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: 61

Title: Okeelanta Corporation Particulate Emissions Test Reprot Boiler #11

December 1990

Eastmount Engineering
Environmental Consultants — Air Quality Specialists

OKEELANTA CORPORATION

COMPLIANCE PARTICULATE EMISSIONS TEST REPORT

BOILER #11

PREPARED FOR:

Okeelanta Corporation
Okeelanta Sugar Division
South Bay, Florida 33493

CONCERNING:

Particulate Emissions Testing
Okeelanta Corporation
Boiler #11
South Bay Florida Facility
December 6 & 7, 1990

PREPARED BY:

Sean MacKay
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 # 11 at Okeelanta Corporation's South Bay, Florida facility on December 6 and 7, 1990. The test program consisted of a series of three EPA Method 5 test runs. A series of four Method 5 tests were performed on December 4 and 5, 1991. Due to upsets in facility operations during the tests these numbers are not reported under this cover but are available upon request.

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 II, Emission Limiting Standards.

During testing the boiler was burning bagasse and oil as fuel. Boiler No. 11 is rated at 125,000 pounds of steam per hour. Results of the test program indicate Boiler No. 11 to be in compliance with the Florida DER emission standard. 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
1A	12-6-90	.149	37.54	.193	48.48	123415	98.7%
2A	12-7-90	.184	46.91	.192	49.02	123514	98.8%
3A	12-7-90	.215	55.00	.193	49.54	124029	99.2%
3 RUN AVG.		.183	46.48	.193	49.01	123652	98.9%

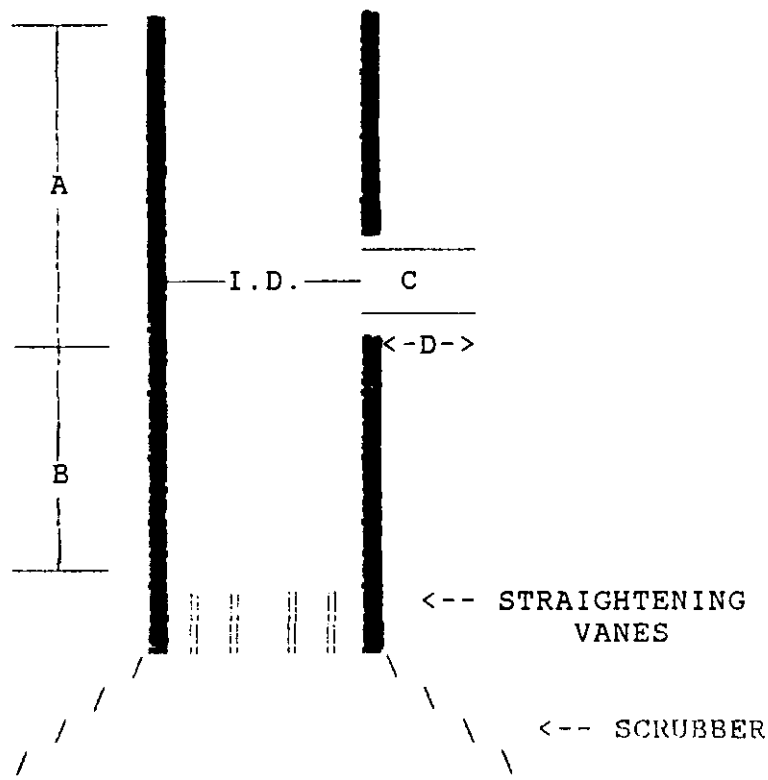
Sean MacKay, Project Director, was in charge of and responsible for all stack testing, conducted all calculations and maintained chain of custody of all samples. Kieran Nolan operated the meter box and performed the field laboratory aspects of the program. Mark Wescott located the probe at the proper 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. A. 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 #11
SOUTH BAY, FLORIDA FACILITY

The following is a schematic of the stack which services Boiler #11 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'

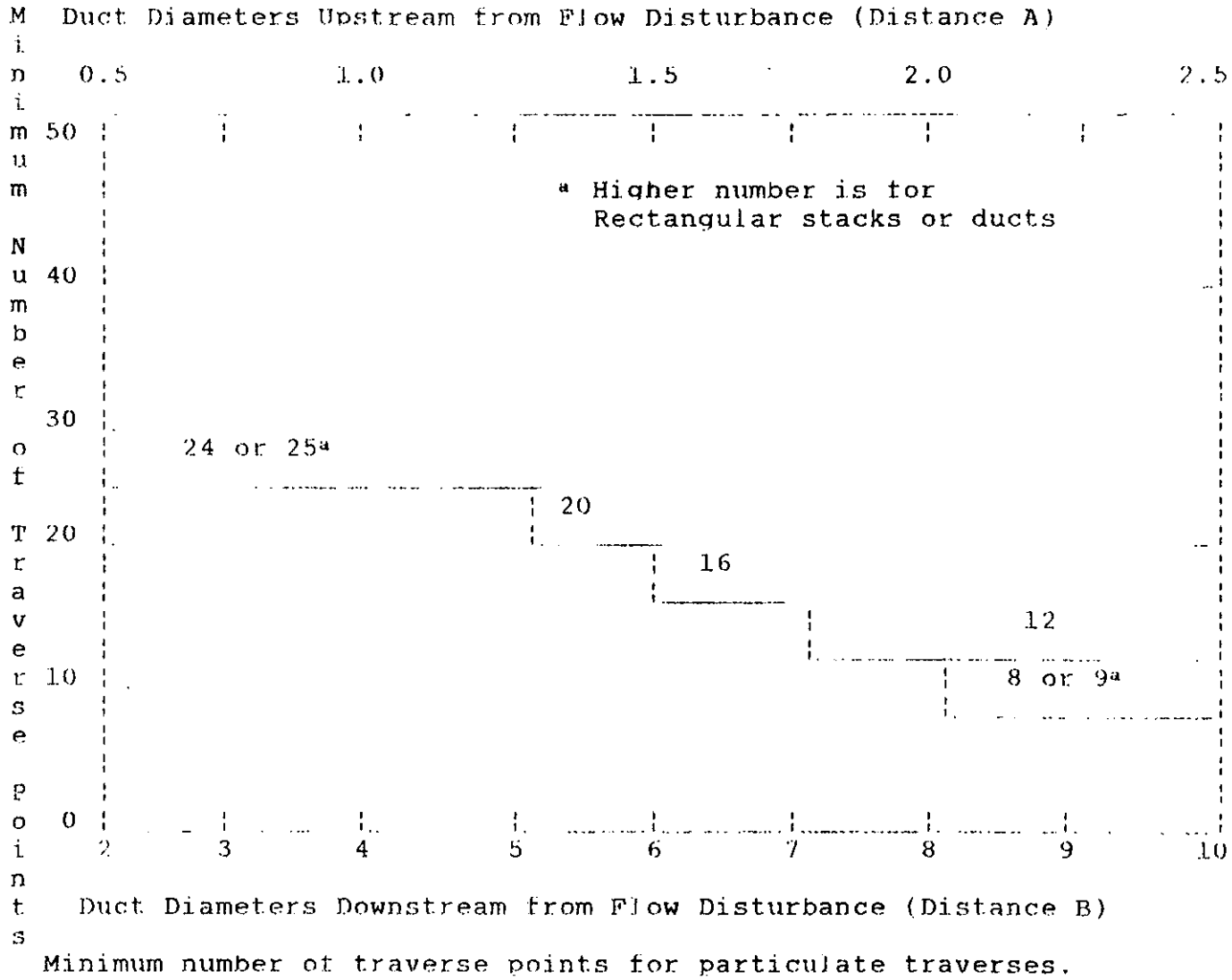
Drawing not to scale

PB GARDEN
GOLF COURSE

685
3885
DON
KEPLER

3.0 NUMBER OF TRAVERSE POINTS AND SAMPLING TIME PER POINT

OKEELANTA CORPORATION
UNIT #11
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 #11
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,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 11

RUN #: COMP-1a
DATE : 12-06-90

Ds (FT)	7.5
Dn (IN)	.305
FILTER#	3780
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	370
IMP-2 (FIN)	156
IMP-3 (FIN)	3
IMP-4 (FIN)	529.0
% CO2	10.7
% O2	9.5
% CO	0
P BAR	30.08
P STK	.2
NO. PTS	24
TEST LNGTH	60
END METER	662.137
	.201
INT METER	614.600
BEGIN TIME:	12:15
END TIME:	13:20

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.63	.79	3.53	77	75	152
2	.70	.84	3.92	82	77	153
3	.66	.81	3.70	83	78	153
4	.61	.78	3.42	87	78	154
5	.56	.75	3.14	91	80	153
6	.44	.66	2.46	89	78	154
7	.40	.63	2.24	89	80	154
8	.38	.62	2.13	88	80	153
9	.45	.67	2.52	90	81	153
10	.48	.69	2.69	90	83	154
11	.54	.73	3.02	91	85	153
12	.57	.75	3.14	92	83	155
B1	1.00	1.00	5.60	88	83	153
2	1.10	1.05	6.16	92	83	154
3	1.10	1.05	6.16	94	84	153
4	1.05	1.02	5.88	95	85	153
5	.92	.96	5.15	96	86	154
6	.64	.80	3.58	94	85	154
7	.20	.45	1.12	96	87	154
8	.12	.35	.67	94	86	154
9	.11	.33	.62	96	87	155
10	.11	.33	.62	93	86	154
11	.12	.35	.67	92	87	153
12	.11	.33	.62	90	87	153
AVERAGE	.54	.70	3.03	90.4	82.7	153.5

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-2a
DATE :12-07-90

Ds (FT)	7.5
Dn (IN)	.250
FILTER#	3779
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	309
IMP-2 (FIN)	143
IMP-3 (FIN)	3
IMP-4 (FIN)	513.2
% CO2	11.5
% O2	8.7
% CO	0
P BAR	30.09
P STK	.2
NO. PTS	24
TEST LNGTH	60
END METER	693.926
	.144
INT METER	662.468
BEGIN TIME:	09:40
END TIME:	10:50

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.55	.74	1.38	81	77	156
2	.60	.77	1.50	81	77	156
3	.63	.79	1.58	82	79	158
4	.60	.77	1.50	83	79	158
5	.53	.73	1.33	86	79	156
6	.45	.67	1.13	85	80	156
7	.33	.57	.83	88	80	157
8	.35	.59	.88	91	82	156
9	.38	.62	.95	86	80	156
10	.43	.66	1.08	88	82	156
11	.41	.64	1.03	88	83	160
12	.39	.62	.98	87	82	157
B1	1.00	1.00	2.50	86	82	156
2	1.05	1.02	2.63	89	84	156
3	1.05	1.02	2.63	89	85	156
4	1.05	1.02	2.67	88	84	157
5	.85	.92	2.13	91	83	158
6	.57	.75	1.43	92	85	158
7	.18	.42	.45	90	85	157
8	.08	.28	.20	88	85	156
9	.06	.24	.15	87	84	156
10	.07	.26	.18	86	84	156
11	.08	.28	.20	85	84	157
12	.10	.32	.25	85	83	156
AVERAGE	.49	.66	1.23	86.8	82.0	156.7

INPUT DATA SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-3a
DATE : 12-07-90

Ds (FT)	7.5
Dn (IN)	.250
FILTER#	3778
PIT COEFF	.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	500.0
IMP-1 (FIN)	310
IMP-2 (FIN)	136
IMP-3 (FIN)	4
IMP-4 (FIN)	514.0
% CO2	11.6
% O2	8.6
% CO	0
P BAR	30.09
P STK	.2
NO. PTS	24
TEST LNGTH	60
END METER	726.972
	.263
INT METER	694.180
BEGIN TIME:	12:00
END TIME:	13:10

TRAV PT	VEL HEAD	SQ ROOT	DELTA H	DRYGAS IN	DRYGAS OUT	STACK TEMP
A1	.51	.71	1.33	80	79	157
2	.55	.74	1.43	83	80	160
3	.59	.77	1.53	84	80	157
4	.55	.74	1.43	85	81	160
5	.52	.72	1.35	89	81	157
6	.45	.67	1.17	88	82	155
7	.37	.61	.96	92	83	155
8	.40	.63	1.04	86	84	155
9	.46	.68	1.20	87	84	156
10	.48	.69	1.25	89	84	156
11	.50	.71	1.30	90	83	156
12	.51	.71	1.33	94	86	155
B1	1.05	1.02	2.73	88	84	156
2	1.05	1.02	2.73	90	86	156
3	1.08	1.04	2.81	91	87	155
4	1.05	1.02	2.73	92	88	156
5	.90	.95	2.34	96	87	156
6	.63	.79	1.64	93	87	155
7	.23	.48	.60	92	86	156
8	.09	.30	.23	89	87	156
9	.08	.28	.21	90	86	155
10	.05	.22	.13	87	85	155
11	.10	.32	.26	87	85	155
12	.04	.20	.10	87	86	155
AVERAGE	.51	.67	1.33	88.7	84.2	156.0

APPENDIX II

ISOKINETIC CALCULATION SHEETS

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-1a
DATE : 12-06-90

TS (`F)=	153.5	% CO2=	10.7	VM (CF) =	47.336
TS (`R)=	613.5	% O2=	9.5	DELTA H (ABS)=	30.30
TM (`F)=	86.5	% CO=	0	PS (ABS) =	30.09
TM (`R)=	546.5	% N2=	79.8	SQRT DELTA P =	.698097
VI(TOT)=	358.0	CP=	.84	AREA NOZZLE =	.000507
				Y =	1.001

VM STD	=	$\frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 46.34	DSCF
VW STD	=	.04707 (VI TOT)	= 16.85	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .267	
BWO	=	MOISTURE FROM STEAM TABLES	= .274	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	=	1 - BWO	= .733	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	= 30.09	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 26.87	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .87	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 43.7	FPS
H	=	0.002669 (VI TOT)	= .96	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 2.63	
K	=	(H) + (J)	= 3.58	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 91.6	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-2a
DATE :12-07-90

TS (`F)=	156.7	% CO2=	11.5	VM (CF) =	31.314
TS (`R)=	616.7	% O2=	8.7	DELTA H (ABS)=	30.18
TM (`F)=	84.4	% CO=	0	PS (ABS) =	30.10
TM (`R)=	544.4	% N2=	79.8	SQRT DELTA P =	.656382
VI(TOT)=	268.2	CP=	.84	AREA NOZZLE =	.000341

Y = 1.001

VM STD	=	$\frac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$	= 30.66	DSCF
VW STD	=	.04707 (VI TOT)	= 12.62	CF
BWO	=	$\frac{VW\ STD}{VW\ STD + VM\ STD}$	= .292	
BWO	=	MOISTURE FROM STEAM TABLES	= .296	
VI TOT	=	ADJUSTED TO SATURATION VOLUME	= N/A	ML
1-BWO	=	1 - BWO	= .708	
Md (DRY)	=	.44 (% CO2) +.32 (% O2) +.28 (% CO) +.28 (% N2)	= 30.19	LBS/LB MOLE
Ms (WET)	=	MD (1-BWO) + 18 (BWO)	= 26.63	LBS/LB MOLE
G	=	SQRT (TS / PS / MS)	= .88	
VS	=	85.49(CP)(G)(SQRT DELTA P)	= 41.3	FPS
H	=	0.002669 (VI TOT)	= .72	
J	=	(DELTA H ABS)(VM)(Y) /(TM)	= 1.74	
K	=	(H) + (J)	= 2.45	
% ISO	=	$\frac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$	= 99.1	

ISOKINETIC CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-3a
DATE : 12-07-90

Avg = 155 Avg = 8.9

TS (`F)=	156.0	% CO2=	11.6	VM (CF) =	32.529
TS (`R)=	616.0	% O2=	8.6	DELTA H (ABS)=	30.19
TM (`F)=	86.5	% CO=	0	PS (ABS) =	30.10
TM (`R)=	546.5	% N2=	79.8	SQRT DELTA P =	.668685
VI(TOT)=	264.0	CP=	.84	AREA NOZZLE =	.000341
				Y =	1.001

VM STD = $17.64 \dfrac{(VM)(Y)(DELTA\ H\ ABS)}{(TM)}$ = 31.73 DSCF

VW STD = .04707 (VI TOT) = 12.43 CF

BWO = $\dfrac{VW\ STD}{VW\ STD + VM\ STD}$ = .281

BWO = MOISTURE FROM STEAM TABLES = .291

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

1-BWO = 1 - BWO = .719

Md (DRY) = .44 (% CO2)
+.32 (% O2)
+.28 (% CO)
+.28 (% N2)

= 30.20 LBS/LB MOLE

Ms (WET) = MD (1-BWO)
+ 18 (BWO)

= 26.77 LBS/LB MOLE

G = SQRT (TS / PS / MS) = .87

VS = 85.49(CP)(G)(SQRT DELTA P) = 42.0 FPS

H = 0.002669 (VI TOT) = .70

J = (DELTA H ABS)(VM)(Y) /(TM) = 1.80

K = (H) + (J) = 2.50

% ISO = $\dfrac{(TS)\ (K)\ (1.667)}{(TIME)\ (VS)\ (PS)\ (AN)}$ = 99.4

APPENDIX III

ENTHALPY CALCULATION SHEETS

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-1a
DATE : 12-06-90

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	350	700	260
	370	700	
	360	690	
	330	610	
	340	660	
AVERAGE	350.0 PSIG	672.0	260.0

P ABS = 364.7 PSIA

ENTHALPY @	700	'F AND	360	PSIA =	1364.1
ENTHALPY @	600	'F AND	360	PSIA =	1309.9
ENTHALPY @	672.0	'F AND	360	PSIA =	1348.9

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1120.3 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-2a
DATE : 12-07-90

STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
340	700	260
355	700	
330	690	
350	700	
365	700	
360		

AVERAGE	350.0	PSIG	698.0		260.0
P ABS =	364.7	PSIA			
ENTHALPY @	700	'F AND	360	PSIA =	1364.1
ENTHALPY @	600	'F AND	360	PSIA =	1309.9
ENTHALPY @	698.0	'F AND	360	PSIA =	1363.0

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1134.4 BTU/LB OF STEAM

ENTHALPY CALCULATION SHEET

PLANT : OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-3a
DATE : 12-07-90

	STEAM PRESSURE	STEAM TEMPERATURE	FEED WATER TEMPERATURE
	360	700	260
	360	700	
	350	700	
	345	700	
	355	700	
	340	700	
AVERAGE	351.7 PSIG	700.0	260.0

P ABS = 366.4 PSIA

ENTHALPY @	700	'F AND	360	PSIA =	1364.1
ENTHALPY @	600	'F AND	360	PSIA =	1309.9
ENTHALPY @	700.0	'F AND	360	PSIA =	1364.1

ENTHALPY OF FEED WATER = 228.65

AVERAGE ENTHALPY = 1135.5 BTU/LB OF STEAM

APPENDIX IV

HEAT INPUT CALCULATION SHEETS

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-1a
DATE : 12-06-90

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
			100
END	881572	13: 20	
			LBS/HR STEAM
BEGIN	880235	12: 15	
NET	1337 X 100	/ 65	MINS = 123415

123415 LBS/HR STEAM / 55% EFF. = 224392 EQUIV.

224392 LBS/HR STEAM X 1120 BTU/LB = 251.4 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
END	877780	13: 20	
BEGIN	877650	12: 15	
NET	130 GALLONS	65	MINS = 120 GPH

120 GPH X 150,000 BTU/GAL (EST) = 18 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	251.4	-	18	X	.2	=	46.7	LBS/HR
OIL			18	X	.1	=	1.8	LBS/HR
TOTAL						=	48.5	LBS/HR
						=	.193	#/MBtu

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-2a
DATE : 12-07-90

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
			100
END	907519	10: 50	
			LBS/HR STEAM
BEGIN	906078	9: 40	
NET	1441 X 100 / 70 MINS =		123514

123514 LBS/HR STEAM / 55% EFF. = 224571 EQUIV.

224571 LBS/HR STEAM X 1134 BTU/LB = 254.7 BTU(e6)/HR

	OIL INTEGRATOR READINGS	TIME	GALS/HR
END	878170	10: 50	
BEGIN	878020	9: 40	
NET	150 GALLONS	70 MINS =	128.571 GPH

128.5714 GPH X 150,000 BTU/GAL (EST) = 19.286 BTU(e6)/HR

ALLOWABLE EMISSIONS

BAGASSE	254.7	-	19	X	.2	=	47.1	LBS/HR
OIL			19	X	.1	=	1.9	LBS/HR
TOTAL						=	49.0	LBS/HR
							.192	#/MMBtu

HEAT INPUT CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-3a
DATE : 12-07-90

	STEAM INTEGRATOR READINGS	TIME	INTEGRATOR FACTOR
			100
END	910262	13: 10	
			LBS/HR STEAM
BEGIN	908815	12: 0	
NET	1447 X 100	/ 70	MINS = 124029

124029 LBS/HR STEAM / 55% EFF. = 225506 EQUIV.

225506 LBS/HR STEAM X 1135 BTU/LB = 256.1 BTU(e6)/HR

Avg = 254.1

	OIL INTEGRATOR READINGS	TIME	GALS/HR
END	878430	13: 10	
BEGIN	878300	12: 0	
NET	130 GALLONS	70	MINS = 111.429 GPH

Avg = 120.000

111.4286 GPH X 150,000 BTU/GAL (EST) = 16.714 BTU(e6)/HR

Avg = 18.000
Total = 272.07

ALLOWABLE EMISSIONS

BAGASSE	256.1	-	17	X	.2	=	47.9 LBS/HR
OIL			17	X	.1	=	1.7 LBS/HR
TOTAL						=	49.5 LBS/HR
						=	.193 #/MMBtu

APPENDIX V

EMISSION CALCULATION SHEETS

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-1a
DATE : 12-06-90

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NO. :	3780	5	3777	9
FINAL:	.7950	70.3204	.6444	72.5770
TARE :	.6386	70.2968	.6442	72.5759
NET :	.1564	.0236	.0002	.0011/200ML

VOLUME OF RINSE 174

WEIGHT = 180.00
RESIDUE = - .96

Mn = 179.04 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 4407016 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 8.519e-6 LBS/SCF

CS' = 0.0154 (Mn) / (VM STD) = .06 GRAINS /SCF

PMR = (QS) (CS) = 37.54 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 251.4 BTU e6 / HR

CS = LBS / MILLION BTu = .149 LBS/ BTu e6

ALLOWABLE = 48.48 LBS/HR

= .193 LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-2a
DATE : 12-07-90

	SAMPLES		BLANKS		
	FILTER	BEAKER	FILTER	ACETONE	
NO. :	3779	6	3777	EE220	
FINAL:	.7517	69.9221	.6444	72.5770	
TARE :	.6390	69.8710	.6442	72.5759	
NET :	.1127	.0511	.0002	.0011	/200ML

VOLUME OF RINSE 210

WEIGHT = 163.80
RESIDUE = - 1.15

Mn = 162.65 Mg AS ▫ 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 4010100 DSCFH

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.170e-5 LBS/SCF

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

PMR ▫ (QS) (CS) = 46.91 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 254.7 BTU e6 / HR

CS = LBS / MILLION BTu = .184 LBS/ BTu e6

ALLOWABLE = 49.02 LBS/HR

= .192 LBS/ BTu e6

EMISSION CALCULATION SHEET

PLANT: OKEELANTA
LOCATION: UNIT 11

RUN #: COMP-3a
DATE : 12-07-90

	SAMPLES		BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NO. :	3778	7	3777	9
FINAL:	.7663	72.5956	.6444	72.5770
TARE :	.6426	72.5270	.6442	72.5759
NET :	.1237	.0686	.0002	.0011/200ML

VOLUME OF RINSE 174

WEIGHT = 192.30
RESIDUE = - .96

Mn = 191.34 Mg AS = 44.2 SQ FT

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 4136387 DSCFH

Avg = 4,184,501

CS = (2.205 X 10-6) (Mn) / (VM STD) = 1.330e-5 LBS/SCF

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

PMR = (QS) (CS) = 55.00 LBS/HR

LOAD= MILLIONS OF BTU / HOUR INPUT = 256.1 BTU e6 / HR

CS = LBS / MILLION BTu = .215 LBS/ BTu e6

ALLOWABLE = 49.54 LBS/HR

= .193 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 125,000
INT. FACTOR 100
RUN # 11-1A

BOILER # 11

POLLUTION COMPLIANCE TESTING
DATE: 12-6-90
TESTED BY: East Mount 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 12:15	880235	728570	877650	350	700	120,000	700	260
12:30	880541			370	700	123,000	700	"
12:45	880851			360	700	123,000	690	"
1:00	881164			330	690	124,500	610	"
1:15	881479			340	710	124,800	660	"
1:20	881572	728570	877780					

BOILER PRESSURE DROP						CO_2
OVERFIRE AIR PRESS.						
AIR HEATER AIR OUT						
UNDERGRATE AIR PRESS.						
WIND BOX PRESSURE	.8	.8	.8	.8	.8	
FURNACE PRESSURE	.25	.25	.25	.25	.25	
BLR. OUTLET PRESSURE						
DUST COLLECTOR OUT.						
SCRUBBER DIFF.	20.5	20.2	20.2	20.2	20.2	

BOILER TEMPERATURE					
BOILER OUTLET					
AIR HEATER GAS OUT					
AIR HEATER AIR OUT					
I.D. FAN	495	495	495	495	495
S.H. STEAM TEMP.	700	700	700	690	710

PANEL SETTINGS					
FURNACE PRESSURE					
F.D. FAN PRESSURE	60	60	60	60	60
BAGASSE FEED					
UNDERGRATE AIR					
OVERFIRE AIR					

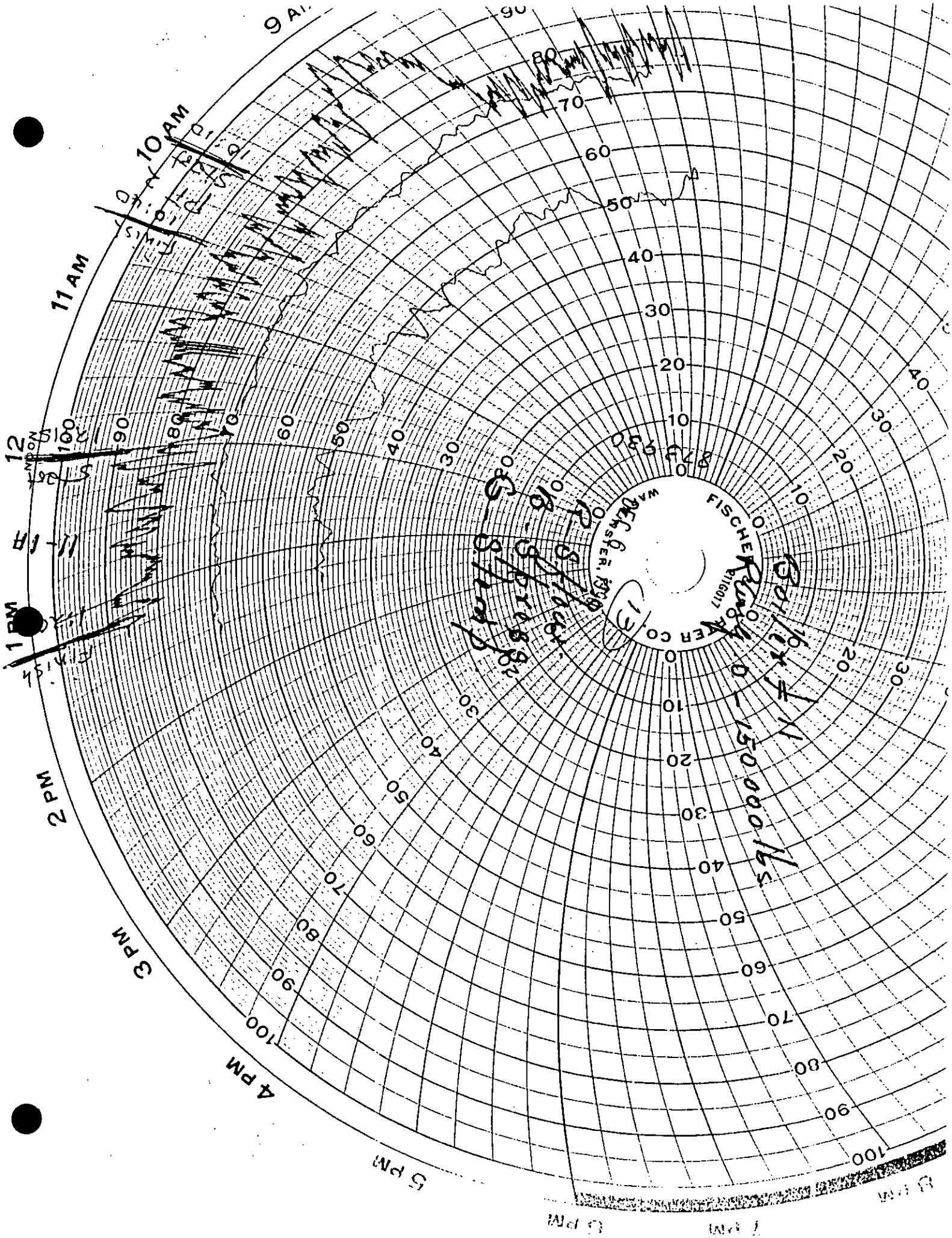
TEST RESULTS

OIL USED	130	GALS.
TOTAL TEST TIME	65	MINS.
INTERGATOR TIME	1337	COUNT
INTERGRATOR STEAM	123,415	P.P.H.
CHART READING	615000	TOTAL
CHART AVERAGE	123,000	P.P.H.
I.D. FAN TURBINE	4800	RPM
STACK TEMPERATURE	153	°F
GRATE TEMPERATURE	NA	°F
SCRUBBER WATER	800	G.P.M.

COMMENTS:
(1) Mill speed "A" 75 "B" 75 F.P.M.
(2) using one oil gun at minimum.
(3) Beginning intergrator number is - 880235

Allowed = 48.48
Actual = 37.54

PLANT READINGS BY George [illegible]
% OF CAPACITY



9 AM
10 AM
11 AM
12 NOON
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
FISCHER
WARCHESTER, 1990

CAPACITY 125,000
INT. FACTOR 100
RUN # 11-2A

BOILER # 11

POLLUTION COMPLIANCE TESTING
DATE: 12-7-90
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.
9:40	906078	728670	878020	340	700	124,500	600	260°
9:55	906381			355	700	124,500	620	"
10:10	906715			330	690	120,000	600	"
10:25	907006			350	700	124,500	630	"
10:40	907309			365	700	123000	680	"
10:50	907519	728670	878170	360	700	124,500	660	"

BOILER PRESSURE DROP						CO_2
OVERFIRE AIR PRESS.						
AIR HEATER AIR OUT						
UNDERGRATE AIR PRESS.						
WIND BOX PRESSURE	.8	.8	.8	.8	.8	
FURNACE PRESSURE	.25	.25	.25	.25	.25	
BLR. OUTLET PRESSURE						
DUST COLLECTOR OUT.						
SCRUBBER DIFF.	20.5	20.5	20.5	20.5	20.5	

BOILER TEMPERATURE					
BOILER OUTLET					
AIR HEATER GAS OUT					
AIR HEATER AIR OUT					
I.D. FAN	500	500	495	495	495
S.H. STEAM TEMP.	700	700	690	700	700

PANEL SETTINGS					
FURNACE PRESSURE					
F.D. FAN PRESSURE					
BAGASSE FEED	60	60	60	60	60
UNDERGRATE AIR					
OVERFIRE AIR					

TEST RESULTS		
OIL USED	150	GALS.
TOTAL TEST TIME	70	MINS.
INTERGATOR TIME	1441	COUNT
INTERGRATOR STEAM	123,514	P.P.H.
CHART READING	741,000	TOTAL
CHART AVERAGE	123,500	P.P.H.
I.D. FAN TURBINE	4800	RPM
STACK TEMPERATURE	156	°F
GRATE TEMPERATURE	NA	°F
SCRUBBER WATER	800	G.P.M.

COMMENTS:

	"A"	"B"	
(1) Mill speed	75	75	F.P.M.

(2) using one oil burner at minimum.
(3) Instrument dept. working on 220/350 station.

Allowed = 49.02
Actual = 46.91

PLANT READINGS BY George Delk

% OF CAPACITY

CAPACITY 125,000
INT. FACTOR 100
RUN # 11-3A

BOILER # 11

POLLUTION COMPLIANCE TESTING
DATE: 12-7-90
TESTED BY: Gastnaert Eng

TIME	STEAM INTERGRATOR	OIL METER North	OIL METER South	STEAM PRESS.	STEAM TEMP.	CHART READING LBS/HR.	FEED WATER PRESS.	FEED WATER TEMP.
Noon 12:00	908815	728670	878300	360	700	123,000	680	260
12:15	909116			360	700	118,500	710	"
12:30	909417			350	700	120,000	700	"
12:45	909732			345	700	126,000	680	"
1:00	910046			355	700	124,500	670	"
1:10	910262	728670	878430	340	700	124,500	600	"

BOILER PRESSURE DROP						CO_2
OVERFIRE AIR PRESS.						
AIR HEATER AIR OUT						
UNDERGRATE AIR PRESS.						
WIND BOX PRESSURE	.8	.8	.8	.8	.8	
FURNACE PRESSURE	.25	.25	.25	.25	.25	
BLR. OUTLET PRESSURE						
DUST COLLECTOR OUT.						
SCRUBBER DIFF.	20.5	20.5	20.5	20.2	20.0	

BOILER TEMPERATURE					
BOILER OUTLET					
AIR HEATER GAS OUT					
AIR HEATER AIR OUT					
I.D. FAN	495	495	495	495	495
S.H. STEAM TEMP.	700	700	700	700	700

PANEL SETTINGS					
FURNACE PRESSURE					
F.D. FAN PRESSURE					
BAGASSE FEED	60	60	60	60	60
UNDERGRATE AIR					
OVERFIRE AIR					

TEST RESULTS		
OIL USED	130	GALS.
TOTAL TEST TIME	70	MINS.
INTERGATOR TIME	1447	COUNT
INTERGRATOR STEAM	124,029	P.P.H
CHART READING	736500	TOTAL
CHART AVERAGE	122750	P.P.H.
I.D. FAN TURBINE	4800	RPM
STACK TEMPERATURE	160	°F
GRATE TEMPERATURE	N.A.	°F
SCRUBBER WATER	800	G.P.M.

COMMENTS:

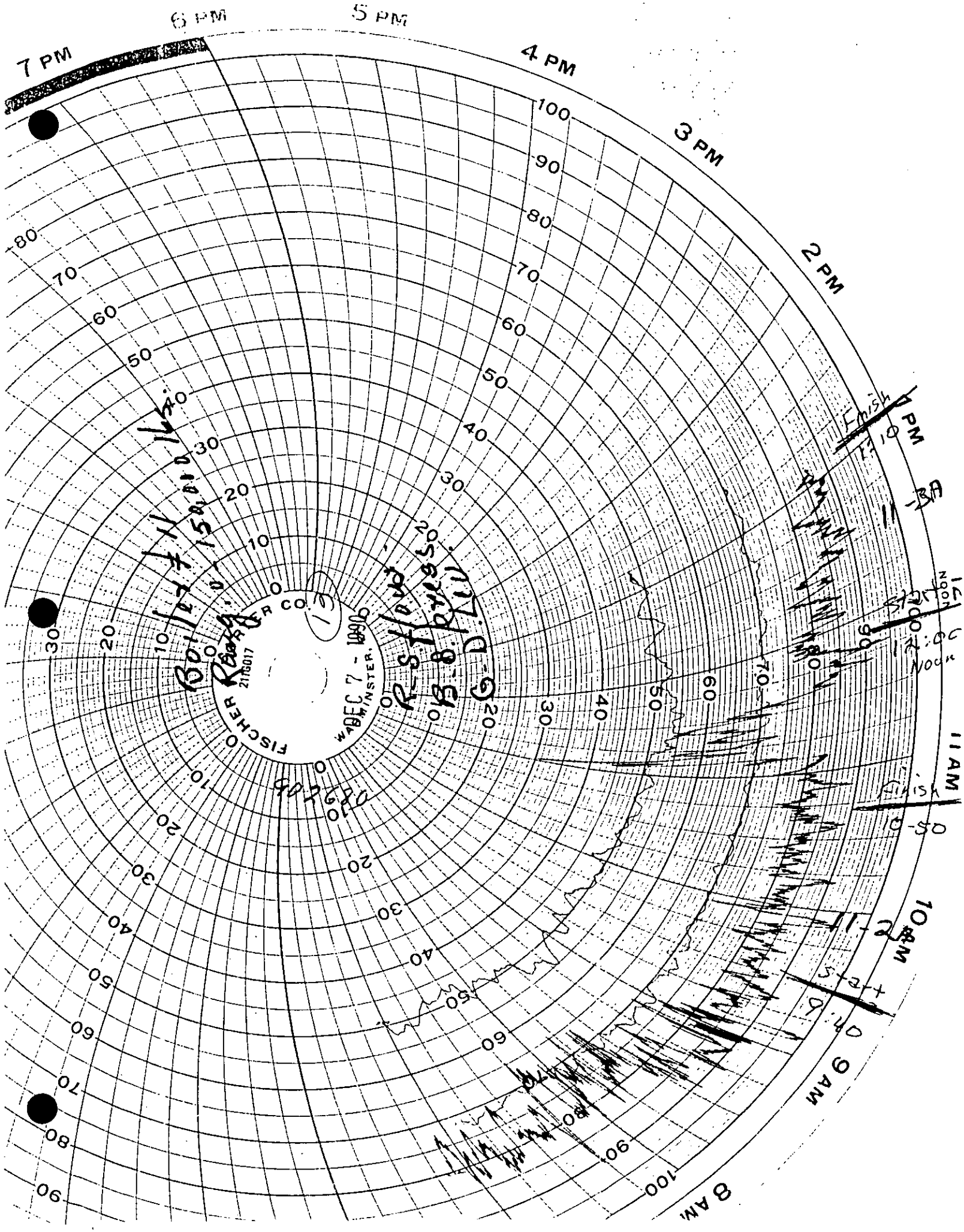
	"A"	"B"
(1) Mill speed	75	75 F.P.M.

(2) using one oil burner at minimum
(3) Ins. dept. working on 250/350 station.

Allowed = 49.54
Actual = 55.00

PLANT READINGS BY George Dolan

% OF CAPACITY



7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
11 AM
10 AM
9 AM
8 AM
NOON
FISCHER RECORDER CO.
WASHINGTON
DEC 7 - 1990
Finish
11-3A
Start
12:00 Noon
Finish
10-50
11-2
Start
9:40

APPENDIX VIII

FIELD DATA SHEETS - STACK TESTING

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	CKGEIANTA	Run #:	Comp-1A
Location:	UNIT 11	Date:	6 DEC 90
Ds (ft):	7.50	No. Points:	24
Dn (in):	.305	Test Length:	60
Filter #:	3780	End Meter Reading:	662.137
Cp:	.84	Int Meter Reading:	614.600
P bar:	30.08	Begin Time:	12:15
P stack:	.2	End Time:	13:20
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	370
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	156
IMP-3 (INT)	0 ML	IMP-3 (FINAL)	3
IMP-4 (INT)	500.0 gr	IMP-4 (FINAL)	529

	TEST 1	TEST 2	TEST 3
% CO2	10.7		
% O2	9.5		
% CO	0		

Project Director:	SEAN MACKAY	Field Laboratory:	S. MACKAY
Meter Box Operator:	K. NOLAN	Chain of Custody:	S. MACKAY
Probe Operator:	M. WESCOTT	Plant Coordinator:	G. DEVANE
Orsat Analyst:	S. MACKAY	Agency Rep:	K. TUCKER

Comments:

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

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

Page 1 of 2 | Sampling time per point: 2 ½ min

Plant: OKEELANTA | Run #: COMP-5A/A

Location: UNIT 11 | Date: 12-6-90

O_2%	Trav. No.	Delta P	Delta H	Meter Reading 614 600	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
	A1	.63	3.53	616.89	77	75	228	53	152	8
	2	.70	3.92	619.20	82	77	230	51	153	10
	3	.66	3.70	621.55	83	78	257	49	153	10
9.7	4	.61	3.42	623.38	87	78	269	51	154	10
	5	.56	3.14	626.13	91	80	248	54	153	9
	6	.44	2.46	627.09	89	78	237	55	154	9
9.4	7	.40	2.24	629.80	89	80	234	58	154	6
	8	.38	2.13	631.59	88	80	233	57	153	5
	9	.45	2.52	633.57	90	81	237	56	153	5
	10	.48	2.69	635.46	90	83	241	60	154	6
	11	.54	3.02	637.54	91	85	239	58	153	8
9.7	12	.57	3.19	639.610	92	83	230	58	155	8

Comments: DELTA P @ 5.6 = DELTA H
BOX # 4 ; Y = 1.001 , DELTA H @ 2.03
START TIME : 12.15
STOP TIME : 1320
INITIAL LEAK CHECK .000 AT 15 INCHES HG
FINAL LEAK CHECK 10 AT 14 INCHES HG
Pitot leak chk ~ good @ 5" H_2O

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

Page 2 of 2 | Sampling time per point: 2 ½ min

Plant: CKEELANTA | Run #: COMP - 5 /A

Location: UNIT 11 | Date: 12-6-90

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
				639.511						
	B1	1.0	5.6	642.20	88	83	265	54	153	14
	2	1.1	6.16	644.74	92	83	251	51	154	14
9.8	3	1.1	6.16	647.11	94	84	236	51	153	14
	4	1.05	5.88	649.52	95	85	229	52	153	14
	5	.92	5.15	651.85	96	86	229	50	154	14
	6	.64	3.58	654.23	94	85	234	50	154	14
9.2	7	.20	1.12	656.30	96	87	242	51	154	14
	8	.12	.67	658.05	94	86	247	57	154	13
	9	.11	.62	659.23	96	87	251	60	155	2
	10	.11	.62	660.20	93	86	251	57	154	1
9.2	11	.12	.67	661.18	92	87	246	57	153	1
	12	.11	.62	662.137	90	87	258	60	153	1

Comments: DELTA P * _____ = DELTA H
BOX # _____ ; Y = _____ , DELTA H @ = _____
START TIME : _____
STOP TIME : 1:20 pm
INITIAL LEAK CHECK .000 AT 14 INCHES HG
FINAL LEAK CHECK _____ AT _____ INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	OKEELANTA	Run #:	comp 11-2A
Location:	UNIT 11	Date:	7 DEC 90
Ds (ft):	2.5 Ft	No. Points:	24
Dn (in):	.250	Test Length:	60 min
Filter #:	3779	End Meter Reading:	693.926
Cp:	.84	Int Meter Reading:	662.468
P bar:	30.09	Begin Time:	9:40
P stack:	.2	End Time:	10:50
IMP-1 (INT)	100 ml	IMP-1 (FINAL)	309 ml
IMP-2 (INT)	100 ml	IMP-2 (FINAL)	143.0 ml
IMP-3 (INT)	0 ml	IMP-3 (FINAL)	3.0 ml
IMP-4 (INT)	500.0g	IMP-4 (FINAL)	513.2 g

	TEST 1	TEST 2	TEST 3
% CO2	11.5		
% O2	8.7		
% CO	0		

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

Comments:

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

Page 1 of 2 | Sampling time per point: 2 ½ min

Plant: OKEELANTA | Run #: COMP - 2A

Location: UNIT 11 | Date: 12-7-90

O_2 %	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
				662.468						
	A1	-55	1.38	664.03	81	77	225	54	156	1
	2	.60	1.50	665.56	81	77	241	55	156	1
8.6	3	.63	1.58	667.16	82	77	264	56	158	1
	4	.60	1.50	668.77	83	79	270	57	158	1
	5	.53	1.33	670.17	86	79	254	60	156	1
	6	.45	1.13	671.68	85	80	247	60	156	1
	7	.33	.83	672.79	88	80	238	63	157	1
8.8	8	.35	.88	673.96	91	82	238	63	156	1
	9	.38	.95	675.16	86	80	247	62	156	1
	10	.43	1.08	676.46	88	82	243	61	156	1
	11	.41	1.03	677.67	88	83	248	61	160	1
8.6	12	.39	.98	678.916	87	82	248	62	157	1

Comments: DELTA P = 2.50 = DELTA H
BOX # [redacted] ; Y = 1.001 , DELTA H @ 2.03
START TIME : 9.40
STOP TIME : _____
INITIAL LEAK CHECK .000 AT 15 INCHES HG
FINAL LEAK CHECK _____ AT _____ INCHES HG

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

Page 2 of 2 | Sampling time per point: 2 ½ min

Plant: CKGELANTA | Run #: COMP - 2A

Location: UNIT 11 | Date: 12-7-90

	Trav. No.	Delta P	Delta H	Meter Reading 679.060	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
	B1	1.0	2.5	681.01	86	82	243	63	156	2
	2	1.05	2.63	682.92	89	84	246	57	156	2
9.1	3	1.05	2.63	684.05	89	85	244	59	156	2
	4	1.05	2.67	686.81	88	84	252	62	157	3
	5	.85	2.13	688.67	91	83	260	65	158	3
	6	.57	1.43	690.28	92	85	261	68	158	3
8.7	7	.18	.45	691.23	90	85	265	68	157	3
	8	.08	.20	691.80	88	85	247	66	156	1
	9	.06	.15	692.27	87	84	250	63	156	1
	10	.07	.18	692.75	86	84	255	62	156	1
	11	.08	.20	693.31	85	84	265	62	157	1
8.8	12	.10	.25	693.926	85	83	251	60	156	1

Comments: DELTA P = 2.5 = DELTA H
BOX # _____ ; Y = _____ , DELTA H @ _____
START TIME : _____
STOP TIME : 10:50
INITIAL LEAK CHECK .0 AT 15 INCHES HG
FINAL LEAK CHECK .000 AT 5 INCHES HG

FIELD DATA SHEET

GENERAL INFORMATION

Plant:	CKEEHANTA	Run #:	Comp-3A
Location:	UNIT 11	Date:	7 DEC 90
Ds (ft):	7.5	No. Points:	24
Dn (in):	.350	Test Length:	60 MIN
Filter #:	3778	End Meter Reading:	726.972
Cp:	.84	Int Meter Reading:	694.180
P bar:	30.09	Begin Time:	12:00
P stack:	.2	End Time:	13:00
IMP-1 (INT)	100 ML	IMP-1 (FINAL)	310 ML
IMP-2 (INT)	100 ML	IMP-2 (FINAL)	136 ML
IMP-3 (INT)	0 ML	IMP-3 (FINAL)	4 ML
IMP-4 (INT)	500.0 g	IMP-4 (FINAL)	514 g

	TEST 1	TEST 2	TEST 3
% CO2	11.6		
% O2	5.6		
% CO			

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

Comments:

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

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

Page 1 of 2 | Sampling time per point: 2 ½ MIN

Plant: OKEELANTA | Run #: COMP-3A

Location: UNIT 11 | Date: 12-7-90

O_2%	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
				694.180						
	1	.51	1.33	695.78	80	79	266	62	157	1
	2	.55	1.43	697.27	83	80	267	57	160	1
7.4	3	.59	1.53	698.80	84	80	260	60	157	1
	4	.55	1.43	700.34	85	81	267	59	160	1
	5	.52	1.35	701.54	89	81	266	60	157	1
9.5	6	.45	1.17	703.23	86	82	258	62	155	1
	7	.37	.96	704.47	92	83	230	63	155	1
	8	.40	1.04	705.71	86	84	251	65	155	1
	9	.46	1.20	707.06	87	84	228	65	156	1
	10	.48	1.25	708.46	89	84	255	62	156	1
8.8	11	.50	1.30	709.90	90	83	251	63	156	1
	12	.51	1.33	711.315	94	86	232	66	155	1

Comments: DELTA P = 2.6 = DELTA H
BOX # 4 ; Y = 1.001 , DELTA H @ = 2.03
START TIME : 12:00
STOP TIME : 1310
INITIAL LEAK CHECK .0 AT 15 INCHES HG
FINAL LEAK CHECK .0 AT 6 INCHES HG

FIELD DATA SHEET

TRAVERSE POINT INFORMATION

Page 2 of 2 | Sampling time per point: 2½ min

Plant: OKEELANTA | Run #: Comp

Location: UNIT 11 | Date: 12-7-90

	Trav. No.	Delta P	Delta H	Meter Reading	DGM In	DGM Out	Hot Box	Impg Temp	Stack Temp	Vac
O_2 %				711.578						
	B1	1.05	2.73	713.95	88	88	256	58	156	5
	2	1.05	2.73	716.05	90	86	240	65	156	5
	3	1.08	2.81	718.0	91	87	260	61	155	6
9.9	4	1.05	2.73	720.11	92	88	242	62	156	6
	5	.90	2.34	721.87	96	87	239	65	156	6
	6	.63	1.64	723.62	93	87	242	64	155	5
	7	.23	.60	724.62	92	86	262	65	156	4
9.1	8	.09	.234	725.22	89	87	264	61	156	2
	9	.08	.21	725.78	90	86	260	63	155	1
	10	.05	.13	726.26	87	85	260	62	155	1
	11	.10	.26	726.65	87	85	259	62	155	1
7.6	12	.04	.10	726.972	87	86	250	66	155	1

Comments: DELTA P * _____ = DELTA H
BOX # _____ ; Y = _____ , DELTA H @ _____
START TIME : _____
STOP TIME : _____
INITIAL LEAK CHECK _____ AT _____ INCHES HG
FINAL LEAK CHECK .006 AT 6 INCHES HG

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=

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

DELTA H @=

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

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

SCOTT LAWTON

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# A/04-1	NOZZLE # 1/4-2	NOZZLE# ____	NOZZLE # ____
1	.305	.256	____	____
2	.305	.258	____	____
3	.305	.257	____	____
AVG.	.305	.257	____	____

SEAN MACKAY 3 DEC 90

CALIBRATED BY: DATE:

THERMOCOUPLE CALIBRATION SHEET

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

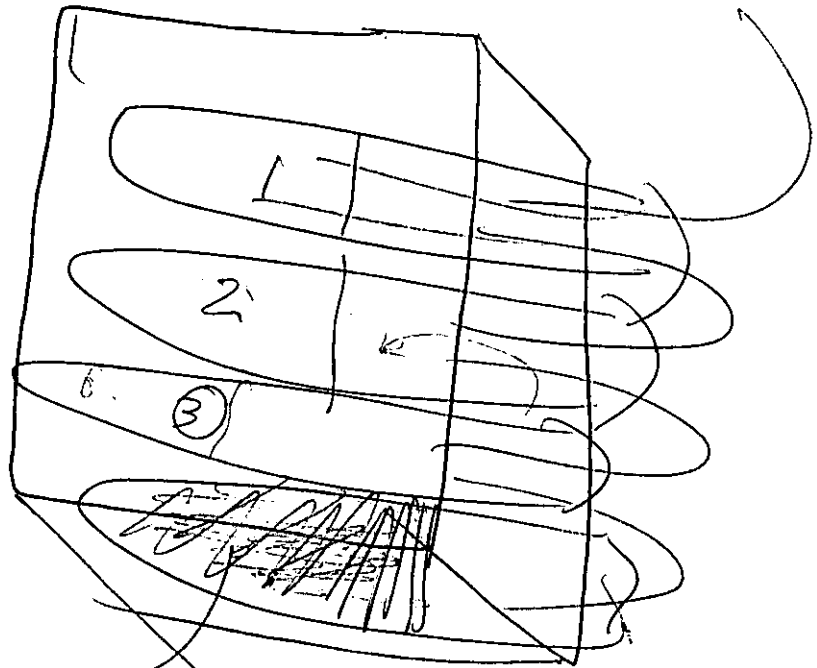
REFERENCE MERCURY/GLASS

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



12 gm

Silica

12 gm of mat

500 gm

5 12 gm

mat

Sp

1 gm = 1 ml = 12 ml

AS 244.2
unit input 253 ← Load 2

APIS 0005 49

Facility: Okeelanta Corporation
49.

INPUT SHEET - REV:09/13/83 - PAGE 2 OF 2

ENTER THE FOLLOWING:

		RUN1	RUN2	RUN3
1. H2O	COLLECTED (ONLY VOL.MEASURED),ML:	329	250.0	250.0
2. H2O	COLLECTED (WEIGHED PART ONLY),GM:	2.9	13.2	14.9
3. M'N	PARTICULATE WEIGHT, GM:	.179	.162	.191
4. V'M	VOLUME METERED, CF:	47.336	31.314	32.529
5. Y	DRY GAS METER CAL FACTOR:	1.001	1.001	1.001
6. RDP	AVG SQR DELTA P (WHEN SAMPLING):	.07	.66	.67
7. DH	AVG DELTA H, IN H2O:	3.03	1.23	1.33
8. T'M	AVG METER TEMP, DEG F:	86.5	84.4	86.5
9. T'S	AVG STACK TEMP, DEG F:	153.5	156.7	156
10. P'S*	STACK PRESS, *IN ....(.....):	.2	.2	.2
11. P'B	BAROMETRIC PRESS, IN HG:	30.08	30.09	30.09
13. D'N	ACTUAL NOZZLE DIAMETER, IN.:	.305	.25	.25
14. T	ACTUAL SAMPLE TIME, MIN:	60	60	60
15. C'P	PITOT TUBE COEFFICIENT:	.84	.84	.84

OPTION ENTRIES:

17. ORSAT/FYRITE - %CO2:	10.7		
18. ORSAT/FYRITE - %O2:	9.5		
28. ORSAT/FYRITE (FOR C'S @ 50%E.A.)-%CO:			
19. SPECIFIC M'D ENTRIES:			
20. CYCLONIC (10-20 DEG) - AVG COS(YAW):			
26. CYC.(>20) - AVG[SQR D.P X COS(YAW)]:			
21. PROCESS WT SOURCE - T/HR:			
22. LB/TON REGULATED - T/HR:			
27. LB/* REGULATED (* AS DEFINED) - */HR:			
23. LAM&CYC(<20)-VAL(SAMPLE PTS/TO PTS):	1	1	1