AP-42 Section Number: 1.8

Reference Number: 62

Title: Okeelanta Corporation Particulate Emissions Test Reprot Boiler #12

January 1991

Eastmount Engineering

Environmental Consultants — Air Quality Specialists

OKEELANTA CORPORATION

COMPLIANCE PARTICULATE EMISSIONS TEST REPORT

BOILER #12

PREPARED FOR:

Okeelanta Corporation
Okeelanta Sugar Division
South Bay, Florida 33493

CONCERNING:

Particulate Emissions Testing
Okeelanta Corporation
Boiler #12
South Bay Florida Facility
January 31 & February 1, 1991

PREPARED BY:

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Sean MacKay

Sean MacKay
Project Director

28 Feb 91

Date

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APPENDIX

1.0 COMPENDIUM

Eastmount Engineering Inc., conducted a Compliance Particulate Emissions Test Program on Unit #12 at Okeelanta Corporation's South Bay, Florida facility on January 31 and February 1, 1991. 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's 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 II, Emission Limiting Standards.

During testing the boiler was burning bagasse and oil as fuel. Boiler No. 12 is rated at 150,000 pounds of steam per hour. Results of the test program indicate Boiler No. 12 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 150 KPH
1	01-31-91	.164	42.58	.185	48.16	127938	85.3%
2	01-31-91	.137	34.04	.187	46.49	122480	81.7%
3	02-01-91	.158	40.38	.185	47.32	126086	84.1%
3	RUN AVG.	.153	39.00	.186	47.32	125501	83.7%

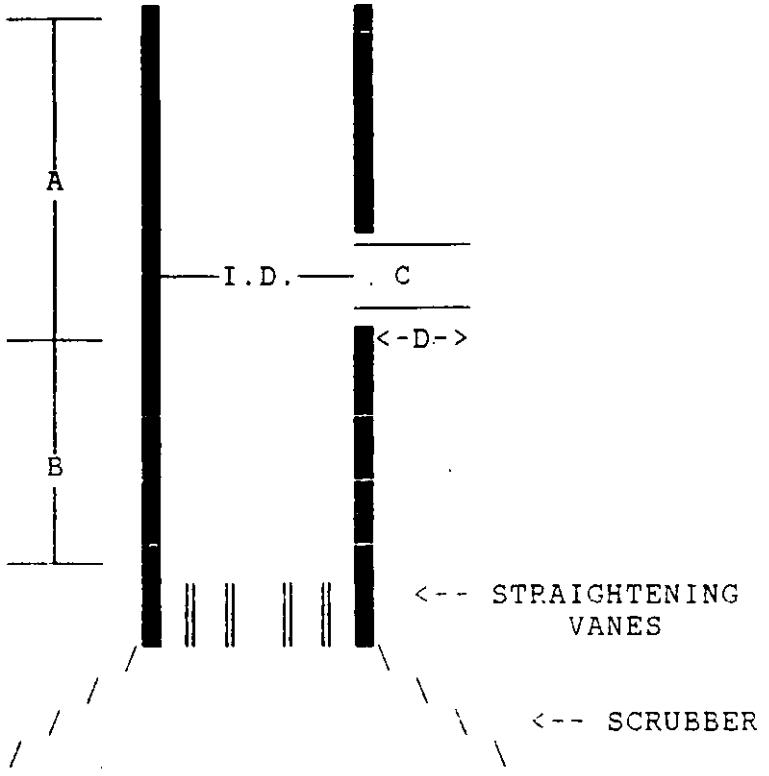
Sean MacKay, Project Director, was in charge of and responsible for all stack testing, conducted all calculations and maintained chain of custody of all samples. Mark Wescott operated the meter box and performed the field laboratory aspects of the program. Brian Gibson located the probe at the proper traverse point locations and assisted where required. Mr. Sherrel Culliver 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 # 12
SOUTH BAY, FLORIDA FACILITY

