AP-42 Section Number: 1.8

Reference Number: 45

Title: Particulate Emissions Testing, Atlantic Sugar Association Boiler #1

December 1991

Ref 33
1.8 #1/5
5th Ed.
Supp. B

Eastmount Engineering Inc.
420 Main Street
Walpole, MA 02081

PARTICULATE EMISSIONS TESTING

ATLANTIC SUGAR ASSOCIATION

BOILER #1

BELLE GLADE, FLORIDA FACILITY

DECEMBER 16, 1991

Allowable Emission
I - 70.9 LBS/HR
II - 67.8
III - 64.9
As = 29.9

Facility: Atlantic Sugar Association
Belle Glade, Boiler 1
Description
Testing firm. Gastmount Eng. Inc.

API S-0016-01

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INPUT SHEET - REV:09/13/83 - PAGE 2 OF 2

ENTER THE FOLLOWING:

		RUN1	RUN2	RUN3
1. H2O	COLLECTED (ONLY VOL. MEASURED), ML:	312	257	247
2. H2O	COLLECTED (WEIGHED PART ONLY), GM:	11.1	13.1	12.4
3. M'N	PARTICULATE WEIGHT, GM:	.2498	.191	.218
4. V'M	VOLUME METERED, CF:	44.317	45.916	45.749
5. Y	DRY GAS METER CAL FACTOR:	.9872	.9872	.9872
6. RDP	AVG SQR DELTA P (WHEN SAMPLING):	.83	.86	.87
7. DH	AVG DELTA H, IN H2O:	1.72	1.89	1.89
8. T'M	AVG METER TEMP, DEG F:	91.1	96.1	92.4
9. T'S	AVG STACK TEMP, DEG F:	163.2	155.3	157.9
10. P'S*	STACK PRESS, *IN ....Hg.....:	30.12	30.12	30.14
11. P'B	BAROMETRIC PRESS, IN HG:	30.12	30.12	30.14
13. D'N	ACTUAL NOZZLE DIAMETER, IN.:	.250	.249	.250
14. T	ACTUAL SAMPLE TIME, MIN:	60	60	60
15. C'P	PITOT TUBE COEFFICIENT:	.84	.84	.84
OPTION ENTRIES:				
17.	ORSAT/FYRITE - %CO2:	.....	.....	.....
18.	ORSAT/FYRITE - %O2:	.....	.....	.....
28.	ORSAT/FYRITE (FOR C'S @ 50%E.A.)-%CO:	.....	.....	.....
19.	SPECIFIC M'D ENTRIES:	.....	.....	.....
20.	CYCLONIC (10-20 DEG) - AVG COS(YAW):	.....	.....	.....
26.	CYC.(>20) - AVG(SQR D.P X COS(YAW)]:	.....	.....	.....
21.	PROCESS WT SOURCE - T/HR:	.....	.....	.....
22.	LB/TON REGULATED - T/HR:	.....	.....	.....
27.	LB/* REGULATED (* AS DEFINED) - */HR:	.....	.....	.....
23.	LAM&CYC((20)-VAL(SAMPLE PTS/T PTS):	1	1	1

Raised

DATE 02/06/92 revised

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
PARTICULATE STACK TEST VERIFICATION
EPA METHOD 5

FACILITY NAME: Atlantic Sugar Association APIS # ~~0000~~ 0016-01

COMPANY CONDUCTING TEST: Eastmount Engineering Inc. TEST DATE December16,1991

SOURCE DESCRIPTION: Boiler1

STACK TEST DATA SUMMATION

		RUN1	RUN2	RUN3
1.H2O	(VOL.MEAS.),ML	312	251	247
2.H2O	(MASS MEAS.),GM	11.1	13.1	12.4
3.M'N	PARTICULATE WEIGHT, GM	.2498	.191	.218
4.V'M	VOLUME METERED,CF	44.31	45.92	45.75
5.Y	DRY GAS MTR. CALIB.FCTR.	.9872	.9872	.9872
6.RDP	AVG SQR D.P-SAMPLING	.83	.86	.87
7.DH	AVG DELTA H,IN.H2O	1.72	1.89	1.89
8.T'M	AVG MTR. TEMP,DEG.F	91.1	96.1	92.4
9.T'S	AVG STACK TEMP,DEG.F	163.2	155.3	157.9
10.P'S	STACK PRESS,''HG(ABS)	30.12	30.12	30.14
11.P'B	BAROMETRIC PRESS,''HG	30.12	30.12	30.14
13.D'N	ACTUAL NOZZLE DIAM,IN	.25	.249	.25
14.T	ACTUAL SAMPLE TIME,MIN	60	60	60
15.C'P	PITOT TUBE COEFFICIENT	.84	.84	.84
23.S/T	VALUE:SAMPLE PTS/TOT PTS	1	1	1

RUN	VOLUME SAMPLED DSCF	MOISTURE CONTENT PERCENT	STACK VEL FPS	FLOW RATE DSCF/H	PERCENT ISO-KINETIC	ACTUAL EMISS LB/HR	ALLOW EMISS LB/HR
1	42.35	26.42	52.34	3,534,214	105.12	45.952	69.530
2	43.51	22.22	53.39	3,859,728	99.68	37.347	69.530
3	43.67	21.85	54.06	3,913,079	97.90	43.059	69.530
MEAN	43.18	23.50	53.27	3,769,007	100.90	42.119	69.530

SUMMARY

GENERAL:
REVIEWED BY Raisa
ACTUAL A 'S = 29.9 SQ FT
LAMINAR FLOW ASSUMED (<10 DEG YAW) (OR <20 DER)
ALL REQUIRED LEAK TESTS ACCEPTABLE
ASSUMED M 'D=30.0 (COMBUSTION GASES)

COMMENT.....

RUN 1 :
ACTUAL A 'N = .0003409 SQ FT

COMMENT.....

RUN 2 :
ACTUAL A 'N = .0003382 SQ FT

COMMENT.....

RUN 3 :
ACTUAL A 'N = .0003409 SQ FT

COMMENT.....

Atlantic Sugar Association, Inc.

P.O. BOX #1570

BELLE GLADE, FLORIDA 33430

Tel: (407) 996-6541 Fax: (407) 996-8021

January 29, 1992

Ms. Sherrill Culliver
Department of Environmental Regulation
2269 Bay Street
Ft. Myers, Fla. 33901

RE: Atlantic Sugar Association, Inc. - Boiler #1
Permit #AO50-189612

Dear Ms. Culliver:

Enclosed is a copy of the results for the Particulate Emissions testing performed on the above mentioned boiler on December 16, 1991.

The results of the test program indicate that Boiler #1 is in compliance with the Florida DER emission standards.

If you should have any questions, please do not hesitate to contact me.

Very truly yours,

Hector J. Cardentey
Environmental Director

HJD/ed

CC: S. Diego, General Manager
A. Pacheco, Plant Manager
A. Satyal, Palm Beach County Health Department
J. Mercadante, Eastmount Engineering

Eastmount Engineering

Environmental Consultants - Air Quality Specialists

05W1 - ASA7

PARTICULATE EMISSIONS COMPLIANCE TEST REPORT

Boiler #1

PREPARED FOR: Atlantic Sugar Association
P. O. Drawer B
Belle Glade, Florida 33430

CONCERNING: Particulate Emissions Testing
Atlantic Sugar Association
Boiler #1
Belle Glade, Florida Facility
December 16, 1991

PREPARED BY: John Siderwicz
Environmental Engineer
Eastmount Engineering, Inc.
420 Main Street
Walpole, MA 02081

I hereby certify that the information presented in this report is accurate and true to the best of my knowledge.

John Siderwicz
John Siderwicz
Environmental Engineer

January 16, 1992
Date

CHAIN OF CUSTODY

All filters and washes were in my custody at all times during the testing on Unit #1 at Atlantic Sugar Association's Belle Glade, Florida facility. This includes the time from initial taring before the test until final analysis at Eastmount's Florida laboratory.

John Siderwicz

John Siderwicz
Environmental Engineer

TABLE OF CONTENTS

APPENDIX

I COMPENDIUM

Eastmount Engineering conducted a series of three EPA Method 5 test runs on December 16, 1991 to measure particulate emissions from Boiler #1 located at Atlantic Sugar Association's facility in Belle Glade, Florida.

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

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.

Results of the test indicate that the particulate emissions averaged 0.182 pounds per million Btu, 42.2 pounds per hour. These results are compared to the allowable emission limit of 0.30 pounds per million Btu, 78.7 pounds per hour.

During testing the boiler was burning bagasse as fuel and operating at an average of 122,543 pounds of steam per hour. This load is approximately 122.5 % of the permitted load of 100,000 pounds of steam per hour.

