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Title:	*Source Test Report–Woodtech, Inc., Bluefield, Virginia*, prepared for Woodtech, Inc., by Environmental Quality Management, Inc., and Pacific Environmental Services, January 1992 2002 supplement

20

SOURCE TEST REPORT
WOODTECH, INC.
BLUEFIELD, VIRGINIA
REGISTRATION NO. 11103

Sources Tested:
Boiler Nos. 1 and 2
Veneer Dryer No. 1
Hot Press No. 1
November 5 to 8, 1991

PN 5015-2

Test conducted by

Environmental Quality Management, Inc.
3109 University Drive, Suite B
Durham, North Carolina 27707

and

Pacific Environmental Services
4700 Duke Drive, Suite 150
Mason, Ohio 45040

(513) 398-2550

January 1992

REPORT CERTIFICATION

The sampling and analyses performed for this report were carried out under my direction and supervision.

Date: _____ Signature: _____
Daniel Scheffel

I have reviewed all process operating procedures and sampling procedures and certify that all information contained in this report is authentic and accurate.

Date: _____ Signature: _____
Ron Hawks

CONTENTS

Figures	iv
Tables	v
Acknowledgment	vii
1. Introduction	1
Purpose	1
Test location	1
Test dates	1
Pollutants tested	2
Test methods used	2
Observers names	2
Operators names	3
2. Summary of Results	4
Boiler No. 1	4
Boiler No. 2	7
Veneer dryer	10
Hot press	12
3. Source Operation	15
Boiler No. 1	15
Boiler No. 2	18
Veneer dryer	19
Hot press	24
4. Sampling and Analytical Procedures	28
Quality assurance/quality control	28
Sample locations and test methods	29
Sampling and analytical procedures	36
Example calculations and data sheets	42
Correspondence	42

CONTENTS (continued)

Appendices

A.	Operating Permit	A-1
B.	Opacity Observations	B-1
C.	Boiler Logs	C-1
D.	Boiler Steam Charts	D-1
E.	Process Log Sheets	E-1
F.	Example Calculations/Computer Sheets	F-1
G.	Field Data Sheets	G-1
H.	Strip Chart Data/CEM	H-1
I.	Laboratory Data	I-1
J.	Equipment Calibration Sheets	J-1
K.	Correspondence with SAPCB	K-1

FIGURES

Number		Page
1	Simplified boiler flow diagram for boilers 1 and 2	16
2	Dryer flow diagram	23
3	Hot press flow diagram	25
4	Boiler No. 1 and boiler No. 2 sampling locations	30
5	Dryer No. 1 sampling locations	32
6	Dryer No. 2 sampling locations	33
7	Scrubber inlet sampling locations	34
8	Scrubber outlet sampling locations	35
9	Sampling train schematic for filterable particulate (Method 5)	38
10	Instrumental analyzer schematic for NO_x (7E) and CO (10) sampling	39
11	Instrumental analyzer schematic for volatile organic compound sampling (25A)	41

TABLES

Number		Page
1	Summary of Test Results Boiler No. 1 Flue Gas Data	5
2	Summary of Test Results Boiler No. 1 Emissions Data	5
3	Comparison of Test Operating Conditions and Permit Specifications Boiler No. 1	6
4	Test Results Versus Permit Conditions Boiler No. 1	6
5	Summary of Test Results Boiler No. 2 Flue Gas Data	8
6	Summary of Test Results Boiler No. 2 Emissions Data	8
7	Comparison of Test Operating Conditions and Permit Specifications Boiler No. 2	9
8	Test Results Versus Permit Conditions Boiler No. 2	9
9	Summary of Dryer No. 1 Flue Gas Data	10
10	Summary Dryer No. 2 Emission Data	11
11	Summary Scrubber Inlet/Outlet Flue Gas Data	12
12	Summary Heat Press Emissions Data	13
13	Detection Limits for CO, NO_x, THC, and Formaldehyde	14
14	Summary of Boiler No. 1 Operating Conditions	17
15	Summary of Boiler No. 2 Operating Conditions	19
16	Dryer Process Rate Run No. 1	20

TABLES (continued)

Number		Page
17	Dryer Process Rate Run No. 2	21
18	Dryer Process Rate Run No. 3	22
19	Summary of Dryer Operating Conditions	22
20	Hot Press Operating Conditions	26
21	Packed-Bed Scrubber Operating Conditions	26
22	Press Cycle Times and Conditions	27

ACKNOWLEDGMENT

This report was prepared for Woodtech by Mr. Ron Hawks and Mr. Dan Scheffel. The authors would like to thank Mr. Chuck Blevins and the staff of Woodtech for their cooperation during the testing activities.

SECTION 1

INTRODUCTION

Woodtech, Inc. conducted stack tests of wood-fired boiler Nos. 1 and 2, the veneer dryer, and the hot press on November 5 to 8, 1991, to determine the emissions as required by Virginia State Air Pollution Control Board (SAPCB) operating permit.

1.1 PURPOSE

The purpose of the test was to determine the representative emissions for the sources in accordance with operating permit DTE-126-91 specific condition Nos. 16, 17, 19, 20, 21, and 23 and special conditions 2 and 3 (Appendix A).

1.2 TEST LOCATION

Woodtech is located on Virginia Highway 102 two miles west of Bluefield, Virginia, near Fall River, Virginia. The plant produces furniture quality laminates from local hardwood species. The processes tested were two wood-fired boilers, veneer dryer, and plywood hot press system (scrubber-inlet and outlet).

1.3 TEST DATES

The test period covered four days with boiler No. 2 being tested on November 5 and boiler No. 1 on November 6. The veneer dryer was tested on November 7 and the scrubber on November 8.

1.4 POLLUTANTS TESTED

The boilers were tested for particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), and formaldehyde with flue gas moisture and oxygen (O_2) being determined using the U.S. Environmental Protection Agency (EPA) methods. Pollutants determined for the dryer and hot press were VOC and formaldehyde (inlet/outlet). In addition, visible emission observations were conducted on the boiler and dryer stacks.

1.5 TEST METHODS USED

The following test methods were used for the sources listed:

Source	Pollutant	Method
Boiler Nos. 1 and 2	PM	EPA Method 5
	NO_x	EPA Method 7E
	CO	EPA Method 10
	VOC	EPA Method 25A
	Formaldehyde	NIOSH Method 2541
Dryer (stack Nos. 1 and 2)	VOC	EPA Method 25A
	Formaldehyde	NIOSH Method 2541
Hot press scrubber (inlet/outlet)	VOC	EPA Method 25A
	Formaldehyde	NIOSH Method 2541

1.6 OBSERVERS NAMES

Personnel on-site to observe process operations were:

Chuck Blevins, Woodtech, Inc.
Ronald Hawks, Environmental Quality Management, Inc. (EQ)
Rob Fegens, SAPCB

Don Hilt, SAPCB

1.7 OPERATORS NAMES

Personnel operating process equipment during the test periods were:

Boilers:	Austin Butts, boiler operator Brad Peterson, boiler operator David Ambruzey, boiler operator
Dryer:	Robert Martin, shift supervisor
Hot press:	Albert Jarvis, hot press operator
Test personnel:	Frank Meadows, Pacific Environmental Services, Inc. (PES) Dan Scheffel, PES

SECTION 2

SUMMARY OF RESULTS

The following sections summarize the emission rates and process operating conditions occurring during the test period. Each section presents the information for the source tested to provide continuity.

2.1 BOILER NO. 1

Boiler No. 1 was tested on November 5, 1991, for PM, NO_x, CO, VOC, and formaldehyde. Table 1 summarizes the flue gas data for Boiler No. 1. Table 2 summarizes the emissions data for Boiler No. 1. The boiler was operated at a raw steam flow of 18,133 lb/h (12,791 lb/h true steam flow). The represented approximately 62 percent of the rated capacity of 20,700 lb/h (270 psig) and the highest steam flow obtainable because of the physical limitations of the boiler [i.e., surface area, firebox volume, and forced draft (FD) fan limits]. Table 3 compares the design (permitted) values to the test conditions.

Allowable emissions for the boiler are specified in permit No. DTE-126-91 and are reproduced in Table 4. These values (lb/h) are specified at full boiler rating and measured values can be compared to permit limits by prorating measured values. It is assumed that measured values are linear with boiler load up to the design boiler heat input.

Visible emission observations were conducted on boiler No. 1 by Don Hilt of the Virginia SAPCB, Abbington, Virginia. The average opacity was 0.17 percent for run Nos. 1 and 2. The range of individual opacity readings was between 0 (min) and 5 (max). No readings were taken during run 3 due to darkness and sun angle (Appendix B).

TABLE 1. SUMMARY OF TEST RESULTS BOILER NO. 1 FLUE GAS DATA

Run No.	Velocity, ft/s[a]	Temp., °F	Flow rate		Moisture, %	CO_2, %[d]	O_2, %[d]
			acfm[b]	dscfm[c]			
1-1	28.8	306	8,778	4,772	16.9	12.5	7.8[e]
1-2	30.2	334	9,191	4,796	17.0	12.5	7.8
1-3	30.4	328	9,239	4,991	14.7	12.6	7.7
Average	29.8	323	9,069	4,853	16.2	12.5	7.8

[a]Velocity in feet per second, ft/s.
[b]Flue gas flow rate at actual temperature and pressure.
[c]Flue gas flow rate in dry standard cubic feet per minute at 68° F and 29.92 in. Hg.
[d]Analysis on integrated bag sample, percentage by volume on a dry basis.
[e]Value taken from run number 2.

TABLE 2. SUMMARY OF TEST RESULTS BOILER NO. 1 EMISSIONS DATA

Run No.	Concentration, ppm[a]				Emission rate, lb/h[b]				Particulate[b]	
	CO	NO_x	THC	Formaldehyde	CO	NO_x	THC	Formaldehyde	lb/h	lb/10^6 Btu
1-1	194	145	11.4	1.0	4.0	5.0	0.38	0.027	2.64	0.139
1-2	195	111	17.4	1.0	4.1	3.8	0.57	0.021	2.69	0.141
1-3	128	121	25.7	0.0	2.8	4.3	0.88	0.009	2.87	0.143
Average	172	126	18.2	0.7	3.6	4.4	0.61	0.019	2.73	0.141

[a]Concentration in parts per million, ppm.
[b]Emission rates in pounds per hour, lb/h. Particulate emissions also in pounds per million Btu of heat input, lb/10^6 Btu.

TABLE 3. COMPARISON OF TEST OPERATING CONDITIONS AND PERMIT SPECIFICATIONS BOILER NO.1

Parameter	Permit/design	Operation/test
True steam flow, lb/h	20,700	12,790.8
Steam pressure, psig	270	125.03
Steam temp., °F	412.0	348.6
Heat output, 10^6 Btu/h	20.112[a] (20.807)[b]	13.32
Heat input, 10^6 Btu/h	29.00	19.37
Excess O_2, %	6.96	7.8
Fuel moisture, %	50	50
Boiler efficiency, %	69.35[a] (71.74[b])	68.77

[a]600 HP rated at 33,520 Btu/h.p. (boiler).
[b]Steam flow at net enthalpy of 1005.175 Btu/lb.

TABLE 4. TEST RESULTS VERSUS PERMIT CONDITIONS BOILER NO. 1

Pollutant	Permit limit[a]	Measured value	Expected value at full load[b]
CO, lb/h	16.03	3.6	5.39
NO_2, lb/h	2.72	4.4	6.58
PM, lb/h	5.20	2.73	4.08
PM, lb/10^6 Btu	0.20	0.141	0.20
VOC, lb/h	5.62	0.61	0.91
Formaldehyde, lb/h	c	<0.019[d]	<0.028[d]
Heat input, 10^6 Btu/h	29.0	19.37	29.0

[a]Permit limits applicable at full boiler load.
[b]Linear adjustment to full load based on ratio of heat input level.
[c]No permit value specified.
[d]lb/h based on detectable limit for each pollutant.

Attempts were made by the boiler operators to maintain maximum steam flow from the boilers during the test runs. Because wood fuel is nonhomogeneous, variations in wood size, moisture, and heat value occurred during each run.

2.2 BOILER NO. 2

Boiler No. 2 was tested on November 6, 1991, for PM, NO_x, CO, VOC, and formaldehyde. Table 5 summarizes flue gas data for boiler No. 2. Table 6 summarizes the emissions data for boiler No. 2. The boiler was operated at a raw steam flow of 18,310 lb/h (12,991 lb/h true steam flow). This represented approximately 62.7 percent of the rated capacity of 20,700 lb/h (270 psig). This represented the highest steam flow obtainable because of physical limitations of the boiler (i.e., surface area, firebox volume, and FD fan limits). Table 7 compares the design (permitted) values to the test conditions.

Allowable emissions for the boiler are specified in permit No. DTE-126-91 and are reproduced in Table 8. These values (lb/h) are specified at full boiler rating and measured values can be compared to permit limits by prorating.

It appears that a leak or stratification may have occurred in generating integrated flue gas samples for Orsat analysis for run Nos. 1 and 2. A continuous O_2 analyzer placed in the stack at a single point (center line) indicated 9.4 percent O_2 for all runs. Considering that the steam flow, flue gas, moisture and stack temperature did not vary significantly during the three runs, it is not considered reasonable that flue gas O_2 could be in the 11 to 12 percent range. Further boiler efficiency for the O_2 values would be 86 and 86.5 percent, respectively. For these reasons the heat input for run Nos. 1 and 2 were calculated using a flue gas O_2 of 9.4 percent.

Attempts were made by the boiler operators to maintain maximum steam flow from the boilers during the test runs. Because wood fuel is nonhomogeneous variations in wood size, moisture, and heat value occurred during each run.

TABLE 5. SUMMARY OF TEST RESULTS BOILER NO. 2 FLUE GAS DATA

Run No.	Velocity, ft/s[a]	Temp., °F	Flow rate		Moisture, %	CO_2, %[d]	O_2, %[d]
			acfm[b]	dscfm[c]			
2-1	31.3	312	9,541	5,394	13.3	9.2[e]	11.4[e]
2-2	33.0	298	10,044	5,744	13.5	8.6[e]	12.2[e]
2-3	33.1	309	10,065	5,606	14.3	11.0	9.4
Average	32.5	306	9,883	5,581	13.7	11.0[f]	9.4[f]

[a]Velocity in feet per second, ft/s.
[b]Flue gas flow rate at actual temperature and pressure.
[c]Flue gas flow rate in dry standard cubic feet per minute at 68° F and 29.92 in. Hg.
[d]Analysis on integrated bag sample, percentage by volume on a dry basis.
[e]Measure value appears to be in error due to inleakage.
[f]Average based on continuous monitor and results of run No. 3.

TABLE 6. SUMMARY OF TEST RESULTS BOILER NO. 2 EMISSIONS DATA

Run No.	Concentration, ppm[a]				Emission rate, lb/h[b]				Particulate[b]	
	CO	NO_x	THC	Formaldehyde	CO	NO_x	THC	Formaldehyde	lb/h	lb/10^6 Btu
2-1	243	112	34.0	1.0	5.7	4.3	1.26	0.018	2.96	0.157[c]
2-2	9.7	85.5	10.5	0.0	0.24	3.5	0.41	0.011	2.91	0.145[c]
2-3	8.5	75.1	4.8	0.0	0.21	3.0	0.18	0.011	2.87	0.147
Average	87.1	90.9	16.4	0.3	2.1	3.6	0.62	0.013	2.91	0.150

[a]Concentration in parts per million, ppm.
[b]Emission rates in pounds per hour, lb/h.
[c]Heat input calculated based on flue gas O_2 of 9.4 percent.

TABLE 7. COMPARISON OF TEST OPERATING CONDITIONS AND PERMIT SPECIFICATIONS BOILER NO. 2

Parameter	Permit/design	Operation/test
True steam flow, lb/h	20,700	12,991
Steam pressure, psig	270	118.89
Steam temperature, °F	412.0	348.93
Heat output, 10^6 Btu/h	20.122[a] (20.807)[b]	13.40
Heat input, 10^6 Btu/h	29.00	19.4
Excess O_2, %	6.96	9.4
Fuel moisture, %	50	50
Boiler efficiency, %	69.35[a] (71.74)[b]	69.0

[a]600 HP rated at 33,520 But/h.p. (boiler).
[b]Steam flow at net enthalpy of 1005.175 Btu/lb.

TABLE 8. TEST RESULTS VERSUS PERMIT CONDITIONS BOILER NO. 2

Pollutant	Permit limit[a]	Measured value	Expected value at full load[b]
CO, lb/h	16.03	2.1	3.14
NO_2, lb/h	2.72	3.6	5.38
PM, lb/h	5.20	2.91	4.35
PM, lb/10^6 Btu	0.20	0.150	0.20
VOC, lb/h	5.62	0.62	0.93
Formaldehyde, lb/h	c	<0.013[d]	<0.019[d]
Heat input, 10^6 Btu/h	29.0	19.4	29.0

[a]Permit limits applicable at full boiler load.
[b]Linear adjustment to full load based on ratio of heat input level.
[c]No permit value specified.
[d]lb/h based on detectable limit for each pollutant.

2.3 VENEER DRYER

The veneer dryer was tested for VOC and formaldehyde on November 7, 1991. The unit has two exhaust stacks that removes moisture from the dryer and maintains zone temperatures. Table 9 summarizes the flue gas data for the veneer dryer. Table 10 summarizes the emission data for the veneer dryer. The dryer was operated near maximum production levels during each run. The production rate was not constant, however, due to variation in veneer drying rates and feed rates. The test, however, was conducted under normal variation in feed and product quality ranges.

TABLE 9. SUMMARY OF DRYER NO. 1 FLUE GAS DATA

Run No.	Location	Velocity, ft/s[a]	Temp., °F	Flow rate		Moisture, %	O_2, %[d]
				acfm[b]	dscfm[c]		
1	Dryer No. 1	8.7	137	1,640	1,318	3.9	19.0
2		7.9	136	1,484	1,195	3.9	19.0
3		7.7	137	1,458	1,172	3.9	19.0
Average		8.1	137	1,527	1,228	3.9	19.0
1	Dryer No. 2	7.2	114	4,587	3,907	2.1	20.0
2		9.4	115	6,031	5,128	2.1	20.0
3		9.5	115	6,077	5,167	2.1	20.0
Average		8.7	115	5,565	4,734	2.1	20.0

[a]Velocity in feet per second, ft/s.
[b]Flue gas flow rate at actual temperature and pressure.
[c]Flue gas flow rate in dry standard cubic feet per minute at 68° F and 29.92 in. Hg.
[d]Percentage by volume on a dry basis.

TABLE 10. SUMMARY DRYER NO. 1 EMISSION DATA

Run No.	Location	Concentration, ppm[a]			Emission rate, lb/h[b]	
		THC (wet)	THC (dry)	Formaldehyde	THC	Formaldehyde
1	Dryer No. 1 stack	8.1	8.4	1	0.08	0.007
2		7.8	8.1	1	0.07	0.004
3		9.8	10.2	0	0.08	0.002
Average		8.6	8.9	0.7	0.08	0.004
1	Dryer No. 2 stack	6.5	6.6	1	0.18	0.005
2		9.9	10.1	1	0.36	0.007
3		7.4	7.7	0	0.27	0.002
Average		7.9	8.1	0.7	0.27	0.005

[a]Concentration in parts per million, ppm.
[b]Emission rate in pounds per hour, lb/h.

THC as propane

Calculated process rates were between 3.345 and 3.84 m^3/h of 3.5 mm veneer. Final moisture content of the veneer was between 8 and 16 percent. Design operating rates are 8 m^3/h at a maximum zone temperature of 360° F.

The dryer is allowed a total VOC emission of 6.56 lb/h. Combined emissions from both stacks were 0.035 lb/h, which is well below the permitted allowable level. 0.35 Combined formaldehyde emissions were < 0.009 lb/h and did not appear to vary with either process rate on dryer temperature. In fact, the formaldehyde concentration was near detectable limits for the method.

Visible emission observations from the dryer were conducted by Don Hilt of the Virginia SAPCB. Average visible emissions from stack Nos. 1 and 2 were zero (Appendix B).

Because of the steam demand constraints of the plant at full production it was difficult to maintain optimum steam pressure to the dryer. For this reason, zone

temperatures varied during the test runs. This variation, however, did not appear to cause a variation in emissions.

2.4 HOT PRESS

The hot press is hooded and the emissions are controlled by a packed-bed caustic scrubber. The inlet and outlet of the scrubber were tested for VOC and formaldehyde. Table 11 summarizes the flue gas data for the inlet and outlet of the scrubber. Table 12 summarizes the emissions data from the hot press.

TABLE 11. SUMMARY SCRUBBER INLET/OUTLET FLUE GAS DATA

Run No.	Location	Velocity, ft/s[a]	Temp., °F	Flow rate		Moisture, %	O_2, %[d]
				acfm[b]	dscfm[c]		
1	Scrubber Inlet	53.1	77	9,906	9,221	1.2	20.5
2		53.6	78	9,994	9,292	1.2	20.5
3		53.6	75	10,005	9,348	1.2	20.5
Average		53.4	77	9,968	9,287	1.2	20.5
1	Scrubber Outlet	51.3	61	9,667	9,145	1.8	20.5
2		50.5	61	9,521	9,003	1.8	20.5
3		50.9	58	9,598	9,132	1.8	20.5
Average		50.9	60	9,595	9,093	1.8	20.5

[a]Velocity in feet per second, ft/s.
[b]Flue gas flow rate at actual temperature and pressure.
[c]Flue gas flow rate in dry standard cubic feet per minute at 68° F and 29.92 in. Hg.
[d]Percentage by volume on a dry basis.

TABLE 12. SUMMARY HEAT PRESS EMISSIONS DATA

Run No.	Location	Concentration, ppm[a]			Emission rate, lb/h[b]	
		THC (wet)	THC (dry)	Formaldehyde	THC	Formaldehyde
1	Scrubber inlet	3.4	3.4	1	0.22	0.032
2		1.1	1.1	1	0.07	0.035
3		1.9	1.9	1	0.12	0.033
Average		2.1	2.1	1	0.14	0.033
1	Scrubber outlet	3.4	3.5	0	0.22	0.016
2		1.1	1.1	1	0.07	0.026
3		1.6	1.6	0	0.10	0.017
Average		2.0	2.1	0.3	0.13	0.020

[a]Concentration in parts per million, ppm.
[b]Emission rate in pounds per hour, lb/h. THC as propane

Production through the press was 4.56 to 7.00 m^3 of finished plywood. The product thickness was between 15 and 45 mm and the sheet count was 15 to 30.

Allowable emissions from the scrubber are 15.50 lb/h VOC and 0.05 lb/h formaldehyde. Actual emissions were 0.13 lb/h VOC and < 0.020 lb/h formaldehyde, which are well below permitted levels. It should be noted that the measured formaldehyde levels were detectable limit values for the method and that actual emissions may be below the reported values. This is particularly true of the scrubber inlet values, which also were at detectable limits.

No visible emission observations were made on the scrubber stack because of weather conditions (rain) and the presence of a condensed water vapor plume.

The operation of the scrubber system was erratic during the test series because of electrical problems in the pH controller feed back system and freezing of the caustic chemical feed pump and lines. This required manual chemical charging and manual

adjustment of the scrubber pH to complete the test series. The pH during each of the runs was different but did not appear to have an impact on the emission levels.

Table 13 lists the sample locations, pollutants, and method detection limits.

TABLE 13. DETECTION LIMITS FOR CO, NO_x, THC, AND FORMALDEHYDE

Location	Pollutant Method Detection Limits (MDL)			
	CO, ppm	NO_x, ppm	THC, ppm	Formaldehyde, μg
Boiler 1 & 2	20	14	7	1.0
Scrubber Inlet/Outlet	NA	NA	1.5	1.0
Dryer 1 & 2	NA	NA	1.5	1.0

SECTION 3

SOURCE OPERATION

The following section describes the control devices and processes operated at Woodtech. A summary of process operating logs, conditions, and process rates are included.

3.1 BOILER NO. 1

Boiler No. 1 is a 20,700 lb/h (270 psig) wood-fired boiler designed and installed by Hurst Boiler Co. Inc. The boiler has been upgraded and modified by Entech Automation Inc. and EQ. Boiler No. 1 consists of a refractory lined single retort underfeed stoker, combustion chamber, and a hybrid steam generation section. The crown of the combustion chamber contains water tubes and the rear of the boiler consists of a three pass fire tube boiler. The total design heating surface area is 3385 ft^2. An air heater is used at the outlet of the fire tube boiler to produce heated combustion air and reduce stack temperature.

Combustion air (overfire and underfire) is provided from a single FD fan at a temperature of 215° to 225° F. The fan volume (lb of combustion air) is a physical limit for the boiler operation and was at maximum flow during the test period.

Particulate matter emissions are controlled by a mutlicyclone containing 12 inch diameter tubes. In an effort to reduce CO, VOC, and smoke, the boiler has been also modified to increase turbulence in the firebox. This modification consists of four tangential steam jets placed approximately 20 inches above the fuel bed. Figure 1 is a simplified process flow diagram for the boiler system.

During the test, the boiler was operated at maximum steam generation rate available within the available FD fan capacity. The resulting steam rate was 12790.8

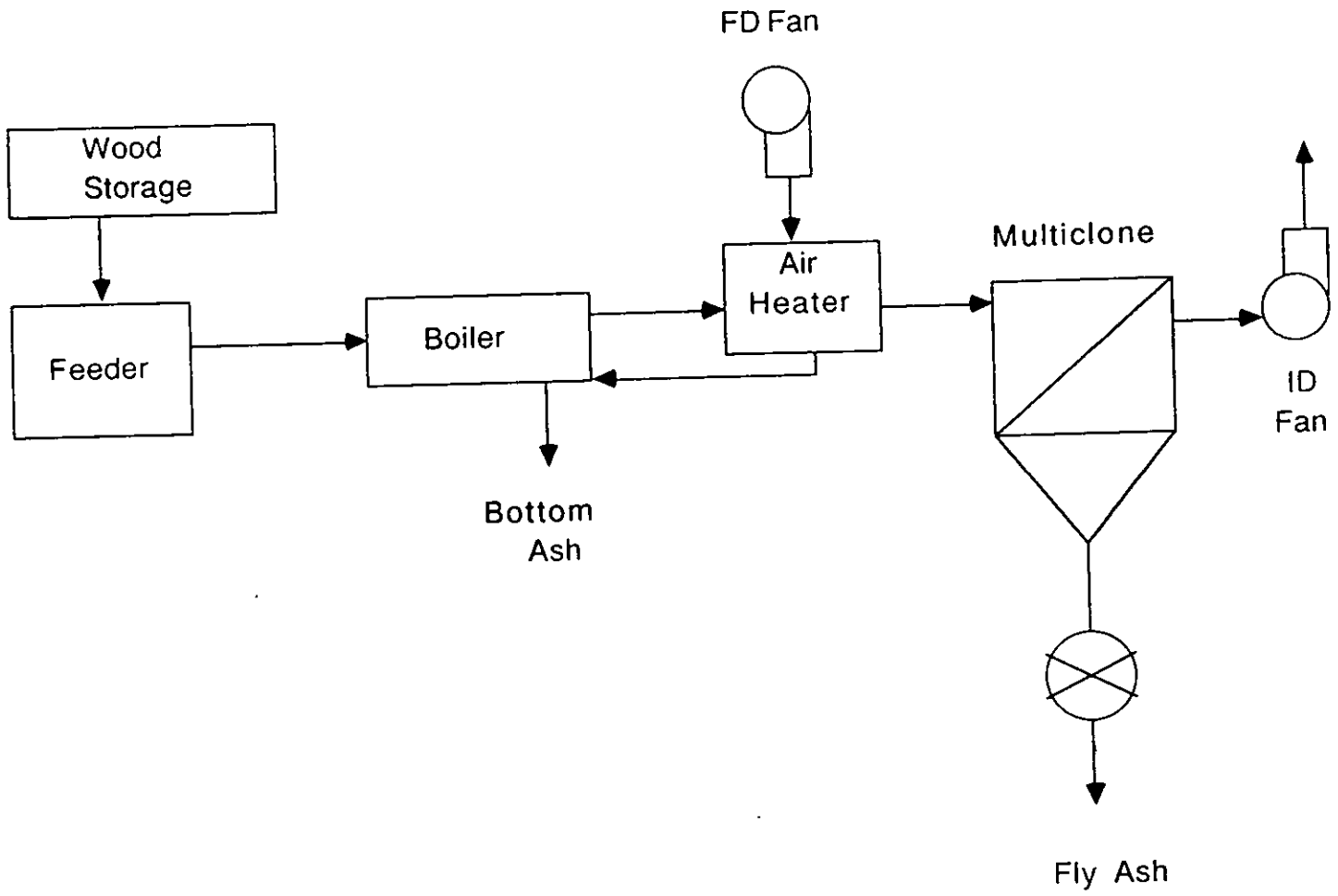


Figure 1. Simplified boiler flow diagram for Boilers 1 and 2.

lb/h which is 61.8 percent of the boiler rating. Based on the design heating surface and firebox dimensions, it is not expected that the boiler will be capable of achieving more than 15,000 lb/h steam generating rate even with additional combustion air. The test steam rate therefore is 85 percent of the expected maximum operating rate for the boiler.

Table 14 summarizes the boiler operating conditions for the three runs. Boiler logs and steam charts are provided in Appendices C and D.

TABLE 14. SUMMARY OF BOILER NO. 1 OPERATING CONDITIONS

Run	1	2	3	Average
Steam pressure, psia	121.86	116.37	136.86	125.03
Steam temperature, °F	346.8	348.3	350.8	348.6
Flue gas oxygen, %	7.8	7.8	7.7	7.75
Feed water temperature, °F	179	172.8	198.3	183.36
Stack temperature, °F	306	334	328	322.67
Raw steam flow, lb/h	16,800	19,200	18,400	18,133
True steam flow, lb/h	11,895	13,295	13,182	12,790.8
Heat output, 10^6 Btu/h	12.43	14.01	13.53	13.32
Heat input, 10^6 Btu/h	18.99	19.09	20.02	19.37
Steam enthalpy, Btu/lb	1192.79	1194.65	1193.35	1193.59
Feed water enthalpy, Btu/lb	147.07	140.86	166.40	151.44
Net enthalpy, Btu/lb	1045.72	1053.79	1026.95	1042.15
Boiler efficiency, %	65.45	73.81	67.58	68.77

During run 3 the fuel feed screw stopped, which decreased firing rate for the last 5 minutes of the run. Testing continued as steam flow decreased.

3.2 BOILER NO. 2

Boiler No. 2 is a 20,700 lb/h (270 psig) wood-fired boiler designed and installed by Hurst Boiler Co., Inc. The boiler has been upgraded and modified by Entech Automation Inc. and EQ. Boiler No. 2 consists of a refractory lined single retort underfeed stoker, combustion chamber, and a hybrid steam generation section. The crown of the combustion chamber contains water tubes and the rear of the boiler consists of a three pass fire tube boiler. The total design heating surface area is 3385 ft^2. An air heater is used at the outlet of the fire tube boiler to produce heated combustion air and reduce stack temperature.

Combustion air (overfire and underfire) is provided from a single FD fan at a temperature of 215° to 225° F. The fan volume (lb of combustion air) is a physical limit for the boiler operation and was at maximum flow during the test period.

Particulate matter emissions are controlled by a mutlicyclone containing 12 inch diameter tubes. In an effort to reduce CO, VOC, and smoke, the boiler has also been modified to increase turbulence in the firebox. This modification consists of four tangential steam jets placed approximately 20 inches above the fuel bed.

During the test, the boiler was operated at the maximum steam generation rate available within the available FD fan capacity. The resulting steam rate was 12,991 lb/h, which is 62.8 percent of the boiler rating. Based on the design heating surface and firebox dimensions, it is not expected that the boiler will be capable of achieving more than 15,000 lb/h steam generating rate even with additional combustion air. The test steam rate therefore is 86.7 percent of the expected maximum operating rate for the boiler.

Table 15 summarizes the boiler operating conditions for the three runs. Boiler logs and steam charts are provided in Appendices C and D, respectively.

TABLE 15. SUMMARY OF BOILER NO. 2 OPERATING CONDITIONS

Run	1	2	3	Average
Steam pressure, psia	117.5	115.78	123.41	118.89
Steam temperature, °F	352.8	348.3	345.71	348.93
Flue gas oxygen, %	9.4	9.4	9.4	9.4
Feed water temperature, °F	202.85	173.0	198.4	191.33
Stack temperature, °F	312.0	298	309	306.3
Raw steam flow, lb/h	17,640	18,090	19,200	18,310
True steam flow, lb/h	13,082	12,507	13,385	12,991
Heat output, 10^6 Btu/h	13.385	13.144	13.733	13.40
Heat input, 10^6 Btu/h	18.84	20.07	19.58	19.4
Steam enthalpy, Btu/lb	1194.19	1191.99	1192.21	1192.79
Feed water enthalpy, Btu/lb	170.96	141.06	166.24	159.42
Net enthalpy, Btu/lb	1023.23	1050.93	1025.97	1033.37
Boiler efficiency, %	71.04	65.50	70.12	68.88

A power interruption occurred during run 2 that resulted in a loss of automated boiler controls. The boiler was restarted on manual and returned to automatic control without stopping the test run. The cause of the power outage has been corrected.

3.3 VENEER DRYER

The veneer dryer is a steam heated tunnel dryer that is used to reduce moisture in the veneer produced by the lathe. A dry veneer is required to produce a

Source category: Plywood FILE: PLY_EF02. Date: 05/23/94
Plant name : Woodtech, Inc. Location: Bluefield, VA
Test date : Ref. No.: 2
Process : Dryer, press Basis for process rate :

Source	Type of control	Pollutant	Run No.	Emission rate, lb/hr	Process rate, MSF/hr	Emission factor kg/MSF	Emission factor lb/MSF	Volumetric flow rate, DSCFM	Concen. ppm
Dryer Stack 1	None	THC	1	0.029					
		THC	2	0.025					
		THC	3	0.029					
					average				
Stack 2	None	THC	1	0.131					
		THC	2	0.098					
		THC	3	0.098					
					average				
Total	None	THC	1	0.16	3.8	0.21	0.042		
		THC	2	0.12	3.9	0.15	0.032		
		THC	3	0.13	4.3	0.14	0.029		
					average	0.17	0.034	Rating:	B
Dryer Stack 1	None	formaldehyde	1	0.007					
		formaldehyde	2	0.004					
		formaldehyde	3	0.002					
					average				
Stack 2	None	formaldehyde	1	0.005					
		formaldehyde	2	0.007					
		formaldehyde	3	0.002					
					average				
Total	None	formaldehyde	1	0.012	3.8	0.016	0.0032		
		formaldehyde	2	0.011	3.9	0.014	0.0028		
		formaldehyde	3	0.0040	4.3	0.0045	0.00092		
					average	0.011	0.0023	Rating:	D
Press	None	THC	1	0.080	7.38	0.053	0.011		
	METH	THC	2	0.025	8.20	0.015	0.0031		
		THC	3	0.044	8.20	0.026	0.0053		
					average	0.031	0.0064	Rating	B
		formaldehyde	1	0.032	7.38	0.021	0.0043		
		formaldehyde	2	0.035	8.20	0.021	0.0043		
		formaldehyde	3	0.033	8.20	0.020	0.0040		
					average	0.021	0.0042	Rating:	D
Press	Scrubber	THC	1	0.080	7.38	0.053	0.011		
		THC	2	0.025	8.20	0.015	0.0031		
	METH	THC	3	0.036	8.20	0.022	0.0044		
					average	0.030	0.0061	Rating:	B
		formaldehyde	1	0.016	7.38	0.011	0.0022		
		formaldehyde	2	0.026	8.20	0.015	0.0032		
		formaldehyde	3	0.017	8.20	0.010	0.0021		
					average	0.012	0.0025	Rating:	D

METHANE 0.38 lb/hr

Notes: Emission rates for THC converted from propane to methane basis using factor of 16/44.

Calculation of process rates

Source	Run	Process rate m^3/hr	ft^3/hr	MSM/hr	MSF/hr
Dryer	1	3.35	118.1	0.352	3.78
	2	3.47	122.5	0.365	3.92
	3	3.84	135.6	0.404	4.34
Press	1	6.534027	230.7	0.688	7.38
	2	7.26003	256.4	0.764	8.20
	3	7.26003	256.4	0.764	8.20

4.013 MSF/hr

MSM = thousand square meters of 9.5 mm thick board.
MSF = thousand square feet of 3/8 in. thick board.

dimensionally stable plywood and insure adhesive bonding in the hot press. Improperly dried veneer will result in sheet delamination and blow out (bubbles in the sheet).

The dryer consists of multilayer passes of veneer sheets held and moved by rollers. Air is heated by steam coils and passed through and around the veneer sheets as they travel through the dryer. Because of the vertical temperature variation in the dryer, the lower and upper decks are operated at different speeds (ft/min) to produce the desired moisture in the final products. The dryer is divided into four zones in which the temperature is controlled.

Feed opening cycle times and dryer speed were recorded at 15 minute intervals and veneer feed rate determined for each run (Tables 16, 17, and 18). All veneer processed was 3.5 mm thickness and the sheet dimension was a nominal 4' x 4'. Each pallet contained 200 sheets at a thickness of 28 inches (1.057 m^3/pallet).

TABLE 16. DRYER PROCESS RATE RUN NO. 1

Time	Gate opening, s	Motor, rpm	Sheet/ h rate	Total sheet/h	m^3/h rate	Drying time, min	Sheet speed, ft/min
1100	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1115	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1130	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1145	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1200	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
Average					3.345		

TABLE 17. DRYER PROCESS RATE RUN NO. 2

Time	Gate opening, s	Motor, rpm	Sheet rate	Total sheet/h	m^3/h	Drying time, min	Sheet speed, ft/min
1200	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1215	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1230	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1445	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1500	T 15 B 38	850 500	480 189	669	3.345	33 37	3.94 3.51
1515	T 15 B 38	850 500	480 189	669	3.345	33 77	3.94 3.51
1530	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
1545	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
Average					3.468		

TABLE 18. DRYER PROCESS RATE RUN NO. 3

Time	Gate opening, s	Motor, rpm	Sheet rate	Total sheet/h	m^3/h	Drying time, min	Sheet speed, ft/min
1615	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
1630	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
1645	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
1700	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
1715	T 15 B 25	900 800	480 288	768	3.84	26 24	5.00 5.42
Average					3.84		

The production during the run 1 was 3.345 m^3/h, run 2 was 3.468 m^3/h, and run 3 was 3.84 m^3/h. Tables 16, 17, and 18 present the process information for each run. Table 19 summarizes the average operating conditions for each run.

Figure 2 is a simplified process flow diagram for the dryer operation.

TABLE 19. SUMMARY OF DRYER OPERATING CONDITIONS

Run	Temp. zone					Process rate, m^3/h	Steam press, kg/cm^2	Drier speed	Drive, rpm
	1	2	3	4	Term			Top	Bottom
1	109.6	144.8	137.2	139.2	390	3.345	3.5	850	500
2	126.3	161.7	153.4	155.8	390	3.468	8.5	850	500
3	119.4	152.6	144.4	149.2	390	3.84	5.0	900	800
Average	118.4	153.0	145.0	148.1	390	3.55	5.67	866	600

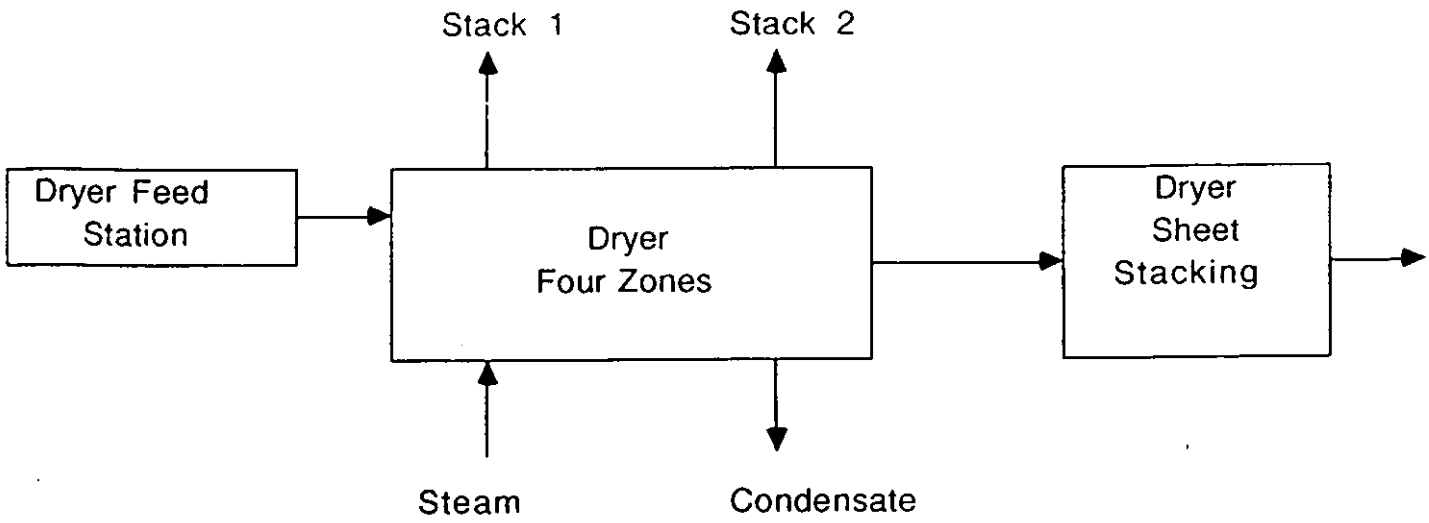


Figure 2. Dryer flow diagram.

3.4 HOT PRESS

The hot press is used to heat the plywood to allow the thermosetting of the urea formaldehyde adhesive. The plywood is composed to meet the required dimensions (thickness) and sheet count and staged for press operation. Each press charge containing multiple sheets is first compressed to insure wood/adhesive contact in a cold press. This provides a flat sheet with air and voids removed between the veneer layers.

After the cold press sheets are individually placed between the steam heated platens. The press is closed and hydraulically loaded to a preset pressure and the sheets heated for a preset time at the required temperature. The required press cycle time is determined by sheet count, thickness,and product use.

At the end of the press cycle, the platens are opened and the sheets are removed and cooled before transfer into the fabrication area. Figure 3 is a simplified process flow diagram for the hot press system.

The hot press emissions are captured by a large hood placed over and around the press and cooling station. The hood is exhausted to the packed-bed caustic scrubber. In the scrubber any collected formaldehyde is converted to sodium formate and discharged to the sewer.

The scrubber has a diameter of 5 feet and contains 12 feet of Tellerette packing followed by a chevron demister. A caustic solution (pH 12) is recirculated in the scrubber at a rate of 118 gal/min. A blowdown of 2 to 4 gal/min is discharged to the sewer to maintain solids content in the system. A Great Lakes pH probe, pH controller, and chemical feed system are used to maintain pH levels in the recirculated liquor. An acid feed system is used to reduce blowdown discharge pH to 6 to 8 before discharge to the sewer.

During the test, hot press records were maintained to determine sheet count, cycle time, and press temperatures. The production rate was 6.73 M^3/cycle or 6.98 M^3/h equivalent rate. Table 20 summarizes the production rates and the process logs

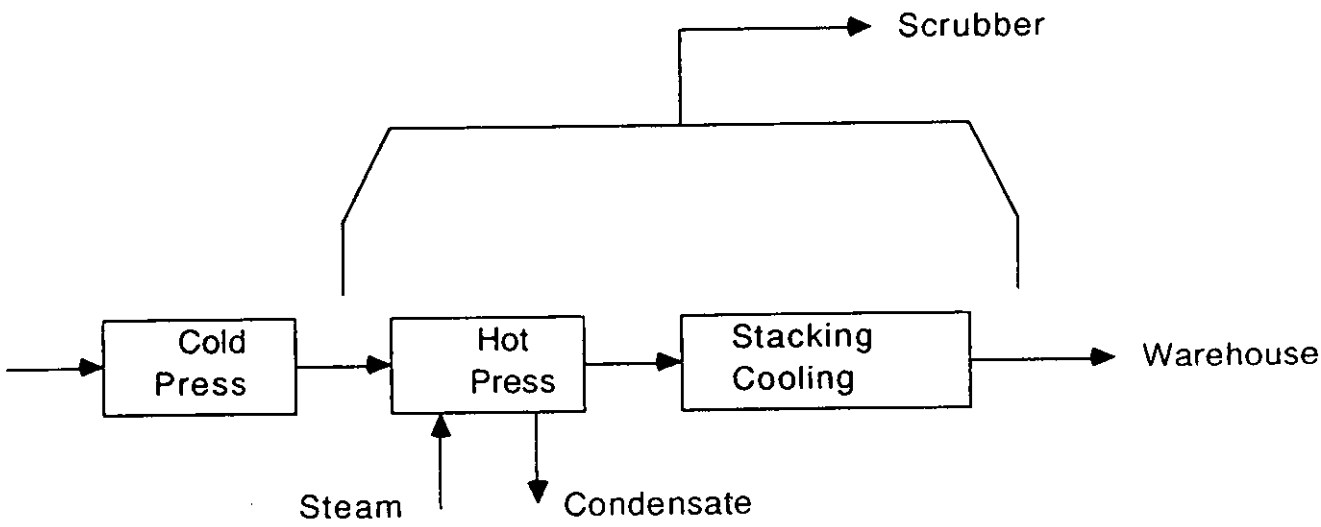


Figure 3. Hot press flow diagram.

TABLE 20. HOT PRESS OPERATING CONDITIONS

Run	Species	Size	Thickness, mm	Sheets	Process rate, m^3	Press temperature, °C
1	YP YP	4 x 8 4 x 8	18 45	30 15	6.3	114
2	YP YP	4 x 8 4 x 8	45 45	15 15	7.0	114
3	YP	4 x 8	45	15	7.0	114
Average					6.73	114

are provided in Appendix E. Table 21 summarizes the packed-bed scrubber operating conditions and Table 22 summarizes the press cycle times and conditions.

TABLE 21. PACKED-BED SCRUBBER OPERATING CONDITIONS

Run	pH	Inlet gas temperature	Pressure drop	Nozzle press, psig	Overflow, gal/min
1 Start	10.85	60	2.5	118	4
Mid pt.				118	4
End	10.80	60		118	4
Avg.		60	2.5	118	4
2 Start	12.28	60	2.5	118	4
Mid pt.	11.90			118	4
End	10.90	60		118	4
Avg.		60	2.5	118	4
3 Start	12.78	60	2.5	118	4
Mid pt.	13.01			118	4
End	12.88	60		118	4
Avg.		60	2.5	118	4

TABLE 22. PRESS CYCLE TIMES AND CONDITIONS

Lot No.	Press start time	Press time, min	Press end time	Pres-sure, kg	Temp., °C	Sheet count	Thick-ness, mm	Dead time, min	M^3/ cycle
250	1054	9.9	1106	145	114	30	15	17	4.66
P	1123	9.9	1133	145	114	29	15	39	4.51
251	1212	9.9	1222	145	114	30	15	76	4.66
252	1338	9.9	1348	145	114	30	18	22	5.60
253	1410	27	1437	145	114	15	45	21	7.00
254	1458	27	1525	145	114	15	45	68	7.00
255	1533	27	1600	145	114	15	45	0	7.00
256	1600	27	1627	145	114	15	45	100	7.00
257	1807	27	1835	145	114	15	45	6	7.00
258	1841	11.5	1852.5	145	114	30	21	23.5	6.53
259	1916	11.5	1927.5	145	114	29	21		6.32

17.9

30 mm
1.18 in.

SECTION 4

SAMPLING AND ANALYTICAL PROCEDURES

The following sections describe the quality assurance/quality control, sample locations and test methods, and sampling and analytical procedures.

4.1 QUALITY ASSURANCE/QUALITY CONTROL

The field sampling quality assurance for this project includes use of calibrated source sampling equipment, use of reference test methods, sample chain of custody, and traceability protocols for the recording and calculation of data.

Field quality control checks include the following:

- Pretest and post-test leak checks of velocity measuring equipment and particulate sample trains.
- Periodic zeroing and leveling of the manometers during each measurement run.
- Recording of all field data on standard data forms, which also serve as check lists.
- Adherence to reference test methods as published in the most recent revisions of the Federal Register, 40 CFR 60, Appendix A, EPA Reference Methods 1 to 5, July 1985.
- Calibration of dry gas meters and thermocouples, as specified in EPA-600/4-77-027b, "Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods.
- Use of Type "S" pitot tubes with an assigned coefficient of 0.84, based on EPA alignment criteria of Method 2.

- Pretest and post-test calibrations of instrumental analyzers with EPA Protocol grade gases to establish linearity and resolution of the analyzers.
- Use of standard procedures for sample recovery.
- The reagent blanks are taken directly from the wash bottle at the sample recovery area.
- A clean filter is taken to the field, exposed at the sample recovery site, and returned to the laboratory for analysis. This ensures the proper handling of filters in the field.
- Maintaining a sample "Chain-of-Custody."

The analytical quality assurance for this project includes the use of prescribed filters and reagent grade acetone, use of recommended procedures for analysis of samples and blanks, and recording of data on standard forms.

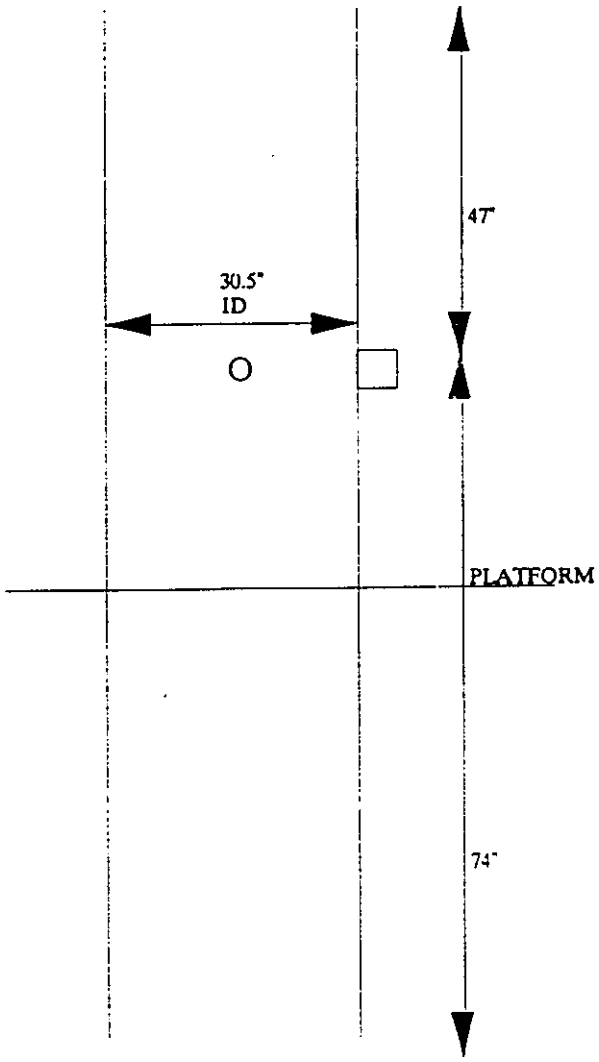
Specific laboratory quality control checks include:

- Use of a certified 4-place balance for the weighing of samples
- Proper desiccating of samples
- Weighing individual samples to constant weights
- Maintaining a sample "Chain-of-Custody."

4.2 SAMPLE LOCATIONS AND TEST METHODS

4.2.1 Boiler No. 1 and Boiler No. 2

Sampling was conducted at the outlet ducts serving Boiler No. 1 and No. 2. Figure 4 shows the outlet sample locations and traverse points. Each boiler has separate, but identical stacks. The outlet ports are located 2.4 duct diameters downstream and 1.5 duct diameters upstream from the nearest flow disturbances. Twenty-four sampling points (12 points per port) were used to traverse the cross-sectional area of the 30.5 inch I.D. ducts.



TRAVERSE POINT NO.	FRACTION OF STACK ID
1	2.1
2	6.7
3	11.8
4	17.7
5	25.0
6	35.6
7	64.4
8	75.0
9	82.3
10	88.2
11	93.3
12	97.9

Figure 4. Boiler No. 1 and Boiler No. 2 sampling locations.

4.2.2 Dryer No. 1

Sampling was conducted at the outlet duct serving Dryer No. 1. Figure 5 shows the outlet sample locations and traverse points. The outlet ports are located 3.7 duct diameters downstream and 2.9 duct diameters upstream from the nearest flow disturbances. Sixteen sampling points (8 points per port) were used to traverse the cross-sectional area of the 24 inch I.D. duct.

4.2.3 Dryer No. 2

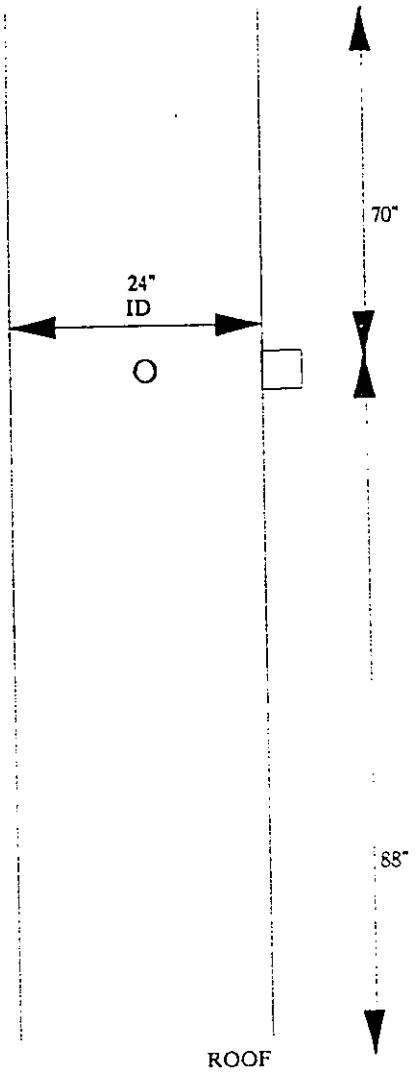
Sampling was conducted at the outlet duct serving Dryer No. 2. Figure 6 shows the outlet sample location and traverse points. The outlet ports are located 3.9 duct diameters downstream and 1.5 duct diameters upstream from the nearest flow disturbances. Sixteen sampling points (8 points per port) were used to traverse the cross-sectional area of the 44.25 inch I.D. duct.

4.2.5 Scrubber Inlet

Sampling was conducted at the horizontal duct serving the Scrubber Inlet. Figure 7 shows the sample location and traverse points. The sample ports are located >8 duct diameters downstream and 6.5 duct diameters upstream from the nearest flow disturbances. Twelve sampling points (6 points per port) were used to traverse the cross-sectional area of the 23.9 inch I.D. duct.

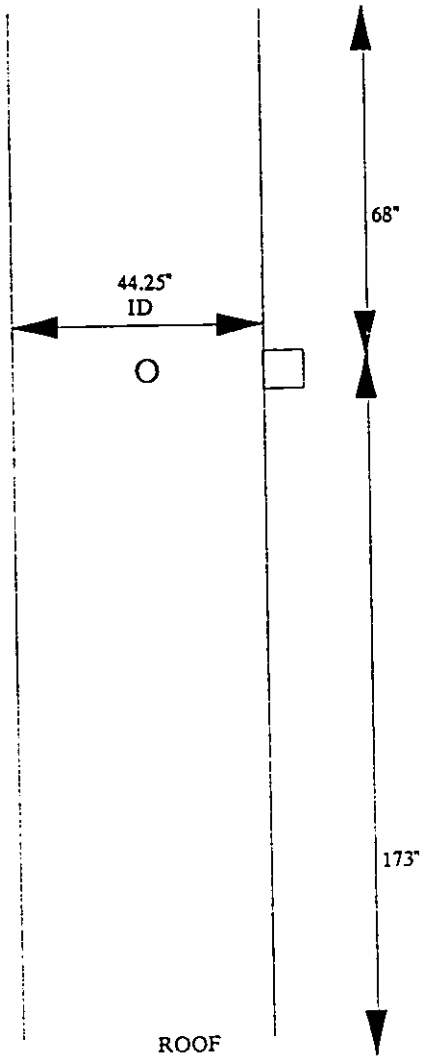
4.2.6 Scrubber Outlet

Figure 8 shows the outlet sample location and traverse points. The outlet ports are located 3.4 duct diameters downstream and 0.75 duct diameters upstream from the nearest flow disturbances. Sixteen sampling points (8 points per port) were used to traverse the cross-sectional area of the 24 inch I.D. duct.



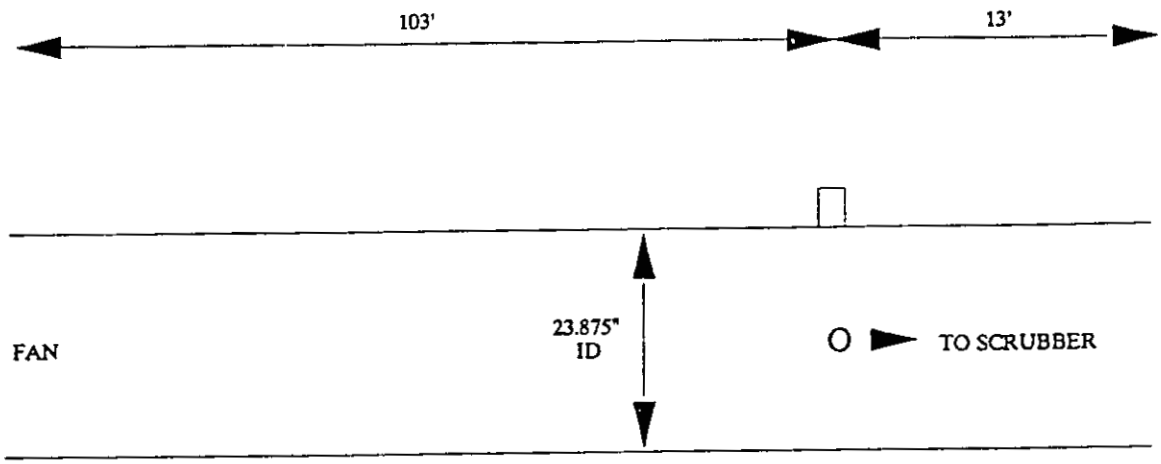
TRAVERSE POINT NO.	FRACTION OF STACK ID
1	3.2
2	10.5
3	19.4
4	32.3
5	67.7
6	80.6
7	89.5
8	96.8

Figure 5. Dryer No. 1 sampling locations.



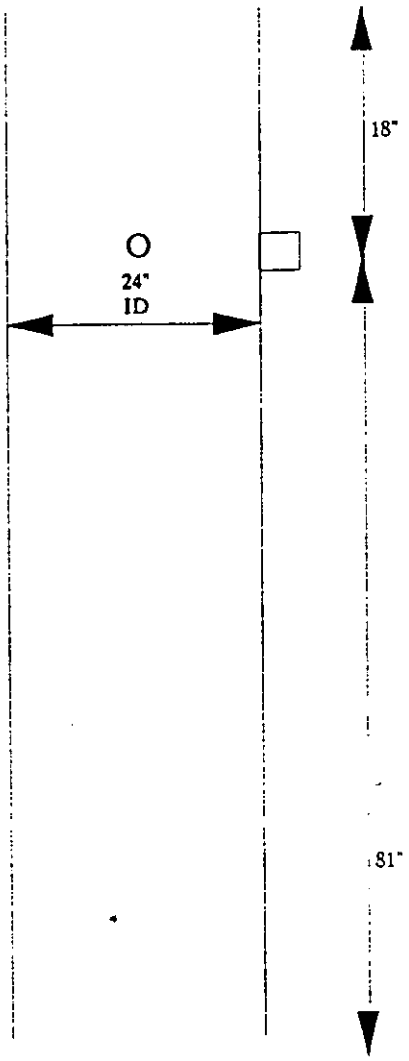
TRAVERSE POINT NO.	FRACTION OF STACK ID
1	3.2
2	10.5
3	19.4
4	32.3
5	67.7
6	80.6
7	89.5
8	96.8

Figure 6. Dryer No. 2 sampling locations.



TRAVERSE POINT NO.	FRACTION OF STACK ID
1	4.4
2	14.6
3	29.6
4	70.4
5	85.4
6	95.6

Figure 7. Scrubber inlet sampling locations.



TRAVERSE POINT NO.	FRACTION OF STACK ID
1	3.2
2	10.5
3	19.4
4	32.3
5	67.7
6	80.6
7	89.5
8	96.8

Figure 8. Scrubber outlet sampling locations.

4.3 SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures used in this test program conform to the requirements of the Federal U.S. Environmental Protection Agency (EPA). A brief description of each method follows:

4.3.1 Location of Measurement Sites

U.S. EPA Method 1, "Sample and Velocity Traverses for Stationary Sources" was used to select representative measurement sites. The measurement sites are discussed in the previous section.

4.3.2 Stack Gas Volumetric Flow Rate

U.S. EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate" was used to determine volumetric flow rate. A Type 'S' pitot tube having an assigned coefficient of 0.84 and an inclined manometer were used to measure velocity pressure. A calibrated Type 'K' thermocouple attached directly to the pitot tube was used to measure stack gas temperature. The average stack gas velocity was calculated from the average velocity pressure, average stack gas temperature, stack gas molecular weight, and absolute static pressure. The volumetric flow rate is the product of velocity and the stack cross-sectional area.

4.3.3 Emission Rate Correction Factor, Dry Molecular Weight, and Excess Air

U.S. EPA Method 3, "Gas Analysis For Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight" was used to determine emission rate correction factors, dry molecular weight, and excess air. Integrated gas samples were collected in Tedlar bags by traversing the stack cross-sectional area simultaneously with each particulate test run. The samples were then analyzed using an Orsat analyzer.

4.3.4 Stack Gas Moisture Content

U.S. EPA Method 4, "Determination of Moisture Content in Stack Gases" was used to determine stack gas moisture content. This method was conducted

simultaneously with each pollutant measurement run. The initial and final contents of all impingers were determined gravimetrically.

Moistures were also determined by wet-bulb/dry-bulb determinations at the dryer and scrubber sites.

4.3.5 Filterable Particulate Matter

U.S. EPA Method 5, "Determination of Particulate Emissions From Stationary Sources" was used to determine filterable particulate matter. The sample train consisted of a heated glass-lined probe, heated glass fiber filter, and a series of impingers followed by a vacuum pump, dry gas meter, and calibrated orifice. The filter temperature was maintained at 248 $\pm$ 25° F. Thermocouples were used to monitor temperatures of the stack gas, sample probe, filter, and impinger exit gas. Figure 9 is a diagram of the sampling train.

4.3.6 Nitrogen Oxides

U.S. EPA Method 7E, "Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure)," was employed for these tests. The test team used a chemilluminescent NO_x analyzer, manufactured by Thermo Electron Corporation, for nitrogen oxide emission monitoring. The NO_x analyzer was operated continuously during the one hour sampling test runs. The zero and three calibration gases for the NO_x analyzer were checked prior to the initial test run and at the end of the one hour sampling period. The instrument was zeroed on ultra zero air and spanned on EPA Protocol gases.

A four (4) foot probe with a 3-way valve on the exit end was inserted directly into the stack with a teflon sample line attached to one side of the valve, and the calibration gas to the other. A condenser for moisture removal was attached to the exit end of the probe and a nonheated teflon line for the dry gas connected the condenser and the analyzer. Figure 10 shows a schematic of the sampling train.

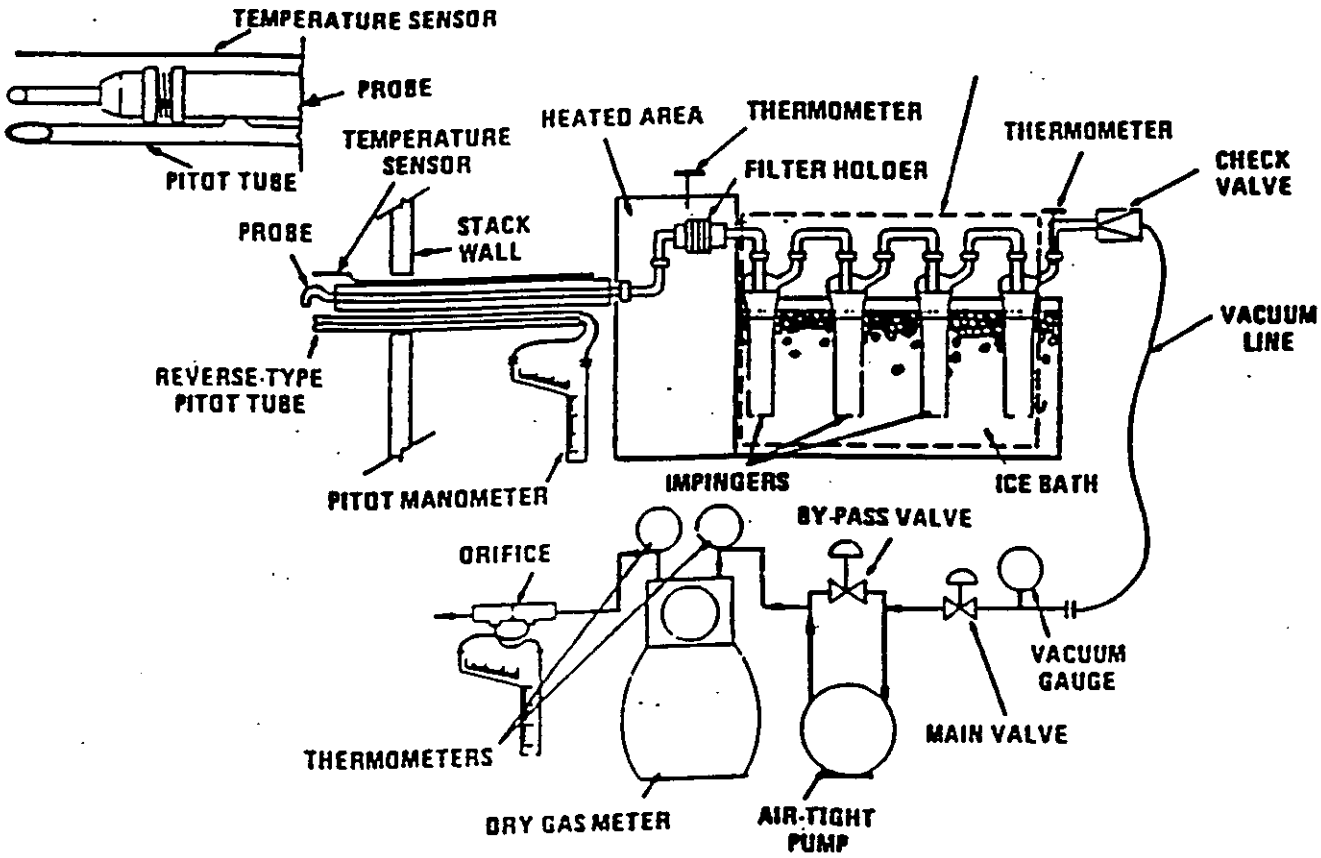


Figure 9. Sampling train schematic for filterable particulate (Method 5).

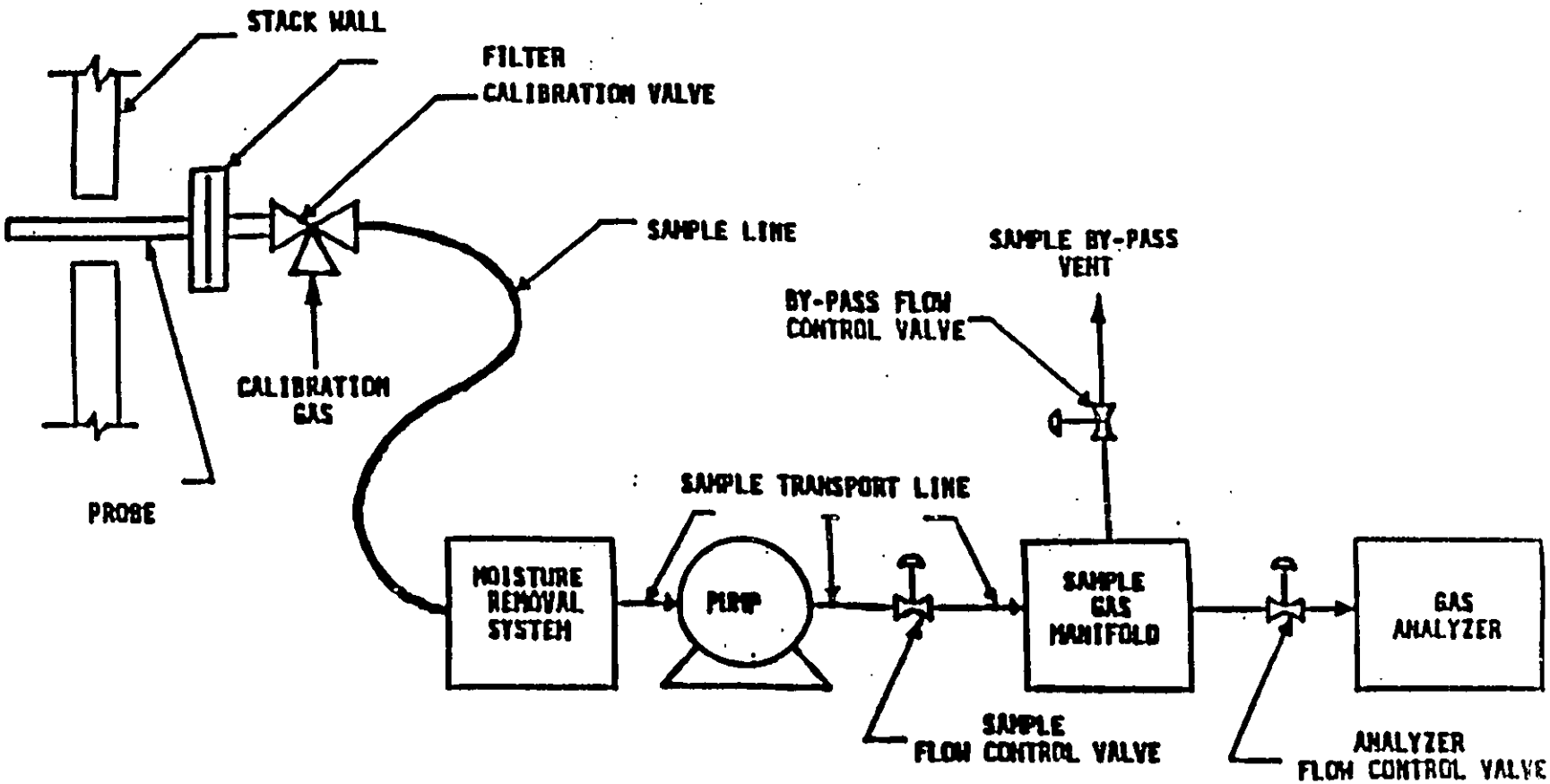


Figure 10. Instrumental analyzer schematic for NO_x (7E) and CO (10) sampling.

4.3.7 Volatile Organic Compounds (VOC)

U.S. EPA Method 25A, "Determination of Total Gaseous Organic Concentration," was used. The sample system consists of a stainless steel probe, heated Teflon line, and heated flame ionization analyzer (FIA). The FIA was calibrated with three EPA Protocol 1 propane standards in air and zero gas. Calibrations and drift checks were conducted after each sample run. Data were reduced based on responses as propane. Concentrations were reported on a dry basis using moisture values from the Method 5 sample system. Figure 11 is a schematic of the sampling system.

4.3.8 Carbon Monoxide

U.S. EPA Method 10, "Determination of Carbon Monoxide Emissions From Stationary Sources" was used to determine carbon monoxide emissions on Unit 3. Samples were extracted from the stack and analyzed continuously using a nondispersive infrared analyzer (NDIR). The NDIR was calibrated using gases certified by the manufacturer to be within ± 2 percent of the specified concentration. The instrument was zeroed with prepurified grade nitrogen. Span gases of known concentrations of CO in nitrogen were used as intermediate calibration points. Figure 10 is a schematic of the sampling system.

4.3.9 Formaldehyde

A modified U.S. EPA Method 18 sampling system was used to determine formaldehyde concentrations. The sample train consisted of a stainless steel probe, teflon sample line, treated XAD-2 collection tube (ORBO-22), critical orifice, and sample pump. Tubes were sealed and placed on ice until delivery to the lab. Tubes were then desorbed in 1 milliliter of toluene, separated by a DB 1301 capillary column prior to analyses by gas chromatography/flame ionization detector. This method is similar to NIOSH Method 2541.

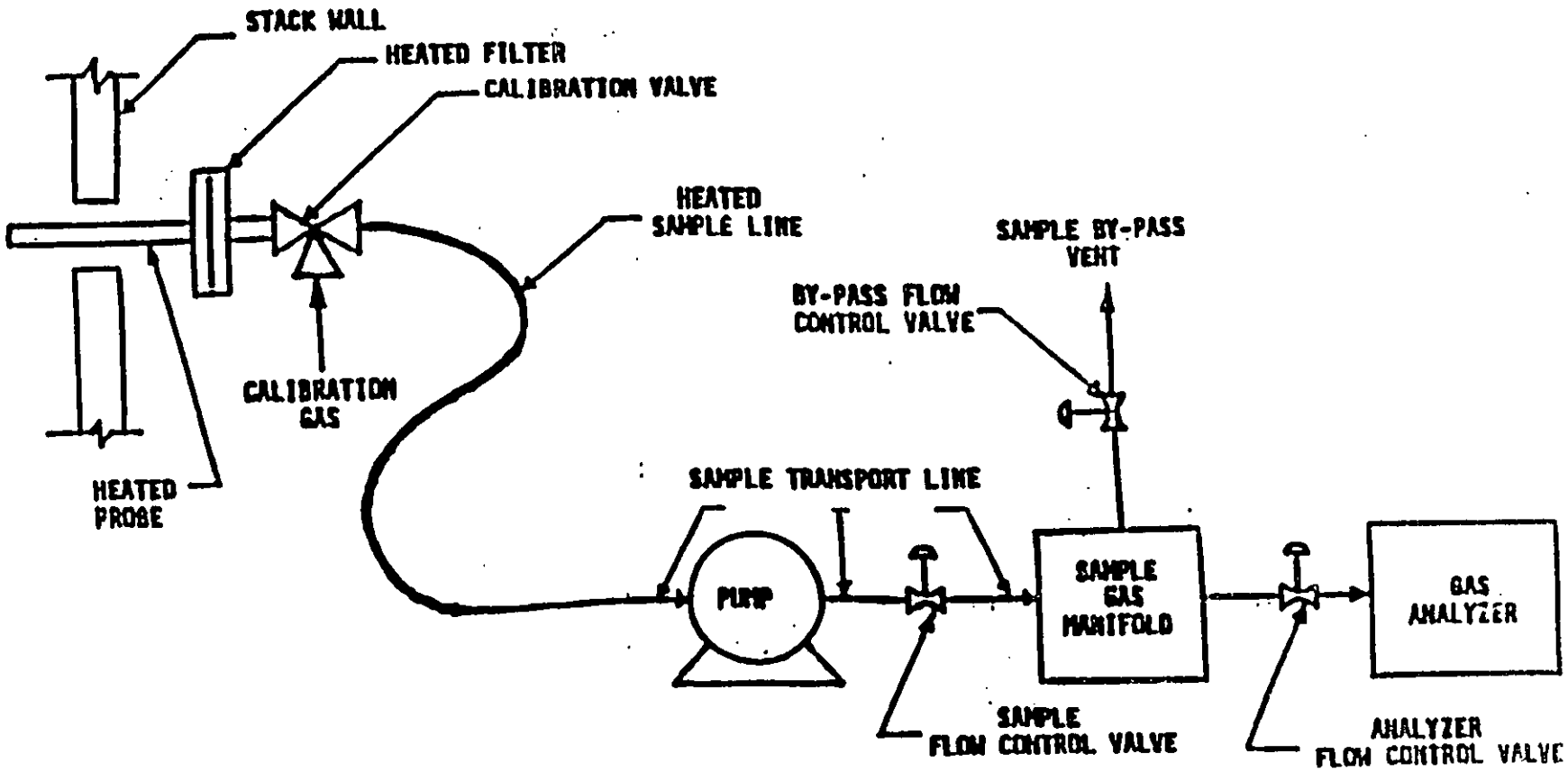


Figure 11. Instrumental analyzer schematic for volatile organic compound sampling (25A).

4.4 EXAMPLE CALCULATIONS AND DATA SHEETS

Appendix F contains the example calculations and computer sheets for the test. Appendix G contains the field data sheets. Appendix H contains the strip chart data and CEM calibration sheets. Appendix I contains the laboratory data. Appendix J contains the equipment calibration sheets.

4.5 CORRESPONDENCE

Appendix K contains the correspondence associated with the test.

APPENDIX A

OPERATING PERMIT

DTE-126-91

WALLACE E. REED, CHAIRMAN
CHARLOTTESVILLE

TIMOTHY E. BARROW,
VICE CHAIRMAN
VIRGINIA BEACH

SAM C. BROWN, JR.
VIRGINIA BEACH

FRANCES C. KIEFFER
FAIRFAX

COMMONWEALTH of VIRGINIA

Department of Air Pollution Control
ROOM 801, NINTH STREET OFFICE BUILDING
POST OFFICE BOX 10089
RICHMOND, VIRGINIA 23240
(804) 786-2378
FAX # (804) 225-3933
TDD # (804) 371-8471

WALLACE N. DAVIS
EXECUTIVE DIRECTOR

NEW SOURCE PERFORMANCE STANDARDS PERMIT

STATIONARY SOURCE PERMIT TO INSTALL, MODIFY AND OPERATE

In compliance with the Federal Clean Air Act and the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution,

Woodtech, Incorporated
Route 102
Bluefield, Virginia 24605
Registration No. 11103
County-Plant No. 3160-0116

is authorized to install, modify and operate

a laminated wood veneer
manufacturing facility

located at

Route 102, two miles from
Bluefield, Virginia

in accordance with Part I - Specific Conditions (emission limitations, monitoring and testing requirements), Part II - General Conditions, and Part III - Document List of this permit.

Approved this twenty-third day of May, 1991.

Pamela F. Faggert

for Wallace N. Davis
Executive Director

Permit Consists of 16 pages.
Part I - Specific Conditions 1 to 33.
Part II - General Conditions 1 to 17.
Part III - Document List, 25 items.
Part IV - Source Testing Report Format.

An Equal Opportunity Employer

PART I - SPECIFIC CONDITIONS - the regulatory reference and authority for each condition is listed in parenthesis () after each condition.

1. Woodtech, Incorporated is located on Route 102, two miles from Bluefield in Tazewell County, Virginia.

2. Installation, modification and operation shall be as proposed in the permit applications dated May 7, 1990 and November 28, 1990 including amendments referenced in the Document List which is Part III of this permit. (Section 120-02-11 of State Regulations)

3. The equipment to be installed and/or modified consists of:

   - two Hurst Boiler Company Model H-3500-150-W-S wood/bark fired boilers rated at 29 million Btu per hour maximum heat input each;
   - log debarking equipment;
   - log cutting and sawing equipment;
   - sixteen log steaming rooms;
   - two log peeling (veneering) lathes;
   - two veneer dryers;
   - veneer jointing and scarfing operations; consisting of:

     three scarf composers
     three joint composers

   - three adhesive roll coater applicators;
   - two cold presses;
   - two hot presses;
   - trimming and sanding operations; and
   - two 6,200 gallon capacity heavy gauge plastic adhesive storage tanks.

SMALL HOT COLD

4. Particulate and PM10 emissions from each of the two Hurst boilers shall be controlled by one 12K-21T multicyclone or equivalent each. The multicyclones shall be provided with adequate access for inspection.
(Section 120-08-01 F of State Regulations)

5. Particulate and PM10 emissions from the plywood sanding and trimming operations shall be controlled by a Bruning and Federal Manufacturing Company dust collector system or equivalent which exhausts to the interior of the building. The dust collector system shall be provided with adequate access for inspection.
(Section 120-08-01 F of State Regulations)

6. Total VOC and Formaldehyde emissions from the hot pressing operation exhausts shall be controlled by one Ceilcote packed bed caustic scrubber or equivalent on each hot press exhaust. The scrubbers and exhaust systems shall be provided with adequate access for inspection, and must be equipped with devices for continuous measurement of pressure drop across the scrubbers, and measurement of scrubber liquid pH.
(Section 120-08-01 F of State Regulations)

7. The production of finished plywood product shall not exceed 16 cubic meters (13.12 tons) per hour and 61,440 cubic meters (50,381 tons) per year.
(Section 120-02-11 of State Regulations)

8. The adhesive roll applicators shall consume no more than 27.33 tons per day of adhesive compound and no more than 1,845 pounds per hour of the Southeastern Adhesive Company 290-L Urea Formaldehyde resin or equivalent total.
(Section 120-02-11 of State Regulations)

9. The adhesive roll coater applicators and hot presses shall not operate more than 16 hours per day and 5,824 hours per year.
(Section 120-02-11 of State Regulations)

10. Hourly, daily, monthly, and annual records of wood/bark boiler fuel consumption, resin consumption, adhesive compound consumption, log consumption, and finished plywood output shall be maintained. A report of the hourly, daily, and monthly consumptions of the above listed parameters for each calendar month shall be submitted to the Department (Director, Region I) no later than the fifteenth of the following calendar month. The report of annual consumptions for each calendar year shall be submitted no later than February fifteenth of the following calendar year. After accumulation and reporting of this data for one full calendar year, the Department (Director, Region I) shall

review the results and determine if a change to quarterly, semi-annual or annual reporting is indicated.
(Section 120-02-11 of State Regulations)

11. Emissions from the operation of each of the two veneer dryers on an individual basis shall not exceed the limitations specified below:

Volatile Organic Compounds	6.56 lbs/hr	12.6 tons/yr

(Section 120-05-0403 of State Regulations)

12. Emissions from the operation of each of the two Hurst boilers, on an individual basis, shall not exceed the limitations specified below:

Total Suspended Particulates	0.20 lbs/10^6 Btu	5.80 lbs/hr	25.40 tons/yr
PM10	0.20 lbs/10^6 Btu	5.20 lbs/hr	22.70 tons/yr
Sulfur Dioxide		0.60 lbs/hr	2.63 tons/yr
Nitrogen Dioxide		2.72 lbs/hr	11.92 tons/yr
Carbon Monoxide		16.03 lbs/hr	70.08 tons/yr
Volatile Organic Compounds		5.62 lbs/hr	24.53 tons/yr

(Section 120-05-0403 and 120-05-0303 of State Regulations)

13. Fugitive dust emissions from the operation of the log debarking, and log sawing and wood hogging processes are specified below:

<u>Log Debarking</u>

Total Suspended Particulates	0.34 lbs/hr	1.49 tons/yr
PM10	0.34 lbs/hr	1.49 tons/yr

<u>Log Sawing</u>

Total Suspended Particulates	5.98 lbs/hr	26.19 tons/yr

PM10	5.98 lbs/hr	26.19 tons/yr

Wood Hogging

Total Suspended Particulates	0.04 lbs/hr	0.17 tons/yr
PM10	0.002 lbs/hr	0.01 tons/yr

These emissions are derived from the estimated overall emission contribution and are included for emission inventory purposes. Compliance shall be determined as stated in Specific Conditions number 7, 10, and 18.
(Sections 120-05-0403 and 120-05-0104 of State Regulations)

14. Emissions from the operation of the large hot press (as exhausted from its scrubber) shall not exceed the limitations specified below:

Volatile Organic Compounds	15.50 lbs/hr	30.41 tons/yr
Formaldehyde	0.05 lbs/hr	0.13 tons/yr
Methanol	0.25 lbs/hr	1.10 tons/yr

(Section 120-05-0403 and 120-05-0303 of State Regulations)

15. Emissions from the operation of the small hot press (as exhausted from its respective scrubber) shall not exceed the limitations specified below:

Volatile Organic Compounds	3.87 lbs/hr	7.61 tons/yr
Formaldehyde	0.01 lbs/hr	0.03 tons/yr
Methanol	0.06 lbs/hr	0.28 tons/yr

(Section 120-05-0403 and 120-05-0303 of State Regulations)

16. Visible emissions from each of the two Hurst boiler stacks shall not exceed 20 percent opacity.
(Section 120-02-11 of State Regulations)

17. Visible emissions from each of the veneer dryer stacks and each hot press scrubber stack shall not exceed 10 percent opacity.
(Section 120-02-11 of State Regulations)

18. Visible emissions from each of the log debarking and log sawing operations shall not exceed 10 percent opacity. (Section 120-02-11 of State Regulations)

19. Within the time limits specified in General Condition No. 3 of this permit, stack emission tests for formaldehyde and volatile organic compounds from each Ceilcote hot press exhaust scrubber, shall be conducted simultaneously with emission tests for formaldehyde and volatile organic compounds from each hot press exhaust at a point prior to the scrubber. Stack tests for new or modified sources shall be conducted and reported and data reduced as set forth in Sections 120-05-03 and 120-06-03 of State Regulations and the test methods and procedures contained in each applicable section or subpart listed in Sections 120-05-0502 and 120-06-0102. At the same time, opacity tests, in accordance with 40 CFR, Part 60, Appendix A, Method 9, shall also be conducted on the scrubber exhausts. The details of the emission tests are to be arranged with the Director, Region I. These tests shall be repeated every twelve months and shall be subject to review as outlined in Specific Condition Number 22. (Section 120-08-01 H of State Regulations)

20. Within the time limits specified in General Condition No. 3 of this permit, stack emission tests for formaldehyde, carbon monoxide, total suspended particulate and PM10, oxides of nitrogen and volatile organic compounds from one of two Hurst boiler exhausts shall be conducted. These tests shall be conducted when the boilers are consuming the wood/bark fuel at or near, but not exceeding the maximum rated fuel consumption. A heating value analysis shall be conducted on the fuel used during the stack tests.

    Stack tests for new or modified sources shall be conducted and reported and data reduced as set forth in Sections 120-05-03 and 120-06-03 of State Regulations and the test methods and procedures contained in each applicable section or subpart listed in Sections 120-05-0502 and 120-06-0102. At the same time, opacity tests, in accordance with 40 CFR, Part 60, Appendix A, Method 9, shall also be conducted on the tested boiler exhaust stack. The details of the emission tests are to be arranged with the Director, Region I. These tests shall be repeated after twenty-four months but not later than twenty-seven months after the initial test. (Section 120-08-01 H of State Regulations)

21. After twelve months, but not later than fifteen months after the stack tests prescribed in Specific Condition Number 20 have been conducted, stack tests as prescribed in Specific Condition 20 shall be conducted on the other Hurst boiler. (Section 120-08-01 H and 120-02-11 of State Regulations)

22. Following the third year's stack test of the scrubbers and the boilers, the data will be reviewed and evaluated by the Department (Director, Region I) to determine if the stack test schedules should be modified.
(Section 120-02-11 of State Regulations)

23. Within the time limits specified in General Condition No. 3 of this permit, simultaneous stack emission tests for formaldehyde and volatile organic compounds from two stacks (to be determined by the Director, Region I) of each veneer dryer shall be conducted. Stack tests for new or modified sources shall be conducted and reported and data reduced as set forth in Sections 120-05-03 and 120-06-03 of State Regulations and the test methods and procedures contained in each applicable section or subpart listed in Sections 120-05-0502 and 120-06-0102. At the same time, opacity tests, in accordance with 40 CFR, Part 60, Appendix A, Method 9, shall also be conducted simultaneously on each of the two tested stacks. The details of the emission tests are to be arranged with the Director, Region I.
(Section 120-08-01 H of State Regulations)

24. After review of the stack test data on the first Hurst Boiler, as prescribed in Specific Condition Number 20, the Department (Director, Region I) will determine if Woodtech, Incorporated shall be allowed to conduct a test burn of scrap plywood in the Hurst Boiler simultaneous with stack emission tests as prescribed in Specific Condition Number 20. The details of the determination shall be arranged with the Director, Region I.
(Section 120-02-11 of State Regulations)

25. The caustic scrubber liquid used in the scrubbers shall be maintained at the pH of 12. The pressure drop across each scrubber shall be maintained at 2.5 inches of water. Adequate access for sampling and/or measurement of scrubber liquid pH and pressure drop shall be provided.
(Section 120-02-11 of State Regulations)

26. Fugitive dust emissions from open storage stockpiles, yard area, ash storage and disposal, and haul roads shall be controlled by wet suppression or other reasonable methods so as to prevent particulate matter from becoming airborne. Trucks hauling waste material from the plant area via public roads/highways shall be wetted or covered to prevent spilling or tracking of dirt or debris on such public roads/highway. Any dirt or debris spilled or tracked onto public roads/highways shall be promptly removed to prevent particulate matter from becoming airborne or creating a traffic hazard.
(Sections 120-05-0104 and 120-02-11 of State Regulations)

27. The approved fuels for the two Hurst boilers are wood and bark waste (excluding any adhesive resin contaminated scrap or by-product). A change in the fuels may require a permit to modify and operate.
(Section 120-08-01 of State Regulations)

28. A continuously displaying and recording emission monitor shall be installed to measure and record the opacity of the exhaust gas streams emitted from each of the two Hurst boiler exhaust stacks. They shall be maintained and calibrated in accordance with the manufacturer's specifications and Appendix J of State Regulations. A 30 day notification prior to the demonstration of continuous monitoring system performance and subsequent notification requirements, are to be submitted to the Department (Director, Region I).
(Section 120-05-04 of State Regulations)

29. The veneer drying operations shall be equipped with continuous temperature monitors that display and record temperatures within the veneer dryer(s). They shall be maintained and operated in accordance with the manufacturer's specifications. Temperature during this operation shall not exceed 360°F. The temperature records shall be maintained at the facility for inspection by Department personnel upon request.
(Section 120-05-04 of State Regulations)

30. Specifications and other technical information for the continuous emission monitors required in Specific Conditions Number 28 and 29 shall be submitted to the Department (Director, Region I) for review prior to installation of the monitors.
(Sections 120-05-04 and 120-02-11 of State Regulations)

31. A report of raw data, and data summarized by hourly averages along with a report of the availability and downtime of each opacity monitor for each calendar month shall be submitted to the Department (Director, Region I) no later than the fifteenth of the following calendar month.
(Section 120-02-11 of State Regulations)

32. After the initial emission tests on one Hurst boiler, one veneer dryer, and one hot press scrubber have been conducted, Woodtech shall model the extrapolated plant-wide emission of formaldehyde using a model approved by the Department. Plant-wide formaldehyde emissions modeling shall be repeated after emission tests on both boilers, both veneer dryers, and both hot press scrubbers have been conducted. If any model predicts an exceedence of limitations specified in Rule 5-3, Woodtech shall immediately reduce formaldehyde emissions to levels that comply with Rule

5-3. Woodtech's emission reduction actions may include but are not limited to reduced facility operations, cessation of facility operations, installation and operation of additional control equipment.
(Section 120-02-11 and 120-05-03 of State Regulations)

33. Woodtech, Incorporated shall install, operate, and maintain continuously monitoring and recording resin flow metering devices or equivalent as approved by the Department (Director, Region I) on each outflow of each liquid urea formaldehyde storage tank(s) at the facility. There shall be no physical by-pass or diversion system around the monitoring points between the tank outflow points and the delivery system outflow points. (This includes, but is not limited to by-pass valves, etc.) The data from the monitoring devices shall be reported in gallons per hour and pounds per hour of outflow from each outflow point. Data shall be gathered and recorded using real-time references. The data from the monitoring devices shall be reported monthly to the Department (Director, Region I) for a period of two years. After the second year of cumulative data, the Department will evaluate the reporting schedule to determine if it should be modified. Woodtech, Incorporated shall submit to the Department (Director, Region I) a detailed design of the systems to be used for flow monitoring prior to installation of said systems. If, for any reason, the metering devices and/or associated equipment fails, malfunctions, or is off-line Woodtech, Incorporated shall notify the Department (Director, Region I) by telephone or facsimile within four business hours of the nature and anticipated duration of the breakdown/shut down. The storage tanks, outflow points, and monitoring and recording devices shall be provided with adequate access for inspection and evaluation by Department staff.
(Section 120-02-11 of State Regulations)

PART II - GENERAL CONDITIONS

1. Quarterly reports on the progress of installation and/or modification shall be submitted to the Department (Director, Region I), beginning upon receipt of permit.
(Section 120-02-11 of State Regulations)

2. The permittee shall furnish written notification to the Department (Director, Region I) of:

   a. The anticipated start-up date of the plywood manufacturing facility postmarked not more than 60 days nor less than 30 days prior to such date.

   b. The actual start-up date of the plywood manufacturing facility within 15 days after such date.

   c. The anticipated date of stack emission tests of the sources at the plywood manufacturing facility postmarked at least 30 days prior to such date.

   Copies of written notification referenced in items a, b, and c above to be sent to:

   NSPS Coordinator
   Air Radiation and Toxics Division (3AM21)
   U. S. Environmental Protection Agency
   Region III
   841 Chestnut Street
   Philadelphia, PA 19107

   (Section 120-05-05 of State Regulations)

3. Stack testing, as required in Part I of this permit, shall be performed to determine compliance with the emission limits contained herein within 60 days after achieving the maximum production rate but in no event later than 180 days after start-up of the permitted facility. Compliance test results shall be reported to the Department (Director, Region I) in writing within 45 days after test completion and shall conform to the test report format enclosed with this permit.
(Sections 120-05-03 and 120-06-03 of State Regulations)

4. The permitted facility shall be designed and constructed to allow emissions testing using appropriate methods upon reasonable notice at any time.
(Sections 120-05-03 and 120-06-03 of State Regulations)

5. All continuous monitoring systems and monitoring devices, as may be applicable for your source type, shall be installed and operational prior to conducting performance tests under Sections 120-05-03 and 120-06-03. Performance evaluations of the continuous monitoring system shall take place during the performance tests under Sections 120-05-03 and 120-06-03 or within 30 days thereafter. The Department (Director, Region I) shall be furnished with two copies of the report of the performance evaluations within 60 days of the evaluation.
(Sections 120-05-04 and 120-06-04 of State Regulations)

6. The permittee shall retain records of all emission data and operating parameters required, to include process throughputs, by the terms of this permit. These records shall be maintained by the source for the most current three year period.
(Sections 120-05-05 and 120-06-05 of State Regulations)

7. The permittee shall develop, maintain, and have available to all operators good written operating procedures for all air pollution control equipment. A maintenance schedule for all such equipment shall be established and made available to the Department (Director, Region I) for review. Records of service and maintenance shall be maintained on file by the source for the most current three year period.
(Section 120-02-11 of State Regulations)

8. If, for any reason, the permitted facility or related air pollution control equipment fails or malfunctions and may cause excess emissions for more than one hour, the owner shall notify the Department (Director, Region I) by telephone or telegraph or facsimile within 4 business hours. The portion of the facility which is subject to the provisions of Rule 6-1 (hazardous pollutants) shall be shut down safely and expeditiously. The portion of the facility which is subject to the provision of Rule 4-3 or Rule 5-3 (non-criteria) shall shut down immediately upon request of the Department. In addition, the owner shall provide a written statement explaining the problem and the estimated duration of the breakdown/shut down.
(Section 120-02-34 of State Regulations)

9. This permit may be modified or revoked in whole or in part for cause, including, but not limited to, the following:

   a. Violation of any terms or conditions of this permit;

   b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of a permitted discharge; or

d. Information that the permitted discharge of any pollutant poses a threat to human health, welfare, or the environment.

(Sections 120-02-11 and 120-08-01 of State Regulations)

10. The permitted facility is to be constructed and operated as represented in the permit applications referenced in Condition 2 of Part I. No changes in the permit application specifications or any existing facilities shall be made which alter the emissions into the ambient air or alter the impact of the facility on air quality without the prior written approval of the Board. (Sections 120-02-11 and 120-08-01 of State Regulations)

11. This permit shall become invalid if installation and/or modification is not commenced within eighteen months from the date of this permit or if it is discontinued for a period of eighteen months. (Section 120-08-01 of State Regulations)

12. In the event of any change in control of ownership of the permitted source, the permittee shall notify the succeeding owner of the existence of this permit by letter and send a copy of that letter to the Department (Director, Region I). (Section 120-02-11 of State Regulations)

13. The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the remainder of this permit, shall not be affected thereby. (Section 120-02-11 of State Regulations)

14. This permit approval is only applicable to the permit requirements of the State Air Pollution Control Board and does not alter permit requirements by any other local, state, or federal government agency. The permittee is cautioned that approval of this permit should not be construed to mean its operation is automatically in compliance with all aspects of the Regulations for the Control and Abatement of Air Pollution. Initial compliance shall be verified by stack test if required, visible emission evaluation if appropriate, and by other means (process rate, operating practice, etc.) as applicable. Continuing compliance shall be verified by Department personnel by constant surveillance in accordance with the State Air Pollution Control Board regulations. Compliance with all air pollution regulations must be a continuing, full time effort. (Section 120-02-11 of State Regulations)

15. Annual requirements to fulfill legal obligations to maintain current stationary source emissions data will necessitate your prompt response to requests for information to include, as appropriate: fuel consumption by type, heat value, sulfur and ash content; process and production data; refuse disposal by incineration including auxiliary fuels burned; storage, handling and use of liquid organic compounds; and, changes in stack data, control equipment, and operating schedules. Such requests for information from the Department will either be in writing or by personal contact. The availability of information submitted to the Department or the Board will be governed by applicable provisions of the Freedom of Information Act, §§ 2.1-340 through 2.1-348 of the Code of Virginia, § 10.1-1314 (addressing information provided to the Board), and § 120-02-30 of the State Air Pollution Control Board Regulations. Information provided to federal officials is subject to appropriate federal law and regulations governing confidentiality of such information. (Section 120-02-31 of State Regulations)

16. A copy of this permit shall be maintained on the premises of the facility to which it applies. (Section 120-02-11 of State Regulations)

17. The permittee shall allow authorized state and federal representatives, upon the presentation of credentials:

    a. to enter upon the permittee's premises on which the facility is located or in which any records are required to be kept under the terms and conditions of this permit;

    b. to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit or the State Air Pollution Control Board Regulations;

    c. to inspect at reasonable times any facility, equipment, or process subject to the terms and conditions of this permit or the State Air Pollution Control Board Regulations; and

    d. to sample or test at reasonable times. For purposes of this section, the time for inspection shall be deemed reasonable during regular business hours or whenever the facility is in operation. Nothing contained herein shall make an inspection time unreasonable during an emergency.

    (Section 120-02-11 of State Regulations)

PART III - DOCUMENT LIST

1. Woodtech, Incorporated permit application, dated November 28, 1990 and signed by Kenneth W. Powell, Secretary.

2. Department of Air Pollution Control, Region I engineering analysis, dated February 28, 1991.

3. Department of Air Pollution Control notification letter to the Tazewell County Administrator, dated December 3, 1990.

4. Federal NSPS Regulation Part 60 Subpart Dc, Standards of Performance for New Stationary Source; Small Industrial-Commercial-Institutional Steam Generating units.

5. Letter and addendum information from Hazel and Thomas, dated December 13, 1990 and signed by Clayton L. Walton.

6. Letter and addendum information from Hazel and Thomas, dated December 28, 1990 and signed by Clayton L. Walton.

7. Letter and addendum information from Hazel and Thomas, dated January 17, 1991 and signed by Clayton L. Walton.

8. Facsimile transmission from Hazel and Thomas, dated February 4, 1991 and signed by Clayton L. Walton.

9. Department of Air Pollution Control memorandum to Woodtech's file, dated February 11, 1991 regarding information received from Ron Hawks of Environmental Quality Management, Inc.

10. Letter and addendum information from Environmental Quality Management, Incorporated, dated February 20, 1991 and signed by Ronald L. Hawks.

11. Woodtech, Inc. permit application, dated May 7, 1990 and signed by Kenneth W. Powell, Secretary.

12. Department of Air Pollution Control, Region I engineering analysis, dated August 31, 1990.

13. Department of Air Pollution Control notification letter to the Tazewell County Administrator, dated June 13, 1990.

14. Letter and addendum information from Hazel, Thomas, Fiske, Weiner, Beckhorn and Hanes, dated May 18, 1990, signed by Clayton L. Walton.

15. Letter and addendum information from Hazel, Thomas, Fiske, Beckhorn and Hanes, dated June 5, 1990, signed by Clayton L. Walton.

16. Letter and addendum information from Hazel and Thomas, dated July 2, 1990, signed by Clayton L. Walton.

17. Letter and amended permit application from Hazel and Thomas, dated July 3, 1990, signed by Clayton L. Walton.

18. Letter and addendum information from Hazel and Thomas, dated July 9, 1990, signed by Clayton L. Walton.

19. Letters and addendum information from Hazel and Thomas, dated July 24, 26, and 27, 1990, signed by Clayton L. Walton.

20. Facsimile transmission from Hazel, Thomas, Fiske, Beckhorn and Hanes of EPA Document Estimating Chemical Releases from Presswood and Laminated Wood Products Manufacturing received August 1, 1990.

21. Facsimile transmission from Hazel, Thomas, Fiske, Beckhorn and Hanes of NCASI Technical Bulletin 504, dated September 1986, received August 1, 1990.

22. Letter from Hazel and Thomas, dated August 3, 1990, signed by Clayton L. Walton.

23. Letters from Hazel and Thomas, dated August 6, 1990, signed by Clayton L. Walton.

24. Letter from Hazel and Thomas and excerpts from U. S. Department of Agriculture Publication Theories of the Combustion of Wood and its Control, dated August 15, 1990, signed by William J. Dinkins for Clayton L. Walton.

25. Letter from Hazel and Thomas with the entire U. S. Department of Agriculture Publication Theories of the Combustion of Wood and its Control, dated August 16, 1990, signed by Clayton L. Walton.

APPENDIX B

OPACITY OBSERVATIONS

BOILER NO. 1
BOILER NO. 2
DIRER STACK 1
DRIER STACK 2

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

VEE #1

DATE Nov. 5, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va. Rt. 102

EMISSION POINT NAME Woodwaste Boiler #2 HEIGHT TO DISCHARGE POINT ~ 40 ft Stack

OBSERVER Don Hiet CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 11 : 15 (A.M.) ~~P.M.~~ FINAL 12 : 15 ~~A.M.~~ (P.M.)

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
12	0	10	35	25	10			
	1	5	5	5	20			
	2	10	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
11	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
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	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
11	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
11	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	5	5	5	25			
	48	5	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	5	15			
11	59	20	5	5	25			

SAPCB Form 13

VEE #2

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

DATE Nov. 5, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va Rt 102

EMISSION POINT NAME Woodwaste Boiler # 2 HEIGHT TO DISCHARGE POINT ~40 ft Stack

OBSERVER Don Hill CERTIFICATION EXPIRATION DATE 3-25-91

CLOCK TIME: INITIAL 12 : 15 ~~A.M.~~ P.M. FINAL 12 : 30 ~~A.M.~~ P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
12	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			Permit # 1
	27	0	0	0	0			error
	28	0	0	0	0			
12	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
12	30	0						
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							

SAPCB Form 13

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

VEE #3

DATE Nov. 5, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 71103

LOCATION Benefield, Va. Rt 102

EMISSION POINT NAME Woodchute Boiler #2 HEIGHT TO DISCHARGE POINT ~40 ft Stac

OBSERVER Don Hiet CERTIFICATION EXPIRATION DATE 3-25-91

CLOCK TIME: INITIAL 1 : 10 ~~A.M.~~/P.M. FINAL 2 : 10 ~~A.M.~~/P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
2	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
1	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
1	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
1	59	0	0	0	0			

SAPCB Form 13

VEE #4

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

DATE Nov. 5, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va. Rt 102

EMISSION POINT NAME Woodwaste Boiler #2 HEIGHT TO DISCHARGE POINT ~40 ft Stack

OBSERVER Don Hill CERTIFICATION EXPIRATION DATE 3-25-91

CLOCK TIME: INITIAL 2 : 10 ~~A.M.~~ (P.M.) FINAL 2 : 20 ~~A.M.~~ (P.M.)

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
2	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	10	10	35			
	14	10	5	10	15			
	15	30	50	10	10			
	16	10	10	5	5			
	17	5	0	0	0			
	18	0	0	0	0			end
	19	0	0	0	0			Run
	20	0	0	0	0			#2
	21	0	0	0	0			
2	22	0						
	23							
	24							
	25							
	26							
	27							
	28							
2	29							

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
	30							
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							

SAPCB Form 13

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

VEE #5

DATE Nov 6, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va.

EMISSION POINT NAME wood waste boiler #1 HEIGHT TO DISCHARGE POINT ~ 40 ft stack

OBSERVER Dan Hiet CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 10 : 15 (A.M.)/P.M. FINAL 11 : 15 (A.M.)/P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
11	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	5	5	5	5			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
11	14	0	0	0	0			
10	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
10	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
10	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			← switched points
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
10	59	0	0	0	0			

SAPCB Form 13

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

VEE #6

DATE Nov. 6, 1991.

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va, Rt. 102

EMISSION POINT NAME Woodworte Boiler #1 HEIGHT TO DISCHARGE POINT ~40 ft Stack

OBSERVER Don Hill CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 11 : 15 (A.M.)/~~P.M.~~ FINAL 11 : 30 (A.M.)/~~P.M.~~

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
11	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			end of
	28	0	0	0	0			Run
11	29	0	0	0	0	✓		#1

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
11	30	0						
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							

SAPCB Form 13
(5/1/75)

VEE #7

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

DATE Nov. 6 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va.

EMISSION POINT NAME Woodwaste Boiler # 1 HEIGHT TO DISCHARGE POINT ~40ft Stack

OBSERVER Don Hiet CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 12 : 30 ~~A.M.~~ (P.M) FINAL 1 : 18 ~~A.M.~~ (P.M.)

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
1	0	0	0	0	0			
	1	0	0	5	5			
	2	5	5	5	5			
	3	5	5	5	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	5	5			End
	14	0	0	0	0			Run
	15	0	0	0	0			#2
	16	5	5	5	5			
	17	5	0	0	0			
1	18	0						
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
12	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	5	5	5	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
12	59	0	0	0	0			

SAPCB Form 13
(5/1/75)

VEE # 8

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

DATE Nov. 7, 1991

COMPANY Woodstock, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va.

EMISSION POINT NAME Veneer dryer (large stack) (North) HEIGHT TO DISCHARGE POINT ~60 ft stack

OBSERVER Don Hill CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 11 : 00 A.M. ~~P.M.~~ FINAL 12 : 00 ~~A.M.~~ P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
11	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
11	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
11	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
11	59	0	0	0	0			

SAPCB Form 13

VEE #9

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

DATE Nov 7, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Benefield Va. Rt 102

EMISSION POINT NAME Veneer Dryer (Smoke Stack) (Scrub) HEIGHT TO DISCHARGE POINT ~ 50 ft Stack

OBSERVER Don Hilt CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 12 : 00 ~~A.M.~~/P.M. FINAL 12 : 40 ~~A.M.~~/P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
12	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
12	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
12	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
12	40	0						
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							

SAPCB Form 13
(5/1/75)

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

VEE#10

DATE Nov. 7, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va, Rt 102

EMISSION POINT NAME Veneer Dryer (Ranger Stack) (North) HEIGHT TO DISCHARGE POINT ~ 60 ft Stack

OBSERVER Don Hiet CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 2 : 00 ~~A.M.~~/P.M. FINAL 3 : 00 ~~A.M.~~/P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
2	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
2	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
2	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
2	59	0	0	0	0			

SAPCS Form 13

VEE #11

VIRGINIA STATE AIR POLLUTION CONTROL BOARD
VISIBLE EMISSION EVALUATION RECORD

DATE Nov. 7, 1991

COMPANY Woodtech, Inc. REGISTRATION NO. 11103

LOCATION Bluefield, Va.

EMISSION POINT NAME Veneer Dryer (Smaller Stack) (South) HEIGHT TO DISCHARGE POINT ~ 50 ft stack

OBSERVER Don Hilt CERTIFICATION EXPIRATION DATE 3-25-92

CLOCK TIME: INITIAL 3 : 00 ~~A.M.~~ P.M. FINAL 3 : 45 ~~A.M.~~ P.M.

VISIBLE EMISSION READINGS

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
3	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	0			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	0			
	11	0	0	0	0			
	12	0	0	0	0			
	13	0	0	0	0			
	14	0	0	0	0			
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0	0	0			
	20	0	0	0	0			
	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
3	29	0	0	0	0			

HR.	MIN.	SECONDS 0	15	30	45	STEAM PLUME CHECK IF APPLICABLE DET.	ATT.	COMMENT
3	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
3	45	0						
	46							
	47							
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							

SAPCB Form 13

APPENDIX C

BOILER LOGS

Boiler No. 1 Date 11/6/91

Time	Steam Integrator	Steam Temp. °F	FW Temp. °F	Fire Box Temp. °F	Steam Pressure Psig	Steam Nozzles Psig
0930	2259	360	165	1672	136	15
0945	2264	365	130	1665	132	15
1000	2268	350	138	1662	130	15
1015	2272	350	172	1585	109	15
1030	2276	348	190	1571	99	15
1045	2280	348	185	1568	101	15
1100	2284	348	150	1577	100	15
1115	2288	348	150	1617	100	15
1130	2293	348	190	1632	101	15
1145	2298	348	200	1644	101	15
1200	2302	348	200	1653	104	15
1215	2307	348	178	1658	105	15
1230	2313	345	148	1670	105	15
1245	2317	345	158	1690	111	15
1300	2321	345	190	1675	109	15
1315	2326	350	200	1671	109	15
1330	2330	345	180	1675	106	15

Boiler No. 1 Date 11/6/91

Time	Steam Integrator	Steam Temp. °F	FW Temp. °F	Fire Box Temp. °F	Steam Pressure Psig	Steam Nozzles Psig
1345	2334	345	145	1700	107	15
1400	2339	346	162	1687	101	15
1415	2343	348	190	1552	70.5	15
1715	2368	350	170	1606	120	15
1730	–	350	184	1739	136	15
1745	–	350	200	1707	116	15
1800	2382	356	220	1710	114	15
1815	2386	355	210	1743	121	15
1830	2391	350	206	1725	126	15

Boiler No. 2 Date 11/5/91

Time	Steam Integrator	Steam Temp. °F	FW Temp. °F	Fire Box Temp. °F	Steam Pressure Psig	Steam Nozzles Psig
1100	2659	330	215	1695	89	15
1115	–	340	190	1669	99	15
1130	–	350	170	1686	126	15
1145	–	370	185	1693	144	15
1200	–	370	230	1740	138	15
1215	2683	360	230	1718	124	15
1230	2687	350	200	1723	125	15
1245	2691	350	165	1720	119	15
1300	2696	350	148	1728	112	15
1315	2700	350	170	1755	118	15
1330	2705	350	210	1757	120	15
1345	–	350	200	1738	97	15
1400	–	350	160	1626	65	15
1415	2717	340	150	1684	90	15
1430	2723	345	190	1750	105	15
1445	2727	340	210	1744	105	15
1500	2732	350	215	1750	110	15

Boiler No. 2 Date 11/5/91

Time	Steam Integrator	Steam Temp. °F	FW Temp. °F	Fire Box Temp. °F	Steam Pressure Psig	Steam Nozzles Psig
1515	2736	350	180	1747	107	15
1530	2743	350	154	1764	107	15
1545	2747	340	210	1768	108	15
1600	2751	340	213	1767	106	15
1615	2757	345	220	1774	111	15
1630	2760	345	190	1778	112	15
1645						

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant and City: WOODTECH Date: 11-8-91

Sampling Location: Scrubber Outlet Clock Time: _____

Run No. _____ Operator _____

Barometric Pressure, in.Hg: 28.40 Static Pressure, in.H_2O: +.5

Moisture, % _____ Molecular wt., Dry _____ Pitot Tube, Cp _____

Stack Dimension, in. Diameter or Side 1 _____ Side 2 _____

FIELD DATA

TRAVERSE POINT NUMBER	VELOCITY HEAD (ΔP_s), in.H_2O	STACK TEMP., °F

Run 1 Run 2 Run 3

28.82 .982 .324

CALCULATIONS

$M_s = Md \times (1 - \frac{H_2O}{100}) + 18 (\frac{H_2O}{100})$

$M_s = (\quad) \times (1 - \frac{\quad}{100}) + 18 (\frac{\quad}{100})$

$M_s = 28.63$

$T_s = \quad °F = 521 \quad °R = (°F + 460)$ 521.2 521

$P_s = P_b + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

$P_s = 28.44$ in.Hg

$\sqrt{\Delta P} = .8928$ .8791 .8[illegible]

$V_s = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{T_s, °R}{P_s \times M_s}}$

$V_s = 85.49 \times (\quad) \times (\quad) \times \sqrt{\frac{\quad}{\quad}}$

$V_s = 51.285$ ft/s 50.508 5[illegible]

$A_s = 3.1416$ ft²

$Q_s = V_s \times A_s \times \frac{60\ s}{m}$

$Q_s = \quad \times \quad \times 60$

$Q_s = 9667$ acfm 9521 9[illegible]

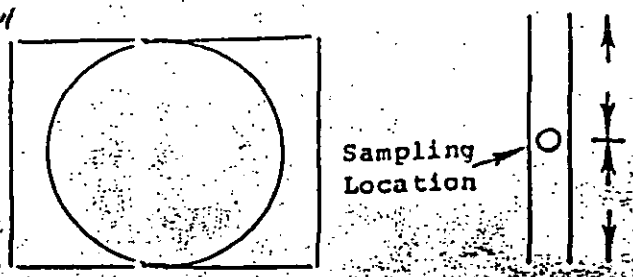
$Q_{std} = Q_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{H_2O\ \%}{100})$ .962

$Q_{std} = \quad \times 17.647 \times \frac{\quad}{\quad} \times (1 - \frac{\quad}{100})$

$Q_{std} = 9145$ dscfm 9,005 9[illegible]

PRELIMINARY VELOCITY TRAVERSE

Plant: Woodtech Job No. 4533 cd
Date: 11-8-91
Location: Scrubber Inlet
Stack I.D.: 23.875
Barometric Pressure, in. Hg: 28.40
Stack Gauge Pressure, in. H_2O: +3.6
Operators: BG, JM
Pitot Tube I.D. Number: 4B
Temperature Readout I.D.: HH82
Pitot Tube Leak Check: OK
Run Number 1 Time 13:35



Schematic of Traverse Point Layout

205%, Wet Bulb - 60°F, Dry Bulb - 78°F

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.75		76
2	.89		76
3	.97		76
4	.98		78
5	.91		78
6	.71		77
7	.72		77
8	.90		77
9	.99		77
10	.89		77
11	.74		77
12	.65		76
	$\overline{\sqrt{\Delta p}}$ = .9152		537
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.74	77	Run 2 15:40
2	.87	77	
3	.97	78	
4	1.1	78	
5	.91	78	
6	.74	78	
7	.74	78	
8	.91	78	
9	1.1	78	
10	.89	77	
11	.76	77	
12	.57	77	
	$\overline{\sqrt{\Delta p}}$ = .9228	537.6	
Average			

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant and City Woodtech Date 11-8-91

Sampling Location Scrubber Inlet Clock Time ~~11-8-91~~ @ 135-

Run No. ______ Operator ______

Barometric Pressure, in.Hg 28.40 Static Pressure, in.H_2O +3.6

Moisture, % ______ Molecular wt., Dry ______ Pitot Tube, Cp .84

Stack Dimension, in. Diameter or Side 1 ______ Side 2 ______

FIELD DATA

TRAVERSE POINT NUMBER	VELOCITY HEAD (ΔP_s), in.H_2O	STACK TEMP., °F

CALCULATIONS

Run 1 Run 2 Run [illegible]

28.?? .?? .?

$M_s = M_d \times (1 - \frac{H_2O}{100}) + 18 (\frac{H_2O}{100})$

$M_s = (\quad) \times (1 - \frac{\quad}{100}) + 18 (\frac{\quad}{100})$

M_s = 28.69

T_s = °F = 537 °R = (°F + 460) 537.6

$P_s = P_b + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

P_s = 28.67 in.Hg

$\sqrt{\Delta P}$ = .9152 .9208

$V_s = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{T_s, °R}{P_s \times M_s}}$

$V_s = 85.49 \times (\quad) \times (\quad) \times \sqrt{\frac{\quad}{\quad \times \quad}}$

V_s = 53.10 ft/s 53.57

A_s = 3.1040 ft²

$Q_s = V_s \times A_s \times \frac{60 s}{m}$

Q_s = × × 60

Q_s = 9906 acfm .988 9994

$Q_{s_{std}} = Q_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{H_2O}{100})$

$Q_{s_{std}}$ = × 17.647 × ―― × (1 - $\frac{\quad}{100}$)

$Q_{s_{std}}$ = 9221 dscfm 9292

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant and City: Wood Tech — Date: _____

Sampling Location: Dryer #1 — Clock Time: 11-7-91

Run No. _____ — Operator _____

Barometric Pressure, in.Hg _____ — Static Pressure, in.H_2O _____

Moisture, % _____ — Molecular wt., Dry _____ — Pitot Tube, Cp _____

Stack Dimension, in. Diameter or Side 1 _____ — Side 2 _____

Run 1 | Run 2 | Run 3

FIELD DATA

TRAVERSE POINT NUMBER	VELOCITY HEAD (ΔP_s), in.H_2O	STACK TEMP., °F

CALCULATIONS

28.760 .039

$M_s = Md \times (1 - \frac{H_2O}{100}) + 18 (\frac{H_2O}{100})$

$M_s = (\quad) \times (1 - \frac{\quad}{100}) + 18 (\frac{\quad}{100})$

$M_s = 28.34$

$T_s = \quad °F = 597 \; °R = (°F + 460)$ — 596 597

$P_s = P_b + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

$P_s = 28.3$ in.Hg

$\sqrt{\Delta P} = .1404$ — .1272 .1246

$V_s = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{T_s \times Pb}{P_s \times M_s}}$

.89

$V_s = 85.49 \times (\quad) \times (\quad) \times \sqrt{\frac{\quad}{\quad}}$

$V_s = 8.699$ ft/s — 7.874 7.732

$A_s = 3.1416$ ft²

$Q_s = V_s \times A_s \times \frac{60 \; s}{m}$

$Q_s = \quad \times \quad \times 60$

$Q_s = 1640$ acfm — .961 — 1464 1458

$Q_{std} = Q_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{H_2O \%}{100})$

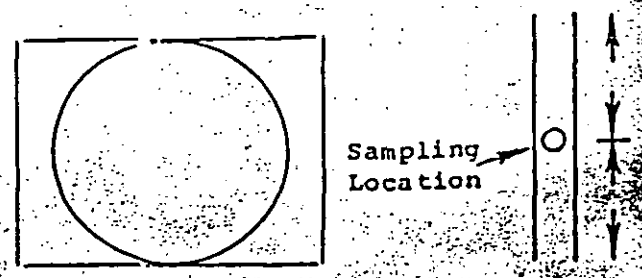
$Q_{std} = \quad \times 17.647 \times \frac{\quad}{\quad} \times (1 - \frac{\quad}{100})$

$Q_{std} = 1318$ dscfm — 1195 1172

PRELIMINARY VELOCITY TRAVERSE

24" ID

Plant: Woodtech Job No.
Date: 11-7-91
Location: Dryer #1
Stack I.D.:
Barometric Pressure, in. Hg: 28.30
Stack Gauge Pressure, in. H_2O: +0.01
Operators: JM, BG
Pitot Tube I.D. Number: D-5
Temperature Readout I.D.: 0-1
Pitot Tube Leak Check: ok
Run Number 1 Time 1520



Schematic of Traverse Point Layout

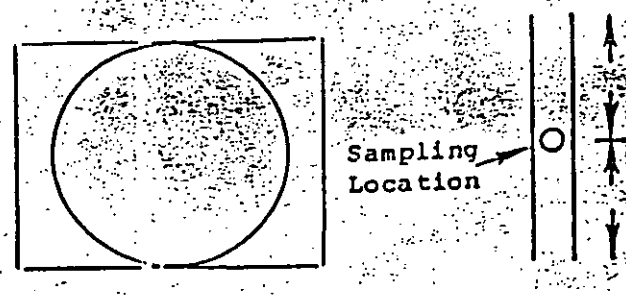
19.0% O_2 Wet Bulb — 92 Dry Bulb — 132

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
A-1	0.015	118	
2	0.015	129	
3	0.020	135	
4	0.020	138	
5	0.020	142	
6	0.025	144	
7	0.020	144	
8	0.015	135	
B-1	0.010	127	
2	0.015	134	
3	0.020	139	
4	0.025	140	
5	0.025	142	
6	0.025	143	
7	0.025	142	
8	0.025	141	
$\overline{\Delta p_s}$	0.1404	137°F	
$\overline{\Delta P}$	0.020	597°R	
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
Average			

PRELIMINARY VELOCITY TRAVERSE

Plant: Woodtech Job No. _____
Date: 11-7-91
Location: Dryer #1
Stack I.D.: _____
Barometric Pressure, in. Hg: 28.30
Stack Gauge Pressure, in. H_2O: _____
Operators: _____
Pitot Tube I.D. Number: _____
Temperature Readout I.D.: _____
Pitot Tube Leak Check: _____
Run Number 2 Time 1615



Schematic of Traverse Point Layout

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
A 1	0.015	126	
2	0.015	130	
3	0.015	132	
4	0.015	134	
5	0.015	137	
6	0.015	138	
7	0.015	139	
8	0.015	137	
B 1	0.015	134	
2	0.015	136	
3	0.020	138	
4	0.020	139	
5	0.020	141	
6	0.020	141	
7	0.015	140	
8	0.015	138	
	$\sqrt{\Delta p}$		
	0.1272	136°F	
	ΔP	596°R	
	.016		
Average			

Run #3

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
A 1	0.015	134	
2	0.015	136	
3	0.015	137	
4	0.015	138	
5	0.015	139	
6	0.015	140	
7	0.015	140	
8	0.015	139	
B 1	0.015	127	
2	0.015	132	
3	0.015	134	
4	0.015	136	
5	0.020	139	
6	0.020	139	
7	0.015	138	
8	0.015	139	
	$\sqrt{\Delta p}$		
	0.1248	137°F	
	ΔP	597°R	
	0.016		
Average			

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant and City Wood Tech Date _____

Sampling Location Dryer No. 2 Clock Time 11-7-91

Run No. _____ Operator _____

Barometric Pressure, in.Hg _____ Static Pressure, in.H_2O _____

Moisture, % _____ Molecular wt., Dry _____ Pitot Tube, Cp _____

Stack Dimension, in. Diameter or Side 1 _____ Side 2 _____

Run 1 Run 2 Run 3

28.6 .979 .37

FIELD DATA

TRAVERSE POINT NUMBER	VELOCITY HEAD (ΔP_s), in.H_2O	STACK TEMP., °F

CALCULATIONS

$M_s = M_d \times (1 - \frac{H_2O}{100}) + 18 (\frac{H_2O}{100})$

$M_s = (\quad) \times (1 - \frac{\quad}{100}) + 18 (\frac{\quad}{100})$

$M_s = 28.57$

$T_s = \quad °F = 574 \; °R = (°F + 460)$ 575 575

$P_s = P_b + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

$P_s = 28.3$ in.Hg

$\overline{\sqrt{\Delta P}} = .1183$ .1554 .1[illegible]

$V_s = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{T_s \times °R}{P_s \times M_s}}$

$V_s = 85.49 \times (\quad) \times (\quad) \times \sqrt{\frac{\quad}{\quad}}$

$V_s = 7.158$ ft/s 9.411 9.[illegible]

$A_s = 10.68$ ft²

$Q_s = V_s \times A_s \times \frac{60 \, s}{m}$

$Q_s = \quad \times \quad \times 60$

$Q_s = 4587$ acfm .979 6031 6177

$Q_{s_{std}} = Q_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{H_2O \, s}{100})$

