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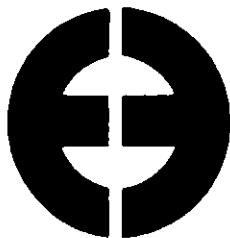
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AP-42 Section Number: 1.8

Reference Number: 52

Title: Okeelanta Corporation Compliance
Particulate Emissions Test Report
Boiler #6

January 1992



Ref 40
0501 - 005

Eastmount Engineering

Environmental Consultants — Air Quality Specialists

OKEELANTA CORPORATION
COMPLIANCE PARTICULATE EMISSIONS TEST REPORT
BOILER #6

PREPARED FOR:

Okeelanta Corporation
Okeelanta Sugar Division
South Bay, Florida 33493

CONCERNING:

Particulate Emissions Testing
Okeelanta Corporation
Boiler #6
South Bay Florida Facility
January 24, 1992

PREPARED BY:

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Eastmount Engineering, Inc.
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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 M. MacKay
Project Director

February 22, 1992
Date

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Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

1.0 COMPENDIUM

Eastmount Engineering conducted a Compliance Particulate Emissions Test Program on Unit #6 at Okeelanta Corporation's South Bay, Florida facility on January 24, 1992. The test program consisted of a series of three EPA Method 5 tests. Run one was void due to a break in glassware during the test.

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 and oil as fuel. Boiler #6 has a maximum rated capacity of 125,000 pounds of steam per hour. The following table summarizes the emission results, the emission standards, and the boiler operating conditions.

RUN #	DATE	EMISSION RATE		ALLOWABLE		LOAD	% OF
		LB/MMBtu	LB/HR	LB/MMBtu	LB/HR	LB/HR	
2	01-24-92	.249	35.56	.245	34.94	77,446	62.0%
3	01-24-92	.168	26.42	.240	37.79	85,569	68.5%
4	01-24-92	.217	24.34	.240	26.94	60,986	48.8%
3 RUN AVG.		.211	28.77	.242	33.22	74,667	59.8%

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. Brian Gibson operated the meter box and assisted in the field laboratory. Pat Wildman located the probe at the proper traverse point locations and assisted where required. Mr. Sterling Jordan 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.

EPA - method 5

STACK TEST REVIEW DATA INPUT FORM

TEST DATE: January 24, 1992

FACILITY: Okeelanta Corporation South Bay APIS #: 0005

DESCRIPTION: Boiler 6

TESTING FIRM: Eastmount Engineering, Inc.

PERMIT EMISSION LIMIT: 242 LB/MMBTU OR 33.22 LB/HR

AVERAGE HEAT INPUT: 137.43 MMBTU/HR 74.667 LB/HR

A's (AREA OF STACK): 44.2 FT²

142.6
157.5
112.2 } 137.43

MEASURED PARAMETERS

	Run-1	Run-2	Run-3
1. H ₂ O impingers (V _i), milliliters	217	208	208
2. H ₂ O filter, grams	11.8	11.5	26.1
3. M _n (particulate weight), grams	1895	1404	1312
4. V _m (gas volume metered), FT ³	48.06	48.82	51.68
5. Y (dry gas calibration factor)	.9911	.9911	.9911
6. RDP (average square root dP)	.56	.57	.59
7. dH (average delta H), inches H ₂ O	2.23	2.25	2.41
8. T _m (average meter temperature), F	95.6	98.0	98.7
9. T _s (average stack temperature), F	144.1	150.0	148.3
10. P _s (stack pressure, abs.) inches Hg	29.99	30.0	30.0
11. P _b (barometric pressure, abs.) inches Hg	30.01	30.02	30.02
13. D _n (nozzle dia.), inches	.310	.310	.310
14. Sample Time, minutes	60	60	60
15. C _p (pitot tube coefficient)	.84	.84	.84
23. S/T (sample pts./total pts.)	1.0	1.0	1.0

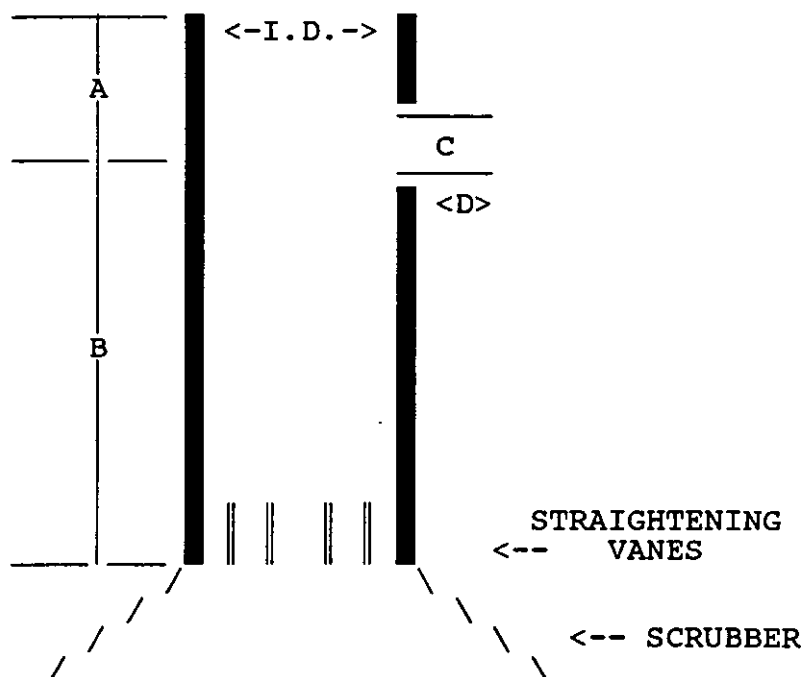
Okeelanta Corporation - Boiler #6
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2.0 STACK SCHEMATIC

OKEELANTA CORPORATION
Boiler #6
South Bay, Florida Facility

The following is a schematic of the stack which services Boiler #6 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.



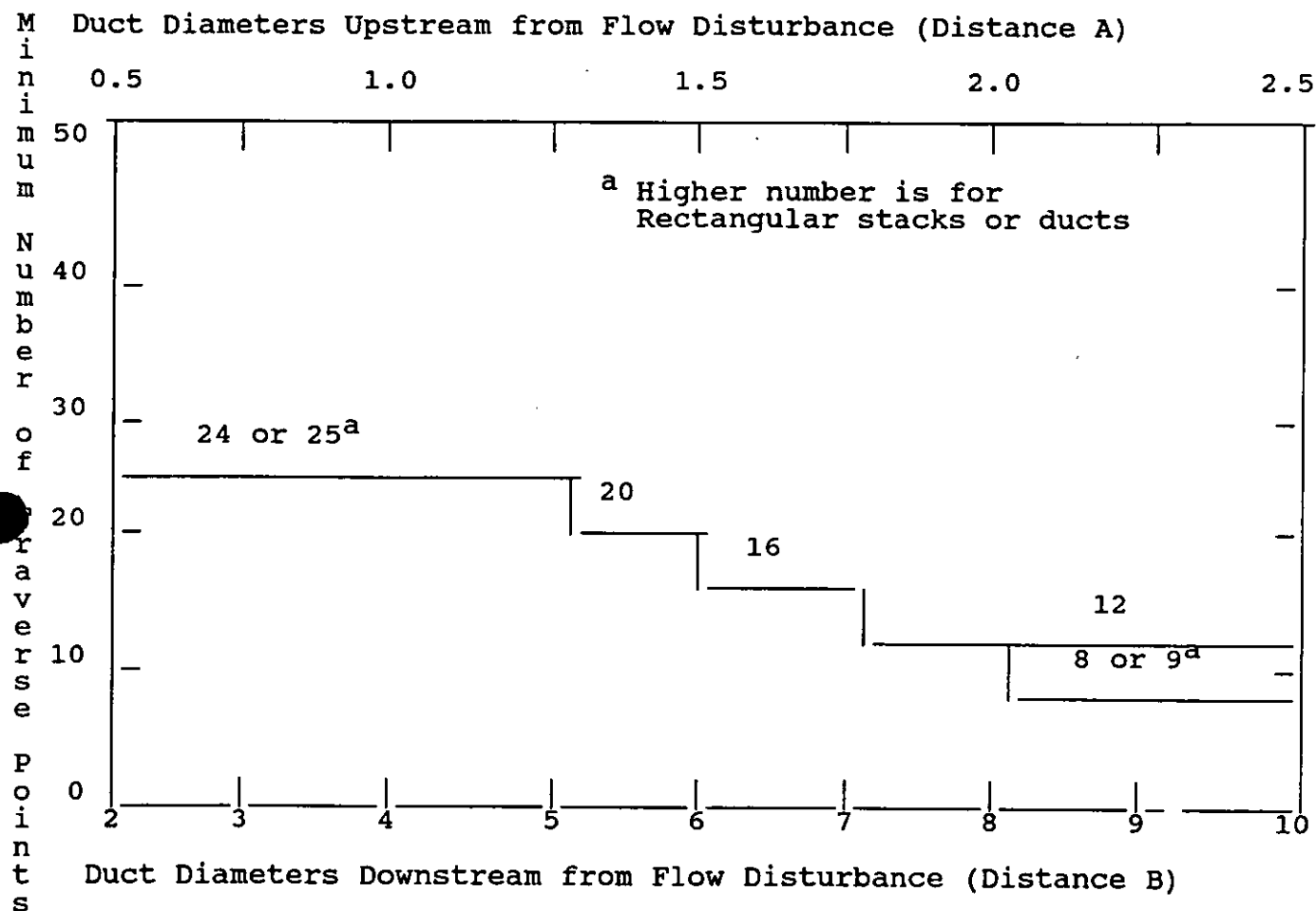
DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	4'
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	16'
DIAMETER OF PORT SLEEVE (C)	4"
LENGTH OF PORT SLEEVE (D)	3.5"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	7.5'

SCHEMATIC NOT TO SCALE

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

3.0 TRAVERSE POINT LOCATIONS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
Boiler #6
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.

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

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

OKEELANTA CORPORATION
Boiler #6
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

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES

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

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.

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

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

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 relationships.

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

Sampling Train Set-Up

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

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

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

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

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

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

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

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

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

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

5.0 QUALITY CONTROL PROCEDURES

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

Pre-test preparation consisted of the filters being desiccated at $68 \pm 10^\circ\text{F}$ 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).

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-2
DATE : 01-24-92

Ds (FT)	7.5							
Dn (IN)	.310							
FILTER#	4569	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
		B1	.22	.47	1.54	77	77	139
IMP-1 (INT)	100	2	.41	.64	2.87	82	77	138
		3	.38	.62	2.66	89	77	136
IMP-2 (INT)	100	4	.40	.63	2.80	95	77	141
		5	.39	.62	2.73	102	78	140
IMP-3 (INT)	0	6	.39	.62	2.73	107	79	141
		7	.35	.59	2.45	110	80	143
IMP-4 (INT)	500.0	8	.31	.56	2.17	114	81	148
		9	.28	.53	1.96	116	82	147
IMP-1 (FIN)	290	10	.31	.56	2.17	116	83	147
		11	.32	.57	2.24	117	83	144
IMP-2 (FIN)	124	12	.29	.54	2.03	119	84	144
IMP-3 (FIN)	3	A1	.21	.46	1.47	109	84	141
		2	.24	.49	1.68	111	84	144
IMP-4 (FIN)	511.8	3	.27	.52	1.89	115	85	144
		4	.30	.55	2.10	116	86	141
% CO2	9.4	5	.30	.55	2.10	118	86	144
		6	.33	.57	2.31	99	84	144
% O2	10.9	7	.35	.59	2.45	106	85	150
		8	.37	.61	2.59	111	85	150
% CO	0	9	.34	.58	2.38	116	85	150
		10	.35	.59	2.45	120	85	149
P BAR	30.01	11	.30	.55	2.10	120	86	150
		12	.24	.49	1.68	123	87	143
P STK	-.21							
NO. PTS	24							
TEST LGTH	60							
END METER	744.565							
INT METER	696.500							
BEGIN TIME:	10:00							
END TIME:	11:15							
AVERAGE			.32	.56	2.23	108.7	82.5	144.1

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-3
DATE : 01-24-92

Ds (FT)	7.5							
Dn (IN)	.310							
FILTER#	4574	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
		A1	.31	.56	2.17	77	77	138
IMP-1 (INT)	100	2	.31	.56	2.17	84	78	150
		3	.30	.55	2.10	90	77	146
IMP-2 (INT)	100	4	.33	.57	2.31	96	78	149
		5	.32	.57	2.24	104	78	147
IMP-3 (INT)	0	6	.34	.58	2.38	107	79	149
		7	.36	.60	2.52	111	79	148
IMP-4 (INT)	500.0	8	.36	.60	2.52	114	80	149
		9	.33	.57	2.31	117	81	147
IMP-1 (FIN)	283	10	.35	.59	2.45	118	82	147
		11	.35	.59	2.45	120	83	148
IMP-2 (FIN)	122	12	.34	.58	2.38	121	83	143
IMP-3 (FIN)	3	B1	.31	.56	2.17	110	82	140
		2	.32	.57	2.24	114	83	150
IMP-4 (FIN)	511.5	3	.35	.59	2.45	118	84	152
		4	.35	.59	2.45	121	84	152
% CO2	7.8	5	.34	.58	2.38	122	85	154
		6	.32	.57	2.24	125	86	156
% O2	12.6	7	.30	.55	2.10	125	87	157
		8	.30	.55	2.10	125	87	157
% CO	0	9	.30	.55	2.10	125	87	156
		10	.29	.54	2.03	125	88	156
P BAR	30.02	11	.27	.52	1.89	125	88	155
		12	.26	.51	1.82	125	88	153
P STK	-.21							
NO. PTS	24							
TEST LNTH	60							
END METER	793.727							
LK CHK	.095							
INT METER	744.902							
BEGIN TIME:	12:20							
END TIME:	13:25							
AVERAGE			.32	.57	2.25	113.3	82.7	150.0

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-4
DATE : 01-24-92

Ds (FT)	7.5							
Dn (IN)	.310							
FILTER#	4573	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
		PT	HEAD	ROOT	H	IN	OUT	TEMP
PIT COEFF	.84							
		B1	.36	.60	2.52	83	80	141
IMP-1 (INT)	100	2	.37	.61	2.59	91	80	145
		3	.37	.61	2.59	95	81	144
IMP-2 (INT)	100	4	.37	.61	2.59	102	80	144
		5	.38	.62	2.66	105	80	148
IMP-3 (INT)	0	6	.36	.60	2.52	111	82	148
		7	.34	.58	2.38	105	82	147
IMP-4 (INT)	500.0	8	.34	.58	2.38	109	82	150
		9	.34	.58	2.38	113	82	149
IMP-1 (FIN)	280	10	.32	.57	2.24	115	83	150
		11	.27	.52	1.89	117	83	148
IMP-2 (FIN)	124	12	.28	.53	1.96	118	83	150
IMP-3 (FIN)	4	A1	.34	.58	2.38	106	83	142
		2	.37	.61	2.59	117	84	141
IMP-4 (FIN)	526.1	3	.38	.62	2.66	119	84	149
		4	.37	.61	2.59	122	84	150
% CO2	5.7	5	.35	.59	2.45	124	85	152
		6	.35	.59	2.45	125	87	150
% O2	14.8	7	.35	.59	2.45	125	87	154
		8	.37	.61	2.59	125	87	153
% CO	0	9	.36	.60	2.52	125	87	151
		10	.34	.58	2.38	126	87	151
P BAR	30.02	11	.32	.57	2.24	126	88	151
		12	.27	.52	1.89	125	88	151
P STK	-.21							
NO. PTS	24							
TEST LNTH	60							
END METER	845.476							
LK CHK								
INT METER	794.100							
BEGIN TIME:	14:10							
END TIME:	16:20							
AVERAGE			.34	.59	2.41	113.7	83.7	148.3

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX II

ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-2
DATE : 01-24-92

TS (°F) = 144.1	% CO2 = 9.4	VM (CF) = 48.065
TS (°R) = 604.1	% O2 = 10.9	DELTA H (ABS) = 30.17
TM (°F) = 95.6	% CO = 0	PS (ABS) = 29.99
TM (°R) = 555.6	% N2 = 79.7	SQRT DELTA P = .562318
VI(TOT) = 228.8	CP = .84	AREA NOZZLE = .000524

Y = .9911

VM STD	= 17.64	$\frac{(VM)(Y)(DELTA H ABS)}{(TM)}$	= 45.64	DSCF
VW STD	= .04707 (VI TOT)		= 10.77	CF
BWO	= $\frac{VW STD}{VW STD + VM STD}$		= .191	
BWO	= MOISTURE FROM STEAM TABLES		= .218	
VI TOT	= ADJUSTED TO SATURATION VOLUME		= N/A	ML
1-BWO	= 1 - BWO		= .809	
Md (DRY)	= $\begin{matrix} .44 (\% CO2) \\ +.32 (\% O2) \\ +.28 (\% CO) \\ +.28 (\% N2) \end{matrix}$		= 29.94	LBS/LB MOLE
Ms (WET)	= $\begin{matrix} MD (1-BWO) \\ + 18 (BWO) \end{matrix}$		= 27.66	LBS/LB MOLE
G	= SQRT (TS / PS / MS)		= .85	
VS	= 85.49 (CP) (G) (SQRT DELTA P)		= 34.5	FPS
H	= 0.002669 (VI TOT)		= .61	
J	= (DELTA H ABS) (VM) (Y) / (TM)		= 2.59	
K	= (H) + (J)		= 3.20	
% ISO	= $\frac{(TS) (K) (1.667)}{(TIME) (VS) (PS) (AN)}$		= 99.1	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-3
DATE : 01-24-92

TS (°F) = 150.0	% CO2 = 7.8	VM (CF) = 48.730
TS (°R) = 610.0	% O2 = 12.6	DELTA H (ABS) = 30.19
TM (°F) = 98.0	% CO = 0	PS (ABS) = 30.00
TM (°R) = 558.0	% N2 = 79.6	SQRT DELTA P = .566289
VI(TOT) = 219.5	CP = .84	AREA NOZZLE = .000524

Y = .9911

VM STD	= 17.64	$\frac{(VM)(Y)(DELTA H ABS)}{(TM)}$	= 46.09	DSCF
VW STD	= .04707 (VI TOT)		= 10.33	CF
BWO	= $\frac{VW STD}{VW STD + VM STD}$		= .183	
BWO	=	MOISTURE FROM STEAM TABLES	= .252	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	= 1 - BWO		= .817	
Md (DRY)	=	$.44 (\% CO2) + .32 (\% O2) + .28 (\% CO) + .28 (\% N2)$	= 29.75	LBS/LB MOLE
Ms (WET)	=	$MD (1-BWO) + 18 (BWO)$	= 27.60	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .86	
VS	=	85.49 (CP) (G) (SQRT DELTA P)	= 34.9	FPS
H	=	0.002669 (VI TOT)	= .59	
J	=	(DELTA H ABS) (VM) (Y) / (TM)	= 2.61	
K	=	(H) + (J)	= 3.20	
% ISO	=	$\frac{(TS) (K) (1.667)}{(TIME) (VS) (PS) (AN)}$	= 98.8	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-4
DATE: 01-24-92

TS (°F) = 148.3 % CO2 = 5.7 VM (CF) = 51.376
 TS (°R) = 608.3 % O2 = 14.8 DELTA H (ABS) = 30.20
 TM (°F) = 98.7 % CO = 0 PS (ABS) = 30.00
 TM (°R) = 558.7 % N2 = 79.5 SQRT DELTA P = .586358
 VI (TOT) = 234.1 CP = .84 AREA NOZZLE = .000524

Y = .9911
 VM STD = 17.64 (VM) (Y) (DELTA H ABS) / (TM) = 48.55 DSCF
 VW STD = .04707 (VI TOT) = 11.02 CF
 BWO = VW STD / (VW STD + VM STD) = .185
 BWO = MOISTURE FROM STEAM TABLES = .242
 VI TOT = ADJUSTED TO SATURATION VOLUME = N/A ML
 1-BWO = 1 - BWO = .815
 Md (DRY) = .44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2) = 29.51 LBS/LB MOLE
 Ms (WET) = MD (1-BWO) + 18 (BWO) = 27.38 LBS/LB MOLE
 G = SQRT (TS / PS / MS) = .86
 VS = 85.49 (CP) (G) (SQRT DELTA P) = 36.2 FPS
 H = 0.002669 (VI TOT) = .62
 J = (DELTA H ABS) (VM) (Y) / (TM) = 2.75
 K = (H) + (J) = 3.38
 % ISO = ((TS) (K) (1.667) / ((TIME) (VS) (PS) (AN))) = 100.2

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-2
DATE : 01-24-92

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
*		**	
	290	470	260
	290		
	270		
	240		
	220		
AVERAGE	262.0 PSIG	470.0	260.0
P ABS =	276.7 PSIA		
ENTHALPY @	500 'F AND	280 PSIA =	1260.0
ENTHALPY @	450 'F AND	280 PSIA =	1228.8
ENTHALPY @	470.0 'F AND	280 PSIA =	1241.3
ENTHALPY OF FEED WATER =		228.76	
AVERAGE ENTHALPY =		1012.5	BTU/LB OF STEAM
* - STEAM PRESSURE TAKEN AT BOILER HEADER ** - STEAM TEMPERATURE IS SATURATION FOR AVERAGE STEAM PRESSURE PLUS 60°			

ENTHALPY CALCULATION SHEET -----

PLANT : OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-3
DATE : 01-24-92

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	220	460	260
	220		
	235		
AVERAGE	225.0 PSIG	460.0	260.0
P ABS =	239.7 PSIA		
ENTHALPY @	500 'F AND	240 PSIA =	1264.6
ENTHALPY @	450 'F AND	240 PSIA =	1234.9
ENTHALPY @	460.0 'F AND	240 PSIA =	1240.8
ENTHALPY OF FEED WATER =		228.76	
AVERAGE ENTHALPY =		1012.1	BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-4
DATE : 01-24-92

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	220	467	260
	225		
	270		
	270		
	270		
	270		
AVERAGE	254.2 PSIG	467.0	260.0
P ABS =	268.9 PSIA		
ENTHALPY @	500 'F AND	270 PSIA =	1261.2
ENTHALPY @	450 'F AND	270 PSIA =	1230.4
ENTHALPY @	467.0 'F AND	270 PSIA =	1240.9
ENTHALPY OF FEED WATER =		228.76	
AVERAGE ENTHALPY =		1012.1	BTU/LB OF STEAM

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-2
DATE: 01-24-92

	<u>STEAM INTEGRATOR READINGS</u>	<u>TIME</u>	<u>INTEGRATOR FACTOR</u>
END	78957	11: 5	100
BEGIN	78498	10: 0	LBS/HR STEAM
NET	839	X 100 / 65	MINS = 77446

77446 LBS/HR STEAM / 55% EFF. = 140811 EQUIV.

140811 LBS/HR STEAM X 1013 BTU/LB = 142.6 BTU(e6)/HR

	<u>OIL INTEGRATOR READINGS</u>	<u>TIME</u>	<u>GALS/HR</u>
END	795830	11: 5	
BEGIN	795655	10: 0	
NET	283	GALLONS 65	MINS = 261.231 GPH

261.2308 GPH X 150,000 BTU/GAL (EST) = 39.185 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	142.6	-	39	X	.3	=	31.0	LBS/HR
OIL			39	X	.1	=	3.9	LBS/HR
TOTAL						=	34.9	LBS/HR
							.245	LB/MMBTU

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-3
DATE: 01-24-92

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
	-----	----	-----
END	91539	13: 25	100
BEGIN	90612	12: 20	LBS/HR STEAM
	-----	-----	-----
NET	927 X 100 / 65	MINS =	85569

85569 LBS/HR STEAM / 55% EFF. = 155580 EQUIV.

155580 LBS/HR STEAM X 1012 BTU/LB = 157.5 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
	-----	----	-----
END	797088	13: 25	
BEGIN	796747	12: 20	
	---	-----	
NET	341 GALLONS	65	MINS = 314.769 GPH

314.7692 GPH X 150,000 BTU/GAL (EST) = 47.215 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	157.5	-	47	X	.3	=	33.1	LBS/HR
OIL			47	X	.1	=	4.7	LBS/HR
TOTAL						=	37.8	LBS/HR
							.240	LB/MMBTU

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-4
DATE: 01-24-92

<u>STEAM INTEGRATOR READINGS</u>		<u>TIME</u>	<u>INTEGRATOR FACTOR</u>
END	92832	15: 23	100
BEGIN	92090	14: 10	LBS/HR STEAM
NET	742	X 100 / 73	MINS = 60986

60986 LBS/HR STEAM / 55% EFF. = 110884 EQUIV.

110884 LBS/HR STEAM X 1012 BTU/LB = 112.2 BTU(e6)/HR

Avg = 137.4

<u>OIL INTEGRATOR READINGS</u>		<u>TIME</u>	<u>GALS/HR</u>
END	797444	15: 23	
BEGIN	797171	14: 10	
NET	273	GALLONS 73	MINS = 224.384 GPH

Avg = 266.795

224.3836 GPH X 150,000 BTU/GAL (EST) = 33.658 BTU(e6)/HR

Avg = 42.02

ALLOWABLE EMISSIONS

total = 177.45

BAGASSE	112.2	-	34	X	.3	=	23.6	LBS/HR
OIL			34	X	.1	=	3.4	LBS/HR
TOTAL						=	26.9	LBS/HR
							.240	LB/MMBTU

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX V

PARTICULATE EMISSION CALCULATION SHEETS

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-2
DATE: 01-24-92

	SAMPLES		BLANKS		
	FILTER	BEAKER	FILTER	ACETONE	
	-----	-----	-----	-----	
NO. :	4569	105	4398	6	
FINAL:	.7730	67.4871	.6022	69.8709	
TARE :	.5952	67.4751	.6020	69.8707	
	-----	-----	-----	-----	
NET :	.1778	.0120	.0002	.0002/200ML	
	VOLUME OF RINSE				280
WEIGHT =	189.80				
RESIDUE =	-	.28			
Mn =	189.52	Mg	AS =	44.2	SQ FT
Qs =	$3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)$		=	3883597	DSCFH
CS =	$(2.205 \times 10^{-6})(Mn) / (VM \text{ STD})$		=	$9.157e-6$	LBS/SCF
CS' =	$0.0154 (Mn) / (VM \text{ STD})$		=	.06	GRAINS /SCF
PMR =	(QS) (CS)		=	35.56	LBS/HR
LOAD=	MILLIONS OF BTU / HOUR INPUT		=	142.6	BTU e6 / HR
E =	LBS / MILLION BTu		=	.249	LBS/ BTu e6
ALLOWABLE			=	34.94	LBS/HR
			=	.245	LBS/ BTu e6

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-3
DATE: 01-24-92

	SAMPLES		BLANKS		
	FILTER	BEAKER	FILTER	ACETONE	
	-----	-----	-----	-----	
NO. :	4574	106	4398	6	
FINAL:	.7055	67.3221	.6022	69.8709	
TARE :	.5918	67.2952	.6020	69.8707	
	-----	-----	-----	-----	
NET :	.1137	.0269	.0002	.0002/200ML	
WEIGHT =	140.60		VOLUME OF RINSE		240
RESIDUE =	-	.24			
Mn =	140.36	Mg	AS =	44.2	SQ FT
Qs =	$3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)$		=	3934585	DSCFH
CS =	$(2.205 \times 10^{-6})(Mn) / (VM \text{ STD})$		=	6.715e-6	LBS/SCF
CS' =	$0.0154 (Mn) / (VM \text{ STD})$		=	.05	GRAINS /SCF
PMR =	(QS) (CS)		=	26.42	LBS/HR
LOAD=	MILLIONS OF BTU / HOUR INPUT		=	157.5	BTU e6 / HR
E =	LBS / MILLION BTu		=	.168	LBS/ BTu e6
ALLOWABLE			=	37.79	LBS/HR
			=	.240	LBS/ BTu e6

PARTICULATE EMISSION CALCULATION SHEET -----

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP-4
DATE: 01-24-92

	SAMPLES		BLANKS	
	FILTER -----	BEAKER -----	FILTER -----	ACETONE -----
NO. :	4573	107	4398	6
FINAL:	.7139	67.4995	.6022	69.8709
TARE :	.5935	67.4885	.6020	69.8707
NET :	.1204	.0110	.0002	.0002/200ML

			VOLUME OF RINSE 250	
WEIGHT =	131.40			
RESIDUE =	- .25			
Mn =	131.15 Mg	AS =	44.2	SQ FT
Qs =	3600 (1-BWO) (VS) (AS) (17.64) (PS) / (TS)		=	4086570 DSCFH
CS =	(2.205 X 10 ⁻⁶) (Mn) / (VM STD)		=	5.957e-6 LBS/SCF
CS' =	0.0154 (Mn) / (VM STD)		=	.04 GRAINS / SCF
PMR =	(QS) (CS)		=	24.34 LBS/HR
LOAD=	MILLIONS OF BTU / HOUR INPUT		=	112.2 BTU e6 / HR
E =	LBS / MILLION BTu		=	.217 LBS / BTu e6
ALLOWABLE			=	26.94 LBS/HR
			=	.240 LBS / BTu e6

3968251
Aug =

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX VI
NOMENCLATURE SHEETS

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

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.

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Particulate Emissions Test Report

NOMENCLATURE (cont'd)

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

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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.

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Particulate Emissions Test Report

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

CAPACITY 125,000
 INT. FACTOR 100
 RUN 1 6-2

BOILER 1 6

POLLUTION COMPLIANCE TESTING
 DATE: 1-24-92
 TESTED BY: ESTIMOUNT/ENG

TIME	STEAM INTERGRATOR	OIL METER	STEAM PRESS.	TEMP.	LOADING LBS/HR.	FEED WATER PRESS.	TEMP.	BOILER PRESSURE DROP
10:00	887410	702360	290	470*	70000	355	240	OVERFIRE AIR PRESS. AIR HEATER AIR OUT UNDERGRATE AIR PRESS. WIND BOX PRESSURE FURNACE PRESSURE 32. OUTLET PRESSURE DUST COLLECTOR OUT. SCRUBBER DIFF.
10:15	89086		290		70000	350	11	
10:30	89234	(554)	270		70000	365	1	24.4
10:45	89494	796587	240			330	11	
10:55	89634	796621	220		70000	320	11	6.5/6.5
11:15	89919	796681			60000	320	"	
	(285)							BOILER TEMPERATURE
								BOILER OUTLET AIR HEATER GAS OUT AIR HEATER AIR OUT 32. FAN S.H. STEAM TEMP.
								445 450 445 560 560 560
								PANEL SETTINGS
								FURNACE PRESSURE F.D. FAN PRESSURE BAGASSE FEED UNDERGRATE AIR OVERFIRE AIR

TEST RESULTS

OIL USED	283	GALS.
TOTAL TEST TIME	65	MIN.
INTERGRATOR TIME	839	COUNT
INTERGRATOR STEAM	77 446	P.P.H.
CHART READING	416,000	TOTAL
CHART AVERAGE	82,000	P.P.H.
I.D. FAN TURBINE	5600	RPM
STACK TEMPERATURE	139	F
GRATE TEMPERATURE		F
SCRUBBER WATER	500	G.P.H.

COMMENTS:

- (1) Mill speed 85 F.P.H.
- (2) using two (2) oil burners.
- (3) stop testing 10:45
- (4) Restart 10:55

"A" "B"

Allowed =

Actual =

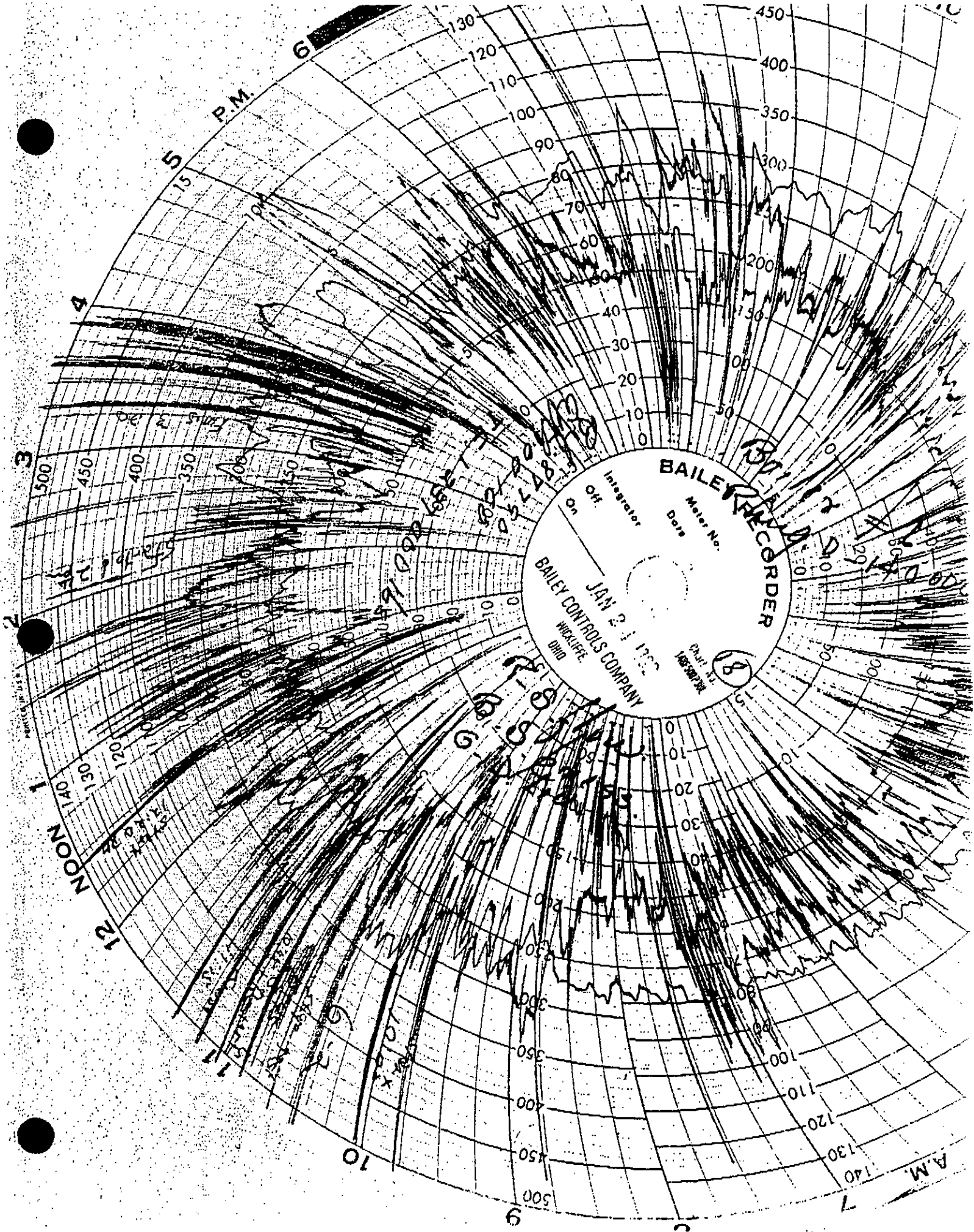
PLANT READINGS BY *Estimount*
 % OF CAPACITY

* ADD 20° TO ALL STEAM PRESSURE

FIND SATURATION, ADD 60° FOR STEAM TEMP

UNCLASSIFIED
DATE: 1-24-92
TESTED BY:

TEST RESULTS			
Oil used			GALLS.
TOTAL TEST TIME			MTNS.
INTEGRATOR TIME			COUNT
INTEGRATOR STEAM			P D H
CHART READING			TOTAL
CHART AVERAGE			P D H
L.D. FAN VIBRATION			RPM
STACK TEMPERATURE		150	°F
GRATE TEMPERATURE			°F
SCRUBBER WATER			G.P.M.



Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET
GENERAL INFORMATION

Plant: <u>OKEELANTA</u>	Run #: <u>COMP-2</u>
Location: <u>UNIT 6</u>	Date: <u>24 JAN 92</u>
Ds (ft): <u>7.5</u>	No. Points: <u>24</u>
Dn (in): <u>.310</u>	Test Length: <u>60 MIN</u>
Filter #: <u>4574⁴⁵⁶⁹SM</u>	End Meter Reading: <u>744.565</u>
Cp: <u>.84</u>	Int Meter Reading: <u>696.500</u>
P bar: <u>30.01</u>	Begin Time: <u>10:00</u>
P stack: <u>-.21</u>	End Time: <u>11:15</u>
IMP-1 (INT) <u>100 ml</u>	IMP-1 (FINAL) <u>290</u>
IMP-2 (INT) <u>100 ml</u>	IMP-2 (FINAL) <u>124</u>
IMP-3 (INT) <u>0 ml</u>	IMP-3 (FINAL) <u>3</u>
IMP-4 (INT) <u>500.0g</u>	IMP-4 (FINAL) <u>511.8 g</u>

	TEST 1	TEST 2	TEST 3
% CO ₂	<u>9.4</u>	<u> </u>	<u> </u>
% O ₂	<u>10.9</u>	<u> </u>	<u> </u>
% CO	<u>0</u>	<u> </u>	<u> </u>

Project Director: <u>S. Mackay</u>	Field Laboratory: <u>S. Mackay/Wiloman</u>
Meter Box Operator: <u>P. Wiloman</u>	Chain of Custody: <u>S. Mackay</u>
Probe Operator: <u>B. Gibson</u>	Plant Coordinator: <u>G. Devane</u>
Orsat Analyst: <u>S. Mackay</u>	Agency Rep: <u>S. Jordan</u>

Comments:

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 1 OF 2

SAMPLING TIME PER POINT

PLANT Okeelantia

RUN # C-2

LOCATION Unit 6

DATE 24 Jan 92

[illegible]

COMMENTS: DELTA P X 7.0 = DELTA H
BOX # 11 Y = .9911 DELTA H B = 1.80
START TIME : 10:00
END TIME : _____
INITIAL LEAK CHECK ~~OF 2005~~ AT 15 INCHES HG
FINAL LEAK CHECK _____ AT _____ INCHES HG

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta

RUN # C-2

LOCATION Unit 6

DATE 24 Jan 92

90 O₂

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
A 1	.21	1.47	723.0	109	84	260	57	141	1
2	.24	1.68	724.7	111	84	265	55	144	2
3	.27	1.89	726.6	115	85	251	56	144	3
4	.30	2.10	728.5	116	86	243	57	141	5
5	.30	2.10	730.4	118	86	270	60	144	6
6	.33	2.31	732.2	99	84	264	58	144	7
7	.35	2.45	734.3	106	85	260	58	150	8
8	.37	2.59	736.5	111	85	252	58	150	9
9	.34	2.38	738.6	116	85	248	61	150	8.5
10	.35	2.45	740.8	120	85	272	62	149	9
11	.40	2.10	742.8	120	86	255	63	150	7.5
12	.24	1.68	744.565	123	87	255	65	143	6

COMMENTS: DELTA P * 7.0 = DELTA H
 BOX # 11 Y = .9911 DELTA H B = 1.80
 START TIME: 10:00
 END TIME: 11:15
 INITIAL LEAK CHECK .005 AT 18 INCHES HG
 FINAL LEAK CHECK .002 AT 10 INCHES HG

stop test at 12:30 port A

FIELD DATA SHEET
GENERAL INFORMATION

Plant:	<u>OKEELANTA</u>	Run #:	<u>Comp-3</u>
Location:	<u>UNIT 6</u>	Date:	<u>24 JAN 92</u>
Ds (ft):	<u>7.5</u>	No. Points:	<u>24</u>
Dn (in):	<u>3/0</u>	Test Length:	<u>60</u>
Filter #:	<u>4574</u>	End Meter Reading:	<u>793.727</u>
Cp:	<u>.84</u>	Int Meter Reading:	<u>744.902</u>
P bar:	<u>30.02</u>	Begin Time:	<u>12:10</u>
P stack:	<u>-.21</u>	End Time:	<u>13:25</u>
IMP-1 (INT)	<u>100 mL</u>	IMP-1 (FINAL)	<u>283</u>
IMP-2 (INT)	<u>100 mL</u>	IMP-2 (FINAL)	<u>122</u>
IMP-3 (INT)	<u>0</u>	IMP-3 (FINAL)	<u>3</u>
IMP-4 (INT)	<u>500.0g</u>	IMP-4 (FINAL)	<u>511.5</u>

	TEST 1	TEST 2	TEST 3
% CO ₂	<u>7.8</u>	<u> </u>	<u> </u>
% O ₂	<u>12.6</u>	<u> </u>	<u> </u>
% CO	<u>0</u>	<u> </u>	<u> </u>

Project Director:	<u>S. MacKay</u>	Field Laboratory:	<u>MacKay/Wilkinson</u>
Meter Box Operator:	<u>P. Wilkman</u>	Chain of Custody:	<u>S. MacKay</u>
Probe Operator:	<u>B. Gibson</u>	Plant Coordinator:	<u>G. Devan</u>
Orsat Analyst:	<u>S. MacKay</u>	Agency Rep:	<u>S. Jordan</u>

Comments:

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 1 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta

RUN # C-3

LOCATION Unit 6

DATE 24 Jan 92

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
A1	.31	2.17	746.8	77	77	260	57	138	2
2	.31	2.17	748.8	84	78	250	56	150	2.5
3	.30	2.10	750.8	90	77	262	55	146	3
4	.33	2.31	752.8	96	78	249	57	149	4
5	.32	2.24	754.9	104	78	262	59	147	4
6	.34	2.38	756.9	107	79	255	56	149	4
7	.36	2.52	759.1	111	79	267	55	148	5
8	.36	2.52	761.3	114	80	258	55	149	5
9	.33	2.31	763.4	117	81	263	55	147	4.5
10	.35	2.45	765.5	118	82	255	55	147	5
11	.35	2.45	767.6	120	83	262	56	148	5
12	.34	2.38	769.710	121	83	257	57	143	5

COMMENTS: DELTA P x 2.0 = DELTA H
 BOX # 11 Y = .9911 DELTA H @ = 1.80
 START TIME: 12:15
 END TIME:
 INITIAL LEAK CHECK .003 AT 15 INCHES HG
 FINAL LEAK CHECK .001 AT 8 INCHES HG

EASTMOUNT ENGINEERING INC. • 420 MAIN STREET • NALPOLE, MA 02081 • (508) 668-9005

745.980 → 746.075
 1.19 into test
 leak check

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT On-eelanta

RUN # C-3

LOCATION Unit 6

DATE 24 Jan 92

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPQ TEMP	STACK TEMP	VAC	% O ₂
B 1	.31	2.17	771.6	110	82	249	57	140	4	13.4
2	.32	2.24	773.6	114	83	261	55	150	4	12.5
3	.35	2.45	775.7	118	84	268	56	152	5	12.9
4	.35	2.45	777.9	121	84	263	58	152	5	12.7
5	.34	2.38	780.1	122	85	261	58	154	5	12.5
6	.32	2.24	782.1	125	86	261	59	156	5	12.8
7	.30	2.10	784.1	125	87	259	60	157	5	12.3
8	.30	2.10	786.0	125	87	257	61	157	5	12.0
9	.30	2.10	788.0	125	87	263	60	156	5	12.3
10	.29	2.03	790.0	125	88	262	60	156	5	12.0
11	.27	1.89	791.9	125	88	258	60	155	5	11.9
12	.26	1.82	793.727	125	88	261	61	153	4.5	

COMMENTS:

DELTA P = 7.0 - DELTA H

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

START TIME: 12:00

END TIME: 13:25

INITIAL LEAK CHECK .003 AT 15 INCHES HG

FINAL LEAK CHECK AT INCHES HG

FIELD DATA SHEET
GENERAL INFORMATION

Plant:	<u>OKEELANTA</u>	Run #:	<u>COMP-4</u>
Location:	<u>UNIT 6</u>	Date:	<u>24 JAN 92</u>
Ds (ft):	<u>7.5</u>	No. Points:	<u>24</u>
Dn (in):	<u>.310</u>	Test Length:	<u>60 MIN</u>
Filter #:	<u>4573</u>	End Meter Reading:	<u>845.476</u>
Cp:	<u>.84</u>	Int Meter Reading:	<u>794.100</u>
P bar:	<u>30.02</u>	Begin Time:	<u>14:10</u>
P stack:	<u>-.21</u>	End Time:	<u>15:20</u>
IMP-1 (INT)	<u>100 mL</u>	IMP-1 (FINAL)	<u>280</u>
IMP-2 (INT)	<u>100 mL</u>	IMP-2 (FINAL)	<u>124</u>
IMP-3 (INT)	<u>0 mL</u>	IMP-3 (FINAL)	<u>4</u>
IMP-4 (INT)	<u>500.0g</u>	IMP-4 (FINAL)	<u>526.1g</u>

	TEST 1
% CO ₂	<u>5.7</u>
% O ₂	<u>14.8</u>
% CO	<u>0</u>

TEST 2

TEST 3

Project Director:	<u>S. MacKay</u>
Meter Box Operator:	<u>B. Gibson</u>
Probe Operator:	<u>P. Wiloman</u>
Orsat Analyst:	<u>S. MacKay</u>

Field Laboratory:	<u>S. MacKay / B. Gibson</u>
Chain of Custody:	<u>S. MacKay</u>
Plant Coordinator:	<u>G. Devane</u>
Agency Rep:	<u>S. Jordan</u>

Comments:

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 1 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta

RUN # C-4

LOCATION Unit 6

DATE 24 Jan 92

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
B1	.36	2.52	796.4	83	80	265	49	141	3
2	.37	2.59	798.6	91	80	260	50	145	3
3	.37	2.59	800.6	95	81	265	52	144	3
4	.37	2.59	802.9	102	80	267	52	144	3
5	.38	2.66	805.1	105	80	268	54	148	3
6	.36	2.52	807.3	111	82	268	55	148	3
7	.34	2.38	809.4	105	82	262	57	147	3
8	.34	2.38	811.6	109	82	260	57	150	3
9	.34	2.38	813.7	113	82	254	58	149	3
10	.32	2.24	815.8	115	83	256	59	150	3
11	.27	1.89	817.6	117	83	258	60	148	2
12	.28	1.96	819.632	118	83	259	61	150	2

% O₂

15.7

15.3

15.0

15.5

14.3

14.5

COMMENTS:

DELTA P = 7.0 = DELTA H

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

START TIME: 1410

END TIME:

INITIAL LEAK CHECK .007 AT 16 INCHES HG

FINAL LEAK CHECK AT INCHES HG

1425 stop 1430 go

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FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta

RUN # C-4

LOCATION Unit 6

DATE 24 Jan 92

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
A1	.34	2.38	821.7	106	83	262	57	142	3
2	.37	2.59	824.0	117	84	263	56	141	4
3	.38	2.66	826.2	119	84	262	57	149	4
4	.37	2.59	828.5	122	84	259	56	150	4
5	.35	2.45	830.7	124	85	259	58	152	4
6	.35	2.45	832.8	125	87	258	57	150	4
7	.35	2.45	835.0	125	87	258	58	154	4
8	.37	2.59	837.1	125	87	258	59	153	4
9	.36	2.52	839.3	125	87	255	60	151	5
10	.34	2.38	841.4	126	87	257	59	151	5
11	.32	2.24	843.5	126	88	257	61	151	4
12	.27	1.89	845.476	125	88	257	60	151	3

% O₂

14.3

15.0

14.3

14.0

14.3

14.3

COMMENTS:

DELTA P * 7.0 = DELTA H

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

START TIME : 1410

END TIME :

INITIAL LEAK CHECK .007 AT 16 INCHES HG

FINAL LEAK CHECK .002 AT 7 INCHES HG

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX IX
LABORATORY RESULTS



South Florida Environmental Services

LABORATORY SUMMARY OF RESULTS

PROJECT NUMBER: 91-102
PROJECT NAME: OKEELANTA CORPORATION
BOILER #6

ANALYST: M. WAYT
ANALYSIS: EPA METHOD 5

FILTER

SAMPLE DESCRIPTION	FILTER #	TEST DATE	TARE WEIGHT (g)	FINAL* WEIGHT (g)
C-2	4569	1-24-92	0.5952	0.7730
C-3	4574	1-24-92	0.5918	0.7055
C-4	4573	1-24-92	0.5935	0.7139
BLANK	4398	1-24-92	0.6020	0.6022

WASH

SAMPLE DESCRIPTION	BKR#	TEST DATE	TARE WEIGHT (g)	FINAL WEIGHT (g)	VOLUME (ml)
C-2	105	1-24-92	67.4751	67.4871	280
C-3	106	1-24-92	67.2952	67.3221	240
C-4	107	1-24-92	67.4885	67.4995	250
BLANK	6	1-24-92	69.8707	69.8709	200

• Filters heated at 220 degrees(F) for 2.5 hours

Okeelanta Corporation - Boiler #6
Particulate Emissions Test Report

APPENDIX X

EQUIPMENT CALIBRATION SHEETS

POST
METER BOX CALIBRATION SHEET

BOX #: 11
PRES BAR: 29.98

DATE: 27 JAN 92
VACUUM: 16 IN Hg

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	10.00	10.217	2.00	.147	30.13	12.54
2	10.00	10.320	2.00	.147	30.13	12.58
3	10.00	10.324	2.00	.147	30.13	12.59

RUN #	TEMP WET (°F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	69.0	108.0	86.3	97.2	1.026	1.80
2	69.0	123.7	88.7	106.2	1.032	1.80
3	69.0	127.7	91.3	109.5	1.038	1.80
AVERAGE					1.032	1.80

MAX % DEV .59
ALLOWABLE % DEV 2.00

PRE CAL Y = .9911 % DIFFERENCE = 3.95 %
ALLOWABLE = 5.00 %

FORMULAS:

Y=

DELTA H @=

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

CALIBRATION BY:

Sean Mackay
SEAN MACKAY

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:

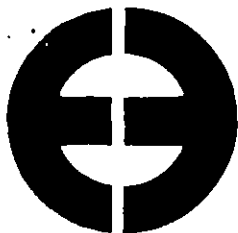
Y=

DELTA H @=

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

CALIBRATION BY:


JEM JARDIN



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

NOZZLE CALIBRATION SHEET

PROJECT NAME: ORIELANTA 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.

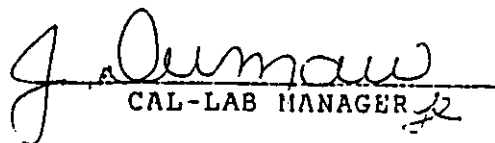
TEMPERATURE 68° F.

RELATIVE HUMIDITY OF 59%.

Customer : EASTMONT ENGINEERING
Manufacturer : TRANSHATION
Model Number : 1261
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	FLUXE	9842A	DMH	03/13/91	03/18/92
2471	KATE	149-4	ICK FT. REZ.	03/14/91	03/13/92
2482	NRS	172144-K	STD THERMOCOUPLE	04/19/91	04/19/93


CAL-LAB MANAGER

TEMPERATURE INDICATOR CALIBRATION FORM

INDICATOR S/N: 650 - 6

CAL DATE: 8 AUG 91

REFERENCE S/N:1061-8277

DUE DATE: 8 AUG 92

CHANNEL NO.	REFERENCE SET POINT							
	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

CHANNEL NO.	REFERENCE SET POINT							
	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 #: 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

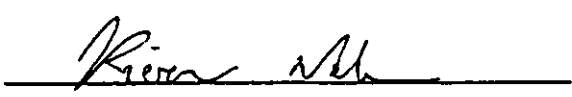
THERMOCOUPLE CALIBRATION SHEET

SET #: 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

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

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