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

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

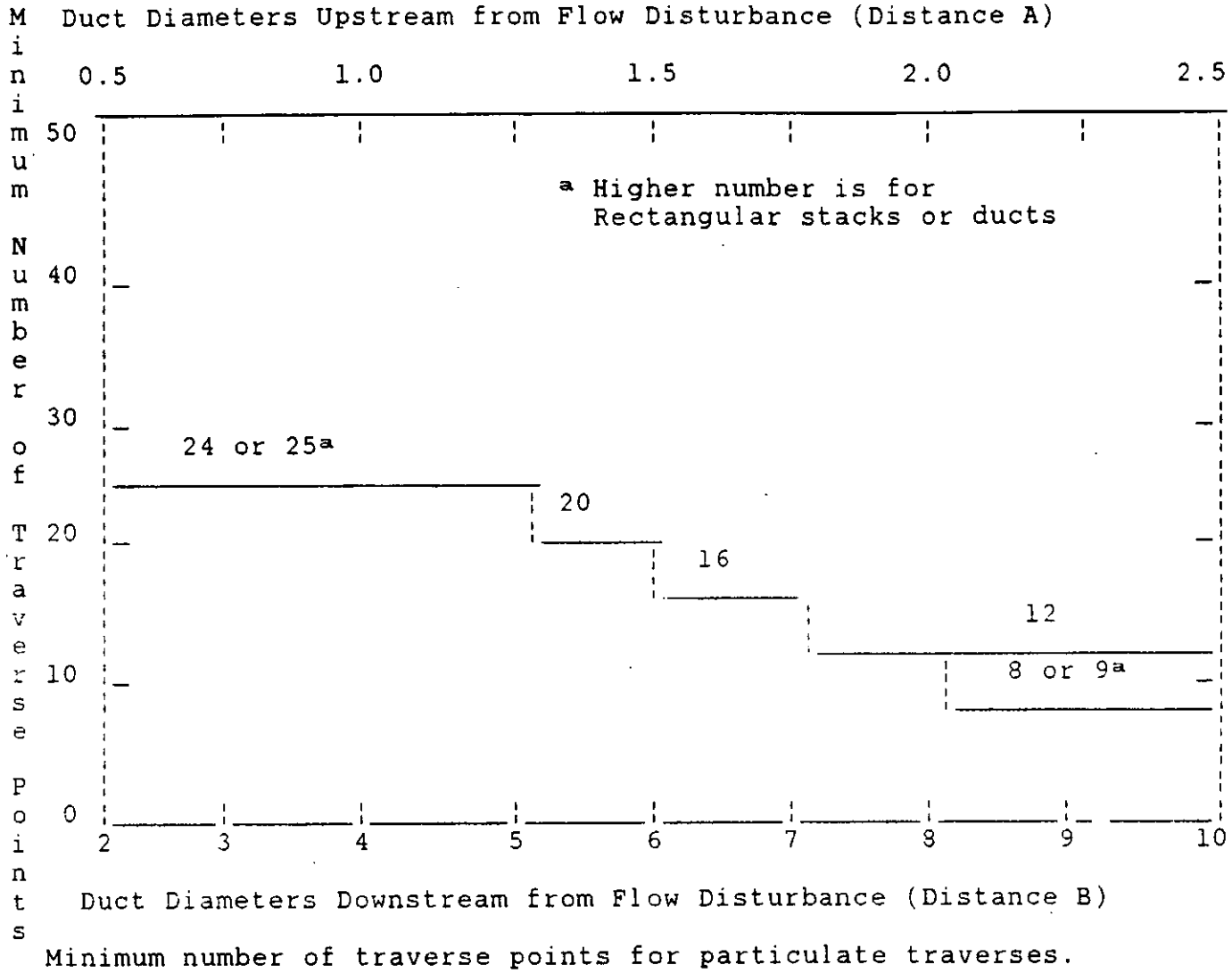


DISTANCE UPSTREAM FROM FLOW DISTURBANCE (A)	4'
DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE (B)	16'
DIAMETER OF PORT SLEEVE (C)	4"
LENGTH OF PORT SLEEVE (D)	3.5"
NUMBER OF PORTS	2
INTERNAL DIAMETER OF STACK AT SAMPLING PORTS	7.5'

Drawing not to scale

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
UNIT # 12
SOUTH BAY, FLORIDA FACILITY



Minimum number of traverse points for particulate traverses.

Distance A = 4' or 0.5 diameters.

Distance B = 16' or 2.1 diameters.

In accordance with Method 1, 24 traverse points are needed.

In order to sample for a minimum of one hour and draw at least 30 cubic feet, each traverse point was sampled for 2.5 minutes.

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
UNIT # 12
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, calculations were conducted to determine the percent isokinetics of the test run.

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

5.0 QUALITY CONTROL PROCEDURES

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

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

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

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

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

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

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

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

APPENDIX I

COMPUTER INPUT SHEETS

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-1
DATE : 01-31-91

Ds (FT)	7.5
Dn (IN)	.305
FILTER#	3760
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	254
IMP-2 (FIN)	120
IMP-3 (FIN)	2
IMP-4 (FIN)	512.0
% CO2	12.2
% O2	8.0
% CO	0
P BAR	30.06
P STK	.15
NO. PTS	24
TEST LNGTH	60
END METER	687.772
	.190
INT METER	647.427
BEGIN TIME:	11:30
END TIME:	12:35

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.18	.42	1.24	80	79	138
2	.24	.49	1.66	79	79	138
3	.25	.50	1.72	83	79	139
4	.27	.52	1.86	85	80	139
5	.26	.51	1.80	86	80	139
6	.23	.48	1.59	87	81	139
7	.23	.48	1.59	87	82	139
8	.24	.49	1.66	89	83	138
9	.24	.49	1.66	89	83	140
10	.24	.49	1.66	90	84	138
11	.24	.49	1.66	91	84	139
12	.25	.50	1.72	91	85	137
B1	.22	.47	1.52	90	86	138
2	.24	.49	1.66	90	86	137
3	.26	.51	1.80	92	87	138
4	.27	.52	1.86	93	87	139
5	.26	.51	1.80	94	88	137
6	.24	.49	1.66	94	88	139
7	.25	.50	1.73	95	89	140
8	.26	.51	1.80	95	89	140
9	.28	.53	1.93	96	90	139
10	.28	.53	1.93	97	90	140
11	.27	.52	1.56	97	92	139
12	.26	.51	1.80	97	91	139
AVERAGE	.25	.50	1.70	90.3	85.1	138.7

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 01-31-91

Ds (FT)	7.5
Dn (IN)	.305
FILTER#	3761
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	254
IMP-2 (FIN)	125
IMP-3 (FIN)	2
IMP-4 (FIN)	515.5
% CO2	12.1
% O2	8.1
% CO	0
P BAR	30.06
P STK	.15
NO. PTS	24
TEST LNGTH	60
END METER	728.351
	.395
INT METER	688.150
BEGIN TIME:	13:45
END TIME:	15:00

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.20	.45	1.40	85	83	138
2	.22	.47	1.54	86	84	140
3	.26	.51	1.82	87	84	140
4	.27	.52	1.90	88	84	140
5	.26	.51	1.82	90	86	139
6	.23	.48	1.61	90	85	140
7	.22	.47	1.54	91	86	139
8	.23	.48	1.61	92	88	140
9	.23	.48	1.61	92	86	140
10	.24	.49	1.68	92	87	140
11	.23	.48	1.61	93	87	139
12	.23	.48	1.61	92	88	141
B1	.23	.48	1.61	89	87	141
2	.24	.49	1.68	91	88	143
3	.25	.50	1.75	91	87	144
4	.26	.51	1.82	92	88	144
5	.25	.50	1.78	93	88	144
6	.24	.49	1.68	94	89	143
7	.25	.50	1.75	94	89	143
8	.25	.50	1.75	96	90	141
9	.25	.50	1.75	95	90	143
10	.25	.50	1.75	95	90	142
11	.25	.50	1.75	95	90	143
12	.26	.51	1.82	96	91	143
AVERAGE	.24	.49	1.69	91.6	87.3	141.3

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 02-01-91

Ds (FT)	7.5
Dn (IN)	.305
FILTER#	3762
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	270
IMP-2 (FIN)	125
IMP-3 (FIN)	3
IMP-4 (FIN)	515.2
% CO2	11.7
% O2	8.5
% CO	0
P BAR	30.10
P STK	.15
NO. PTS	24
TEST LNGTH	60
END METER	774.680
	.134
INT METER	729.520
BEGIN TIME:	11:45
END TIME:	12:55

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.29	.54	2.03	72	71	139
2	.31	.56	2.17	73	71	138
3	.35	.59	2.45	76	72	139
4	.37	.61	2.59	78	73	139
5	.35	.59	2.45	79	73	140
6	.33	.57	2.31	80	73	140
7	.31	.56	2.17	81	75	138
8	.32	.57	2.24	82	75	138
9	.32	.57	2.24	83	76	138
10	.32	.57	2.24	83	76	140
11	.30	.55	2.10	84	77	138
12	.30	.55	2.10	84	77	140
B1	.23	.48	1.61	82	79	139
2	.29	.54	2.03	84	80	137
3	.31	.56	2.17	85	80	140
4	.33	.57	2.31	88	81	140
5	.33	.57	2.31	88	81	140
6	.30	.55	2.10	89	82	139
7	.32	.57	2.24	89	82	138
8	.35	.59	2.45	90	83	138
9	.36	.60	2.52	90	83	139
10	.36	.60	2.52	91	84	138
11	.27	.52	1.89	90	84	139
12	.15	.39	1.05	89	84	139
AVERAGE	.31	.56	2.18	83.8	78.0	138.9

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 01-31-91

TS (`F)=	141.3	% CO2=	12.1	VM (CF) =	39.806
TS (`R)=	601.3	% O2=	8.1	DELTA H (ABS)=	30.18c
TM (`F)=	89.5	% CO=	0	PS (ABS) =	30.07
TM (`R)=	549.5	% N2=	79.8	SQRT DELTA P =	.491321
VI(TOT)=	196.5	CP=	.84	AREA NOZZLE =	.000507

Y = 1.001

VM STD	=	$17.64 \frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 38.61	DSCF
VW STD	=	.04707 (VI TOT)	= 9.25	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .193	
BWO	=	MOISTURE FROM STEAM TABLES	= .202	
VI TOT	=	ADJUSTED TO SATURATION VOLUME=	N/A	ML
1-BWO	=	1 - BWO	= .807	
Md (DRY)	=	.44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2)	= 30.26	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 27.89	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .85	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 29.9	FPS
H	=	0.002669 (VI TOT)	= .52	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.19	
K	=	(H) + (J)	= 2.71	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 99.4	

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ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-1
DATE : 01-31-91

TS (`F)=	138.7	% CO2=	12.2	VM (CF) =	40.155
TS (`R)=	598.7	% O2=	8.0	DELTA H (ABS)=	30.19
TM (`F)=	87.7	% CO=	0	PS (ABS) =	30.07
TM (`R)=	547.7	% N2=	79.8	SQRT DELTA P =	.497851
VI(TOT)=	188.0	CP=	.84	AREA NOZZLE =	.000507

Y = 1.001

VM STD	=	$\frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 17.64	= 39.08	DSCF
VW STD	=	.04707 (VI TOT)	= 8.85	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .185	
BWO	=	MOISTURE FROM STEAM TABLES	= .189	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	=	1 - BWO	= .815	
Md (DRY)	=	.44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2)	= 30.27	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 28.01	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .84	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 30.1	FPS
H	=	0.002669 (VI TOT)	= .50	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.22	
K	=	(H) + (J)	= 2.72	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 98.3	

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APPENDIX II

ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 02-01-91

TS (`F)=	138.9 Avg = 140	% CO2=	11.7 Avg = 8.2	VM (CF)	= 45.026
TS (`R)=	598.9	% O2=	8.5	DELTA H (ABS)=	30.26
TM (`F)=	80.9	% CO=	0	PS (ABS)	= 30.11
TM (`R)=	540.9	% N2=	79.8	SQRT DELTA P	= .556093
VI(TOT)=	213.2	CP=	.84	AREA NOZZLE	= .000507

Y = 1.001

VM STD	=	$\frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 17.64	= 44.48	DSCF
VW STD	=	.04707 (VI TOT)	= 10.04	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .184	
BWO	=	MOISTURE FROM STEAM TABLES	= .190	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	=	1 - BWO	= .816	
Md (DRY)	=	.44 (% CO2) + .32 (% O2) + .28 (% CO) + .28 (% N2)	= 30.21	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)	= 33.7	FPS
H	=	0.002669 (VI TOT)	= .57	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.52	
K	=	(H) + (J)	= 3.09	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 99.9	

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APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-1
DATE : 01-31-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	350	670	260
	340	670	
	340	660	
	360	660	
	340	670	
AVERAGE	346.0 PSIG	666.0	260.0

P ABS = 360.7 PSIA

ENTHALPY @	700	'F AND	360	PSIA =	1364.1
ENTHALPY @	600	'F AND	360	PSIA =	1309.9
ENTHALPY @	666.0	'F AND	360	PSIA =	1345.7

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1117.0 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 01-31-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	350	660	260
	340	660	
	350	660	
	350	680	
	350	670	
	350	660	
AVERAGE	348.3 PSIG	665.0	260.0

P ABS = 363.0 PSIA

ENTHALPY @	700	'F AND	360	PSIA =	1364.1
ENTHALPY @	600	'F AND	360	PSIA =	1309.9
ENTHALPY @	665.0	'F AND	360	PSIA =	1345.1

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1116.5 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 02-01-91

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	340	650	260
	350	660	
	340	650	
	360	680	
	350	660	
	340	660	
AVERAGE	346.7 PSIG	660.0	260.0
P ABS =	361.4 PSIA		

ENTHALPY @	700	'F AND	360	PSIA =	1364.1
ENTHALPY @	600	'F AND	360	PSIA =	1309.9
ENTHALPY @	660.0	'F AND	360	PSIA =	1342.4

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1113.8 BTU/LB OF STEAM

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-1
DATE : 01-31-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR		
					100		
END	741611		12: 35				
					LBS/HR STEAM		
BEGIN	740225		11: 30				
NET	1386	X	100 / 65	MINS =	127938		

127938 LBS/HR STEAM / 55% EFF. = 232615 EQUIV.

232615 LBS/HR STEAM X 1117 BTU/LB = 259.8 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR
END	847334		12: 35		
BEGIN	847059		11: 30		
NET	275	GALLONS	65	MINS = 253.846	GPH

253.8462 GPH X 150,000 BTU/GAL (EST) = 38.077 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	259.8 - 38	X	.2	=	44.4	LBS/HR
OIL	38	X	.1	=	3.8	LBS/HR
TOTAL				=	48.2	LBS/HR

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 01-31-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR	
					100	
END	744575		15: 0			
BEGIN	743044		13: 45		LBS/HR STEAM	
NET	1531	X	100 / 75	MINS =	122480	

122480 LBS/HR STEAM / 55% EFF. = 222691 EQUIV.

222691 LBS/HR STEAM X 1116 BTU/LB = 248.6 BTU(e6)/HR

	OIL INTEGRATOR READINGS		TIME		GALS/HR	
END	847865		15: 0			
BEGIN	847595		13: 45			
NET	270	GALLONS	75	MINS =	216	GPH

216 GPH X 150,000 BTU/GAL (EST) = 32.4 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	248.6	-	32	X	.2	=	43.2 LBS/HR
OIL			32	X	.1	=	3.2 LBS/HR
TOTAL						=	46.5 LBS/HR

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HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 02-01-91

	STEAM INTEGRATOR READINGS		TIME		INTEGRATOR FACTOR
END	767658		12: 55		100
BEGIN	766187		11: 45		LBS/HR STEAM
NET	1471	X	100 / 70	MINS =	126086

126086 LBS/HR STEAM / 55% EFF. = 229247 EQUIV.

229247 LBS/HR STEAM X 1114 BTU/LB = 255.3 BTU(e6)/HR

Avg = 254.6

	OIL INTEGRATOR READINGS		TIME		GALS/HR
END	850545		12: 55		
BEGIN	850254		11: 45		
NET	291	GALLONS	70	MINS = 249.429	GPH

Avg = 239.758

249.4286 GPH X 150,000 BTU/GAL (EST) = 37.414 BTU(e6)/HR

Avg = 35.964

Total = 290.53

ALLOWABLE EMISSIONS

BAGASSE	255.3	-	37	X	.2	=	43.6 LBS/HR
OIL			37	X	.1	=	3.7 LBS/HR
TOTAL						=	47.3 LBS/HR

APPENDIX V

EMISSION CALCULATION SHEETS

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-1
DATE : 01-31-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3760	206	3747	211
FINAL:	.8393	77.9397	.6434	79.1328
TARE :	.6472	77.9138	.6430	79.1327
NET :	.1921	.0259	.0004	.0001/200ML

VOLUME OF RINSE 235

WEIGHT = 218.00
RESIDUE = - .12

Mn = 217.88 Mg AS = 44.2 SQ FT

Qs =	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) =	3463483	DSCFH
CS =	(2.205 X 10-6) (Mn) / (VM STD) =	1.229e-5	LBS/SCF
CS' =	0.0154 (Mn) / (VM STD) =	.09	GRAINS /SCF
PMR =	(QS) (CS) =	42.58	LBS/HR
LOAD=	MILLIONS OF BTU / HOUR INPUT =	259.8	BTU e6 / HR
CS =	LBS / MILLION BTu =	.164	LBS/ BTu e6
ALLOWABLE	=	48.16	LBS/HR
	=	.185	LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-2
DATE : 01-31-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3761	212	3747	211
FINAL:	.8052	77.1935	.6434	79.1328
TARE :	.6450	77.1772	.6430	79.1327
NET :	.1602	.0163	.0004	.0001/200ML

VOLUME OF RINSE 425

WEIGHT ▫ 176.50
RESIDUE = - .21

Mn = 176.29 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3381659 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.007e-5 LBS/SCF

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

PMR = (QS) (CS) = 34.04 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 248.6 BTU e6 / HR

CS = LBS / MILLION BTu = .137 LBS/ BTu e6

ALLOWABLE = 46.49 LBS/HR

= .187 LBS/ BTu e6

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EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 12

RUN #: COMP-3
DATE : 02-01-91

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3762	213	3747	211
FINAL:	.8379	78.0304	.6434	79.1328
TARE :	.6456	78.0124	.6430	79.1327
NET :	.1923	.0180	.0004	.0001/200ML

VOLUME OF RINSE 280

WEIGHT = 210.30
RESIDUE = - .14

Mn = 210.16 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 3876127 DSCFH

Avg = 3,573,756

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.042e-5 LBS/SCF

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

PMR = (QS) (CS) = 40.38 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 255.3 BTU e6 / HR

CS = LBS / MILLION BTu = .158 LBS/ BTu e6

ALLOWABLE = 47.32 LBS/HR

= .185 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.
VI (TOT)	The amount of water collected in the impingers in milliliters.
VM (CF)	The volume sampled through the dry gas meter in cubic feet.
VM STD	Volume sampled through the dry gas meter corrected to standard conditions.
VS	Velocity of the stack gas in feet per second.
VW STD	The amount of moisture collected, converted to standard cubic feet.
Y	Meter box calibration factor.
o	Sampling time in minutes.

APPENDIX VII

FIELD DATA SHEETS - UNIT OPERATING CONDITIONS

CAPACITY 150,000
INT. FACTOR 100
RUN # 12-1

BOILER # 12

POLLUTION COMPLIANCE TESTING
DATE: 1-31-91
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.
AM 11:30	740225	847059	~~one~~ ~~None~~	350	670	125,000	640	260
11:45	740541			340	670	128,000	620	"
PM 12:00	740855			340	660	125,000	610	"
12:15	741172			360	660	128,000	600	"
12:35	741611	847334		340	670	125,000	600	"

BOILER PRESSURE DROP						
OVERFIRE AIR PRESS.	14	14	14	15	14	0 a
AIR HEATER AIR OUT	2.0	1.9	1.9	2.0	1.9	8.4
UNDERGRATE AIR PRESS.	.40	.60	.60	.40	.50	
WIND BOX PRESSURE	2.5	2.2	2.4	2.4	2.3	
FURNACE PRESSURE	.60	.60	.70	.60	.60	
BLR. OUTLET PRESSURE						
DUST COLLECTOR OUT.	4.2	4.1	4.2	4.2	4.2	
SCRUBBER DIFF.	6.2	6.0	6.2	6.0	6.0	

BOILER TEMPERATURE					
BOILER OUTLET					
AIR HEATER GAS OUT					
AIR HEATER AIR OUT					
I.D. FAN					
S.H. STEAM TEMP.	670	670	660	660	670

PANEL SETTINGS	
FURNACE PRESSURE	7
F.D. FAN PRESSURE	15
BAGASSE FEED	62
UNDERGRATE AIR	90
OVERFIRE AIR	45

TEST RESULTS		
OIL USED	275	GALS.
TOTAL TEST TIME	65	MINS.
INTERGATOR TIME	1386	COUNT
INTERGRATOR STEAM	127,938	P.P.H.
CHART READING	631,000	TOTAL
CHART AVERAGE	126,200	P.P.H.
I.D. FAN TURBINE	4400	RPM
STACK TEMPERATURE	139	°F
GRATE TEMPERATURE	675	°F
SCRUBBER WATER	64 600	G.P.M.

COMMENTS:

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

(2) [redacted] oil burner - one

Allowed =

Actual =

PLANT READINGS BY Joseph Dixon

% OF CAPACITY

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

BOILER # 12

POLLUTION COMPLIANCE TESTING
DATE: 1-31-97
TESTED BY: Eastmount EAS

TIME	STEAM INTERGRATOR	OIL METER NORTH	OIL METER SOUTH	STEAM PRESS.	STEAM TEMP.	CHART READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
PM 1:45	743044	847595	~~one~~ ~~meter~~	350	660	125,000	640	260°
2:00	743361			340	660	120,000	600	"
2:15	743669			350	660	125,000	620	"
2:30	743975			350	680	125,000	650	"
2:45	744274			350	670	120,000	660	"
3:00	744575	847865		350	660	120,000	660	"

BOILER PRESSURE DROP

OVERFIRE AIR PRESS.	14	14	14	14	14
AIR HEATER AIR OUT	2.0	1.9	2.0	2.0	2.0
UNDERGRATE AIR PRESS.	.50	.60	.50	.50	.50
WIND BOX PRESSURE	2.4	2.2	2.4	2.4	2.4
FURNACE PRESSURE	.50	.60	.60	.60	.70
BLR. OUTLET PRESSURE					
DUST COLLECTOR OUT.	4.0	4.0	4.0	3.9	4.0
SCRUBBER DIFF.	6.0	5.8	5.8	5.8	6.0

BOILER TEMPERATURE

BOILER OUTLET	700	690	680	680	680
AIR HEATER GAS OUT	410	410	410	410	410
AIR HEATER AIR OUT	590	590	590	590	590
I.D. FAN	400	400	400	400	400
S.H. STEAM TEMP.	660	660	660	680	670

PANEL SETTINGS

FURNACE PRESSURE	7
F.D. FAN PRESSURE	15
BAGASSE FEED	60%
UNDERGRATE AIR	90%
OVERFIRE AIR	45

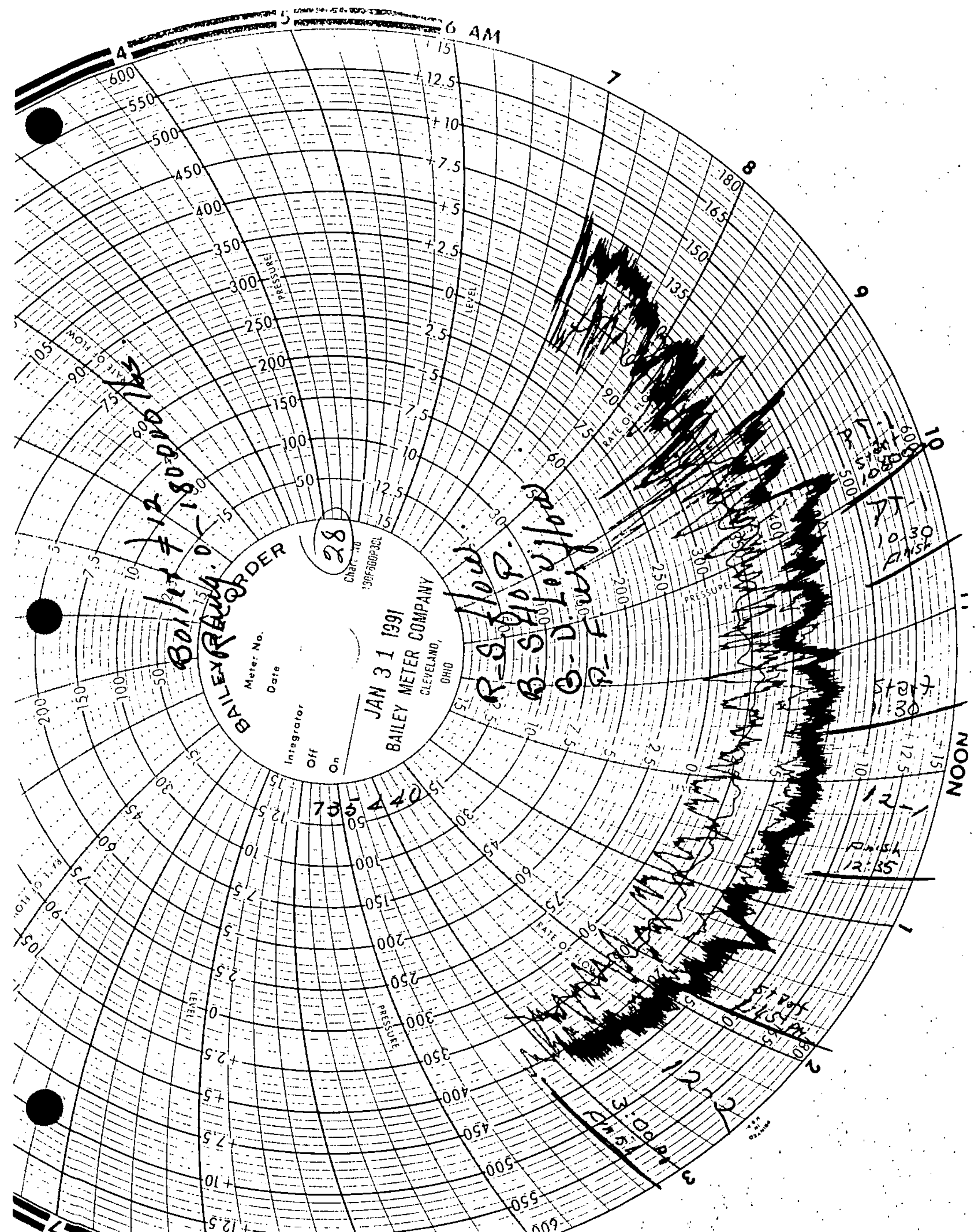
TEST RESULTS

OIL USED	270	GALS.
TOTAL TEST TIME	75	MINS.
INTERGATOR TIME	1531	COUNT
INTERGRATOR STEAM	122,460	P.P.H.
CHART READING	735,000	TOTAL
CHART AVERAGE	122,500	P.P.H.
I.D. FAN TURBINE	4400	RPM
STACK TEMPERATURE	140	°F
GRATE TEMPERATURE	680	°F
SCRUBBER WATER	est 600	G.P.M.

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

Allowed =
Actual =

PLANT READINGS BY [signature]
% OF CAPACITY


BAILEY RECORDER
Meter No.
Date
Integrator
Off
On
JAN 31 1991
BAILEY METER COMPANY
CLEVELAND, OHIO
6 AM
NOON
RATE OF FLOW
PRESSURE
LEVEL
28

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

BOILER # 12

POLLUTION COMPLIANCE TESTING
DATE: 2-1-91
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.
AM 11:45	766187	850254	ans Meter	340	650	122,000	630	260
PM 12:00	766505			350	660	125,000	620	"
12:15	766825			340	650	128,000	600	"
12:30	767134			360	680	125,000	620	"
12:45	767450			350	660	125,000	640	"
12:55	767658	850545		340	660	125,000	630	"

BOILER PRESSURE DROP

OVERFIRE AIR PRESS.	14	14	14	14	14
AIR HEATER AIR OUT	1.8	1.9	1.8	1.8	1.9
UNDERGRATE AIR PRESS.	.40	.50	.50	.50	.50
WIND BOX PRESSURE	2.0	2.2	2.0	2.2	2.3
FURNACE PRESSURE	.60	.60	.60	.60	.60
BLR. OUTLET PRESSURE					
DUST COLLECTOR OUT.	4.3	4.3	4.3	4.3	4.3
SCRUBBER DIFF.	6.2	6.2	6.0	6.2	6.2

BOILER TEMPERATURE

BOILER OUTLET	670	660	660	680	680
AIR HEATER GAS OUT	400	400	400	410	410
AIR HEATER AIR OUT	580	580	580	585	580
I.D. FAN	390	390	380	390	390
S.H. STEAM TEMP.	650	660	650	680	660

PANEL SETTINGS

FURNACE PRESSURE	6.5
F.D. FAN PRESSURE	15
BAGASSE FEED	60%
UNDERGRATE AIR	100%
OVERFIRE AIR	46%

TEST RESULTS

OIL USED	291	GALS.
TOTAL TEST TIME	70	MINS.
INTERGATOR TIME	1471	COUNT
INTERGRATOR STEAM	126,086	P.P.H
CHART READING	750,000	TOTAL
CHART AVERAGE	125,000	P.P.H.
I.D. FAN TURBINE	4800	RPM
STACK TEMPERATURE	138	°F
GRATE TEMPERATURE	650	°F
SCRUBBER WATER	est 600	G.P.M.

COMMENTS:

	"A"	"B"
(1) Mill speed	65	65 F.P.M.

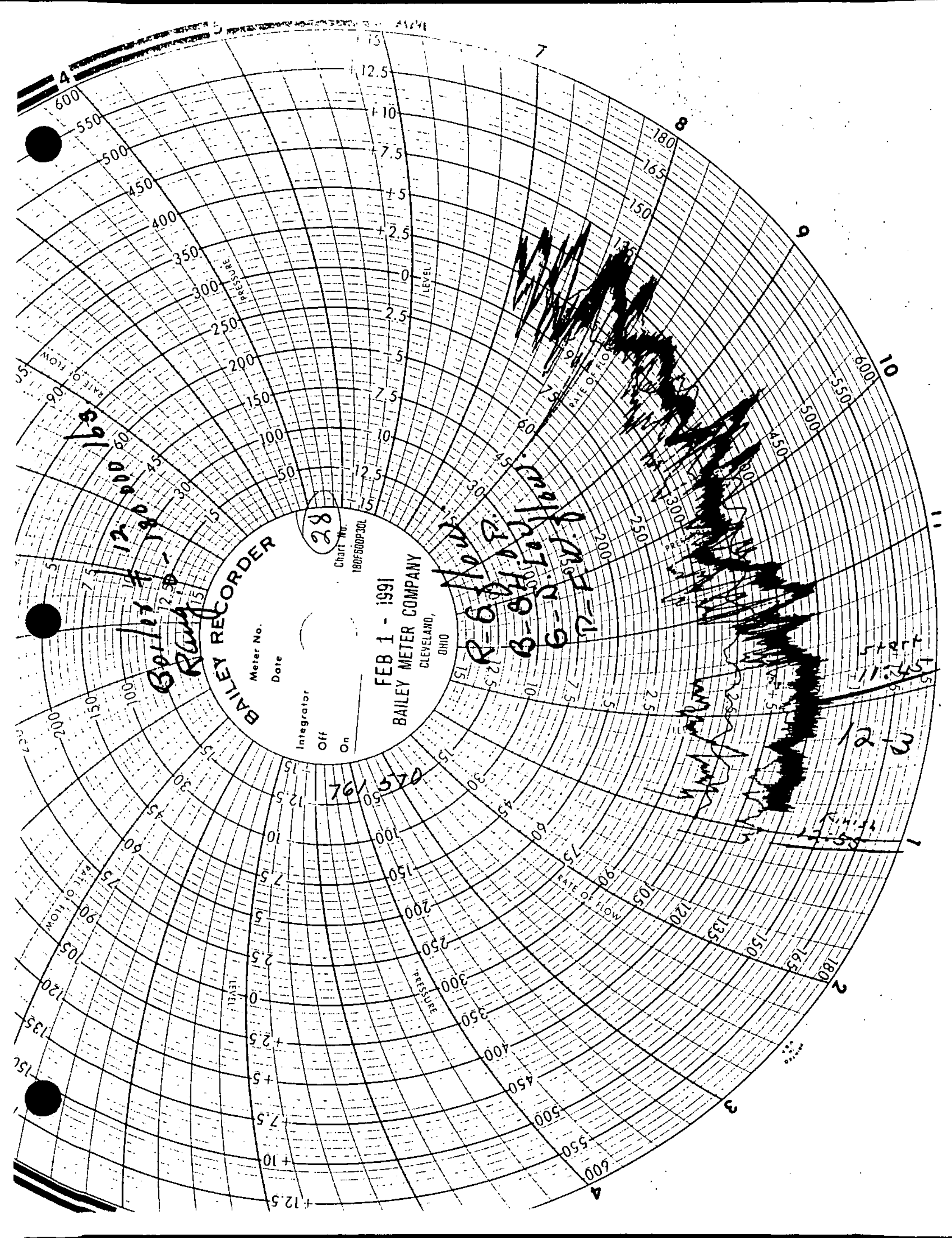
(2) using oil burner @ 60%

Allowed =

Actual =

PLANT READINGS BY Joseph Dalla

% OF CAPACITY


BAILEY RECORDER
Meter No.
Date
Integrator
Off
On
Chart No.
180F600P30L
FEB 1 - 1991
BAILEY METER COMPANY
CLEVELAND,
OHIO
RATE OF FLOW
PRESSURE
LEVEL

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	COMP-1
Location:	UNIT 12	Date:	31 JAN 91
Ds (ft):	7.5	No. Points:	24
Dn (in):	.305	Test Length:	60
Filter #:	3760	End Meter Reading:	687.772
Cp:	.84	Int Meter Reading:	647.427
P bar:	30.06	Begin Time:	11:30
P stack:	+.15	End Time:	12:35
IMP-1 (INT)	100 ml	IMP-1 (FINAL)	254
IMP-2 (INT)	100 ml	IMP-2 (FINAL)	120
IMP-3 (INT)	0 ml	IMP-3 (FINAL)	2
IMP-4 (INT)	500.0g	IMP-4 (FINAL)	512

	TEST 1	TEST 2	TEST 3
% CO2	12.2		
% O2	8.0		
% CO	0		

Project Director:	S. MacKay	Field Laboratory:	MacKay / Wescott
Meter Box Operator:	M Wescott	Chain of Custody:	S. MacKay
Probe Operator:	R. Gibson	Plant Coordinator:	G. DeVane
Orsat Analyst:	S. MacKay	Agency Rep:	C. Culliver

Comments:

TRAVERSE DATA SHEET

Page 2 of 2

Sampling time per point: 2.5 min/pt

Plant: Okeelanta

Run #: Comp-1

Location: Unit # 12

Date:

Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
B			667.425						
%O2									
1	.22	1.52	668.85	90	86	270	69	138	4.0
8.0 2	.24	1.66	670.4195	90	86	270	65	137	4.5
3	.20	1.80	672.018	92	87	262	67	138	5.0
8.0 4	.27	1.66	673.91	93	87	250	68	139	6.0
5	.26	1.80	675.635	94	88	257	68	137	6.0
6	.24	1.66	677.335	94	88	264	67	139	6.0
8.0 7	.25	1.73	679.02	95	89	256	66	140	6.0
8	.26	1.80	680.715	95	89	255	66	140	6.0
8.0 9	.28	1.93	682.48	96	90	251	66	139	7.0
10	.25	1.93	684.27	97	90	245	65	140	7.5
5.0 11	.27	1.86	686.03	97	92	243	66	139	7.5
12	.26	1.80	687.772	97	91	265	66	139	7.5

Relationship:

Box #: Y: Delta H@:

Start Time: End Time:

Pre Leak Ck: CFM @ "Hg

Mid Leak Ck: CFM @ "Hg (Vol:)

Post Leak CK: Leak CFM @ 7.5 "Hg

Pitot Leak CK: @ "H2O

Box Oper: Probe Oper:

TRAVERSE DATA SHEET

Page 1 of 2

Sampling time per point: 2.5 min/pt

Plant: Okeelanta

Run #: Comp-1

Location: Unit #12

Date: 31 JAN 91

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In (5)	DGM Out (6)	Hot Box (1)	Impg Temp (2)	Stack Temp (3)	Vac
				647.427						
A	1	.18	1.24	649.03	80	79	248	63	138	2.0
	2	.24	1.66	650.64	79	79	253	64	138	2.0
	3	.25	1.72	652.95	83	79	261	66	139	2.5
	4	.27	1.86	654.81	85	80	259	66	139	3.0
6.0	5	.26	1.80	655.745	86	80	268	65	139	3.0
	6	.23	1.59	657.41	87	81	266	66	139	3.0
	7	.23	1.59	658.88	87	82	251	66	139	3.0
8.0	8	.24	1.66	660.69	89	83	261	67	138	3.0
	9	.24	1.66	662.335	89	83	264	68	140	3.0
9.0	10	.24	1.66	663.95	90	84	266	66	138	3.0
	11	.24	1.66	665.71	91	84	270	66	139	4.0
9.0	12	.25	1.72	667.235	91	85	265	66	137	4.5

Relationship: 0.9

Box #: 4 Y: 1.001 Delta H@: 2.03

Start Time: 1130 End Time: _____

Pre Leak Ck: dead CFM @ 15 "Hg

Mid Leak Ck: dead CFM @ 4.5 "Hg (Vol: _____)

Post Leak CK: _____ CFM @ ~~9.2~~ "Hg

Pitot Leak CK: dead @ 9.2 "H2O

Box Oper: M. Wescott Probe Oper: B. Gibson

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	COMP-2
Location:	UNIT 12	Date:	31 JAN 91
Ds (ft):	7.5	No. Points:	24
Dn (in):	.305	Test Length:	60 MIN
Filter #:	3761	End Meter Reading:	~~608.150~~ 728.351
Cp:	.84	Int Meter Reading:	~~628~~ 638.150
P bar:	30.06	Begin Time:	13:45
P stack:	-.15	End Time:	
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	254
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	125
IMP-3 (INT)	0 ML	IMP-3 (FINAL)	2
IMP-4 (INT)	500.0 g	IMP-4 (FINAL)	515.5

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

Project Director:	S. MacKay	Field Laboratory:	MacKay / WESCOTT
Meter Box Operator:	M. WESCOTT	Chain of Custody:	S. MacKay
Probe Operator:	B. GIBSON	Plant Coordinator:	G. DEVANE
Orsat Analyst:	S. MacKay	Agency Rep:	C. CULLIVER

Comments:

TRAVERSE DATA SHEET

Page 1 of 2

Sampling time per point: 2.5 min/pt

Plant: Okeelanta

Run #: Comp - 2

Location: Unit #12

Date: 31 Jan 91

	Trav. No.	Delta P	Delta H	Meter Reading 688.15	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
	1	.20	1.40	689.71	85	83	264	68	138	1.0
8.5	2	.22	1.54	691.31	86	84	270	68	140	1.0
	3	.20	1.82	693.02	87	84	267	68	140	1.0
8.0	4	.27	1.90	694.765	88	84	257	67	140	1.0
	5	.26	1.82	696.49	90	86	255	67	139	1.0
8.5	6	.23	~~1.61~~ 1.61	698.23	90	85	252	66	140	1.0
	7	.22	1.54	699.88	91	86	249	68	139	1.0
8.0	8	.23	1.61	701.52	92	88	260	67	140	1.0
	9	.23	1.61	703.145	92	86	269	66	140	1.0
8.0	10	.24	1.68	704.78	92	87	265	60	140	1.0
	11	.23	1.61	706.415	93	87	267	59	139	1.5
	12	.23	1.61	708.055	92	88	255	58	141	2.0

Relationship: 7.0

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: _____ CFM @ _____ "Hg

Pitot Leak CK: dead @ 5.5 "H2O

Box Oper: ~~M Wescott~~ Probe Oper: B Gibson

TRAVERSE DATA SHEET

Page 2 of 2

Sampling time per point: 2.5 min/pt

Plant: Okeelanta

Run #: Comp-2

Location: Unit #12

Date: 31 Jan 91

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
				708.48						
	1	.23	1.61	709.74	89	87	265	68	141	2.0
8.0	2	.24	1.68	711.385	91	88	270	66	143	2.0
	3	.25	1.75	713.085	91	87	259	67	144	2.5
8.0	4	.26	1.82	714.795	92	88	252	67	144	3.0
	5	.25	1.75	716.49	93	88	252	64	144	3.0
8.0	6	.24	1.68	718.195	94	89	253	63	143	3.0
	7	.25	1.75	719.90	94	89	259	62	143	3.0
8.0	8	.25	1.75	721.59	96	90	264	63	141	3.5
	9	.25	1.75	723.27	95	90	268	66	143	3.5
8.0	10	.25	1.75	724.95	95	90	270	66	142	3.5
	11	.25	1.75	726.63	95	90	270	67	143	3.5
8.0	12	.26	1.82	728.351	96	91	265	67	143	4.0

Relationship: 2.0

Box #: 4 Y: 1.001 Delta H@: 2.03

Start Time: _____ End Time: _____

Pre Leak Ck: _____ CFM @ _____ "Hg

Mid Leak Ck: _____ CFM @ 20 "Hg (Vol: _____)

Post Leak CK: leak CFM @ 4.0 "Hg

Pitot Leak CK: _____ @ _____ "H2O

Box Oper: M. Wescott Probe Oper: B Gibson

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	COMP-3
Location:	UNIT 12	Date:	1 FEB 91
Ds (ft):	7.5	No. Points:	24
Dn (in):	.305	Test Length:	60 MIN
Filter #:	3762	End Meter Reading:	774.680
Cp:	.84	Int Meter Reading:	729.520
P bar:	30.10	Begin Time:	11:45
P stack:	-.1	End Time:	12.55
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	270
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	125
IMP-3 (INT)	0 ML	IMP-3 (FINAL)	3
IMP-4 (INT)	500.0 g	IMP-4 (FINAL)	515.2

	TEST 1	TEST 2	TEST 3
% CO2	11.7		
% O2	8.5		
% CO	0		

Project Director:	S. MacKay	Field Laboratory:	S. MacKay/WESCOTT
Meter Box Operator:	M. WESCOTT	Chain of Custody:	S. MacKay
Probe Operator:	B. GIBSON	Plant Coordinator:	G. DEVANE
Orsat Analyst:	S. MacKay	Agency Rep:	C. CULLIVER

Comments:

TRAVERSE DATA SHEET

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

Plant: Okeelanta — Run #: Comp-3

Location: Unit #12 — Date: 1 Feb 91

B	Trav. No.	Delta P	Delta H	Meter Reading 752.496	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
$\%O_2$	1	.23	1.61 2.03	754.12	82	79	266	66	139	1.0
3.5	2	.29	~~2.32~~ MM	755.95	84	80	265	59	137	2.0
	3	.31	2.17	757.88	85	80	246	60	140	2.0
5.0	4	.33	2.31	759.79	88	81	242	62	140	2.0
	5	.33	2.31	761.71	88	81	256	62	140	2.0
8.5	6	.30	2.10	763.545	89	82	270	63	139	2.0
	7	.32	2.24	765.46	89	82	263	61	138	2.5
8.5	8	.35	2.45	767.44	90	83	261	62	138	3.0
	9	.36	2.52	769.46	90	83	258	62	139	3.0
8.5	10	.36	2.52	771.47	91	84	256	64	138	3.0
	11	.27	1.89	773.265	90	84	253	63	139	2.5
	12	.15	1.05	774.68	89	84	256	65	139	1.5

Relationship: 7.0

Box #: 4 Y: 1.001 Delta H@: 2.03

Start Time: _____ End Time: _____

Pre Leak Ck: _____ CFM @ _____ "Hg

Mid Leak Ck: dead CFM @ 2.0 "Hg (Vol: _____)

Post Leak CK: dead CFM @ 3.0 "Hg

Pitot Leak CK: _____ @ _____ "H2O

Box Oper: _____ Probe Oper: _____

TRAVERSE DATA SHEET

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

Plant: Okeelanta — Run #: Comp-3

Location: Unit #12 — Date: 1 Feb 91

Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
A			729.52						
1	.29	2.03	731.51	72	71	270	69	139	1.0
2	.31	2.17	733.38	73	71	259	63	138	1.0
3	.35	2.45	735.355	76	72	246	66	139	1.0
4	.37	2.59	737.39	78	73	246	67	139	1.0
5	.35	2.45	739.29	79	73	267	67	140	1.0
6	.33	2.31	741.23	80	73	265	66	140	1.0
7	.31	2.17	743.09	81	75	268	62	138	1.0
8	.32	2.24	744.96	82	75	267	60	138	1.5
9	.32	2.24	746.855	83	76	270	59	138	1.5
10	.32	2.24	748.745	83	76	265	58	140	2.0
11	.30	2.10	750.58	84	77	264	59	135	2.0
12	.30	2.10	752.362	84	77	268	59	140	2.0

Relationship: 7.0
Box #: 4 Y: 1.001 Delta H@: 2.03
Start Time: 11:45 End Time: 11:4
Pre Leak Ck: dead CFM @ 15 "Hg
Mid Leak Ck: 0 CFM @ 2 "Hg (Vol: _____)
Post Leak CK: 0 CFM @ 3 "Hg
Pitot Leak CK: dead @ 6.5 "H2O
Box Oper: M. Waskett Probe Oper: B. Gibson

APPENDIX IX

EQUIPMENT CALIBRATION SHEETS

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:

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

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

CALIBRATION BY: S. MacKAY

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	2.05
				MAX % DEVIATION	1.10	
				ALLOWABLE % DEV	2.00	

FORMULAS:

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

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

CALIBRATION BY: From Computer Disk BC to 12-Feb-90

SCOTT LAWTON

THERMOCOUPLE CALIBRATION SHEET

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

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

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

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

CALIBRATION BY: C. LODI

CARL POE CO., INC. 99 REINERMAN ST. • HOUSTON, TEXAS 77007 • 713-861-3816

February 19, 1990

Eastmount Engineering
420 Main
Walpole, MA 02081

Dear Sirs:

This is to certify that your AL-19 American Wet Test Meter, serial no.P-468, has been calibrated with an American five foot bell prover, serial no. 2260. It is traceable to the Bureau of Standards, reference no. 106870, PI-TAPE.

Test Results are as follows:

FLOW RATE	% OF ERROR
60 CFH	+0.3%
30 CFH	0.0%
15 CFH	0.0%

Sincerely,

CARL POE CO., INC.

Carl W. Poe
CWP/mp

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

NOZZLE CALIBRATION SHEET

PROJECT NAME: OKEE/ANTA PROJECT NUMBER: 90 102

POINT#	NOZZLE# 19/64-1	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:

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
CALIBRATED BY:

3 DEC 90
DATE: