Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section Number: 1.8

Reference Number: 58

Title: Okeelanta Corporation Particulate Emissions Test Report Boiler #6

December 1990

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
December 13 & 14, 1990

PREPARED BY:

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Project Director
Eastmount Engineering, Inc.
420 Main Street
Walpole, MA 02081

Sean MacKay
Project Director

11 FEB 91
Date

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1.0 COMPENDIUM

Eastmount Engineering Inc., conducted a Compliance Particulate Emissions Test Program on Unit #6 at Okeelanta Corporation's South Bay, Florida facility on December 13 and 14, 1990. The test program consisted of a series of three EPA Method 5 test runs.

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

The purpose of this test was to determine compliance with the rules of the Department of Environmental Regulation (DER), Chapter 17-2.600 Air Pollution, Section 2.05 Prohibitive Acts, Subsection 6, Stationary Sources, Table 11, Emission Limiting Standards.

During testing the boiler was burning bagasse as fuel. Boiler No. 6 is rated at 125,000 pounds of steam per hour. Results of the test program indicate Boiler No. 6 to be in compliance with the Florida DER emission standards. The following table summarizes the emission results, emission standards and boiler operating conditions.

RUN#	DATE	EMISSION RATE #/MMBtu	EMISSION RATE #/HR	ALLOWABLE #MMBtu	ALLOWABLE #/HR	LOAD #/HR	% OF 125 KPH
1	12-13-90	.138	27.45	.270	53.59	102000	81.6%
2	12-14-90	.135	26.91	.269	53.56	104400	83.5%
3	12-14-90	.118	23.41	.273	54.20	102092	81.7%
3 RUN AVG.		.130	25.92	.271	53.78	102831	82.3%

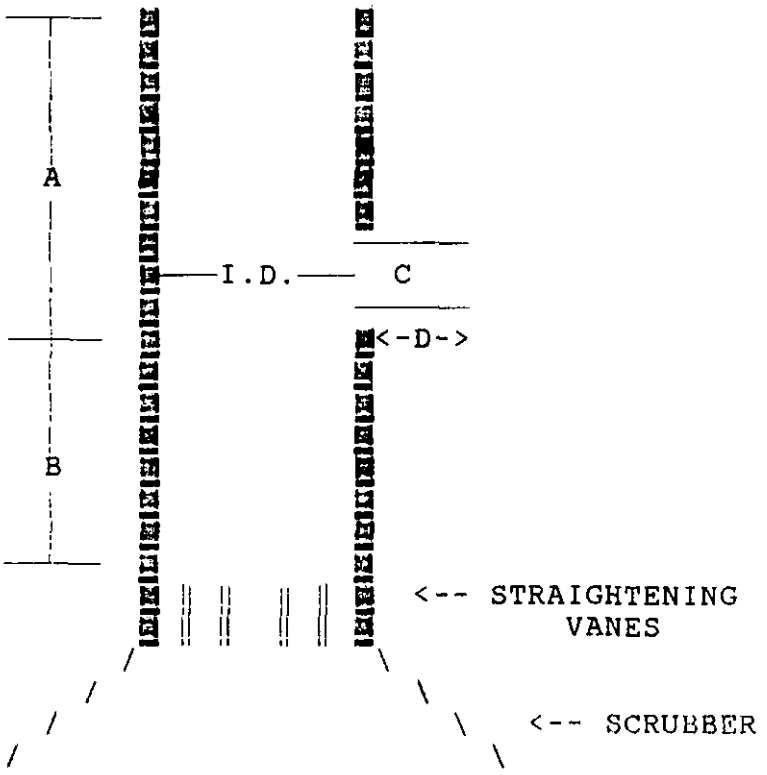
Sean MacKay, Project Director, was in charge of and responsible for all stack testing, conducted all calculations and maintained chain of custody of all samples. Kieran Nolan operated the meter box and performed the field laboratory aspects of the program. Mark Wescott located the probe at the proper 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. Mr. George Devane was responsible for boiler operation and acquisition of all pertinent process data.

2.0 STACK SCHEMATIC

OKEELANTA CORPORATION
UNIT # 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.

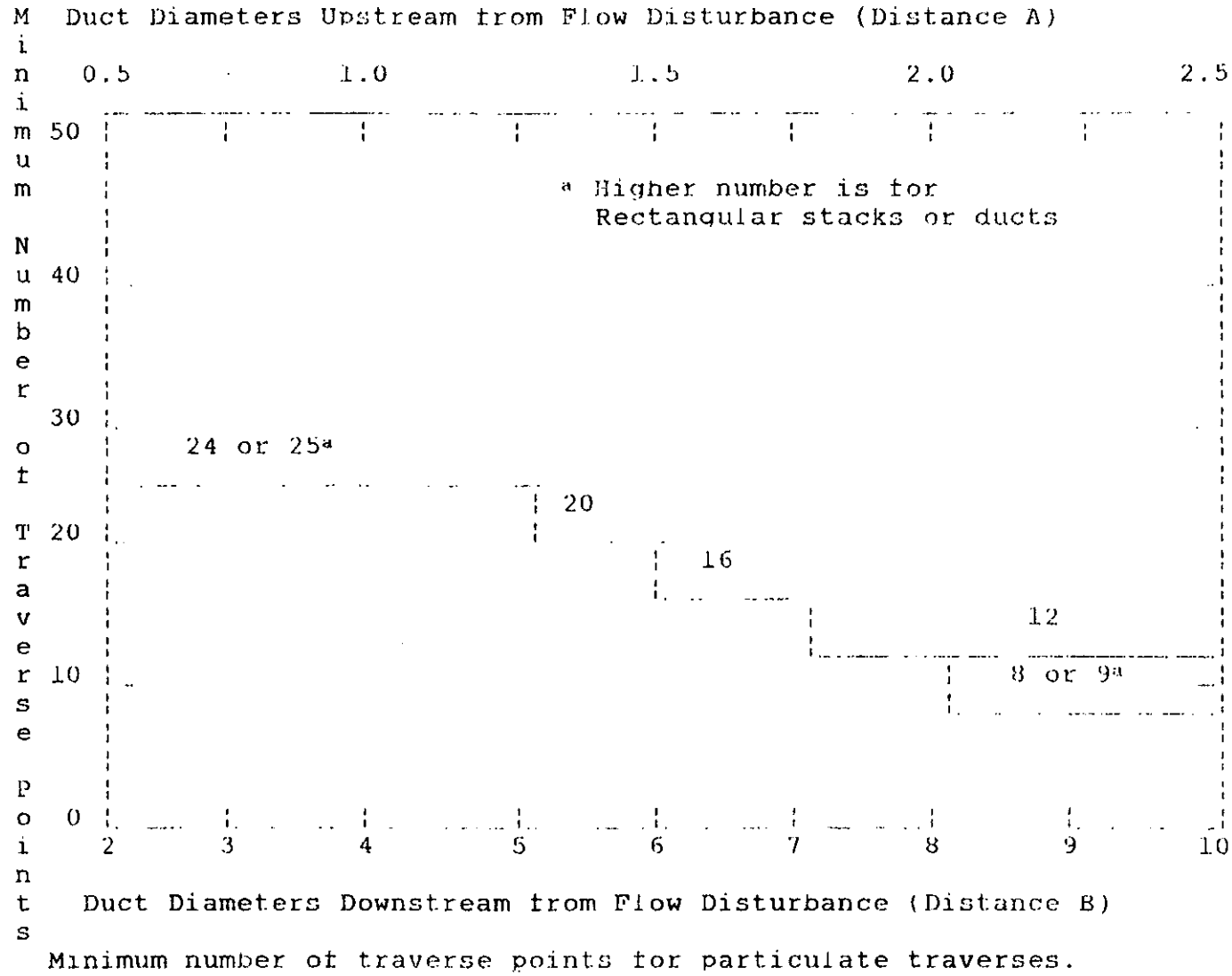


DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	4'
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	16'
DIAMETER OF PORT SLEEVE (C)	4"
LENGTH OF PORT SLEEVE (D)	3.5"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	7.5'

Drawing not to scale

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
UNIT # 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.

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
UNIT # 6
SOUTH BAY, FLORIDA FACILITY

DIAMETER OF STACK: 7.5 FEET
PORT SLEEVE LENGTH: 3 INCHES

TRAVERSE POINT	DISTANCE % OF DIAMETER	DISTANCE (INCHES)	PROBE MARK (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.

1. EMISSION SAMPLING EQUIPMENT

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

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

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

Heating System - The filter temperature was maintained by enclosing the filter in a hot box capable of maintaining the temperature at 248 °F +25°F. This temperature was monitored by use of a thermocouple in the hot box.

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

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

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

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

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

Gas Density Determination - An ORSAT type combustion analyzer, capable of measuring CO_2, O_2 and CO was used to determine the molecular weight of the flue gas. An integrated proportional sample was taken at each of the traverse points in order to assure that the total test span was covered. The ORSAT analysis was conducted immediately following each test run.

2. SAMPLING AND ANALYTICAL PROCEDURES

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

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

Static Pressure - The static pressure was checked and recorded.

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

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

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

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

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

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

4.0 SAMPLING TRAIN AND ANALYTICAL TEST PROCEDURES (cont.)

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

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

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

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

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

5.0 QUALITY CONTROL PROCEDURES

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

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

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

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

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

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

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

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

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 1
DATE : 12-13-90

Ds (FT)	7.5
Dn (IN)	.315
FILTER#	3785
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	222
IMP-2 (FIN)	114
IMP-3 (FIN)	2
IMP-4 (FIN)	517.5
% CO2	7.4
% O2	12.8
% CO	0
P BAR	30.11
P STK	.1
NO. PTS	24
TEST LNGTH	60
END METER	65.423
	.290
INT METER	21.945
BEGIN TIME:	13:00
END TIME:	14:10

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.19	.44	1.81	86	84	131
2	.23	.48	1.96	89	84	140
3	.25	.50	2.12	90	85	140
4	.28	.53	2.38	91	85	142
5	.28	.53	2.38	91	86	143
6	.28	.53	2.38	94	87	143
7	.25	.50	2.12	94	87	143
8	.24	.49	2.04	95	87	143
9	.25	.50	2.12	95	88	143
10	.26	.51	2.21	96	88	143
11	.26	.51	2.21	95	89	142
12	.25	.50	2.12	96	89	142
B1	.17	.41	1.45	91	89	130
2	.21	.46	1.79	93	89	132
3	.23	.48	1.96	94	89	133
4	.23	.48	1.96	95	89	136
5	.25	.50	2.13	95	89	140
6	.24	.49	2.04	96	89	143
7	.25	.50	2.13	96	89	145
8	.27	.52	2.23	95	89	143
9	.28	.53	2.38	96	90	144
10	.29	.54	2.47	87	90	143
11	.27	.52	2.23	87	90	142
12	.28	.53	2.38	87	91	142
AVERAGE	.25	.50	2.13	92.7	88.0	140.3

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 2
DATE : 12-14-90

Ds (FT)	7.5
Dn (IN)	.315
FILTER#	3786
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	227
IMP-2 (FIN)	114
IMP-3 (FIN)	1
IMP-4 (FIN)	513.8
% CO2	8.3
% O2	11.9
% CO	0
P BAR	30.09
P STK	.1
NO. PTS	24
TEST LNGTH	60
END METER	111.478
	.183
INT METER	67.535
BEGIN TIME:	10:10
END TIME:	11:20

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.23	.48	1.94	74	72	138
2	.25	.50	2.11	77	72	141
3	.29	.54	2.45	77	73	142
4	.30	.55	2.54	80	74	142
5	.30	.55	2.54	82	75	143
6	.28	.53	2.45	83	75	143
7	.26	.51	2.20	84	77	143
8	.26	.51	2.20	85	77	141
9	.27	.52	2.28	86	78	142
10	.28	.53	2.45	86	78	143
11	.29	.54	2.45	87	79	142
12	.28	.53	2.45	88	80	143
B1	.17	.41	1.44	84	80	139
2	.20	.45	1.69	85	80	142
3	.23	.48	1.94	86	80	143
4	.25	.50	2.11	87	82	143
5	.25	.50	2.11	88	81	144
6	.25	.50	2.11	89	82	145
7	.27	.52	2.11	89	82	145
8	.29	.54	2.28	89	82	144
9	.29	.54	2.45	90	83	143
10	.29	.54	2.45	90	83	142
11	.30	.55	2.54	90	83	141
12	.30	.55	2.54	91	84	141
AVERAGE	.27	.51	2.24	85.3	78.8	142.3

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 3
DATE : 12-14-90

Ds (FT)	7.5
Dn (IN)	.305
FILTER#	3784
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	227
IMP-2 (FIN)	118
IMP-3 (FIN)	2
IMP-4 (FIN)	532.5
% CO2	8.2
% O2	12.0
% CO	0
P BAR	30.09
P STK	.1
NO. PTS	24
TEST LNGTH	60
END METER	156.482
	.207
INT METER	112.019
BEGIN TIME:	12:05
END TIME:	13:10

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.21	.46	1.58	80	79	131
2	.25	.50	1.88	82	79	137
3	.27	.52	2.03	85	80	141
4	.31	.56	2.33	86	80	141
5	.31	.56	2.33	87	81	142
6	.33	.57	2.48	88	82	141
7	.31	.56	2.33	89	82	141
8	.30	.55	2.25	89	82	142
9	.33	.57	2.48	90	82	142
10	.34	.58	2.63	90	83	142
11	.34	.58	2.63	90	83	142
12	.35	.59	2.63	91	83	144
B1	.20	.45	1.50	86	83	131
2	.24	.49	1.80	89	84	138
3	.24	.49	1.80	90	84	142
4	.27	.52	2.03	90	84	143
5	.29	.54	2.18	91	84	143
6	.29	.54	2.18	91	85	142
7	.30	.55	2.25	90	85	143
8	.32	.57	2.40	91	86	143
9	.33	.57	2.48	91	85	144
10	.35	.59	2.63	92	85	144
11	.36	.60	2.70	92	86	144
12	.36	.60	2.70	92	86	144
AVERAGE	.30	.55	2.26	88.8	83.0	141.1

APPENDIX II

ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 1
DATE : 12-13-90

TS (`F)=	140.3	% CO2=	7.4	VM (CF) =	43.188
TS (`R)=	600.3	% O2=	12.8	DELTA H (ABS)=	30.27
TM (`F)=	90.3	% CO=	0	PS (ABS) =	30.12
TM (`R)=	550.3	% N2=	79.8	SQRT DELTA P =	.498679
VI(TOT)=	155.5	CP=	.84	AREA NOZZLE =	.000541
				Y =	1.001

VM STD = 17.64 $\frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 41.94 DSCF

VW STD = .04707 (VI TOT) = 7.32 CF

BWO = $\frac{VW\ STD}{VW\ STD + VM\ STD}$ = .149

BWO = MOISTURE FROM STEAM TABLES = .197

VI TOT = ADJUSTED TO SATURATION VOLUME= N/A ML

1-BWO = 1 - BWO = .851

Md (DRY) = .44 (% CO2)
+.32 (% O2)
+.28 (% CO)
+.28 (% N2)
= 29.70 LBS/LB MOLE

Ms (WET) = MD (1-BWO)
+ 18 (BWO)
= 27.96 LBS/LB MOLE

G = SQRT (TS / PS / MS) = .84

VS = 85.49(CP)(G)(SQRT DELTA P) = 30.2 FPS

H = 0.002669 (VI TOT) = .42

J = (DELTA H ABS)(VM)(Y) /(TM) = 2.38

K = (H) + (J) = 2.79

% ISO = $\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$ = 94.5

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 2
DATE : 12-14-90

TS (`F)=	142.3	% CO2=	8.3	VM (CF) =	43.760
TS (`R)=	602.3	% O2=	11.9	DELTA H (ABS)=	30.25
TM (`F)=	82.1	% CO=	0	PS (ABS) =	30.10
TM (`R)=	542.1	% N2=	79.8	SQRT DELTA P =	.514527
VI(TOT)=	155.8	CP=	.84	AREA NOZZLE =	.000541
				Y =	1.001

VM STD = $17.64 \dfrac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 43.13 DSCF

VW STD = .04707 (VI TOT) = 7.33 CF

BWO = $\dfrac{VW\ STD}{VW\ STD + VM\ STD}$ = .145

BWO = MOISTURE FROM STEAM TABLES = .207

VI TOT = ADJUSTED TO SATURATION VOLUME= N/A ML

1-BWO = 1 - BWO = .855

Md (DRY) = .44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2) = 29.80 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 28.09 LBS/LB MOLE

G = SQRT (TS / PS / MS) = .84

VS = 85.49(CP)(G)(SQRT DELTA P) = 31.2 FPS

H = 0.002669 (VI TOT) = .42

J = (DELTA H ABS)(VM)(Y) /(TM) = 2.44

K = (H) + (J) = 2.86

% ISO = $\dfrac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$ = 94.2

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 3
DATE : 12-14-90

Avg=141 Avg=12.2

TS (`F)=	141.1	% CO2=	8.2	VM (CF) =	44.256
TS (`R)=	601.1	% O2=	12.0	DELTA H (ABS)=	30.26
TM (`F)=	85.9	% CO=	0	PS (ABS) =	30.10
TM (`R)=	545.9	% N2=	79.8	SQRT DELTA P =	.546074
VI(TOT)=	179.5	CP=	.84	AREA NOZZLE =	.000507

Y = 1.001

VM STD = $\frac{17.64 \; (VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 43.31 DSCF

VW STD = .04707 (VI TOT) = 8.45 CF

BWO = $\frac{VW\ STD}{VW\ STD + VM\ STD}$ = .163

BWO = MOISTURE FROM STEAM TABLES = .201

VI TOT = ADJUSTED TO SATURATION VOLUME= N/A ML

1-BWO = 1 - BWO = .837

Md (DRY) = .44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2) = 29.79 LBS/LB MOLE

Ms (WET) = MD (1-BWO) + 18 (BWO) = 27.87 LBS/LB MOLE

G = SQRT (TS / PS / MS) = .85

VS = 85.49(CP)(G)(SQRT DELTA P) = 33.2 FPS

H = 0.002669 (VI TOT) = .48

J = (DELTA H ABS)(VM)(Y) /(TM) = 2.46

K = (H) + (J) = 2.93

% ISO = $\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$ = 96.7

APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 1
DATE : 12-13-90

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	220	560	260
	220	560	
	220	560	
	225	560	
	220	560	
	220	560	
AVERAGE	220.8 PSIG	560.0	260.0

P ABS = 235.5 PSIA

ENTHALPY @	550	'F AND	235	PSIA =	1292.9
ENTHALPY @	600	'F AND	235	PSIA =	1319.0
ENTHALPY @	560.0	'F AND	235	PSIA =	1298.1

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1069.5 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 2
DATE : 12-14-90

STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
260	560	260
220	560	
220	560	
215	560	
215	560	
	560	

AVERAGE 226.0 PSIG 560.0 260.0

P ABS = 240.7 PSIA

ENTHALPY @ 600 'F AND 240 PSIA = 1318.6

ENTHALPY @ 550 'F AND 240 PSIA = 1265.7

ENTHALPY @ 560.0 'F AND 240 PSIA = 1276.3

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1047.6 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 3
DATE : 12-14-90

STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
220	560	260
225	560	
225	560	
220	560	
220	560	
315	560	
AVERAGE 237.5 PSIG	560.0	260.0

P ABS = 252.2 PSIA

ENTHALPY @	600	'F AND	250	PSIA =	1317.9
ENTHALPY @	550	'F AND	250	PSIA =	1291.6
ENTHALPY @	560.0	'F AND	250	PSIA =	1296.9

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1068.2 BTU/LB OF STEAM

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 1
DATE : 12-13-90

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
			1400
END	156496	14: 10	LBS/HR STEAM
BEGIN	156411	13: 0	
NET	85	70	

85 X 1400 / 70 MINS = 102000

102000 LBS/HR STEAM / 55% EFF. = 185455 EQUIV.

185455 LBS/HR STEAM X 1069 BTU/LB = 198.3 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
END	1684	14: 10	
BEGIN	1454	13: 0	
NET	230 GALLONS	70	MINS = 197.143 GPH

197.1429 GPH X 150,000 BTU/GAL (EST) = 29.571 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	198.3	-	30	X	.3	=	50.6	LBS/HR
OIL			30	X	.1	=	3.0	LBS/HR
TOTAL						=	53.6	LBS/HR
						=	.270	#/MMBTu

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 2
DATE : 12-14-90

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
			1400
END	157453	11: 20	
			LBS/HR STEAM
BEGIN	157366	10: 10	
NET	87	70	

87 X 1400 / 70 MINS = 104400

104400 LBS/HR STEAM / 55% EFF. = 189818 EQUIV.

189818 LBS/HR STEAM X 1048 BTU/LB = 198.9 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
END	2445	11: 20	
BEGIN	2208	10: 10	
NET	237 GALLONS	70	

237 GALLONS 70 MINS = 203.143 GPH

203.1429 GPH X 150,000 BTU/GAL (EST) = 30.471 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	198.9	-	30	X	.3	=	50.5	LBS/HR
OIL			30	X	.1	=	3.0	LBS/HR
TOTAL						=	53.6	LBS/HR

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 3
DATE : 12-14-90

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
			1400
END	157578	13: 10	
			LBS/HR STEAM
BEGIN	157499	12: 5	
NET	79	65	

NET 79 X 1400 / 65 MINS = 102092

102092 LBS/HR STEAM / 55% EFF. = 185622 EQUIV.

185622 LBS/HR STEAM X 1068 BTU/LB = ~~198.3~~ BTU(e6)/HR

Avg = 198.5

	OIL INTEGRATOR READINGS		TIME		GALS/HR
END	2770		13: 10		
BEGIN	2579		12: 5		
NET	191	GALLONS	65	MINS = 176.308	GPH

Avg = 192.198

176.3077 GPH X 150,000 BTU/GAL (EST) = 26.446 BTU(e6)/HR

Avg = 28.829

Total = 227.33

ALLOWABLE EMISSIONS

BAGASSE	198.3	-	26	X	.3	=	51.6	LBS/HR
OIL			26	X	.1	=	2.6	LBS/HR
TOTAL						=	54.2	LBS/HR
						=	.273	#/MMBTu

APPENDIX V

EMISSION CALCULATION SHEETS

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 1
DATE : 12-13-90

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3785	200	3777	12
FINAL:	.7553	78.5103	.6443	73.2295
TARE :	.6358	78.4843	.6442	73.2285
NET :	.1195	.0260	.0001	.0010/200ML

VOLUME OF RINSE 285

WEIGHT = 145.50
RESIDUE = - 1.43

Mn = 144.08 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3623492 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 7.575e-6 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .05 GRAINS /SCF

PMR = (QS) (CS) = 27.45 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 198.3 BTU e6 / HR

CS = LBS / MILLION BTu = .138 LBS/ BTu e6

ALLOWABLE = 53.59 LBS/HR

= .270 LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 2
DATE : 12-14-90

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NO. :	3786	212	3777	12
FINAL:	.7590	77.1959	.6443	73.2295
TARE :	.6351	77.1776	.6442	73.2285
NET :	.1239	.0183	.0001	.0010/200ML

VOLUME RINSE 275

WEIGHT = 142.20
RESIDUE = - 1.38

Mn = 140.83 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3736898 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 7.200e-6 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .05 GRAINS /SCF

PMR = (QS) (CS) = 26.91 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 198.9 BTU e6 / HR

CS = LBS / MILLION BTu = .135 LBS/ BTu e6

ALLOWABLE = 53.56 LBS/HR

= .269 LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 6

RUN #: COMP - 3
DATE : 12-14-90

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3784	217	3777	12
FINAL:	.7403	76.6050	.6443	73.2295
TARE :	.6357	76.5907	.6442	73.2285
NET :	.1046	.0143	.0001	.0010/200ML

VOLUME OF RINSE 212

WEIGHT = 118.90
RESIDUE = - 1.06

Mn = 117.84 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3902071 DSCFH

Avg = 3,754,154

CS = (2.205 X 10-6) (Mn) / (VM STD) = 6.000e-6 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .04 GRAINS /SCF

PMR = (QS) (CS) = 23.41 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 198.3 BTU e6 / HR

Avg = 198.5

CS = LBS / MILLION BTu = .118 LBS/ BTu e6

ALLOWABLE = 54.20 LBS/HR

= .273 LBS/ BTu e6

APPENDIX VI

NOMENCLATURE SHEETS

NOMENCLATURE SHEET

PARTICULATE EMISSION TEST

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

NOMENCLATURE (cont'd)

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

NOMENCLATURE (cont'd)

TM (°R)	Average temperature of the dry gas meter in degrees Rankine.
VEL HEAD	The pressure drop measured across the pitot tubes.
V1 (TOT)	The amount of water collected in the impingers in milliliters.
VM (CF)	The volume sampled through the dry gas meter in cubic feet.
VM STD	Volume sampled through the dry gas meter corrected to standard conditions.
VS	Velocity of the stack gas in feet per second.
VW STD	The amount of moisture collected, converted to standard cubic feet.
Y	Meter box calibration factor.
o	Sampling time in minutes.

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

CAPACITY 125,000
INT. FACTOR 1400
RUN # 6-1

BOILER # 6

POLLUTION COMPLIANCE TESTING
DATE: 12-13-90
TESTED BY: Eastmount Eng.

TIME	STEAM INTERGRATOR	OIL METER North	OIL METER South	STEAM PRESS.	STEAM TEMP.	CHART READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
PM 1:00	156411	1454	CKD Meter	220	560	105,000	350	260°
1:15	156430			220	560	105,000	350	"
1:30	156449			220	560	105,000	350	"
1:45	156467			225	560	105,000	360	"
2:00	156484			220	560	105,000	350	"
2:10	156496	1684		220	560	102,000	350	"

BOILER PRESSURE DROP				
OVERFIRE AIR PRESS.				
AIR HEATER AIR OUT				
UNDERGRATE AIR PRESS.				
WIND BOX PRESSURE				
FURNACE PRESSURE	.40	.40	.50	.50
BLR. OUTLET PRESSURE				
DUST COLLECTOR OUT.				
SCRUBBER DIFF.	4.5	4.0	4.5	4.5

BOILER TEMPERATURE				
BOILER OUTLET				
AIR HEATER GAS OUT				
AIR HEATER AIR OUT	500	500	500	500
I.D. FAN	—	450	450	450
S.H. STEAM TEMP.	560	560	560	560

PANEL SETTINGS				
FURNACE PRESSURE				
F.D. FAN PRESSURE				
BAGASSE FEED				
UNDERGRATE AIR				
OVERFIRE AIR				

TEST RESULTS

OIL USED	230	GALS.
TOTAL TEST TIME	70	MINS.
INTERGATOR TIME	85	COUNT
INTERGRATOR STEAM	102,000	P.P.H.
CHART READING	637,000	TOTAL
CHART AVERAGE	104,500	P.P.H.
I.D. FAN TURBINE	4600	RPM
STACK TEMPERATURE	140	°F
GRATE TEMPERATURE	None	°F
SCRUBBER WATER	500	G.P.M.

COMMENTS:

	"A"	"B"	
(1) Mill speed	80	80	F.P.M.

(2) Using two oil burners

Allowed = 53.59

Actual = 27.45

PLANT READINGS BY [signature]

% OF CAPACITY

BAILEY RECORDER
Chart No.
Meter No.
Date
Integrator
Off
On
DEC 13 1990
BAILEY CONTROLS COMPANY
WICKLIFFE, OHIO
Start
Finish
11:35
R-10

CAPACITY 125,000
INT. FACTOR 1400
RUN # 6-2

BOILER # 6

POLLUTION COMPLIANCE TESTING
DATE: 12-14-90
TESTED BY: Eastmount Eng

TIME	STEAM INTERGRATOR	OIL METER North	OIL METER South	STEAM PRESS.	STEAM TEMP.	CHART READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
10:10	157366	2208	Use Meter	260	560	100,000	360	260
10:25	157387			220	560	110,000	350	"
10:40	157403			220	560	108,000	350	"
10:55	157422			215	560	105,000	340	"
11:10	157441			215	560	108,000	340	"
11:20	157453	2445			560	105,000	340	"

BOILER PRESSURE DROP				
OVERFIRE AIR PRESS.				
AIR HEATER AIR OUT				
UNDERGRATE AIR PRESS.				
WIND BOX PRESSURE	3.5	3.5	3.5	2.5
FURNACE PRESSURE	.40	.40	.40	.40
BLR. OUTLET PRESSURE				
DUST COLLECTOR OUT.				
SCRUBBER DIFF.	4.5	4.5	4.5	4.5

BOILER TEMPERATURE				
BOILER OUTLET	650	650	650	650
AIR HEATER GAS OUT	500	500	450	460
AIR HEATER AIR OUT				
I.D. FAN				
S.H. STEAM TEMP.	560	560	560	560

PANEL SETTINGS				
FURNACE PRESSURE				
F.D. FAN PRESSURE				
BAGASSE FEED				
UNDERGRATE AIR				
OVERFIRE AIR				

TEST RESULTS

OIL USED	237	GALS.
TOTAL TEST TIME	70	MINS.
INTERGATOR TIME	87	COUNT
INTERGRATOR STEAM	104,400	P.P.H.
CHART READING	638,000	TOTAL
CHART AVERAGE	106,000	P.P.H.
I.D. FAN TURBINE	4600	RPM
STACK TEMPERATURE	144	°F
GRATE TEMPERATURE	None	°F
SCRUBBER WATER	500	G.P.M.

COMMENTS:

	"A"	"B"	
(1) Mill speed	80	80	F.P.M.

(2) Using one oil burner

Allowed = 53.56

Actual = 26.91

PLANT READINGS BY George Dolton

% OF CAPACITY

CAPACITY 125,000
INT. FACTOR 1400
RUN # 6-3

BOILER # 6

POLLUTION COMPLIANCE TESTING
DATE: 12-14-90
TESTED BY: Eastmount Eng

TIME	STEAM INTERGRATOR	OIL METER North	OIL METER South	STEAM PRESS.	STEAM TEMP.	CHART READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
PM 12:05	157499	2579	One Meter	220	560	95,000	340	260
12:20	157518			225	560	104,000	360	"
12:35	157536			225	560	109,000	360	"
12:50	157554			220	560	110,000	350	"
1:05	157571			220	560	95,000	350	"
1:10	157578	2770		215	560	100,000	340	"

BOILER PRESSURE DROP				
OVERFIRE AIR PRESS.				
AIR HEATER AIR OUT				
UNDERGRATE AIR PRESS.				
WIND BOX PRESSURE				
FURNACE PRESSURE	.40	.50	.40	.40
BLR. OUTLET PRESSURE				
DUST COLLECTOR OUT.				
SCRUBBER DIFF.	4.5	4.5	4.5	4.5

BOILER TEMPERATURE				
BOILER OUTLET	650	650	650	650
AIR HEATER GAS OUT	450	450	450	450
AIR HEATER AIR OUT				
I.D. FAN				
S.H. STEAM TEMP.	560	560	560	560

PANEL SETTINGS
FURNACE PRESSURE
F.D. FAN PRESSURE
BAGASSE FEED
UNDERGRATE AIR
OVERFIRE AIR

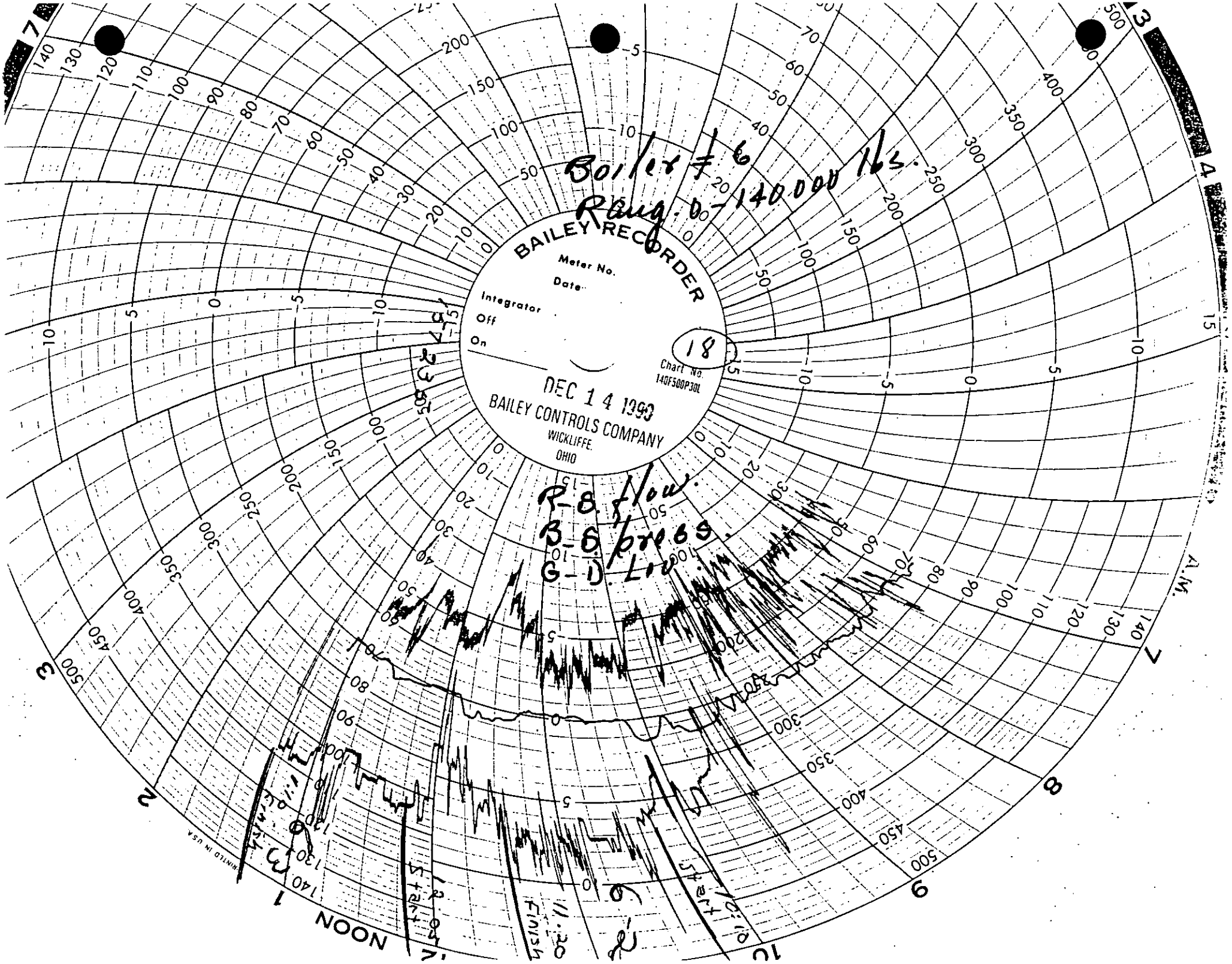
TEST RESULTS

OIL USED	191	GALS.
TOTAL TEST TIME	65	MINS.
INTERGATOR TIME	79	COUNT
INTERGRATOR STEAM	102,092	P.P.H.
CHART READING	604,000	TOTAL
CHART AVERAGE	100,666	P.P.H.
I.D. FAN TURBINE	4700	RPM
STACK TEMPERATURE	141	°F
GRATE TEMPERATURE	None	°F
SCRUBBER WATER	500	G.P.H.

COMMENTS:
(1) Mill speed "A" 80 "B" 80 F.P.M.
(2) using one oil burner

Allowed = 54.20
Actual = 23.41

PLANT READINGS BY [signature]
% OF CAPACITY


BAILEY RECORDER
Meter No.
Date
Integrator
Off
On
Chart No.
140F500P30L
18
DEC 14 1993
BAILEY CONTROLS COMPANY
WICKLIFFE
OHIO
Boiler # 6
Rang 0-140000 lbs.
R-8 flow
B-6 press
G-D Liv
NOON
A.M.
Finish
Start
PRINTED IN USA

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

TRAVERSE DATA SHEET

Page 2 of 2 — Sampling time per point: 2.5 min/pt

Plant: Okaelanta — Run #: Comp-1

Location: #6 Unit — Date: 13 Dec 90

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
Port B				43.935						
10	B 1	.17	1.45	45.045	91	89	231	54	130	1.0
12.5	2	.21	1.79	47.115	93	89	249	52	132	1.0
	3	.23	1.96	48.85	94	89	269	53	133	2.0
13.0	4	.23	1.96	50.63	95	89	264	53	136	2.0
	5	.25	2.13	52.435	95	89	261	54	140	2.0
13.0	6	.24	2.04	54.24	96	89	257	54	143	2.0
	7	.25	2.13	56.08	96	~~96~~ 89	261	57	145	2.0
13.0	8	.27	2.23	57.925	95	89	264	57	143	2.5
	9	.28	2.38	59.68	96	90	263	57	144	3.0
13.0	10	.29	2.47	61.685	97	90	263	57	143	3.0
	11	.27	2.23	63.55	97	90	263	59	142	3.0
12.5	12	.28	2.38	65.423	97	91	261	60	142	3.0

Relationship: 8.5
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: 13:00 End Time: 14:10
Pre Leak Ck: _____ CFM @ _____ "Hg
Mid Leak Ck: _____ CFM @ _____ "Hg (Vol: _____)
Post Leak CK: dead CFM @ 3.0 "Hg
Pitot Leak CK: _____ @ _____ "H2O
Box Oper: M. Wisell Probe Oper: Kevin Nolan

TRAVERSE DATA SHEET

Page 1 of 2 | Sampling time per point: 25 min/pt

Plant: Okeelanta | Run #: Comp-1

Location: Unit # 6 | Date: 13 Dec 90

	Trav. No.	Delta P	Delta H	Meter Reading 21.945	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A	1	.19	1.81	23.35	86	84	270	65	131	1
11.5	2	.23	1.96	25.42	89	84	235	60	140	1
	3	.25	2.12	27.18	90	85	255	62	140	1
13.5	4	.28	2.38	29.15	91	85	270	63	142	1
	5	.28	2.38	30.865	91	86	265	65	143	1
13.0	6	.28	2.38	32.7.25	94	87	245	65	143	1.5
	7	.25	2.12	34.54	74	87	270	64	143	1.5
12.5	8	.24	2.04	36.345	95	87	270	64	143	1.5
	9	.25	2.12	38.125	95	88	235	57	143	1.5
12.5	10	.26	2.21	40.06	96	88	270	52	143	2.0
	11	.24	2.21	41.815	95	89	263	51	142	2.0
13.0	12	.25	2.12	43.645	96	89	261	50	142	2.0

Relationship: 8.5
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: 1300 End Time: _____
Pre Leak Ck: dead CFM @ 10 "Hg
Mid Leak Ck: dead CFM @ 2 "Hg (Vol: _____)
Post Leak CK: _____ CFM @ _____ "Hg
Pitot Leak CK: dead @ 7.2 "H2O
Box Oper: Mick Wescott Probe Oper: Kieran Nolan

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	Comp - 2
Location	UNIT 6	Date:	14 DEC 90
Ds (ft):	7.5	No. Points:	24
Dn (in):	.375	Test Length:	60 min
Filter #:	3786	End Meter Reading:	111.478
Cp:	.84	Int Meter Reading:	67.535
P bar:	30.09	Begin Time:	10:10
P stack:	.1	End Time:	11:20
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	227 ml
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	114 ml
IMP-3 (INT)	0	IMP-3 (FINAL)	1 ml
IMP-4 (INT)	500.00	IMP-4 (FINAL)	513.5

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

Project Director:	Sean MacKay	Field Laboratory:	MacKay Wescott
Meter Box Operator:	M. Wescott	Chain of Custody:	MacKay
Probe Operator:	K. NOLAN	Plant Coordinator:	C. CLAUNE
Orsat Analyst:	S. MacKay	Agency Rep:	K. TUCKER

Comments:

TRAVERSE DATA SHEET

Page 1 of 2 | Sampling time per point: 2.5 min/pt

Plant: Okeelanta | Run #: Comp-2

Location: Unit #6 | Date:

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
				67.535						
A	1	.23	1.94	69.462	74	72	270	60	138	1
12.5	2	.25	2.11	71.14	77	72	266	52	141	1
	3	.29	2.45	73.025	77	73	263	53	142	1
13.0	4	.30	2.54	74.955	80	74	259	54	142	1
	5	.30	2.54	76.895	82	75	270	54	143	1.5
13.0	6	.28	2.45	78.795	83	75	269	53	143	1.5
	7	.26	2.20	80.645	84	77	262	54	143	1.5
13.0	8	.26	2.20	82.46	85	77	240	55	141	1.5
	9	.27	2.28	84.29	86	78	260	56	143	1.5
13.0	10	.28	2.45	86.14	86	78	257	56	143	2.0
	11	.29	2.45	87.95	87	79	270	56	142	2.0
13.5	12	.28	2.45	89.567	88	80	256	58	143	2.0

Relationship: 8.45
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: 10:10 End Time: 11:20
Pre Leak Ck: dead CFM @ 15 "Hg
Mid Leak Ck: dead CFM @ 2.0 "Hg (Vol: .183)
Post Leak CK: .0 CFM @ 3 "Hg
Pitot Leak CK: good @ 4 "H2O
Box Oper: MW Probe Oper: KN

TRAVERSE DATA SHEET

Page 2 of 2 | Sampling time per point: 2.5 min/pt

Plant: Okeelanta | Run #: Comp-2

Location: Unit #6 | Date: 14 Dec 90

	Trav. No.	Delta P	Delta H	Meter Reading ~~89~~ 90.05	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
% O_2	1	.17	1.44	91.54	84	80	240	59	139	1
12.5	2	.20	1.69	93.15	85	80	243	56	142	1
	3	.23	1.94	94.865	86	80	263	57	143	1
12.5	4	.25	2.11	96.65	87	82	255	57	143	2.0
	5	.25	2.11	98.44	88	81	232	58	144	2.0
12.5	6	.25	2.11	100.245	89	82	239	59	145	2.0
	7	.25	2.11	102.004	89	82	248	59	145	2.0
12.5	8	.27	2.28	103.89	89	82	256	59	144	2.5
	9	.29	2.45	105.78	90	83	260	60	143	2.75
12.5	10	.29	2.45	107.65	90	83	268	60	142	3.0
	11	.30	2.54	109.57	90	83	270	61	141	3.0
13.0	12	.30	2.54	111.478	91	84	267	60	141	3.0

Relationship: 8.45
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: _____ End Time: _____
Pre Leak Ck: _____ CFM @ _____ "Hg
Mid Leak Ck: _____ CFM @ _____ "Hg (Vol: _____)
Post Leak CK: dead CFM @ 3.0 "Hg
Pitot Leak CK: _____ @ _____ "H2O
Box Oper: _____ Probe Oper: _____

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	COMP-3
Location:	UNIT 6	Date:	14 DEC 90
Ds (ft):	7.5	No. Points:	24
Dn (in):	.305	Test Length:	60 MIN
Filter #:	3784	End Meter Reading:	156.432
Cp:	.84	Int Meter Reading:	112.019
P bar:	30.09	Begin Time:	1205
P stack:	.1	End Time:	1310
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	227
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	118
IMP-3 (INT)	0 ML	IMP-3 (FINAL)	2
IMP-4 (INT)	500.0 g	IMP-4 (FINAL)	532.5 g

	TEST 1	TEST 2	TEST 3
% CO2	8.2		
% O2	12.0		
% CO	0		

Project Director:	S. MacKay	Field Laboratory:	MacKay / Wescott
Meter Box Operator:	M. Wescott	Chain of Custody:	MacKay
Probe Operator:	K. Nolan	Plant Coordinator:	G. Devane
Orsat Analyst:	S. MacKay	Agency Rep:	K. Tucker

Comments:

TRAVERSE DATA SHEET

Page 1 of 2 | Sampling time per point: 2.5 min/pt

Plant: Okeelanta | Run #: Comp-3

Location: Unit #6 | Date: 14 Dec. 90

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
				112.019						
MO_2	A1	.21	1.58	114.09	80	79	261	55	131	1
	2	.23	1.88	115.90	82	79	270	49	137	1
11.5	3	.27	2.03	117.77	85	80	266	50	141	1
	4	.31	2.33	119.645	86	80	262	52	141	1
12.5	5	.31	2.33	121.635	87	81	268	53	142	1
	6	.33	2.48	123.42	88	82	256	55	141	1
12.5	7	.31	2.33	125.155	89	82	261	55	141	1
	8	.30	2.25	126.90	89	82	235	56	142	1
	9	.33	2.48	128.86	90	82	260	56	142	1
12.5	10	.34	2.63	130.83	90	83	270	57	142	1
	11	.34	2.63	132.79	90	83	248	57	142	1
13.0	12	.35	2.63	134.59	91	83	241	57	144	1.5

Relationship: 7.5
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: 1205 End Time: 1370
Pre Leak Ck: .10 CFM @ 15 "Hg
Mid Leak Ck: dead CFM @ 1.5 "Hg (Vol: _____)
Post Leak CK: .10 CFM @ 2.5 "Hg
Pitot Leak CK: good @ 5 "H2O
Box Oper: MJ Probe Oper: KN

TRAVERSE DATA SHEET

Page 2 of 2 | Sampling time per point: 2.5 min/pt

Plant: Okeelanta | Run #: Comp-3

Location: Unit # 6 | Date: 14 Dec 90

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
$\%O_2$				134.797						
	1	.20	1.5	136.355	86	83	240	62	131	1
12.5	2	.24	1.8	138.40	89	84	243	55	138	1
	3	.24	1.8	139.73	90	84	263	56	142	1
12.5	4	.27	2.03	141.46	90	84	260	57	143	1
	5	.27	2.18	143.27	91	84	254	57	143	1
12.5	6	.29	2.18	145.09	91	85	242	57	142	1
	7	.30	2.25	146.92	90	85	248	57	143	1
12.5	8	.32	2.40	148.79	91	86	238	57	143	1.5
	9	.33	2.48	150.66	91	85	262	58	144	1.5
13.0	10	.35	2.63	152.575	92	85	265	59	144	2.0
	11	.36	2.7	154.53	92	86	245	59	144	2.0
13.0	12	.36	2.7	156.482	92	86	241	58	144	2.5

Relationship: 7.5
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: _____ End Time: _____
Pre Leak Ck: _____ CFM @ _____ "Hg
Mid Leak Ck: _____ CFM @ _____ "Hg (Vol: _____)
Post Leak CK: dead CFM @ 2.5 "Hg
Pitot Leak CK: _____ @ _____ "H2O
Box Oper: M. Wescott Probe Oper: K. Nolan

APPENDIX IX

EQUIPMENT CALIBRATION SHEETS

METER BOX CALIBRATION SHEET

BOX NUMBER: 4
PRESS BAR : 30.04

DATE: 10 SEPT 1990
DUE: 10 MAR 1991

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	5	5.037	.50	.0368	30.08	13.80
2	5	5.043	1.00	.0735	30.11	9.55
3	10	10.190	1.50	.1103	30.15	15.34
4	10	10.273	2.00	.1471	30.19	13.46
5	10	10.330	3.00	.2206	30.26	11.69
6	10	10.400	4.00	.2941	30.33	9.64

RUN #	TEMP WET (°F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	69.3	82.3	77.3	79.8	1.011	2.09
2	69.7	83.7	78.3	81.0	1.010	2.00
3	70.0	86.7	80.3	83.5	1.003	1.93
4	70.0	89.3	82.7	86.0	.9979	1.97
5	69.3	91.7	83.3	87.5	.9940	2.21
6	69.0	94.7	85.3	90.0	.9900	1.99
				AVERAGE	1.001	2.03

MAX % DEVIATION 1.10
ALLOWABLE % DEV 2.00

FORMULAS:

Y=

$$\frac{(V\ w)\ (P\ b)\ (1\ d)}{(V\ d)\ (P\ b\ \ ABS)\ (T\ w)}$$

DELTA H @=

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

CALIBRATION BY: From Computer Disk BCH 12-Feb-90

SCOTT LAWTON

POST
METER BOX CALIBRATION SHEET

BOX #: 4 DATE: 2-11-91
PRES BAR: 30.02 VACUUM: 10IN HG

RUN #	VOLUME WET	VOLUME DRY	DELTA H	DELTA H /13.6	PRES BAR (ABS)	TIME (MINS)
1	10.00	10.089	1.95	.143	30.16	13.39
2	10.00	10.353	1.95	.143	30.16	13.73
3	10.00	10.333	1.95	.143	30.16	13.73

RUN #	TEMP WET (`F)	TEMP DRY INLET	TEMP DRY OUT	TEMP DRY (AVG)	Y	DELTA H @
1	65.0	85.7	80.0	82.8	1.020	1.87
2	65.0	87.7	81.7	84.7	.9973	1.96
3	65.0	88.7	82.3	85.5	1.001	1.96
				AVERAGE	1.006	1.93

PRE CAL Y = 1.0010 % DIFFERENCE = .50 %

ALLOWABLE = 5.00 %

FORMULAS:

Y=

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

DELTA H @=

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

CALIBRATION BY: S. MacKAY

NOZZLE CALIBRATION SHEET

PROJECT NAME: OKEELANTA PROJECT NUMBER: 90-102

POINT#	NOZZLE# 5/16-3	NOZZLE # 5/16-14	NOZZLE# 1/4-3	NOZZLE # 1/4-1
1	.316	.313	.251	.250
2	.314	.312	.249	.251
3	.315	.311	.250	.251
AVG.	.315	.312	.250	.251

Sean MacKay 3 DEC 90

CALIBRATED BY: DATE:

NOZZLE CALIBRATION SHEET

PROJECT NAME: OKEELANTA PROJECT NUMBER: 90 102

POINT#	NOZZLE# 1/64-1	NOZZLE # 1/4-2	NOZZLE# ____	NOZZLE # ____
1	.305	.256	____	____
2	.305	.258	____	____
3	.305	.257	____	____
AVG.	.305	.257	____	____

SEAN MACKAY
CALIBRATED BY:

3 DEC 90
DATE:

THERMOCOUPLE CALIBRATION SHEET

SET #: 8'-1 DATE: 10-25-85

REFERENCE MERCURY/GLASS

STANDARD ('F)	THERMOCOUPLE ('F)	ABSOLUTE OF % DEVIATION
74	72	.37
210	205	.75
400	409	1.05
	MAXIMUM DEVIATION	1.05
	ALLOWABLE	1.50

SET #: 8.5'-1 DATE: 11-15-85

STANDARD ('F)	THERMOCOUPLE ('F)	ABSOLUTE OF % DEVIATION
66	63	.57
170	170	0
211.5	215	.52
	MAXIMUM DEVIATION	.57
	ALLOWABLE	1.50

CALIBRATION BY: G. ZWILLING

DATE 4/25/91 FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
PARTICULATE STACK TEST VERIFICATION
DER METHOD 5

FACILITY NAME: OKEELANTA APIS #

COMPANY CONDUCTING TEST: EASTMOUNT TEST DATE 12 13 90

SOURCE DESCRIPTION: BOILER 6

STACK TEST DATA SUMMATION

		RUN1	RUN2	RUN3
1.H2O	(VOL.MEAS.),ML	155.5	155.8	179.5
2.H2O	(MASS MEAS.),GM	0	0	0
3.M'N	PARTICULATE WEIGHT, GM	.144	.1408	.1178
4.V'M	VOLUME METERED,CF	43.188	43.76	44.256
5.Y	DRY GAS MTR. CALIB.FCTR.	1.001	1.001	1.001
6.RDP	AVG SQR D.P-SAMPLING	.5	.51	.55
7.DH	AVG DELTA H,IN.H2O	2.13	2.24	2.26
8.T'M	AVG MTR. TEMP,DEG.F	90.3	82.1	85.9
9.T'S	AVG STACK TEMP,DEG.F	140.3	142.3	141.1
10.P'SG	STACK PRESS,''HG(GAUGE)	.1	.1	.1
11.P'B	BAROMETRIC PRESS,''HG	30.11	30.09	30.09
13.D'N	ACTUAL NOZZLE DIAM,IN	.315	.315	.305
14.T	ACTUAL SAMPLE TIME,MIN	60	60	60
15.C'P	PITOT TUBE COEFFICIENT	.84	.84	.84
23.S/T	VALUE:SAMPLE PTS/TOT PTS	1	1	1

RUN	VOLUME SAMPLED DSCF	MOISTURE CONTENT PERCENT	STACK VEL FPS	FLOW RATE DSCF/H	PERCENT ISO-KINETIC	ACTUAL EMISS LB/HR	ACTUAL EMISS LB/MBTU	ALLOW EMISS LB/MBTU
1	41.94	14.86	30.13	3,623,827	94.55	27.42	0.139	0.300
2	43.12	14.53	30.77	3,700,431	95.20	26.63	0.135	0.300
3	43.31	16.32	33.28	3,925,953	96.12	23.54	0.119	0.300
MEAN	42.79	15.24	31.40	3,750,070	95.29	25.86	0.131	0.300

SUMMARY

GENERAL:

REVIEWED BY AS
ACTUAL A 'S = 44.2 SQ FT
LAMINAR FLOW ASSUMED (<10 DEG YAW) (OR <20 DER)
ACTUAL EMISS BASED ON HEAT INPUT = 198 MBTU/HR
ALL REQUIRED LEAK TESTS ACCEPTABLE
ASSUMED M 'D=30.0 (COMBUSTION GASES)

COMMENT.....

RUN 1 :

ACTUAL A 'N = .0005412 SQ FT
P 'S = 30.21 IN HG

COMMENT.....

RUN 2 :

ACTUAL A 'N = .0005412 SQ FT
P 'S = 30.19 IN HG

COMMENT.....

RUN 3 :

ACTUAL A 'N = .0005074 SQ FT
P 'S = 30.19 IN HG

COMMENT.....

STACK TEST REVIEW DATA INPUT FORM

TEST DATE: _____

FACILITY: Okeelanta #C APIS #: _____

DESCRIPTION: Boiler #6

TESTING FIRM: E E

PERMIT EMISSION LIMIT: .3 LB/MMBTU OR _____ LB/HR

AVERAGE HEAT INPUT: 198 MMBTU/HR

A's (AREA OF STACK): 442 FT2

MEASURED PARAMETERS

		Run-1	Run-2	Run-3
1.	H2O impingers (V'i), milliliters	155.5	155.8	179.5
2.	H2O filter, grams	.1440	.1408	.1178
3.	M'n (particulate weight), grams	43.188	43.760	44.256
4.	V'm (gas volume metered), FT3	1.001	1.001	1.001
5.	Y (dry gas calibration factor)	.50	.51	.55
6.	RDP (average square root dP)	2.13	2.24	2.26
7.	dH (average delta H), inches H2O	90.3	82.1	85.9
8.	T'm (average meter temperature), F	140.3	142.3	141.1
9.	T's (average stack temperature), F	.1	.1	.1
10.	P's (stack pressure, abs.) inches Hg	30.11	30.09	30.09
11.	P'b (barometric pressure, abs.) inches Hg	.315	.315	.305
13.	D'n (nozzle dia.), inches	60	60	60
14.	Sample Time, minutes	.84	.84	.84
15.	C'p (pitot tube coefficient)	1	1	1
23.	S/T (sample pts./total pts.)			