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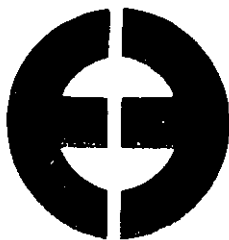
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AP-42 Section Number: 1.8

Reference Number: 55

Title: Okeelanta Corporation Compliance
Particulate Emissions Test Report
Boiler #4

December 1991



Ref 43
0501-008
Eastmount Engineering

Environmental Consultants — Air Quality Specialists

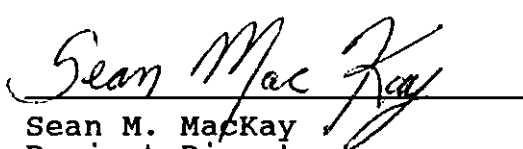
OKEELANTA CORPORATION
COMPLIANCE PARTICULATE EMISSIONS TEST REPORT
BOILER #4

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

CONCERNING: Particulate Emissions Testing
Okeelanta Corporation
Boiler #4
South Bay Florida Facility
December 11 & 12, 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 M. MacKay
Project Director

JANUARY 13, 1992
Date

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Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

1.0 COMPENDIUM

Eastmount Engineering conducted a Compliance Particulate Emissions Test Program on Unit #4 at Okeelanta Corporation's South Bay, Florida facility on December 11 and 12, 1991. The test program consisted of a series of three EPA Method 5 tests.

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 #4 has a maximum rated capacity of 90,000 pounds of steam per hour. Results of the test program indicate Boiler #4 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		ALLOWABLE		LOAD	% OF
		LB/MMBtu	LB/HR	LB/MMBtu	LB/HR	LB/HR	90 KPH
1	12-11-91	.174	41.43	.300	71.58	117,969	131.1%
2	12-11-91	.164	38.24	.300	70.11	115,200	128.0%
3	12-12-91	.179	41.18	.300	68.85	114,092	126.8%
3 RUN AVG.		.172	40.28	.300	70.18	115,754	128.6%

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 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.

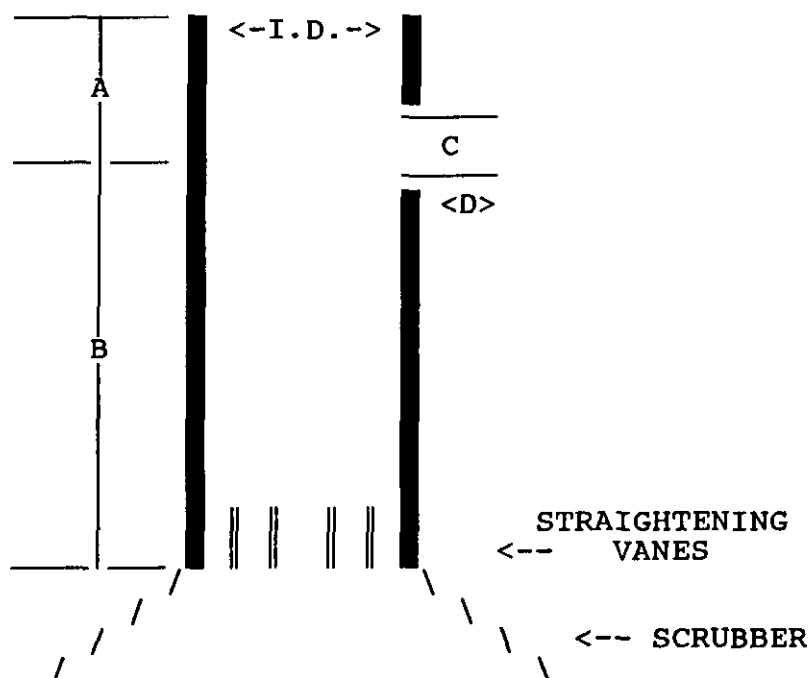
Okeelanta Corporation - Boiler #4
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2.0 STACK SCHEMATIC

OKEELANTA CORPORATION
Boiler #4
South Bay, Florida Facility

The following is a schematic of the stack which services Boiler #4 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.



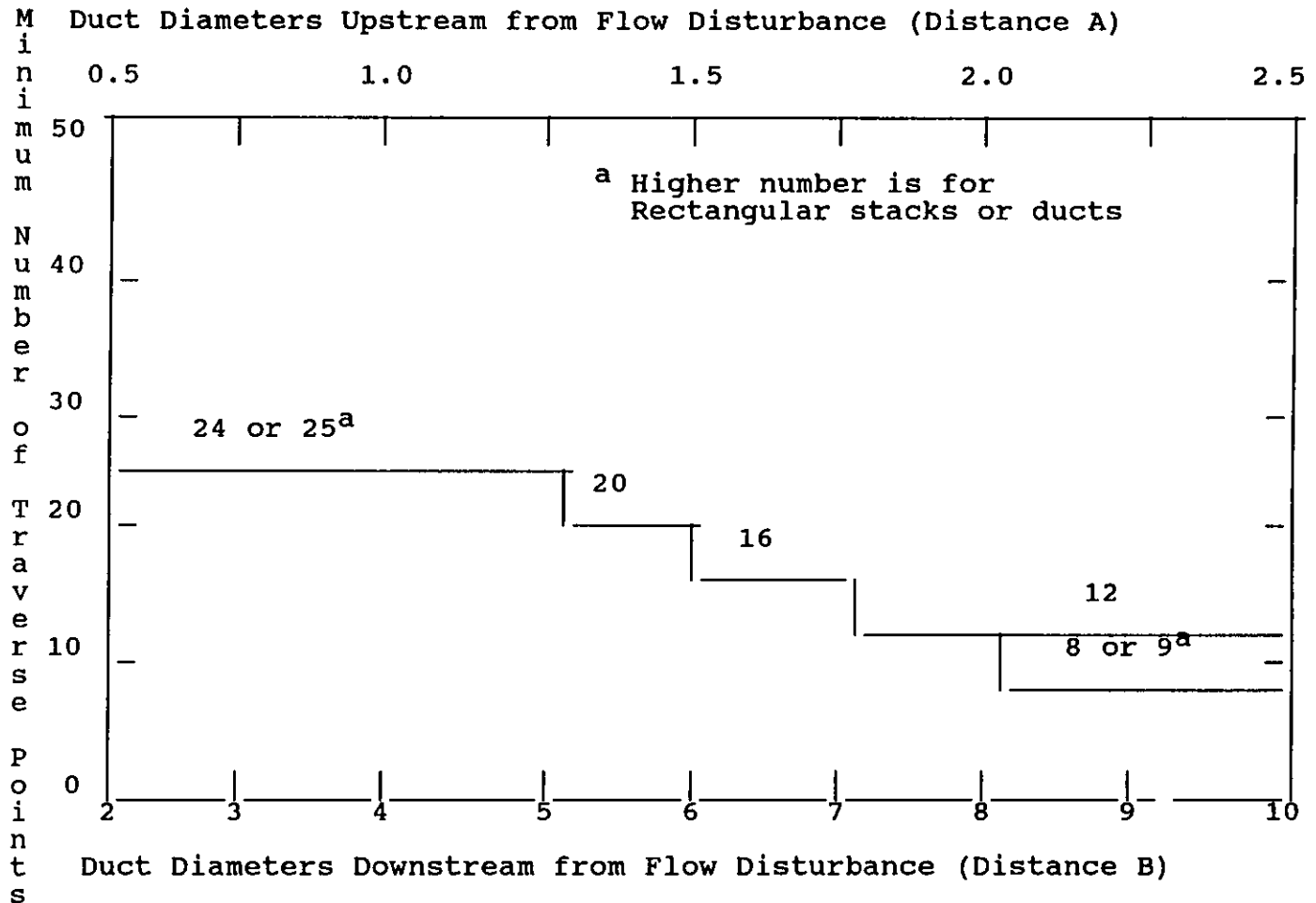
DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	4'
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	16'
DIAMETER OF PORT SLEEVE (C)	4"
LENGTH OF PORT SLEEVE (D)	3.5"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	7.5'

SCHEMATIC NOT TO SCALE

Okeelanta Corporation - Boiler #4
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3.0 TRAVERSE POINT LOCATIONS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
Boiler #4
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.

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

OKEELANTA CORPORATION
Boiler #4
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 $\pm$ 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 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.

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 $68 \pm 10^\circ\text{F}$ 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 #4
Particulate Emissions Test Report

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-1
DATE : 12-11-91

Ds (FT)	7.5							
Dn (IN)	.314							
FILTER#	4461	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
		A1	.28	.53	1.60	84	82	157
IMP-1 (INT)	100	2	.31	.56	1.77	87	82	164
		3	.33	.57	1.88	93	82	164
IMP-2 (INT)	100	4	.34	.58	1.94	97	83	165
		5	.35	.59	2.00	100	83	160
IMP-3 (INT)	0	6	.33	.57	1.88	105	83	165
		7	.31	.56	1.77	107	83	163
IMP-4 (INT)	500.0	8	.32	.57	1.82	110	84	164
		9	.32	.57	1.82	111	84	164
IMP-1 (FIN)	352	10	.32	.57	1.82	113	85	161
		11	.32	.57	1.82	115	85	161
IMP-2 (FIN)	138	12	.31	.56	1.77	116	86	163
IMP-3 (FIN)	4	B1	.29	.54	1.65	108	86	152
		2	.34	.58	1.94	113	86	159
IMP-4 (FIN)	515.5	3	.35	.59	2.00	116	87	160
		4	.34	.58	1.94	118	87	160
% CO2	10.6	5	.35	.59	2.00	120	88	159
		6	.32	.57	1.82	122	89	161
% O2	9.6	7	.31	.56	1.77	122	89	161
		8	.32	.57	1.82	122	89	163
% CO	0	9	.33	.57	1.88	123	89	163
		10	.35	.59	2.00	124	90	161
P BAR	30.14	11	.35	.59	2.00	125	90	162
		12	.36	.60	2.05	126	91	156
P STK	.28							
NO. PTS	24							
TEST LNGTH	60							
END METER	497.925							
INT METER	453.793							
BEGIN TIME:	12:10							
END TIME:	13:15							
AVERAGE			.33	.57	1.86	111.5	86.0	161.2

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-2
DATE : 12-11-91

Ds (FT)	7.5							
Dn (IN)	.310							
FILTER#	4462	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
		A1	.24	.49	1.49	80	81	150
IMP-1 (INT)	100	2	.30	.55	1.86	85	81	152
		3	.34	.58	2.11	91	81	153
IMP-2 (INT)	100	4	.35	.59	2.17	96	81	153
		5	.34	.58	2.11	101	81	159
IMP-3 (INT)	0	6	.35	.59	2.17	105	82	161
		7	.33	.57	2.05	108	82	160
IMP-4 (INT)	500.0	8	.34	.58	2.11	112	83	161
		9	.35	.59	2.17	114	83	160
IMP-1 (FIN)	333	10	.34	.58	2.11	117	84	159
		11	.34	.58	2.11	118	85	161
IMP-2 (FIN)	162	12	.35	.59	2.17	120	86	160
IMP-3 (FIN)	4	B1	.29	.54	1.80	110	85	152
		2	.32	.57	1.98	114	87	152
IMP-4 (FIN)	516.0	3	.36	.60	2.23	117	87	153
		4	.39	.62	2.42	121	88	154
% CO2	11.0	5	.40	.63	2.48	124	88	157
		6	.38	.62	2.36	127	89	161
% O2	9.2	7	.34	.58	2.11	128	89	160
		8	.35	.59	2.17	129	90	160
% CO	0	9	.37	.61	2.29	130	90	161
		10	.38	.62	2.36	131	90	160
P BAR	30.12	11	.38	.62	2.36	131	90	159
		12	.37	.61	2.29	132	91	161
P STK	.28							
NO. PTS	24							
TEST LGTH	60							
END METER	545.360							
INT METER	498.200							
BEGIN TIME:	14:15							
END TIME:	15:20							
AVERAGE			.35	.59	2.14	114.2	85.6	157.5

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

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

Ds (FT)	7.5							
Dn (IN)	.310							
FILTER#	4463	TRAV	VEL	SQ	DELTA	DRYGAS	DRYGAS	STACK
PIT COEFF	.84	PT	HEAD	ROOT	H	IN	OUT	TEMP
		A1	.33	.57	1.98	76	76	151
IMP-1 (INT)	100	2	.32	.57	1.92	84	76	158
		3	.33	.57	1.98	88	77	158
IMP-2 (INT)	100	4	.32	.57	1.92	91	76	157
		5	.33	.57	1.98	95	77	161
IMP-3 (INT)	0	6	.32	.57	1.92	97	77	158
		7	.33	.57	1.98	100	78	160
IMP-4 (INT)	500.0	8	.35	.59	2.10	103	79	160
		9	.34	.58	2.04	105	80	162
IMP-1 (FIN)	345	10	.33	.57	1.98	107	81	163
		11	.33	.57	1.98	108	81	160
IMP-2 (FIN)	146	12	.30	.55	1.80	108	81	161
IMP-3 (FIN)	5	B1	.32	.57	1.92	100	81	150
		2	.37	.61	2.22	106	82	151
IMP-4 (FIN)	515.5	3	.35	.59	2.10	108	83	161
		4	.36	.60	2.16	110	83	160
% CO2	11.2	5	.33	.57	1.98	112	83	161
		6	.31	.56	1.86	113	84	158
% O2	9.0	7	.31	.56	1.86	113	85	161
		8	.34	.58	2.04	114	85	161
% CO	0	9	.34	.58	2.04	114	85	159
		10	.33	.57	1.98	115	85	160
P BAR	30.12	11	.31	.56	1.86	116	86	160
		12	.27	.52	1.62	116	86	152
P STK	.28							
NO. PTS	24							
TEST LNGTH	60							
END METER	591.164							
INT METER	545.673							
BEGIN TIME:	09:05							
END TIME:	10:10							
AVERAGE			.33	.57	1.97	104.1	81.1	158.5

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX II
ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-1
DATE : 12-11-91

TS (°F) = 161.2	% CO2 = 10.6	VM (CF) = 44.132	
TS (°R) = 621.2	% O2 = 9.6	DELTA H (ABS) = 30.28	
TM (°F) = 98.8	% CO = 0	PS (ABS) = 30.16	
TM (°R) = 558.8	% N2 = 79.8	SQRT DELTA P = .571649	
VI (TOT) = 309.5	CP = .84	AREA NOZZLE = .000538	
		Y = .9911	
VM STD = 17.64	(VM) (Y) (DELTA H ABS) ----- (TM)	= 41.81	DSCF
VW STD = .04707	(VI TOT)	= 14.57	CF
BWO =	VW STD ----- VW STD + VM STD	= .258	
BWO =	MOISTURE FROM STEAM TABLES	= .329	
VI TOT =	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO =	1 - BWO	= .742	
Md (DRY) =	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2) -----	= 30.08	LBS/LB MOLE
Ms (WET) =	MD (1-BWO) + 18 (BWO) -----	= 26.96	LBS/LB MOLE
G =	SQRT (TS / PS / MS)	= .87	
VS =	85.49 (CP) (G) (SQRT DELTA P)	= 35.9	FPS
H =	0.002669 (VI TOT)	= .83	
J =	(DELTA H ABS) (VM) (Y) / (TM)	= 2.37	
K =	(H) + (J)	= 3.20	
% ISO =	(TS) (K) (1.667) ----- (TIME) (VS) (PS) (AN)	= 94.8	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-2
DATE : 12-11-91

TS (°F) = 157.5	% CO2 = 11.0	VM (CF) = 47.160
TS (°R) = 617.5	% O2 = 9.2	DELTA H (ABS) = 30.28
TM (°F) = 99.9	% CO = 0	PS (ABS) = 30.14
TM (°R) = 559.9	% N2 = 79.8	SQRT DELTA P = .587322
VI (TOT) = 315.0	CP = .84	AREA NOZZLE = .000524
		Y = .9911
VM STD = 17.64	(VM) (Y) (DELTA H ABS) ----- (TM)	= 44.59 DSCF
VW STD = .04707	(VI TOT)	= 14.83 CF
BWO =	VW STD ----- VW STD + VM STD	= .250
BWO =	MOISTURE FROM STEAM TABLES	= .302
VI TOT =	ADJUSTED TO SATURATION VOLUME	= N/A ML
1-BWO =	1 - BWO	= .750
Md (DRY) =	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2) -----	= 30.13 LBS/LB MOLE
Ms (WET) =	MD (1-BWO) + 18 (BWO) -----	= 27.10 LBS/LB MOLE
G =	SQRT (TS / PS / MS)	= .87
VS =	85.49 (CP) (G) (SQRT DELTA P)	= 36.7 FPS
H =	0.002669 (VI TOT)	= .84
J =	(DELTA H ABS) (VM) (Y) / (TM)	= 2.53
K =	(H) + (J)	= 3.37
% ISO =	(TS) (K) (1.667) ----- (TIME) (VS) (PS) (AN)	= 99.7

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

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

TS (°F) = 158.5 / *Avg = 159* % CO2 = 11.2 / *Avg = 9.3* VM (CF) = 45.491
 TS (°R) = 618.5 % O2 = 9.0 DELTA H (ABS) = 30.26
 TM (°F) = 92.6 % CO = 0 PS (ABS) = 30.14
 TM (°R) = 552.6 % N2 = 79.8 SQRT DELTA P = .572368
 VI(TOT) = 311.5 CP = .84 AREA NOZZLE = .000524

Y = .9911

VM STD = 17.64 (VM) (Y) (DELTA H ABS) / (TM) = 43.56 DSCF
 VW STD = .04707 (VI TOT) = 14.66 CF
 BWO = $\frac{\text{VW STD}}{\text{VW STD} + \text{VM STD}}$ = .252
 BWO = MOISTURE FROM STEAM TABLES = .309
 VI TOT = ADJUSTED TO SATURATION VOLUME = N/A ML
 1-BWO = 1 - BWO = .748
 Md (DRY) = $\frac{.44 (\% \text{ CO}_2) + .32 (\% \text{ O}_2) + .28 (\% \text{ CO}) + .28 (\% \text{ N}_2)}{1}$ = 30.15 LBS/LB MOLE
 Ms (WET) = $\frac{\text{MD} (1-\text{BWO}) + 18 (\text{BWO})}{1}$ = 27.09 LBS/LB MOLE
 G = $\sqrt{\text{TS} / \text{PS} / \text{MS}}$ = .87
 VS = $85.49 (\text{CP}) (\text{G}) (\sqrt{\text{DELTA P}})$ = 35.8 FPS
 H = $0.002669 (\text{VI TOT})$ = .83
 J = $(\text{DELTA H ABS}) (\text{VM}) (\text{Y}) / (\text{TM})$ = 2.47
 K = (H) + (J) = 3.30
 % ISO = $\frac{(\text{TS}) (\text{K}) (1.667)}{(\text{TIME}) (\text{VS}) (\text{PS}) (\text{AN})}$ = 100.4

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APPENDIX III
ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-1
DATE : 12-11-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	350	650	260
	360	660	
	370	660	
	360	660	
	360	660	
AVERAGE	360.0 PSIG	658.0	260.0
P ABS =	374.7 PSIA		
ENTHALPY @	700 'F AND	380 PSIA =	1364.5
ENTHALPY @	600 'F AND	380 PSIA =	1309.0
ENTHALPY @	658.0 'F AND	380 PSIA =	1341.2
ENTHALPY OF FEED WATER =		228.76	
AVERAGE ENTHALPY =		1112.4	BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-2
DATE : 12-11-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	350	660	260
	365	660	
	360	660	
	380	670	
	370	670	
 AVERAGE	 365.0 PSIG	 664.0	 260.0
 P ABS =	 379.7 PSIA		
 ENTHALPY @	 700 'F AND	 380 PSIA =	 1364.5
ENTHALPY @	600 'F AND	380 PSIA =	1309.0
ENTHALPY @	664.0 'F AND	380 PSIA =	1344.5
 ENTHALPY OF FEED WATER =		 228.76	
AVERAGE ENTHALPY =		1115.8	BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
 LOCATION: UNIT 4

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

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	360	650	260
	390	650	
	375	650	
	380	650	
	390	650	
 AVERAGE	 379.0 PSIG	 650.0	 260.0
 P ABS =	 393.7 PSIA		
 ENTHALPY @	 700 'F AND	 390 PSIA =	 1362.5
ENTHALPY @	600 'F AND	390 PSIA =	1307.7
ENTHALPY @	650.0 'F AND	390 PSIA =	1335.1
 ENTHALPY OF FEED WATER =		 228.76	
AVERAGE ENTHALPY =		1106.3	BTU/LB OF STEAM

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-1
DATE: 12-11-91

STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
-----	----	-----
END 930903	13: 15	100
BEGIN 929625	12: 10	LBS/HR STEAM
-----	-----	-----
NET 1278 X 100 / 65	MINS =	117969

117969 LBS/HR STEAM / 55% EFF. = 214490 EQUIV.

214490 LBS/HR STEAM X 1112 BTU/LB = 238.6 BTU(e6)/HR

OIL INTEGRATOR READINGS	TIME	GALS/HR
-----	----	-----
END 0	13: 15	
BEGIN 0	12: 10	
---	-----	
NET 0 GALLONS	65 MINS =	0 GPH

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

ALLOWABLE EMISSIONS

BAGASSE	238.6	-	0	X	.3	=	71.6	LBS/HR
OIL			0	X	.1	=	.0	LBS/HR
TOTAL						=	71.6	LBS/HR
							.300	LB/MMBTU

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-2
DATE: 12-11-91

	<u>STEAM INTEGRATOR READINGS</u>	<u>TIME</u>	<u>INTEGRATOR FACTOR</u>
END	933315	15: 20	100
BEGIN	932067	14: 15	LBS/HR STEAM
	<u> </u>	<u> </u>	<u> </u>
NET	1248 X 100	/ 65 MINS	= 115200

115200 LBS/HR STEAM / 55% EFF. = 209455 EQUIV.

209455 LBS/HR STEAM X 1116 BTU/LB = 233.7 BTU(e6)/HR

	<u>OIL INTEGRATOR READINGS</u>	<u>TIME</u>	<u>GALS/HR</u>
END	0	15: 20	
BEGIN	0	14: 15	
	<u> </u>	<u> </u>	
NET	0 GALLONS	65 MINS	= 0 GPH

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

ALLOWABLE EMISSIONS

BAGASSE	233.7	-	0	X	.3	=	70.1	LBS/HR
OIL			0	X	.1	=	.0	LBS/HR
TOTAL						=	70.1	LBS/HR
							.300	LB/MMBTU

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

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

	<u>STEAM INTEGRATOR READINGS</u>		<u>TIME</u>		<u>INTEGRATOR FACTOR</u>
END	950204		10: 10		100
BEGIN	948968		9: 5		LBS/HR STEAM
	<u> </u>		<u> </u>		<u> </u>
NET	1236	X	100	/ 65 MINS =	114092

114092 LBS/HR STEAM / 55% EFF. = 207441 EQUIV.

207441 LBS/HR STEAM X 1106 BTU/LB = 229.5 BTU(e6)/HR

	<u>OIL INTEGRATOR READINGS</u>		<u>TIME</u>		<u>GALS/HR</u>
END	0		10: 10		
BEGIN	0		9: 5		
	<u>---</u>		<u>-----</u>		
NET	0	GALLONS	65	MINS =	0 GPH

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

ALLOWABLE EMISSIONS

BAGASSE	229.5	-	0	X	.3	=	68.8	LBS/HR
OIL			0	X	.1	=	.0	LBS/HR
TOTAL						=	68.8	LBS/HR
							.300	LB/MMBTU

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX V

EMISSION CALCULATION SHEETS

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-1
DATE: 12-11-91

	SAMPLES		BLANKS		
	FILTER	BEAKER	FILTER	ACETONE	
	-----	-----	-----	-----	
NO. :	4461	212	4468	220	
FINAL:	.7777	77.2102	.5945	78.5543	
TARE :	.5922	77.1779	.5945	78.5533	
	-----	-----	-----	-----	
NET :	.1855	.0323	.0000	.0010/200ML	
WEIGHT =	217.80		VOLUME OF RINSE		220
RESIDUE =	-	1.10			
Mn =	216.70	Mg	AS =	44.2	SQ FT
Qs =	3600 (1-BWO) (VS) (AS) (17.64) (PS) / (TS)		=	3624615	DSCFH
CS =	(2.205 X 10 ⁻⁶) (Mn) / (VM STD)		=	1.143e-5	LBS/SCF
CS' =	0.0154 (Mn) / (VM STD)		=	.08	GRAINS /SCF
PMR =	(QS) (CS)		=	41.43	LBS/HR
LOAD=	MILLIONS OF BTU / HOUR INPUT		=	238.6	BTU e6 / HR
E =	LBS / MILLION BTu		=	.174	LBS/ BTu e6
ALLOWABLE			=	71.58	LBS/HR
			=	.300	LBS/ BTu e6

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

RUN #: COMP-2
DATE: 12-11-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
	-----	-----	-----	-----
NO. :	4462	214	4468	220
FINAL:	.7827	74.9329	.5945	78.5543
TARE :	.5928	74.916	.5945	78.5533
	-----	-----	-----	-----
NET :	.1899	.0169	.0000	.0010/200ML
WEIGHT =	206.80		VOLUME OF RINSE	325
RESIDUE =	- 1.63			
Mn =	205.18	Mg	AS =	44.2 SQ FT
Qs =	3600 (1-BWO) (VS) (AS) (17.64) (PS) / (TS)		=	3768706 DSCFH
CS =	(2.205 X 10-6) (Mn) / (VM STD)		=	1.015e-5 LBS/SCF
CS' =	0.0154 (Mn) / (VM STD)		=	.07 GRAINS /SCF
PMR =	(QS) (CS)		=	38.24 LBS/HR
LOAD=	MILLIONS OF BTU / HOUR INPUT		=	233.7 BTU e6 / HR
E =	LBS / MILLION BTu		=	.164 LBS/ BTu e6
ALLOWABLE			=	70.11 LBS/HR
			=	.300 LBS/ BTu e6

PARTICULATE
EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 4

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

	SAMPLES		BLANKS	
	FILTER -----	BEAKER -----	FILTER -----	ACETONE -----
NO. :	4463	216	4468	220
FINAL:	.7986	75.3408	.5945	78.5543
TARE :	.6080	75.3080	.5945	78.5533
NET :	.1906	.0328	.0000	.0010/200ML

WEIGHT = 223.40		VOLUME OF RINSE 220	
RESIDUE = - 1.10			
Mn = 222.30 Mg		AS = 44.2	SQ FT
Qs = 3600 (1-BWO) (VS) (AS) (17.64) (PS) / (TS)		= 3659325	DSCFH
		<i>Avg = 3,684,215</i>	
CS = (2.205 X 10 ⁻⁶) (Mn) / (VM STD)		= 1.125e-5	LBS/SCF
CS' = 0.0154 (Mn) / (VM STD)		= .08	GRAINS / SCF
PMR = (QS) (CS)		= 41.18	LBS/HR
LOAD= MILLIONS OF BTU / HOUR INPUT		= 229.5	BTU e6 / HR
E = LBS / MILLION BTu		= <i>Avg = 233.9</i> .179	LBS / BTu e6
ALLOWABLE		= 68.85	LBS/HR
		= .300	LBS / BTu e6

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX VI
NOMENCLATURE SHEETS

Okeelanta Corporation - Boiler #4
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.