S. Joseph Mercadante, President, was in charge of and responsible for all stack testing. John Siderwicz, Environmental Engineer, was responsible for all field laboratory aspects of the program and all calculations as well as maintaining chain of custody of all samples. Mark Wescott and Patrick Wildman assisted with the engineering and technical aspects of the testing program. Mr. Ken Tucker of the Florida Department of Environmental Regulation observed the stack testing and boiler operations. Mr. E. Perez was resposible for boiler observations and acquisition of all pertinent process data.

II STACK SCHEMATIC

Atlantic Sugar Association
Unit #1

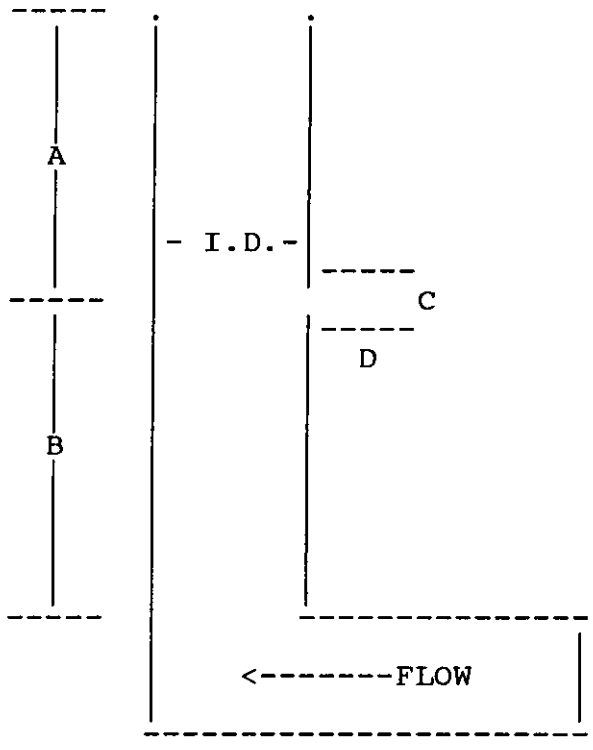
Belle Glade, Florida Facility

The following is a schematic of the stack which services Boiler #1 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.

STACK SCHEMATIC

ATLANTIC SUGAR ASSOCIATION
Unit #1
Belle Glade, Florida Facility

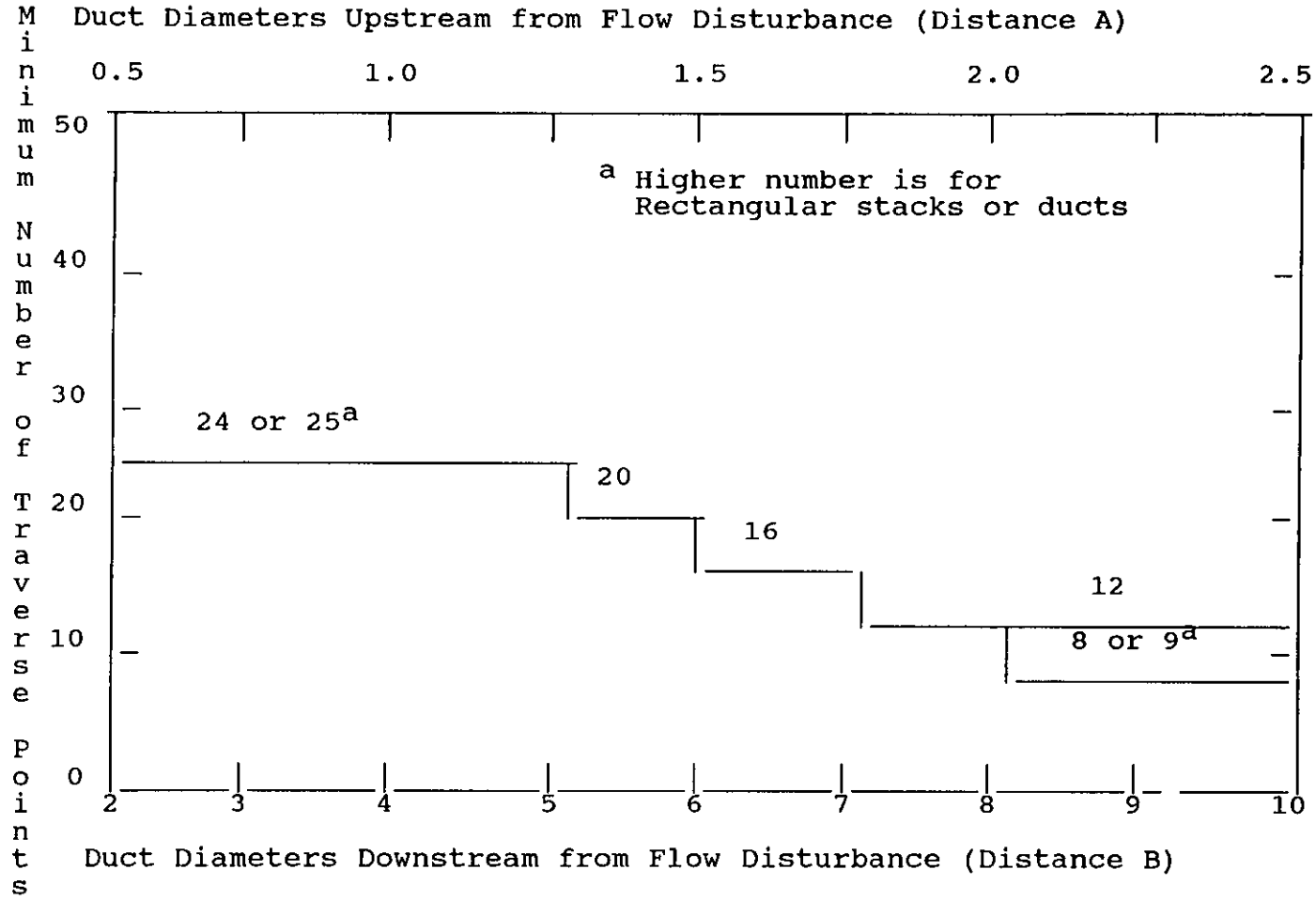


DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	58'
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	12'
DIAMETER OF PORT SLEEVE (C)	3"
LENGTH OF PORT SLEEVE (D)	3"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	74"

SCHEMATIC NOT TO SCALE

III NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

ATLANTIC SUGAR ASSOCIATION
Unit #1
Belle Glade, Florida Facility



Minimum number of traverse points for particulate traverses.

Distance A = ~ 58' or 9.7 diameters.

Distance B = 12' or 2.0 diameters.

In accordance with Method 1, 12 traverse points were 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 minutes.

III NUMBER OF TRAVERSE POINTS (cont'd)

ATLANTIC SUGAR ASSOCIATION
Unit #1
Belle Glade, Florida Facility

% DIAMETER		STACK DIAMETER (INCHES)		PORT SLEEVE (INCHES)		PROBE MARKING (INCHES)
4.4	x	74	+	3	=	6.3
14.6	x	74	+	3	=	13.8
29.6	x	74	+	3	=	24.9
70.4	x	74	+	3	=	55.1
85.4	x	74	+	3	=	66.2
95.6	x	74	+	3	=	73.7

IV SAMPLING TRAIN AND 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 8 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 `F ±25`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.

IV SAMPLING TRAIN AND TEST PROCEDURES (cont'd)

Gas Density Determination - An ORSAT type combustion analyzer, capable of measuring CO_2, O_2 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 the 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.

IV SAMPLING TRAIN AND TEST PROCEDURES (cont'd)

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

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.

V ANALYTICAL AND 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.

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C1
DATE : 12-16-91

Ds (FT)	6.17
Dn (IN)	.250
FILTER#	4424
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	316
IMP-2 (FIN)	190
IMP-3 (FIN)	6
IMP-4 (FIN)	511.1
% CO2	11.3
% O2	8.9
% CO	0
P BAR	30.12
P STK	-.30
NO. PTS	12
TEST LNGTH	60
END METER	568.037
INT METER	523.720
BEGIN TIME:	13:35
END TIME:	14:40

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.68	.82	1.70	84	79	170
2	.76	.87	1.90	96	80	169
3	.77	.88	1.93	98	81	163
4	.69	.83	1.73	101	83	162
5	.59	.77	1.48	102	84	161
6	.55	.74	1.38	102	84	161
B1	.57	.75	1.43	93	84	163
2	.64	.80	1.60	99	84	163
3	.63	.79	1.58	101	84	161
4	.74	.86	1.85	103	85	165
5	.81	.90	2.03	103	86	161
6	.80	.89	2.00	105	86	159
AVERAGE	.69	.83	1.72	98.9	83.3	163.2

INPUT DATA SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C2
DATE : 12-16-91

Ds (FT) .	6.17
Dn (IN)	.249
FILTER#	4474
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	308
IMP-2 (FIN)	138
IMP-3 (FIN)	5
IMP-4 (FIN)	513.1
% CO2	9.5
% O2	10.8
% CO	0
P BAR	30.12
P STK	-.30
NO. PTS	12
TEST LNGTH	60
END METER	614.239
INT METER	568.323
BEGIN TIME:	15:40
END TIME:	16:45

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.49	.70	1.23	87	83	162
2	.60	.77	1.50	97	84	150
3	.63	.79	1.58	102	86	161
4	.88	.94	2.20	105	87	155
5	.94	.97	2.35	109	89	154
6	.95	.97	2.38	111	90	154
B1	.54	.73	1.35	100	90	149
2	.76	.87	1.90	105	90	154
3	.86	.93	2.15	107	90	158
4	.88	.94	2.20	108	90	156
5	.78	.88	1.95	108	90	154
6	.76	.87	1.90	109	90	156
AVERAGE	.76	.86	1.89	104.0	88.3	155.3

INPUT DATA SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C3
DATE : 12-16-91

Ds (FT)	6.17
Dn (IN)	.250
FILTER#	4470
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	311
IMP-2 (FIN)	130
IMP-3 (FIN)	6
IMP-4 (FIN)	512.4
% CO2	9.7
% O2	10.6
% CO	0
P BAR	30.14
P STK	-.30
NO. PTS	12
TEST LNGTH	60
END METER	660.265
INT METER	614.516
BEGIN TIME:	17:25
END TIME:	18:30

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.62	.79	1.55	89	85	160
2	.76	.87	1.90	98	86	156
3	.80	.89	2.00	102	86	158
4	.85	.92	2.13	103	87	159
5	.77	.88	1.93	102	88	151
6	.66	.81	1.65	101	87	157
B1	.57	.75	1.43	91	84	156
2	.61	.78	1.53	96	84	158
3	.66	.81	1.65	99	84	161
4	.86	.93	2.15	101	85	162
5	.98	.99	2.45	104	84	161
6	.92	.96	2.30	106	86	156
AVERAGE	.76	.87	1.89	99.3	85.5	157.9

APPENDIX II

ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C1
DATE : 12-16-91

TS ('F)=	163.2	% CO2=	11.3	VM (CF) =	44.317
TS ('R)=	623.2	% O2=	8.9	DELTA H (ABS)=	30.25
TM ('F)=	91.1	% CO=	0	PS (ABS) =	30.10
TM ('R)=	551.1	% N2=	79.8	SQRT DELTA P =	.826472
VI(TOT)=	323.1	CP=	.84	AREA NOZZLE =	.000341

Y = .9872

VM STD	=	$17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 42.35	DSCF
VW STD	=	.04707 (VI TOT)	= 15.21	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .264	
BWO	=	MOISTURE FROM STEAM TABLES	= .346	
VI TOT	=	ADJUSTED TO SATURATION VOLUME=	N/A	ML
1-BWO	=	1 - BWO	= .736	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	= 30.17	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 26.95	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .88	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 52.0	FPS
H	=	0.002669 (VI TOT)	= .86	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.40	
K	=	(H) + (J)	= 3.26	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 105.9	

Eastmount Engineering Inc. • 420 Main Street • Walpole, MA 02081 • (508) 668-9005 • FAX (508) 668-4989

ISOKINETIC CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C2
DATE : 12-16-91

TS ('F)=	155.3	% CO2=	9.5	VM (CF) =	45.916
TS ('R)=	615.3	% O2=	10.8	DELTA H (ABS)=	30.26
TM ('F)=	96.1	% CO=	0	PS (ABS) =	30.10
TM ('R)=	556.1	% N2=	79.7	SQRT DELTA P =	.864804
VI(TOT)=	264.1	CP=	.84	AREA NOZZLE =	.000338

Y = .9872

VM STD	=	$17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 43.51	DSCF
VW STD	=	.04707 (VI TOT)	= 12.43	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .222	
BWO	=	MOISTURE FROM STEAM TABLES	= N/A	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	=	1 - BWO	= .778	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	= 29.96	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 27.30	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .87	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 53.7	FPS
H	=	0.002669 (VI TOT)	= .70	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.47	
K	=	(H) + (J)	= 3.17	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 99.1	

Eastmount Engineering Inc. • 420 Main Street • Walpole, MA 02081 • (508) 668-9005 • FAX (508) 668-4989

ISOKINETIC CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C3
DATE : 12-16-91

TS ('F)=	157.9 Avg=159	% CO2=	9.7	VM (CF) =	45.749
TS ('R)=	617.9	% O2=	10.6 Avg=10.6	DELTA H (ABS)=	30.28
TM ('F)=	92.4	% CO=	0	PS (ABS) =	30.12
TM ('R)=	552.4	% N2=	79.7	SQRT DELTA P =	.865863
VI(TOT)=	259.4	CP=	.84	AREA NOZZLE =	.000341

Y = .9872

VM STD	=	$\frac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 17.64	43.67	DSCF
VW STD	=	.04707 (VI TOT)	12.21	CF
BWO	=	$\frac{\text{VW STD}}{\text{VW STD + VM STD}}$	.219	
BWO	=	MOISTURE FROM STEAM TABLES	N/A	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	N/A	ML
1-BWO	=	1 - BWO	.781	
Md (DRY)	=	.44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2)	29.98	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	27.36	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	.87	
VS	=	85.49(CP)(G)(SQRT DELTA P)	53.8	FPS
H	=	0.002669 (VI TOT)	.69	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	2.48	
K	=	(H) + (J)	3.17	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	98.4	

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APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : ATLANTIC
LOCATION: UNIT 1

RUN #: C1
DATE : 12-16-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	275	480	240
	285	470	240
	275	480	240
	275	490	240
	265	480	240
	265	480	240
AVERAGE	273.3 PSIG	480.0	

P ABS = 288.0 PSIA

ENTHALPY @ 500 'F AND 290 PSIA = 1258.9

ENTHALPY @ 550 'F AND 290 PSIA = 1288.1

ENTHALPY @ 480.0 'F AND 290 PSIA = 1247.2

ENTHALPY OF FEED WATER = 208.5

AVERAGE ENTHALPY = 1038.8 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : ATLANTIC
LOCATION: UNIT 1

RUN #: C2
DATE : 12-16-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	280	500	240
	270	470	240
	275	480	240
	275	480	240
	275	480	240
	270	470	240
AVERAGE	274.2 PSIG	480.0	

P ABS = 288.9 PSIA

ENTHALPY @ 500 'F AND 290 PSIA = 1258.9

ENTHALPY @ 550 'F AND 290 PSIA = 1288.1

ENTHALPY @ 480.0 'F AND 290 PSIA = 1247.2

ENTHALPY OF FEED WATER = 208.5

AVERAGE ENTHALPY = 1038.8 BTU/LB OF STEAM

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ENTHALPY CALCULATION SHEET

PLANT : ATLANTIC
LOCATION: UNIT 1

RUN #: C3
DATE : 12-16-91

STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
280	480	240
280	480	240
285	490	240
270	480	240
275	480	240

AVERAGE 278.0 PSIG 482.0

P ABS = 292.7 PSIA

ENTHALPY @ 500 'F AND 290 PSIA = 1258.9

ENTHALPY @ 550 'F AND 290 PSIA = 1288.1

ENTHALPY @ 482.0 'F AND 290 PSIA = 1248.4

ENTHALPY OF FEED WATER = 208.5

AVERAGE ENTHALPY = 1039.9 BTU/LB OF STEAM

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C1
DATE : 12-16-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR	
END	9460		14: 45		100	
BEGIN	8002		13: 35		LBS/HR STEAM	
NET	1458	X 100	/ 70	MINS =	124971	

124971 LBS/HR STEAM / 55% EFF. = 227221 EQUIV.

227221 LBS/HR STEAM X 1040 BTU/LB = 236.3 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR	
END	0		14: 45			
BEGIN	0		13: 35			
NET	0	GALLONS	70	MINS =	0	GPH

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

ALLOWABLE EMISSIONS

BAGASSE	236.3	-	0	X .3	=	70.9	LBS/HR
OIL			0	X .1	=	.0	LBS/HR
TOTAL					=	70.9	LBS/HR

HEAT INPUT CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C2
DATE : 12-16-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR
END	72077		16: 55		100
BEGIN	70583		15: 40		LBS/HR STEAM
NET	1494	X 100 /	75	MINS =	119520

119520 LBS/HR STEAM / 55% EFF. = 217309 EQUIV.

217309 LBS/HR STEAM X 1040 BTU/LB = 226.0 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR
END	0		16: 55		
BEGIN	0		15: 40		
NET	0	GALLONS	75	MINS =	0 GPH

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

ALLOWABLE EMISSIONS

BAGASSE	226.0	-	0	X	.3	=	67.8 LBS/HR
OIL			0	X	.1	=	.0 LBS/HR
TOTAL						=	67.8 LBS/HR

HEAT INPUT CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C3
DATE : 12-16-91

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
END	74033	18: 30	100
BEGIN	72699	17: 25	LBS/HR STEAM
NET	1334	65	123138

NET 1334 X 100 / 65 MINS = 123138

123138 LBS/HR STEAM / 55% EFF. = 223888 EQUIV.

223888 LBS/HR STEAM X 1041 BTU/LB = 233.1 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
END	0	18: 30	
BEGIN	0	17: 25	
NET	0 GALLONS	65 MINS =	0 GPH

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

ALLOWABLE EMISSIONS

BAGASSE	233.1	-	0	X	.3	=	69.9 LBS/HR
OIL			0	X	.1	=	.0 LBS/HR
TOTAL						=	69.9 LBS/HR

APPENDIX V

EMISSION CALCULATION SHEETS

EMISSION CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C1
DATE : 12-16-91

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NO. :	4424	100	4459	103
FINAL:	.8482	66.8528	.5984	67.0167
TARE :	.6174	66.8319	.5982	67.0154
NET :	.2308	.0209	.0002	.0013/200ML

VOLUME OF RINSE 280

WEIGHT = 251.70
RESIDUE = - 1.82

Mn = 249.88 Mg AS = 29.9 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3506201 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.301e-5 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .09 GRAINS /SCF

PMR = (QS) (CS) = 45.61 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 236.0 BTU e10 / HR

CS = LBS / MILLION BTu = .193 LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C2
DATE : 12-16-91

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	4474	101	4459	103
FINAL:	.7664	67.0700	.5984	67.0167
TARE :	.5961	67.0469	.5982	67.0154
NET :	.1703	.0231	.0002	.0013/200ML

VOLUME OF RINSE 360

WEIGHT = 193.40
RESIDUE = - 2.34

Mn = 191.06 Mg AS = 29.9 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3878102 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 9.683e-6 LBS/SCF

CS′ = 0.0154 (Mn) / (VM STD) = .07 GRAINS /SCF

PMR = (QS) (CS) = 37.55 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 225.7 BTU e10 / HR

CS = LBS / MILLION BTu = .166 LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: ATLANTIC
LOCATION: UNIT 1

RUN #: C3
DATE : 12-16-91

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NO. :	4470	102	4459	103
FINAL:	.7918	67.6216	.5984	67.0167
TARE :	.5934	67.5992	.5982	67.0154
NET :	.1984	.0224	.0002	.0013/200ML

VOLUME OF RINSE 420

WEIGHT = 220.80
RESIDUE = - 2.73

Mn = 218.07 Mg AS = 29.9 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3889890 DSCFH

AVG = 3,758,204

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.101e-5 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .08 GRAINS /SCF

PMR = (QS) (CS) = 42.83 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 232.8 BTU e10 / HR

AVG: 231.5

CS = LBS / MILLION BTu = .184 LBS/ BTu e6

APPENDIX VI

NOMENCLATURE SHEETS

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 Fahrenheit.
DRY GAS OUT	Temperature of the dry gas meter outlet degrees Fahrenheit.
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.

NOMENCLATURE (cont'd)

F factor	The theoretical amount of air in dry standard cubic feet (DSCF) needed to combust a million Btu's worth of fuel.
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.

NOMENCLATURE (cont'd)

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.
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.

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

BOILER DATA SHEET

ATLANTIC SUGAR
UNIT # 1

RUN #: C1

DATE: 12/16/92

TIME	1:35 PM	1:50 PM	2:05 PM	2:20 PM	2:35 PM	2:45 PM
STEAM PRESSURE	275	285	275	275	265	265
STEAM TEMPERATURE	480	470	480	490	480	480
STEAM INTEGRATOR	8002	8330	8631	8931	9250	9460
FUEL OIL PRESSURE	—	—	—	—	—	—
FUEL OIL TEMPERATURE	—	—	—	—	—	—
FUEL OIL INTEGRATOR	—	—	—	—	—	—
FEED WATER TEMPERATURE	340	340	340	340	340	340
% O2	—	—	—	—	—	—
SCRUBBER DIFFERENTIAL	5	5	5	5	5	5

READINGS TAKEN BY: _____

BOILER DATA SHEET

ATLANTIC SUGAR
UNIT # 1

RUN #: C2 DATE: 12/16/91

TIME	3:40 PM	3:55 PM	4:10 PM	4:25 PM	4:40 PM	4:55 PM
STEAM PRESSURE	580	570	575	575	575	570
STEAM TEMPERATURE	500	470	480	480	480	470
STEAM INTEGRATOR	70583	70864	71145	71440	71766	72077
FUEL OIL PRESSURE	-	-	-	-	-	-
FUEL OIL TEMPERATURE	-	-	-	-	-	-
FUEL OIL INTEGRATOR	-	-	-	-	-	-
FEED WATER TEMPERATURE	240	240	240	240	240	240
% O2	-	-	-	-	-	-
SCRUBBER DIFFERENTIAL	5	5	5	5	5	5

READINGS TAKEN BY: _____

BOILER DATA SHEET

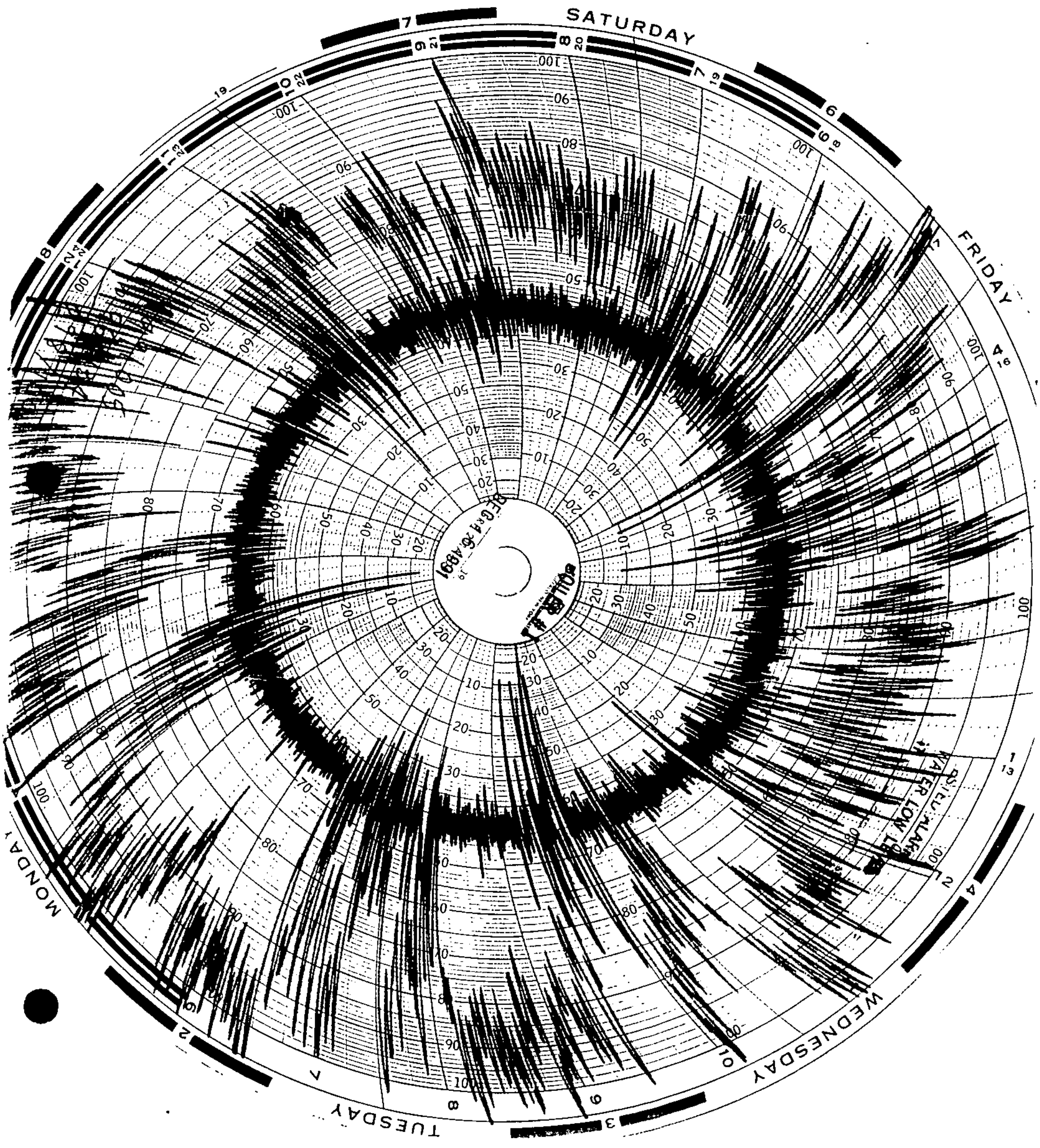
ATLANTIC SUGAR
UNIT # 1

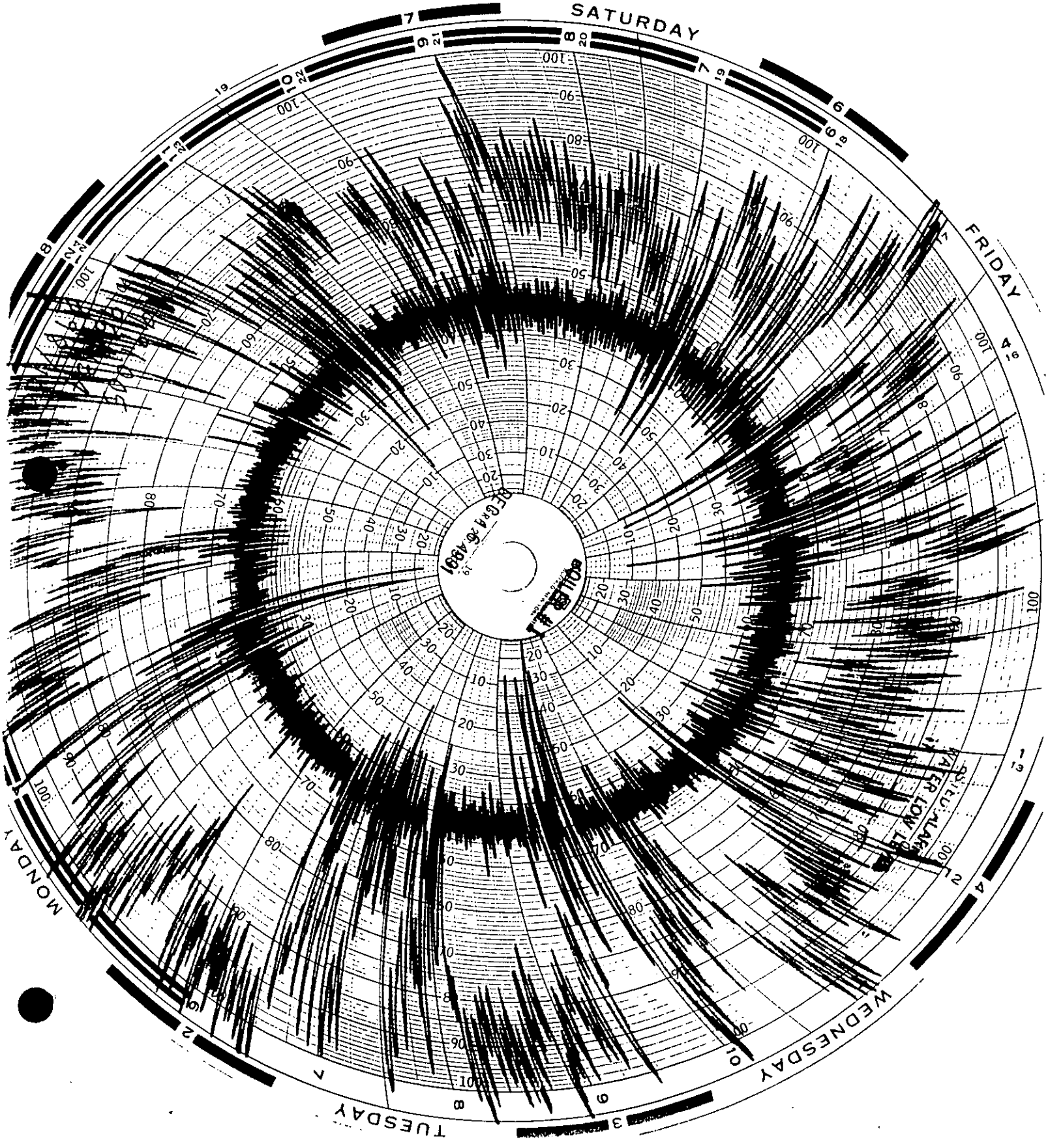
RUN #: C3

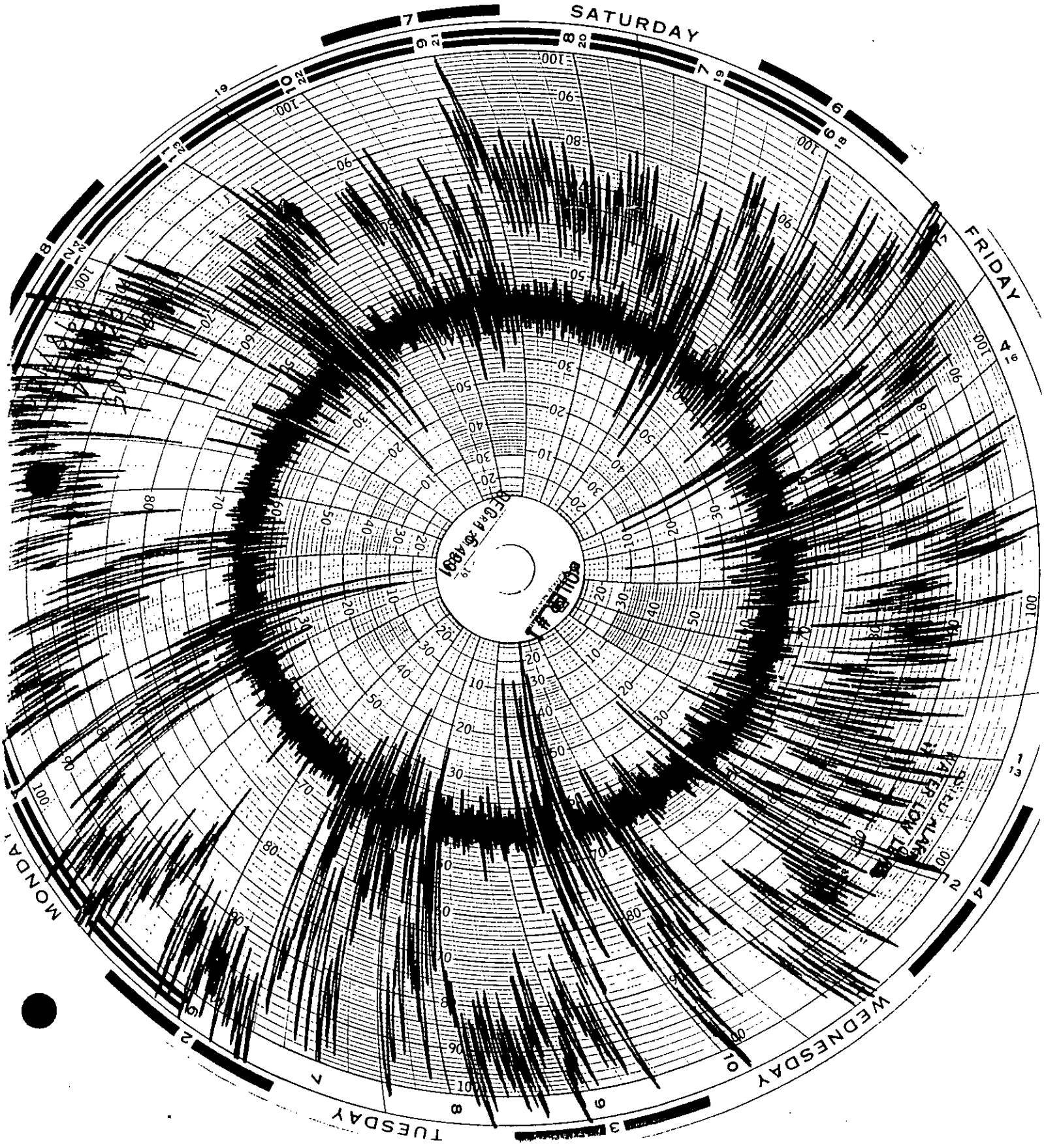
DATE: 12/16/91

TIME	5:25 PM	5:55 PM	6:10 PM	6:25 PM	6:30 PM
STEAM PRESSURE	280	280	285	270	275
STEAM TEMPERATURE	480	480	490	480	480
STEAM INTEGRATOR	72699	73340	~~490~~ 73574	73930	74033
FUEL OIL PRESSURE	-	-	-	-	-
FUEL OIL TEMPERATURE	-	-	-	-	-
FUEL OIL INTEGRATOR	-	-	-	-	-
FEED WATER TEMPERATURE	240	240	240	240	240
% O2	-	-	-	-	-
SCRUBBER DIFFERENTIAL	5	5	5	5	5

READINGS TAKEN BY: _____


SATURDAY
FRIDAY
WEDNESDAY
TUESDAY
MONDAY
WATER LOW


SATURDAY
FRIDAY
WEDNESDAY
TUESDAY
MONDAY
SYLVANIA
WATER LOW LEVEL ALARM


SATURDAY
FRIDAY
WEDNESDAY
TUESDAY
MONDAY

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	Atlantic	Run #:	C-1
Location:	Unit #1	Date:	16-DEC-91
Ds (ft):	6.17	No. Points:	12
Dn (in):	.250	Test Length:	60
Filter #:	4424	End Meter Reading:	568.037
Cp:	.84	Int Meter Reading:	523.720
P bar:	30.12	Begin Time:	1335
P stack:	-.3	End Time:	1440
IMP-1 (INT)	100	IMP-1 (FINAL)	316
IMP-2 (INT)	100	IMP-2 (FINAL)	170
IMP-3 (INT)	0	IMP-3 (FINAL)	6
IMP-4 (INT)	569	IMP-4 (FINAL)	511.1

	TEST 1	TEST 2	TEST 3
% CO2	11.3		
% O2	8.9		
% CO			

Project Director:	John Siderewicz	Field Laboratory:	John Siderewicz
Meter Box Operator:	Pat Wildman	Chain of Custody:	J. Siderewicz
Probe Operator:	Mark Wescott	Plant Coordinator:	Ed Perez
Orsat Analyst:	Joe Mercadante	Agency Rep:	Ken Tricker

Comments:

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 1 OF 1

SAMPLING TIME PER POINT 5 min.

PLANT Atlantic

RUN # C-1

LOCATION Unit #1

DATE 16 Dec 91

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
			523.700	1	2	3	4	5	
A1	.68	1.70	527.4	84	79	266	61	170	3
2	.76	1.90	531.2	96	80	260	61	169	3.5
3	.77	1.93	535.1	98	81	258	60	163	4
4	.69	1.73	538.9	101	83	252	62	162	4
5	.59	1.48	542.4	102	84	263	62	161	4
6	.55	1.38	545.966	102	84	261	64	161	4
			545.966						
B1	.57	1.43	549.1	93	84	252	60	163	4.5
2	.64	1.60	552.8	99	84	260	55	163	5
3	.63	1.58	556.4	101	84	263	56	161	5.5
4	.74	1.85	560.2	103	85	258	58	165	6.5
5	.81	2.03	564.1	103	86	255	58	161	7.0
6	.80	2.00	568.037	105	86	254	60	159	7.5

COMMENTS: DELTA P x 2.5 = DELTA H

BOX # 4 Y = .9872 DELTA H @ = 1.76

START TIME : 13:35

END TIME : 14:40

INITIAL LEAK CHECK 0.0 AT 15 INCHES HG

FINAL LEAK CHECK 0.005 AT 8 INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	Atlantic	Run #:	C2
Location:	Unit #1	Date:	16 DEC 11
Ds (ft):	6.12	No. Points:	12
Dn (in):	.249	Test Length:	60
Filter #:	4474	End Meter Reading:	614.239
Cp:	.84	Int Meter Reading:	568.323
P bar:	30.12	Begin Time:	1540
P stack:	-.3	End Time:	1645
IMP-1 (INT)	100	IMP-1 (FINAL)	303
IMP-2 (INT)	100	IMP-2 (FINAL)	138
IMP-3 (INT)	0	IMP-3 (FINAL)	5
IMP-4 (INT)	100	IMP-4 (FINAL)	123.1

	TEST 1	TEST 2	TEST 3
% CO2	9.5		
% O2	10.8		
% CO			

Project Director:	John Sidorowicz	Field Laboratory:	J. Sidorowicz
Meter Box Operator:	Pat Wildman	Chain of Custody:	J. Sidorowicz
Probe Operator:	Mark Wiesati	Plant Coordinator:	Ed Perez
Orsat Analyst:	S. Joe Mercadante	Agency Rep:	

Comments:

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 1 OF 1

SAMPLING TIME PER POINT 5 min.

PLANT Atlantic

RUN # C-2

LOCATION Unit #1

DATE 16 DEC 91

	TRAV. NO.	DELTA P	DELTA H	METER READING (568.323)	DGM IN (2)	DGM OUT (3)	HOT BOX (4)	IMPG TEMP (5)	STACK TEMP	VAC
(B)	A1	.49	1.23	571.5	87	83	248	67	162	4
	2	.60	1.50	575.0	97	84	261	63	150	5
	3	.63	1.58	578.6	102	86	255	68	161	6.5
	4	.88	2.20	582.6	105	87	260	62	155	9
	5	.94	2.35	586.9	109	87	261	62	154	10
	6	.95	2.38	591.225	111	90	260	65	154	11
(A)	B1	.54	1.35	594.3	100	90	258	64	149	6
	2	.76	1.90	598.1	105	90	258	57	154	8.5
	3	.86	2.15	602.2	107	90	261	57	158	10
	4	.88	2.20	606.3	108	90	262	56	156	11
	5	.78	1.95	610.3	106	90	261	56	154	11
	6	.76	1.90	614.239	109	90	262	55	156	11

COMMENTS: DELTA P * 2.5 = DELTA H

BOX # 4 Y = .9872 DELTA H @ = 1.76

START TIME : 15:40

END TIME : 16:45

INITIAL LEAK CHECK .006 AT 15 INCHES HG

FINAL LEAK CHECK .006 AT 17 INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	Atlantic	Run #:	C3
Location:	Unit #1	Date:	16 DEC 91
Ds (ft):	6.17	No. Points:	12
Dn (in):	.250	Test Length:	60
Filter #:	4470	End Meter Reading:	660.265
Cp:	.84	Int Meter Reading:	614.516
P bar:	30.14	Begin Time:	1225
P stack:	-.30	End Time:	1330
IMP-1 (INT)	100	IMP-1 (FINAL)	511
IMP-2 (INT)	102	IMP-2 (FINAL)	130
IMP-3 (INT)	0	IMP-3 (FINAL)	6
IMP-4 (INT)	760	IMP-4 (FINAL)	772.4

	TEST 1	TEST 2	TEST 3
% CO2	9.7		
% O2	10.6		
% CO			

Project Director:	John Silverwood	Field Laboratory:	J. Silverwood
Meter Box Operator:	Pat Wildman	Chain of Custody:	J. Silverwood
Probe Operator:	M. Wood	Plant Coordinator:	E. Perez
Orsat Analyst:	S. Joe Mercadante	Agency Rep:	

Comments:

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 1 OF 1

SAMPLING TIME PER POINT 5 min

PLANT Atlantic

RUN # C-3

LOCATION Unit #1

DATE 16 Dec 91

614.516 1 2 3 4 5

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
A'	.62	1.55	618.4	89	85	252	62	160	3
2	.76	1.90	622.2	98	86	257	60	156	3
3	.80	2.00	626.1	102	86	252	61	158	4
4	.85	2.13	630.1	103	87	254	61	159	5
5	.77	1.93	634.0	102	88	262	61	151	5
6	.66	1.65	637.737	101	87	253	62	157	5
B'	.57	1.43	640.9	91	84	267	61	156	4.5
2	.61	1.53	644.4	96	84	255	62	158	5
3	.66	1.65	648.0	99	84	254	64	161	6
4	.86	2.15	651.7	101	85	263	67	162	6
5	.98	2.45	656.0	104	84	254	65	161	9
6	.92	2.30	660.265	106	86	252	64	156	9

COMMENTS: DELTA P * 2.5 = DELTA H

BOX # 4 Y = .9872 DELTA H @ = 1.76

START TIME : 17.25

END TIME : 1830

INITIAL LEAK CHECK .008 AT 15 INCHES HG

FINAL LEAK CHECK 0.0 AT 9 INCHES HG

APPENDIX IX

EQUIPMENT CALIBRATION SHEETS

POST
METER BOX CALIBRATION SHEET

BOX #: 4
BAR PRES: 30.18

DATE: 12-19-91
VACUUM: 11.0 IN HG

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	10.00	10.498	1.84	.135	30.32	13.33
2	10.00	10.538	1.84	.135	30.32	13.35
3	10.00	10.549	1.84	.135	30.32	13.35

RUN #	TEMP WET	TEMP DRY INLET	TEMP DRY OUTLET	TEMP DRY (AVG)	Y	DELTA H @
1	69	103	82	93	.9912	1.74
2	69	104	84	94	.9892	1.74
3	70	104	85	95	.9881	1.74
				AVERAGE	.9895	1.74

ACTUAL % DEVIATION = .14%

ALLOWABLE % DEVIATION = 2.0%

PRE CALIBRATION Y = .9872

ACTUAL % DIFFERENCE = .23%

ALLOWABLE DIFFERENCE = 5.0%

FORMULAS:

$$Y = \frac{(V_w)(P_b)(T_d)}{(V_d)(P_b\ ABS)(T_w)}$$

$$\text{DELTA H @} = \frac{0.0317\ (\text{DELTA H})}{(P_b)(T_d)} * \left[\frac{(T_w)(\text{TIME})}{(V_w)}\right]^2$$

CALIBRATION BY: MARK WESCOTT

Eastmount Engineering Inc. • 420 Main Street • Walpole, MA 02081 • (508) 668-9005 • FAX (508) 668-4989

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test numbers Unit 1 Date 19 Dec. 91 Meter box number 24 Plant Atlantic

Barometric pressure, P_b = 30.15 in. Hg Dry gas meter number _____ Pretest Y .9872

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (Θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1.50	10	709.913	69, 69, 69	102, 103, 103	91, 92, 93		13 35/60	11	.9912	
1.50	10	719.457	69, 69, 69	103, 104, 104	93, 94, 94		13 31/60	11	.9892	
1.50	10	723.000	70, 70, 70	103, 104, 104	94, 95, 95		13 31/60	11	.9881	
									Y = .9895	

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y

P_b = Barometric pressure, in. Hg.

Θ = Time of calibration run, min.

NOZZLE CALIBRATION SHEET

PROJECT NAME: Atlantic PROJECT NUMBER: 91-10

POINT#	NOZZLE#____	NOZZLE #____	NOZZLE#____	NOZZLE #____
1	.250	.248	____	____
2	.251	.251	____	____
3	.250	.248	____	____
AVG.	.250	.249	____	____

John Sidorwicz
CALIBRATED BY:

Dec. 16, 1991
DATE:

APPENDIX X

LABORATORY RESULTS

South Florida
Environmental Services

LABORATORY

SUMMARY OF RESULTS

PROJECT NUMBER: 91-103
PROJECT NAME: ATLANTIC SUGAR ASSOCIATION
BOILER #1

ANALYST: M. WAYT
ANALYSIS: EPA METHOD 5

FILTER

SAMPLE DESCRIPTION	FILTER #	TEST DATE	TARE WEIGHT (g)	FINAL WEIGHT (g)
C-1	4424	12-16-91	0.6174	0.8482
C-2	4474	12-16-91	0.5961	0.7664
C-3	4470	12-16-91	0.5934	0.7918
BLANK	4459	12-16-91	0.5982	0.5984

WASH

SAMPLE DESCRIPTION	BKR#	TEST DATE	TARE WEIGHT	FINAL WEIGHT (g)	VOLUME (ml)
C-1	100	12-16-91	66.8319	66.8528	280
C-2	101	12-16-91	67.0469	67.0700	360
C-3	102	12-16-91	67.5992	67.6216	420
BLANK	103	12-16-91	67.0154	67.0167	200

6821 Vista Parkway North, West Palm Beach, FL 33411
Tel: 407-687-5300 Fax: 407-687-3676

METER BOX CALIBRATION SHEET

BOX NUMBER: 10
PRESS BAR : 30.22

DATE: 4 NOV 91
DUE: 4 MAY 92

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	5	5.234	.50	.0368	30.26	13.78
2	5	5.266	1.00	.0735	30.29	9.92
3	10	10.469	1.50	.1103	30.33	16.43
4	10	10.707	2.00	.1471	30.37	14.18
5	10	10.628	3.00	.2206	30.44	11.52
6	10	10.66	4.00	.2941	30.51	10.02

RUN #	TEMP WET (`F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	65.3	81.7	80.0	80.9	.9824	2.03
2	65.7	80.7	79.7	80.2	.9733	2.11
3	65.3	81.7	79.3	80.5	.9793	2.17
4	65.0	87.7	80.0	83.9	.9628	2.14
5	65.0	101.0	81.3	91.2	.9806	2.09
6	65.0	106.0	82.3	94.2	.9806	2.09
				AVERAGE	.9765	2.11
				MAX % DEVIATION	1.40	
				ALLOWABLE % DEV	2.00	

FORMULAS:

$$Y = \frac{(V_w)(P_b)(T_d)}{(V_d)(P_b\ ABS)(T_w)}$$

$$\text{DELTA H @} = \frac{0.0317\ (\text{DELTA H})}{(P_b)(T_d)} * \left[\frac{(T_w)(\text{TIME})}{(V_w)}\right]^2$$

CALIBRATION BY: Mark Wescott
MARK WESCOTT

METER BOX CALIBRATION SHEET

BOX NUMBER: 4
PRESS BAR : 30.19

DATE: 4 NOV 91
DUE: 4 MAY 92

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	5	5.112	.50	.0368	30.23	14.42
2	5	5.121	1.00	.0735	30.26	9.83
3	10	10.299	1.50	.1103	30.30	15.90
4	10	10.33	2.00	.1471	30.34	13.63
5	10	10.34	3.00	.2206	30.41	11.98
6	10	10.359	4.00	.2941	30.48	9.82

RUN #	TEMP WET (`F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	66.00	73.00	69.67	71.3	.9868	2.27
2	66.00	78.00	72.67	75.3	.9913	2.10
3	65.67	82.00	76.00	79.0	.9920	2.04
4	66.00	85.33	78.00	81.7	.9921	1.99
5	65.67	87.67	80.33	84.0	.9936	2.30
6	65.33	90.00	81.33	85.7	.9930	2.05
				AVERAGE	.9915	2.13

MAX % DEVIATION .47
ALLOWABLE % DEV 2.00

FORMULAS:

$$Y = \frac{(V_w)(P_b)(T_d)}{(V_d)(P_b\ ABS)(T_w)}$$

$$\text{DELTA H @} = \frac{0.0317\ (\text{DELTA H})}{(P_b)(T_d)} * \left[\frac{(T_w)(\text{TIME})}{(V_w)}\right]^2$$

CALIBRATION BY: Mark M Wescott
MARK WESCOTT

METER BOX CALIBRATION SHEET

BOX NUMBER: 11
PRESS BAR : 30.19

DATE: 15 OCT 91
DUE: 15 APR 92

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	5	5.168	.50	.0368	30.23	12.48
2	5	5.195	1.00	.0735	30.26	8.97
3	10	10.456	1.50	.1103	30.30	14.83
4	10	10.539	2.00	.1471	30.34	13.28
5	10	10.581	3.00	.2206	30.41	10.82
6	10	10.613	4.00	.2941	30.48	9.50

RUN #	TEMP WET (`F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	71.0	82.7	76.0	79.3	.9815	1.71
2	69.7	95.3	77.0	86.2	.9900	1.73
3	69.0	107.0	79.0	93.0	.9961	1.75
4	69.0	114.7	82.7	98.7	.9972	1.86
5	69.0	114.3	85.0	99.7	.9926	1.84
6	68.7	114.7	86.3	100.5	.9893	1.89
				AVERAGE	.9911	1.80
				MAX % DEVIATION	.97	
				ALLOWABLE % DEV	2.00	

FORMULAS:

$$Y = \frac{(V_w)(P_b)(T_d)}{(V_d)(P_b\ ABS)(T_w)}$$

$$\text{DELTA H @} = \frac{0.0317\ (\text{DELTA H})}{(P_b)(T_d)} * \left[\frac{(T_w)(\text{TIME})}{(V_w)}\right]^2$$

CALIBRATION BY:

JIM JARDIN

TRANSCAT

"CAL-LAB"

Certificate of Calibration

TRANSCAT certifies that this instrument has been calibrated to manufacturer's specifications using measurement standards traceable to the National Institute of Standards and Technology (NIST) and as required by The National Research Council of Canada, Division of Physics, within the limitations of the Council's calibrations services. TRANSCAT's calibration system meets or exceeds the requirements of MIL-STD-45662A.

Complete records of all work performed is maintained by TRANSCAT and is available upon request.

TEMPERATURE 68° F. RELATIVE HUMIDITY OF 59%.

Customer	:	EASTMONT ENGINEERING
Manufacturer	:	TRANSNATION
Model Number	:	1061
Serial Number	:	8277
Description	:	THERMOCOUPLE CALIBRA
Calibrated	:	08/02/91
Date Due	:	08/01/92
Repair Number	:	17-7047-00

ITEM RECEIVED IN TOLERANCE

ASSETS	MANUFACTURER	MODEL	DESCRIPTION	CALIBRATED	DATE DUE
2485	DATA PRECISION	8200	DC CALIB.	01/03/91	01/03/92
2486	FLUKE	9842A	DMM	03/19/91	03/19/92
2471	KAYE	140-4	ICE PT. REF.	03/14/91	03/13/92
2192	NBS	172144-K	STD THERMOCOUPLE	04/19/91	04/19/93

J. Dumaw
CAL-LAB MANAGER

1144 Lexington Ave. • Rochester • NY 14606 • 800-828-1470 - FAX 716-458-0543
P.O. Box 456 • Station A • Rexdale • Ontario M9W 5L4 • 800-268-4739 • FAX 416-675-1445

THERMOCOUPLE CALIBRATION SHEET

SET #: METER BOX #4 - IN DATE: 9/11/85

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE
32	27	1.02
63	57	1.15
204	201	.45
	MAXIMUM	1.15
	ALLOWABLE	1.50

SET #: METER BOX #4 - OUT DATE: 9/11/85

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE
32	27	1.02
63	57	1.15
204	202	.30
	MAXIMUM	1.15
	ALLOWABLE	1.50

CALIBRATION BY: C. LODI

Eastmount Engineering Inc., • 420 Main Street • Walpole, MA 02981 • (508) 668-9005 • FAX (508) 668-4989

THERMOCOUPLE CALIBRATION SHEET

SET #: METER BOX 10-IN DATE: 11/22/88

STANDARD ('F)	THERMOCOUPLE ('F)	% DEVIATION OF ABSOLUTE
32	28	.81
66	65	.19
212	217	.74
	MAXIMUM	.81
	ALLOWABLE	1.50

SET #: METER BOX 10-OUT DATE: 11/22/88

STANDARD ('F)	THERMOCOUPLE ('F)	% DEVIATION OF ABSOLUTE
32	30	.41
66	65	.19
212	216	.60
	MAXIMUM	.60
	ALLOWABLE	1.50

CALIBRATION BY: A. STRATTON

Eastmount Engineering Inc., • 420 Main Street • Walpole, MA 02981 • (508) 668-9005 • FAX (508) 668-4989

THERMOCOUPLE CALIBRATION SHEET

SET #: METER BOX 11-IN DATE: 08-11-86

STANDARD ('F)	THERMOCOUPLE ('F)	% DEVIATION OF ABSOLUTE
34	29	1.01
211	210	.15
404	403	.12
	MAXIMUM	1.01
	ALLOWABLE	1.50

SET #: METER BOX 11-OUT DATE: 08-11-86

STANDARD ('F)	THERMOCOUPLE ('F)	% DEVIATION OF ABSOLUTE
34	28	1.21
211	210	.15
404	401	.35
	MAXIMUM	1.21
	ALLOWABLE	1.50

CALIBRATION BY: G. ZWILLING

TEMPERATURE INDICATOR CALIBRATION FORM

INDICATOR S/N: 650 - 6 CAL DATE: 8 AUG 91

REFERENCE S/N:1061-8277 DUE DATE: 8 AUG 92

	REFERENCE SET POINT							
	0	32	200	250	320	600	800	1000
CHANNEL NO.								
1	0	33	199	249	320	600	800	1000
2	0	32	199	249	320	599	800	1000
3	0	32	199	249	320	599	800	1000
4	0	32	199	249	320	600	800	1001
5	0	32	199	250	320	600	800	1000
6	0	32	199	249	320	599	800	1000
7								
8								
9								
10								

% DIFF: .06

CALIBRATED BY____KIERAN NOLAN KN

TEMPERATURE INDICATOR CALIBRATION FORM

INDICATOR S/N: 650 - 7 CAL DATE: 13 SEP 91

REFERENCE S/N:1061-8277 DUE DATE: 13 SEP 92

	REFERENCE SET POINT							
	0	32	200	250	320	600	800	1000
CHANNEL NO.								
1	1	32	199	249	320	599	798	999
2	1	32	200	250	320	599	799	999
3	1	33	200	250	320	599	799	999
4	1	32	200	250	320	599	799	999
5	0	32	199	249	320	600	799	998
6	0	32	199	250	320	599	799	998
7								
8								
9								
10								

% DIFF: .04

CALIBRATED BY____KIERAN NOLAN KN

TEMPERATURE INDICATOR CALIBRATION FORM

INDICATOR S/N: 650 - 8 CAL DATE: 8 AUG 91

REFERENCE S/N:1061-8277 DUE DATE: 8 AUG 92

	REFERENCE SET POINT							
CHANNEL	0	32	200	250	320	600	800	1000
1	-1	32	199	249	319	599	799	999
2	0	31	199	249	320	599	800	1000
3	-1	31	199	249	320	599	800	1000
4	0	32	199	249	320	599	800	1000
5	0	32	199	249	320	600	799	1000
6	0	31	199	249	320	599	800	1000
7								
8								
9								
10								

% DIFF: .39

CALIBRATED BY____KIERAN NOLAN KN

TEMPERATURE INDICATOR CALIBRATION FORM

INDICATOR S/N: NEWPONT - 12 CAL DATE: 8 AUG 91

REFERENCE S/N: 1061-8277 DUE DATE: 8 AUG 92

	REFERENCE SET POINT							
	0	32	200	250	320	600	800	1000
CHANNEL NO.								
1	1	31	199	250	321	600	801	1002
2	0	31	199	250	321	600	801	1002
3	0	31	199	250	321	600	801	1002
4	0	31	199	250	321	600	801	1002
5	2	32	201	251	322	600	802	1003
6	0	31	199	250	321	600	801	1002
7	0	31	199	250	321	600	801	1002
8	0	31	199	250	321	600	801	1002
9	1	31	199	250	321	600	801	1002
10	0	31	199	250	321	600	801	1002

% DIFF: .37

CALIBRATED BY____KIERAN NOLAN KN

THERMOCOUPLE CALIBRATION SHEET

SET #: 7.75' - 9 DATE 3/6/91

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
32	32	.00
212	213	.15
466	479	1.43
	MAXIMUM	1.43
	ALLOWABLE	1.50

CALIBRATION BY: Kieran Nolan

KIERAN NOLAN

THERMOCOUPLE CALIBRATION SHEET

SET #: 7.5'- 168 DATE 1/11/91

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
32	33	.20
212	215	.45
495	505	1.09
	MAXIMUM	1.09
	ALLOWABLE	1.50

CALIBRATION BY: Kieran Nolan

KIERAN NOLAN

THERMOCOUPLE CALIBRATION SHEET

TC #: 4THIMP-210 DATE: 2/27/91

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
32.0	32	.00
157.1	157	.02
212	214	.30
	MAXIMUM	.30
	ALLOWABLE	1.50

CALIBRATION BY: Kieran Nolan

KIERAN NOLAN

Eastmount Engineering Inc., • 420 Main Street • Walpole, MA 02981 • (508) 668-9005 • FAX (508) 668-4989

THERMOCOUPLE CALIBRATION SHEET

TC #: 4THIMP-191

DATE: 2/27/91

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
32.0	32	.00
157.1	157	.02
212	214	.30
	MAXIMUM	.30
	ALLOWABLE	1.50

CALIBRATION BY: Kieran Nolan

KIERAN NOLAN

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THERMOCOUPLE CALIBRATION SHEET

TC #: 4THIMP-188 DATE: 1/25/91

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
32.0	32	.00
139.0	138	.17
212	212	.00
	MAXIMUM	.17
	ALLOWABLE	1.50

CALIBRATION BY: Kieran Nolan

KIERAN NOLAN

THERMOCOUPLE CALIBRATION SHEET

TC #: RAC - 2 - 170 DATE: 1/11/91

STANDARD ('F)	THERMOCOUPLE ('F)	% DIFFERENCE (ABSOLUTE)
32.0	32	.00
516.2	519	.29
212	213	.15
	MAXIMUM	.29
	ALLOWABLE	1.50

CALIBRATION BY: Kieran Nolan

KIERAN NOLAN

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