

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.

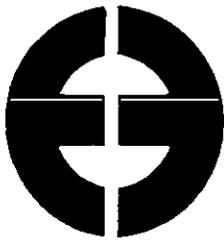
AP-42 Section Number: 1.8

Reference Number: 42

Title: Atlantic Sugar Association
Compliance Particulate Emissions
Test Report Boiler #2

February 1991

Ref: 29



Eastmount Engineering

Environmental Consultants — Air Quality Specialists

**ATLANTIC SUGAR ASSOCIATION
COMPLIANCE PARTICULATE EMISSIONS TEST REPORT
BOILER #2**

PREPARED FOR:

Atlantic Sugar Association
P.O. Box 1570
Belle Glade, Florida 33430

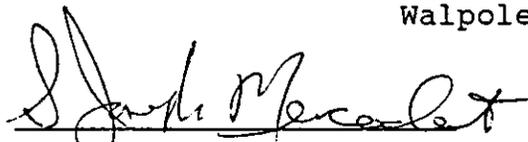
0501-ASA-5

CONCERNING:

Particulate Emissions Testing
Atlantic Sugar Association
Boiler #2
Belle Glade, Florida Facility
February 1, 1991

PREPARED BY:

S. Joseph Mercadante
President
Eastmount Engineering, Inc.
420 Main Street
Walpole, MA 02081


S. Joseph Mercadante
President

Feb 28, 1991
Date

TABLE OF CONTENTS

- 1.0 COMPENDIUM
- 2.0 STACK SCHEMATIC
- 3.0 TRAVERSE POINT LOCATION & SAMPLING TIME PER POINT
- 4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES
- 5.0 QUALITY CONTROL PROCEDURES

APPENDIX

- I COMPUTER INPUT SHEETS
- II ISOKINETIC CALCULATION SHEETS
- III ENTHALPY CALCULATION SHEETS
- IV HEAT INPUT CALCULATION SHEETS
- V EMISSION CALCULATION SHEETS
- VI NOMENCLATURE SHEETS
- VII FIELD DATA SHEETS - UNIT OPERATING CONDITIONS
- VIII FIELD DATA SHEETS - STACK TESTING
- IX EQUIPMENT CALIBRATION SHEETS

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

1.0 COMPENDIUM

Eastmount Engineering Inc., conducted a Compliance Particulate Emissions Test Program on Unit #2 at Atlantic Sugar Association's Belle Glade, Florida facility on February 1, 1991. The test program consisted of a series of three EPA Method 5 test runs.

All testing was conducted in strict accordance with the Environmental Protection Agency Reference Methods 1 through 5 as found in the Federal Register (40 CFR 60) as amended and were consistent with the State of Florida Department of Environmental Regulation's guidelines.

The purpose of this test was to determine compliance with the rules of the Department of Environmental Regulation (DER), Chapter 17-2.600 Air Pollution, Section 2.05 Prohibitive Acts, Subsection 6, Stationary Sources, Table II, Emission Limiting Standards.

During testing the boiler was burning bagasse as fuel. Boiler No. 2 is rated at 100,000 pounds of steam per hour. Results of the test program indicate Boiler No. 2 to be in compliance with the Florida DER emission standards. The following table summarizes the emission results, emission standards and boiler operating conditions.

RUN#	DATE	EMISSION RATE		ALLOWABLE		LOAD #/HR	% OF 100 KPH
		#/MMBtu	#/HR	#MMBtu	#/HR		
1	02-01-91	.266	56.63	.300	63.80	113500	113.5%
2	02-01-91	.246	54.37	.300	66.30	117700	117.7%
3	02-01-91	.289	61.60	.300	64.00	113800	113.8%
3 RUN AVG.		.267	57.53	.300	64.70	115000	115.0%

S. Joseph Mercadante, President, was in charge of and responsible for all stack testing including conducting all calculations. Ray Valdez, operated the meter box and performed Method 3A analysis. Mark Spiro performed sample recovery and performed the field laboratory aspects of the program. Jim Jardin positioned the probe at the proper traverse points and assisted where required. Mr. E. Perez was responsible for boiler operations and acquisition of all pertinent process data. Mr. Jeff Koerner of the Palm Beach County Department of Health observed the stack testing and boiler operations.

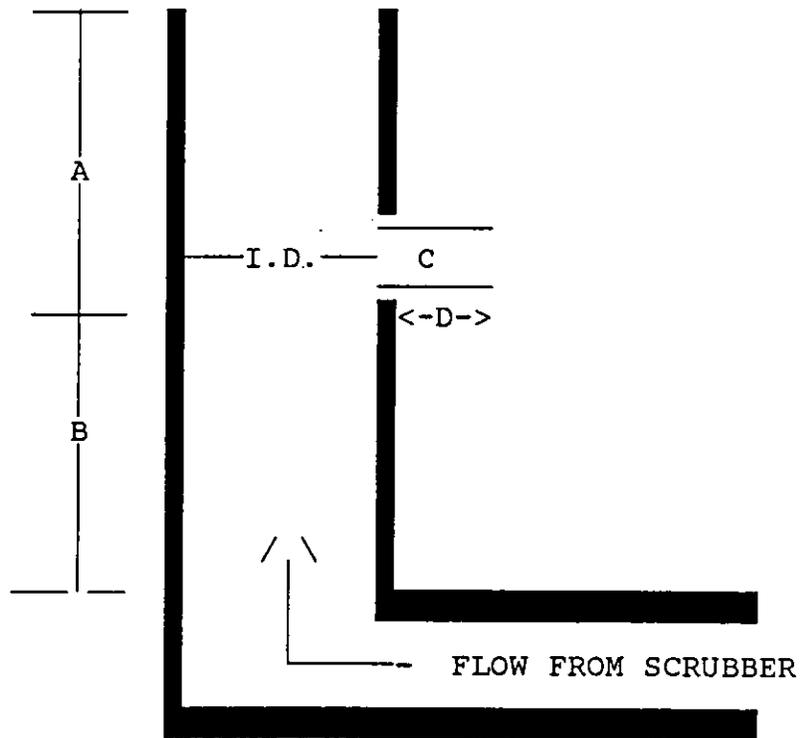
Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

2.0 STACK SCHEMATIC

ATLANTIC SUGAR ASSOCIATION
UNIT # 2
BELLE GLADE, FLORIDA FACILITY

The following is a schematic of the stack which services Boiler #2 at Atlantic Sugar Association's Belle Glade, Florida facility.

Defined are the sampling port locations, interior stack dimensions and distances from the ports to the nearest upstream and downstream interferences.



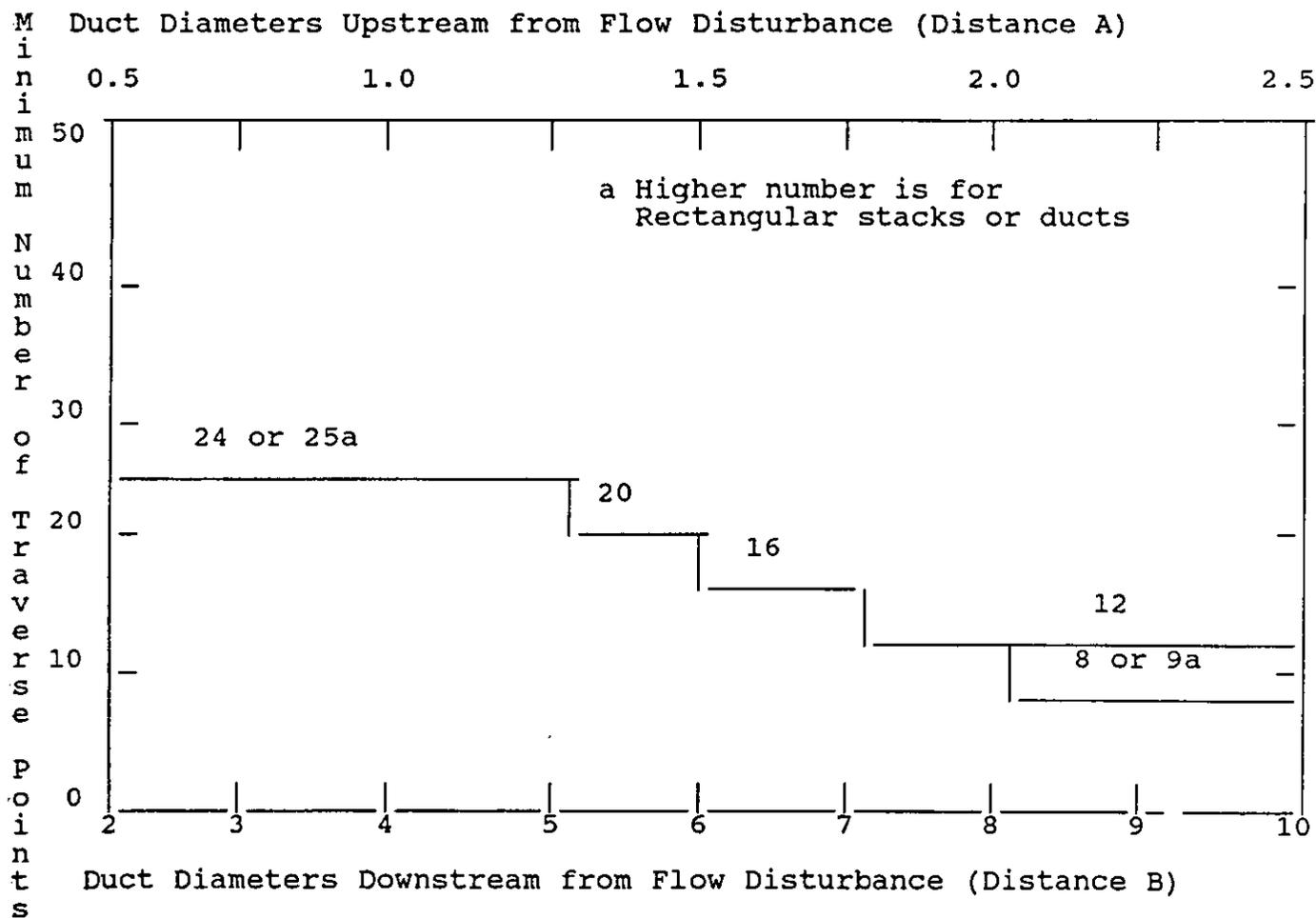
DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	148"
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	690"
DIAMETER OF PORT SLEEVE (C)	3.5"
LENGTH OF PORT SLEEVE (D)	3"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	74"

Drawing not to scale

Atlantic Sugar Association - Boiler #2
 Particulate Emissions Test Report

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

ATLANTIC SUGAR ASSOCIATION
 UNIT # 2
 BELLE GLADE, FLORIDA FACILITY



Minimum number of traverse points for particulate traverses.

Distance A = 148" or 2.0 diameters.

Distance B = 690" or 9.3 diameters.

In accordance with Method 1, 12 traverse points are needed.

In order to sample for a minimum of one hour and draw at least 30 cubic feet, each traverse point was sampled for 5.0 minutes.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

ATLANTIC SUGAR ASSOCIATION
UNIT # 2
BELLE GLADE, FLORIDA FACILITY

DIAMETER OF STACK: 74 INCHES
PORT SLEEVE LENGTH: 3.5 INCHES

TRAVERSE POINT	DISTANCE % OF DIAMETER	DISTANCE (INCHES)	PROBE MARK (INCHES)
1	4.4	3.2	6.7
2	14.6	10.8	14.3
3	29.6	21.9	25.4
4	70.4	52.1	55.6
5	85.4	63.2	66.7
6	95.6	70.7	74.2

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES

The following is a description of the sampling train and specifications of particulate collection media used in the tests.

1. EMISSION SAMPLING EQUIPMENT

The specific train used during this test is one manufactured by Research Appliance Company (RAC). The design specifications of this train meets all the requirements of Environmental Protection Agency's Method 5 as found in the Federal Regulations under Section 40 CFR 60 as amended. The following is a description of the individual pieces of equipment used:

Nozzle - The nozzle was of seamless stainless steel tubing construction of the button hook design. A range of sizes suitable for isokinetic sampling was available. All nozzles were calibrated before testing. A nozzle calibration sheet may be found in the calibration section of this report.

Probe - An 10 foot steel probe with a stainless steel liner was used.

Heating System - The filter temperature was maintained by enclosing the filter in a hot box capable of maintaining the temperature at $248^{\circ}\text{F} \pm 25^{\circ}\text{F}$. This temperature was monitored by use of a thermocouple in the hot box.

Pitot Tube - A type S pitot tube attached to the probe was used to monitor the stack gas velocity. Since the pitot tube meets all the dimensional criteria set forth in Method 2 of 40 CFR 60, a coefficient of 0.84 has been used.

Filter Holder - A borosilicate glass type filter holder with frit support was used.

Condenser - Four impingers connected in series, with ground glass leak-free fittings were used as the condenser. The first, third and fourth impingers were of the Greenburg-Smith design, modified by replacing the tip with a 1/2" glass tube extending to about 1/2" from the bottom of the flask. The second impinger was of the Greenburg-Smith design with the standard tip.

Metering System - A vacuum gauge, micromanometer, inclined manometer, leak-free pump, calibrated thermocouples and a calibrated dry gas meter were the basic components used to meter the dry gas through the system.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

Gas Density Determination - An ORSAT type combustion analyzer, capable of measuring CO₂, O₂ and CO was used to determine the molecular weight of the flue gas. An integrated proportional sample was taken at each of the traverse points in order to assure that the total test span was covered. The ORSAT analysis was conducted immediately following each test run.

2. SAMPLING AND ANALYTICAL PROCEDURES

All sampling and analytical procedures were conducted in strict accordance with the methods prescribed in Methods 1 through 5 of the Code of Federal Regulations as found in 40 CFR 60 as amended. The following is the sequence of events that occur both prior to and during the actual stack test.

Traverse Points - The traverse points were calculated in accordance with Method 1 and the probe was marked accordingly.

Static Pressure - The static pressure was checked and recorded.

Preliminary Traverse - A preliminary traverse was conducted. Readings included the pressure drops and stack gas temperatures.

Nomograph - Once all of the above information had been obtained, the nomograph was set up for the actual test to correlate the isokinetic relationships.

Barometric Pressure - Barometric pressure was obtained by use of an aneroid barometer at the test site.

Sampling Train Set-Up

- (a) The pre-weighed filter was placed in the filter holder and visually checked.
- (b) 100 ml of water was placed in the first two impingers.
- (c) Approximately 200 grams of silica gel was placed in the fourth impinger. (Exact weights were logged on the field data sheets).
- (d) Crushed ice was placed around the impingers.
- (e) Once assembly of the entire train was completed, the probe and heater box were turned on.

Pre-test Leak Check - Once the heater box was at the desired temperature for testing, the system was leak checked at 15 inches of vacuum. A leakage rate of less than 0.02 CFM had to be achieved before testing commenced.

Final Check - Once everything was ready to go, the plant was checked to assure that it was running at desired capacity.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

Sampling - Isokinetic sampling as described in Method 5 then took place.

Post-test Leak Check - Upon completion of each test run, the system was leak checked at the highest vacuum recorded during that run. All leak checks were less than 0.02 CFM and considered acceptable.

Sample Recovery - Because of the importance of proper sample recovery procedures, details of the sample recovery can be found in the Quality Control Procedures Section of this report.

Isokinetics - Once all sample recovery was completed and the amount of moisture collected had been determined, calculations were conducted to determine the percent isokinetics of the test run.

Operating Data Sheets - All pertinent operating data were logged throughout the testing period by plant personnel.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

5.0 QUALITY CONTROL PROCEDURES

The following is a description of the procedures used for maintaining the integrity of samples collected, including the chain of custody and quality control assurance of filters and acetone wash.

Pre-test preparation consisted of the filters being desiccated at 68° + 10° F at ambient pressure for at least twenty four (24) hours. At intervals of at least six (6) hours, the filters were re-weighed until a constant weight was achieved ± 0.5 mg change from the previous weighing. These pre-marked filters were then put into petri dishes and sealed. All filters used during testing were put into a carrying case for transport to the job site. A list of the filters and tare weights was available prior to testing.

After each test run, the filter and any particles which may have adhered to the filter holder gasket were carefully removed from the filter holder and placed into its identified petri dish container. This container was then labeled with the run number and date.

Taking care to see that particulate on the outside of the probe or other exterior surface did not get into the sample, particulate matter from the probe liner, nozzle, probe fittings, and front half of the filter holder were acetone washed into a sample container. This container was then sealed. The run number, date, and a mark indicating the level of the acetone wash in the bottle was recorded on the bottle.

Both the petri dish containing the filter and the bottle containing the acetone wash were transported to Eastmount Engineering's laboratory.

Once at the laboratory, each filter was weighed and then put back into its individual container. The container was then placed in a desiccator for at least twenty four (24) hours and then weighed. At intervals of at least six (6) hours, the filters were re-weighed until a constant weight was achieved ± 0.5 mg change from the previous weighing.

The levels marked on the bottles containing the acetone wash were checked to confirm that no leakage occurred during transport. The contents were then transferred into a pre-tared beaker and evaporated to dryness. Once this had been accomplished, the beaker was placed in a desiccator for at least twenty four (24) hours and then weighed. At intervals of at least six (6) hours, the beaker was re-weighed until a constant weight of ± 0.5 mg change from the previous weighing was achieved.

All calculations were conducted in strict accordance with 40 CFR 60 (See Calculation Sheets in report).

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-1
 DATE : 02-01-91

Ds (FT)	6.17							
Dn (IN)	.248							
FILTER#	3755	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
IMP-1 (INT)	100	A1	.89	.94	2.23	91	87	161
IMP-2 (INT)	100	2	1.00	1.00	2.50	97	89	173
IMP-3 (INT)	0	3	1.00	1.00	2.50	99	90	173
IMP-4 (INT)	500.0	4	1.00	1.00	2.50	101	91	175
IMP-1 (FIN)	376	5	.95	.97	2.38	102	93	173
IMP-2 (FIN)	154	6	.72	.85	1.80	102	93	170
IMP-3 (FIN)	19	B1	.87	.93	2.18	99	93	163
IMP-4 (FIN)	524.2	2	1.00	1.00	2.50	102	94	171
% CO2	10.6	3	1.00	1.00	2.50	103	95	173
% O2	9.3	4	.95	.97	2.38	104	96	171
% CO	0	5	.90	.95	2.25	105	96	172
P BAR	30.06	6	.72	.85	1.80	105	96	170
P STK	-.3							
NO. PTS	12							
TEST LNGTH	60							
END METER	371.016							
INT METER	322.786							
BEGIN TIME:	11:15							
END TIME:	12:20							
AVERAGE			.92	.96	2.29	100.8	92.8	170.4

INPUT DATA SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-2
 DATE : 02-01-91

Ds (FT) 6.17

Dn (IN) .248

FILTER#	3754	TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
PIT COEFF	.84							
IMP-1 (INT)	100	A1	.96	.98	2.11	98	95	157
		2	1.10	1.05	2.42	101	96	169
		3	1.00	1.00	2.20	103	96	168
IMP-2 (INT)	100	4	.90	.95	1.98	104	97	167
		5	.72	.85	1.58	103	97	168
IMP-3 (INT)	0	6	.38	.62	.84	102	97	166
IMP-4 (INT)	500.0	B1	.85	.92	1.84	99	96	166
		2	.98	.99	2.16	100	96	167
IMP-1 (FIN)	357	3	1.00	1.00	2.20	102	96	168
		4	.94	.97	2.07	103	97	169
IMP-2 (FIN)	135	5	.92	.96	2.02	103	97	168
		6	.75	.87	1.65	103	97	168
IMP-3 (FIN)	3							
IMP-4 (FIN)	513.2							
% CO2	10.6							
% O2	9.3							
% CO	1.5							
P BAR	30.06							
P STK	-.3							
NO. PTS	12							
TEST LNGTH	60							
END METER	417.694							
INT METER	374.001							
BEGIN TIME:	13:35							
END TIME:	14:43							
AVERAGE			.88	.93	1.92	101.8	96.4	166.8

INPUT DATA SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-3
 DATE: 02-01-91

Ds (FT)	6.17							
Dn (IN)	.248							
FILTER#	3753	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
IMP-1 (INT)	100	A1	.90	.95	2.25	95	93	159
		2	1.10	1.05	2.75	99	94	168
		3	1.10	1.05	2.75	101	94	172
IMP-2 (INT)	100	4	.92	.96	2.30	102	95	173
		5	.80	.89	2.00	102	96	172
IMP-3 (INT)	0	6	.62	.79	1.55	102	96	170
IMP-4 (INT)	500.0	B1	.91	.95	2.28	98	95	164
		2	1.00	1.00	2.50	101	95	167
IMP-1 (FIN)	352	3	1.10	1.05	2.75	102	96	171
		4	1.00	1.00	2.50	103	96	170
IMP-2 (FIN)	173	5	.94	.97	2.35	103	96	173
		6	.88	.94	2.20	103	96	172
IMP-3 (FIN)	3							
IMP-4 (FIN)	522.3							
% CO2	11.9							
% O2	8.9							
% CO	.0							
P BAR	30.06							
P STK	-.3							
NO. PTS	12							
TEST LNGTH	60							
END METER	465.270							
INT METER	418.025							
BEGIN TIME:	15:31							
END TIME:	16:36							
AVERAGE			.94	.97	2.35	100.9	95.2	169.3

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX II
ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-1
 DATE : 02-01-91

TS (°F) = 170.4	% CO2 = 10.6	VM (CF) = 48.230
TS (°R) = 630.4	% O2 = 9.3	DELTA H (ABS) = 30.23
TM (°F) = 96.8	% CO = 0	PS (ABS) = 30.04
TM (°R) = 556.8	% N2 = 80.1	SQRT DELTA P = .955936
VI(TOT) = 373.2	CP = .84	AREA NOZZLE = .000335

		Y = .9863
VM STD =	17.64 $\frac{(VM)(Y)(DELTA H ABS)}{(TM)}$	= 45.56 DSCF
VW STD =	.04707 (VI TOT)	= 17.57 CF
BWO =	$\frac{VW STD}{VW STD + VM STD}$	= .278
BWO =	MOISTURE FROM STEAM TABLES	= .410
VI TOT =	ADJUSTED TO SATURATION VOLUME	= N/A ML
1-BWO =	1 - BWO	= .722
Md (DRY) =	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2) -----	= 30.07 LBS/LB MOLE
Ms (WET) =	MD (1-BWO) + 18 (BWO) -----	= 26.71 LBS/LB MOLE
G =	SQRT (TS / PS / MS)	= .89
VS =	85.49(CP)(G)(SQRT DELTA P)	= 60.9 FPS
H =	0.002669 (VI TOT)	= 1.00
J =	(DELTA H ABS)(VM)(Y) / (TM)	= 2.58
K =	(H) + (J)	= 3.58
% ISO =	$\frac{(TS) (K) (1.667)}{(TIME) (VS) (PS) (AN)}$	= 102.2

ISOKINETIC CALCULATION SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-2
 DATE : 02-01-91

TS (`F)= 166.8	% CO2= 10.6	VM (CF) = 43.693
TS (`R)= 626.8	% O2= 9.3	DELTA H (ABS)= 30.20
TM (`F)= 99.1	% CO= 1.5	PS (ABS) = 30.04
TM (`R)= 559.1	% N2= 78.6	SQRT DELTA P = .929074
VI(TOT)= 308.2	CP= .84	AREA NOZZLE = .000335

Y = .9863

VM STD	= 17.64	$\frac{(VM)(Y)(DELTA H ABS)}{(TM)}$	= 41.06	DSCF
VW STD	= .04707 (VI TOT)		= 14.51	CF
BWO	=	$\frac{VW STD}{VW STD + VM STD}$	= .261	
BWO	=	MOISTURE FROM STEAM TABLES	= .385	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	=	N/A ML
1-BWO	=	1 - BWO	= .739	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	=	30.07 LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	=	26.92 LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	=	.88
VS	=	85.49(CP)(G)(SQRT DELTA P)	=	58.7 FPS
H	=	0.002669 (VI TOT)	=	.82
J	=	(DELTA H ABS)(VM)(Y) / (TM)	=	2.33
K	=	(H) + (J)	=	3.15
% ISO	=	$\frac{(TS) (K) (1.667)}{(TIME) (VS) (PS) (AN)}$	=	92.7

ISOKINETIC CALCULATION SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-3
 DATE: 02-01-91

Avg = 16.9

Avg = 9.2

TS (°F) = 169.3	% CO2 = 11.9	VM (CF) = 47.245
TS (°R) = 629.3	% O2 = 8.9	DELTA H (ABS) = 30.23
TM (°F) = 98.0	% CO = 0	PS (ABS) = 30.04
TM (°R) = 558.0	% N2 = 79.2	SQRT DELTA P = .966472
VI(TOT) = 350.3	CP = .84	AREA NOZZLE = .000335

Y = .9863

VM STD	= 17.64	$\frac{(VM)(Y)(DELTA H ABS)}{(TM)}$	= 44.53	DSCF
VW STD	= .04707 (VI TOT)		= 16.49	CF
BWO	=	$\frac{VW STD}{VW STD + VM STD}$	= .270	
BWO	=	MOISTURE FROM STEAM TABLES	= .402	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	=	N/A ML
1-BWO	=	1 - BWO	= .730	
Md (DRY)	=	$\begin{aligned} &.44 (\% CO2) \\ &+.32 (\% O2) \\ &+.28 (\% CO) \\ &+.28 (\% N2) \\ &\hline \end{aligned}$	= 30.26	LBS/LB MOLE
Ms (WET)	=	$\begin{aligned} &MD (1-BWO) \\ &+ 18 (BWO) \\ &\hline \end{aligned}$	= 26.95	LBS/LB MOLE
G	=	$SQRT (TS / PS / MS)$	= .88	
VS	=	$85.49(CP)(G)(SQRT DELTA P)$	= 61.2	FPS
H	=	$0.002669 (VI TOT)$	= .93	
J	=	$(DELTA H ABS)(VM)(Y) / (TM)$	= 2.52	
K	=	$(H) + (J)$	= 3.46	
% ISO	=	$\frac{(TS) (K) (1.667)}{(TIME) (VS) (PS) (AN)}$	= 98.1	

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : ATLANTIC
LOCATION: UNIT 2

RUN #: 2-1
DATE : 02-01-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	270	480	250
	265	480	
	265	480	
	245	475	
	250	475	
 AVERAGE	 259.0 PSIG	 478.0	 250.0
 P ABS =	 273.7 PSIA		
 ENTHALPY @	 480 'F AND	 275 PSIA =	 1250.0
ENTHALPY @	460 'F AND	275 PSIA =	1237.3
ENTHALPY @	478.0 'F AND	275 PSIA =	1248.7
 ENTHALPY OF FEED WATER =		 218.5	
AVERAGE ENTHALPY =		1030.3	BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : ATLANTIC
LOCATION: UNIT 2

RUN #: 2-2
DATE : 02-01-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	260	490	250
	250	480	
	250	475	
	250	480	
	250	480	
 AVERAGE	 252.0 PSIG	 481.0	 250.0
 P ABS =	 266.7 PSIA		
 ENTHALPY @	 480 'F AND	 265 PSIA =	 1251.2
ENTHALPY @	460 'F AND	265 PSIA =	1238.7
ENTHALPY @	481.0 'F AND	265 PSIA =	1251.8
 ENTHALPY OF FEED WATER =		 218.5	
AVERAGE ENTHALPY =		1033.3	BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : ATLANTIC
LOCATION: UNIT 2

RUN #: 2-3
DATE : 02-01-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	250	480	250
	245	475	
	260	475	
	245	475	
	250	480	
AVERAGE	250.0 PSIG	477.0	250.0

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX IV
HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: ATLANTIC
 LOCATION: UNIT 2

RUN #: 2-1
 DATE: 02-01-91

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
	-----	-----	-----
END	3610	12: 15	100
BEGIN	2475	11: 15	LBS/HR STEAM
NET	----- 1135	----- / 60	----- = 113500

113500 LBS/HR STEAM / 55% EFF. = 206364 EQUIV.

206364 LBS/HR STEAM X 1030 BTU/LB = 212.6 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
	-----	-----	-----
END	0	12: 15	
BEGIN	0	11: 15	
NET	----- 0	----- 60	----- MINS = 0 GPH

0 GPH X 150,000 BTU/GAL (EST) = 0 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	212.6	-	0	X	.3	=	63.8	LBS/HR
OIL			0	X	.1	=	.0	LBS/HR
TOTAL						=	63.8	LBS/HR

HEAT INPUT CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 2

RUN #: 2-2
DATE: 02-01-91

STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
-----		-----
END	6102	14: 35
BEGIN	4925	13: 35
NET	1177	X 100 / 60 MINS =
		117700
117700 LBS/HR STEAM	/ 55% EFF.	= 214000 EQUIV.
214000 LBS/HR STEAM	X 1033 BTU/LB	= 221.1 BTU(e6)/HR

OIL INTEGRATOR READINGS	TIME	GALS/HR
-----		-----
END	0	14: 35
BEGIN	0	13: 35
NET	0	GALLONS 60 MINS =
		0 GPH
0 GPH	X 150,000 BTU/GAL (EST)	= 0 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	221.1	-	0	X	.3	=	66.3	LBS/HR
OIL			0	X	.1	=	.0	LBS/HR
TOTAL						=	66.3	LBS/HR

HEAT INPUT CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 2

RUN #: 2-3
DATE: 02-01-91

	<u>STEAM INTEGRATOR READINGS</u>	<u>TIME</u>	<u>INTEGRATOR FACTOR</u>
END	8183	16: 30	100
BEGIN	7045	15: 30	LBS/HR STEAM
NET	1138	X 100 / 60 MINS	= 113800

113800 LBS/HR STEAM / 55% EFF. = 206909 EQUIV.

206909 LBS/HR STEAM X 1031 BTU/LB = 213.3 BTU(e6)/HR

	<u>OIL INTEGRATOR READINGS</u>	<u>TIME</u>	<u>GALS/HR</u>
END	0	16: 30	
BEGIN	0	15: 30	
NET	0	GALLONS 60 MINS	= 0 GPH

0 GPH X 150,000 BTU/GAL (EST) = 0 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	213.3	-	0	X	.3	=	64.0	LBS/HR
OIL			0	X	.1	=	.0	LBS/HR
TOTAL						=	64.0	LBS/HR

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX V
EMISSION CALCULATION SHEETS

EMISSION CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 2

RUN #: 2-1
DATE: 02-01-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3755	200	3747	209
FINAL:	.9175	78.5062	.6434	76.3019
TARE :	.6422	78.4846	.6430	76.3009
NET :	.2753	.0216	.0004	.0010/200ML

VOLUME OF RINSE 420

WEIGHT = 296.90
RESIDUE = 2.10

Mn = 294.80 Mg AS = 29.9 SQ FT

$Q_s = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3968859 \text{ DSCFH}$

$CS = (2.205 \times 10^{-6}) (Mn) / (VM \text{ STD}) = 1.427e-5 \text{ LBS/SCF}$

$CS' = 0.0154 (Mn) / (VM \text{ STD}) = .10 \text{ GRAINS / SCF}$

$PMR = (QS) (CS) = 56.63 \text{ LBS/HR}$

$LOAD = \text{MILLIONS OF BTU / HOUR INPUT} = 212.6 \text{ BTU } e10 / \text{HR}$

$CS = \text{LBS / MILLION BTu} = .266 \text{ LBS / BTu } e6$

EMISSION CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 2

RUN #: 2-2
DATE: 02-01-91

	SAMPLES		BLANKS	
	FILTER -----	BEAKER -----	FILTER -----	ACETONE -----
NO. :	3754	205	3747	209
FINAL:	.8845	75.8751	.6434	76.3019
TARE :	.6419	75.8598	.6430	76.3009
NET :	.2426	.0153	.0004	.0010/200ML

VOLUME OF RINSE 255

WEIGHT = 257.90
RESIDUE = - 1.28

Mn = 256.63 Mg AS = 29.9 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3945677 DSCFH

CS = (2.205 X 10⁻⁶) (Mn) / (VM STD) = 1.378e-5 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .10 GRAINS / SCF

PMR = (QS) (CS) = 54.37 LBS/HR

LOAD = MILLIONS OF BTU / HOUR INPUT = 221.1 BTU e10 / HR

CS = LBS / MILLION BTu = .246 LBS / BTu e6

EMISSION CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 2

RUN #: 2-3
DATE: 02-01-91

	SAMPLES		BLANKS	
	FILTER -----	BEAKER -----	FILTER -----	ACETONE -----
NO. :	3753	206	3747	209
FINAL:	.9234	77.9375	.6434	76.3019
TARE :	.6378	77.9131	.6430	76.3009
NET :	.2856	.0244	.0004	.0010/200ML

		VOLUME OF RINSE 465	
WEIGHT =	310.00		
RESIDUE =	- 2.33		
Mn =	307.68 Mg	AS =	29.9 SQ FT
Qs =	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) =		4043323 DSCFH
			<i>3,985,953</i>
CS =	(2.205 X 10 ⁻⁶) (Mn) / (VM STD) =		1.523e-5 LBS/SCF
CS' =	0.0154 (Mn) / (VM STD) =		.11 GRAINS / SCF
PMR =	(QS) (CS) =		61.60 LBS/HR
LOAD =	MILLIONS OF BTU / HOUR INPUT =		213.3 BTU e10 / HR
			<i>215.7</i>
CS =	LBS / MILLION BTu =		.289 LBS / BTu e6

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX VI
NOMENCLATURE SHEETS

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

NOMENCLATURE SHEET

PARTICULATE EMISSION TEST

Ar	Acetone residue - result of Blank evaporation.
AREA NOZZLE	Area of the nozzle in square feet.
AS	Area of the stack in square feet.
BDL	Below detectable limits
BWO	The amount of moisture in the flue gas.
% CO	Percent of carbon monoxide in the flue gas.
% CO2	Percent of carbon dioxide in the flue gas.
Cp	Pitot tube coefficient.
CS	The concentration in the stack in pounds per standard cubic foot.
Cs'	The concentration in the stack in grains per standard cubic foot.
DELTA H	The meter orifice differential.
DELTA H(ABS)	The meter orifice differential, absolute conditions in inches of mercury.
Dn (IN)	Diameter of the nozzle in inches.
DRY GAS IN	Temperature of the dry gas meter inlet degrees Farenheight.
DRY GAS OUT	Temperature of the dry gas meter outlet degrees Farenheight.
Ds (FT)	Diameter of the stack in feet.
E	The emission rate in pounds per million Btu derived by using F-Factor.
E (Heat Input)	The emission rate in pounds per million Btu derived by use of calculated heat input.
END METER	The dry gas meter reading at the end of the test.
F factor	The theoretical amount of air in dry standard cubic feet (DSCF) needed to combust a million Btu's worth of fuel.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

NOMENCLATURE (cont'd)

Filter Catch	The amount of particulate captured on the filter during testing.
INT METER	The dry gas meter reading at the beginning of the test.
Md (DRY)	The dry molecular weight of the flue gas in pounds per pound mole.
MN	The amount of particulate collected by washing the nozzle, probe, and front half of the glassware, reported in milligrams.
MN'	The milligrams of particulate collected minus the blank.
Ms (WET)	Wet or actual molecular weight of the flue gas in pounds per pound mole.
% N2	The percent of nitrogen in the flue gas.
NO PTS	Number of traverse points.
% O2	Percent of oxygen in the flue gas.
P BAR	Barometric pressure at test location.
P STK	Static pressure of the stack in inches of water.
PMR	The emission rate in pounds per hour.
PS (ABS)	Absolute pressure conditions in the stack in inches of mercury.
Qs	The volumetric flow rate of the flue gas in dry standard cubic feet per hour.
SQ ROOT	The square root of each velocity head measurement.
SQRT DELTA P	The average of the square roots of the measured pressure drops.
Stack Temp or TS (°F)	The temperature of the stack in degrees Fahrenheit.
TS (°R)	The temperature of the stack in degrees Rankine.
T (Hot Box)	Temperature around the filter box, degrees Fahrenheit.
TM (°F)	Average temperature of the dry gas meter in degrees Fahrenheit.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

NOMENCLATURE (cont'd)

TM (°R)	Average temperature of the dry gas meter in degrees Rankine.
VEL HEAD	The pressure drop measured across the pitot tubes.
VI (TOT)	The amount of water collected in the impingers in milliliters.
VM (CF)	The volume sampled through the dry gas meter in cubic feet.
VM STD	Volume sampled through the dry gas meter corrected to standard conditions.
VS	Velocity of the stack gas in feet per second.
VW STD	The amount of moisture collected, converted to standard cubic feet.
Y	Meter box calibration factor.
o	Sampling time in minutes.

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

BOILER DATA SHEET

ATLANTIC SUGAR

UNIT # 3

RUN #: 2-1

DATE: 02/01/91

TIME	: 11 ¹⁵ _{AM}	: 11 ³⁰ _{AM}	: 11 ⁴⁵ _{AM}	: 12 ⁰⁰ _{AM}	: 12 ¹⁵ _{AM}
STEAM PRESSURE	: 290	: 265	: 265	: 245	: 250
STEAM TEMPERATURE	: 480	: 480	: 480	: 475	: 475
STEAM INTEGRATOR	: 2975	: 2760	: 3023	: 3303	: 3610
FUEL OIL PRESSURE	: -	: -	: -	: -	: -
FUEL OIL TEMPERATURE	: -	: -	: -	: -	: -
FUEL OIL INTEGRATOR	: -	: -	: -	: -	: -
FEED WATER TEMPERATURE	: 250	: 250	: 250	: 250	: 250
% O2	: -	: -	: -	: -	: -
SCRUBBER DIFFERENTIAL	: 5	: 5	: 5	: 5	: 5

READINGS TAKEN BY: _____

BOILER DATA SHEET

ATLANTIC SUGAR
UNIT #3 2

RUN #: 2-2

DATE: 02/01/91

TIME	1:35 PM	1:50 PM	2:05 PM	2:20 PM	2:35 PM
STEAM PRESSURE	260	250	250	250	250
STEAM TEMPERATURE	490	480	475	480	480
STEAM INTEGRATOR	4925	5204	5493	5793	6102
FUEL OIL PRESSURE	-	-	-	-	-
FUEL OIL TEMPERATURE	-	-	-	-	-
FUEL OIL INTEGRATOR	-	-	-	-	-
FEED WATER TEMPERATURE	250	250	250	250	250
% O2	-	-	-	-	-
SCRUBBER DIFFERENTIAL	5	5	5	5	5

READINGS TAKEN BY: _____

BOILER DATA SHEET

ATLANTIC SUGAR
UNIT ~~202~~ 2

RUN #: 2-3

DATE: 02/01/91

TIME	3:30 PM	3:45 PM	4:00 PM	4:15 PM	4:30 PM
STEAM PRESSURE	220	245	260	245	250
STEAM TEMPERATURE	480	475	475	475	480
STEAM INTEGRATOR	7045	7225	7601	7905	8100
FUEL OIL PRESSURE	-	-	-	-	-
FUEL OIL TEMPERATURE	-	-	-	-	-
FUEL OIL INTEGRATOR	-	-	-	-	-
FEED WATER TEMPERATURE	250	250	250	250	250
% O2	-	-	-	-	-
SCRUBBER DIFFERENTIAL	5	5	5	5	

READINGS TAKEN BY: [Signature]

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	<u>ATLANTIC</u>	Run #:	<u>2-1</u>
Location:	<u>UNIT 2</u>	Date:	<u>02/01/91</u>
Ds (ft):	<u>6.17</u>	No. Points:	<u>12</u>
Dn (in):	<u>248 SP</u> 257	Test Length:	<u>60</u>
Filter #:	<u>3755</u>	End Meter Reading:	<u>371.016</u>
Cp:	<u>0.25</u>	Int Meter Reading:	<u>322.786</u>
P bar:	<u>30.06</u>	Begin Time:	<u>11:15</u>
P stack:	<u>- .3</u>	End Time:	<u>12:20</u>

IMP-1 (INT)	<u>100</u>	IMP-1 (FINAL)	<u>376</u>
IMP-2 (INT)	<u>100</u>	IMP-2 (FINAL)	<u>154</u>
IMP-3 (INT)	<u>0</u>	IMP-3 (FINAL)	<u>19</u>
IMP-4 (INT)	<u>500.0</u>	IMP-4 (FINAL)	<u>524.2</u> (MRS) 507.2

	TEST 1	TEST 2	TEST 3
% CO2	<u>10.6</u>	_____	_____
% O2	<u>9.3</u>	_____	_____
% CO	<u>—</u>	_____	_____

Project Director:	<u>S.J. MERCADANTE</u>	Field Laboratory:	<u>MRS PIRO</u>
Meter Box Operator:	<u>S.J. MERCADANTE</u>	Chain of Custody:	<u>S.J.M.</u>
Probe Operator:	<u>J. JARDIN</u>	Plant Coordinator:	<u>E. PEREZ</u>
Orsat Analyst:	<u>R. VALDEZ</u>	Agency Rep:	<u>J. KOERNER</u>

Comments:

TRAVERSE DATA SHEET

Page 1 of

Sampling time per point: 5 min

Plant: Atlantic

Run #: RUN 2-1

Location: Unit #2

Date: 2/2/91

Trav. No.	Delta P	Delta H	Meter Reading	⑥ DGM In	⑦ DGM Out	② Hot Box	③ Impg Temp	① Stack Temp	Vac
A 1	.89	2.23	326.8	91	87	203	65	161	3.0
2	1.00	2.50	331.0	97	89	240	64	173	4.0
3	1.00	2.50	335.8	99	90	239	68	173	4.0
4	1.00	2.50	339.3	101	91	245	69	175	4.5
5	.95	2.38	343.4	102	93	244	67	173	5.0
6	.72	1.80	347.016	102	93	256	67	170	5.0
B 1	.87	2.18	351.0	99	93	245	63	163	6.0
2	1.00	2.50	355.2	102	94	255	64	171	7.0
3	1.00	2.50	359.3	103	95	262	66	173	7.5
4	.95	2.38	363.5	104	96	266	65	171	8.0
5	.90	2.25	267.4	105	96	257	64	172	8.0
6	.72	1.80	371.016	105	96	255	66	170	7.5

Relationship: 2.2
 Box #: 3 Y: 9863 Delta H_e: 1.9
 Start Time: 11:15 End Time: 12:20
 Pre Leak CK: 0.005 CFM @ 15 "Hg
 Mid Leak CK: CFM @ "Hg (Vol:)
 Post Leak CK: 0.00 CFM @ 10 "Hg
 Pitot Leak CK: OK @ OK "H₂O
 Box Oper: S.P.M. Probe Oper: T.S.

Jeff KOERUEER

FIELD DATA SHEET

GENERAL INFORMATION

Plant: Atlantic Run #: Run 2-2
Location: Unit 2 Date: 2/1/91
Ds (ft): 2576.17 No. Points: 1/12
Dn (in): 248 Test Length: 60
Filter #: 3754 End Meter Reading: 417.694
Cp: 84 Int Meter Reading: 374.001
P bar: 30.06 Begin Time: 13:35
P stack: -1.3 End Time: 14:43

IMP-1 (INT) 100 mls IMP-1 (FINAL) 357 mls
IMP-2 (INT) 100 mls IMP-2 (FINAL) 135 mls
IMP-3 (INT) 0 IMP-3 (FINAL) 3 mls
IMP-4 (INT) 500.0 gms IMP-4 (FINAL) 513.2 g

	TEST 1	TEST 2	TEST 3
% CO2	<u>10.6</u>	_____	_____
% O2	<u>9.3</u>	_____	_____
% CO	_____	_____	_____

Project Director: S.S. MENDOZA RE Field Laboratory: M. SPIRO
Meter Box Operator: R. VALDEZ Chain of Custody: S.S. MENDOZA RE
Probe Operator: J. STARDIN Plant Coordinator: E PEREZ
Orsat Analyst: R. VALDEZ Agency Rep: J. ROEMER

Comments:

TRAVERSE DATA SHEET

Page 1 of 1

Sampling time per point: 5 min

Plant: Atlantic Sugar

Run #: RUN 2-2

Location: #2 STACK

Date: 2-1-91

Trav. No.	Delta P	Delta H	374.001 Meter Reading	⑥ DGM In	⑦ DGM Out	④ Hot Box	③ Impg Temp	① Stack Temp	Vac
A 1	.96	2.11	377.82	98	95	230°	68	157	4.0
2	1.10	2.42	381.91	101	96	245	64	169	4.5
3	1.00	2.20	385.83	103	96	262	64	168	5.0
4	.90	1.98	389.57	104	97	256	64	167	5.0
5	.72	1.58	392.63	103	97	268	65	168	5.0
6	.38	.84	395.68	102	97	254	65	166	3.5
<hr/>									
B 1	.85	1.87	399.42	99	96	264	66	166	5.0
2	.98	2.16	403.19	100	96	267	63	167	6.5
3	1.00	2.20	406.88	102	96	266	64	168	7.0
4	.94	2.07	410.57	103	97	266	62	169	7.0
5	.92	2.02	414.25	103	97	255	63	168	7.5
6	.75	1.65	417.694	103	97	250	63	168	7.5

Relationship: 2.2
 Box #: 3 Y: .9863 Delta H: 1.90
 Start Time: 13:35 End Time: 2:43
 Pre Leak CK: 0.0 CFM @ 15 "Hg
 Mid Leak CK: _____ CFM @ _____ "Hg (Vol: _____)
 Post Leak CK: _____ CFM @ _____ "Hg
 Pitot Leak CK: _____ @ _____ "H2O
 Box Oper: RV Probe Oper: JJ

~~XXXXXXXXXX~~

FIELD DATA SHEET
GENERAL INFORMATION

Plant:	<u>Atlantic</u>	Run #:	<u>Run 2-3</u>
Location:	<u>Unit #2</u>	Date:	<u>2/1/91</u>
Ds (ft):	<u>6.17</u>	No. Points:	<u>17</u>
Dn (in):	<u>.248</u>	Test Length:	<u>50 min</u>
Filter #:	<u>3753</u>	End Meter Reading:	<u>4651.270</u>
Cp:	<u>.84</u>	Int Meter Reading:	<u>418.025</u>
P bar:	<u>30.06</u>	Begin Time:	<u>15:31</u>
P stack:	<u>- .3</u>	End Time:	<u>16:36</u>

IMP-1 (INT)	<u>100 ml</u>	IMP-1 (FINAL)	<u>352 ml</u>
IMP-2 (INT)	<u>100 ml</u>	IMP-2 (FINAL)	<u>173 ml</u>
IMP-3 (INT)	<u>0</u>	IMP-3 (FINAL)	<u>3 ml</u>
IMP-4 (INT)	<u>500.0 gms</u>	IMP-4 (FINAL)	<u>522.3 gms</u>

	TEST 1	TEST 2	TEST 3
% CO2	<u>11.9</u>	_____	_____
% O2	<u>8.9</u>	_____	_____
% CO	<u>—</u>	_____	_____

Project Director:	<u>S.S. MERCADANTE</u>	Field Laboratory:	<u>M. SPIRO</u>
Meter Box Operator:	<u>R. VALDEZ</u>	Chain of Custody:	<u>S.S. MERCADANTE</u>
Probe Operator:	<u>J. JARDIN</u>	Plant Coordinator:	<u>R. PEREZ</u>
Orsat Analyst:	<u>R. VALDEZ</u>	Agency Rep:	_____

Comments:

TRAVERSE DATA SHEET

Page 1 of 1

Sampling time per point: 5 min

Plant: ATLANTIC

Run #: RUN 2-3

Location: #2 STACK

Date: 2-1-91

Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
			418.025						
A 1	.90	2.25	421.78	95	93	235	64	159	3.0
2	1.10	2.75	426.03	99	94	242	63	168	4.0
3	1.10	2.75	430.26	101	94	254	66	172	4.5
4	.92	2.30	434.16	102	95	253	65	173	4.5
5	.80	2.00	437.77	102	96	264	66	172	4.5
6	.62	1.55	441.09	102	96	265	67	170	4.0
X	X	X	X	X	X	X	X	X	X
B 1	.91	2.28	444.90	98	95	265	69	164	5.5
2	1.00	2.50	448.95	101	95	267	66	167	6.0
3	1.10	2.75	453.06	102	96	268	67	171	7.5
4	1.00	2.50	457.45	103	96	260	66	170	7.5
5	.94	2.35	461.50	103	96	258	66	173	7.5
6	.88	2.20	465.270	103	96	255	65	172	8.0

Relationship: 2.5
 Box #: 3 y: 9863 Delta H@: 1.90
 Start Time: 15:31 End Time: 16:36
 Pre Leak Ck: 0.0 CFM @ 15 "Hg
 Mid Leak Ck: _____ CFM @ _____ "Hg (Vol: _____)
 Post Leak Ck: _____ CFM @ _____ "Hg
 Pitot Leak Ck: _____ @ _____ "H2O
 Box Oper: RV Probe Oper: JJ

Atlantic Sugar Association - Boiler #2
Particulate Emissions Test Report

APPENDIX IX

EQUIPMENT CALIBRATION SHEETS

POST
METER BOX CALIBRATION SHEET

BOX #: 3
PRES BAR: 30.04

DATE: 2-11-91
VACUUM: 15IN HG

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	10.00	10.198	1.40	.103	30.14	16.22
2	10.00	10.336	1.40	.103	30.14	16.24
3	10.00	10.406	1.40	.103	30.14	16.26

RUN #	TEMP WET (°F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	66.0	85.3	74.0	79.7	1.003	1.99
2	66.0	90.7	79.3	85.0	.9990	1.98
3	66.0	93.3	83.0	88.2	.9981	1.97
AVERAGE					1.000	1.98

PRE CAL Y = .9863 % DIFFERENCE = 1.36 %
ALLOWABLE = 5.00 %

FORMULAS:

Y = DELTA H @ =

$$\frac{(V w) (P b) (T d)}{(V d) (P b \text{ ABS}) (T w)} \cdot \frac{0.0317 (\text{DELTA H})}{(P b) (T d)} * \left[\frac{(T w) (\text{TIME})}{(V w)} \right]^2$$

JIM JARDIN

CALIBRATION BY: _____

METER BOX CALIBRATION SHEET

BOX NUMBER: #3
 PRESS BAR : 30.20

DATE: 16 NOV 90
 DUE: 16 MAY 91

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	5	5.084	.50	.0368	30.24	11.99
2	5	5.137	1.00	.0735	30.27	8.97
3	10	10.410	1.50	.1103	30.31	15.46
4	10	10.506	2.00	.1471	30.35	13.57
5	10	10.671	3.00	.2206	30.42	11.08
6	10	10.777	4.00	.2941	30.49	9.69

RUN #	TEMP WET (°F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	74.0	79.4	88.2	83.8	1.000	1.58
2	74.0	96.8	82.5	89.6	.9994	1.75
3	74.0	101.3	85.5	93.4	.9918	1.94
4	74.0	103.8	88.3	96.0	.9862	1.98
5	74.0	108.3	90.5	99.4	.9745	1.97
6	74.0	110.3	91.5	100.9	.9652	2.00
AVERAGE					.9863	1.87

FORMULAS:

Y=

DELTA H @=

$$\frac{(V w) (P b) (T d)}{(V d) (P b \text{ ABS}) (T w)} \quad 0.0317 (\text{DELTA H}) \quad * \quad \frac{(T w) (\text{TIME})^2}{(V w) (P b) (T d)}$$

MIKE RIDGE

CALIBRATION BY:

THERMOCOUPLE CALIBRATION SHEET

SET #: METER BOX #3

DATE: 6-20-87

REFERENCE MERCURY/GLASS

STANDARD ('F)	THERMOCOUPLE ('F)	% DEVIATION OF ABSOLUTE
32	33	.20
67	70	.57
212	215	.45
MAXIMUM % DEVIATION		.57
ALLOWABLE % DEVIATION		1.50

SET #: METER BOX #3

DATE: 6-20-87

STANDARD ('F)	THERMOCOUPLE ('F)	% DEVIATION OF ABSOLUTE
32	29	.61
73	70	.56
212	211	.15
MAXIMUM % DEVIATION		.61
ALLOWABLE		1.50

G. ZWILLING

CALIBRATION BY: _____

NOZZLE CALIBRATION SHEET

PROJECT NAME: ATLANTIC #5

PROJECT NUMBER: 90-104

POINT#	NOZZLE# <u>1/4-2</u>	NOZZLE # <u>1/4-3</u>	NOZZLE# _____	NOZZLE # _____
1	<u>.256</u>	<u>.249</u>	_____	_____
2	<u>.258</u>	<u>.251</u>	_____	_____
3	<u>.257</u>	<u>.250</u>	_____	_____
AVG.	<u>.257</u>	<u>.250</u>	_____	_____

Sean MacKay

CALIBRATED BY:

10 JAN 91

DATE:

THERMOCOUPLE CALIBRATION SHEET

SET #: 8.5' - 7

DATE: 07/07/89

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
87	86	.18
212	211	.15
415	420	.57
	MAXIMIUM	.57
	ALLOWABLE	1.50

CALIBRATION BY:

S. MacKay

THERMOCOUPLE CALIBRATION SHEET

SET #: 8.5' - 6

DATE: 07/07/89

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
87	86	.18
212	211	.15
430	436	.67
	MAXIMUM	.67
	ALLOWABLE	1.50

CALIBRATION BY:

S. MacKay
