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Eastmount Engineering

Environmental Consultants — Air Quality Specialists

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OKEELANTA CORPORATION

COMPLIANCE PARTICULATE EMISSIONS TEST REPORT

BOILER #12

PREPARED FOR: Okeelanta Corporation
Okeelanta Sugar Division
South Bay, Florida 33493

CONCERNING: Particulate Emissions Testing
Okeelanta Corporation
Boiler #12
South Bay Florida Facility
December 17, 1991

PREPARED BY: Sean M. MacKay
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I hereby certify that the information presented in this report is accurate and true to the best of my knowledge.

Sean Mac Kay
Sean M. MacKay
Project Director

JANUARY 23, 1992
Date

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1.0 COMPENDIUM

Eastmount Engineering conducted a Compliance Particulate Emissions Test Program on Unit #12 at Okeelanta Corporation's South Bay, Florida facility on December 17, 1991. The test program consisted of a series of three EPA Method 5 tests. The first run was discarded due to moisture on the filter at the conclusion of the run.

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, 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 #12 has a maximum rated capacity of 150,000 pounds of steam per hour. Results of the test program indicate Boiler #12 to be in compliance with the Florida DER emission standard. The following table summarizes the emission results, the emission standards, and the boiler operating conditions.

RUN #	DATE	EMISSION RATE LB/MMBtu	EMISSION RATE LB/HR	ALLOWABLE LB/MMBtu	ALLOWABLE LB/HR	LOAD LB/HR	% OF 150 KPH
2	12-17-91	.181	51.02	.200	56.40	137,631	91.8%
3	12-17-91	.156	44.08	.200	56.36	137,538	91.7%
4	12-17-91	.147	40.99	.200	55.85	136,154	90.8%
3 RUN AVG.		.161	45.36	.200	56.20	137,107	91.4%

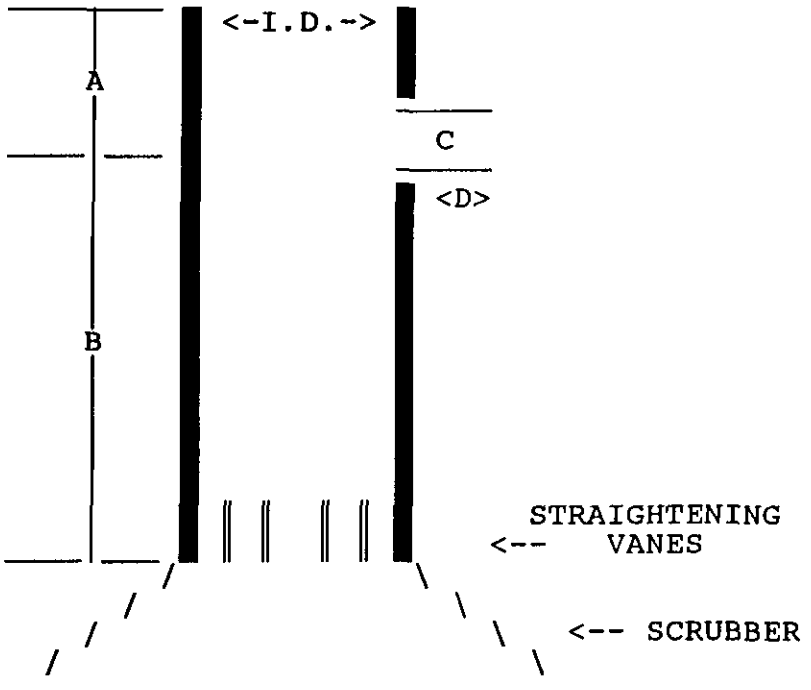
Sean MacKay, Project Director, was in charge of and responsible for all stack testing, conducted all calculations and maintained chain of custody of all samples. Pat Wildman and Brian Gibson operated the meter box and assisted in the field laboratory. Ralph Good located the probe at the proper traverse point locations and assisted where required. Mr. Kenneth Tucker of the Florida Department of Environmental Regulation observed the stack testing and boiler operations. Mr. Alberto Padrone was the boiler room superintendent and acted as liaison between Okeelanta Corporation and the Florida DER. Mr. George Devane was responsible for boiler operations and acquisition of all pertinent process data.

2.0 STACK SCHEMATIC

OKEELANTA CORPORATION
Boiler #12
South Bay, Florida Facility

The following is a schematic of the stack which services Boiler #12 at Okeelanta Corporation's South Bay, Florida facility.

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

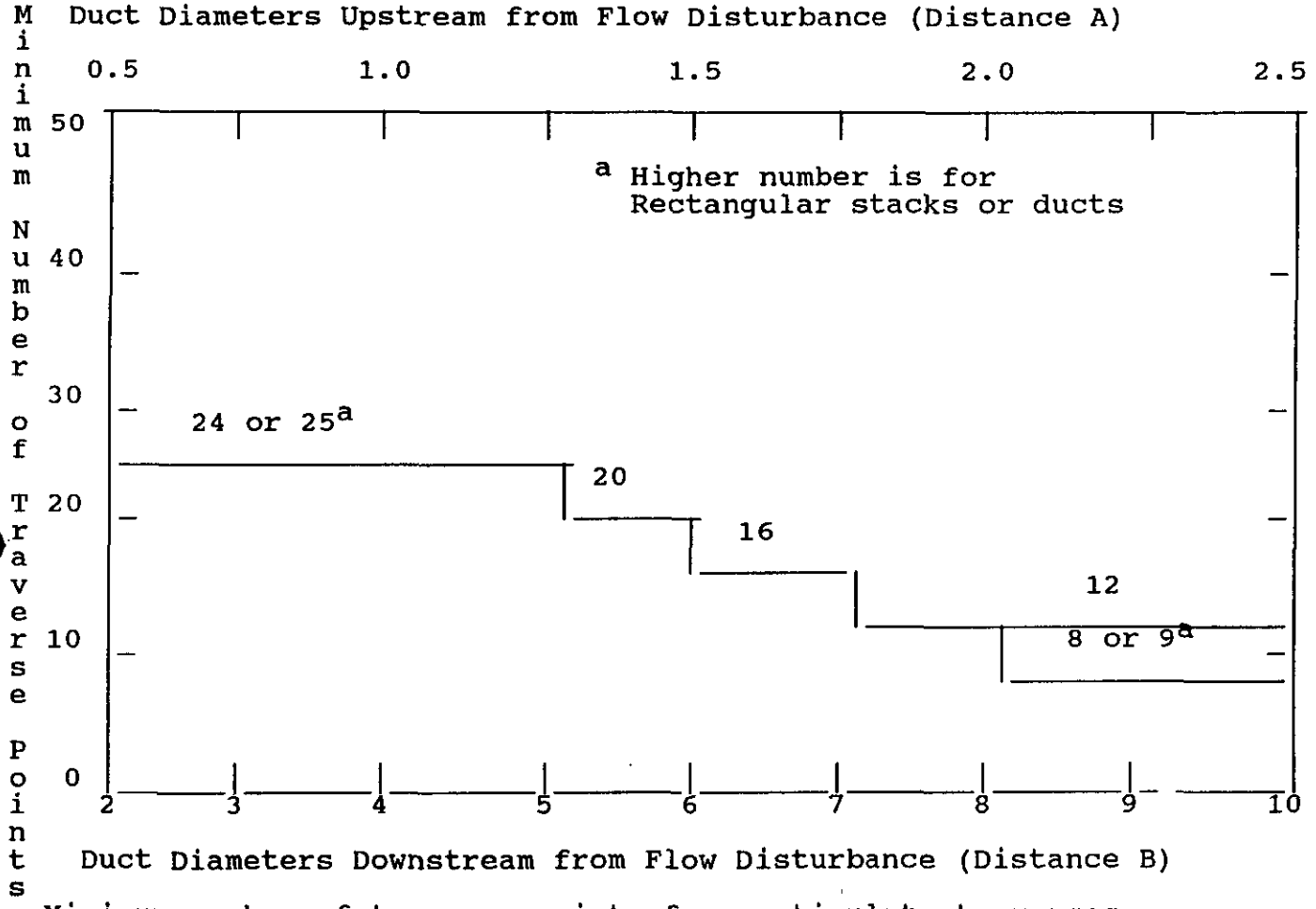


DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	4'
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	16'
DIAMETER OF PORT SLEEVE (C)	4"
LENGTH OF PORT SLEEVE (D)	3.5"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	7.5'

SCHEMATIC NOT TO SCALE

3.0 TRAVERSE POINT LOCATIONS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
Boiler #12
South Bay, Florida Facility



Minimum number of traverse points for particulate traverses.

Distance A = 4' or 0.5 diameters.

Distance B = 16' or 2.1 diameters.

In accordance with Method 1, 24 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 2.5 minutes.

3.0 TRAVERSE POINT LOCATIONS AND SAMPLING TIME PER POINT (cont)

OKEELANTA CORPORATION
Boiler #12
South Bay, Florida Facility

DIAMETER OF STACK: 7.5 FEET
PORT SLEEVE LENGTH: 3.5 INCHES

TRAVERSE POINT	DISTANCE % OF DIAMETER	DISTANCE (INCHES)	PROBE MARKING (INCHES)
1	2.1	1.9	5.4
2	6.7	6.0	9.5
3	11.8	10.6	14.1
4	17.7	15.9	19.4
5	25.0	22.5	26.0
6	35.6	32.0	35.5
7	64.4	57.9	61.5
8	75.0	67.5	71.0
9	82.3	74.1	77.6
10	88.2	79.4	82.9
11	93.3	84.0	87.5
12	97.9	88.1	91.6

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.

4.1 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 `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.

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

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.

4.2 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 relation ships.

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.

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.

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).

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 12-17-91

Ds (FT)	7.5
Dn (IN)	.310
FILTER#	4402
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	366
IMP-2 (FIN)	132
IMP-3 (FIN)	5
IMP-4 (FIN)	515.5
% CO2	13.5
% O2	6.5
% CO	0
P BAR	30.16
P STK	-.15
NO. PTS	24
TEST LNGTH	60
END METER	878.518
INT METER	832.750
BEGIN TIME:	11:05
END TIME:	12:10

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.31	.56	1.98	77	76	152
2	.32	.57	2.05	81	77	152
3	.33	.57	2.11	86	77	152
4	.44	.66	2.82	92	77	151
5	.46	.68	2.94	96	78	151
6	.37	.61	2.37	100	77	150
7	.44	.66	2.82	104	78	151
8	.34	.58	2.18	106	79	149
9	.39	.62	2.50	109	80	151
10	.41	.64	2.62	111	80	145
11	.37	.61	2.37	114	82	152
12	.32	.57	2.05	113	82	152
B1	.06	.24	.38	101	81	151
2	.08	.28	.51	102	82	151
3	.18	.42	1.15	104	82	152
4	.22	.47	1.41	106	82	151
5	.37	.61	2.37	111	83	151
6	.45	.67	2.88	114	83	150
7	.38	.62	2.43	118	84	151
8	.34	.58	2.18	119	84	152
9	.37	.61	2.37	120	85	151
10	.33	.57	2.11	121	86	151
11	.27	.52	1.73	122	87	152
12	.21	.46	1.34	121	87	151
AVERAGE	.32	.56	2.07	106.2	81.2	150.9

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 12-17-91

Ds (FT)	7.5
Dn (IN)	.314
FILTER#	4404
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	370
IMP-2 (FIN)	130
IMP-3 (FIN)	4
IMP-4 (FIN)	513.5
% CO2	13.7
% O2	6.3
% CO	0
P BAR	30.15
P STK	-.15
NO. PTS	24
TEST LNGTH	60
END METER	924.292
INT METER	878.901
BEGIN TIME:	13:10
END TIME:	14:15

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.30	.55	1.98	82	81	152
2	.31	.56	2.05	86	80	153
3	.30	.55	1.98	90	80	153
4	.40	.63	2.64	94	80	151
5	.48	.69	3.17	99	81	149
6	.38	.62	2.51	104	81	151
7	.41	.64	2.71	107	82	152
8	.31	.56	2.05	108	82	151
9	.35	.59	2.31	109	83	153
10	.42	.65	2.77	112	83	149
11	.36	.60	2.38	113	84	152
12	.32	.57	2.11	114	84	152
B1	.17	.41	1.12	105	84	151
2	.13	.36	.86	107	85	151
3	.15	.39	.99	107	85	151
4	.18	.42	1.19	109	85	151
5	.19	.44	1.25	109	85	152
6	.26	.51	1.72	110	84	152
7	.31	.56	2.05	114	86	152
8	.31	.56	2.05	116	86	148
9	.33	.57	2.18	117	86	151
10	.33	.57	2.18	118	87	153
11	.37	.61	2.44	120	87	152
12	.30	.55	1.98	122	88	152
AVERAGE	.31	.55	2.03	107.2	83.7	151.4

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-4
DATE : 12-17-91

Ds (FT)	7.5
Dn (IN)	.310
FILTER#	4405
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	395
IMP-2 (FIN)	139
IMP-3 (FIN)	4
IMP-4 (FIN)	515.0
% CO2	13.6
% O2	6.4
% CO	0
P BAR	30.14
P STK	-.15
NO. PTS	24
TEST LNGTH	60
END METER	970.914
INT METER	924.501
BEGIN TIME:	15:00
END TIME:	16:05

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.30	.55	1.92	84	82	152
2	.30	.55	1.92	87	82	152
3	.35	.59	2.24	92	82	152
4	.32	.57	2.05	97	82	153
5	.44	.66	2.82	102	82	152
6	.40	.63	2.56	105	82	153
7	.36	.60	2.30	108	82	153
8	.39	.62	2.50	111	83	153
9	.29	.54	1.86	112	83	151
10	.36	.60	2.30	111	84	154
11	.40	.63	2.56	114	84	153
12	.36	.60	2.30	116	85	151
B1	.14	.37	.90	104	84	153
2	.19	.44	1.22	107	85	154
3	.21	.46	1.34	108	85	154
4	.38	.62	2.43	111	85	152
5	.36	.60	2.30	114	85	153
6	.38	.62	2.43	117	86	153
7	.34	.58	2.18	119	86	153
8	.35	.59	2.24	120	86	154
9	.34	.58	2.18	121	87	152
10	.34	.58	2.18	121	88	154
11	.32	.57	2.05	121	88	153
12	.21	.46	1.34	121	88	152
AVERAGE	.33	.57	2.09	109.3	84.4	152.8

APPENDIX II

ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 12-17-91

TS ('F)=	150.9	% CO2=	13.5	VM (CF) =	45.768
TS ('R)=	610.9	% O2=	6.5	DELTA H (ABS)=	30.31
TM ('F)=	93.7	% CO=	0	PS (ABS) =	30.15
TM ('R)=	553.7	% N2=	80.0	SQRT DELTA P =	.558012
VI(TOT)=	318.5	CP=	.84	AREA NOZZLE =	.000524

Y = .9911

VM STD	=	$\frac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 17.64	43.81	DSCF
VW STD	=	.04707 (VI TOT)	14.99	CF
BWO	=	$\frac{\text{VW STD}}{\text{VW STD + VM STD}}$	.255	
BWO	=	MOISTURE FROM STEAM TABLES	.257	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	N/A	ML
1-BWO	=	1 - BWO	.745	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	30.42	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	27.26	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	.86	
VS	=	85.49(CP)(G)(SQRT DELTA P)	34.6	FPS
H	=	0.002669 (VI TOT)	.85	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	2.48	
K	=	(H) + (J)	3.33	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	103.6	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 12-17-91

TS ('F)=	151.4	% CO2=	13.7	VM (CF) =	45.391
TS ('R)=	611.4	% O2=	6.3	DELTA H (ABS)=	30.30
TM ('F)=	95.4	% CO=	0	PS (ABS) =	30.14
TM ('R)=	555.4	% N2=	80.0	SQRT DELTA P =	.547712
VI(TOT)=	317.5	CP=	.84	AREA NOZZLE =	.000538

Y = .9911

VM STD	=	$17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 43.29	DSCF
VW STD	=	.04707 (VI TOT)	= 14.94	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .257	
BWO	=	MOISTURE FROM STEAM TABLES	= .260	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	=	1 - BWO	= .743	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	= 30.45	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 27.25	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .86	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 33.9	FPS
H	=	0.002669 (VI TOT)	= .85	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.45	
K	=	(H) + (J)	= 3.30	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 102.0	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-4
DATE : 12-17-91

TS ('F)=	152.8 Avg=152	% CO2=	13.6 / Avg=6.4	VM (CF)	= 46.413
TS ('R)=	612.8	% O2=	6.4	DELTA H (ABS)	= 30.29
TM ('F)=	96.9	% CO=	0	PS (ABS)	= 30.13
TM ('R)=	556.9	% N2=	80.0	SQRT DELTA P	= .567084
VI(TOT)=	353.0	CP=	.84	AREA NOZZLE	= .000524

Y = .9911

VM STD	=	$\frac{(VM)(Y)(\text{DELTA H ABS})}{(TM)}$ = 17.64	44.14	DSCF
VW STD	=	.04707 (VI TOT)	16.62	CF
BWO	=	$\frac{\text{VW STD}}{\text{VW STD + VM STD}}$	.273	
BWO	=	MOISTURE FROM STEAM TABLES	.269	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	345.3	ML
1-BWO	=	1 - BWO	.731	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	30.43	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	27.09	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	.87	
VS	=	85.49(CP)(G)(SQRT DELTA P)	35.3	FPS
H	=	0.002669 (VI TOT)	.92	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	2.50	
K	=	(H) + (J)	3.42	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	104.6	

APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 12-17-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	350	680	260
	350	680	
	350	680	
	350	680	
	350	690	
AVERAGE	350.0 PSIG	682.0	260.0
P ABS =	364.7 PSIA		

ENTHALPY @	700	'F AND	360	PSIA =	1365.6
ENTHALPY @	600	'F AND	360	PSIA =	1310.6
ENTHALPY @	682.0	'F AND	360	PSIA =	1355.7

ENTHALPY OF FEED WATER = 228.76

AVERAGE ENTHALPY = 1126.9 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 12-17-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	355	680	260
	350	690	
	350	680	
	350	680	
	350	680	
AVERAGE	351.0 PSIG	682.0	260.0
P ABS =	365.7 PSIA		

ENTHALPY @	700	'F AND	360	PSIA =	1365.6
ENTHALPY @	600	'F AND	360	PSIA =	1310.6
ENTHALPY @	682.0	'F AND	360	PSIA =	1355.7

ENTHALPY OF FEED WATER = 228.76

AVERAGE ENTHALPY = 1126.9 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-4
DATE : 12-17-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	345	680	260
	345	680	
	340	680	
	350	690	
	350	690	
AVERAGE	346.0 PSIG	684.0	260.0

P ABS = 360.7 PSIA

ENTHALPY @	700	'F AND	360	PSIA =	1365.6
ENTHALPY @	600	'F AND	360	PSIA =	1310.6
ENTHALPY @	684.0	'F AND	360	PSIA =	1356.8

ENTHALPY OF FEED WATER = 228.76

AVERAGE ENTHALPY = 1128.0 BTU/LB OF STEAM

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 12-17-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR		
END	60006		12: 10		100		
BEGIN	58515		11: 5		LBS/HR STEAM		
NET	1491	X	100	/ 65 MINS =	137631		

137631 LBS/HR STEAM / 55% EFF. = 250238 EQUIV.

250238 LBS/HR STEAM X 1127 BTU/LB = 282.0 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR	
END	0		12: 10			
BEGIN	0		11: 5			
NET	0	GALLONS	65	MINS =	0	GPH

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

ALLOWABLE EMISSIONS

BAGASSE	282.0	-	0	X .2	=	56.4	LBS/HR
OIL			0	X .1	=	.0	LBS/HR
TOTAL					=	56.4	LBS/HR
						.200	LB/MMBTU

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 12-17-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR		
END	62862		14: 15		100		
BEGIN	61372		13: 10		LBS/HR STEAM		
NET	1490	X 100	65	MINS =	137538		

137538 LBS/HR STEAM / 55% EFF. = 250070 EQUIV.

250070 LBS/HR STEAM X 1127 BTU/LB = 281.8 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR	
END	0		14: 15			
BEGIN	0		13: 10			
NET	0	GALLONS	65	MINS =	0	GPH

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

ALLOWABLE EMISSIONS

BAGASSE	281.8	- 0	X	.2	=	56.4	LBS/HR
OIL		0	X	.1	=	.0	LBS/HR
TOTAL					=	56.4	LBS/HR
						.200	LB/MMBTU

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-4
DATE : 12-17-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR
END	65351		16: 5		100
BEGIN	63876		15: 0		LBS/HR STEAM
NET	1475	X	100 / 65	MINS =	136154

136154 LBS/HR STEAM / 55% EFF. = 247552 EQUIV.

247552 LBS/HR STEAM X 1128 BTU/LB = 279.2 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR
END	0		16: 5		
BEGIN	0		15: 0		
NET	0	GALLONS	65	MINS =	0 GPH

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

ALLOWABLE EMISSIONS

BAGASSE	279.2	-	0	X	.2	=	55.8 LBS/HR
OIL			0	X	.1	=	.0 LBS/HR
TOTAL						=	55.8 LBS/HR
							.200 LB/MMBTU

APPENDIX V

PARTICULATE EMISSION CALCULATION SHEETS

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 12-17-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	4402	104	4406	107
FINAL:	.8204	67.3445	.6043	67.4889
TARE :	.5948	67.2843	.6045	67.4876
NET :	.2256	.0602	-.0002	.0013/200ML

VOLUME OF RINSE 220

WEIGHT = 285.80
RESIDUE = - 1.43

Mn	=	284.37 Mg	AS	= 44.2	SQ FT
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	3564013	DSCFH
CS	=	(2.205 X 10-6) (Mn) / (VM STD)	=	1.431e-5	LBS/SCF
CS'	=	0.0154 (Mn) / (VM STD)	=	.10	GRAINS /SCF
PMR	=	(QS) (CS)	=	51.02	LBS/HR
LOAD=		MILLIONS OF BTU / HOUR INPUT	=	282.0	BTU e6 / HR
E	=	LBS / MILLION BTu	=	.181	LBS/ BTu e6
ALLOWABLE			=	56.40	LBS/HR
			=	.200	LBS/ BTu e6

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 12-17-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	4404	105	4406	107
FINAL:	.8156	67.5024	.6043	67.4889
TARE :	.5932	67.4749	.6045	67.4876
NET :	.2224	.0275	-.0002	.0013/200ML

VOLUME OF RINSE 280

WEIGHT = 249.90
RESIDUE = - 1.82

Mn = 248.08 Mg

AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3488700 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.264e-5 LBS/SCF

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

PMR = (QS) (CS) = 44.08 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 281.8 BTU e6 / HR

E = LBS / MILLION BTu = .156 LBS/ BTu e6

ALLOWABLE = 56.36 LBS/HR

= .200 LBS/ BTu e6

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-4
DATE : 12-17-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	4405	106	4406	107
FINAL:	.8137	67.3086	.6043	67.4889
TARE :	.5962	67.2941	.6045	67.4876
NET :	.2175	.0145	-.0002	.0013/200ML

VOLUME OF RINSE 210

WEIGHT = 232.00
RESIDUE = - 1.37

Mn = 230.64 Mg

AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3557693 DSCFH

Avg = 3,536,802

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.152e-5 LBS/SCF

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

PMR = (QS) (CS) = 40.99 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 279.2 BTU e6 / HR

Avg = 281.0

E = LBS / MILLION BTu = .147 LBS/ BTu e6

ALLOWABLE = 55.85 LBS/HR

= .200 LBS/ BTu e6

APPENDIX VI

NOMENCLATURE SHEETS

NOMENCLATURE SHEET

PARTICULATE EMISSIONS 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.

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 Farenheight.
TS (`R)	The temperature of the stack in degrees Rankine.
T (Hot Box)	Temperature around the filter box, degrees Farenheight.
TM (`F)	Average temperature of the dry gas meter in degrees Farenheight.

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.

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

CAPACITY 150,000
INT. FACTOR 100
RUN # 12-2

BOILER # 12

POLLUTION COMPLIANCE TESTING
DATE: 12-17-81
TESTED BY: Eastmount Eng

TIME	STEAM INTERGRATOR	OIL METER NORTH	OIL METER SOUTH	STEAM PRESS.	STEAM TEMP.	STEAM READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
start AM								
11:05	58545	286496	X	350	680	130,000	650	260°
11:20	58852			350	680	132,000	650	"
11:35	59205			350	680	135,000	640	"
11:50	59552			350	680	132,000	650	"
PM 12:10	60006	286426	X	350	690	132,000	660	"

BOILER PRESSURE DROP

OVERFIRE AIR PRESS.	18	17	17	17
AIR HEATER AIR OUT	5.0	5.0	5.0	5.0
UNDERGRATE AIR PRESS.	.2	.2	.2	.2
WIND BOX PRESSURE	.2	.2	.2	.2
FURNACE PRESSURE	.4	.4	.3	.4
BLR. OUTLET PRESSURE	—	—	—	—
DUST COLLECTOR OUT.	—	—	—	—
SCRUBBER DIFF.	4.5	4.5	4.5	4.5

BOILER TEMPERATURE

BOILER OUTLET	780	780	780	790
AIR HEATER GAS OUT				
AIR HEATER AIR OUT				
I.D. FAN	460	460	460	460
S.H. STEAM TEMP.	680	680	680	690

PANEL SETTINGS

FURNACE PRESSURE				
F.D. FAN PRESSURE				
BAGASSE FEED	61 cy	61 cy	61 cy	61 cy
UNDERGRATE AIR				
OVERFIRE AIR				

TEST RESULTS

OIL USED	None	GALS.
TOTAL TEST TIME	65	MINS.
INTERGATOR TIME	1491	COUNT
INTERGRATOR STEAM	137,630	P.P.H
CHART READING	66,000	TOTAL
CHART AVERAGE	132,200	P.P.H.
I.D. FAN TURBINE	4400	RPM
STACK TEMPERATURE	152	°F
GRATE TEMPERATURE	NA	°F
SCRUBBER WATER ESH	700	G.P.M.

COMMENTS:

	"A"	"B"
(1) Mill speed	85	85 F.P.M.

(2) using no oil burner
(3) "B" Mill stopped for 20 min (11:20 - 11:40)

Allowed =

Actual =

PLANT READINGS BY Doug Dalton

% OF CAPACITY

CAPACITY 150,000
INT. FACTOR 100
RUN # 12-3

BOILER # 12

POLLUTION COMPLIANCE TESTING
DATE: 12-17-91
TESTED BY: Eastmount Eng

TIME	STEAM INTERGRATOR	OIL METER NORTH	OIL METER SOUTH	STEAM PRESS.	STEAM TEMP.	STEAM READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
start (PM) 1:10	61372	286476	one meter	355	680	135,000	680	260
1:25	61720			350	690	135,000	660	"
1:40	62063			350	680	135,000	620	"
1:55	62404			350	680	132,000	620	"
end (45) 2:15	62862	286476		350	680	135,000	620	"

BOILER PRESSURE DROP

OVERFIRE AIR PRESS.	17	17	17	17	17
AIR HEATER AIR OUT	5.0	5.0	5.0	5.0	5.0
UNDERGRATE AIR PRESS.	.2	.2	.2	.2	.2
WIND BOX PRESSURE	.2	.2	.2	.1	.2
FURNACE PRESSURE	.4	.3	.3	.4	.3
BLR. OUTLET PRESSURE	—	—	—	—	—
DUST COLLECTOR OUT.	—	—	—	—	—
SCRUBBER DIFF.	4.8	4.9	4.7	4.7	4.8

BOILER TEMPERATURE

BOILER OUTLET	790	790	780	780	780
AIR HEATER GAS OUT					
AIR HEATER AIR OUT					
I.D. FAN	460	460	460	460	460
S.H. STEAM TEMP.	680	690	690	680	680

PANEL SETTINGS

FURNACE PRESSURE					
F.D. FAN PRESSURE					
BAGASSE FEED	6 cy	6 cy	6 cy	6 cy	6 cy
UNDERGRATE AIR					
OVERFIRE AIR					

TEST RESULTS

OIL USED	None	GALS.
TOTAL TEST TIME	65	MINS.
INTERGRATOR TIME	1490	COUNT
INTERGRATOR STEAM	137,538	P P H
CHART READING	672,000	TOTAL
CHART AVERAGE	134,000	P P H
I.D. FAN TURBINE	4400	RPM
STACK TEMPERATURE	152	°F
GRATE TEMPERATURE	N A	°F
SCRUBBER WATER Est	700	G.P.M.

COMMENTS:

	"A"	"B"	
(1) Mill speed	85	85	F.P.M.

(2) using no oil burner

Allowed =

Actual =

PLANT READINGS BY George Rollo

% OF CAPACITY

CAPACITY 150,000
INT. FACTOR 400
RUN # 12-4

BOILER # 12

POLLUTION COMPLIANCE TESTING
DATE: 12-17-97
TESTED BY: Eastmount Eng

TIME	STEAM INTERGRATOR	OIL METER North	OIL METER South	STEAM PRESS.	STEAM TEMP.	GRATE READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
start PM 3:00	63876	286476	End Meter	345	680	132,000	610	260°
3:15	64216			345	680	132,000	610	"
3:30	64562			340	680	135,000	600	"
3:45	64904			350	690	130,000	630	"
4:05	65351	286476		350	690	130,000	660	"

BOILER PRESSURE DROP

OVERFIRE AIR PRESS.	17	17	17	17
AIR HEATER AIR OUT	5.0	5.0	5.0	5.0
UNDERGRATE AIR PRESS.	.2	.2	.2	.2
WIND BOX PRESSURE	.2	.2	.2	.2
FURNACE PRESSURE	.3	.3	.3	.3
BLR. OUTLET PRESSURE	—	—	—	—
DUST COLLECTOR OUT.	—	—	—	—
SCRUBBER DIFF.	5.0	4.9	4.8	4.8

BOILER TEMPERATURE

BOILER OUTLET	780	780	790	790
AIR HEATER GAS OUT				
AIR HEATER AIR OUT				
I.D. FAN	460	460	460	460
S.H. STEAM TEMP.	680	680	680	690

PANEL SETTINGS

FURNACE PRESSURE				
F.D. FAN PRESSURE				
BAGASSE FEED	61 cy	61 cy	61 cy	61 cy
UNDERGRATE AIR				
OVERFIRE AIR				

TEST RESULTS

OIL USED	None	GALS.
TOTAL TEST TIME	65	MINS.
INTERGATOR TIME	1475	COUNT
INTERGRATOR STEAM	136,154	P.P.H.
CHART READING	659,000	TOTAL
CHART AVERAGE	131,800	P.P.H.
I.D. FAN TURBINE	4460	RPM
STACK TEMPERATURE	153	°F
GRATE TEMPERATURE	N/A	°F
SCRUBBER WATER Est	700	G.P.M.

COMMENTS:

	"A"	"B"	
(1) Mill speed	8.5	8.5	F.P.M.

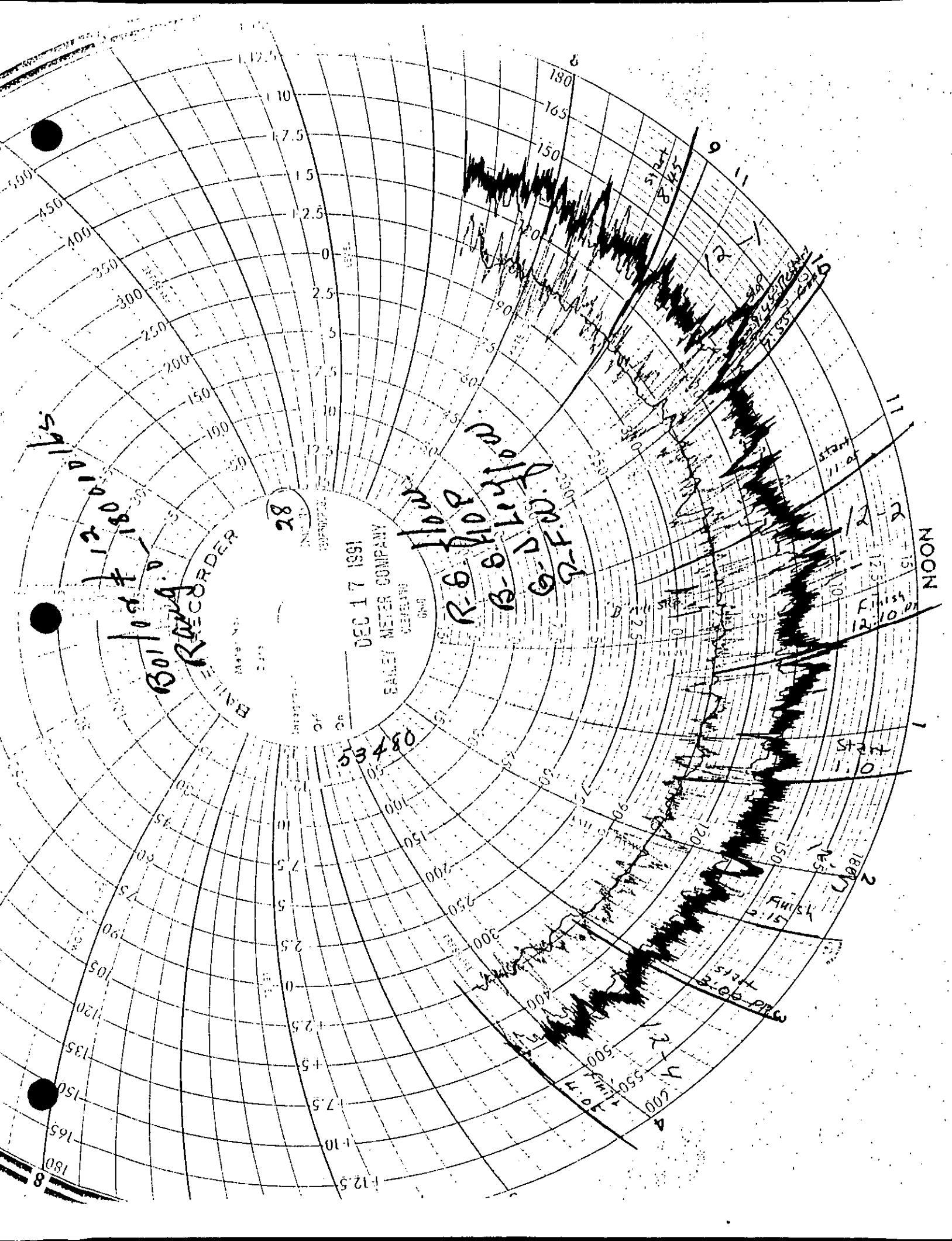
(2) Using no oil burner.

Allowed =

Actual =

PLANT READINGS BY George Dolce

% OF CAPACITY


BAILEY METER COMPANY
CLEVELAND, OHIO
DEC 17 1951
BAILEY RECORDER
53480
NOON
Start 1.0
Finish 12.10 PM
Start 11 AM
Start 8.45
Finish 5.15
Start 3:00 PM
Finish 7.00 PM

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	Comp-2
Location:	UNIT 12	Date:	17DEC 91
Ds (ft):	7.5	No. Points:	24
Dn (in):	.310	Test Length:	60
Filter #:	4402	End Meter Reading:	878.518
Cp:	.84	Int Meter Reading:	832.750
P bar:	30.16	Begin Time:	11:05
P stack:	-.15	End Time:	12:10
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	366
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	132
IMP-3 (INT)	0 ML	IMP-3 (FINAL)	5
IMP-4 (INT)	500.09	IMP-4 (FINAL)	515.5

	TEST 1	TEST 2	TEST 3
% CO2	13.5		
% O2	6.5		
% CO	0		

Project Director:	S. MacKay	Field Laboratory:	MacKay/Wilkman
Meter Box Operator:	P. Wilkman	Chain of Custody:	S. MacKay
Probe Operator:	R. Good	Plant Coordinator:	G. DeVane
Orsat Analyst:	S. MacKay	Agency Rep:	C. Culliver/S. Jordan

Comments:

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 1 OF 2

PLANT Okeelanta

LOCATION Unit #12

SAMPLING TIME PER POINT 2½

RUN # C-2

DATE 17 Dec 91

832.750

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	
				1	2	3	4	5		90 O_2
A	.31	1.98	834.6	77	76	260	58	152	1	
2	.32	2.05	836.5	81	77	263	55	152	1.5	6.8
3	.33	2.11	838.4	86	77	259	55	152	2	6.9
4	.44	2.82	840.6	92	77	258	55	151	4	6.7
5	.46	2.94	842.8	96	78	260	57	151	5	
6	.37	2.37	844.9	100	77	260	58	150	4	6.3
7	.44	2.82	847.1	104	78	262	59	151	5	
8	.34	2.18	849.2	106	79	255	60	149	4	7.1
9	.39	2.50	851.2	109	80	261	60	151	5	
10	.41	2.62	853.4	111	80	267	60	145	5	5.8
11	.37	2.37	855.4	114	82	255	60	152	5	
12	.32	2.05	857.480	113	82	260	60	152	5	7.0

COMMENTS: DELTA P × 6.4 = DELTA H

BOX # 11 Y = .9911 DELTA H @ = 1.80

START TIME : 11:05

END TIME : 12:10

INITIAL LEAK CHECK .003 AT 15 INCHES HG

FINAL LEAK CHECK _____ AT _____ INCHES HG

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 2 OF 2

PLANT Oceanside

LOCATION Unit #12

SAMPLING TIME PER POINT 2 1/2

RUN # C-2

DATE 17 DEC. 91

857.480 1 2 3 4 5

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	
B1	.06	.384	858.7	101	81	257	58	151	1	
2	.08	.512	859.6	102	82	269	58	151	1	
3	.18	1.15	861.0	104	82	258	58	152	2	6.502
4	.22	1.41	862.6	106	82	273	59	151	3	
5	.37	2.37	864.6	111	83	273	59	151	6	6.4
6	.45	2.88	866.7	114	83	249	60	150	8	
7	.38	2.43	868.8	118	84	258	62	151	8	6.7
8	.34	2.18	870.9	119	84	264	64	152	7	
9	.37	2.37	873.0	120	85	261	64	151	7.5	6.4
10	.33	2.11	875.0	121	86	265	66	151	7.5	
11	.27	1.73	876.9	122	87	263	64	152	6	
12	.21	1.34	878.518	121	87	264	63	151	5	6.4

COMMENTS: DELTA P * 6.4 = DELTA H

BOX # 11 Y = .9911 DELTA H @ = 1.80

START TIME : ~~11:00~~ 11:05

END TIME : 12:10

INITIAL LEAK CHECK .003 AT 15 INCHES HG

FINAL LEAK CHECK 0.0 AT 10 INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	ORMESANTA	Run #:	COMP-3
Location:	UNIT 12	Date:	17 DEC 91
Ds (ft):	7.5	No. Points:	24
Dn (in):	.314	Test Length:	60
Filter #:	4404	End Meter Reading:	924.292
Cp:	.84	Int Meter Reading:	878.901
P bar:	30.15	Begin Time:	13:10
P stack:	-.15	End Time:	14:15
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	370
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	130
IMP-3 (INT)	0	IMP-3 (FINAL)	4
IMP-4 (INT)	500.0g	IMP-4 (FINAL)	513.5

	TEST 1	TEST 2	TEST 3
% CO2	13.7		
% O2	6.3		
% CO	0		

Project Director:	S. MACKAY	Field Laboratory:	MACKAY/WILLIAMS
Meter Box Operator:	P. WILLIAMS	Chain of Custody:	S. MACKAY
Probe Operator:	R. GOOD	Plant Coordinator:	G. DEVANE
Orsat Analyst:	S. MACKAY	Agency Rep:	C. CULLIVER/S. JORDAN

Comments:

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 1 OF 2

SAMPLING TIME PER POINT 2½

PLANT Okeelanta

RUN # C-3

LOCATION Unit #12

DATE 12/xx/91

878.901 1 2 3 4 5 % O_2

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	
A'	.30	1.98	880.7	82	81	271	67	152	1	
2	.31	2.05	882.6	86	80	253	63	153	1	6.5
3	.30	1.98	884.5	90	80	262	62	153	1	
4	.40	2.64	886.6	94	80	266	62	151	1.5	
5	.48	3.17	888.9	99	81	271	62	149	2	6.0
6	.38	2.51	891.1	104	81	259	62	151	2	6.2
7	.41	2.71	893.2	107	82	264	62	152	2.5	
8	.31	2.05	895.2	108	82	267	63	151	2	
9	.35	2.31	897.2	109	83	260	63	153	2	6.4
10	.42	2.77	899.3	112	83	264	63	149	4	5.8
11	.36	2.38	901.4	113	84	267	64	152	4	
12	.32	2.11	903.493	114	84	263	63	152	3.5	5.9

COMMENTS: DELTA P * 6.6 = DELTA H

BOX # 11 Y = .9911 DELTA H @ = 1.80

START TIME : 13:10

END TIME : 14:15

INITIAL LEAK CHECK .002 AT 15 INCHES HG

FINAL LEAK CHECK .0 AT 7 INCHES HG

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Ohealanta

RUN # C-3

LOCATION Unit #12

DATE 12 Dec 91

			903.493	1	2	3	4	5		
TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	
B1	.17	1.12	904.9	105	84	271	63	151	1.5	6.3
2	.13	.858	906.2	107	85	266	60	151	1	
3	.15	.99	907.6	107	85	263	61	151	1	6.4
4	.18	1.18	909.1	109	85	270	61	151	1.5	
5	.19	1.25	910.7	109	85	268	60	152	2	6.2
6	.26	1.72	912.4	110	84	266	61	152	3	
7	.31	2.05	914.4	114	86	259	61	152	4.5	6.6
8	.31	2.05	916.3	116	86	258	63	148	4.5	
9	.33	2.18	918.2	117	86	273	63	151	5	5.8
10	.33	2.18	920.2	118	87	268	64	153	5.5	
11	.37	2.44	922.3	120	87	266	64	152	6.5	6.3
12	.30	1.98	924.292	122	88	267	65	152	6	6.2

COMMENTS: DELTA P x 6.6 = DELTA H

BOX # 11 Y = .9916 DELTA H @ = 1.80

START TIME : 13:10

END TIME : 14:15

INITIAL LEAK CHECK .002 AT 15 INCHES HG

FINAL LEAK CHECK _____ AT _____ INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	comp-4
Location:	UNIT 12	Date:	17 DEC 91
Ds (ft):	7.5	No. Points:	24
Dn (in):	.310	Test Length:	60
Filter #:	4405	End Meter Reading:	970.914
Cp:	.84	Int Meter Reading:	924.501
P bar:	30.14	Begin Time:	16:00
P stack:	-.15	End Time:	16:05
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	395
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	139
IMP-3 (INT)	0	IMP-3 (FINAL)	4
IMP-4 (INT)	500.0 g	IMP-4 (FINAL)	515.0 g

	TEST 1	TEST 2	TEST 3
% CO2	13.6		
% O2	6.4		
% CO	0		

Project Director:	S. MacKay	Field Laboratory:	MacKay/Wilcman
Meter Box Operator:	P. Wilcman	Chain of Custody:	S. MacKay
Probe Operator:	R. Good	Plant Coordinator:	G. Dearne
Orsat Analyst:	S. MacKay	Agency Rep:	C. Oliver/S. Jordan

Comments:

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 1 OF 2 SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta RUN # C-14

LOCATION Unit #12 DATE 12 Dec 91

924.501 1 2 3 4 5

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	% O_2
A'	.30	1.92	926.4	84	82	271	56	152	1	7.4
2	.30	1.92	928.3	87	82	271	52	152	1	
3	.35	2.24	930.2	92	82	267	53	152	2	6.9
4	.32	2.05	932.2	97	82	271	52	153	2	
5	.44	2.82	934.3	102	82	267	53	152	4	6.1
6	.40	2.56	936.5	105	82	258	55	153	4	
7	.36	2.30	938.6	108	82	263	55	153	4	6.2
8	.39	2.50	940.6	111	83	269	57	153	4.5	
9	.29	1.86	942.6	112	83	270	57	151	3.5	6.1
10	.36	2.30	944.6	111	84	260	58	154	4	
11	.40	2.56	946.7	114	84	263	58	153	5	6.3
12	.36	2.30	948.735	116	85	269	59	151	5	

COMMENTS: DELTA P × 6.4 = DELTA H

BOX # 11 Y = .9911 DELTA H @ = 1.80

START TIME : 15:00

END TIME : 16:05

INITIAL LEAK CHECK 0.0 AT 15 INCHES HG

FINAL LEAK CHECK .0 AT 7 INCHES HG

FIELD DATA SHEET
TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta

RUN # C-74

LOCATION Un.#12

DATE 12 Dec 91

948,735

TRAV. NO.	DELTA P	DELTA H	METER READING	1 DGM IN	2 DGM OUT	3 HOT BOX	4 IMPG TEMP	5 STACK TEMP	VAC	% O_2
B1	.14	.896	950.1	104	84	270	60	153	1	6.4
2	.19	1.22	951.6	107	85	268	58	154	2	
3	.21	1.34	953.1	108	85	273	59	154	2	5.9
4	.38	2.43	955.1	111	85	269	60	152	6	
5	.36	2.30	957.1	114	85	272	60	153	6	6.3
6	.38	2.43	959.2	117	86	268	62	153	7	
7	.34	2.18	961.3	119	86	266	63	153	6.5	6.3
8	.35	2.24	963.3	120	86	264	64	154	7	
9	.34	2.18	965.3	121	87	269	66	152	7	6.2
10	.34	2.18	967.3	121	88	272	66	154	7	
11	.32	2.05	969.2	121	88	265	67	153	7	6.2
12	.21	1.34	970.914	121	88	270	68	152	5	

COMMENTS: DELTA P * 6.4 = DELTA H

BOX # 11 Y = .9911 DELTA H @ = 1.80

START TIME : 15:00

END TIME : 16:05

INITIAL LEAK CHECK 0.0 AT 15 INCHES HG

FINAL LEAK CHECK .0 AT 7 INCHES HG

APPENDIX IX

LABORATORY RESULTS

LABORATORY

SUMMARY OF RESULTS

PROJECT NUMBER: 91-102
PROJECT NAME: OKEELANTA CORPORATION
BOILER #12

ANALYST: M. WAYT
ANALYSIS: EPA METHOD 5

FILTER

SAMPLE DESCRIPTION	FILTER #	TEST DATE	TARE WEIGHT (g)	FINAL WEIGHT (g)
C-2	4402	12-17-91	0.5948	0.8204
C-3	4404	12-17-91	0.5932	0.8156
C-4	4405	12-17-91	0.5962	0.8137
BLANK	4406	12-17-91	0.6045	0.6043

WASH

SAMPLE DESCRIPTION	BKR#	TEST DATE	TARE WEIGHT (g)	FINAL WEIGHT (g)	VOLUME (ml)
C-2	104	12-17-91	67.2843	67.3445	220
C-3	105	12-17-91	67.4749	67.5024	280
C-4	106	12-17-91	67.2941	67.3086	210
BLANK	107	12-17-91	67.4876	67.4889	200

APPENDIX X

EQUIPMENT CALIBRATION SHEETS

POST

METER BOX CALIBRATION SHEET

BOX #: 11
PRES BAR: 30.16

DATE: 19 DEC 9
VACUUM: 13 IN Hg

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	10.00	10.498	1.90	.140	30.30	13.80
2	10.00	10.563	1.90	.140	30.30	13.90
3	10.00	10.614	1.90	.140	30.30	13.90

RUN #	TEMP WET (`F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	70.0	116.0	79.0	97.5	.9974	1.80
2	70.0	118.0	83.0	100.5	.9966	1.80
3	70.0	120.7	85.7	103.2	.9965	1.80
				AVERAGE	.9968	1.80
				MAX % DEV	.06	
				ALLOWABLE % DEV	2.00	

PRE CAL Y = .9911 % DIFFERENCE = .57 %

ALLOWABLE = 5.00 %

FORMULAS:

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

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

CALIBRATION BY:

MARK WESCOTT

Sean

Eastmount Engineering
Environmental Consultants — Air Quality Specialists

WET TEST METER CALIBRATION

WET TEST METER:- Model AL-19, Serial No. P-468

BELL PROVER :- Chain Compensated Gasometer
Warren E. Collins Inc.
Serial NO. 2874
Factor 133.2 cc/mm

(Maintained by E.P.A. region 1)

CALIBRATED BY :- Anthony Stratton and Kieran Nolan

DATE CALD. :- March 28 1991

DATE DUE :- March 28 1992

RESULTS :-

RUN #	C.F.M.	% DIFF.
1	.55	+.31
2	.55	+.20
3	.55	+.10
AVERAGE :-	.55	+.20

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

NOZZLE CALIBRATION SHEET

PROJECT NAME: GREENTA Corp PROJECT NUMBER: 91-102

POINT#	NOZZLE# 1/4-5	NOZZLE # 1/4-13	NOZZLE# 5/16-14	NOZZLE # 5/16-3
1	.265	.260	.310	.315
2	.264	.258	.310	.314
3	.266	.261	.310	.313
AVG.	.265	.260	.310	.314

Sean MacKay — CALIBRATED BY:

Dec 9, 1991 — DATE:

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	9200	DC CALIB.	01/03/91	01/03/92
2486	FLUKE	9842A	DMM	03/13/91	03/13/92
2471	KATE	140-4	ICE PT. REF.	03/14/91	03/13/92
2492	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 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

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

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							
CHANNEL NO.	0	32	200	250	320	600	800	1000
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							
CHANNEL NO.	0	32	200	250	320	600	800	1000
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

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 #: 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

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