Okeelanta Corporation - Boiler #4
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.
% N ₂	The percent of nitrogen in the flue gas.
NO PTS	Number of traverse points.
% O ₂	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.

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

NOMENCLATURE (cont'd)

TM ($^{\circ}$ 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.

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

CAPACITY 90,000
INT. FACTOR 100
RUN 1 4 - 1

BOILER 1 4

EVALUATION COMPLIANCE TESTING
DATE: 12-11-91
TESTED BY: Eastmont Eng

TIME	STEAM INTERGRATOR	OIL METER		STEAM		RECORDING LBS/HR.	FEED WATER		BOILER PRESSURE DROP	
		WATER	SOUP	PRESS.	TEMP.		PRESS.	TEMP.	OVERFIRE AIR PRESS.	AIR HEATER AIR OUT
12:10 PM	929625	135365	ONE	350	650	125,000	660	260		
12:25	929923		meter	360	660	120,000	670	"		
12:40	930218			370	660	120,000	680	"		
12:55	930576			360	660	125,000	680	"		
1:15 PM	930903	135365	X	360	660	115,000	680	"		
BOILER TEMPERATURE										
									BOILER OUTLET	
									AIR HEATER GAS OUT	
									AIR HEATER AIR OUT	
									L.D. FAN	460 460 460 460
									S.H. STEAM TEMP.	650 660 660 660
PANEL SETTINGS										
									FURNACE PRESSURE	
									F.D. FAN PRESSURE	
									BAGASSE FEED	
									UNDERGRATE AIR	
									OVERFIRE AIR	

TEST RESULTS		COMMENTS:	
OIL USED	NONE GALS.	"A"	"B"
TOTAL TEST TIME	65 MINS.	(1) Mill speed 85	85 F.P.H.
INTERGRATOR TIME	1278 COUNT	(2) using no oil, burner	
INTERGRATOR STEAM	117,969 P.O.H		
CHART READING	605,000 TOTAL		
CHART AVERAGE	125,000 P.P.H		
L.D. FAN TURBINE	3600 RPM		
STACK TEMPERATURE	163 °F		
GRATE TEMPERATURE	NONE °F		
SCRUBBER WATER	4.00 G.P.M.		

PLANT READINGS BY George D. Allen
% OF CAPACITY

Allowed =
Actual =

CAPACITY 90,000
INT. FACTOR 100
RUN # 4-3

BOILER 1 4

COLLECTION COMPLIANCE TESTING
DATE: 12-12-91
TESTED BY: Eastmont Eng

TIME	STEAM INTERGRATOR	OIL METER	STEAM PRESS.	TEMP.	READING LBS/HR.	FEED WATER PRESS.	TEMP.	BOILER PRESSURE DROP
9:05 AM	948968	135376	360	650	115,000	620	260°	OVERFIRE AIR PRESS. AIR HEATER AIR OUT UNDERGRATE AIR PRESS. WIND BOX PRESSURE FURNACE PRESSURE 3RD. OUTLET PRESSURE DUST COLLECTOR OUT. SCRUBBER DIFF.
9:20	949240		390	650	110,000	690	"	
9:35	949527		375	650	115,000	670	"	102 102 102 102 102 102 102 102
9:50	949812		380	650	115,000	650	"	1.4 1.5 1.4 1.4 1.4 1.4 1.4 1.4
10:10	950204	135376	390	650	115,000	690	"	1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4
								BOILER TEMPERATURE
								BOILER OUTLET AIR HEATER GAS OUT AIR HEATER AIR OUT I.D. FAN S.H. STEAM TEMP.
								390 390 390 390 390 390 390 390 650 650 650 650 650 650 650 650
								PANEL SETTINGS
								FURNACE PRESSURE F.D. FAN PRESSURE BAGASSE FEED UNDERGRATE AIR OVERFIRE AIR

TEST RESULTS

OIL USED	None	GALS.
TOTAL TEST TIME	65	MINS.
INTERGRATOR TIME	1236	COUNT
INTERGRATOR STEAM	114,092	P.P.H.
CHART READING	570,000	TOTAL
CHART AVERAGE	114,000	P.P.H.
I.D. FAN TURBINE	3600	RPM
STACK TEMPERATURE	151	°F
GRATE TEMPERATURE	None	°F
SCRUBBER WATER	59	G.P.M.

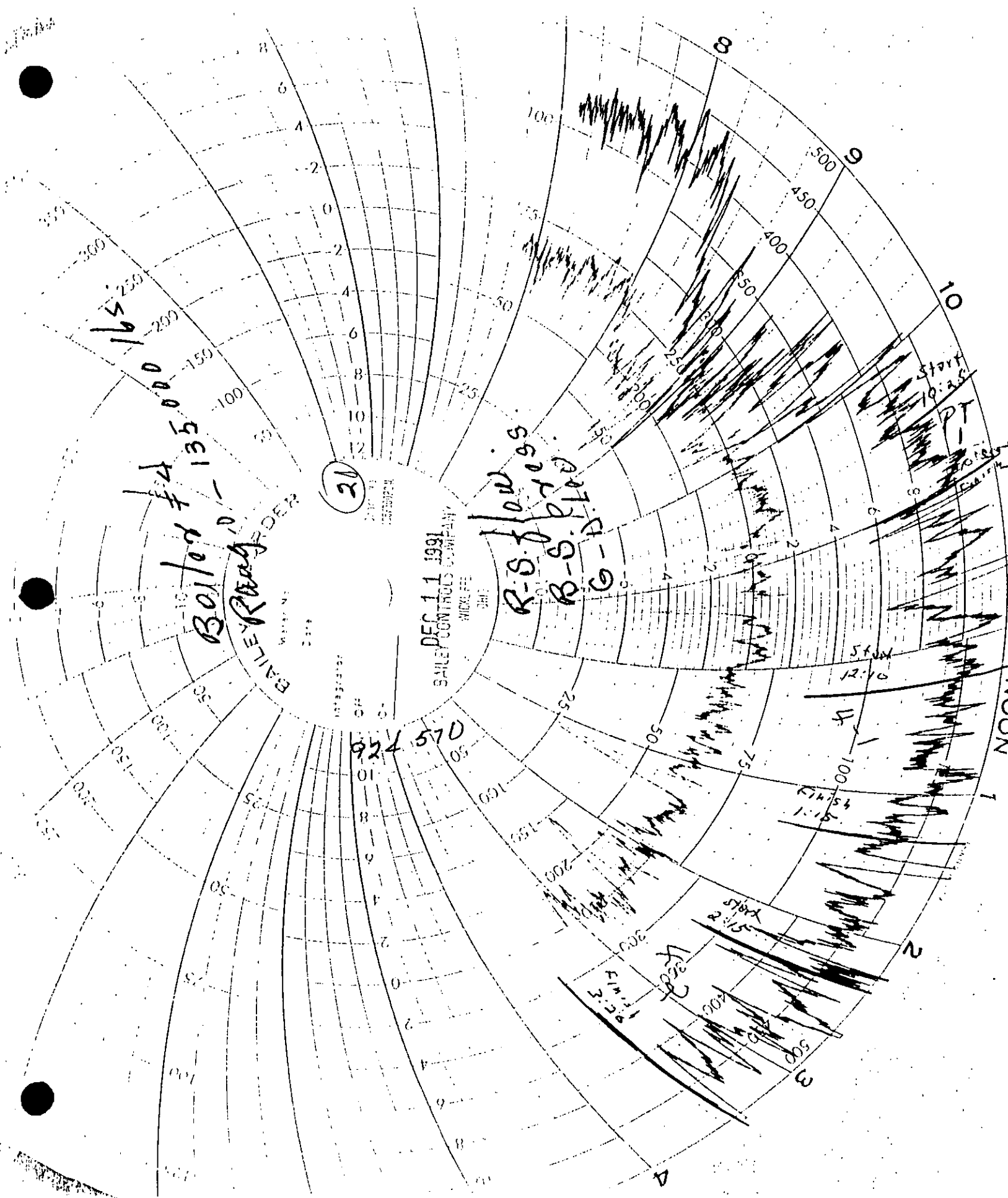
COMMENTS: "A" "B"

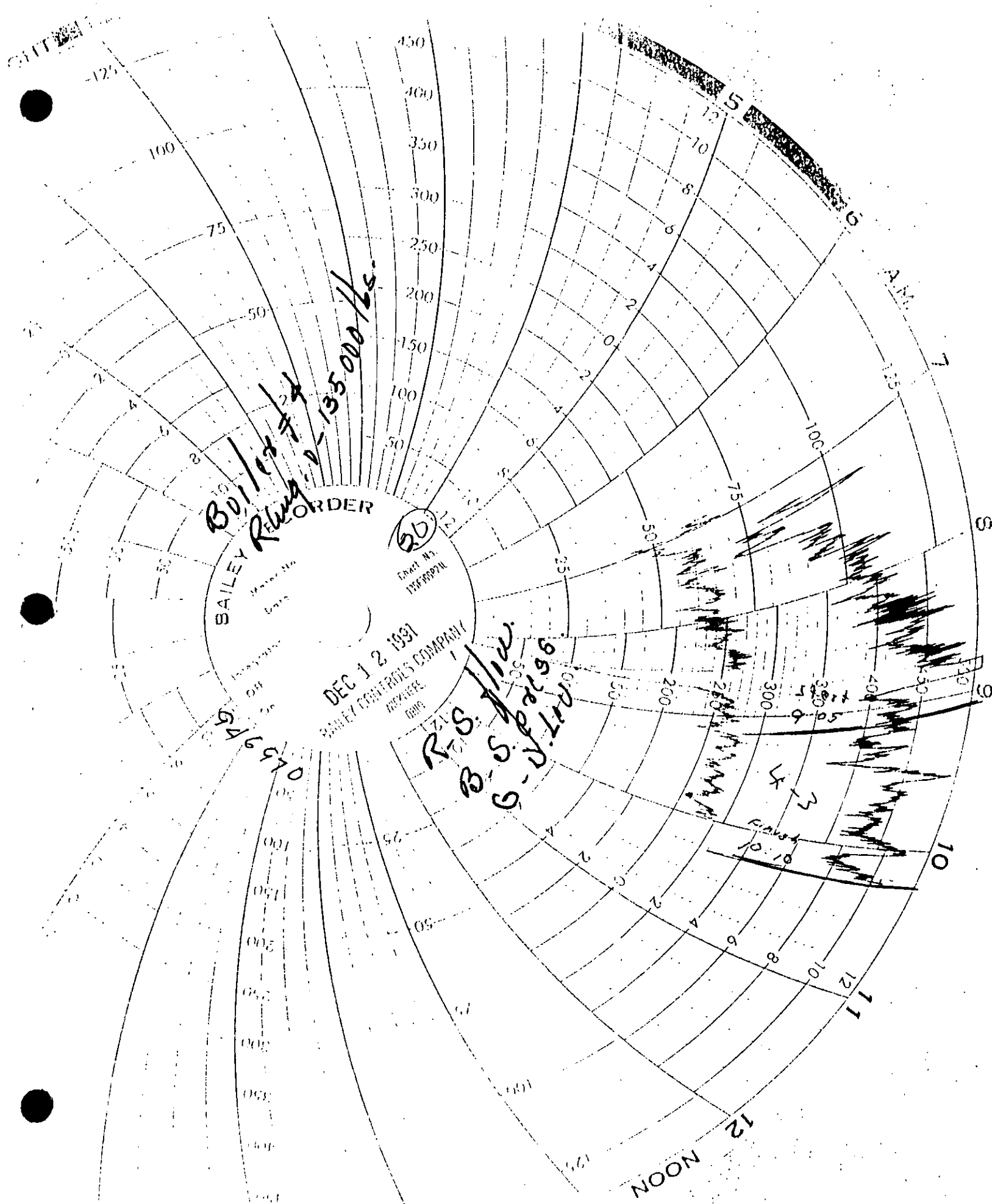
- (1) Mill speed 85 85 F.P.H.
- (2) using no oil burner.
- (3) Installed new thermocouples at I.D. fan.

Allowed =

Actual =

PLANT READINGS BY *Eng 8/10*
% OF CAPACITY





Boiler #4
Reup - 135,000 lbs.

BAILEY
ORDER
DEC 1 & 1931
BAILEY CONTROLS COMPANY
REVERSE
G.A. 940

(55)
Chart No.
135-00000

R-S low
B-S low
G-S low
Chart No. 135-00000

NOON

A.M.

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET
GENERAL INFORMATION

Plant:	<u>OKEELANTA</u>	Run #:	<u>Comp - 1</u>
Location:	<u>UNIT 4</u>	Date:	<u>11 DEC 91</u>
Ds (ft):	<u>7.5</u>	No. Points:	<u>24</u>
Dn (in):	<u>.314</u>	Test Length:	<u>60 MIN</u>
Filter #:	<u>4461</u>	End Meter Reading:	<u>497.925</u>
Cp:	<u>.84</u>	Int Meter Reading:	<u>483.793</u>
P bar:	<u>30.14</u>	Begin Time:	<u>12:10</u>
P stack:	<u>.28</u>	End Time:	<u>13:15</u>
IMP-1 (INT)	<u>100 mL</u>	IMP-1 (FINAL)	<u>352</u>
IMP-2 (INT)	<u>100 mL</u>	IMP-2 (FINAL)	<u>138</u>
IMP-3 (INT)	<u>0</u>	IMP-3 (FINAL)	<u>4</u>
IMP-4 (INT)	<u>500.0g</u>	IMP-4 (FINAL)	<u>515.9</u>

	TEST 1	TEST 2	TEST 3
% CO ₂	<u>10.6</u>	<u> </u>	<u> </u>
% O ₂	<u>9.6</u>	<u> </u>	<u> </u>
% CO	<u>0</u>	<u> </u>	<u> </u>

Project Director:	<u>S. MACKAY</u>	Field Laboratory:	<u>S. MACKAY</u>
Meter Box Operator:	<u>P. WILDMAN</u>	Chain of Custody:	<u>S. MACKAY</u>
Probe Operator:	<u>R. GOOD</u>	Plant Coordinator:	<u>G. DEVANE</u>
Orsat Analyst:	<u>S. MACKAY</u>	Agency Rep:	<u>K. TUCKER</u>

Comments:

FIELD DATA SHEET

"TRAVERSE POINT" INFORMATION

PAGE 1 OF 2

SAMPLING TIME PER POINT

 $2\frac{1}{2}$

PLANT Okeelanta

RUN # Camp-1

LOCATION Unit 4

DATE 11 Dec. 91

[illegible]

COMMENTS:

DELTA P * ^{pw} 3.7 = DELTA H
BOX # 11 Y = .9911 DELTA H @ = 1.80
START TIME : 12:10
END TIME : 12:40
INITIAL LEAK CHECK 00 AT 15 INCHES HG
FINAL LEAK CHECK AT INCHES HG

Initial P_t tot recheck food at 4

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

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT

 $2\frac{1}{2}$

PLANT Okelanta

RUN # Comp - 1

LOCATION Unit 4

DATE 11 Dec 91

[illegible]

COMMENTS:

DELTA P $\approx$ 5.1652 = DELTA H

BOX # 11 Y - -9911 DELTA H @ - 1.80

START TIME : 12:45

END TIME : 1315

INITIAL LEAK CHECK AT INCHES HG

FINAL LEAK CHECK .0 AT 6 INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	<u>OKEELANTA</u>	Run #:	<u>COMP-2</u>
Location:	<u>UNIT 4</u>	Date:	<u>11 DEC 91</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>4462</u>	End Meter Reading:	<u>546.300</u>
Cp:	<u>.84</u>	Int Meter Reading:	<u>498.200</u>
P bar:	<u>30.12</u>	Begin Time:	<u>14:15</u>
P stack:	<u>.28</u>	End Time:	<u>15:20</u>
IMP-1 (INT)	<u>100 ML</u>	IMP-1 (FINAL)	<u>333</u>
IMP-2 (INT)	<u>100 ML</u>	IMP-2 (FINAL)	<u>162</u>
IMP-3 (INT)	<u>0</u>	IMP-3 (FINAL)	<u>4</u>
IMP-4 (INT)	<u>500.0g</u>	IMP-4 (FINAL)	<u>516.0</u>

	TEST 1	TEST 2	TEST 3
% CO2	<u>11.0</u>	<u> </u>	<u> </u>
% O2	<u>9.2</u>	<u> </u>	<u> </u>
% CO	<u>0</u>	<u> </u>	<u> </u>

Project Director:	<u>S. Mackay</u>	Field Laboratory:	<u>S. Mackay</u>
Meter Box Operator:	<u>P. Wilmon</u>	Chain of Custody:	<u>S. Mackay</u>
Probe Operator:	<u>R. Good</u>	Plant Coordinator:	<u>G. DEVAHE</u>
Orsat Analyst:	<u>S. Mackay</u>	Agency Rep:	<u>K. TUCKER</u>

Comments:

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 1 OF 2

SAMPLING TIME PER POINT

PLANT Okeelanta

RUN # Comp-2

LOCATION Unit # 4

DATE 11 Dec 91

 $\% O_2$ [illegible]

COMMENTS:

$$\Delta P \approx \underline{6.2} = \Delta H$$

BOX # 11 Y = .9911 DELTA H θ = 1.80

START TIME : 14:20

END TIME : 14:50

INITIAL LEAK CHECK 01 AT 15 INCHES HG

FINAL LEAK CHECK 10 AT 9 INCHES HG

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2 1/2

PLANT Okeelanta

RUN # Comp-2

LOCATION Unit #4

DATE 11 Dec 91

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC
8'	.29	1.79	522.7	110	85	261	67	152	4
2	.32	1.98	524.6	114	87	268	63	152	4.5
3	.36	2.23	526.6	117	87	256	63	153	6
4	.39	2.42	528.7	121	88	245	64	154	6.5
5	.40	2.48	530.8	124	88	251	63	157	7
6	.38	2.36	532.9	127	89	257	64	161	7
7	.34	2.11	535.0	128	89	261	64	160	7
8	.35	2.17	537.1	129	90	256	65	160	7
9	.37	2.29	539.0	130	90	253	64	161	7.5
10	.38	2.36	541.1	131	90	253	66	160	8
11	.38	2.36	543.2	131	90	259	64	159	8.5
12	.37	2.29	545.360	132	91	262	66	161	8

COMMENTS:

DELTA P * 6.2 = DELTA H
 BOX # 11 Y = 9911 DELTA H @ = 1.80
 START TIME : 1450
 END TIME : 1520
 INITIAL LEAK CHECK AT INCHES HG
 FINAL LEAK CHECK .0 AT 9 INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	<u>OKEE/ANTA</u>	Run #:	<u>CORP-3</u>
Location:	<u>UNIT 4</u>	Date:	<u>12 DEC 91</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>4463</u>	End Meter Reading:	<u>591.164</u>
Cp:	<u>.84</u>	Int Meter Reading:	<u>545.673</u>
P bar:	<u>30.12</u>	Begin Time:	<u>09:05</u>
P stack:	<u>.28</u>	End Time:	<u>10:10</u>
IMP-1 (INT)	<u>100 ML</u>	IMP-1 (FINAL)	<u>345</u>
IMP-2 (INT)	<u>100 ML</u>	IMP-2 (FINAL)	<u>176</u>
IMP-3 (INT)	<u>0 ML</u>	IMP-3 (FINAL)	<u>5</u>
IMP-4 (INT)	<u>500.0g</u>	IMP-4 (FINAL)	<u>515.5</u>

	TEST 1	TEST 2	TEST 3
% CO ₂	<u>11.2</u>	<u> </u>	<u> </u>
% O ₂	<u>9.0</u>	<u> </u>	<u> </u>
% CO	<u>0</u>	<u> </u>	<u> </u>

Project Director:	<u>S. MacKay</u>	Field Laboratory:	<u>MacKay/Gibson</u>
Meter Box Operator:	<u>B. Gibson</u>	Chain of Custody:	<u>S. MacKay</u>
Probe Operator:	<u>R. Good</u>	Plant Coordinator:	<u>G. DEVANE</u>
Orsat Analyst:	<u>S. MacKay</u>	Agency Rep:	<u> </u>

Comments:

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 1 OF 2
 PLANT Okeelanta
 LOCATION Unit 4

SAMPLING TIME PER POINT 2.5
 RUN # C-3
 DATE 12 DEC

TC# 1 2 3 4 5

	TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	
2.5	A 1	.33	1.98	542.5	76	76	260	68	151	2	
5	2	.32	1.92	549.5	84	76	258	66	158	2	
7.5	3	.33	1.98	551.2	88	77	252	62	158	2	9.3
10	4	.32	1.92	553.1	91	76	257	60	157	2	
12.5	5	.33	1.98	555.0	95	77	257	60	161	2	9.0
15	6	.32	1.92	556.9	97	77	259	60	158	2	9.5
17.5	7	.33	1.98	558.8	100	78	261	60	160	2	
20	8	.35	2.10	562.6	103	79	258	61	160	3	9.6
22.5	9	.34	2.04	564.6	105	80	259	62	162	3	
25	10	.33	1.98	566.5	107	81	258	63	163	3	8.8
27.5	11	.33	1.98	566.5	108	81	259	63	160	3	8.3
30	12	.30	1.80	568.2	108	81	260	63	161	3	9.0

COMMENTS: DELTA P * 6 = DELTA H
 BOX # 11 Y = .9911 DELTA H @ = 1.80
 START TIME : 0905
 END TIME : _____
 INITIAL LEAK CHECK .015 AT 16 INCHES HG
 FINAL LEAK CHECK .004 AT 6 INCHES HG

P.H. 0.0 @ 6 in HG

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

PAGE 2 OF 2

SAMPLING TIME PER POINT 2.5

PLANT Okefenokee

RUN # C-3

LOCATION Unit 4

DATE 12 DEC

TRAV. NO.	DELTA P	DELTA H	METER READING	DGM IN	DGM OUT	HOT BOX	IMPG TEMP	STACK TEMP	VAC	
2.5 B1	.32	1.92	570.1	100	81	266	66	150	3	9.0
5 2	.37	2.22	572.2	106	82	266	62	151	4	9.4
7.5 3	.35	2.10	574.1	108	83	265	62	161	3	9.8
10 4	.36	2.16	576.1	110	83	261	63	160	4	8.5
12.5 5	.33	1.98	578.0	112	83	255	65	161	3	8.6
15 6	.31	1.86	579.9	113	84	263	66	158	4	8.4
17.5 7	.31	1.86	581.7	113	85	247	65	161	4	8.5
20 8	.34	2.04	583.6	114	85	242	63	161	5	8.5
22.5 9	.34	2.04	585.5	114	85	240	63	159	4	8.6
25 10	.33	1.98	587.4	115	85	249	65	160	5	8.8
27.5 11	.31	1.86	589.3	116	86	247	64	160	5	8.4
30 12	.27	1.62	591.164	116	86	248	65	152	5	8.5
										8.75

COMMENTS:

DELTA P * 6 - DELTA H

BOX # 11 Y = .8911 DELTA H # = 1.80

START TIME : 0905 Same as page 1 of 1

END TIME :

INITIAL LEAK CHECK _____ AT _____ INCHES HG

FINAL LEAK CHECK _____ AT _____ INCHES HG

LABORATORY
SUMMARY OF RESULTS

PROJECT NUMBER: 91-102
PROJECT NAME: OKEELANTA CORPORATION
 BOILER #4

ANALYST: M. WAYT
ANALYSIS: EPA METHOD 5

FILTER

SAMPLE DESCRIPTION	FILTER #	TEST DATE	TARE WEIGHT (g)	FINAL WEIGHT (g)
C-1	4461	12-11-91	0.5922	0.7777
C-2	4462	12-11-91	0.5928	0.7827
C-3	4463	12-12-91	0.6080	0.7986
BLANK	4468	12-12-91	0.5945	0.5945

WASH

SAMPLE DESCRIPTION	BKR#	TEST DATE	TARE WEIGHT (g)	FINAL WEIGHT (g)	VOLUME (ml)
C-1	212	12-11-91	77.1779	77.2102	220
C-2	214	12-11-91	74.9160	74.9329	325
C-3	216	12-12-91	75.3080	75.3408	220
BLANK	220	12-12-91	78.5533	78.5543	200

Okeelanta Corporation - Boiler #4
Particulate Emissions Test Report

APPENDIX IX
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 %

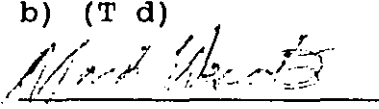
FORMULAS:

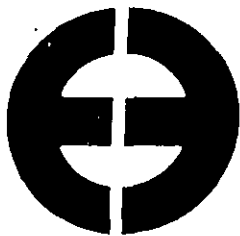
Y=

DELTA H @=

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

CALIBRATION BY:


MARK WESCOTT



Scan

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:

$$Y = \frac{(V w) (P b) (T d)}{(V d) (P b \text{ ABS}) (T w)}$$

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

CALIBRATION BY:


JPM JARDIN

TRANSCAT

"CAL-LAB"

Certificate of Calibration

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

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

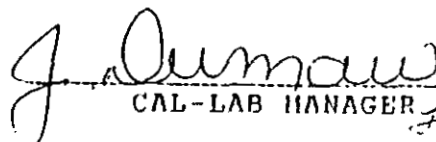
TEMPERATURE 68° F.

RELATIVE HUMIDITY OF 59%.

Customer : EASTMONT ENGINEERING
Manufacturer : TRANSDATION
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
2495	DATA PRECISION	9200	DC CALIB.	01/03/91	01/03/92
2496	FLUXE	9842A	DMH	03/13/91	03/13/92
2471	KAYE	140-4	ICR FT. REF.	03/14/91	03/13/92
2402	NRS	172144-K	STD THERMOCOUPLE	04/19/91	04/19/93


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

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 #: 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

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

NOZZLE CALIBRATION SHEET

PROJECT NAME: OKEELANTA 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: