCRUBBER(S) PRESS.DROP 4", ___

SCRUBBER(S) GPM 330, ___

OPERATOR SIGNATURE FSC SCRUBBER(S)H2O LEVEL ___, ___

Ph(if applicable) ___, ___

INITIAL INTEGRATOR 803396 FINAL INTEGRATOR 804644

124,800 LBS/HR.

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
1245		803396	550	275	235	350
100		803721	550	275	235	350
115		804045	550	270	235	350
130		804362	545	260	235	350
145		804644	555	250	235	350
1.00 HR.						
			550	266	235	350 AVG.

APPENDIX C

LABORATORY ANALYSIS

BOILER 4

AIR CONSULTING & ENGINEERING, inc.

PARTICULATE LAB DATA

SOURCE ATLANTIC SUGAR UNIT 4C

PROBE RINSE	RUN 1	RUN 2	RUN 3	BLANK	
CONTAINER NUMBER	S-2	S-3	S-5	S-30	
TOTAL VOLUME (ml)	150	140	199	148	LIQUID LEVEL ✓
1st GROSS WEIGHT (g)	101.1001	102.6541	101.1080	101.9549	DATE & TIME: 11-23-91 14:00
2nd GROSS WEIGHT (g)	101.1000	102.6540	101.1079	101.9547	DATE & TIME: 11-24-91 09:55
AVERAGE GROSS WEIGHT (g)	101.1000	102.6540	101.1080	101.9548	
TARE WEIGHT (g)	101.0814	102.6430	101.0753	101.9548	
SUB NET WEIGHT (g)	.0186	.0110	.0327	.0000	
ACETONE BLANK (g)	—	—	—	—	
TOTAL NET WEIGHT (mg)	18.6	11.0	32.7	.0	

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	3357	3443	3448	3145	
1st GROSS WEIGHT (g)	0.6060	0.6300	0.6352	0.4031	DATE & TIME: 11-23-91 11:20
2nd GROSS WEIGHT (g)	0.6060	0.6299	0.6349	0.4029	DATE & TIME: 11-24-91 0930
AVERAGE GROSS WEIGHT (g)	0.6060	0.6300	0.6350	0.4031	
TARE WEIGHT (g)	0.4195	0.4101	0.4076	0.4027	
SUB NET WEIGHT (g)	0.1865	0.2199	0.2274	0.0004	
TOTAL NET WEIGHT (mg)	186.5	219.9	227.4	.4	

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. Neck

2nd GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓

0.5g ✓ 100.0g ✓

%RH 66 DATE 11-24-91

Signature Christy L. Neck

APPENDIX D

PRODUCTION RATE CERTIFICATION

BOILER 3

PROCESS DATA INSTALLATION BOILER #3

COMPANY ATLANTIC SUGAR ASSN

DATE 11-20-91

TYPE OF INSTALLATION BAGASSE BOILER

TYPE OF MATERIAL PROCESSED BAGASSE

TYPE OF FUEL USED BAGASSE

TYPE OF POLLUTION CONTROL SYSTEM DUAL WET SCRUBBERS

		NORMAL	RUN 1	RUN 2	RUN 3
SCRUBBER WATER FLOW (GPM)	N	175	200	200	200
	S	175	200	200	200
PRESSURE DROP (INCHES)	N	4.0	3.8	3.6	3.7
	S	4.0	3.6	3.2	3.2

REPORTED BY FRANK KLEEMAN

BOILER DATA SHEET

COMPANY ATLANTIC SUGAR ASSN. REPORTED BY

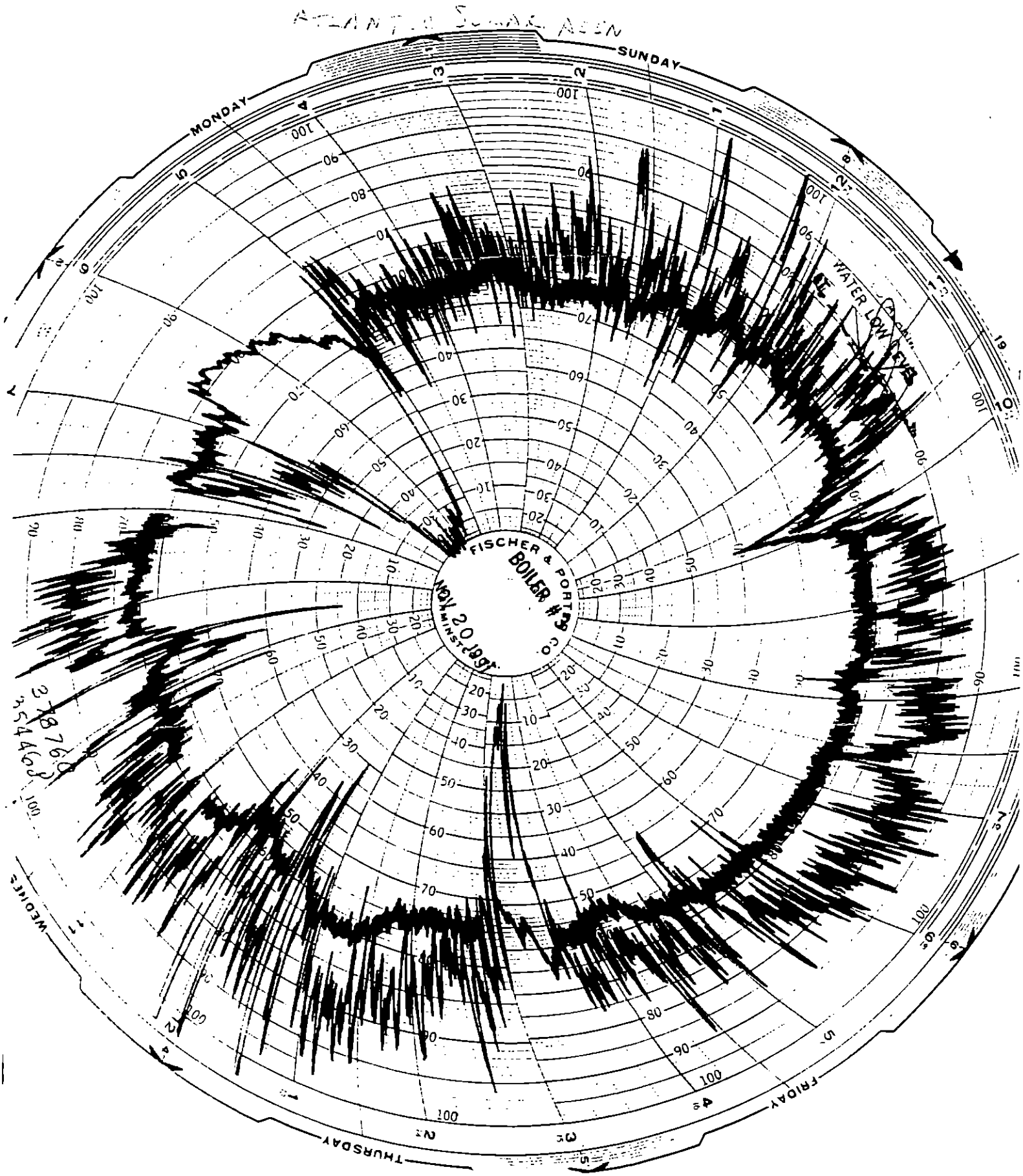
DATE 11-20-91

INTEGRATOR FACTOR ×100 BOILER NO. 3

FUEL OIL USED No OIL

	TIME	INTEGRATOR ×100	STEAM FLOW ×1000	STEAM PRESSURE	TEMP.	FEED WATER TEMP.	FEED WATER PRESSURE
RUN 1	832 AM	354837	88	235	545	235	345
	845	5097	90	235	540	235	345
	900	5396	90	235	540	235	345
	915	5739	89	235	540	235	345
	932	6006	88	235	540	235	345
	1.00 HR.	1169					
				235	541	235	345 AV
		1169 X100 = 116,900	LBS/HR				
RUN 2	1021	356819	88	250	550	235	345
	1045	7291	85	240	550	235	345
	1100	7575	84	240	540	235	345
	1121	7971	87	250	550	235	345
	1.00 HR.	1152					
				245	548	235	345 AV
		1152 X100 = 115,200	LBS/HR				
RUN 3	1210	358879	84	240	550	235	345
	1237 27 MIN	359410	85	235	545	235	345
STOPPED SAMPLING AGAIN	102	9828	531 90	250	555	235	345
	123 33 MIN	360248	667 91	255	550	235	345
	135	360495	93	250	550	235	345
	1.00 HR.		531 667				
		1198		246	550	235	345 AVG
		1198 X100 =	119,800	119,800 LBS/HR			

RUN 3 INITIAL INTEGRATOR 358879
FINAL " 360077


SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
WATER LOW
FISCHER & PORTER CO.
BOILER #3
NOV 20 1997

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	ATLANTIC SUGAR ASSOCATION	DATE:	11-20-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	1
SOURCE:	NUMBER 3 BOILER, SCRUBBER OUTLET	TIME:	0832-932

TIME INTERVAL	60	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	356006	
BEGIN STEAM	354837	
FACTOR	100	
TEMPERATURE	540	DEGREES F
PRESSURE	239	PSIG
	254	PSIA
FEEDWATER:		
TEMPERATURE	235	DEGREES F
PRESSURE	345	PSIG
	360	PSIA
HEAT INPUT:		
STEAM	1285.6	BTU/LB
FEEDWATER	203.2	BTU/LB
NET STEAM	1082.3	BTU/LB
STEAM RATE	116900	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	230.04	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	230.04	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.30	LB/MMBTU
TOTAL ALLOWABLE EMISSION	69.01	LB/HR
TOTAL ACTUAL EMISSION	47.29	LB/HR
TOTAL ALLOWABLE EMISSION	0.300	LB/MMBTU
TOTAL ACTUAL EMISSION	0.206	LB/MMBTU

BOILER OPERATION PARAMETERS

PLANT Atlantic Sugar Association BOILER NUMBER 3

DATE 11-20-91 RUN NUMBER 1 OIL METER FACTOR 1 No Oil

STEAM INTEGRATOR FACTOR 100 SCRUBBER(S) PRESS.DROP 3.6, 3.2

SCRUBBER(S) GPM 200, 200

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

Ph(if applicable) ____, ____

INITIAL INTEGRATOR 354837 FINAL INTEGRATOR 355906

TIME	OIL	STEAM			FEEDWATER	
	METER READING	x1400 LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE ~~345~~
0832		80 ~~112000~~	545	255	235	345
845		90	540	235	235	345
900		90	540	235	235	345
915		89	540	235	235	345
932		88	540	235	235	345
			541	239	235	345

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	ATLANTIC SUGAR ASSOCATION	DATE:	11-20-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	2
SOURCE:	NUMBER 3 BOILER, SCRUBBER OUTLET	TIME:	1021-1121

TIME INTERVAL	60	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	357971	
BEGIN STEAM	356819	
FACTOR	100	
TEMPERATURE	548	DEGREES F
PRESSURE	245	PSIG
	260	PSIA
FEEDWATER:		
TEMPERATURE	236	DEGREES F
PRESSURE	345	PSIG
	360	PSIA
HEAT INPUT:		
STEAM	1289.4	BTU/LB
FEEDWATER	203.2	BTU/LB
NET STEAM	1086.1	BTU/LB
STEAM RATE	115200	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	227.49	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	227.49	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.30	LB/MMBTU
TOTAL ALLOWABLE EMISSION	68.25	LB/HR
TOTAL ACTUAL EMISSION	54.57	LB/HR
TOTAL ALLOWABLE EMISSION	0.300	LB/MMBTU
TOTAL ACTUAL EMISSION	0.240	LB/MMBTU

BOILER OPERATION PARAMETERS

PLANT ATLANTIC SUGAR ASSOCIATION BOILER NUMBER 3

DATE 11-20-91 RUN NUMBER 2 OIL METER FACTOR NO OIL

STEAM INTEGRATOR FACTOR 100 SCRUBBER(S) PRESS.DROP 3.7, 3.2

SCRUBBER(S) GPM 200, 200

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

Ph(if applicable) ____, ____

INITIAL INTEGRATOR 356819 FINAL INTEGRATOR 357971

TIME	OIL	STEAM			FEEDWATER		
	METER READING	LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE	
1021		112000	550	250	240	345	
1045			550	240	235	345	
1100			540	240	235	345	
1121			550	250	235	345	
			548	245	236	345	AVG

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	ATLANTIC SUGAR ASSOCATION	DATE:	11-20-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	3
SOURCE:	NUMBER 3 BOILER, SCRUBBER OUTLET	TIME:	1225-1351

TIME INTERVAL	60	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	360077	
BEGIN STEAM	358879	
FACTOR	100	
TEMPERATURE	550	DEGREES F
PRESSURE	246	PSIG
	261	PSIA
FEEDWATER:		
TEMPERATURE	235	DEGREES F
PRESSURE	345	PSIG
	360	PSIA
HEAT INPUT:		
STEAM	1291.4	BTU/LB
FEEDWATER	203.3	BTU/LB
NET STEAM	1088.1	BTU/LB
STEAM RATE	119800	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	237.01	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	237.01	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.30	LB/MMBTU
TOTAL ALLOWABLE EMISSION	71.10	LB/HR
TOTAL ACTUAL EMISSION	47.83	LB/HR
TOTAL ALLOWABLE EMISSION	0.300	LB/MMBTU
TOTAL ACTUAL EMISSION	0.202	LB/MMBTU

Avg = 231.51

BOILER OPERATION PARAMETERS

PLANT ATLANTIC SUGAR ASSOC.

BOILER NUMBER 3

DATE 11-20-91 RUN NUMBER 3

OIL METER FACTOR

STEAM INTEGRATOR FACTOR 100

SCRUBBER(S) PRESS. DROP 3.7, 3.2
SCRUBBER(S) GPM 200, 200
SCRUBBER(S) H2O LEVEL ____, ____
Ph(if applicable) ____, ____

OPERATOR SIGNATURE

INITIAL INTEGRATOR 358879

FINAL INTEGRATOR 360067

STEAM PRODUCTION 119,800 LBS/HR

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS. FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
1210		118000	560	240	260	345
1240			550	235	235	345
110		(SEE OTHER DATA SHEET)				

BOILER 4

PROCESS DATA

INSTALLATION BOILER #4

COMPANY ATLANTIC SUGAR ASSN.

DATE 11-21-91

TYPE OF INSTALLATION BAGASSE BOILER

TYPE OF MATERIAL PROCESSED BAGASSE

TYPE OF FUEL USED BAGASSE

TYPE OF POLLUTION CONTROL SYSTEM WET SCRUBBER

	NORMAL	RUN 1	RUN 2	RUN 3
SCRUBBER WATER FLOW (GPM)	350	330	335	330
PRESSURE DROP (INCHES)	4.0	4.0	4.0	4.1

REPORTED BY FRANK KLEEMAN

BOILER DATA SHEET

COMPANY ATLANTIC SUGAR ASSN. REPORTED BY FRANK KLEEMAN

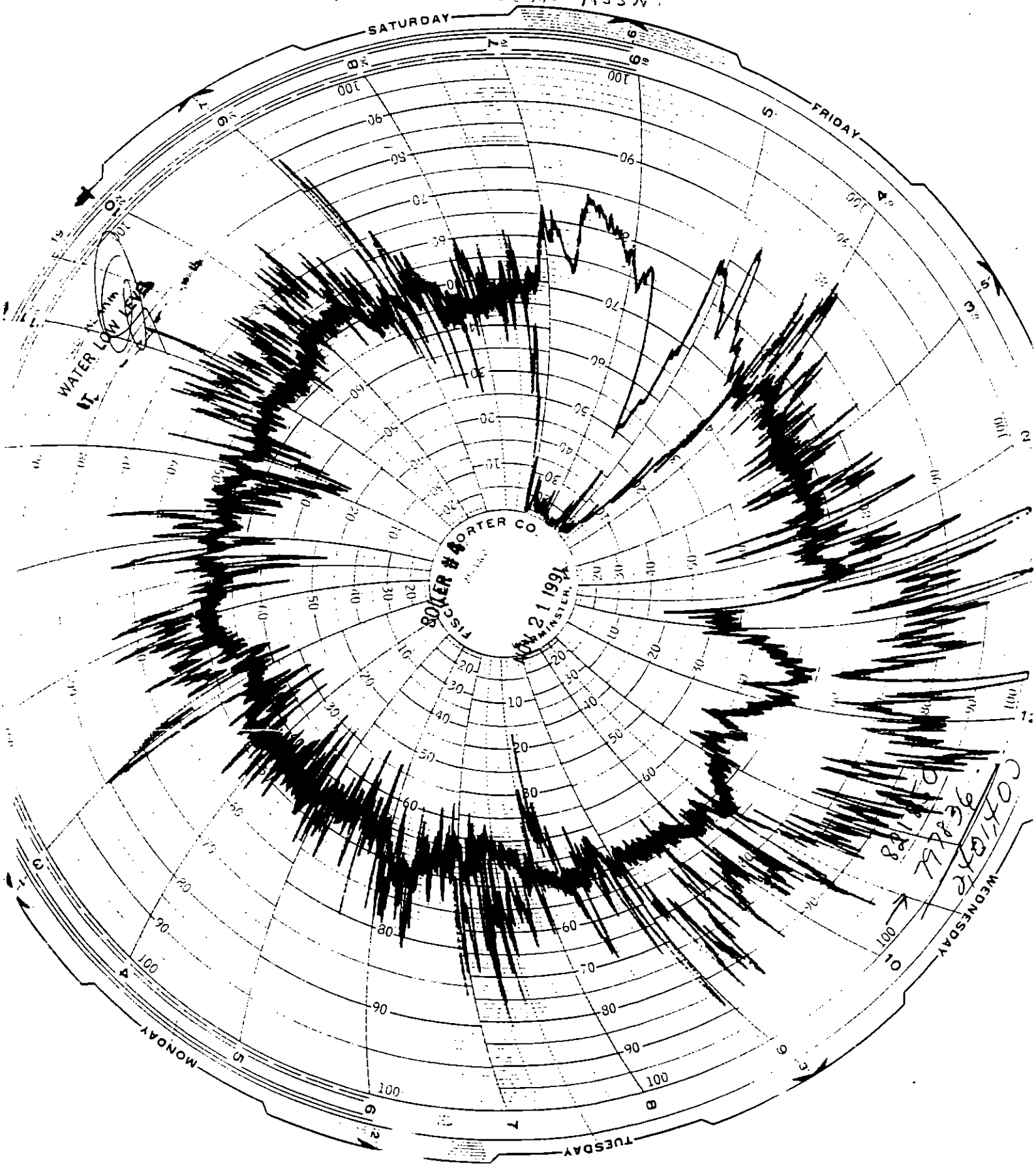
DATE 11-21-91

INTEGRATOR FACTOR X100 BOILER NO. 4

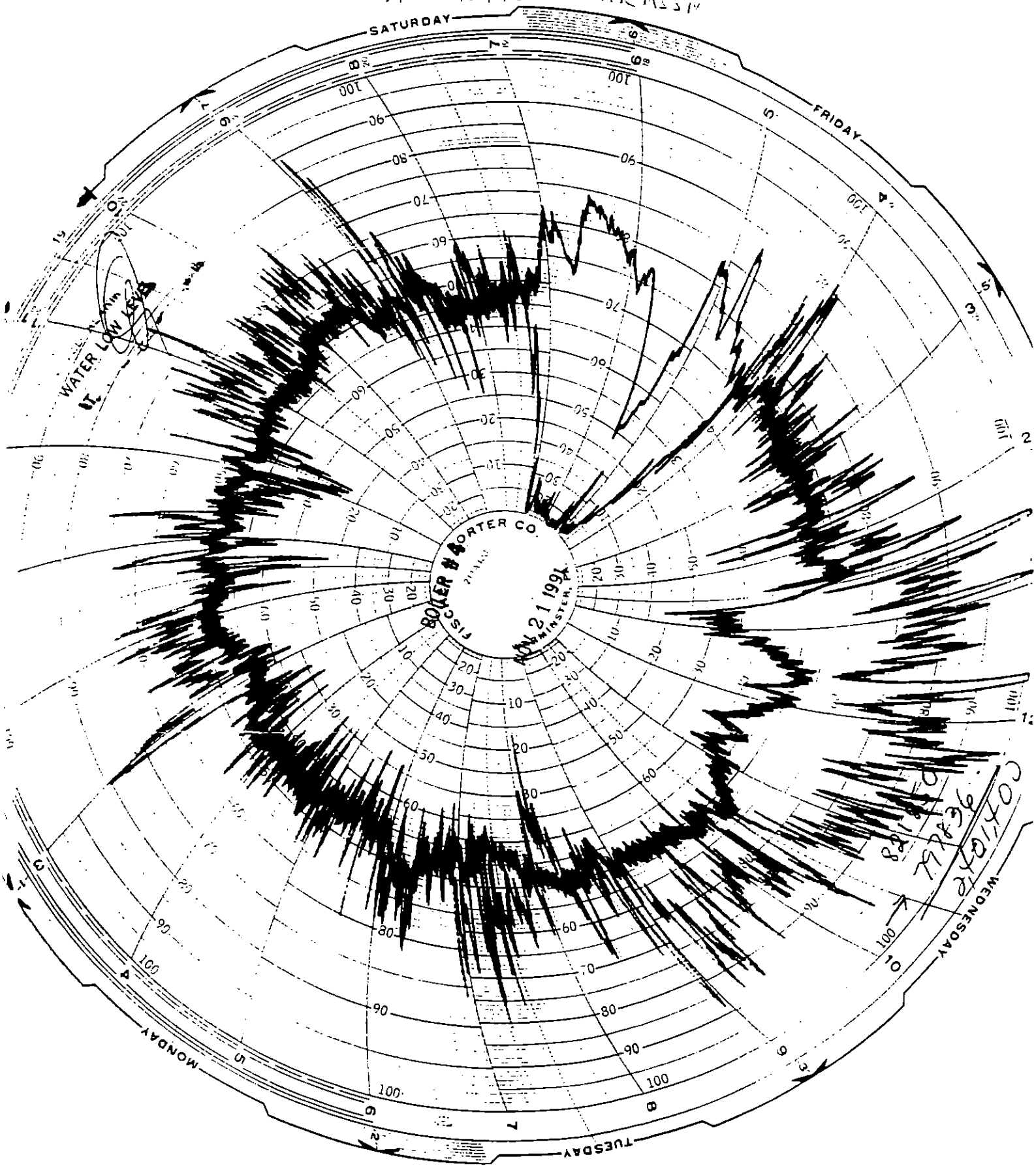
FUEL OIL USED NO OIL

	TIME	INTEGRATOR X100	STEAM FLOW X1400	STEAM PRESSURE	TEMP.	FEED WATER TEMP.	FEED WATER PRESSURE
RUN 1	833	798342	80	235	550	235	350
	848	8627	80	250	560	235	350
	902	8893	90	245	540	235	350
	918	9197	87	255	550	235	350
	933	799488	87	240	550	235	350
	1.00 HR	1146					
				245	550	235	350 AVG.
		1146 X 100 =	114,600	LBS/HR			
RUN 2	1018 } 12 MIN.	800361 }	83	265	555	235	350
	1030	0596 } 235	85	255	550	235	350
STOP	1056	1237	84	250	550	235	350
START	1130	1917	922 85	250	550	235	350
	1144	2159	87	245	545	235	350
		1157					
				253	550	235	350 AVG.
		1157 X 100 =	115,700	LBS/HR			
RUN 3	1245	803396	87	275	550	235	350
	100	3721	88	275	550	235	350
	115	4045	91	270	550	235	350
	130	4342	89	260	545	235	350
	145	4644	90	260	555	235	350
		1248					
				266	550	235	350 AVG.
		1248 X 100 =	124,800	LBS/HR			

ATLANTIC SUGAR ASSN.



ATLANTIC SUGAR ASSN



AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	ATLANTIC SUGAR ASSOCATION	DATE:	11-21-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	1
SOURCE:	NUMBER 4 BOILER, SCRUBBER OUTLET	TIME:	0836-0938

TIME INTERVAL	60	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	799488	
BEGIN STEAM	798342	
FACTOR	100	
TEMPERATURE	550	DEGREES F
PRESSURE	245	PSIG
	260	PSIA
FEEDWATER:		
TEMPERATURE	235	DEGREES F
PRESSURE	350	PSIG
	365	PSIA
HEAT INPUT:		
STEAM	1291.7	BTU/LB
FEEDWATER	203.3	BTU/LB
NET STEAM	1088.4	BTU/LB
STEAM RATE	114600	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	226.78	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	226.78	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.29	LB/MMBTU
TOTAL ALLOWABLE EMISSION	65.77	LB/HR
TOTAL ACTUAL EMISSION	45.27	LB/HR
TOTAL ALLOWABLE EMISSION	0.290	LB/MMBTU
TOTAL ACTUAL EMISSION	0.200	LB/MMBTU

BOILER OPERATION PARAMETERS

PLANT ATLANTIC SUGAR ASSN.

BOILER NUMBER 4

DATE 11/21/91 RUN NUMBER 1

OIL METER FACTOR (NO OIL) ~~X 100~~ 1

STEAM INTEGRATOR FACTOR X 100

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

OPERATOR SIGNATURE _____

INITIAL INTEGRATOR 798342 08333

FINAL INTEGRATOR 799488

114,600 LBS/HR

TIME	OIL	STEAM			FEEDWATER	
	METER READING	LBS.FLOW	TEMP.	PRESSURE	TEMP.	PRESSURE
8:33		110,000	550	245	235	350
8:48		110 000	560	250	235	350
9:03		126000	540	245	235	350
9:18		120 000	550	255	235	350
9:33		120 000	550	240	235	350
			550	245	235	350 AVG.

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	ATLANTIC SUGAR ASSOCATION	DATE:	11-21-91
LOCATION:	BELLE GLADE, FLORIDA	RUN NUMBER	2
SOURCE:	NUMBER 4 BOILER, SCRUBBER OUTLET	TIME:	1018-1149

TIME INTERVAL	60	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	801518	
BEGIN STEAM	800361	
FACTOR	100	
TEMPERATURE	549	DEGREES F
PRESSURE	257	PSIG
	272	PSIA
FEEDWATER:		
TEMPERATURE	235	DEGREES F
PRESSURE	350	PSIG
	365	PSIA
HEAT INPUT:		
STEAM	1290.2	BTU/LB
FEEDWATER	203.3	BTU/LB
NET STEAM	1086.9	BTU/LB
STEAM RATE	115700	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	228.64	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	228.64	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.29	LB/MMBTU
TOTAL ALLOWABLE EMISSION	66.31	LB/HR
TOTAL ACTUAL EMISSION	49.79	LB/HR
TOTAL ALLOWABLE EMISSION	0.290	LB/MMBTU
TOTAL ACTUAL EMISSION	0.218	LB/MMBTU

BOILER OPERATION PARAMETERS

PLANT ATLANTIC SUGAR ASSN. BOILER NUMBER 4

DATE 11-21-91 RUN NUMBER 2 OIL METER FACTOR NO OIL

STEAM INTEGRATOR FACTOR X100 SCRUBBER(S) PRESS. DROP 4.0"

SCRUBBER(S) GPM 335

OPERATOR SIGNATURE FSK SCRUBBER(S) H2O LEVEL

PH(if applicable)

INITIAL INTEGRATOR 800361 FINAL INTEGRATOR 801518

115,700 LBS/HR.

TIME	OIL METER READING	STEAM LBS. FLOW X1400	STEAM TEMP.	STEAM PRESSURE ----	FEEDWATER TEMP.	FEEDWATER PRESSURE
1018	235	800361	555	265	235	350
1030		83 85 800596	550	255	235	350
1056			550	260	235	350
1096		801120				
1130	222	801845	550	260	235	350
11:44		802742	540	245	235	350
60 MINUTES		1157				
			549	257	235	350 AVE

12 MIN

STOPPED SAMPLING

RESTARTED

48 MIN

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	ATLANTIC SUGAR ASSOCATION	DATE:	11-21-91
LOCATION:	SELLE GLADE, FLORIDA	RUN NUMBER	3
SOURCE:	NUMBER 4 BOILER, SCRUBBER OUTLET	TIME:	1245-1345

TIME INTERVAL	60	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	804644	
BEGIN STEAM	803396	
FACTOR	100	
TEMPERATURE	550	DEGREES F
PRESSURE	266	PSIG
	281	PSIA
FEEDWATER:		
TEMPERATURE	235	DEGREES F
PRESSURE	350	PSIG
	365	PSIA
HEAT INPUT:		
STEAM	1289.9	BTU/LB
FEEDWATER	203.3	BTU/LB
NET STEAM	1086.6	BTU/LB
STEAM RATE	124800	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	246.56	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	246.56	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.29	LB/MMBTU
TOTAL ALLOWABLE EMISSION	71.50	LB/HR
TOTAL ACTUAL EMISSION	54.41	LB/HR
TOTAL ALLOWABLE EMISSION	0.290	LB/MMBTU
TOTAL ACTUAL EMISSION	0.221	LB/MMBTU

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:

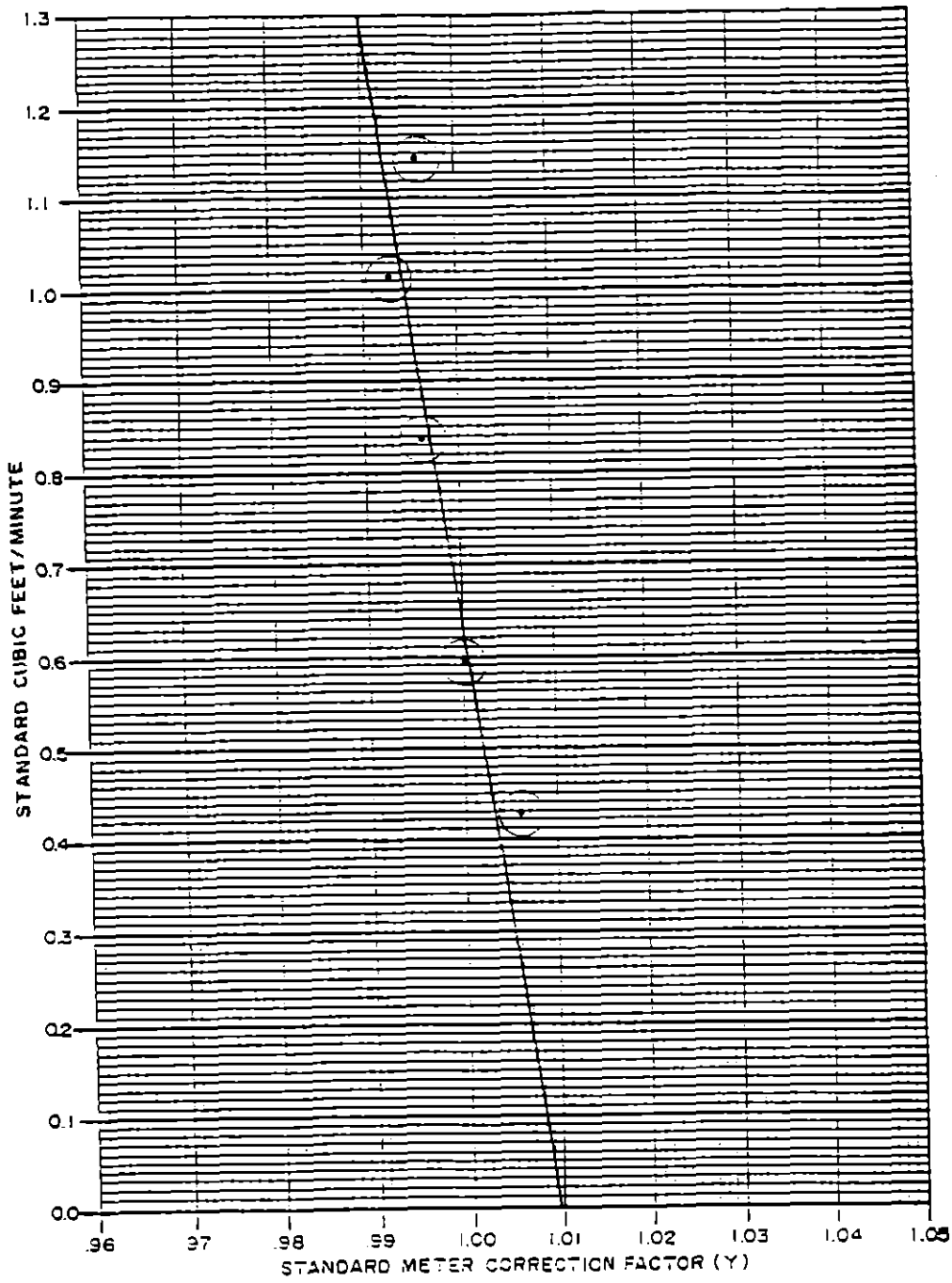
$$Y_a \times Y_s = Y$$

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	5.569	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 10-3-91

LEAK CHECK 0.000 CFM at 15 in. Hg.

METER BOX NUMBER 6

BAROMETRIC PRESSURE 29.94 in. Hg.

DRY GAS METER TEMPERATURE 82 °F/ASTM GLASS THERMOMETER TEMPERATURE 82 °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				
-.08	0.5	65.936	72.128	6.192	550.514	556.690	6.176	81	82	16	16
-.13	1.0	72.551	78.148	5.597	557.102	562.651	5.549	81	82	10	
-.18	1.5	78.417	84.504	6.087	562.914	568.942	6.028	81	83	9	
-.24	2.0	84.709	90.083	5.374	569.145	574.456	5.311	81	83	7	
-.35	3.0	90.361	96.007	5.646	574.724	580.290	5.566	81	84	6	
-.46	4.0	96.243	101.631	5.388	580.521	585.818	5.297	81	85	5	

	DELTA H	Ya	SCFM	Ys	Y
	1.909	1.003	0.378	1.004	1.007
	1.825	1.008	0.547	1.001	1.009
	1.871	1.010	0.661	1.000	1.009
	1.937	1.011	0.750	0.998	1.009
	1.930	1.013	0.919	0.996	1.008
	1.959	1.015	1.052	0.994	1.008
MEAN:	1.905	1.010		0.999	1.009

CALIBRATED BY: H. F. Gabel

AIR CONSULTING & ENGINEERING, inc. POST TEST CALIBRATION

DATE 11-26-91 METER BOX NUMBER 6 LEAK CHECK 0.000 CFM at 15 In. Hg.

CLIENT ATLANTIC SUGAR ASSOCIATION SOURCE BOILER 3 + 4 THERMOCOUPLE NUMBER 75 PYROMETER NUMBER ATK 3

FLIGHT SERVICE Pb 30.14 In. Hg. ACE BAROMETER Pb 30.15 In. Hg.

ASTM GLASS THERMOMETER 170 °F / THERMOCOUPLE 171 °F ASTM GLASS THERMOMETER 62 °F / METER TEMP 62 °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				
1.15	1.75	291.902	316.872	24.970	455.243	480.318	25.075	72 74 (73)	62 76 (69)	35	12
1.15	1.75	316.872	355.477	38.605	480.318	519.768	39.450	74 76 (75)	76 89 (82.5)	54	12
1.15	1.75	355.477	394.915	39.438	519.768	560.564	40.766	76 77 (76.5)	89 95 (92)	55	12

CALIBRATED BY: J. L. [illegible]

RUN NUMBER	SCFM	STANDARD M.C.F.	DELTA Ha	M.C.F.
1	0.71	1.005	1.944	0.989
2	0.71	1.005	1.902	0.993
3	0.71	1.005	1.868	0.996
AVERAGES	0.71	1.005	1.905	0.993

air consulting and engineering

AIR CONSULTING & ENGINEERING, inc. POST TEST CALIBRATION

DATE 11-26-91 METER BOX NUMBER 6 LEAK CHECK 0.000 CFM at 15 In. Hg.

CLIENT ATLANTIC SUGAR ASSOCIATION SOURCE BOILER 3+4 THERMOCOUPLE NUMBER 75 PYROMETER NUMBER ATK 3

FLIGHT SERVICE Pb 30.14 In. Hg. ACE BAROMETER Pb 30.15 In. Hg.

ASTM GLASS THERMOMETER 170 °F / THERMOCOUPLE 171 °F ASTM GLASS THERMOMETER 62 °F / METER TEMP 62 °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				
1.15	1.75	291.902	316.872	24.970	455.243	480.318	25.075	72 74 73	62 76 69	35	12
1.15	1.75	316.872	355.477	38.605	480.318	519.768	39.450	74 76 75	76 89 82.5	54	12
1.15	1.75	355.477	394.915	39.438	519.768	560.564	40.766	76 77 76.5	89 95 92	55	12

CALIBRATED BY: J. L. Deck

RUN NUMBER	SCFM	STANDARD M.C.F.	DELTA Ha	M.C.F.
1	0.71	1.005	1.944	0.989
2	0.71	1.005	1.902	0.993
3	0.71	1.005	1.868	0.996
AVERAGES	0.71	1.005	1.905	0.993

air consulting and engineering

AIR CONSULTING & ENGINEERING, INC. PYROMETER CALIBRATION

DATE 8-25-91

PYROMETER NUMBER Atkins #3

SOURCE (SPECIFY)	GLASS THERMOMETER WITH NBS MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	35	37	2	0.4
AMBIENT	88	89	1	0.2
HOT OVEN	345	348	3	0.5

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

AIR CONSULTING & ENGINEERING, INC. PITOT TUBE CALIBRATION

DATE CALIBRATED 2-22-91 PITOT TUBE 75

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

α_1 = 0 °(< 10°), α_2 = 1 °(< 10°), β_1 = 4 °(< 5°), β_2 = 0 °(< 5°)

γ = 1 ° θ = 2 ° A = 0.9999 in. = (Pa + Pb)

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

w = A sin θ = 0.035 in.; < 0.08 / < 1/32 in.

P_a 0.499 in. P_b 0.5008 in. D_t .400

WAS CALIBRATION REQUIRED NO

THERMOCOUPLE CALIBRATION

SOURCE (SPECIFY)	ASTM GLASS THERMOMETER WITH MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	36	36	0	0.00
AMBIENT	77	75	2	0.38
HOT OVEN	342	341	1	0.19

FDER - MAXIMUM 5° DIFFERENCE

CALIBRATED BY: S. 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 AND ENGINEERING, Inc.

SAMPLE RECOVERY AND CHAIN OF CUSTODY

PLANT NAME ATLANTIC SUGAR ASSOC. TEST DATE 11/20/91

SOURCE NAME NO. 3 BOILER SAMPLE RECOVERED BY SN/CN

TYPE OF SAMPLE PM PARTICULATE ANALYSES BY CN

SAMPLE RECOVERY

RUN NO.	CONTAINER NO.	LIQUID LEVEL MARKED	COLOR	COMMENTS
1	3445	—	LT. GREY	
1 B	S-22	✓	CLEAR	
2	3440	—	MED. GREY	
2	S-23	✓	CLEAR	
3	3444	—	DK. GREY	
3	S-24	✓	CLEAR	
ACETONE/WATER BLANK (CIRCLE)	S-44A	✓	CLEAR	
FILTER BLANK	3472	—	WHITE	

SILICA GEL

RUN NO.	CONTAINER NO.	FINAL WT. (g)	INIT. WT. (g)	NET WT. (g)	COLOR
1	14	207.3	200.0	7.3	PINK
2	2	209.3	200.0	9.3	"
3	4	208.0	200.0	8.0	"
			200.0		
			200.0		
			200.0		
			200.0		
			200.0		

AIR CONSULTING AND ENGINEERING, Inc.

SAMPLE RECOVERY AND CHAIN OF CUSTODY

PLANT NAME Atlantic Sugar TEST DATE 11-21-91
SOURCE NAME Boiler #4 SAMPLE RECOVERED BY CH
TYPE OF SAMPLE Pm PARTICULATE ANALYSES BY CN

SAMPLE RECOVERY

RUN NO.	CONTAINER NO.	LIQUID LEVEL MARKED	COLOR	COMMENTS
1	3357	–	Lt. Gray	
1	S.2	✓		
2	3443	–	Dk. Gray	
2	S.3	✓		
3	3448	–	Md. Gray	
3	S.5	✓		
ACETONE / WATER BLANK (CIRCLE)				
FILTER BLANK	3473	–	White	

SILICA GEL

RUN NO.	CONTAINER NO.	FINAL WT. (g)	INIT. WT. (g)	NET WT. (g)	COLOR
1	41	209.3	200.0	9.3	Pink
2	100	208.1	200.0	8.1	Pink
3	25	208.6	200.0	8.6	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
Field Team Leader

J. Colleen Hodge
Field Participant

Christy Neck
Laboratory Analysis

Dagmar Neck
Report Preparation

Candace V. Taylor
Document Production

KLEEMAN ENGINEERING

Frank Kleeman
Coordinator