$Q_{s_{std}} = \quad \times 17.647 \times \frac{\quad}{\quad} \times (1 - \frac{\quad}{100})$

$Q_{s_{std}} = 3907$ dscfm 5126 5[illegible]

MOISTURE IN STACK GAS BY WET-BULB/DRY-BULB MEASUREMENT

Plant Woodtech Location Dryer No 1

Stack _____ Run _____ Date 11-7-91 C152D

Operators _____

Barometric Pressure, in. Hg = Pbar = 28.30 in Hg

Static Pressure, in. H_2O = Pg = +.01 in H2O

Absolute Pressure of Stack = Pbar $\pm \frac{Pg}{13.6}$ Ps = 28.30 in Hg

Wet-Bulb Temperature, °F = Tw = 92 °F

Dry-Bulb Temperature, °F = Td = 132 °F

Temp Difference, Td-Tw = ΔT = 40 °F

Saturation Vapor Pressure of H_2O at Tw (from table) Pvw = 1.513 in Hg

Vapor Pressure of H_2O = Pva = (Pvw) $\frac{(Ps - Pvw)(\Delta T)}{2800 - (1.3)(Tw)}$

Pva = (1.513) $- \frac{(\cancel{28.3}\ 26.0)(40)}{2800 - (1.3)(92)}$ = ~~1.17~~ 1.113 in Hg

Proportion of water vapor by volume = Bws

Bws = $\frac{(Pva)}{(Ps)}$ = $\frac{(\cancel{1.17}\ 1.113)}{(28.30)}$ = ~~.039~~ .039

VAPOR PRESSURES OF WATER

In Inches of Mercury

Temp. Deg. F.	0	1	2	3	4	5	6	7	8	9
0	.0376	.0398	.0417	.0441	.0463	.0489	.0517	.0541	.0571	.0598
10	.0631	.0660	.0696	.0728	.0768	.0810	.0846	.0892	.0932	.0982
20	.1025	.1080	.1127	.1186	.1248	.1302	.1370	.1429	.1502	.1567
30	.1647	.1716	.1803	.1878	.1955	.2035	.2118	.2203	.2292	.2383
40	.2478	.2576	.2677	.2782	.2891	.3004	.3120	.3240	.3364	.3493
50	.3626	.3764	.3906	.4052	.4203	.4359	.4520	.4686	.4858	.5035
60	.5218	.5407	.5601	.5802	.6009	.6222	.6442	.6669	.6903	.7144
70	.7392	.7648	.7912	.8183	.8462	.8750	.9046	.9352	.9666	.9989
80	1.032	1.066	1.102	1.138	1.175	1.213	1.253	1.293	1.335	1.378
90	1.422	1.467	1.513	1.561	1.610	1.660	1.712	1.765	1.819	1.875
100	1.932	1.992	2.052	2.114	2.178	2.243	2.310	2.379	2.449	2.521
110	2.596	2.672	2.749	2.829	2.911	2.995	3.081	3.169	3.259	3.351
120	3.446	3.543	3.642	3.744	3.848	3.954	4.063	4.174	4.289	4.406
130	4.525	4.647	4.772	4.900	5.031	5.165	5.302	5.442	5.585	5.732
140	5.881	6.034	6.190	6.350	6.513	6.680	6.850	7.024	7.202	7.384
150	7.569	7.759	7.952	8.150	8.351	8.557	8.767	8.981	9.200	9.424
160	9.652	9.885	10.12	10.36	10.61	10.86	11.12	11.38	11.65	11.92
170	12.20	12.48	12.77	13.07	13.37	13.67	13.98	14.30	14.62	14.96
180	15.29	15.63	15.98	16.34	16.70	17.07	17.44	17.82	18.21	18.61
190	19.01	19.42	19.84	20.27	20.70	21.14	21.59	22.05	22.52	22.99
200	23.47	23.96	24.46	24.97	25.48	26.00	26.53	27.07	27.62	28.18
210	28.75	29.33	29.92	30.52	31.13	31.75	32.38	33.02	33.67	34.33
220	35.00	35.68	36.37	37.07	37.78	38.50	39.24	39.99	40.75	41.52
230	42.31	43.11	43.92	44.74	45.57	46.41	47.27	48.14	49.03	49.93
240	50.84	51.76	52.70	53.65	54.62	55.60	56.60	57.61	58.63	59.67

MOISTURE IN STACK GAS BY WET-BULB/DRY-BULB MEASUREMENT

Plant WoodTech Location Dryer No. 2

Stack _____ Run _____ Date 11-7-91

Operators _____

Barometric Pressure, in. Hg = Pbar = 28.3 in Hg

Static Pressure, in. H_2O = Pg = ~~2~~ +.01 in H2O

Absolute Pressure of Stack = Pbar $\pm \frac{Pg}{13.6}$ Ps = 28.30 in Hg

Wet-Bulb Temperature, °F = Tw = 79 °F

Dry-Bulb Temperature, °F = Td = 119 °F

Temp Difference, Td-Tw = Δ T = 40 °F

Saturation Vapor Pressure of H_2O at Tw (from table) Pvw = .9989 in Hg

Vapor Pressure of H_2O = $Pva = (Pvw) \frac{(Ps - Pvw)(\Delta T)}{2800 - (1.3)(Tw)}$

$Pva = (.9989) - \frac{(28.3 - .9989)(40)}{2800 - (1.3)(79)}$ = .5940 in Hg

Proportion of water vapor by volume = Bws

$Bws = \frac{(Pva)}{(Ps)} = \frac{(.5940)}{(28.30)}$ = .021

VAPOR PRESSURES OF WATER

In Inches of Mercury

Temp. Deg. F.	0	1	2	3	4	5	6	7	8	9
0	.0376	.0398	.0417	.0441	.0463	.0489	.0517	.0541	.0571	.0598
10	.0631	.0660	.0696	.0728	.0768	.0810	.0846	.0892	.0932	.0982
20	.1025	.1080	.1127	.1186	.1248	.1302	.1370	.1429	.1502	.1567
30	.1647	.1716	.1803	.1878	.1955	.2035	.2118	.2203	.2292	.2383
40	.2478	.2576	.2677	.2782	.2891	.3004	.3120	.3240	.3364	.3493
50	.3626	.3764	.3906	.4052	.4203	.4359	.4520	.4686	.4858	.5035
60	.5218	.5407	.5601	.5802	.6009	.6222	.6442	.6669	.6903	.7144
70	.7392	.7648	.7912	.8183	.8462	.8750	.9046	.9352	.9666	.9989
80	1.032	1.066	1.102	1.138	1.175	1.213	1.253	1.293	1.335	1.378
90	1.422	1.467	1.513	1.561	1.610	1.660	1.712	1.765	1.819	1.875
100	1.932	1.992	2.052	2.114	2.178	2.243	2.310	2.379	2.449	2.521
110	2.596	2.672	2.749	2.829	2.911	2.995	3.081	3.169	3.259	3.351
120	3.446	3.543	3.642	3.744	3.848	3.954	4.063	4.174	4.289	4.406
130	4.525	4.647	4.772	4.900	5.031	5.165	5.302	5.442	5.585	5.732
140	5.881	6.034	6.190	6.350	6.513	6.680	6.850	7.024	7.202	7.384
150	7.569	7.759	7.952	8.150	8.351	8.557	8.767	8.981	9.200	9.424
160	9.652	9.885	10.12	10.36	10.61	10.86	11.12	11.38	11.65	11.92
170	12.20	12.48	12.77	13.07	13.37	13.67	13.98	14.30	14.62	14.96
180	15.29	15.63	15.98	16.34	16.70	17.07	17.44	17.82	18.21	18.61
190	19.01	19.42	19.84	20.27	20.70	21.14	21.59	22.05	22.52	22.99
200	23.47	23.96	24.46	24.97	25.48	26.00	26.53	27.07	27.62	28.18
210	28.75	29.33	29.92	30.52	31.13	31.75	32.38	33.02	33.67	34.33
220	35.00	35.68	36.37	37.07	37.78	38.50	39.24	39.99	40.75	41.52
230	42.31	43.11	43.92	44.74	45.57	46.41	47.27	48.14	49.03	49.93
240	50.84	51.76	52.70	53.65	54.62	55.60	56.60	57.61	58.63	59.67

MOISTURE IN STACK GAS BY WET-BULB/DRY-BULB MEASUREMENT

Plant Wood Tech Location Scrubber Inlet

Stack _____ Run _____ Date 11-8-91

Operators _____

Barometric Pressure, in. Hg = Pbar = 28.40 in Hg

Static Pressure, in. H_2O = Pg = +3.6 in H20

Absolute Pressure of Stack = Pbar $\pm \frac{Pg}{13.6}$ Ps = 28.66 in Hg

Wet-Bulb Temperature, °F = Tw = 60 °F

Dry-Bulb Temperature, °F = Td = 78 °F

Temp Difference, Td-Tw = Δ T = 18 °F

Saturation Vapor Pressure of H_2O at Tw (from table) Pvw = .5218 in Hg

Vapor Pressure of H_2O = Pva = (Pvw) $\frac{(Ps - Pvw)(\Delta T)}{2800 - (1.3)(Tw)}$

Pva = (.5218) $- \frac{(28.66 - .5218)(18)}{2800 - (1.3)(60)}$ = .3357 in Hg

Proportion of water vapor by volume = Bws

Bws = $\frac{(Pva)}{(Ps)}$ = $\frac{(.3357)}{(28.66)}$ = 0.012

VAPOR PRESSURES OF WATER

In Inches of Mercury

Temp. Deg. F.	0	1	2	3	4	5	6	7	8	9
0	.0376	.0398	.0417	.0441	.0463	.0489	.0517	.0541	.0571	.0598
10	.0631	.0660	.0696	.0728	.0768	.0810	.0846	.0892	.0932	.0982
20	.1025	.1080	.1127	.1186	.1248	.1302	.1370	.1429	.1502	.1567
30	.1647	.1716	.1803	.1878	.1955	.2035	.2118	.2203	.2292	.2383
40	.2478	.2576	.2677	.2782	.2891	.3004	.3120	.3240	.3364	.3493
50	.3626	.3764	.3906	.4052	.4203	.4359	.4520	.4686	.4858	.5035
60	.5218	.5407	.5601	.5802	.6009	.6222	.6442	.6669	.6903	.7144
70	.7392	.7648	.7912	.8183	.8462	.8750	.9046	.9352	.9666	.9989
80	1.032	1.066	1.102	1.138	1.175	1.213	1.253	1.293	1.335	1.378
90	1.422	1.467	1.513	1.561	1.610	1.660	1.712	1.765	1.819	1.875
100	1.932	1.992	2.052	2.114	2.178	2.243	2.310	2.379	2.449	2.521
110	2.596	2.672	2.749	2.829	2.911	2.995	3.081	3.169	3.259	3.351
120	3.446	3.543	3.642	3.744	3.848	3.954	4.063	4.174	4.289	4.406
130	4.525	4.647	4.772	4.900	5.031	5.165	5.302	5.442	5.585	5.732
140	5.881	6.034	6.190	6.350	6.513	6.680	6.850	7.024	7.202	7.384
150	7.569	7.759	7.952	8.150	8.351	8.557	8.767	8.981	9.200	9.424
160	9.652	9.885	10.12	10.36	10.61	10.86	11.12	11.38	11.65	11.92
170	12.20	12.48	12.77	13.07	13.37	13.67	13.98	14.30	14.62	14.96
180	15.29	15.63	15.98	16.34	16.70	17.07	17.44	17.82	18.21	18.61
190	19.01	19.42	19.84	20.27	20.70	21.14	21.59	22.05	22.52	22.99
200	23.47	23.96	24.46	24.97	25.48	26.00	26.53	27.07	27.62	28.18
210	28.75	29.33	29.92	30.52	31.13	31.75	32.38	33.02	33.67	34.33
220	35.00	35.68	36.37	37.07	37.78	38.50	39.24	39.99	40.75	41.52
230	42.31	43.11	43.92	44.74	45.57	46.41	47.27	48.14	49.03	49.93
240	50.84	51.76	52.70	53.65	54.62	55.60	56.60	57.61	58.63	59.67

MOISTURE IN STACK GAS BY WET-BULB/DRY-BULB MEASUREMENT

Plant Wood Tech Location Scrubber Outlet

Stack _____ Run _____ Date _____

Operators _____

Barometric Pressure, in. Hg = Pbar = 28.40 in Hg

Static Pressure, in. H_2O = Pg = +.5 in H2O

Absolute Pressure of Stack = Pbar $\pm \frac{Pg}{13.6}$ Ps = 28.44 in Hg

Wet-Bulb Temperature, °F = Tw = 60 °F

Dry-Bulb Temperature, °F = Td = 61 °F

Temp Difference, Td-Tw = Δ T = 1 °F

Saturation Vapor Pressure of H_2O at Tw (from table) Pvw = .5218 in Hg

Vapor Pressure of H_2O = Pva = (Pvw) $\frac{(Ps - Pvw)(\Delta T)}{2800 - (1.3)(Tw)}$

Pva = (.5218) $- \frac{(28.44 - .5218)(1)}{2800 - (1.3)(60)}$ = .5115 in Hg

Proportion of water vapor by volume = Bws

Bws = $\frac{(Pva)}{(Ps)}$ = $\frac{(.5115)}{(28.44)}$ = 0.018

VAPOR PRESSURES OF WATER

In Inches of Mercury

Temp. Deg. F.	0	1	2	3	4	5	6	7	8	9
0	.0376	.0398	.0417	.0441	.0463	.0489	.0517	.0541	.0571	.0598
10	.0631	.0660	.0696	.0728	.0768	.0810	.0846	.0892	.0932	.0982
20	.1025	.1080	.1127	.1186	.1248	.1302	.1370	.1429	.1502	.1567
30	.1647	.1716	.1803	.1878	.1955	.2035	.2118	.2203	.2292	.2383
40	.2478	.2576	.2677	.2782	.2891	.3004	.3120	.3240	.3364	.3493
50	.3626	.3764	.3906	.4052	.4203	.4359	.4520	.4686	.4858	.5035
60	.5218	.5407	.5601	.5802	.6009	.6222	.6442	.6669	.6903	.7144
70	.7392	.7648	.7912	.8183	.8462	.8750	.9046	.9352	.9666	.9989
80	1.032	1.066	1.102	1.138	1.175	1.213	1.253	1.293	1.335	1.378
90	1.422	1.467	1.513	1.561	1.610	1.660	1.712	1.765	1.819	1.875
100	1.932	1.992	2.052	2.114	2.178	2.243	2.310	2.379	2.449	2.521
110	2.596	2.672	2.749	2.829	2.911	2.995	3.081	3.169	3.259	3.351
120	3.446	3.543	3.642	3.744	3.848	3.954	4.063	4.174	4.289	4.406
130	4.525	4.647	4.772	4.900	5.031	5.165	5.302	5.442	5.585	5.732
140	5.881	6.034	6.190	6.350	6.513	6.680	6.850	7.024	7.202	7.384
150	7.569	7.759	7.952	8.150	8.351	8.557	8.767	8.981	9.200	9.424
160	9.652	9.885	10.12	10.36	10.61	10.86	11.12	11.38	11.65	11.92
170	12.20	12.48	12.77	13.07	13.37	13.67	13.98	14.30	14.62	14.96
180	15.29	15.63	15.98	16.34	16.70	17.07	17.44	17.82	18.21	18.61
190	19.01	19.42	19.84	20.27	20.70	21.14	21.59	22.05	22.52	22.99
200	23.47	23.96	24.46	24.97	25.48	26.00	26.53	27.07	27.62	28.18
210	28.75	29.33	29.92	30.52	31.13	31.75	32.38	33.02	33.67	34.33
220	35.00	35.68	36.37	37.07	37.78	38.50	39.24	39.99	40.75	41.52
230	42.31	43.11	43.92	44.74	45.57	46.41	47.27	48.14	49.03	49.93
240	50.84	51.76	52.70	53.65	54.62	55.60	56.60	57.61	58.63	59.67

PACIFIC ENVIRONMENTAL SERVICES, INC.

Project No. | Page of
Client
Location
Sheet Title
Prepared By | Date | Checked By | Date

Run No.	Location	Flow Rate, dscfm	Sample Volume, liters	Total, µg	lb/h
1	Dryer No. 1	1318		9.9	
2		1195		7.4	
3		1172		2.8	
1	Dryer No. 2	3907		8.0	
2		5128		9.0	
3		5167		3.0	
1	Scrubber Inlet	9221		7.1	
2		9292		7.6	
3		9348		7.2	
1	Scrubber Outlet	9145		3.6	
2		9003		5.7	
3		9132		4.1	

Total µg per sample include front tube and back tube analyses. Method Detection limit was 1.0 µg, the tube blank values were 3.0 µg / tube.

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PACIFIC ENVIRONMENTAL SERVICES, INC.

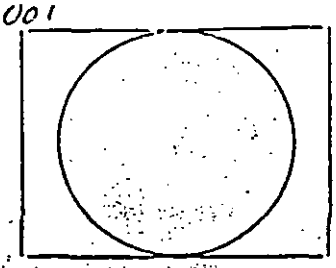
SAMPLE LOG

EQM / Wood tech Formaldehyde Samples

DATE	SAMPLE ID NUMBER	SAMPLE LOCATION	RUN NUMBER	SAMPLE DESCRIPTION
11-7-91	D-1-1A,B,C	Dryer One Small Stack	1	ON 11:04 OFF 12:04 Orifice 27
11-7-91	D2-1A,B,C,	Dryer TWO Big Stack	1	ON 11:04 OFF 12:04 Orifice 28
11-7-91	D1-2A,B	Dryer One Small Stack	2	ON 12:07 ON 14:45 OFF 12:22 Orifice 27
11-7-91	D2-2A,B,C	Dryer Two Big Stack	2	ON 12:07 ON 14:45 OFF 12:22 Orifice 28
11-7-91	D1-3A,B,C	Dryer One	3	ON 16:15 OFF 17:15 Orifice 27
11-7-91	D2-3A,B,C	Dryer TWO	3	ON 16:15 OFF 17:15 Orifice 28

PRELIMINARY VELOCITY TRAVERSE

Plant: Woodtech Job No. 4533.001
Date: 11-2-91
Location: Dryer #2
Stack I.D.: 74 x 4
Barometric Pressure, in. Hg: 28.30
Stack Gauge Pressure, in. H_2O: +.01
Operators: Gerber, Morgan
Pitot Tube I.D. Number: 4B
Temperature Readout I.D.: MB-10
Pitot Tube Leak Check: OK
Run Number 1B2 Time 15:05



Schematic of Traverse Point Layout

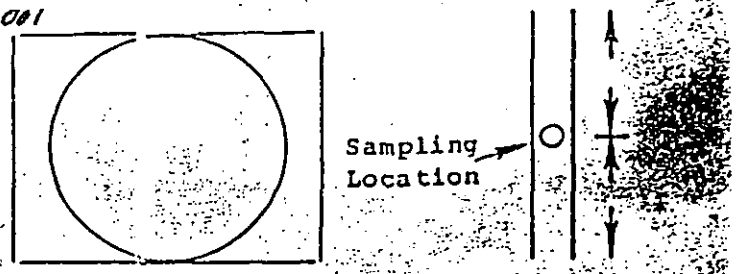
Wet Bulb = 98°F
20% O_2 Dry Bulb = 119°F

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.01	112	
2	.015	113	
3	.015	114	
4	.015	115	
5	.015	115	
6	.015	115	
7	.015	115	
8	.015	115	
9	.015	112	
10	.015	114	
11	.015	114	
12	.015	114	
13	.015	115	
14	.015	115	
15	.01	115	
16	.01	115	
	$\sqrt{\Delta p}$		
	.1183	114°F	
	ΔP	574°R	
	.014		
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.02	114	
2	.025	114	
3	.025	114	
4	.025	114	
5	.02	115	
6	.02	116	
7	.025	116	
8	.025	116	
9	.02	115	
10	.02	115	
11	.02	116	
12	.02	116	
13	.025	116	
14	.03	116	
15	.035	114	
16	.035	113	
	$\sqrt{\Delta p}$		
	0.1554	115°F	
	ΔP	575°R	
	.024		
Average			

PRELIMINARY VELOCITY TRAVERSE

Plant: Woodtech Job No. 4533.001
Date: 11-7-91
Location: Dryer #2
Stack I.D.: 44X4
Barometric Pressure, in. Hg: 28.30
Stack Gauge Pressure, in. H_2O: +.01
Operators: Gerber, Mason
Pitot Tube I.D. Number: 4B
Temperature Readout I.D.: AA3-10
Pitot Tube Leak Check: OK
Run Number 3 Time 16:40



Schematic of Traverse Point Layout

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null	Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.025	115					
2	.025	116					
3	.025	116					
4	.025	116					
5	.025	116					
6	.025	116					
7	.025	114					
8	.02	114					
9	.02	114					
10	.02	115					
11	.02	116					
12	.02	116					
13	.025	116					
14	.03	116					
15	.035	116					
16	.03	115					
	$\sqrt{\Delta p}$						
	0.1564	115°F					
	Δp	575°R					
	.025						
Average				Average			

PACIFIC ENVIRONMENTAL SERVICES, INC.

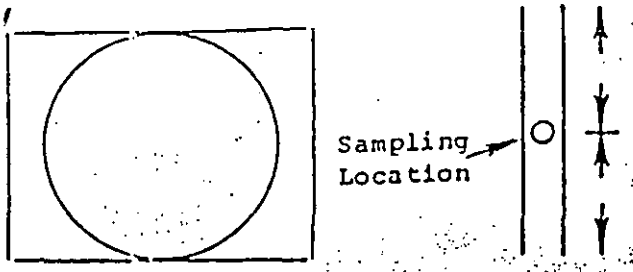
SAMPLE LOG

DATE	SAMPLE ID NUMBER	SAMPLE LOCATION	RUN NUMBER	SAMPLE DESCRIPTION
11-8-91	SI-1A,B,C	Scrubber-Inlet	1	ON 13:30 OFF 14:30 orifice 27
11-8-91	SO-1A,B	Scrubber ~~Inlet~~ Outlet	1	ON 13:30 OFF 14:30 28
11-8-91	SI-2A,B,C	Scrubber Inlet	2	ON 15:00 OFF 16:00
11-8-91	SO-2A,B	Scrubber Outlet	2	ON 15:00 OFF 16:00
11-8-91	SI-2A,B	Scrubber-Inlet	3	ON 1730 OFF 1830
11-8-91	SO-2A,B	Scrubber-Outlet	3	ON 1730 OFF 1830

HHY-1

PRELIMINARY VELOCITY TRAVERSE

Plant: Woodtech Job No. 4533.001
Date: 11-8-91
Location: Scrubber Inlet
Stack I.D.: 23.875
Barometric Pressure, in. Hg: 28.94
Stack Gauge Pressure, in. H_2O: +3.6
Operators: DG JM
Pitot Tube I.D. Number: 46
Temperature Readout I.D.: HH82
Pitot Tube Leak Check: OK
Run Number 3 Time



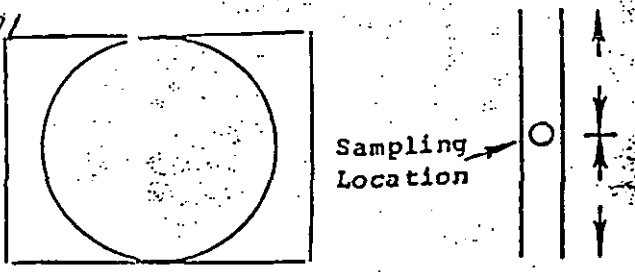
Schematic of Traverse Point Layout

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.82	75	
2	.91	75	
3	1.0	75	
4	1.1	75	
5	.90	75	
6	.63	75	
7	.77	75	
8	.93	75	
9	1.1	75	
10	.89	75	
11	.74	95	
12	.59	75	
	$\sqrt{\Delta p}$ = .9261	535	
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
Average			

PRELIMINARY VELOCITY TRAVERSE

Plant: Wood tech Job No. 453.001
Date: 11-8-91
Location: Scrubber Outlet
Stack I.D.: 24"
Barometric Pressure, in. Hg: 28.40
Stack Gauge Pressure, in. H_2O: +.50
Operators: BG, JM
Pitot Tube I.D. Number: D-5
Temperature Readout I.D.: HH82
Pitot Tube Leak Check: OK
Run Number 1 Time 13:45



Schematic of Traverse Point Layout

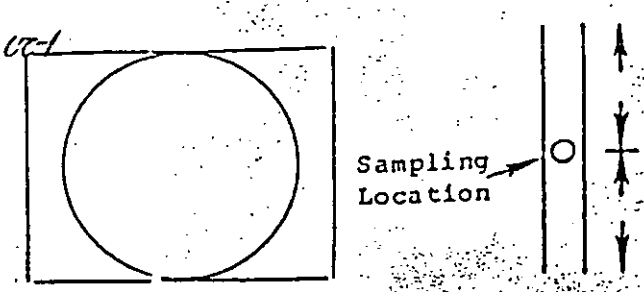
20.5 % O_2 Wetbulb - 60°F Drybulb - 61°F

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.92	61	~~61~~
2	.84	61	
3	.68	61	
4	.62	61	
5	.73	61	
6	.86	61	
7	.81	61	
8	.74	61	
9	.89	61	
10	.93	61	
11	.90	61	
12	.81	61	
13	.80	61	
14	.78	61	
15	.74	61	
16	.74	61	
	$\sqrt{\Delta p}$ = .8928	561	
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.93	62	Run 2 15:00
2	.86	62	
3	.70	61	
4	.69	61	
5	.74	61	
6	.85	61	
7	.81	61	
8	.73	61	
9	.87	61	
10	.86	61	
11	.65	61	
12	.67	61	
13	.69	61	
14	.76	62	
15	.77	61	
16	.82	61	
	$\sqrt{\Delta p}$ = .8791	521.2	
Average			

PRELIMINARY VELOCITY TRAVERSE

Plant: Woolteck Job No. 4533 01
Date: 11-8-91
Location: Scrubber outlet
Stack I.D.: 24"
Barometric Pressure, in. Hg: 28.80
Stack Gauge Pressure, in. H_2O: +.50
Operators: BG, JM
Pitot Tube I.D. Number: 0-5
Temperature Readout I.D.: HH82
Pitot Tube Leak Check: OK
Run Number 3 Time



Schematic of Traverse Point Layout

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
1	.94	58	
2	.77	58	
3	.64	58	
4	.63	58	
5	.72	58	
6	.82	58	
7	.80	58	
8	.66	58	
9	.97	57	
10	.96	58	
11	.90	58	
12	.77	58	
13	.72	58	
14	.75	58	
15	.81	58	
16	.84	57	
	$\bar{\sqrt{\Delta p}}$ = .8990	518	
Average			

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
Average			

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

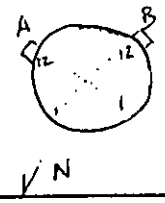
from Run 1-2

CO_2				12.5
O_2				7.8
CO				
N_2				

Condensers	
V_{l_c}: Silica gel	
Total H_2O	

Plant: Wattech
Date: 11-6-91
Sampling Location: Boiler #1
Sample Type: EPA M5
Run Number: 1-1
Operator: JM, BG
Barometric Pressure (P_b): 28.41
Static Pressure (P_s): -.13
Filter Number(s):
Pretest Leak Rate = 0.006 cfm @ 15 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: OK
Read and Record all Data Every: 3 Minutes

Formaldehyde. Start 1017
orifice 2.8 Stop 1117



Schematic of Traverse Point Layout

Probe Length and Type: 4 ft glass
Pitot Tube I.D. No.: D-5
Nozzle I.D.: 0.307
Assumed Moisture, %: 15
Meter Box Number: MB-10
Meter $\Delta H@$: 1.773
Meter Gamma: 0.996
Reference Δp: 0.36
Post Test Leak Rate = 0.003 cfm @ 6 in. Hg
Post Test Pitot Leak Check: OK
Post Test Orsat Leak Check: OK

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum In. Hg
A 1	0	1 / 1015	901.54	0.11	0.53	0.53	290	248 / 264	52	70	70	1
2	3	1	906.23	0.12	0.55	0.55	322	250 / 263	48	70	70	1
3	6	1	907.55	0.12	0.55	0.55	325	250 / 264	49	70	70	1
4	9	1	908.38	0.13	0.66	0.66	326	247 / 262	48	70	70	1
5	12	1	910.27	0.17	0.85	0.85	326	270 / 265	48	71	70	1
6	15	1	911.88	0.20	1.0	1.0	326	248 / 265	49	74	71	1
7	18	1	913.68	0.23	1.2	1.2	325	257 / 264	49	74	71	2
8	21	1	915.69	0.25	1.3	1.3	235	246 / 264	50	76	72	2
9	24	1	917.55	0.21	1.1	1.1	235	248 / 263	50	75	70	2
10	27	1	919.34	0.23	1.2	1.2	233	247 / 262	50	73	69	2
11	30	1	921.27	0.20	1.0	1.0	226	249 / 265	52	75	71	2
12	33	1 / 1051 / 1041	923.00	0.21	1.1	1.1	249	249 / 265	53	75	72	2
B 1	36	1	924.853	0.06	0.30	0.30	329	247 / 262	53	74	71	1
2	39	1	926.01	0.15	0.76	0.76	328	246 / 262	50	74	71	2
3	42	1	927.91	0.19	0.98	0.98	332	257 / 259	49	73	71	2
4	45	1	929.30	0.19	0.98	0.98	334	259 / 261	51	75	72	3
5	48	1	931.03	0.16	0.81	0.81	333	259 / 261	53	76	73	3
6	51	1	932.64	0.20	1.0	1.0	334	259 / 262	55	78	74	3
7	54	1	934.40	0.20	1.0	1.0	335	259 / 263	55	79	74	3
8	57	1	F 936.16	0.20	1.0	1.0	335	259 / 263	56	81	75	4
9	60	1	937.93	0.18	0.91	0.91	329	255 / 260	55	80	75	4
10	63	1	939.61	0.15	0.76	0.76	301	252 / 261	54	80	75	4
11	66	1	941.27	0.14	0.71	0.71	299	254 / 258	53	79	75	4
12	69	1	942.68	0.13	0.66	0.66	309	256 / 262	55	80	76	4
	72		944.175	0.4108		0.87	306°F				74°F	

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: WOOD TECH

Date: 11/6/91

Sampling Location: BOILER NO 1

Sample Type: PMET / EPA 5

Run Number: 1-1

Sample Box Number: SB-1

Clean-up Man: [illegible]

Job Number: 4533.001

Comments:

FRONT HALF

Filter Number: 3007~~736~~ 737-~~1~~

Description of Filter:

MOISTURE

Impingers

Final Volume:	695.0 ml	620.8 ml	464.3 ml
Initial Volume:	564.7 ml	601.1 ml	462.2 ml
Net Volume:	130.3 ml	19.7 ml	2.1 ml
Total H_2O:			

Silica Gel

Final Volume:	705.9 g	g	g
Initial Volume	698.6 g	g	g
Net Volume	7.3 g	g	g
Total Moisture:	159.4		

Description of Impinger Catch: Clear

ISOKINETIC CALCULATION

PLANT WESTECH

RUN # 1-1 DATE 11/6/91

LOCATION BOILER 1 INITIALS [illegible]

Moisture

Dry gas meter gamma Y = .996

Volume liquid collected in impingers and silica gel V_L = 159.4 ml

Net volume of gas through dry gas meter at meter conditions V = 39.324 cu. ft.

Barometric pressure - absolute BP = 28.41 in. Hg.

Average absolute meter temperature (°F + 460) T_m = 534 °R

Net volume of gas through dry gas meter corrected for gamma $V \times Y = Vm$ = 39.167 cu. ft.

ΔH = .87

Percent moisture = B_{ws}

$$B_{ws} = \frac{100}{1 + \frac{374.95\ (Vm)\ BP + \frac{\Delta H}{13.6}}{(T_m)\ (V_L)}}$$

$$\frac{100}{1 + \frac{374.95\ (39.167)\ 28.41 + \frac{.87}{13.6}}{(534)\ (159.4)}}$$

B_{ws} = 16.91

ISOKINETIC CALCULATION--Continued

RUN # _____

MOLECULAR WEIGHT

Percent O_2 by volume dry basis O_2 = 7.8

Percent CO by volume dry basis CO = _____

Percent CO_2 by volume dry basis CO_2 = 12.5

$N_2 = 100-(O_2 + CO_2 + CO)$

$N_2 = 100 - (\quad + \quad + \quad)$

Percent N_2 by volume dry basis N_2 = 79.7

Dry molecular weight = MD

$MD = 0.44\ (CO_2) + 0.32\ (O_2) + 0.28\ (N_2 + CO)$

$MD = 0.44\ (\ 12.5\ ) + 0.32\ (\ 7.8\ ) + 0.28\ (\ 79.7\ +\ )$

MD = 30.312

Stack gas molecular weight = MS

$MS = (MD\quad)\ [1 - (B_{ws} \times 10^{-2})] + 18\ (B_{ws} \times 10^{-2})$

$MS = (30.312)\ [1 - (.1691)] + 18\ (.1691) =$ 28.73

Velocity

Static pressure of stack p = _____ in. H_2O

Pitot tube coefficient, type S CP = _____

Average absolute stack temperature (°F + 460) T_s = _____ °R

Average of the square root of Δp Δp = _____ in. $H_2O^{1/2}$

Absolute pressure of stack (BP + p/13.6) P_s = _____ in Hg.

Stack velocity = V_s

$$V_s = (85.48)\ (CP)\ \left[\sqrt{\frac{(T_s)}{(P_s)(MS)}}\right]\ [\sqrt{\Delta p}]$$

$$V_s = (85.48)\ (\ .84\ )\left[\sqrt{\frac{(\ 766\ )\quad(\ .4108\ )}{(\ 28.40\ )(\ 28.73\ )}}\right] =$$ 28.835 FPS

ISOKINETIC CALCULATION--Continued

RUN # _____

ISOKINETIC PERCENT

Average pressure drop across orifices ΔH = _____ in. H_2O

Total sampling time θ = _____ min.

Diameter of nozzle (use micrometer value) d = .307 in.

Area of nozzle = A

$A = 54.54 \times 10^{-4} (d^2) = 54.54 \times 10^{-4} (\quad)^2$ = _____ sq. ft.

I = percent isokinetic

$$I = \frac{(1.667)\ (T_s)\ \left[0.002667\ (V_L) + \left(\frac{V_m}{T_m}\right)\left(BP + \frac{(\Delta H)}{13.6}\right)\right]}{(\theta)\ (V_s)\ (P_s)\ (A)}$$

$$I = \frac{(1.667)\ (766)\ \left[0.002667\ (1594) + \left(\frac{39.167}{534}\right)\left(28.41 + \frac{(.87)}{13.6}\right)\right]}{(72)\ (28.835)\ (28.40)\ (5.1405 \times 10^{-4})}$$

I = 105.9 %

5778

4772

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: EQM / Wardtech
Date: 11-6-91
Sampling Location: Boiler #1
Sample Type: Particulate Matter
Run Number: 1-2
Operator: Gerber, Morgan
Barometric Pressure (P_B): 28.30
Static Pressure (P_s): -.12
Filter Number(s): 300236
Pretest Leak Rate = 0.009 cfm @ 15 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: OK
Read and Record all Data Every 3 Minutes

Formaldehyde ON - 12:05
orifice #28 OFF - 13:05

Schematic of Traverse Point Layout

CO_2				12.5
O_2				7.8
CO				
N_2				

Condensers
V_L: Silica gel
Total H_2O

Probe Length and Type: 3' Glass
Pitot Tube I.D. No.: D-5
Nozzle I.D.: .304
Assumed Moisture, %: 15
Meter Box Number: MB-10
Meter Δ H@: 1.773
Meter Gamma: 0.996
Reference Δ p: .36 / .34
Post Test Leak Rate = 0.010 cfm @ 8 in. Hg
Post Test Pitot Leak Check: OK
Post Test Orsat Leak Check: OK

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum In. Hg
1	0	112:00	944.505	.16	.81	.81	330	255/259	63	80	79	2
2	3	112:03	946.153	.18	.92	.92	334	268/258	50	81	80	2
3	6	112:06	947.896	.21	1.1	1.1	336	268/258	47	82	80	3
4	9	112:09	949.693	.18	.92	.92	334	266/257	47	83	80	2
5	12	112:12	951.381	.20	1.1	1.1	333	264/258	47	84	80	3
6	15	112:15	953.211	.22	1.2	1.2	335	268/261	48	86	81	3
7	18	112:18	955.096	.20	1.1	1.1	338	265/261	48	87	82	3
8	21	112:21	956.905	.18	.95	.95	337	260/262	47	87	82	3
9	24	112:24	958.649	.18	.95	.95	335	262/260	46	86	80	3
10	27	112:27	960.417	.17	.91	.91	335	262/260	48	87	81	3
11	30	112:30	962.088	.17	.91	.91	335	264/261	48	87	82	3
12	33	112:33	963.777	.14	.74	.74	330	263/260	48	86	81	3
13	36	112:40	965.358	.11	.58	.58	330	254/259	53	84	81	3
14	39	112:43	966.711	.10	.54	.54	333	258/260	49	83	80	3
15	42	112:46	968.023	.11	.58	.58	333	255/257	47	81	78	3
16	45	112:49	969.394	.13	.69	.69	334	259/260	48	81	78	3
17	48	112:52	970.891	.14	.74	.74	334	263/258	47	81	78	4
18	51	112:55	972.444	.16	.84	.84	337	268/260	48	81	78	4
19	54	112:58	974.101	.22	1.2	1.2	339	264/259	48	81	78	5
20	57	113:01	975.919	.24	1.3	1.3	339	266/261	50	82	78	6
21	60	113:04	977.856	.24	1.3	1.3	337	262/260	49	81	76	6
22	63	113:07	979.775	.25	1.35	1.35	335	265/260	50	80	77	7
23	66	113:10	981.795	.22	1.2	1.2	331	264/261	50	81	77	6
24	69	113:13	983.691	.22	1.2	1.2	328	261/260	49	78	75	6
OFF	72	13:16	985.518	0.4216		0.96	334°F				81°F 541°R	

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: WOODTECH

Date: 11/5/91

Sampling Location: BOILER 1

Sample Type: PART / EPA 5

Run Number: 1-2

Sample Box Number: N-2

Clean-up Man:

Job Number: 4533.001

Comments:

FRONT HALF

Filter Number: 3007 ~~37~~ 736

Description of Filter:

MOISTURE

Impingers

Final Volume:	710.9 ml	[illegible] ml	473.5 ml
Initial Volume:	565.3 ml	563.8 ml	472.2 ml
Net Volume:	145.6 ml	14.5 ml	1.3 ml
Total H_2O:			

Silica Gel

Final Volume:	716.1 g	g	g
Initial Volume	712.7 ~~708.5~~ g	g	g
Net Volume	3.4 g	g	g
Total Moisture:	164.6		

Description of Impinger Catch:

ISOKINETIC CALCULATION

PLANT WOODTECH

RUN # 1-2 DATE 11/6/91

LOCATION BOILER 1 INITIALS AH

Moisture

Dry gas meter gamma Y = .996

Volume liquid collected in impingers and silica gel V_L = 164.6 ml

Net volume of gas through dry gas meter at meter conditions V = 41.013 cu. ft.

Barometric pressure - absolute BP = 28.30 in. Hg.

Average absolute meter temperature (°F + 460) T_m = 541 °R

Net volume of gas through dry gas meter corrected for gamma $V \times Y = Vm$ = 40.849 cu. ft.

ΔH = .96

Percent moisture = B_{ws}

$$B_{ws} = \frac{100}{1 + \frac{374.95\ (Vm)\ \ BP + \frac{\Delta H}{13.6}}{(T_m)\ \ (V_L)}}$$

$$\frac{100}{1 + \frac{374.95\ (40.849)\ \ 28.30 + \frac{.96}{13.6}}{(541)\ (164.6)}}$$

B_{ws} = 17.01

ISOKINETIC CALCULATION--Continued

RUN # _____

MOLECULAR WEIGHT

Percent O_2 by volume dry basis O_2 = 7.8

Percent CO by volume dry basis CO = 0

Percent CO_2 by volume dry basis CO_2 = 12.5

$N_2 = 100-(O_2 + CO_2 + CO)$

$N_2 = 100 - (\quad + \quad + \quad)$

Percent N_2 by volume dry basis N_2 = 79.7

Dry molecular weight = MD

$MD = 0.44\ (CO_2) + 0.32\ (O_2) + 0.28\ (N_2 + CO)$

$MD = 0.44\ (12.5) + 0.32\ (7.8) + 0.28\ (79.7)$

MD = 30.312

Stack gas molecular weight = MS

$MS = (MD)\ [1 - (B_{ws} \times 10^{-2})] + 18\ (B_{ws} \times 10^{-2})$

$MS = (30.312)\ [1 - (.1701)] + 18\ (.1701) =$ 28.22

Velocity

Static pressure of stack p = -.12 in. H_2O

Pitot tube coefficient, type S CP = .84

Average absolute stack temperature (°F + 460) T_s = 794 °R

Average of the square root of Δp Δp = .4216 in. $H_2O^{1/2}$

Absolute pressure of stack (BP + p/13.6) P_s = 28.29 in Hg.

Stack velocity = V_s

$$V_s = (85.48)\ (CP)\ \left[\sqrt{\frac{(T_s)}{(P_s)(MS)}}\right]\ [\sqrt{\Delta p}]$$

$$V_s = (85.48)\ (.84)\ \left[\sqrt{\frac{(794)}{(28.29)}\ \frac{(.4216)}{(28.22)}}\right] =$$ 30.193 FPS

ISOKINETIC CALCULATION--Continued

RUN # _____

ISOKINETIC PERCENT

Average pressure drop across orifices ΔH = 0.96 in. H_2O

Total sampling time θ = 72 min.

Diameter of nozzle (use micrometer value) d = .304 in.

Area of nozzle = A

$A = 54.54 \times 10^{-4} (d^2) = 54.54 \times 10^{-4} (\quad)^2 =$ 5.0405×10^{-4} sq. ft.

I = percent isokinetic

$$I = \frac{(1.667)\ (T_s)\ \left[0.002667\ (V_L) + \left(\frac{V_m}{T_m}\right)\left(BP + \left(\frac{\Delta H}{13.6}\right)\right)\right]}{(\theta)\ (V_s)\ (P_s)\ (A)}$$

$$I = \frac{(1.667)\ (794)\ \left[0.002667\ (164.6) + \left(\frac{40.849}{541}\right)\left(28.32 + \left(\frac{.96}{13.6}\right)\right)\right]}{(72)\ (30.193)\ (28.29)\ (5.0405) \times 10^{-4}}$$

I = 110.2 %

$(60)(30.193)(5.454)(10^{-3})(30.5)^2 = 9191$

$(17.647)(9191)\left(1 - \frac{.1761}{.541}\right)\left(\frac{28.29}{794}\right) = 4796$

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: Woodtech / EQM
Date: 11/6/91
Sampling Location: Boiler #1
Sample Type: EPA M5
Run Number: 1-3
Operator: JM, BG
Barometric Pressure (P_B): 28.30
Static Pressure (P_s): -0.12
Filter Number(s): 300743
Pretest Leak Rate = 0.003 cfm @ 16 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: OK
Read and Record all Data Every 3 Minutes

Formaldehyde ON - 1716
OFF - 1816

Schematic of Traverse Point Layout

CO_2				12.6
O_2				7.7
CO				
N_2				

Condensers
V_L: Silica gel
Total H_2O

Probe Length and Type: 3' Glass
Pitot Tube I.D. No.: D-5
Nozzle I.D.: .307
Assumed Moisture, %: 15
Meter Box Number: MB-10
Meter ΔH@: 1.773
Meter Gamma: 0.986
Reference Δp: .34
Post Test Leak Rate = 0.015 cfm @ 7 in. Hg
Post Test Pitot Leak Check: OK
Post Test Orsat Leak Check: OK

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum In. Hg
A 1	0	1715	988.312	0.12	0.64	0.64	328	256 / 259	57	60	60	1
2	3		989.73	0.11	0.58	0.58	331	259 / 253	48	61	60	1
3	6		991.03	0.13	0.69	0.69	334	269 / 256	48	62	60	1
4	9		992.50	0.12	0.64	0.64	336	256 / 253	49	63	60	1
5	12		993.89	0.14	0.73	0.73	333	256 / 254	50	64	60	1
6	15		995.38	0.17	0.90	0.90	338	255 / 254	51	64	59	2
7	18		997.02	0.22	0.13	1.3	340	257 / 255	52	67	60	3
8	21		998.90	0.26	1.4	1.4	340	258 / 254	52	67	60	3
9	24		000.91	0.26	1.4	1.4	335	258 / 254	54	69	60	3
10	27		2.92	0.25	1.3	1.3	329	257 / 254	54	69	61	3
11	30		4.91	0.26	1.4	1.4	325	259 / 254	54	70	61	4
12	33		7.12	0.24	1.3	1.3	315	253 / 257	54	70	61	4
B 1	36	1751/1753	008.785	0.13	0.69	0.69	324	257 / 251	53	66	62	3
2	39		10.27	0.16	0.83	0.83	323	255 / 252	55	67	61	4
3	42		11.80	0.17	0.90	0.90	327	254 / 252	55	68	61	4
4	45		14.47	0.20	1.1	1.1	324	255 / 251	55	68	61	5
5	48		15.26	0.23	1.4	1.4	331	254 / 252	57	68	61	6
6	51		17.14	0.23	1.4	1.4	333	257 / 252	57	68	61	6
7	54		19.17	0.22	1.3	1.3	334	256 / 252	57	69	61	6
8	57		21.10	0.20	1.1	1.1	331	256 / 252	58	68	61	6
9	60		22.89	0.19	1.0	1.0	321	256 / 252	58	69	61	6
10	63		24.65	0.17	0.90	0.90	319	255 / 252	58	69	61	5
11	66		26.12	0.17	0.90	0.90	301	255 / 252	58	68	61	6
12	69		27.75	0.12	0.64	0.64	300	254 / 252	58	63	61	5
	72		24.175									
			40.863	.1276		1.02	328°F				64°F	
							788°R				524°R	

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: WOODTECH

Date: 11/6/91

Sampling Location: BOILER NO. 1

Sample Type: PART/EPA 5

Run Number: 1-3

Sample Box Number: SB-1

Clean-up Man: [illegible]

Job Number: 4533.001

Comments:

FRONT HALF

Filter Number: 300743

Description of Filter:

MOISTURE

Impingers

Final Volume:	668.0 ml	630.8 ml	465.3 ml
Initial Volume:	563.8 ml	601.0 ml	462.4 ml
Net Volume:	104.2 ml	29.8 ml	2.9 ml
Total H_2O:			

Silica Gel

Final Volume:	711.7 g	g	g
Initial Volume	705.9 g	g	g
Net Volume	5.8 g	g	g
Total Moisture:	142.7		

Description of Impinger Catch:

ISOKINETIC CALCULATION

PLANT WOODTECH

RUN # 1-3 DATE 11/6/91

LOCATION BOILER II 1 INITIALS [illegible]

Moisture

Dry gas meter gamma Y = .996

Volume liquid collected in impingers and silica gel V_L = 142.7 ml

Net volume of gas through dry gas meter at meter conditions V = 40.563 cu. ft.

Barometric pressure - absolute BP = 28.30 in. Hg.

Average absolute meter temperature (°F + 460) T_m = 524 °R

Net volume of gas through dry gas meter corrected for gamma $V \times Y = Vm$ = 40.700 cu. ft.

ΔH = 1.02

Percent moisture = B_{ws}

$$B_{ws} = \frac{100}{1 + \frac{374.95\ (Vm)\ \ BP + \frac{\Delta H}{13.6}}{(T_m)\ \ (V_L)}}$$

$$\frac{100}{1 + \frac{374.95\ (40.700)\ \ 28.30 + \frac{1.02}{13.6}}{(524)\ (142.7)}}$$

B_{ws} = 14.73

ISOKINETIC CALCULATION--Continued

RUN # _____

MOLECULAR WEIGHT

Percent O_2 by volume dry basis O_2 = 7.7

Percent CO by volume dry basis CO = _____

Percent CO_2 by volume dry basis CO_2 = 12.6

$N_2 = 100-(O_2 + CO_2 + CO)$

$N_2 = 100 - (\quad + \quad + \quad)$

Percent N_2 by volume dry basis N_2 = 79.7

Dry molecular weight = MD

$MD = 0.44\ (CO_2) + 0.32\ (O_2) + 0.28\ (N_2 + CO)$

$MD = 0.44\ (\ 12.6\ ) + 0.32\ (\ 7.7\ ) + 0.28\ (\ 79.7\ +\ )$

MD = 30.324

Stack gas molecular weight = MS

$MS = (MD\quad)\ [1 - (B_{ws} \times 10^{-2})] + 18\ (B_{ws} \times 10^{-2})$

$MS = (30.324)\ [1 - (.1473)] + 18\ (.1473)$ = 28.51

Velocity

Static pressure of stack p = _____ in. H_2O

Pitot tube coefficient, type S CP = _____

Average absolute stack temperature (°F + 460) T_s = _____ °R

Average of the square root of Δp Δp = _____ in. $H_2O^{1/2}$

Absolute pressure of stack (BP + p/13.6) P_s = _____ in Hg.

Stack velocity = V_s

$$V_s = (85.48)\ (CP)\ \left[\sqrt{\frac{(T_s)}{(P_s)(MS)}}\right]\ [\sqrt{\Delta p}]$$

$$V_s = (85.48)\ (\ .84\ )\left[\sqrt{\frac{(\ 788\ )\quad(.4376)}{(\ 28.31\ )(\ 28.51\ )}}\right] = 30.358 \text{ FPS}$$

ISOKINETIC CALCULATION--Continued

RUN # _____ Page 3

ISOKINETIC PERCENT

Average pressure drop across orifices ΔH = _____ in. H_2O

Total sampling time θ = _____ min.

Diameter of nozzle (use micrometer value) d = .307 in.

Area of nozzle = A

$A = 54.54 \times 10^{-4} (d^2) = 54.54 \times 10^{-4} (\quad)^2 =$ _____ sq. ft.

I = percent isokinetic

$$I = \frac{(1.667)\ (T_s)\ \left[0.002667\ (V_L) + \left(\frac{V_m}{T_m}\right)\left(BP + \frac{(\Delta H)}{13.6}\right)\right]}{(\theta)\ (V_s)\ (P_s)\ (A)}$$

$$I = \frac{(1.667)\ (788)\ \left[0.002667\ (142.7) + \left(\frac{46.700}{524}\right)\left(28.3 + \frac{(1.02)}{13.6}\right)\right]}{(72)\ (36.332)\ (28.29)\ (5.0405) \times 10^{-4}}$$

I = 106.8 %

9239

4911

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

CO_2	9.2
O_2	11.4
CO	
N_2	

Condensers	
V_{L_c}: Silica gel	
Total H_2O	

Plant: Woodtech
Date: 11-5-91
Sampling Location: Boiler #2
Sample Type: Particulate Matter
Run Number: 2-1
Operator: Gerber, Morgan
Barometric Pressure (B_p): 28.53
Static Pressure (P_s): +.10
Filter Number(s): 300233
Pretest Leak Rate = 0.005 cfm @ 15 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: OK
Read and Record all Data Every 3 Minutes

Formaldehyde on 11:17
OFF 11:43
on 11:49
OFF 12:23

Schematic of Traverse Point Layout

Probe Length and Type: 3' Glass
Pitot Tube I.D. No.: D-5
Nozzle I.D.: .307
Assumed Moisture, %: 15
Meter Box Number: 1B-10
Meter $\Delta H@$: 1.773
Meter Gamma: 0.996
Reference Δp: .38/1.34 C = .76/.83
Post Test Leak Rate = 0.003 cfm @ 7 in. Hg
Post Test Pitot Leak Check: OK
Post Test Orsat Leak Check: OK

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum In. Hg
1	0	111:11	772.704	.20	.97	.97	299	255/259	51	59	58	2
2	3	111:14	774.413	.22	1.05	1.05	301	259/259	46	60	58	2
3	6	111:17	776.153	.22	1.05	1.05	303	258/257	46	61	59	2
4	9	111:20	777.882	.22	1.05	1.05	306	257/257	47	63	59	2
5	12	111:23	779.613	.17	.82	.82	307	258/256	46	64	59	2
6	15	111:26	781.234	.19	.90	.90	308	257/256	46	65	60	3
7	18	111:29	782.871	.26	1.25	1.25	311	256/255	46	67	60	4
8	21	111:32	784.763	.23	1.1	1.1	311	256/256	47	68	61	4
9	24	111:35	786.520	.19	.90	.90	311	253/256	47	69	62	3
10	27	111:38	788.179	.17	.82	.82	309	253/256	48	70	63	3
11	30	111:47	789.851	.42	2.1	2.1	322	251/257	54	70	66	5
12	33	111:50	791.998	.38	1.85	1.85	321	258/255	47	73	66	5
13	36	111:53	794.365	.38	1.85	1.85	318	253/257	47	76	68	6
14	39	111:56	796.661	.41	2.0	2.0	317	255/257	45	78	68	6
15	42	111:59	798.799	.38	1.85	1.85	322	254/258	46	79	69	6
16	45	112:02	801.369	.26	1.3	1.3	322	252/257	48	80	70	6
17	48	112:05	803.280	.17	.82	.82	317	255/257	49	81	71	5
18	51	112:08	804.928	.13	.68	.68	314	254/256	49	80	72	4 *
19	54	112:11	806.417	.10	.53	.53	313	252/256	49	81	72	4
20	57	112:14	807.757	.10	.53	.53	312	252/256	50	81	73	4
21	60	112:17	809.051	.08	~~.43~~ .43	.43	311	251/256	48	81	74	4
22	63	112:20	810.258	.10	.53	.53	312	248/255	48	81	74	4
23	66	112:23	811.546	.08	.43	.43	309	249/255	46	81	74	4
24	69	112:26	812.773	.06	.31	.31	302	248/255	47	81	75	3
OFF	72	12:29	813.805									

41.101 .1467 312

* Changed nomograph for meter temperature rise.

PES

SAMPLE RECOVERY DATA

Plant: WOOD TECH Run No.: 2-1

Date: 11/5/91 Sample Box No.: SB-1 Job No.: 4533.001

Sample Location: BOILER NO 2

Sample Type: PART / EPA 5 Filter No.: 300733

Sample Recovery Person: [signature]

Comments: _____

FRONT HALF

Acetone Container No.: _____ Liquid Level Marked: _____ Sealed: _____

Filter Container No.: _____ _____ _____ Sealed: _____

Description of Filter: _____

Samples stored and locked: _____

BACK HALF/MOISTURE

Container No: _____ _____ _____

Liquid Level Marked: _____ Sealed: _____

IMP. NO.	CONTENTS	INITIAL VOL (ml)	WEIGHT (grams)		
			INITIAL	FINAL	NET
1	D.I H_2O	100	564.9	667.4	102.5
2	"	100	563.6	579.0	15.4
3	MT	0	470.3	472.5	2.2
4	Sil Gel	-	701.6	709.0	7.4
5					
6					
TOTAL					127.5

Description of Impinger Catch: _____

EMISSION TEST CALCULATIONS

PLANT WOODTECH SOURCE/RUN 2-1 DATE 11/5/91

1. Leakage Correction for Volume Metered

$V_{m_c} = V_m - (Lp-La)\theta = V_m - (Lp-0.02)\theta = (\quad)-(\quad -0.02)\ (\quad)$

$V_{m_c} =$ _____ ft^3

2. Volume Metered, Standard Conditions (68°F, 29.92 in.Hg)

$$V_{m_{std}} = 17.64\ V_{m_c} Y \left(\frac{P_{bar} + \Delta H / 13.6}{T_m}\right) = 17.647(41.101)(.996)\frac{(28.53)+(1.0)/13.}{(530)}$$

$V_{m_{std}} =$ 38.993 dscf

3. Volume Water Vapor Collected, Standard Conditions

Impingers $= V_{wc} = 0.04707\ (V_f - V_i) = 0.04707\ (127.5) =$ _____ scf

Silica Gel $= V_{wsg} = 0.04707\ (W_f - W_i) = 0.04707\ (\quad) =$ 6.001 scf

$V_{w_{std}} = V_{wc} + V_{wsg} =$ 6.001 scf

4. Percent Moisture, By Volume

$$B_{w_s} = \frac{V_{w_{std}}}{V_{w_{std}} + V_{m_{std}}} = \frac{(6.001)}{(6.001)+(38.993)} = 0.1334$$

5. Molecular Weight, Stack Gas

Dry Molecular Weight, $M_d = 0.440\ (\%CO_2) + 0.320(\%O_2) + 0.280\ (\%N_2 + \%CO)$

$= 0.440\ (9.2) + 0.320(11.4) + 0.280\ (79.4)$

$M_d =$ 29.93 lb/lb - mole

Percent Excess Air, %EA =

$$\left[\frac{\%O_2 - 0.5\ \%CO}{0.264(\%N_2)-(\%O_2-0.5\ \%CO)}\right] X100 \left[\frac{(\quad)-0.5(\quad)}{0.264(\quad)-(\quad -0.5(\quad)}\right] X\ 100$$

%EA = _____

$M_s = M_d\ (1-B_{ws}) + 18.0\ (B_{ws}) = (29.93)(1-.1334) + 18.0\ (.1334) =$ 28.34 lb/lb-mole

6. Stack Gas Velocity, Average

$$V_{s_{avg}} = 85.49 C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}} = 85.49\ (.84)(.4467)\sqrt{\frac{(772)}{(28.54)(28.34)}}$$

$V_{s_{avg}}$ = 31,340 ft/s

7. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_a(\text{circular}) = \left(\frac{60 \times V_s\ (\pi d^2/4)}{144}\right) = 60 \times V_s\ (5.454 \times 10^{-3})\ (d^2)$$

$$= 60 \times 31{,}340\ (5.454 \times 10^{-3})\ (30.5)^2$$

"or" $Q_a(\text{rectangular}) = 60 \times V_s \left(\frac{L \times W}{144}\right) = 60 \times V_s\ (L \times W)\ 6.944 \times 10^{-3}$

$$= 60 \times \_\_\_\_\_\ (\_\_\_\_\_ \times \_\_\_\_\_)\ 6.944 \times 10^{-3}$$

Q_a = 9540 acfm

8. Stack Volumetric Flow Rate, Standard Conditions (68°F, 29.92 in. Hg)

$$Q_{std} = 17.64\, Q_a (1 - B_{ws}) \left(\frac{P_s}{T_s}\right) = 17.64\,(9540)\ (1 - .1334)\left(\frac{28.54}{772}\right)$$

Q_{std} = 5394 dscfm

Isokinetic Variation

$$\%I = K \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1 - B_{ws})}$$

$$= 0.0944 \frac{(772)\ (\_\_\_\_)}{(28.54)\ (31{,}340)\ (5.\_\_\_ \times 10^{-4})\ (\_\_\_)\ (1 - .1334)}$$

= 99.1 %

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

CO_2	8.6
O_2	12.2
CO	
N_2	

Condensers	
V_L: Silica gel	
Total H_2O	

Plant: Woodtech
Date: 11-5-91
Sampling Location: Boiler #2
Sample Type: Particulate Matter
Run Number: 2-2
Operator: Gerber, Maryann
Barometric Pressure (P_B): 28.38
Static Pressure (P_s): -.10
Filter Number(s): 300734
Pretest Leak Rate = 0.01 cfm @ 15 in. Hg
Pretest Pitot Leak Check: ok
Pretest Orsat Leak Check: ok
Read and Record all Data Every 3 Minutes

Formaldehyde on 1304
orifice # 28 off 1334
on 1343
off 1423

Schematic of Traverse Point Layout

Probe Length and Type: 3' Glass
Pitot Tube I.D. No.: 0-5
Nozzle I.D.: ~~.347~~ BAH .304
Assumed Moisture, %: 15
Meter Box Number: MB-10
MeterΔH@: 1.773
Meter Gamma: 0.996
ReferenceΔp: 0.34 C = 0.83
Post Test Leak Rate = 0.004 cfm @ 7 in. Hg
Post Test Pitot Leak Check: ok
Post Test Orsat Leak Check: ok

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (Vm) ft 3	Velocity Head (P_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg
1	0	1301	814.004	0.46	2.5	2.5	317	253 / 252	47	75	74	2
2	3		816.70	0.52	2.8	2.8	316	258 / 252	44	77	74	3
3	6		819.45	0.45	2.4	2.4	318	261 / 255	46	80	75	3
4	9		822.13	0.42	2.2	2.2	321	260 / 250	49	83	75	3
5	12		824.65	0.37	2.0	2.0	321	257 / 256	51	84	75	3
6	15		827.03	0.33	1.8	1.8	321	256 / 258	54	84	76	3
7	18		829.38	0.21	1.1	1.1	317	254 / 258	54	84	76	3
8	21		831.19	0.15	0.80	0.80	315	254 / 258	54	83	76	3
9	24		832.91	0.13	0.68	0.68	312	253 / 257	53	82	76	3
10	27		834.26	0.13	0.68	0.68	312	251 / 256	52	81	76	3
11	30		835.71	0.12	0.62	0.62	310	250 / 255	52	80	75	3
12	33	1338	837.11	0.12	0.62	0.62	310	255 / 257	52	80	76	3
13	36	1341	838.484	0.24	1.3	1.3	295	257 / 258	52	78	75	3
14	39		840.39	0.09	0.47	0.47	256	250 / 258	53	80	75	3
15	42		841.79	0.10	0.53	0.53	255	250 / 258	54	80	75	3
16	45		843.09	0.10	0.53	0.53	252	256 / 259	54	80	75	3
17	48		844.40	0.12	0.64	0.64	250	249 / 259	56	80	76	3
18	51		845.80	0.21	1.1	1.1	272	245 / 259	55	81	75	4
19	54		847.57	0.28	1.5	1.5	283	256 / 259	55	82	76	5
20	57		849.64	0.24	1.3	1.3	288	247 / 259	56	84	76	5
21	60	1*	851.59	0.30	1.6	1.6	299	258 / 258	55	80	76	5
22	63		853.74	0.26	1.4	1.4	303	257 / 259	55	84	77	5
23	66		855.73	0.22	1.2	1.2	305	253 / 259	56	85	77	5
24	69		857.63	0.17	0.90	0.90	301	253 / 260	57	86	77	5
OFF	72	1422	859.267	.4727		1.28	298°F				75°F	

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: WOODTECH

Date: 11-5-91

Sampling Location: BOILER NO. 2

Sample Type: PART 1 EPA 5

Run Number: 2-2

Sample Box Number:

Clean-up Man: [illegible]

Job Number: 453.3.001

Comments:

FRONT HALF

Filter Number: 360734

Description of Filter: DK. GREY

MOISTURE

Impingers

Final Volume:	653.0 ml	616.3 ml	482.4 ml
Initial Volume:	562.6 ml	[illegible] ml	461.0 ml
Net Volume:	90.4 ml	16.1 ml	21.4 ml
Total H_2O:			

Silica Gel

Final Volume:	698.6 g	g	g
Initial Volume	687.2 g	g	g
Net Volume	11.4 g	g	g
Total Moisture:	134.3		

Description of Impinger Catch:

EMISSION TEST CALCULATIONS

PLANT WOODTECH SOURCE/RUN 2-2 DATE 11-5-91

1. Leakage Correction for Volume Metered

$V_{m_c} = V_m - (Lp-La)\theta = V_m - (Lp-0.02)\theta = (\quad)-(\quad -0.02)(\quad)$

$V_{m_c} =$ _____ ft^3

2. Volume Metered, Standard Conditions (68°F, 29.92 in.Hg)

$$V_{m_{std}} = 17.64\ V_{m_c} Y \left(\frac{P_{bar} + \Delta H / 13.6}{T_m}\right) = 17.647(45.263)(.996)\frac{(28.38)+(1.28)/13.}{(538)}$$

$V_{m_{std}} =$ 42.106 dscf

3. Volume Water Vapor Collected, Standard Conditions

Impingers $= V_{wc} = 0.04707\ (V_f - V_i) = 0.04707\ (\ 139.3\ ) =$ _____ scf

Silica Gel $= V_{wsg} = 0.04707\ (W_f - W_i) = 0.04707\ (\quad) =$ 6.557 scf

$V_{w_{std}} = V_{wc} + V_{ws_g} =$ 6.557 scf

4. Percent Moisture, By Volume

$$B_{w_s} = \frac{V_{w_{std}}}{V_{w_{std}} + V_{m_{std}}} = \frac{(6.557)}{(6.557)+(42.106)} = 0.1347$$

5. Molecular Weight, Stack Gas

Dry Molecular Weight, $M_d = 0.440\ (\%CO_2) + 0.320(\%O_2) + 0.280\ (\%N_2 + \%CO)$

$= 0.440\ (8.6) + 0.320(12.2) + 0.280\ (79.2)$

$M_d =$ 29.864 lb/lb - mole

Percent Excess Air, %EA =

$$\left[\frac{\%O_2 - 0.5\ \%CO}{0.264(\%N_2)-(\%O_2-0.5\ \%CO)}\right] X100 \left[\frac{(\quad)-0.5(\quad)}{0.264(\quad)-(\quad -0.5(\quad)}\right] X\ 100$$

%EA = _____

$M_s = M_d\ (1-B_{ws}) + 18.0\ (B_{ws}) = (29.86)(1-.1347) + 18.0\ (.1347) =$ 28.37 lb/lb-mole

6. Stack Gas Velocity, Average

$$V_{s_{avg}} = 85.49 C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}} = 85.49\ (.4727)(.84)\sqrt{\frac{(758)}{(28.39)(28.27)}}$$

$V_{s_{avg}}$ = 32.989 ft/s

7. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_a(\text{circular}) = \left(\frac{60 \times V_s\ (\pi d^2/4)}{144}\right) = 60 \times V_s\ (5.454 \times 10^{-3})\ (d^2)$$

$$= 60 \times 32.989\ (5.454 \times 10^{-3})\ (36.5)^2$$

"or" $Q_a(\text{rectangular}) = 60 \times V_s \left(\frac{L \times W}{144}\right) = 60 \times V_s\ (L \times W)\ 6.944 \times 10^{-3}$

$$= 60 \times \_\_\_\_\_\ (\_\_\_\_\_ \times \_\_\_\_\_)\ 6.944 \times 10^{-3}$$

Q_a = 10042 acfm

8. Stack Volumetric Flow Rate, Standard Conditions (68°F, 29.92 in. Hg)

$$Q_{std} = 17.64\, Q_a (1 - B_{ws}) \left(\frac{P_s}{T_s}\right) = 17.647(10{,}042)\ (1 - .1347)\left(\frac{28.39}{758}\right)$$

Q_{std} = 5743 dscfm

9. Isokinetic Variation

$$\%I = K \frac{T_s\ V_{m(std)}}{P_s\ V_s\ \Lambda_n\ \Theta\ 1 - B_{ws}}$$

$$= 0.0944 \frac{(758)\ (42.106)}{(28.39)\ (32.989)\ (5.0405 \times 10^{-4})\ (72)\ (1 - .1347)}$$

= 102.4 %

PACIFIC ENVIRONMENTAL SERVICES, INC.

FIELD DATA

Plant: Woodtech
Date: 11-5-91
Sampling Location: Boiler #2
Sample Type: EPA M5
Run Number: ~~2~~ BAY 2-3
Operator: JM, BG
Barometric Pressure (P_B): ~~28.53~~ BAY 28.30
Static Pressure (P_s): +0.10
Filter Number(s): 300935
Pretest Leak Rate = 0.002 cfm @ 15 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: OK
Read and Record all Data Every 3 Minutes

Formaldehyde ON- 15:01
OFF- 15:31

ON- 15:40
OFF- 16:10

Orifice #28

Schematic of Traverse Point Layout

CO_2				11.0
O_2				9.4
CO				
N_2				

Condensers
V_L: Silica gel
Total H_2O

Probe Length and Type: 3' Glass
Pitot Tube I.D. No.: D-5
Nozzle I.D.: .307
Assumed Moisture, %: 15
Meter Box Number: MB-10
Meter Δ H@: 1.773
Meter Gamma: 0.996
Reference Δ p: .34 C=.83
Post Test Leak Rate = 0.004 cfm @ 9 in. Hg
Post Test Pitot Leak Check: OK
Post Test Orsat Leak Check: OK

Traverse Point Number	Sampling Time, (min.)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. °F (T_s)	Probe Temp. / Filter Temp. °F	Impinger Temp. °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg
1	0	115:00	859.504	.18	.95	.95	312	254/254	57	75	75	2
2	3	115:03	861.218	.18	.95	.95	312	257/257	46	74	73	2
3	6	115:06	862.915	.18	.95	.95	312	256/254	44	74	72	2
4	9	115:09	864.637	.16	.84	.84	311	258/255	44	74	72	2
5	12	115:12	866.261	.16	.84	.84	314	258/256	44	74	71	2
6	15	115:15	867.860	.18	.95	.95	314	258/255	44	75	71	3
7	18	115:18	869.578	.22	1.2	1.2	312	258/257	44	74	70	3
8	21	115:21	871.569	.26	1.4	1.4	311	257/258	44	74	69	3
9	24	115:24	873.412	.23	1.25	1.25	308	256/256	43	74	69	3
10	27	115:27	875.357	.25	1.35	1.35	308	256/256	43	72	68	3
11	30	115:30	877.340	.20	1.05	1.05	298	254/257	43	72	68	3
12	33	115:33	879.125	.18	.95	.95	287	254/255	43	71	67	3
13	36	115:38	880.846	.42	2.3	2.3	310	253/256	44	69	65	5
14	39	115:41	883.409	.47	2.6	2.6	313	259/257	42	70	66	6
15	42	115:44	886.098	.43	2.3	2.3	317	259/258	42	72	65	7
16	45	115:47	888.656	.43	2.3	2.3	316	259/258	44	72	65	7
17	48	115:50	891.259	.37	2.0	2.0	315	259/259	45	73	65	7
18	51	115:53	893.600	.30	1.6	1.6	314	256/259	45	73	65	7
19	54	115:56	895.800	.23	1.2	1.2	313	260/260	46	72	65	6
20	57	115:59	897.718	.16	.84	.84	309	257/258	46	72	65	5
21	60	116:02	899.370	.13	.68	.68	305	258/258	46	72	64	4
22	63	116:05	900.841	.11	.58	.58	280*	259/258	46	71	64	4
23	66	116:08	902.215	.10	.52	.52	263*	258/258	46	70	64	4
24	69	116:11	903.509	.08	.43	.43	247*	256/257	45	70	64	4
off	72	16:14	904.663	.4708		1.25	3~~4.2~~ 309°F		* Until 305		70 530°R	
			45.159				769°R					

PES

SAMPLE RECOVERY DATA

Plant: WOODTECH Run No.: 2-3

Date: 11-5-91 Sample Box No.: _____ Job No.: 4533.001

Sample Location: BOILER NO. 2

Sample Type: PART / EPA 5 Filter No.: 300735

Sample Recovery Person: _____

Comments: _____

FRONT HALL

Acetone Container No.: _____ Liquid Level Marked: _____ Sealed: _____

Filter Container No.: _____ _____ _____ Sealed: _____

Description of Filter: _____

Samples stored and locked: _____

BACK HALF/MOISTURE

Container No: _____ _____ _____

Liquid Level Marked: _____ Sealed: _____

IMP. NO.	CONTENTS	INITIAL VOL (ml)	WEIGHT (grams)		
			INITIAL	FINAL	NET
1	D.I. H_2O	100	565.1	694.1 ~~686.9~~	129.0
2	"	100	563.7	~~573.6~~ 579.4 ~~571.9~~	15.7
3	MT	0	471.8	473.6 ~~466.4~~	1.8
4	SIL GEL	—	709.0	712.7 ~~708.5~~	3.7
5					
6					
TOTAL					150.7

Description of Impinger Catch: _____

EMISSION TEST CALCULATIONS

PLANT WOODTECH SOURCE/RUN 2-3 DATE 11-5-91

1. Leakage Correction for Volume Metered

$V_{m_c} = V_m - (Lp-La)\theta = V_m - (Lp-0.02)\theta = (\quad)-(\quad -0.02)\ (\quad)$

$V_{m_c} =$ _____ ft^3

2. Volume Metered, Standard Conditions (68°F, 29.92 in.Hg)

$$V_{m_{std}} = 17.64\ V_{m_c} Y \left(\frac{P_{bar} + \Delta H / 13.6}{T_m}\right) = 17.647(45.154)(.9916)\frac{(28.30)+(1.25)/13.}{(530)}$$

$V_{m_{std}} =$ 42.520 dscf

3. Volume Water Vapor Collected, Standard Conditions

Impingers $= V_{wc} = 0.04707\ (V_f - V_i) = 0.04707\ (\quad) =$ _____ scf

Silica Gel $= V_{wsg} = 0.04707\ (W_f - W_i) = 0.04707\ (150.2) = 7.070$ scf

$V_{w_{std}} = V_{wc} + V_{wsg} =$ 7.070 scf

4. Percent Moisture, By Volume

$$B_{ws} = \frac{V_{w_{std}}}{V_{w_{std}} + V_{m_{std}}} = \frac{(7.070)}{(7.070)+(42.520)} = 0.1426$$

5. Molecular Weight, Stack Gas

Dry Molecular Weight, $M_d = 0.440\ (\%CO_2) + 0.320(\%O_2) + 0.280\ (\%N_2 + \%CO)$

$= 0.440\ (11.0) + 0.320(9.4) + 0.280\ (79.6)$

$M_d =$ 30.136 lb/lb - mole

Percent Excess Air, %EA =

$$\left[\frac{\%O_2 - 0.5\ \%CO}{0.264(\%N_2)-(\%O_2-0.5\ \%CO)}\right] X100 \left[\frac{(\quad)-0.5(\quad)}{0.264(\quad)-(\quad -0.5(\quad)}\right] X\ 100$$

%EA = _____

$M_s = M_d\ (1-B_{ws}) + 18.0\ (B_{ws}) = (30.136)(1-.1426) + 18.0\ (.1426) =$ 28.41 lb/lb-mole

6. Stack Gas Velocity, Average

$$V_{s_{avg}} = 85.49 C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}} = 85.49\ (.4768)(.84)\sqrt{\frac{(769)}{(28.31)(28.4)}}$$

$V_{s_{avg}}$ = 33.059 ft/s

7. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Qa(\text{circular}) = \left(\frac{60 \times V_s\ (\pi d^2/4)}{144}\right) = 60 \times V_s\ (5.454 \times 10^{-3})\ (d^2)$$

$$= 60 \times 33.059\ (5.454 \times 10^{-3})\ (30.5)^2$$

"or" $Qa(\text{rectangular}) = 60 \times V_s \left(\frac{L \times W}{144}\right) = 60 \times V_s\ (L \times W)\ 6.944 \times 10^{-3}$

$$= 60 \times \_\_\_\_\_\ (\_\_\_\_\_ \times \_\_\_\_\_)\ 6.944 \times 10^{-3}$$

Qa = 10,064 acfm

8. Stack Volumetric Flow Rate, Standard Conditions (68°F, 29.92 in. Hg)

$$Q_{std} = 17.64\, Q_a (1-B_{ws}) \left(\frac{P_s}{T_s}\right) = 17.647(10,064)\ (1-.1426)\left(\frac{28.31}{769}\right)$$

Q_{std} = 5606 dscfm

9. Isokinetic Variation

$$\%I = K \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ 1-B_{ws}}$$

$$= 0.0944 \frac{(769)\ (4.2326)}{(28.31)\ (33.059)\ (5.1465 \times 10^{-4})\ (72)\ (1-.1426)}$$

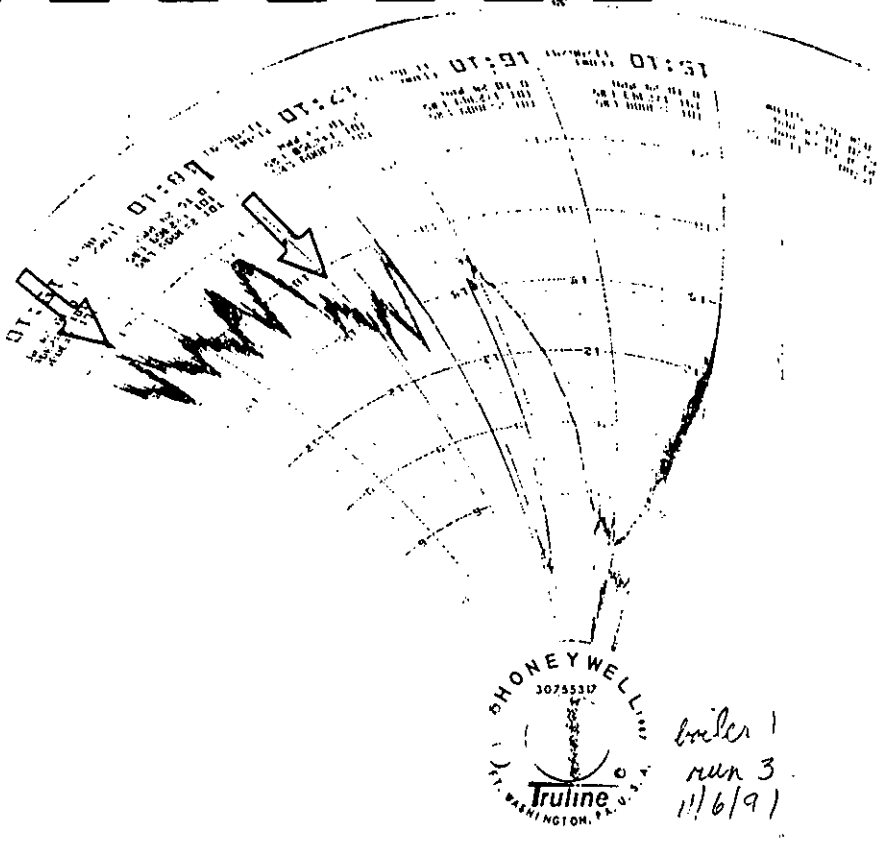
= 103.9 %

APPENDIX D

BOILER STEAM CHARTS

HONEYWELL
Truline
Chart 2
11/5/71
14:48
15:59

HONEYWELL
3025537
Truline
WASHINGTON, PA. U.S.A.
boiler 1
11/6/91



boiler 1
run 3
11/6/91

APPENDIX E

DRYER PROCESS LOG SHEETS
SCRUBBER PROCESS LOG SHEETS
HOT PRESS PROCESS LOG SHEETS
HOT PRESS RECORD (TAPE)
GLUE MIXING RECORD
RESIN MSDS
RESIN CATALYST MSDS (DRY)
RESIN CATALYST MSDS (LIQUID)
GLUE FILLER DATA

Dryer Log Sheet

Time	Temp, °F					Steam Press, kg/cm^2	Speed		Veneer Moisture, %
	Zone 1	Zone 2	Zone 3	Zone 4	Thermocouple		Top	Bottom	
1100	112	150	142	142	390	4.0	850	500	8-16
1115	116	148	138	142	390	4.0	850	500	–
1130	110	146	138	140	390	3.5	850	500	–
1145	106	140	136	136	390	3.0	850	500	–
1200	104	140	132	136	390	3.0	850	500	16
1215	100	132	124	128	390	2.5	850	500	–
down					390				
1430	146	180	164	164	390	10.0	850	500	8
1445	142	176	164	166	390	10.0	850	500	–
1500	138	174	164	166	390	9.0	850	500	–
1515	135	172	164	166	390	9.0	850	500	–
1530	133	170	164	165	390	8.0	900	800	–
1545	132	168	162	164	390	8.0	900	800	–
1600	126	164	158	163	390	7.5	900	800	8
1615	124	160	154	158	390	7.0	900	800	–
1630	120	158	152	154	390	5.5	900	800	–

Dryer Log Sheet

Time	Temp, °F					Steam Press, kg/cm^2	Speed		Veneer Moisture, %
	Zone 1	Zone 2	Zone 3	Zone 4	Thermocouple		Top	Bottom	
1645	120	150	140	148	390	4.5	900	800	–
1700	118	150	138	146	390	4.5	900	800	8
1715	115	145	138	140	390	4.0	900	800	–
1730	110	146	138	140	390	4.0	900	800	–
1745	110	146	138	140	390	4.0	900	800	–

Scrubber Log

Time	pH Value	Blowdown, gal/min	Inlet Gas Temp, °F	Pressure Drop, in Water
1330	10.85	4	60	2.5
1400	–	4	60	2.5
1430	10.80	4	60	2.5
1500	12.28	4	60	2.5
1530	11.90	4	60	2.5
1600	10.90	4	60	2.5
1630	–	4	60	2.5
1700	–	4	60	2.5
1730	12.78	4	60	2.5
1800	13.01	4	60	2.5
1830	12.88	4	60	2.5

Hot Press Log

	Time In	Time Out	Species	ID No	Type	Size X by Y	Ply	Thick-ness, in	Sheets	Temp °C
12	1054	1106	YP	250	B/C	4×8	5	15	30	114
10	1123	1133	YP	P	P	4×8	5	15	29	114
10	1212	1222	YP	251	B	4×8	5	15	30	114
10	1338	1348	YP	252	C	4×8	7	18	30	114
27	1410	1437	YP	253	C	4×8	15	45	15	114
27	1458	1525	YP	254	C	4×8	15	45	15	114
27	1533	1600	YP	255	C	4×8	15	45	15	114
27	1600	1627	YP	256	C	4×8	15	45	15	114
28	1807	1835	YP	257	C	4×8	15	45	15	114
12	1841	1853	YP	258	C	4×8	7	21	30	114
12	1916	1928	YP	259	C	4×8	7	21	29	114

WOODTECH, INC. DRYER DAILY COUNT

	SHIFT	2.5	3.5 ✓					
DATE 11-7-91	2							
TIME	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
DRYER SPEED	800/900	800/900	700/900	700/900	700/900	700/900	700/900	700/900
TEMPERATURE	8/145	5/135	4/125	6/130	6/130	6/130	6/130	7/145
VENEER SIZE	3.5 4x4	—	—	—	—	—	—	—
FRONT	1420	1390	1390	1400	1390	1400	1390	1390
REAR	1290	1300	1300	1290	1300	1310	1290	1300
TOP								
BOTTOM								
MOISTURE	8	8	10	10	10	10	10	10
PALLETS TOTAL 24								22
	1 1	~~2B~~	2C 8	3 9	4 4	5	TOTAL	

COMMENTS: Log count

SAW 281
186

WOODTECH, INC. DRYER DAILY COUNT

	SHIFT 1	2.5	3.5 ✓					
DATE 10-7-91								
TIME	8 Am	9 Am	10 Am	11 Am	12 Pm	1 Pm	2 Pm	3 Pm
DRYER SPEED	600/925	600/925	500/850	500/850	500/850			
TEMPERATURE	5/120	4½/118	7/118	4/115	1½/94			
VENEER SIZE	4x4 4x4	4x4 4x4	4x4 4x4	4x4 4x4	4x4 4x4			
FRONT	X	X	X					
REAR								
TOP								
BOTTOM								
MOISTURE	12-14	6-18	12-16	8-16	16			
PALLETS TOTAL 16								
	1	2B 2	2C 4	3 5	4 5	5	TOTAL	

COMMENTS:

WOODTECH, I[illegible]. GLUE MIXING RECORD DATE: 11/8

	TIME	TEMPERATUR	290-LF	F-3	H2O	CATALYST	GLUE ON	INITIAL	
1	6:45	64°	450	100	75	41 LBS	38g	AE	
2	8:30	64°	450	100	100	41 LBS	36g	AE	
3	11:15	70°	450	100	100	41 LBS	36g	AE	
4	12:35	72°	450	100	100	28 LBS	36g	AE	68°
5	2:45	72°	450	100	100	28 LBS	36g	AE	
6	4:00	72°	450	100	75	28 LBS			
7	6:45	68°	440	100	75	24	—	DS	
8	8:15	70°	338	75	65	21			637#
9			348	775	690	141			5994
10									
11									
12									
13									
14									
15									
16									
17									1152 1082
18									
19									
20									

COMMENTS:

```
4080 0        mm
 145     92 Kg
 535     59  S
 120         t
1•30 - ----
1•30 • ••••
 150    145 Kg
 119    114 t
1•30 • ••••
901 0 9999  S
  30     30 t
1•30 - ----
1•30 - ----
4080 0        mm
 145     92 Kg
 535     59  S
 120         t
1•30 - ----
1•30 • ••••
 149    145 Kg
 119    114 t
1•30 • ••••
950 0 2756  S
1•30 • ••••
 149    145 Kg
 119    114 t
1•30 • ••••
1054 0 4204  S
  60     90 t
1•30 - ----
1•30 • ••••
 149    145 Kg
 118    114 t
1•30 • ••••
1123 0 1494  S
  29    119 t
1•30 - ----
1•30 - ----
080 0         mm
145     92 Kg
535     59  S
120         t
1•30 - ----
1•30 • ••••
150    144 Kg
120    114 t
1•30 • ••••
1•30 • ••••
150    144 Kg
120    114 t
```

```
 30 1212 0 3147  S
  1   30    149 t
     1•30 - ----
     1•30 - ----
450 4080 1        mm
     145     92 Kg
    1458    162  S
     120         t
     1•30 - ----
X•• 1•30 • ••••
     151    145 Kg
     118    114 t
X•• 1•30 • ••••
     1•30 - ----
180 4080 0        mm
     145     92 Kg
     535     59  S
     120         t
     1•30 - ----
X•• 1•30 • ••••
     149    145 Kg
     118    114 t
X•• 1•30 • ••••
  30 1338 0 4760  S
   1   30    179 t
     1•30 - ----
     1•30 - ----
450 4080 1        mm
     145     92 Kg
    1458    162  S
     120         t
     1•30 - ----
X•• 1•30 • ••••
     151    145 Kg
     120    113 t
X•• 1•30 • ••••
  15 1410 1 1023  S
   1   15    194 t
     1•30 - ----
     1•30 - ----
450 4080 1        mm
     145     92 Kg
    1458    162  S
     120         t
     1•30 - ----
X•• 1•30 • ••••
     151    145 Kg
     119    113 t
X•• 1•30 • ••••
  15 1458 1 2132  S
X•• 1•30 • ••••
```

not prev strip chart

May 16 91

SOUTHEASTERN ADHESIVES COMPANY

ADHESIVES FOR THE WOODWORKING INDUSTRY

8150 VIRGINIA STREET, S.W.
P.O. BOX 2070
LENOIR, NORTH CAROLINA 28645
TELEPHONE (704) 754-3493
FAX (704) 754-0052

RIDGEW... ATE RD 689
TEL... P.O. BOX 527
24148-0527
(703) 956-3176
(703) 956-3168

MATERIAL SAFETY DATA SH

THE OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 REQUIRES THAT THIS INFORMATION BE MADE A... EMPLOYEES PLEASE INSTRUCT THEM IN THE PROPER HANDLING OF THIS PRODUCT.

FOR INDUSTRIAL USE ONLY.

SECTION I
PRODUCT IDENTIFICATION

TRADE NAME: 290-LF

DATE:

MSDS #:

CHEMICAL NAME: UREA-FORMALDEHYDE RESIN TANK

REVISION:

CHEMICAL FAMILY: UREA-FORMALDEHYDE RESIN

PREPARER:

EMERGENCY PHONE: (704) 754-3493 (LENOIR,
(703) 956-3176 (RIDGEWAY,
1-800-424-9300 (CHEMTREC
1-800-451-1403 (SARA HOTL

SECTION II
HAZARDOUS COMPONENTS

CHEMICAL NAME	CAS NO.	% RANGE	ACGIH TLV	OSHA PEL
FORMALDEHYDE	50-00-0	< 0.5 % @ 0.C SODIUM SULFITE TITRATION	1 ppm	1 ppm

CARCINOGENICITY

Formaldehyde is listed by IARC and NTP as an experimental animal carcinogen, by IARC as [illegible] carcinogen, by ACGIH as an A2 Industrial Substance Suspect of Carcinogenic Potential for Man, and by [illegible] al cancer hazard.

EMERGENCY AND FIRST AID PROCEDURES

SKIN CONTACT:
Remove contaminated clothing and wash area with water and, if available, a mild soap. If irritation occurs, seek medical attention.

EYE CONTACT:
Flush with a gentle stream of water, as from an eye fountain, for 15 minutes. If irrit[illegible] occurs, seek medical attention.

INHALATION:
Remove from exposure area to fresh air and keep the affected person warm and calm. If [illegible] sicks, begin artificial respiration. If breathing is difficult, administer oxygen. Seek medical at[illegible]

INGESTION:
Administer large amounts of water, if conscious, and induce vomiting. Seek medical att[illegible]

OVER-EXPOSURE:
Treat symptomatically. Secure medical assistance immediately.

SECTION VI
REACTIVITY DATA

STABILITY/CONDITIONS TO AVOID
These resins are reasonably stable under normal storage conditions of 70-80 F and a pH of 7.[illegible] 8.0. A rise in temperature above 80 F or a drop in pH below 7.0 will cause the resin to harden. For more [illegible] information consult the Technical Data Sheets for these resins.

INCOMPATIBILITY
Avoid contact with acidic compounds.

HAZARDOUS DECOMPOSITION PRODUCTS
Polymerization of these resins frequently results in evolution of Formaldehyde fumes. See Sections V and VIII.

HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID
Rapid polymerization will result from exposure to highly acidic compounds and/or elevated temperatures.

SECTION VII
PRECAUTIONS FOR SAFE HANDLING AND USE

RELEASE OR SPILL PROCEDURES

If material is released or spilled, wear protective equipment, ventilate the area, mix wi absorbent material and scoop into containers to seal for disposal.

WASTE DISPOSAL METHOD

Large quantities of these resins may be disposed of in an incinerator designed for aqueous equately diluted, these resins are biodegradable by acclimated organisms. If it is possible to mix spilled resin with an acid, the resin may be hardened and then burned in an incinerator or disposed itary landfill according to federal, state, and local regulations.

HANDLING AND STORAGE PRECAUTIONS

During handling, the protective equipment described in Section VIII should be employed. Avoid contamination with acids and protect from exposure to above ambient temperatures.

SECTION VIII
CONTROL MEASURES

RESPIRATORY PROTECTION

Under normal conditions of use, these resins do not present any unusual hazards. If, ho resin are being handled in open containers, or if a resin is hot and is being handled in certain precautions are recommended to protect personnel against possible exposure to For Section V and IX for information as to the maximum possible concentration of such materi degree or extent of hazard involved.

VENTILATION

Induced-draft or blower-type mechanical ventilation may substitute for personnel respir This will depend entirely on where and how these resins are used or being handled.

PROTECTIVE EQUIPMENT

If a free Formaldehyde content is indicated, personnel handling these resins should be p gloves. Chemical-type safety goggles and rubber or plastic aprons may also be indicated. resins should be avoided since many workers have or develop allergic sensitivity to Form sure.

SECTION IX
REGULATORY INFORMATION

WORKER RIGHT-TO-KNOW

Formaldehyde is considered hazardous under the OSHA Hazard Communication Standard (29 C .1200).

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

- HEALTH 2
- FLAMMABILITY.....1
- REACTIVITY 1
- PROTECTION .....B

EXPOSURE LIMITS (OSHA AND ACGIH)

- TLV (ACGIH) ..... 1 ppm (8 hr. TWA)
- PEL (OSHA) ..... 1 ppm (8 hr. TWA)
- STEL (OSHA/ACGIH) ..... 2 ppm (15 min. TWA)
- ACTION LEVEL (OSHA) ..... 0.5 ppm (8 hr. TWA)

SOUTHEASTERN ADHESIVES COMPANY

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P.O. BOX 527
RIDGEWAY, VIRGINIA 24148-0527
TELEPHONE (703) 956-3176
FAX (703) 956-3168

MATERIAL SAFETY DATA SHEET

THE OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 REQUIRES THAT THIS INFORMATION BE MADE AVAILABLE TO YOUR EMPLOYEES.
PLEASE INSTRUCT THEM IN THE PROPER HANDLING OF THIS PRODUCT.
FOR INDUSTRIAL USE ONLY

SECTION I
PRODUCT IDENTIFICATION

TRADE NAME: EXP 7-973

DATE: 04/08/91

MSDS #: P701-24

REVISION: 010-2

CHEMICAL NAME: RESIN CATALYST POWDER

PREPARER: R. DRUM

CHEMICAL FAMILY: RESIN CATALYST

EMERGENCY PHONE:
(704) 754-3493 (LENOIR, NC)
(703) 956-3176 (RIDGEWAY, VA)
1-800-424-9300 (CHEMTREC)
1-800-451-1403 (SARA HOTLINE)

SECTION II
HAZARDOUS COMPONENTS

CHEMICAL NAME	CAS NO.	% RANGE	ACGIH TLV	OSHA PEL
AMMONIUM CHLORIDE NHCl	12125-02-9	< 20 %	10 mg/m3	20 mg/m3

SECTION III
PHYSICAL DATA

BOILING POINT:	Not Applicable	PERCENT VOLATILE (BY VOLUME):	3 - 8 %
SPECIFIC GRAVITY:	Not Applicable	SOLUBILITY IN WATER:	Appreciable
VISCOSITY:	Not Applicable	PH INFORMATION:	Neutral to acidic
EVAPORATION RATE:	Not Applicable	APPEARANCE AND ODOR:	White to brown powder
VAPOR PRESSURE:	Not Applicable	VAPOR DENSITY:	Not Applicable

SECTION IV
FIRE AND EXPLOSION HAZARD DATA

FLASH POINT
Not Applicable

EXTINGUISHING MEDIA
Powder may be ignited in which case water spray, alcohol foam, dry chemical, or Carbon Dioxide is satisfactory.

SPECIAL FIRE FIGHTING PROCEDURES
Wear appropriate respiratory equipment (Section VIII) if exposure levels are exceeded in a fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS
In a fire, Ammonium Chloride fumes may be evolved which are considered toxic.

SECTION V
HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE

SKIN CONTACT:
Repeated or prolonged exposure to dust may result in skin irritation and possibly dermatitis.

EYE CONTACT:
Dust may cause irritation to the eyes and temporary visual impairment.

INHALATION:
Dust particles may produce irritation of the upper respiratory tract.

INGESTION:
If swallowed, irritation of the mouth, esophagus, and gastrointestinal system may result.

OVER-EXPOSURE:
Effects of over-exposure to this powder may include nausea and headache; temporary irritation of upper respiratory passages; temporary lung irritation resulting in coughing, difficulty in breathing, or shortness of breath.

CARCINOGENICITY
This catalyst is not considered carcinogenic.

EMERGENCY AND FIRST AID PROCEDURES

SKIN CONTACT:

Remove contaminated clothing and wash area with water and, if available, a mild soap. If irritation occurs, seek medical attention.

EYE CONTACT:

Flush with a gentle stream of water, as from an eye fountain, for 15 minutes. If irritation occurs, seek medical attention.

INHALATION:

Remove from exposure area to fresh air and keep the affected person warm and calm. If breathing stops, begin artificial respiration. If breathing is difficult, administer oxygen. Seek medical attention.

INGESTION:

Do not induce vomiting. Administer large amounts of water or milk, if conscious, and seek medical attention.

OVER-EXPOSURE:

Treat symptomatically. Secure medical assistance immediately.

SECTION VI
REACTIVITY DATA

STABILITY/CONDITIONS TO AVOID

This product is considered stable when stored in a cool, dry, well-ventilated area.

INCOMPATIBILITY

Avoid contact with strong oxidizing or reducing agents.

HAZARDOUS DECOMPOSITION PRODUCTS

At temperatures above 653 F, Ammonium Chloride will sublime.

HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID

Polymerization of this product will not occur.

SECTION VII
PRECAUTIONS FOR SAFE HANDLING AND USE

RELEASE OR SPILL PROCEDURES

If material is released or spilled, wear protective equipment, and ventilate the area. The spilled material may be swept into containers for reclaim or disposal.

WASTE DISPOSAL METHOD

This product may be disposed of in accordance with federal, state, and local regulations.

HANDLING AND STORAGE PRECAUTIONS

During handling, the protective equipment described in Section VIII should be employed. This product should be stored in a cool, dry, well-ventilated area. This product may be mildly corrosive to carbon steel, copper, and copper alloys.

TRANSPORTATION INFORMATION

Shipping Name ..... Catalyst Powder
Hazard Class ..... Not Applicable
UN No. ..... Not Applicable
DOT Classification ..... Not Regulated

his information is furnished without warranty, representation, inducement or license of any kind, except that it is accurate to the est of our knowledge or obtained from sources that we believe to be accurate. Furthermore, this company does not assume any legal responsibility for use or reliance upon same. Customers are encouraged to conduct their own tests. Before using any product, read its label and consult its Material Safety Data Sheet.

SOUTHEASTERN ADHESIVES COMPANY

ADHESIVES FOR THE WOODWORKING INDUSTRY

815D VIRGINIA STREET, S.W.
P.O. BOX 2070
LENOIR, NORTH CAROLINA 28645
TELEPHONE (704) 754-3493
FAX (704) 754-0052

RT. 3 STATE RD 689
P.O. BOX 527
RIDGEWAY, VIRGINIA 24148-0527
TELEPHONE (703) 956-3176
FAX (703) 956-3168

MATERIAL SAFETY DATA SHEET

THE OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 REQUIRES THAT THIS INFORMATION BE MADE AVAILABLE TO YOUR EMPLOYEES
PLEASE INSTRUCT THEM IN THE PROPER HANDLING OF THIS PRODUCT
FOR INDUSTRIAL USE ONLY

SECTION I
PRODUCT IDENTIFICATION

TRADE NAME: [redacted] E-4A

DATE: 05/24/91

MSDS #: L701-03

CHEMICAL NAME: RESIN CATALYST LIQUID

REVISION: 015-2

CHEMICAL FAMILY: RESIN CATALYST

PREPARER: R. DRUM

EMERGENCY PHONE:
(704) 754-3493 (LENOIR, NC)
(703) 956-3176 (RIDGEWAY, VA)
1-800-424-9300 (CHEMTREC)
1-800-451-1403 (SARA HOTLINE)

SECTION II
HAZARDOUS COMPONENTS

CHEMICAL NAME	CAS NO.	% RANGE	ACGIH TLV	OSHA PEL
AMMONIUM CHLORIDE	7783-20-2	< 15 %	NE	5 mg/m3

SECTION III
PHYSICAL DATA

BOILING POINT:	212 F	PERCENT VOLATILE (BY VOLUME):	70 - 90 %
SPECIFIC GRAVITY:	< 1.000	SOLUBILITY IN WATER:	Complete
VISCOSITY:	< 100 cPs	PH INFORMATION:	7.7 - 7.9
EVAPORATION RATE:	> Water	APPEARANCE AND ODOR:	Clear to tan liquid
VAPOR PRESSURE:	Not Applicable	VAPOR DENSITY:	Not Applicable

SECTION IV
FIRE AND EXPLOSION HAZARD DATA

FLASH POINT
Not Applicable

EXTINGUISHING MEDIA
Water spray, alcohol foam, dry chemical, or Carbon Dioxide is satisfactory.

SPECIAL FIRE FIGHTING PROCEDURES
Firefighters should wear self-contained breathing apparatus and the appropriate protective equipment as described in Section VIII.

UNUSUAL FIRE AND EXPLOSION HAZARDS
In a fire, Ammonium Chloride fumes may be evolved which are considered toxic.

SECTION V
HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE

SKIN CONTACT:
Repeated or prolonged exposure may result in skin irritation and possibly dermatitis.

EYE CONTACT:
Vapors and fumes may cause irritation to the eyes and temporary visual impairment.

INHALATION:
Vapors and fumes may produce irritation of the upper respiratory tract.

INGESTION:
If swallowed, irritation of the mouth, esophagus, and gastrointestinal system may result.

OVER-EXPOSURE:
Effects of over-exposure to this material may include nausea and headache; temporary irritation of upper respiratory passages; temporary lung irritation resulting in coughing, difficulty in breathing, or shortness of breath.

CARCINOGENICITY
This catalyst is not considered carcinogenic.

EMERGENCY AND FIRST AID PROCEDURES

SKIN CONTACT:
Remove contaminated clothing and wash area with water and, if available, a mild soap. If irritation occurs, seek medical attention.

EYE CONTACT:
Flush with a gentle stream of water, as from an eye fountain, for 15 minutes. If irritation occurs, seek medical attention.

INHALATION:
Remove from exposure area to fresh air and keep the affected person warm and calm. If breathing stops, begin artificial respiration. If breathing is difficult, administer oxygen. Seek medical attention.

INGESTION:
Do not induce vomiting. Administer large amounts of water or milk, if conscious, and seek medical attention.

OVER-EXPOSURE:
Treat symptomatically. Secure medical assistance immediately.

SECTION VI
REACTIVITY DATA

STABILITY/CONDITIONS TO AVOID
This product is considered stable when stored in a cool, dry, well-ventilated area.

INCOMPATIBILITY
Avoid contact with strong oxidizing or reducing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
At temperatures above 100 C, Ammonium Sulfate will decompose to form Sulfur Oxides and Ammonia gases.

HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID
Polymerization of this product will not occur.

SECTION VII
PRECAUTIONS FOR SAFE HANDLING AND USE

RELEASE OR SPILL PROCEDURES
If material is released or spilled, wear protective equipment, ventilate the area, and mix with an approved absorbent material and scoop into containers to seal for disposal.

WASTE DISPOSAL METHOD
This product may be disposed of in accordance with federal, state, and local regulations.

HANDLING AND STORAGE PRECAUTIONS
During handling, the protective equipment described in Section VIII should be employed. This product should be stored in a cool, dry, well-ventilated area. This product may be mildly corrosive to Carbon steel, Copper, and Copper alloys.

CONTROL MEASURES

RESPIRATORY PROTECTION

A NIOSH/MSHA approved respirator is recommended when exposure levels are exceeded.

VENTILATION

Provide adequate ventilation to reduce vapors below exposure levels.

PROTECTIVE EQUIPMENT

Personnel handling this material should be provided with chemical resistant nitrile, neoprene or rubber gloves and safety goggles or face shields.

SECTION IX
REGULATORY INFORMATION

WORKER RIGHT-TO-KNOW

Based on hazardous components, this material would be considered hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200).

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

HEALTH 1
FLAMMABILITY 1
REACTIVITY 1
PROTECTION .....B

EXPOSURE LIMITS (OSHA AND ACGIH)

Ammonium Chloride

PEL (OSHA) - Total Dust 15 mg/m3
PEL (OSHA) - Respirable Fraction ... 5 mg/m3

EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW (SARA TITLE III)
SECTION 311 / 312 INFORMATION (40 CFR 370)

This material is considered hazardous under CERCLA or SARA. Ammonium Chloride is regulated under CERCLA and if a TPQ of 10,000 lbs. is exceeded, Section 311 requires facilities to submit an MSDS to the appropriate State Emergency Response Commission (SERC), the Local Emergency Planning Committee (LEPC), and the Local Fire Department. Furthermore, Section 312 requires facilities to submit an Emergency and Hazardous Chemical Inventory Form (Tier I or II) by March 1 of each year to the previously mentioned organizations.

SECTION 313 INFORMATION (40 CFR 372)

Ammonium Chloride is regulated under Section 313 as a corrosive material and must be reported on the EPA Toxic Chemical Release Inventory (Reporting Form R) if amounts in excess of 25,000 lbs./year are manufactured or processed or amounts in excess of 10,000 lbs./year are otherwise used.

CERCLA INFORMATION (40 CFR 302.4)

Ammonium Chloride is considered hazardous under CERCLA due to its corrosive nature. If an RQ of 5,000 lbs. or more is released into the environment within a 24 hour period, the National Response Center must be notified by phone (1-800-424-8802). The appropriate State Emergency Response Commission and the Local Emergency Planning Committee must also be notified.

TRANSPORTATION INFORMATION

Shipping Name ..... Not Applicable
Hazard Class ..... Not Applicable
UN No..... Not Applicable
DOT Classification ..... Not Regulated

This information is furnished without warranty, representation, inducement or license of any kind, [illegible] it is accurate to the best of our knowledge or obtained from sources that we believe to be accurate. Furthermore, this [illegible] not assume any legal responsibility for use or reliance upon same. Customers are encouraged to conduct their own tests. Be[illegible] using any product, read [illegible] and consult its Material Safety Data Sheet.

High Point Plant
Shawano Warehouse

Robertson, Supplier
WHEAT FLOUR
GLU-X
FLR-241
66-1

DESCRIPTION & TYPICAL SPECIFICATIONS

Glu-X

Reg. U.S. Pat Off.

The "Special" Glue Extender
For the Plywood Industry

THE ROBERTSON CORPORATION

P.O. Box 787
Bedford, IN 47421
800-457-4545

P.O. Box A
Brownstown, IN 47220
812/358-3333

The Special Extender Flour

GLU-X EXTENDER FLOUR is a natural organic cereal product with a non-cereal natural plant source additive. The natural additive is FDA approved as an adulterant.

It is NOT A CHEMICAL and DOES NOT CONTAIN ANY CHEMICAL additives.

It is milled exclusively and especially for extending plywood glues---either phenolic or urea types.

It has been used extensively as a plywood glue extender in most major hardwood plywood plants and in almost all southern pine plywood for many years. The material is generally recognized as safe.

Although GLU-X is a proprietary material with many confidential properties, it is classified as a Proteinaceous Amylaceous Extender.

Typical analyses for GLU-X indicate a moisture of 12.5%, protein of 8.5-9.0, MacMichael Viscosity of 50°-60°, ash of 0.45%-0.50% and 6.0 pH. Other factors including some of those affecting granularity, texture, mixing qualities and water absorption or retention are not generally published. 12/80

APPENDIX F

EXAMPLE CALCULATIONS/COMPUTER SHEETS

Example Calculations for Particulate Emissions

1. Volume of dry gas samples corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a.

$$V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m} \right]$$

2. Volume of water vapor at standard conditions, ft^3.

$$V_{w_{std}} = 0.04707 V_{l_c}$$

3. Moisture content in stack gas.

$$B_{ws} = \frac{V_{w_{std}}}{V_{m_{std}} + V_{w_{std}}}$$

4. Dry molecular weight of stack gas.

$$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$$

5. Molecular weight of stack gas.

$$M_s = M_d\ (1-B_{ws}) + 18\ B_{ws}$$

6. Stack velocity at stack conditions, fps.

$$V_s = 85.49\ Cp \left(\sqrt{\Delta P}\right)\ \text{avg.} \sqrt{\frac{T_s}{P_s\ M_s}}$$

7. Stack gas volumetric flow rate at stack conditions, cfm.

$$Q_s = 60 \times V_s \times A_s$$

(continued)

Example Calculations for Particulate Emissions (continued)

8. Dry stack gas volumetric flow rate at standard conditions, cfm.

$$Q_{s_{std}} = 17.65\ Q_s \frac{P_s}{T_s} \left(1-B_{ws}\right)$$

9. Concentration in gr/dscf.

$$C's = (0.01543) \frac{M_n}{V_{m_{std}}}$$

10. Particulate mass emission rate, lbs/h.

$$pmr = \frac{C's}{7000} \times Q_{s_{std}} \times 60$$

11. Isokinetic variation.

$$I = \frac{100\ T_s \left[0.002669\ V_{l_c} + \frac{V_m}{T_m}\ Y \left(P_{bar} + \frac{\Delta H}{13.6}\right)\right]}{60\ \theta\ V_s\ P_s\ A_n}$$

Nomenclature and Dimensions

A_s = Cross-sectional area of stack, ft^2

A_n = Area of sampling nozzle, ft^2

B_{wo} = Proportion by volume of water vapor in the gas stream, dimensionless

B_{ws} = proportion by volume of water vapor in the gas stream, dimensionless (x 100 - % H_2O)

C_p = Pitot tube coefficient, dimensionless

C's = Concentration of particulate matter in stack gas, gr/scf, dry basis

% CO = Percent of carbon monoxide by volume, dry basis

% CO_2 = Percent of carbon dioxide by volume, dry basis

ΔH = Average pressure drop across the orifice meter, in. of H_2O

I = Percent of isokinetic sampling

L_a = Maximum acceptable leakage rate for either a pretest leak or for a leak check following a component change; equal to 0.00057 m^3/min (0.02 cfm) or 4 percent of the average sampling rate, whichever is less

M_d = Dry molecular weight, lb/lb-mole

M_n = Total amount of particulate matter collected, mg

M_s = Molecular weight of stack gas (wet basis), lb/lb-mole

% N_2 = Percent of nitrogen by volume, dry basis

% O_2 = Percent of oxygen by volume, dry basis

ΔP = Velocity head of stack gas, in. of H_2O

P_{bar} = Barometric pressure, in.Hg

P_s = Absolute stack gas pressure, in.Hg

pmr = Particulate matter emission rate, lb/h

(continued)

Nomenclature and Dimensions (continued)

Q_s = Volumetric flow rate, wet basis, stack conditions

$Q_{s_{std}}$ = Volumetric flow rate, dry basis, standard conditions

T_m = Average temperature of dry gas meter, °R

T_s = Average temperature of stack gas, °R

V_{l_c} = Total volume of liquid collected in impingers and silica gel, ml

V_m = Volume of sample through the dry gas meter at meter conditions, ft^3

$V_{m_{std}}$ = Volume of gas sample through the dry gas meter at standard conditions, ft^3

V_s = Stack gas velocity at stack conditions, fps

$V_{w_{std}}$ = Volume of water vapor collected in silica gel corrected to standard conditions, scf

Y = Dry gas meter calibration factor

Θ = Total sampling time, minutes

Note: Standard condition = 68°F and 29.92 in.Hg.

TOTAL HYDROCARBON EMISSION RATE CALCULATION

$$E_{THC} = \frac{C_{THC}\ (MW\ C_3H_8)}{(385.3)(10^6)} \qquad Q_{s(STD)} \times 60$$

where: E_{THC} = Total Hydrocarbon Mass Emission Rate, lb/h

$MW\ C_3H_8$ = Molecular Weight of Propane, lb/lb mole

$Q_{s(STD)}$ = Volumetric Flow Rate, dscfm

C_{THC} = Hydrocarbon concentration, parts per million (ppm)

Molar Volume = 385.3 ft^3/lb mole

$$\text{ppm by volume} = \frac{ft^3}{10^6\ ft^3} \qquad \text{Volume Ratio}$$

CARBON MONOXIDE (CO) EMISSION RATE CALCULATION

$$E_{co} = \frac{C_{co}\ (MW\ CO)}{(385.3)\ (10^6)} \qquad Q_{s(std)} \times 60$$

E_{co} = CO Mass Emission Rate, lb/h

C_{co} = CO concentration, parts per million (ppm)

NITROGEN OXIDE (NO_x) EMISSION RATE CALCULATION

$$E_{NO} = \frac{C_{NO}\ (MW\ NO_x)}{(385.3)\ (10^6)} \qquad Q_{s(std)} \times 60$$

E_{NO} = NO_x Mass Emission Rate, lb/h

C_{NO} = NO_x concentration, parts per million (ppm)

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	WOODTECH
SAMPLE LOCATION:	BOILER #1
DATE/TIME:	11-6-91/1015
RUN #:	1-1

STATIC PRESSURE("H2O):	-0.13	"HG	28.40
BAROMETRIC("HG):	28.41		
SAMPLE TIME(min):	72.00	Vm(corr)	39.324
ACTUAL METER VOLUME:	39.324	DSCF	36.855
SQ. ROOT /\P:	0.411		
AVG ORIFICE /\H:	0.87		
AVG STACK TEMP °F:	306.0	°R	766.0
AVG METER TEMP °F:	74.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.307	An(ft^2)	5.14E-04
METER GAMMA:	0.996		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	5.07
DIA OR DIM (inches):	30.50		
% O2 :	7.80	DRY MOLE WT	30.31
% CO2 :	12.50	ST MOLE WT	28.23
VOL CONDENSATE(ml):	159.40	% H20	16.91
FILTER GAIN(mg):	122.30		
RINSE GAIN(mg):	32.00	NET WT(mg)	154.30
F-FACTOR(DSCF/mmBtu):	9446		
FUEL AS REC'D(Btu/lb):		% EXCESS AIR	NA
FUEL FEED RATE(lb/hr):			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	28.84	FT/SEC
STACK GAS FLOW (Qs):	8778.2	ACFM
:	4771.9	DSCFM
CONCENTRATION (Cs):	6.45E-02	Gr/DSCF
:	9.21E-06	lb/DSCF
EMISSION RATE (Er):	2.638	lb/hr
:	NA	lb/mmBTU
F-FACTOR EMISSIONS:	0.139	lb/mmBTU
HEAT INPUT RATE:	19.00	mmBTU/hr
STACK GAS TEMP :	306	Deg F
MOISTURE (%H2O):	16.91	%
ISOKINETIC :	105.94	%

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	WOODTECH
SAMPLE LOCATION:	BOILER #1
DATE/TIME:	11-6-91/1200
RUN #:	1-2

STATIC PRESSURE("H2O):	-0.12	"HG	28.29
BAROMETRIC("HG):	28.30		
SAMPLE TIME(min):	72.00	Vm(corr)	41.013
ACTUAL METER VOLUME:	41.013	DSCF	37.803
SQ. ROOT /\P:	0.422		
AVG ORIFICE /\H:	0.96		
AVG STACK TEMP °F:	334.0	°R	794.0
AVG METER TEMP °F:	81.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.304	An(ft^2)	5.04E-04
METER GAMMA:	0.996		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	5.07
DIA OR DIM (inches):	30.50		
% O2 :	7.80	DRY MOLE WT	30.31
% CO2 :	12.50	ST MOLE WT	28.22
VOL CONDENSATE(ml):	164.60	% H20	17.01
FILTER GAIN(mg):	125.50		
RINSE GAIN(mg):	34.80	NET WT(mg)	160.30
F-FACTOR(DSCF/mmBtu):	9446		
FUEL AS REC'D(Btu/lb):		% EXCESS AIR	NA
FUEL FEED RATE(lb/hr):			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	30.19	FT/SEC
STACK GAS FLOW (Qs):	9191.7	ACFM
:	4796.5	DSCFM
CONCENTRATION (Cs):	6.53E-02	Gr/DSCF
:	9.33E-06	lb/DSCF
EMISSION RATE (Er):	2.686	lb/hr
:	NA	lb/mmBTU
F-FACTOR EMISSIONS:	0.141	lb/mmBTU
HEAT INPUT RATE:	19.10	mmBTU/hr
STACK GAS TEMP :	334	Deg F
MOISTURE (%H2O):	17.01	%
ISOKINETIC :	110.25	%

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	WOODTECH
SAMPLE LOCATION:	BOILER #1
DATE/TIME:	11-6-91/1715
RUN #:	1-3

STATIC PRESSURE("H2O):	-0.12	"HG	28.29
BAROMETRIC("HG):	28.30		
SAMPLE TIME(min):	72.00	Vm(corr)	40.863
ACTUAL METER VOLUME:	40.863	DSCF	38.892
SQ. ROOT /\P:	0.428		
AVG ORIFICE /\H:	1.02		
AVG STACK TEMP °F:	328.0	°R	788.0
AVG METER TEMP °F:	64.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.307	An(ft^2)	5.14E-04
METER GAMMA:	0.996		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	5.07
DIA OR DIM (inches):	30.50		
% O2 :	7.70	DRY MOLE WT	30.32
% CO2 :	12.60	ST MOLE WT	28.51
VOL CONDENSATE(ml):	142.70	% H20	14.73
FILTER GAIN(mg):	133.10		
RINSE GAIN(mg):	36.40	NET WT(mg)	169.50
F-FACTOR(DSCF/mmBtu):	9446		
FUEL AS REC'D(Btu/lb):		% EXCESS AIR	NA
FUEL FEED RATE(lb/hr):			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	30.35	FT/SEC
STACK GAS FLOW (Qs):	9239.7	ACFM
:	4991.9	DSCFM
CONCENTRATION (Cs):	6.71E-02	Gr/DSCF
:	9.59E-06	lb/DSCF
EMISSION RATE (Er):	2.873	lb/hr
:	NA	lb/mmBTU
F-FACTOR EMISSIONS:	0.143	lb/mmBTU
HEAT INPUT RATE:	20.03	mmBTU/hr
STACK GAS TEMP :	328	Deg F
MOISTURE (%H2O):	14.73	%
ISOKINETIC :	106.87	%

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	WOODTECH
SAMPLE LOCATION:	BOILER #2
DATE/TIME:	11-5-91/1111
RUN #:	2-1

STATIC PRESSURE("H2O):	0.10	"HG	28.54
BAROMETRIC("HG):	28.53		
SAMPLE TIME(min):	72.00	Vm(corr)	41.101
ACTUAL METER VOLUME:	41.101	DSCF	38.993
SQ. ROOT /\P:	0.447		
AVG ORIFICE /\H:	1.05		
AVG STACK TEMP °F:	312.0	°R	772.0
AVG METER TEMP °F:	70.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.307	An(ft^2)	5.14E-04
METER GAMMA:	0.996		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	5.07
DIA OR DIM (inches):	30.50		
% O2 :	11.40	DRY MOLE WT	29.93
% CO2 :	9.20	ST MOLE WT	28.34
VOL CONDENSATE(ml):	127.50	% H20	13.34
FILTER GAIN(mg):	137.80		
RINSE GAIN(mg):	24.40	NET WT(mg)	162.20
F-FACTOR(DSCF/mmBtu):	9446		
FUEL AS REC'D(Btu/lb):		% EXCESS AIR	NA
FUEL FEED RATE(lb/hr):			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	31.34	FT/SEC
STACK GAS FLOW (Qs):	9541.4	ACFM
:	5394.0	DSCFM
CONCENTRATION (Cs):	6.41E-02	Gr/DSCF
:	9.15E-06	lb/DSCF
EMISSION RATE (Er):	2.963	lb/hr
:	NA	lb/mmBTU
F-FACTOR EMISSIONS:	0.190	lb/mmBTU
HEAT INPUT RATE:	15.57	mmBTU/hr
STACK GAS TEMP :	312	Deg F
MOISTURE (%H2O):	13.34	%
ISOKINETIC :	99.16	%

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	WOODTECH
SAMPLE LOCATION:	BOILER #2
DATE/TIME:	11-5-91/1301
RUN #:	2-2

STATIC PRESSURE("H2O):	0.10	"HG	28.39
BAROMETRIC("HG):	28.38		
SAMPLE TIME(min):	72.00	Vm(corr)	45.263
ACTUAL METER VOLUME:	45.263	DSCF	42.106
SQ. ROOT /\P:	0.473		
AVG ORIFICE /\H:	1.28		
AVG STACK TEMP °F:	298.0	°R	758.0
AVG METER TEMP °F:	78.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.304	An(ft^2)	5.04E-04
METER GAMMA:	0.996		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	5.07
DIA OR DIM (inches):	30.50		
% O2 :	12.20	DRY MOLE WT	29.86
% CO2 :	8.60	ST MOLE WT	28.27
VOL CONDENSATE(ml):	139.30	% H20	13.47
FILTER GAIN(mg):	127.40		
RINSE GAIN(mg):	34.10	NET WT(mg)	161.50
F-FACTOR(DSCF/mmBtu):	9446		
FUEL AS REC'D(Btu/lb):		% EXCESS AIR	NA
FUEL FEED RATE(lb/hr):			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	32.99	FT/SEC
STACK GAS FLOW (Qs):	10043.9	ACFM
:	5743.5	DSCFM
CONCENTRATION (Cs):	5.91E-02	Gr/DSCF
:	8.44E-06	lb/DSCF
EMISSION RATE (Er):	2.909	lb/hr
:	NA	lb/mmBTU
F-FACTOR EMISSIONS:	0.192	lb/mmBTU
HEAT INPUT RATE:	15.19	mmBTU/hr
STACK GAS TEMP :	298	Deg F
MOISTURE (%H2O):	13.47	%
ISOKINETIC :	102.55	%

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	WOODTECH
SAMPLE LOCATION:	BOILER #2
DATE/TIME:	11-5-91/1500
RUN #:	2-3

STATIC PRESSURE("H2O):	0.10	"HG	28.31
BAROMETRIC("HG):	28.30		
SAMPLE TIME(min):	72.00	Vm(corr)	45.159
ACTUAL METER VOLUME:	45.159	DSCF	42.520
SQ. ROOT /\P:	0.471		
AVG ORIFICE /\H:	1.25		
AVG STACK TEMP °F:	309.0	°R	769.0
AVG METER TEMP °F:	70.0		
Cp PITOT :	0.84		
NOZZLE DIA.(inches):	0.307	An(ft^2)	5.14E-04
METER GAMMA:	0.996		
LEAK RATE(IF<0.02):			
CIRC STACK? 1=Y,0=N:	1	As(ft^2)	5.07
DIA OR DIM (inches):	30.50		
% O2 :	9.40	DRY MOLE WT	30.14
% CO2 :	11.00	ST MOLE WT	28.41
VOL CONDENSATE(ml):	150.20	% H20	14.26
FILTER GAIN(mg):	137.80		
RINSE GAIN(mg):	27.10	NET WT(mg)	164.90
F-FACTOR(DSCF/mmBtu):	9446		
FUEL AS REC'D(Btu/lb):		% EXCESS AIR	NA
FUEL FEED RATE(lb/hr):			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	33.06	FT/SEC
STACK GAS FLOW (Qs):	10065.1	ACFM
:	5606.1	DSCFM
CONCENTRATION (Cs):	5.97E-02	Gr/DSCF
:	8.53E-06	lb/DSCF
EMISSION RATE (Er):	2.871	lb/hr
:	NA	lb/mmBTU
F-FACTOR EMISSIONS:	0.147	lb/mmBTU
HEAT INPUT RATE:	19.60	mmBTU/hr
STACK GAS TEMP :	309	Deg F
MOISTURE (%H2O):	14.26	%
ISOKINETIC :	104.03	%

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	Boiler No. 1		
DATE/TIME:	11-6-91/1205		
RUN #:	2		
STATIC PRESSURE("H2O):	-0.12	"HG	28.29
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.422		
AVG STACK TEMP °F:	334.0	°R	794.0
CIRC STACK? 1=Y,0=N:	1		
DIA OR DIM (inches):	30.50	As(ft^2)	5.07E+00
% H2O :	17.0		
% O2 :	7.80	DRY MOLE WT	30.31
% CO2 :	12.500	ST MOLE WT	28.22
SAMPLE TIME(min):	60.00		
ORIFICE Q (cc/min):	124.50	DSCF	2.61E-01
AVG ORIFICE TEMP °F:	45.0		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	8.90		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	30.19	FT/SEC
STACK GAS FLOW (Qs):	9191.7	ACFM
:	4796.5	DSCFM
STACK GAS TEMP :	334	Deg F
MOISTURE (%H2O):	17.0	%

FORMALDEHYDE

CONCENTRATION (Cs):	7.50E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	2.16E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001
SAMPLE LOCATION:	Boiler No. 1
DATE/TIME:	11-6-91/1716
RUN #:	3

STATIC PRESSURE("H2O):	-0.12	"HG	28.29
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.428		
AVG STACK TEMP °F:	328.0	°R	788.0
CIRC STACK? 1=Y,0=N:	1		
DIA OR DIM (inches):	30.50	As(ft^2)	5.07E+00
% H2O :	14.7		
% O2 :	7.70	DRY MOLE WT	30.32
% CO2 :	12.600	ST MOLE WT	28.51
SAMPLE TIME(min):	60.00		
ORIFICE Q (cc/min):	124.50	DSCF	2.61E-01
AVG ORIFICE TEMP °F:	45.0		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	3.70		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	30.35	FT/SEC
STACK GAS FLOW (Qs):	9239.7	ACFM
:	4991.7	DSCFM
STACK GAS TEMP :	328	Deg F
MOISTURE (%H2O):	14.7	%
CONCENTRATION (Cs):	3.12E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	9.34E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	BOILER NO.2		
DATE/TIME:	11-5-91/1111		
RUN #:	1		
STATIC PRESSURE("H2O):	0.10	"HG	28.54
BAROMETRIC("HG):	28.53		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.447		
AVG STACK TEMP °F:	312.000	°R	772.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	30.5	As(ft^2)	5.07E+00
% H2O :	13.3		
% O2 :	11.40	DRY MOLE WT	29.93
% CO2 :	9.200	ST MOLE WT	28.34
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.66E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	6.70		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	31.34	FT/SEC
STACK GAS FLOW (Qs):	9541.5	ACFM
:	5393.9	DSCFM
STACK GAS TEMP :	312	Deg F
MOISTURE (%H2O):	13.3	%
CONCENTRATION (Cs):	5.54E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	1.79E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	BOILER NO.2		
DATE/TIME:	11-5-91/1301		
RUN #:	2		
STATIC PRESSURE("H2O):	0.10	"HG	28.39
BAROMETRIC("HG):	28.38		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.473		
AVG STACK TEMP °F:	298.000	°R	758.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	30.5	As(ft^2)	5.07E+00
% H2O :	13.5		
% O2 :	12.20	DRY MOLE WT	29.86
% CO2 :	8.600	ST MOLE WT	28.27
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.65E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	3.70		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	32.99	FT/SEC
STACK GAS FLOW (Qs):	10043.8	ACFM
:	5743.7	DSCFM
STACK GAS TEMP :	298	Deg F
MOISTURE (%H2O):	13.5	%
CONCENTRATION (Cs):	3.08E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	1.06E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	BOILER NO.2		
DATE/TIME:	11-5-91/1501		
RUN #:	3		
STATIC PRESSURE("H2O):	0.10	"HG	28.31
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.471		
AVG STACK TEMP °F:	309.000	°R	769.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	30.5	As(ft^2)	5.07E+00
% H2O :	14.3		
% O2 :	9.40	DRY MOLE WT	30.14
% CO2 :	11.000	ST MOLE WT	28.41
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.64E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	3.80		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	33.06	FT/SEC
STACK GAS FLOW (Qs):	10065.2	ACFM
:	5606.0	DSCFM
STACK GAS TEMP :	309	Deg F
MOISTURE (%H2O):	14.3	%
CONCENTRATION (Cs):	3.17E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	1.07E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001			
SAMPLE LOCATION:	DRYER NO.1			
DATE/TIME:	11-7-91/1104			
RUN #:	1			
STATIC PRESSURE("H2O):	0.01		"HG	28.30
BAROMETRIC("HG):	28.30			
Cp PITOT :	0.84			
SQ. ROOT ▲P:	0.140			
AVG STACK TEMP °F:	137.000		°R	597.0
CIRC STACK? 1=Y,0=N:	1.00			
DIA OR DIM (inches):	24.0		As(ft^2)	3.14E+00
% H2O :	3.9			
% O2 :	19.00		DRY MOLE WT	29.08
% CO2 :	2.000		ST MOLE WT	28.65
SAMPLE TIME(min):	60.000			
ORIFICE Q (cc/min):	126.8		DSCF	2.63E-01
AVG ORIFICE TEMP °F:	50			
ANALYTE #1 :	FORMALDEHYDE			
MOLE WEIGHT:	30.03			
µg/sample :	9.90			
PPM :				
ANALYTE #2 :				
MOLE WEIGHT:				
µg/sample :				
PPM:				

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	8.65	FT/SEC
STACK GAS FLOW (Qs):	1630.8	ACFM
:	1311.1	DSCFM
STACK GAS TEMP :	137	Deg F
MOISTURE (%H2O):	3.9	%
CONCENTRATION (Cs):	8.27E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	6.51E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	DRYER NO.1		
DATE/TIME:	11-7-91/1207		
RUN #:	2		
STATIC PRESSURE("H2O):	0.01	"HG	28.30
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.127		
AVG STACK TEMP °F:	136.000	°R	596.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	3.9		
% O2 :	19.00	DRY MOLE WT	29.08
% CO2 :	2.000	ST MOLE WT	28.65
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	126.8	DSCF	2.63E-01
AVG ORIFICE TEMP °F:	50		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	7.40		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	7.83	FT/SEC
STACK GAS FLOW (Qs):	1476.3	ACFM
:	1188.8	DSCFM
STACK GAS TEMP :	136	Deg F
MOISTURE (%H2O):	3.9	%
CONCENTRATION (Cs):	6.18E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	4.41E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001			
SAMPLE LOCATION:	DRYER NO.1			
DATE/TIME:	11-7-91/1615			
RUN #:	3			
STATIC PRESSURE("H2O):	0.01		"HG	28.30
BAROMETRIC("HG):	28.30			
Cp PITOT :	0.84			
SQ. ROOT ▲P:	0.125			
AVG STACK TEMP °F:	137.000		°R	597.0
CIRC STACK? 1=Y,0=N:	1.00			
DIA OR DIM (inches):	24.0		As(ft^2)	3.14E+00
% H2O :	3.9			
% O2 :	19.00		DRY MOLE WT	29.08
% CO2 :	2.000		ST MOLE WT	28.65
SAMPLE TIME(min):	60.000			
ORIFICE Q (cc/min):	126.8		DSCF	2.63E-01
AVG ORIFICE TEMP °F:	50			
ANALYTE #1 :	FORMALDEHYDE			
MOLE WEIGHT:	30.03			
µg/sample :	2.80			
PPM :				
ANALYTE #2 :				
MOLE WEIGHT:				
µg/sample :				
PPM:				

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	7.69	FT/SEC
STACK GAS FLOW (Qs):	1449.6	ACFM
:	1165.4	DSCFM
STACK GAS TEMP :	137	Deg F
MOISTURE (%H2O):	3.9	%
CONCENTRATION (Cs):	2.34E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	1.64E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	DRYER NO.2		
DATE/TIME:	11-7-91/1104		
RUN #:	1		
STATIC PRESSURE("H2O):	0.01	"HG	28.30
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.118		
AVG STACK TEMP °F:	114.000	°R	574.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	2.1		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.73
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.59E-01
AVG ORIFICE TEMP °F:	50		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	8.00		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	7.14	FT/SEC
STACK GAS FLOW (Qs):	1345.5	ACFM
:	1146.1	DSCFM
STACK GAS TEMP :	114	Deg F
MOISTURE (%H2O):	2.1	%
CONCENTRATION (Cs):	6.81E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	4.68E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	DRYER NO.2		
DATE/TIME:	11-7-91/1207		
RUN #:	2		
STATIC PRESSURE("H2O):	0.01	"HG	28.30
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.155		
AVG STACK TEMP °F:	115.000	°R	575.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	2.1		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.73
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.59E-01
AVG ORIFICE TEMP °F:	50		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	9.00		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	9.38	FT/SEC
STACK GAS FLOW (Qs):	1768.9	ACFM
:	1504.2	DSCFM
STACK GAS TEMP :	115	Deg F
MOISTURE (%H2O):	2.1	%
CONCENTRATION (Cs):	7.66E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	6.91E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	DRYER NO.2		
DATE/TIME:	11-7-91/1615		
RUN #:	3		
STATIC PRESSURE("H2O):	0.01	"HG	28.30
BAROMETRIC("HG):	28.30		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.157		
AVG STACK TEMP °F:	115.000	°R	575.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	2.1		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.73
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.59E-01
AVG ORIFICE TEMP °F:	50		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	3.00		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	9.46	FT/SEC
STACK GAS FLOW (Qs):	1782.6	ACFM
:	1515.8	DSCFM
STACK GAS TEMP :	115	Deg F
MOISTURE (%H2O):	2.1	%
CONCENTRATION (Cs):	2.55E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	2.32E-03	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

EXAMPLE CALCULATION

CLIENT/PROJECT NUMBER:
SAMPLE LOCATION:
DATE/TIME:
RUN #:

1.SAMPLE VOLUME(DSCF):

Vstd = 6.23E-4*Q(cc/min)*Time*Pbar("Hg)/Tor(°R) = 2.62E-01

2.MOLECULAR WEIGHT:

Md = 0.44*(%CO2)+0.32*(%O2)+0.28(%N2+%CO) = 30.31
Ms = Md*(1-Bws)+(18.0*Bws) = 28.23

3.VOLUMETRIC FLOW RATE(Q):

Vs = 85.49*Cp*Avg(/\P^0.5)*[Ts(°R)/(Ps"Hg*Ms)]^0.5 = 28.8
Qa = Vs*60*As(ft^2) = 8778.1
Qstd = Qa*17.647*(1-%H2O)*Ps/Ts(°R) = 4772.2

EMISSION DATA FOR

CONCENTRATION(Cs):

Cs(lb/dscf) = 2.20E-06*Mn(mg)/Vstd = 9.57E-08
Cs(ppm) = 3.855E08*Cs(lb/dscf)/mole wt = 1

EMISSION RATE(Er):

Er(lb/hr) = Cs(lb/dscf)*Qstd*60 = 2.74E-02

EMISSION DATA FOR

CONCENTRATION(Cs):

Cs(lb/dscf) = 2.20E-06*Mn(mg)/Vstd = NA
Cs(ppm) = 3.855E08*Cs(lb/dscf)/mole wt = NA

EMISSION RATE(Er):

Er(lb/hr) = Cs(lb/dscf)*Qstd*60 = NA

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	SCRUBBER INLET		
DATE/TIME:	11-8-91/1330		
RUN #:	1		
STATIC PRESSURE("H2O):	3.60	"HG	28.66
BAROMETRIC("HG):	28.40		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.915		
AVG STACK TEMP °F:	77.000	°R	537.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	23.9	As(ft^2)	3.11E+00
% H2O :	1.2		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.83
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	126.8	DSCF	2.70E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	7.10		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	52.98	FT/SEC
STACK GAS FLOW (Qs):	9882.8	ACFM
:	9197.7	DSCFM
STACK GAS TEMP :	77	Deg F
MOISTURE (%H2O):	1.2	%

FORMALDEHYDE

CONCENTRATION (Cs):	5.79E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	3.20E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	SCRUBBER INLET		
DATE/TIME:	11-8-91/1500		
RUN #:	2		
STATIC PRESSURE("H2O):	3.60	"HG	28.66
BAROMETRIC("HG):	28.40		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.923		
AVG STACK TEMP °F:	77.600	°R	537.6
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	23.9	As(ft^2)	3.11E+00
% H2O :	1.2		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.83
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	126.8	DSCF	2.70E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	7.60		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	53.45	FT/SEC
STACK GAS FLOW (Qs):	9970.4	ACFM
:	9268.9	DSCFM
STACK GAS TEMP :	78	Deg F
MOISTURE (%H2O):	1.2	%

FORMALDEHYDE

CONCENTRATION (Cs):	6.20E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	3.45E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001
SAMPLE LOCATION:	SCRUBBER INLET
DATE/TIME:	11-8-91/11730
RUN #:	3

STATIC PRESSURE("H2O):	3.60	"HG	28.66
BAROMETRIC("HG):	28.40		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.926		
AVG STACK TEMP °F:	75.000	°R	535.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	23.9	As(ft^2)	3.11E+00
% H2O :	1.2		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.83
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	126.8	DSCF	2.70E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	7.20		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	53.51	FT/SEC
STACK GAS FLOW (Qs):	9981.8	ACFM
:	9324.6	DSCFM
STACK GAS TEMP :	75	Deg F
MOISTURE (%H2O):	1.2	%
CONCENTRATION (Cs):	5.88E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	3.29E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	SCRUBBER OUTLET		
DATE/TIME:	11-8-91/1330		
RUN #:	1		
STATIC PRESSURE("H2O):	0.50	"HG	28.44
BAROMETRIC("HG):	28.40		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.893		
AVG STACK TEMP °F:	61.000	°R	521.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	1.8		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.76
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.65E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	3.60		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	51.17	FT/SEC
STACK GAS FLOW (Qs):	9645.3	ACFM
:	9123.0	DSCFM
STACK GAS TEMP :	61	Deg F
MOISTURE (%H2O):	1.8	%
CONCENTRATION (Cs):	2.99E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	1.64E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	SCRUBBER OUTLET		
DATE/TIME:	11-8-91/1500		
RUN #:	2		
STATIC PRESSURE("H2O):	0.50	"HG	28.44
BAROMETRIC("HG):	28.40		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.879		
AVG STACK TEMP °F:	61.200	°R	521.2
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	1.8		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.76
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.65E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	5.70		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	50.39	FT/SEC
STACK GAS FLOW (Qs):	9499.1	ACFM
:	8981.3	DSCFM
STACK GAS TEMP :	61	Deg F
MOISTURE (%H2O):	1.8	%
CONCENTRATION (Cs):	4.74E-08	lb/DSCF
:	1	PPM
EMISSION RATE (Er):	2.55E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

PACIFIC ENVIRONMENTAL SERVICES EMISSIONS CALCULATIONS

CLIENT/PROJECT #:	Woodtech/4533.001		
SAMPLE LOCATION:	SCRUBBER OUTLET		
DATE/TIME:	11-8-91/1730		
RUN #:	3		
STATIC PRESSURE("H2O):	0.50	"HG	28.44
BAROMETRIC("HG):	28.40		
Cp PITOT :	0.84		
SQ. ROOT ▲P:	0.829		
AVG STACK TEMP °F:	58.000	°R	518.0
CIRC STACK? 1=Y,0=N:	1.00		
DIA OR DIM (inches):	24.0	As(ft^2)	3.14E+00
% H2O :	1.8		
% O2 :	20.00	DRY MOLE WT	28.96
% CO2 :	1.000	ST MOLE WT	28.76
SAMPLE TIME(min):	60.000		
ORIFICE Q (cc/min):	124.5	DSCF	2.65E-01
AVG ORIFICE TEMP °F:	40		
ANALYTE #1 :	FORMALDEHYDE		
MOLE WEIGHT:	30.03		
µg/sample :	4.10		
PPM :			
ANALYTE #2 :			
MOLE WEIGHT:			
µg/sample :			
PPM:			

********** CALCULATED RESULTS **********

GAS VELOCITY (Vs):	47.38	FT/SEC
STACK GAS FLOW (Qs):	8930.2	ACFM
:	8495.6	DSCFM
STACK GAS TEMP :	58	Deg F
MOISTURE (%H2O):	1.8	%
CONCENTRATION (Cs):	3.41E-08	lb/DSCF
:	0	PPM
EMISSION RATE (Er):	1.74E-02	lb/hr
CONCENTRATION (Cs):	NA	lb/DSCF
:	NA	PPM
EMISSION RATE (Er):	NA	lb/hr

COMMENTS:

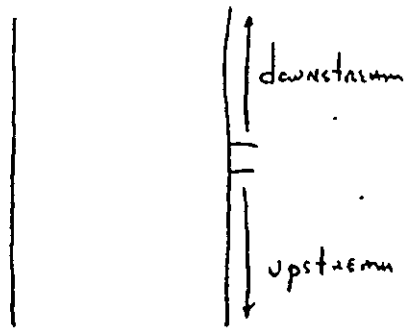
APPENDIX G

FIELD DATA SHEETS

PACIFIC ENVIRONMENTAL SERVICES, INC.

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Woodtech (EGA)
DATE 10.23.91
SAMPLING LOCATION Boiler #1/#2 Outlets
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 32.25
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 1.75
STACK I.D., (DISTANCE A - DISTANCE B) 30.5
NEAREST UPSTREAM DISTURBANCE 74" (2.4 dd)
NEAREST DOWNSTREAM DISTURBANCE 47" (1.5 dd)
CALCULATOR Scrase

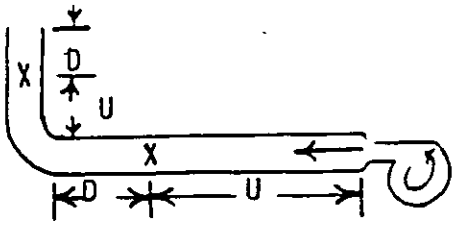


SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LO FROM OUTSIDE OF N (SUM OF COLUMNS
1	.021	30.5	.641	1.75	2.39 → 2.75
2	.067		2.04		3.79
3	.118		3.60		5.35
4	.177		5.40		7.15
5	.250		7.63		9.38
6	.356		10.86		12.6
7	.644		19.64		21.4
8	.750		22.9		24.6
9	.823		25.1		26.9
10	.882		26.9		28.7
11	.933		28.5		30.2
12	.979		29.9		31.6 → 31.7

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT WOODTECH
DATE 11-7-91
SAMPLING LOCATION SMALL DRYER STACK DRYER No. 1
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) _____
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) _____
STACK I.D., (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE (U) 88"
NEAREST DOWNSTREAM DISTURBANCE (D) 70"
CALCULATOR _____

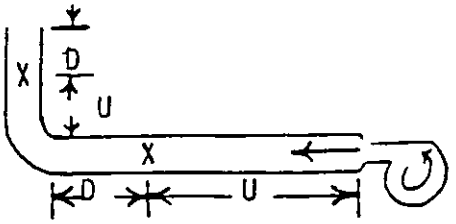


SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.032	24"	0.77	—	0.77
2	0.105		2.5	—	2.5
3	0.194		4.7	—	4.7
4	0.323		7.75	—	7.75
5	0.677		16.2	—	16.2
6	0.806		19.3	—	19.3
7	0.895		21.5	—	21.5
8	0.968		23.2	—	23.2

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Woodtech
DATE 11-7-91
SAMPLING LOCATION Reg Dryer Stack
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) _____
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) _____
STACK I.D., (DISTANCE A - DISTANCE B) 44.25"
NEAREST UPSTREAM DISTURBANCE (U) 173"
NEAREST DOWNSTREAM DISTURBANCE (D) 68"
CALCULATOR _____



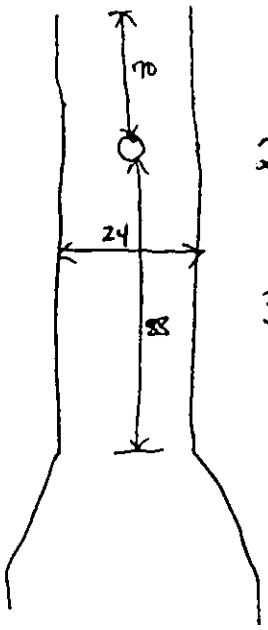
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.032	44.25"	1.4	—	1.4
2	0.105		4.65	—	4.65
3	0.194		8.6	—	8.6
4	0.323		14.3	—	14.3
5	0.677		30.0	—	30.0
6	0.806		35.7	—	35.7
7	0.895		39.6	—	39.6
8	0.968		42.8	—	42.8

THURS

Small Dryer Stack

Id 24"
down 70"
up 88"



2.9

16 points

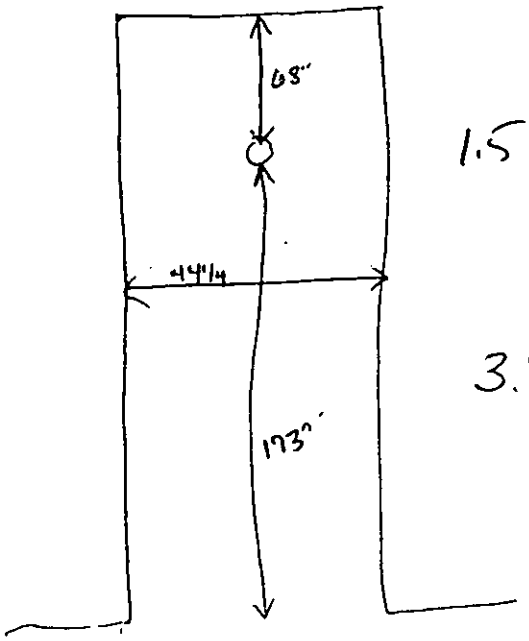
3.7 Dist.

1	0.77
2	2.5
3	4.7
4	7.75
5	16.2
6	19.3
7	21.5
8	23.2

THURS

Big Dryer Stack

ID 44¼
Down 68
Up 173



1.5

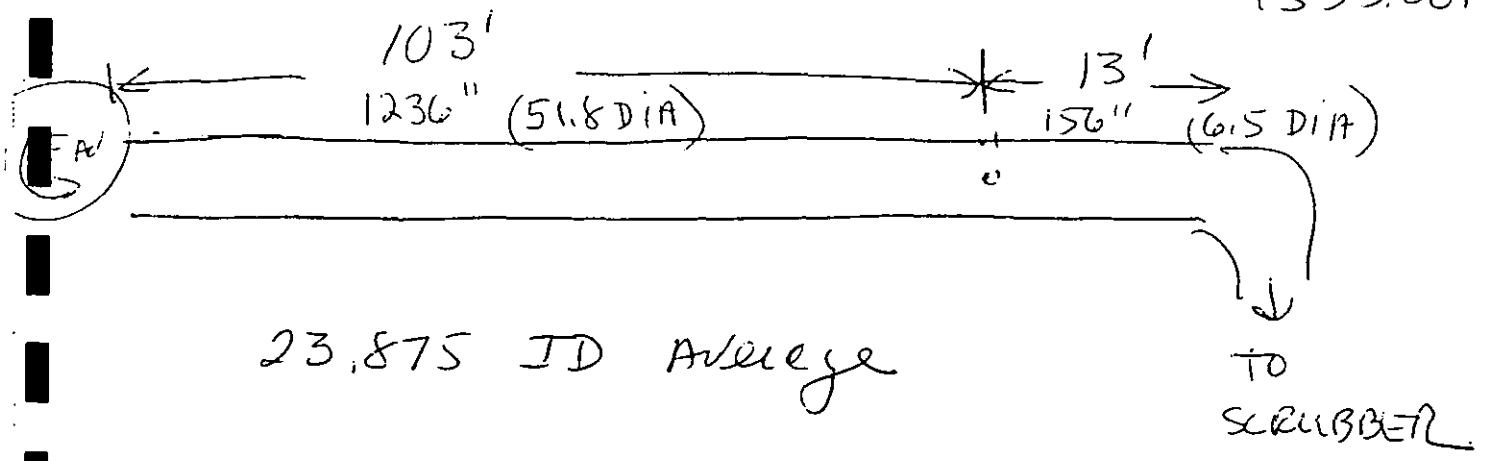
63¼
.9 - 9½
- 9½
44"

3.9

16 points

1	1.4
2	4.65
3	8.6
4	14.3
5	30.0
6	35.7
7	39.6
8	42.8

Scrubber Inlet Woodtech.
4533.001

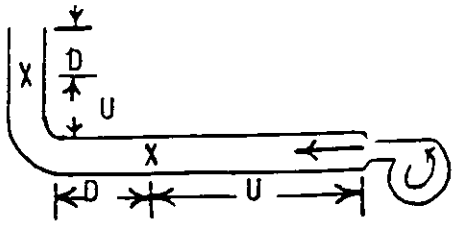


23.875 ID Average

1	.044	1.05
2	.146	3.5
3	.296	7.07
4	.704	16.8
5	.854	20.4
6	.956	22.8

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT WOODTECH
DATE 11-8-91
SAMPLING LOCATION SCRUBBER INLET
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) _____
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) _____
STACK I.D., (DISTANCE A - DISTANCE B) 23.875
NEAREST UPSTREAM DISTURBANCE (U) _____
NEAREST DOWNSTREAM DISTURBANCE (D) _____
CALCULATOR _____

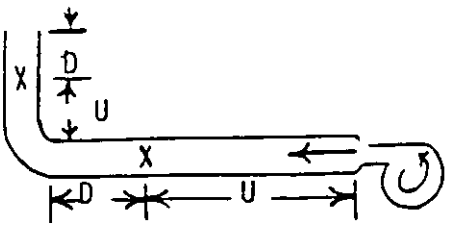


SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.044	23.875"	1.05	—	1.05
2	0.146		3.5	—	3.5
3	0.296		7.07	—	7.07
4	0.704		16.8	—	16.8
5	0.854		20.4	—	20.4
6	0.956		22.8	—	22.8

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT WOODTECH
DATE 11-8-91
SAMPLING LOCATION SCRUBBER OUTLET
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) _____
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) _____
STACK I.D., (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE (U) 81"
NEAREST DOWNSTREAM DISTURBANCE (D) 18"
CALCULATOR _____



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.032	24"	0.77	—	0.77
2	0.105	↓	2.5	—	2.5
3	0.194	↓	4.7	—	4.7
4	0.323	↓	7.75	—	7.75
5	0.677	↓	16.25	—	16.25
6	0.806	↓	19.3	—	19.3
7	0.895	↓	21.5	—	21.5
8	0.968	↓	23.2	—	23.2

Scrubber Outlet

24" ID

~~Nipple 4.25"~~

1	.032	.77
2	.105	2.5
3	.194	4.7
4	.323	7.75
5	.677	16.25
6	.806	19.3
7	.895	21.5
8	.968	23.2

L 18" .75

8" 3.5

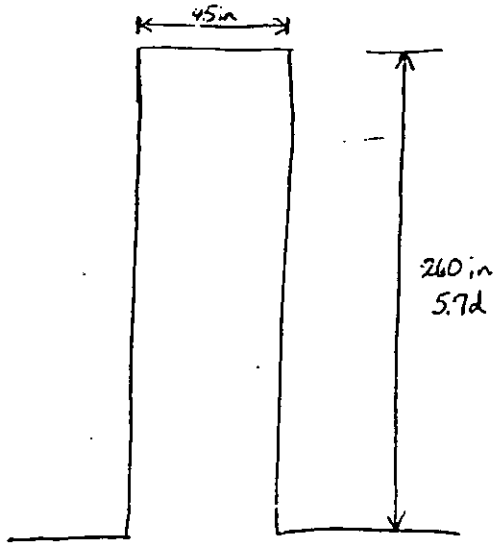
84

ID - 45

$$\begin{array}{r} 45 \\ \times\ 5 \\ \hline 240 \\ +20 \\ \hline 260\text{ in} \end{array}$$

$$\begin{array}{r} 5.7 \\ 45\overline{)260} \\ 225 \\ \hline 350 \end{array}$$

$$\begin{array}{r} 45 \\ \times\ 5 \\ \hline 225 \end{array}$$



APPENDIX H

STRIP CHART DATA/CEM CALIBRATION SHEETS

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Wood Tech	Parameter	SO_2, CO_2, O_2, NO_x, (THC)
Location	Scrubbing	Monitor	JUM
Date	11-8-91	Span value	ppm or % 76.1
Operator	DS	Chart scale	100
PN	4533.001	Pbar, in.Hg	
Time, Pretest ____ Post-test ____		Tamb, °F	
Run No.			

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions Pretest (1445, 1900)	Chart divisions Posttest (1605, 1910)	Concentration predicted by equation* Pretest	Concentration predicted by equation* Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
·	51.3	68.5	67.5	67	68	51.2	-0.1
·	24.7	36.8	37.0	35.5	37.2	26.2	+2.0
·	15.8	21.0	22	19.0	19.0	13.7	-2.8
	0	4.5	5.0	3.0	5.0	0.7	+0.9

- Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(CD - 3.645)}{(1.266)}$$

Correlation coef. = 0.998

$$** \text{ Analyzer cal. error, \% span} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$$

Acceptable limit = ≤2% of span (±5% for THC).

$$*** \text{ Drift \% span} = \frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit ≤3% of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Wood Tech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Boiler Out #1	Monitor	JUM
Date	11-6-91	Span value	ppm or % 83.2
Operator	DS	Chart scale	100
PN	4533.001	Pbar, in.Hg	
Time, Pretest ____ Post-test ____		Tamb, °F	
Run No.			

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions (1350 1140 1340 1340) Pretest	Posttest	Concentration predicted by equation* Pretest	Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
51.3	~~247.3~~	66	67	67	61	52.3	+1.2
24.7	~~150.7~~	34.0	32	33	35.5	23.2	-1.4
15.0	~~51.3~~	25.0	27	25.0	25.5	15.0	-1.0
0	0	10.0	9.5	9.2	9.0	1.3	+1.6

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m} = \frac{(CD - 8.517)}{(1.099)}$

1145 CAL

$\frac{CD - 8.277}{1.112}$ 0.994

Correlation coef. = 0.998

** Analyzer cal. error, % span = $\frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$

Acceptable limit = ≤2% of span (±5% for THC).

*** Drift % span = $\frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$

Acceptable limit ≤3% of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

DAILY CO CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Wood Tech	Monitor	~~HCx~~ CO
Location	Stack No 1	Span value	1666
Date	11-6-91	Chart scale	100
Operator	DS	Pbar, in.Hg	
PN	4533.001	Tamb, deg. F	
Run No.		Time, Pretest ____ Post-test ____	

Cylinder No.	Cal. gas conc., ppm	Chart divisions (1030 1100 1330 1800) Pretest	Posttest	Concentration predicted by equation* Pretest	Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
	857.0	54 53	53	53	857.6	+ 0.03	
	450.3	30.6 30.5	30.2	30.2	445.7	- 0.04	
	85.5	10.0 10.0	9.5	9.3	84.	- 0.08	
	0	5.3 5.6	5.4	5.8	1.5	- 0.09	

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(CD - 5.203)}{(.0587)}$$

Correlation coef. = 0.9999

$$\text{** Analyzer cal. error, \% span} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$$

Acceptable limit = ≤2% of span

$$\text{*** Drift \% span} = \frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit ≤10% of span in 8 hours (EPA Method 10)

Minimum detectable limit = 2% of span or _____ ppm

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	WoodTech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Boiler Div #1	Monitor	TECO
Date	11-6-91	Span value	ppm or %
Operator	DS	Chart scale	100 1114
PN	4533.001	Pbar, in.Hg	
Time, Pretest ____ Post-test ____		Tamb, °F	
Run No.			

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions (0900 / 1100 / 1300 / 1500) Pretest	Posttest	Concentration predicted by equation* Pretest	Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
	537.2	51.0	53 53	50.5	542.2	-0.3	
	222.4	23.0	24.5 24.0	23.2	215.7	-0.6	
	83.7	11.5	12.2 12.2	12.0	81.6	-0.2	
	0	5.0	5.0 5.0	5.0	5.7	+0.5	

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(CD - 4.508)}{(.0857)}$$

Correlation coef. = 0.9997

$$\text{** Analyzer cal. error, \% span} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$$

Acceptable limit = ≤2% of span (±5% for THC).

$$\text{*** Drift \% span} = \frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit ≤3% of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-6-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 453.001 Location Boiler No. 1

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m}$ = $\frac{(CD - 8.517)}{(1.099)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
1	1015-1025	18	6.6	
	1035	22	12.3	
	1045	20	10.4	
	1055	17.0	7.7	
	1105	14.0	5.0	
	1115	23	13.2	Avg = 9.5
2	1200-1210	26.0	15.9	
	1220	35.0	21.0	
	1230	33	22.2	
	1240	20.0	16.5	
	1250	16.0	6.9	
	1300	16.0	6.9	Avg = 14.4
3	1715-1725	57	43.7	
	1735	46	35.6	
	1745	40	28.0	
	1755	25	15.0	
	1805	13	4.2	
	1815	13	4.2	Avg = 21.9

$\frac{CD - 8.277}{1.112}$ Calc @ 1145

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-6-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 4533.001 Location Boiler No. 1

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m}$ = $\frac{(CD - 5.215)}{(.0569)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
1	1015-1025	14.0	154.4	
	1035	14.8	166.5	
	1045	15.0	172.0	
	1055	18.5	235.5	
	1105	17.2	210.7	
	1115	16.0	224.7	AVG = 194.0
2	1200-1210	17.0	207.2	
	1220	17.0	207.2	
	1230	17.5	215.9	
	1240	15.5	186.8	
	1250	15.0	172.0	
	1300	15.8	186.1	AVG 194.9
3	1715-1725	13.2	140.4	
	1735	15.0	172.0	
	1745	9.0	66.6	
	1755	14.8	168.5	
	1805	14.0	154.4	
	1815	9	66.6	AVG 108.1

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-6-91 Parameter SO_2, NO_x* CO_2, O_2, THC, CO

Operator DS PN 4538.001 Location Boiler No. 1

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m} = \frac{(CD - 4.508)}{(.0857)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
1	1015-1025	16.5	139.4	
	1035	16.0	134.1	
	1045	16.8	143.4	
	1055	17.5	151.6	
	1105	17.5	151.6	
	1115	17.5	151.6	Avg = 145.4
2	1200-1210	14.2	113.1	
	1220	13.8	108.4	
	1230	14.0	110.8	
	1240	14.0	110.8	
	1250	14.3	114.3	
	1300	14.0	110.8	Avg = 111.4
3	1715-1725	14.5	116.6	
	1735	15.0	122.4	
	1745	15.3	125.9	
	1755	14.8	120.1	
	1805	15.0	122.4	
	1815	14.5	116.6	

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

[illegible] CALIBRATION AND PERFORMANCE EVALUATION

Plant	Wood Tech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Boiler Outlet	Monitor	ECD
Date	11-5-91	Span value	ppm or % 726 ppm
Operator	DR	Chart scale	100
PN	4-23.001	Pbar, in.Hg	

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions: Direct injection to monitor	Chart divisions: Injection through system	Concentration predicted by equation,* Direct System	Calibration error,** % of span	Sampling system bias,*** % of span
ALM 016187	539.2	75.6	75.6	531	-1.1	0
ALM-016850	222.4	38.2	39.6	244	+3.0	+1.5
ALM 014248	83.7	17.2	15.5	79.6	-0.5	-1.3
	0	5.5	5.2	-9.2	-1.3	-0.6

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(CD - 6.981)}{(.128)}$$

Correlation coef. = 0.998

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$** \text{ Calibration error, \% span} = \frac{(\text{Concentration of cal. gas, ppm} - \text{predicted conc., ppm})}{\text{Span, ppm}} \times 100$$

Acceptable limit = ±2% each gas (THC limit is ±5%).

*** Sampling system bias =

$$\frac{(\text{Direct injection gas conc.} - \text{system injection gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit ≤5% of span

Minimum detectable limit = 2 percent of span or _____ ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through system (return to zero after each injection):

120 s, 120 s, _____ s Avg. _____ s

Precision, % scale = difference in chart division response for two repeated injections of the same gas concentration = _____ - _____ = _____ %
(clock time = _____)

COMMENTS:

INITIAL CO CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Wood Tech	Monitor	CO Monitor
Location	Boiler No 7	Span value	1000 ppm 174 ppm
Date	11-22-91	Chart scale	100
Operator	DES	Pbar, in.Hg	
PN	7632.001	Tamb, °F	

Cylinder No.	Cal. gas conc., ppm	Chart divisions: Direct injection to monitor	Chart divisions: Injection through system	Concentration predicted by equation,* Direct System	Calibration error,** % of span	Sampling system bias,*** % of span
AIM [illegible]	357.0	51.6	54.6	364.4	-0.4	-2.5
AIM [illegible]	450.3	68.5	2[illegible]	4[illegible]	-4.7	0
ARLISM	[illegible]	9.2	10.5	[illegible]	-0.2	-1.4
	0	5.2	6.2	-9.1	-0.5	-1.0

- Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(\text{CD} - 4.74)}{(.364)}$$

Correlation coef. = [illegible]

** Calibration error, % span = $\frac{(\text{Cal. gas conc.} - \text{conc. predicted})}{\text{Span value}} \times 100$

Acceptable limit ≤2% of span

*** Sampling system bias =

$$\frac{(\text{Direct injection gas conc.} - \text{system injection gas conc.})}{\text{Span value}} \times 100$$

Acceptable limit ≤5% of span

Minimum detectable limit = 2 percent of span or _____ ppm

Rise time to 90% of response for high cal. gas value: direct, system.

120 s, 120 s, _____ s Avg. _____ s

Acceptable limits ≤30 seconds (direct injection).

Response for system injections must also be recorded.

Precision = difference in chart division response for two repeated injections of the same gas concentration = _____ - _____ = _____% (clock time = _____)

Acceptable limits = ± 2 percent of full scale.

COMMENTS: _____

INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Wood Tech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Boise, Idaho	Monitor	Fuji
Date	11-5-81	Span value	ppm or % 330
Operator	DS	Chart scale	100
PN	4533.001	Pbar, in.Hg	

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions: Direct injection to monitor	Chart divisions: Injection through system	Concentration predicted by equation,* Direct System	Calibration error,** % of span	Sampling system bias,*** % of span
Nonaqueous	297.5	86.8	85.5	298.6	-0.5	1.4
[illegible] 12477	150.7	43.0	47.5	140.4	-1.2	1.8
[illegible] 290	51.3	25.0	26.0	56.2	~~-3.5~~ 1.4	1.4
	0	10.2	14.0	-1.9	+0.5	0.2

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(\text{CD} - \cancel{7.12})}{(\cancel{2.67})} \quad 10.686 \quad .255$$

Correlation coef. = ~~1.347~~ .9995

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$** \text{ Calibration error, \% span} = \frac{(\text{Concentration of cal. gas, ppm} - \text{predicted conc., ppm})}{\text{Span, ppm}} \times 100$$

Acceptable limit = ±2% each gas (THC limit is ±5%).

*** Sampling system bias =

$$\frac{(\text{Direct injection gas conc.} - \text{system injection gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit ≤5% of span

Minimum detectable limit = 2 percent of span or _____ ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through system (return to zero after each injection):

_____s, _____s, _____s Avg. _____s

Precision, % scale = difference in chart division response for two repeated injections of the same gas concentration = _____ - _____ = _____%
(clock time = _____)

COMMENTS: _____

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Woodtech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Boiler Outlet	Monitor	JUM
Date	11-5-91	Span value	ppm or % ~~250~~ 357
Operator	DS	Chart scale	100
PN	4533.001	Pbar, in.Hg	
Time, Pretest ____ Post-test ____		Tamb, °F	
Run No.			

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions Pretest	Chart divisions Posttest	Concentration predicted by equation* Pretest	Concentration predicted by equation* Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
2973	85.5	84.5	85	84	218.5	+0.4	
1507	47.5	45.5	49.7	48	145.6	-1.4	
51.3	26.0	23.0	23.5	23.0	59.2	+2.2	
0	10.3	10.0	10	10.2	-4.0	-1.7	

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(\text{CD} - 11.295)}{(.249)}$$

1418 Cal.

$$\frac{CD - 10.423}{.252}$$

Correlation coef. = 0.9990

** Analyzer cal. error, % span = $\frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$

Acceptable limit = ≤2% of span (±5% for THC).

*** Drift % span = $\frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$

Acceptable limit ≤3% of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

DAILY CO CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	[illegible]	Monitor	CO Horiba
Location	Boiler [illegible]	Span value	1000 ppm 1699 ppm
Date	11-[illegible]-91	Chart scale	100
Operator	DS	Pbar, in.Hg	
PN	4533.001	Tamb, deg. F	
Run No.		Time, Pretest ____	Post-test ____

Cylinder No.	Cal. gas conc., ppm	Chart divisions (1210 / 1455 / 1610) Pretest	Posttest		Concentration predicted by equation* Pretest	Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
	857.0	54.2	53.0	53.5	52.3	875.7	+1.1	
	400.5	28.6	30.5	30.2	30.0	414	-2.1	
	85.5	10.5	10.2	10.2	9.0	90.3	+.3	
	0	6.2	6.2	6.2	5.2	13	+0.8	

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(\text{CD} - 5.476)}{(.0556)}$$

Correlation coef. = 0.998

$$\text{** Analyzer cal. error, \% span} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$$

Acceptable limit = ≤2% of span

$$\text{*** Drift \% span} = \frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit ≤10% of span in 8 hours (EPA Method 10)

Minimum detectable limit = 2% of span or _____ ppm

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Woodtech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Boiler Outlet	Monitor	TECO
Date	11-5-91	Span value	ppm or % 719.5
Operator	DS	Chart scale	100
PN	4-33.001	Pbar, in.Hg	
Time, Pretest ____ Post-test ____		Tamb, °F	
Run No.			

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions (1250 / 1430 / 1630) Pretest	Chart divisions Posttest	Concentration predicted by equation* Pretest	Concentration predicted by equation* Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
41 ppm	539.2	75	76.0 / 76	77	527.5	-1.6	
	222.4	33.6	34 / 34	34	225.7	+4.6	
	83.7	15.5	16.0 / 15.5	16.0	76.6	-1.8	
	0	5.2	5.0 / 5.0	5.0	18.5	-1.2	

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(CD - 6.305)}{.1302}$$

1250 calc.

$\frac{4.924}{.1317}$ 0.1990

Correlation coef. = 0.997

Pretest - Test. warming up. DS

$$\text{** Analyzer cal. error, \% span} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$$

Acceptable limit = ≤2% of span (±5% for THC).

$$\text{*** Drift \% span} = \frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit ≤3% of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-5-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 4533.001 Location Boiler #2

Pollutant ppm/% = $\frac{\text{(Chart division - b)}}{\text{m}}$ = $\frac{(CD - \cancel{0.117})}{(\cancel{.254})}$ 11.285 / .249

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
1	1110-1110	30	75.1	– Blew Soot Prep to Run
	1120	18	26.9	
	1130	17.5	24.9	
	1140	17.0	22.9	
	1150	17	22.9	
	1200	15	14.9	
	1210	16	18.9	AVG = 29.5 ppm wet
2	1300-1310	15.0	14.9	Steam Injection
	1320	14.0	10.9	
	1330	13.4	8.5	
	1340	13.2	7.7	
	1350	12.5	4.9	
	1400	13.2	7.7	AVG = 9.1

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-5-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 4533.001 Location Boiler #2

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m}$ = $\frac{(CD - 11.275)}{(.24)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
3	1500-1510	13.0	[illegible]	
	1520	12.2	[illegible]	
	1530	12.2	[illegible]	
	1540	12.5	[illegible]	
	1550	12.0	[illegible]	
	1600	12.0	[illegible]	NOx = 4.1

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-5-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 4533.001 Location Boiler #2

Pollutant ppm/% = $\frac{\text{(Chart division - b)}}{m}$ = $\frac{(CD - 5.476)}{(.0556)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
1	1100-1110	12.5	126.3	
	-1120	12.2	121.0	
	-1130	12.8	121.7	
	-1140	12.4	124.6	
	-1150	14.0	155.3	
	-1200	50+	501	offscale
	-1210	100+	1700	offscale -
2	1300-1310	6.0	9.4	
	1320	6.1	11.2	
	1330	6.0	9.4	
	1340	6.0	9.4	
	1350	6.0	9.4	
	1400-1415	6.0	9.4	

AVG = 451

AVG = 243 if 1210 NOT USED

- Steam Flow varied 1300-1400

AVG = 9.7 ppm

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-2-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 45[illegible] Location Boiler #2

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m}$ = $\frac{(CD - 6.305)}{(.1502)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
1	1100-1110	19.8	103.6	
	1120	20.0	105.2	
	1130	20.2	106.7	
	1140	21.0	112.[illegible]	
	1150	21.5	116.[illegible]	
	1200	22	[illegible]	[illegible] 15.3 ppm
	1210	22	[illegible]	
2	1300-1310	16.5	[illegible]	[illegible] ⇒ $\frac{-4.524}{.1317}$ 0.125P 64 [illegible]
	1320	16.3	86.4	
	1330	16.2	87.1	
	1340	16.0	84.[illegible]	
	1350	16.0	84.[illegible]	[illegible] Flow varied 1350-1415
	1405-1415	15.8	82.6	
				[illegible] 0.55

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-5-91 Parameter SO_2, NO_x*, CO_2, O_2, THC, CO

Operator DS PN 4535.001 Location Boiler No. 2

Pollutant ppm/% = $\frac{\text{(Chart division - b)}}{\text{m}}$ = $\frac{(CD - 4.924)}{(.1317)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
3	1500-1510	14.5	72.7	
	1520	14.8	75.0	
	1530	14.8	75.0	
	1540	15.0	76.5	
	1550	15.0	76.5	
	1600	14.8	75.0	Ave 75.1

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-5-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN [illegible] Location Boiler No. 2

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m} = \frac{(CD - 5.976)}{(\ldots 56)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
3	1500-1510	6.2	[illegible]	
	1520	5.9	7.0	
	1530	5.9	[illegible]	
	1540	5.9	7.0	
	1550	5.9	7.0	
	1600	5.9	7.0	[illegible] 8.5 ppm

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-8-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 4533.001 Location Scrubber

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m}$ = $\frac{(CD - 3.645)}{(1.266)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
Out 1	1330-1345	7	2.7	Background 1.9 ppm
	1345-1400	9	4.2	
	1400-1415	8.5	3.8	AVG 3.4
Inlet	1415-1430	8	3.4	AVG 3.4
Outlet 2	1500-1515	3.5	<1.0	
	1515-1530	5.0	1.1	Cal. Gas Injection @1520
	1530-1545	5.2	1.2	AVG 1.1
Inlet	1545-1600	5.0	1.1	AVG 1.1
Outlet 3	1730-1745	5.5	1.5	
	1745-1800	5.5	1.5	
	1800-1815	6.0	1.9	AVG 1.6
Inlet	1815-1830	6.0	1.9	AVG 1.9

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant	Woodtech	Parameter	SO_2, CO_2, O_2, NO_x, THC
Location	Orlando	Monitor	Tum
Date	11-7-91	Span value	ppm or % 62.4
Operator	DS	Chart scale	100
PN	4533.001	Pbar, in.Hg	
Time, Pretest ____ Post-test ____		Tamb, °F	
Run No.			

Cylinder No.	Cal. gas conc., ppm or %	Chart divisions (1230, 1600, 1800) Pretest	Chart divisions Posttest	Concentration predicted by equation* Pretest	Concentration predicted by equation* Posttest	Analyzer calibration error,** % of span	Drift,*** % of span
51.3	82	83	82.5	82.8	50.6	-1.1	
24.7	43.5	43	42.5		25.4	+1.1	
15.8	30.5	29.5	30	31	16.5	-1.4	
0	3.0	3.8	3.0	5.0	1.1	-1.6	

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine following equation:

$y = mx + b$ x = ppm y = chart division

For data reduction:

$$\text{Pollutant ppm/\%} = \frac{(\text{Chart division} - b)}{m} = \frac{(CD - 4.712)}{(1.597)}$$

Correlation coef. = 0.999

$$\text{** Analyzer cal. error, \% span} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Span value}}$$

Acceptable limit = ≤2% of span (±5% for THC).

$$\text{*** Drift \% span} = \frac{(\text{Posttest cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit ≤3% of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = ____% of span or _____ ppm or % (circle one)

Maximum cal. drift = ____% of span or _____ ppm or % (circle one)

COMMENTS: Pretest or posttest (circle one) calibration used to quantitate sample data. Posttest is used if drift exceeds limits and if posttest yields higher concentrations.

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-7-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DS PN 4553.001 Location Dryer 1+2

Pollutant ppm/% = $\frac{\text{(Chart division - b)}}{m}$ = $\frac{(CD - 4.712)}{(1.527)}$

Run No.	Time** (24-H)	Average chart division	Conc.	Comments
Dryer #2 1	1100-1115	16	7.4	Dryer 2 Large Site back of oven
	1115-1130	15	6.7	
	1200-1215	13	5.4	
	1215-1230	offline		AVG 6.5
Dryer #2 2	1445-1500	22	11.3	
	1500-1515	30	16.6	
	1545-1600	18	8.7	
	1600-1615	10	3.5	AVG 9.9
Dryer #2 3	1645-1700	18	8.7	
	1700-1715	14	6.1	AVG 7.4
	1745-1800	16	7.4	Dryer Down ~ 1800

* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated by _____ on _____ Checked by _____ on _____

CEM DATA REDUCTION SHEET FOR BAG ANALYSIS OR STEADY READINGS

Date 11-7-91 Parameter SO_2, NO_x,* CO_2, O_2, THC, CO

Operator DB PN 4535 101 Location Devices 1+2

Pollutant ppm/% = $\frac{(\text{Chart division} - b)}{m}$ = $\frac{(CD - 4.712)}{(1.527)}$

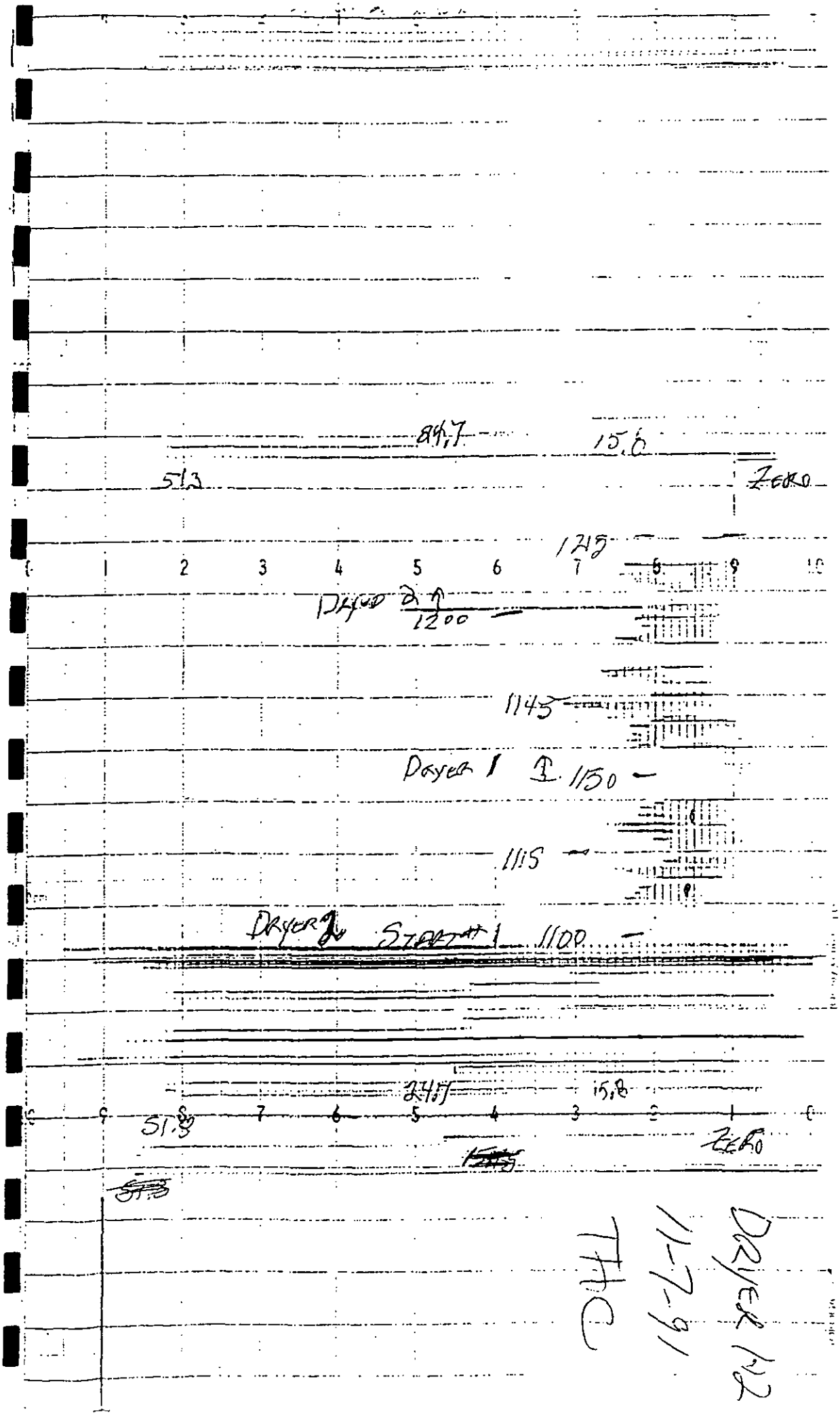
Run No.	Time** (24-H)	Average chart division	Conc.	Comments
Bag #1 * Test 1	1130-1145	18	8.7	Front of oven small diameter
	1145-1200	16	7.4	
				AVG 8.1
Bag #1 Test 2	1515-1530	15.0	6.7	
	1530-1545	13	5.4	
	1615-1630	22	11.3	
				AVG = 7.8
Bag #1 3	1630-1645	28	15.3	
	1715-1730	16	7.4	
	1730-1745	15	6.7	Dump Dump @ 1800
				AVG 9.8

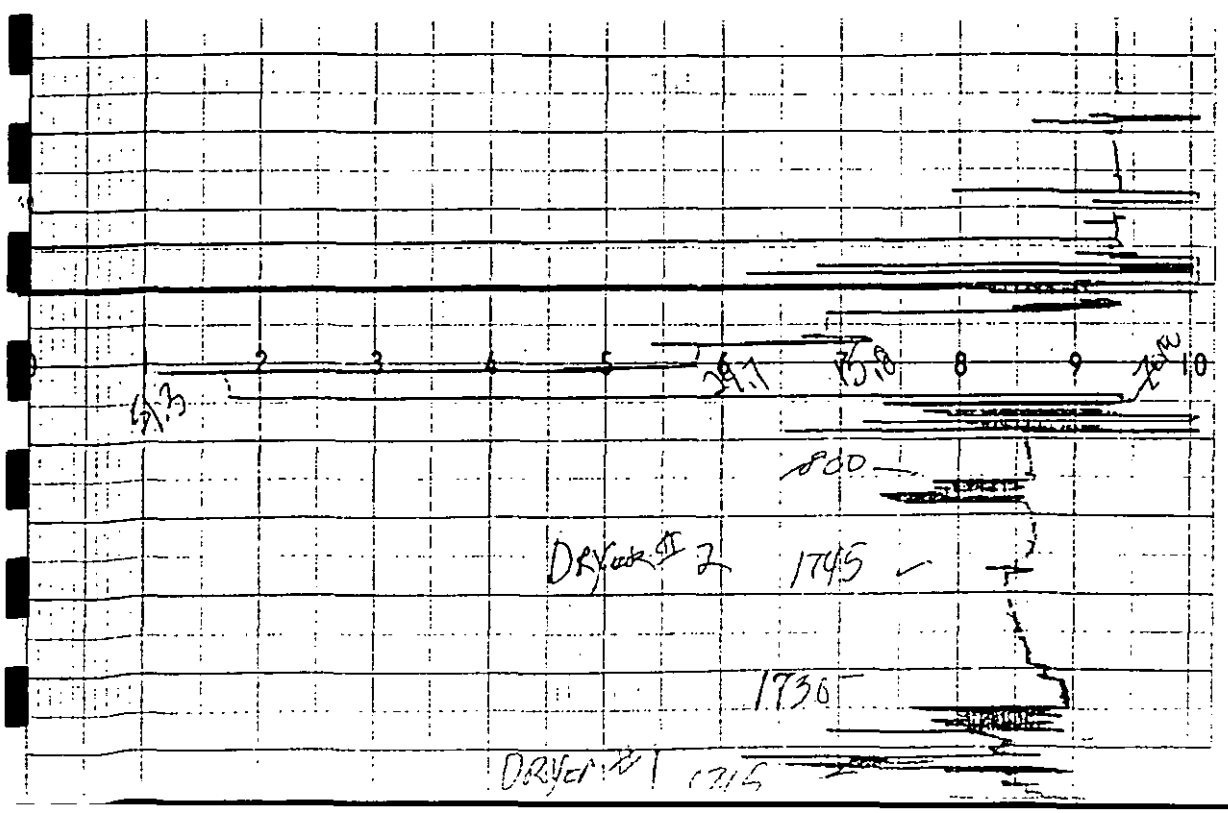
* For NO_x indicate whether NO, NO + NO_2, or NO_2 for specific interval.

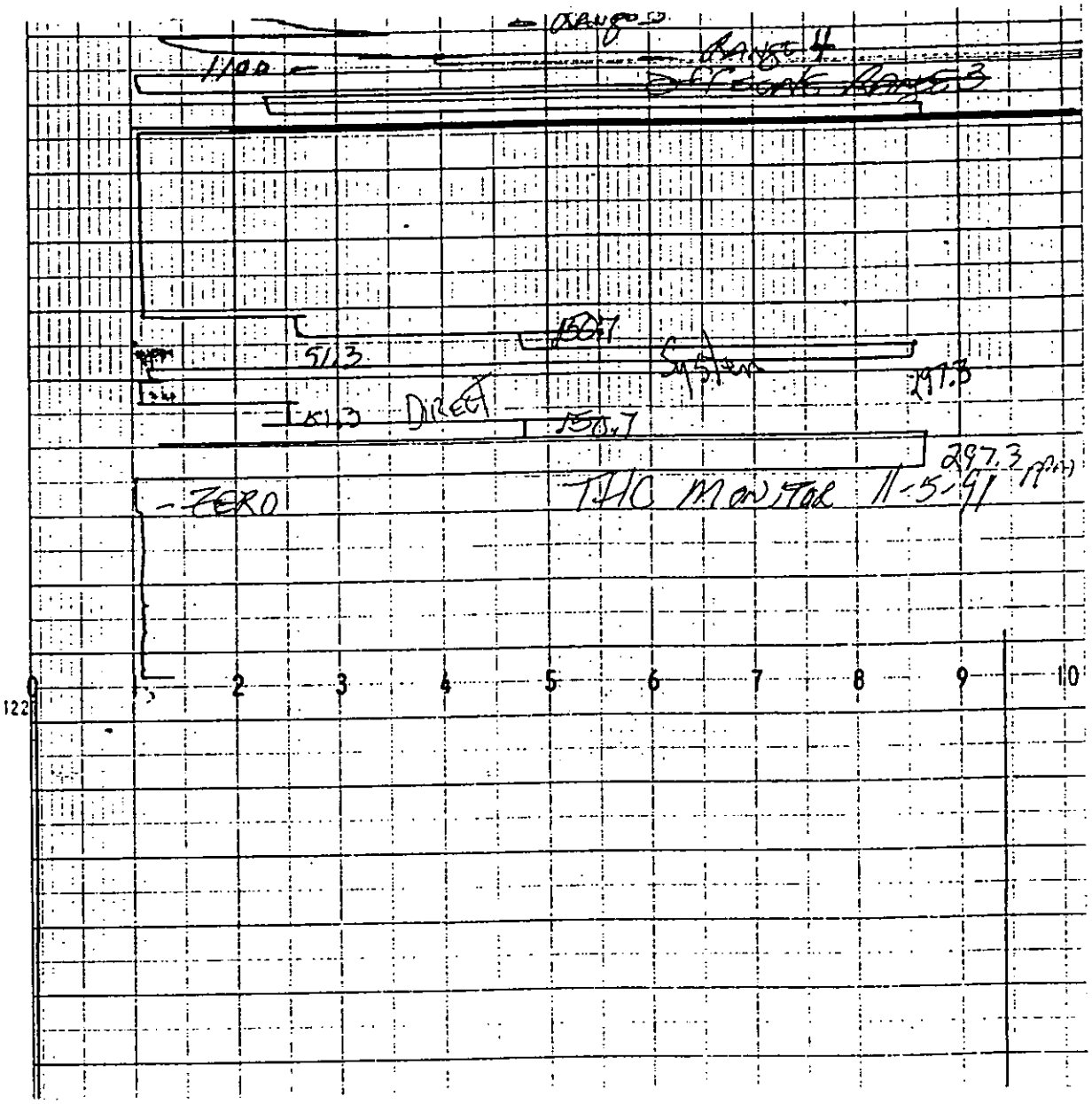
** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

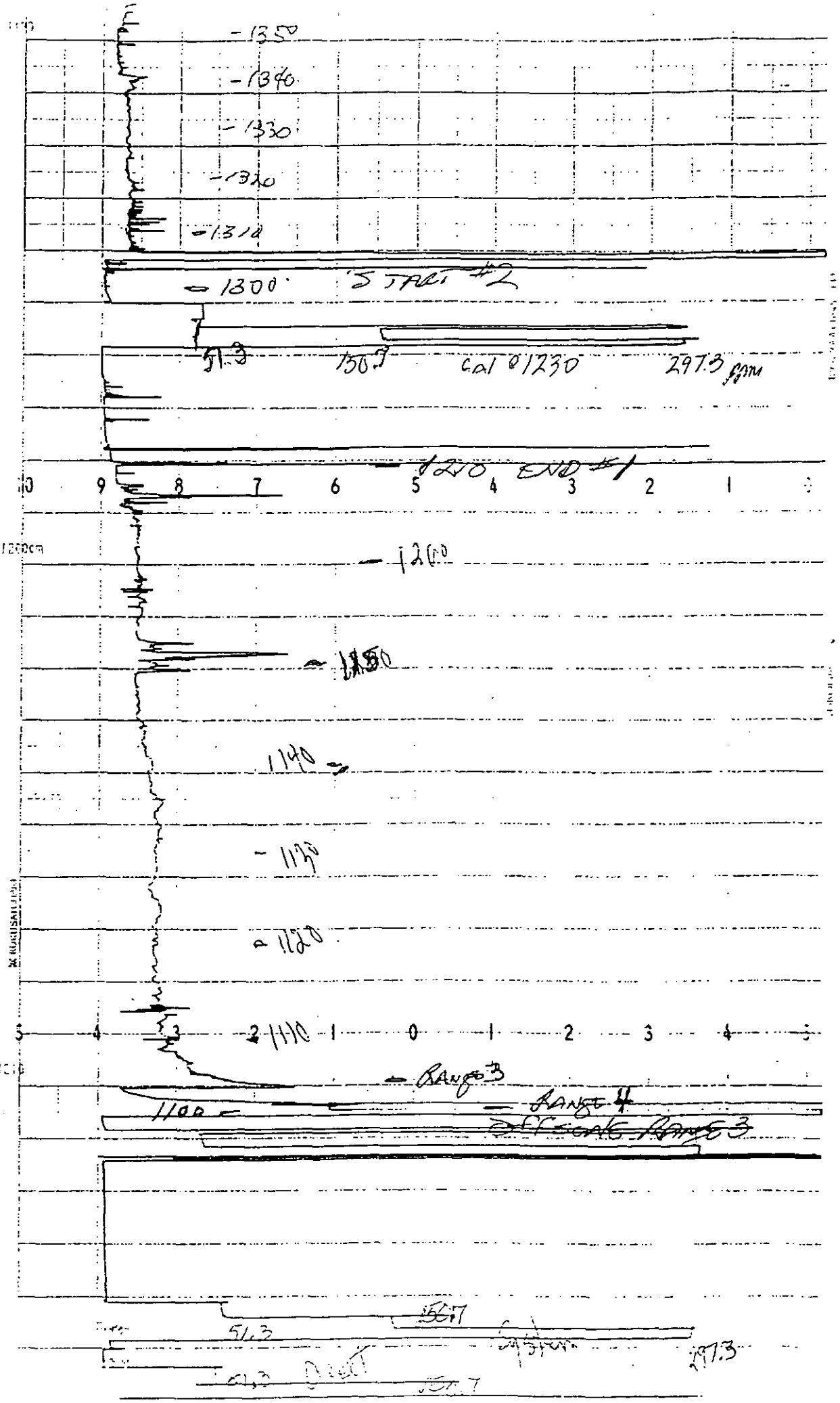
Calculated by _____ on _____ Checked by _____ on _____

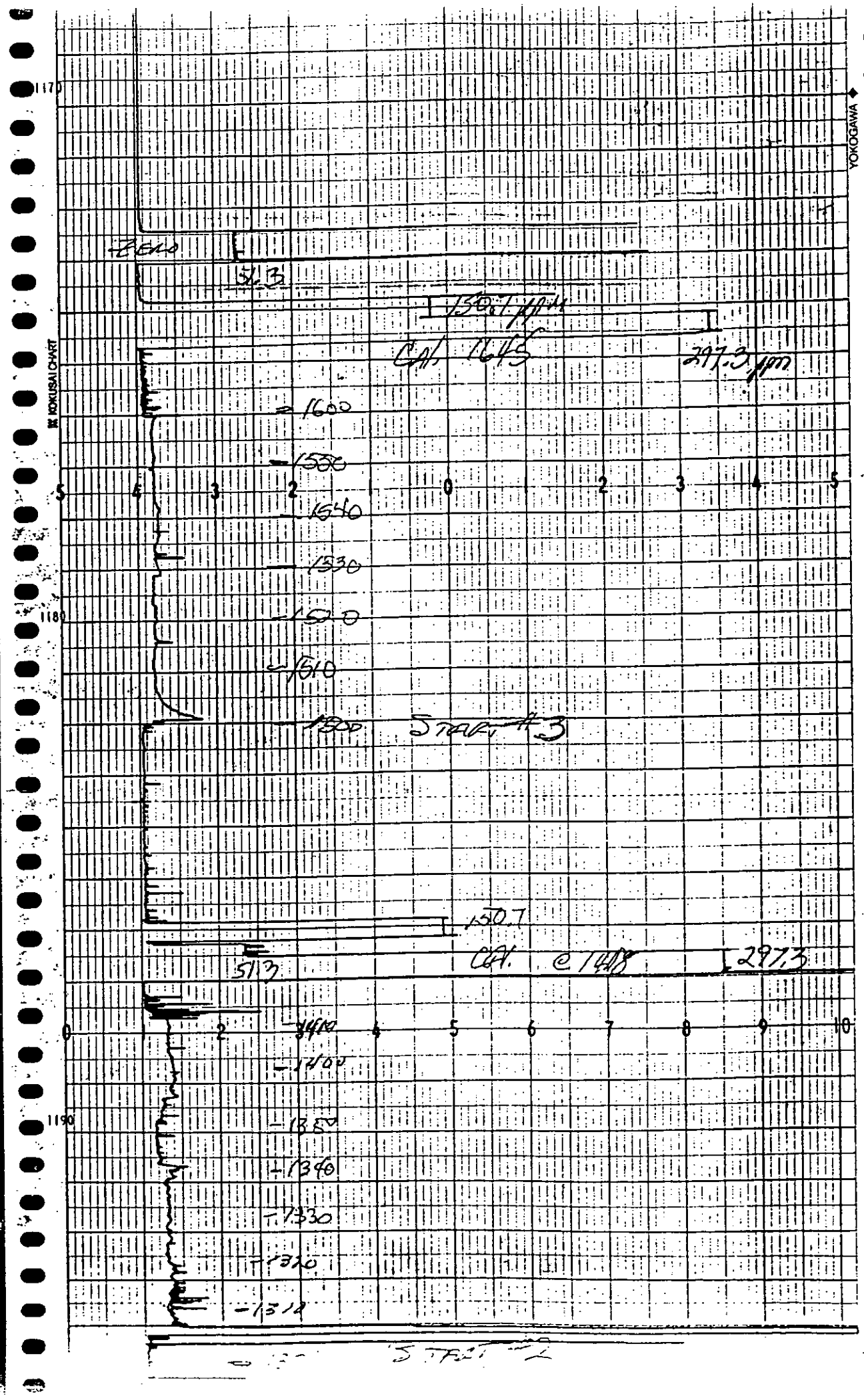
* Indicated to agency that run was completed at 12:30 due to [illegible] 3 [illegible]

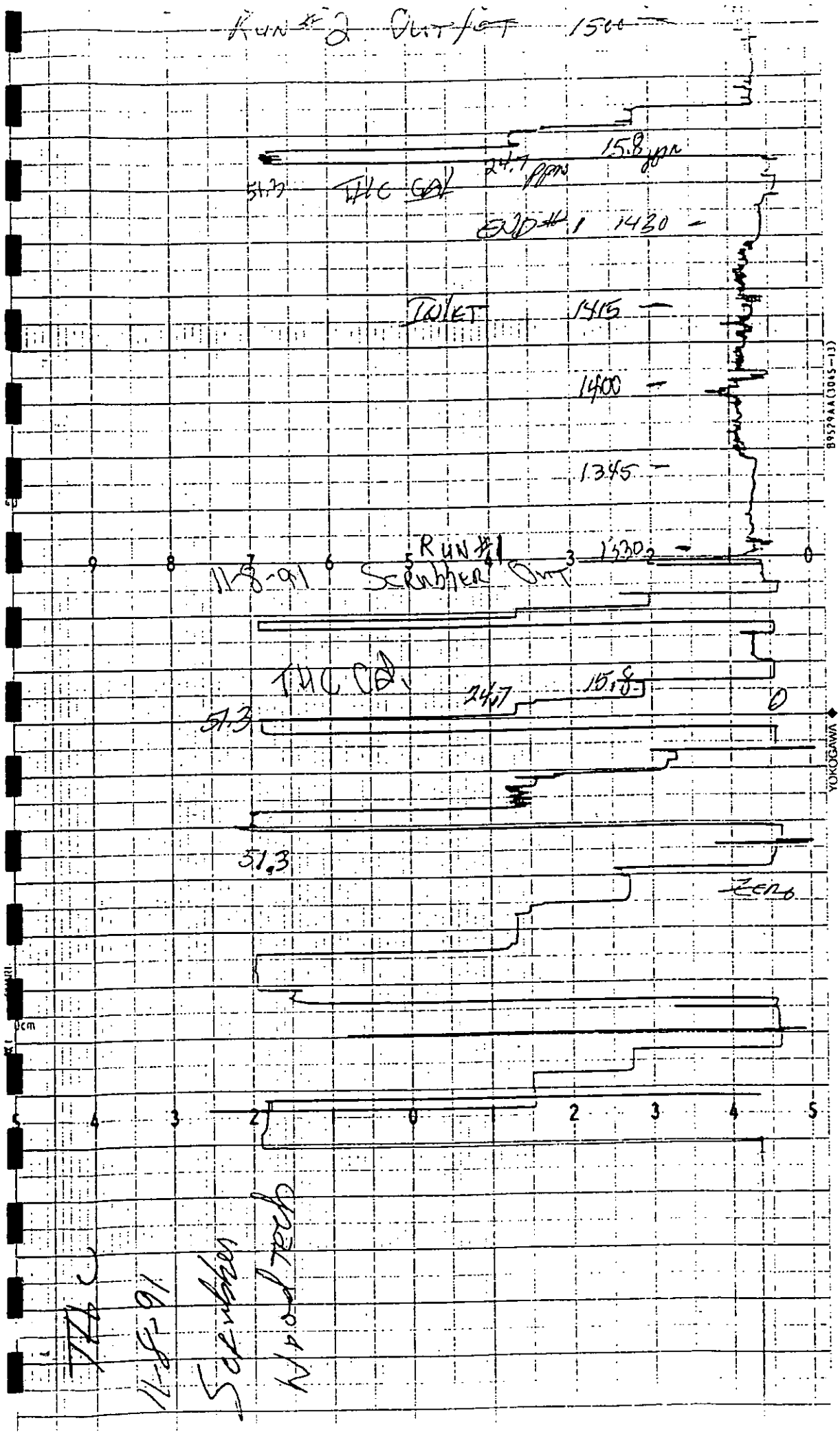

Dryer 2
11-7-91
THC
Dryer 2 Start 1100
Dryer 1 1150
1145
1200
1215
Zero
15.6
51.3
Zero
15.8
51.8
Zero

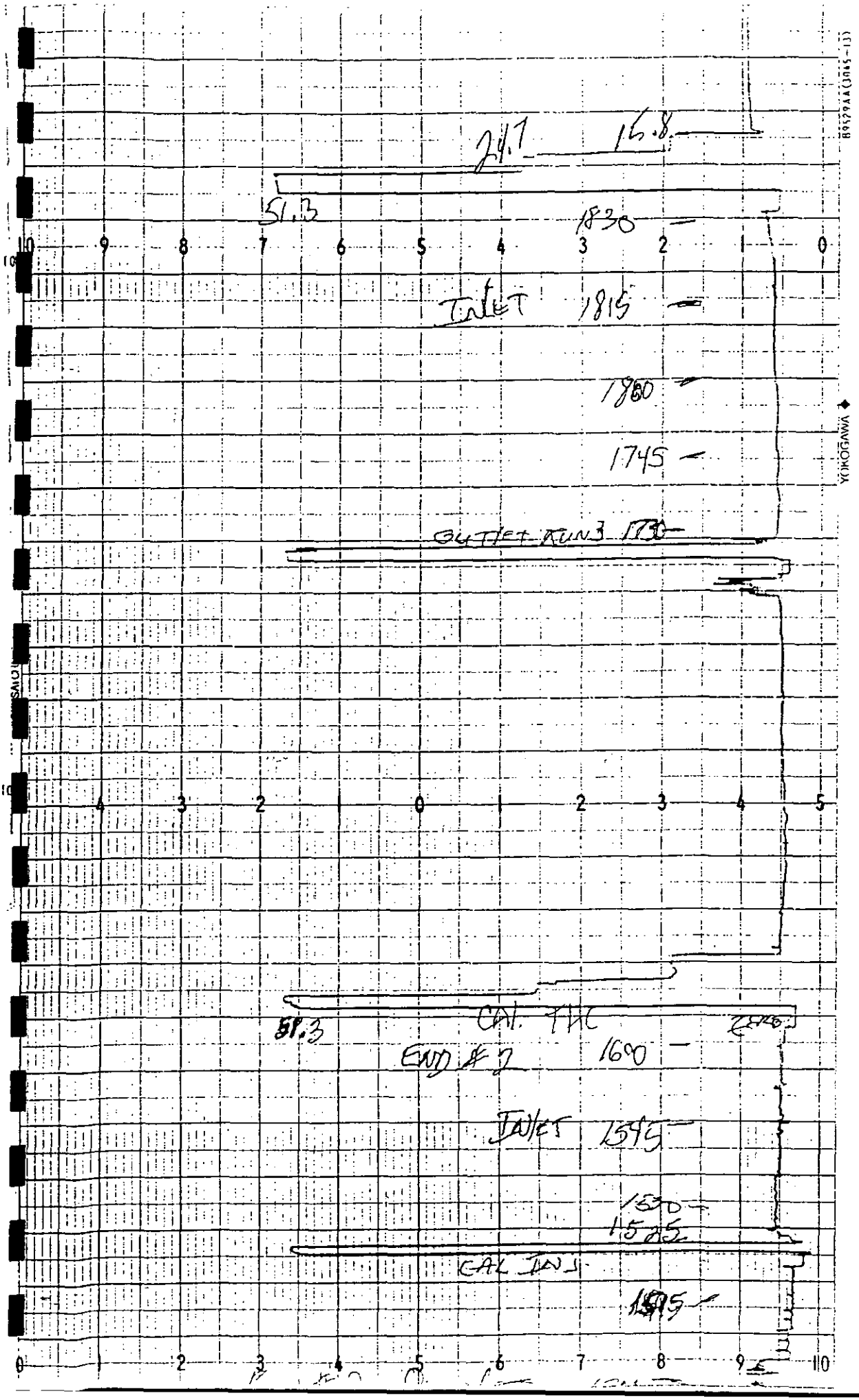

0
1
2
3
4
5
6
7
8
9
10
800
DRYer #2
1745
1730
DRYer #1
1715

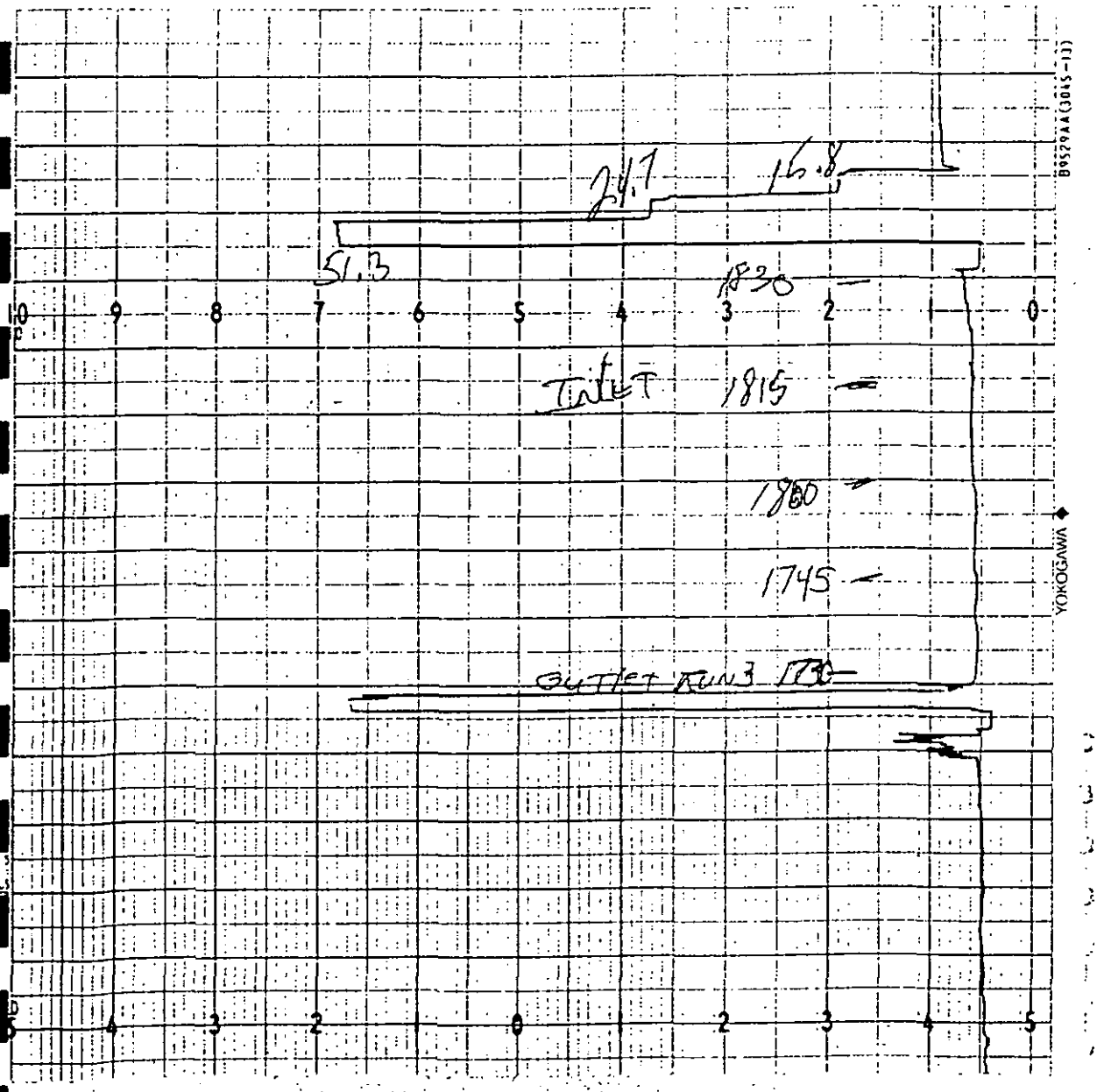

Range 4
Range 3
1100
513
System
297.3
Direct
297.3
ppm
THC Monitor 11-5-91
ZERO
0
2
3
4
5
6
7
8
9
10
122

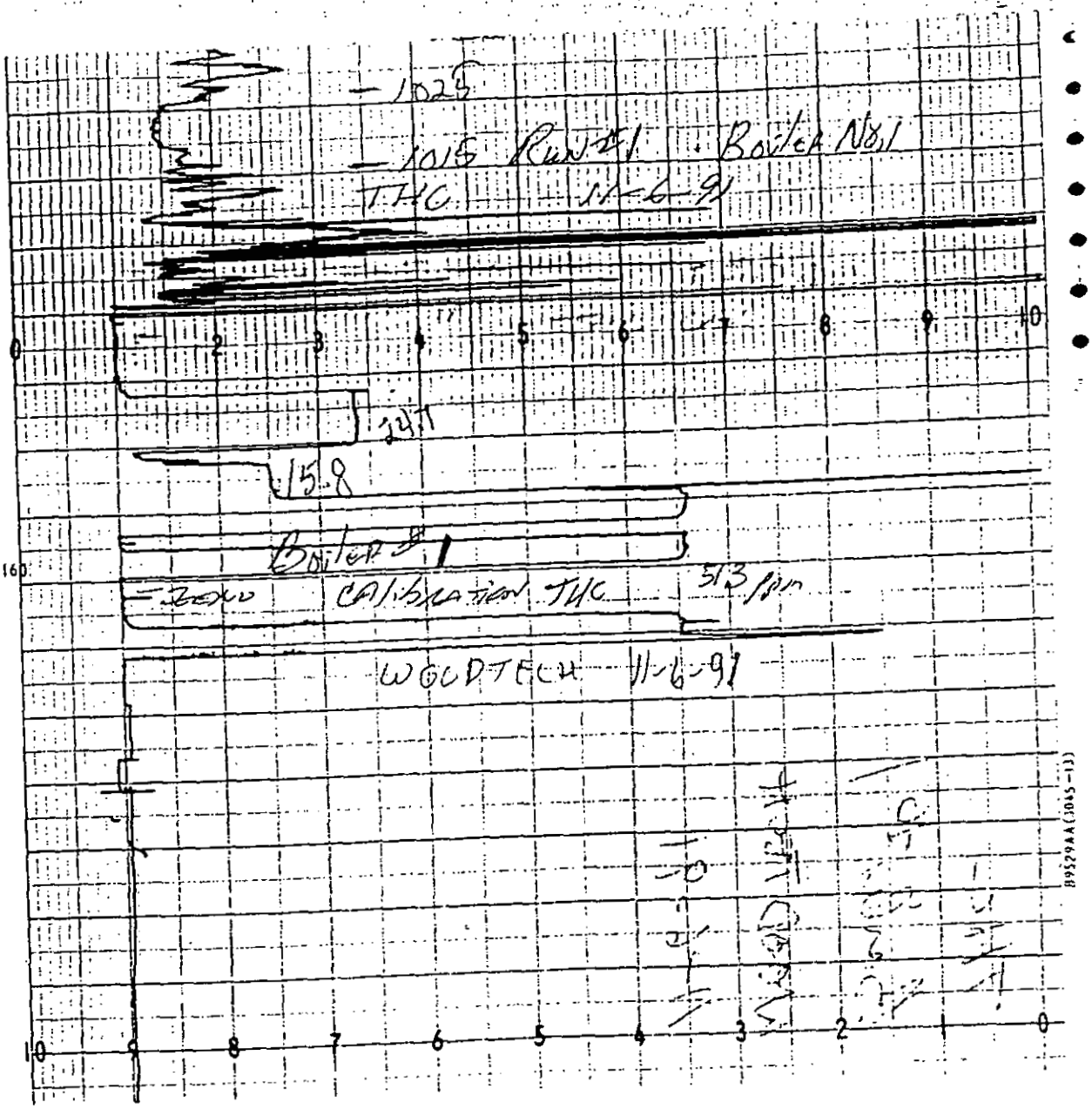

1350
1340
1330
1320
1310
1300
START #2
51.3
150.7
Cal 01230
297.3 gpm
1210 END #1
10 9 8 7 6 5 4 3 2 1
1200
1150
1140
1130
1120
5 4 3 2 1110 1 0 1 2 3 4 5
RANGE 3
1100
RANGE 4
~~DIFFERENT RANGE 3~~
150.7
51.3
297.3

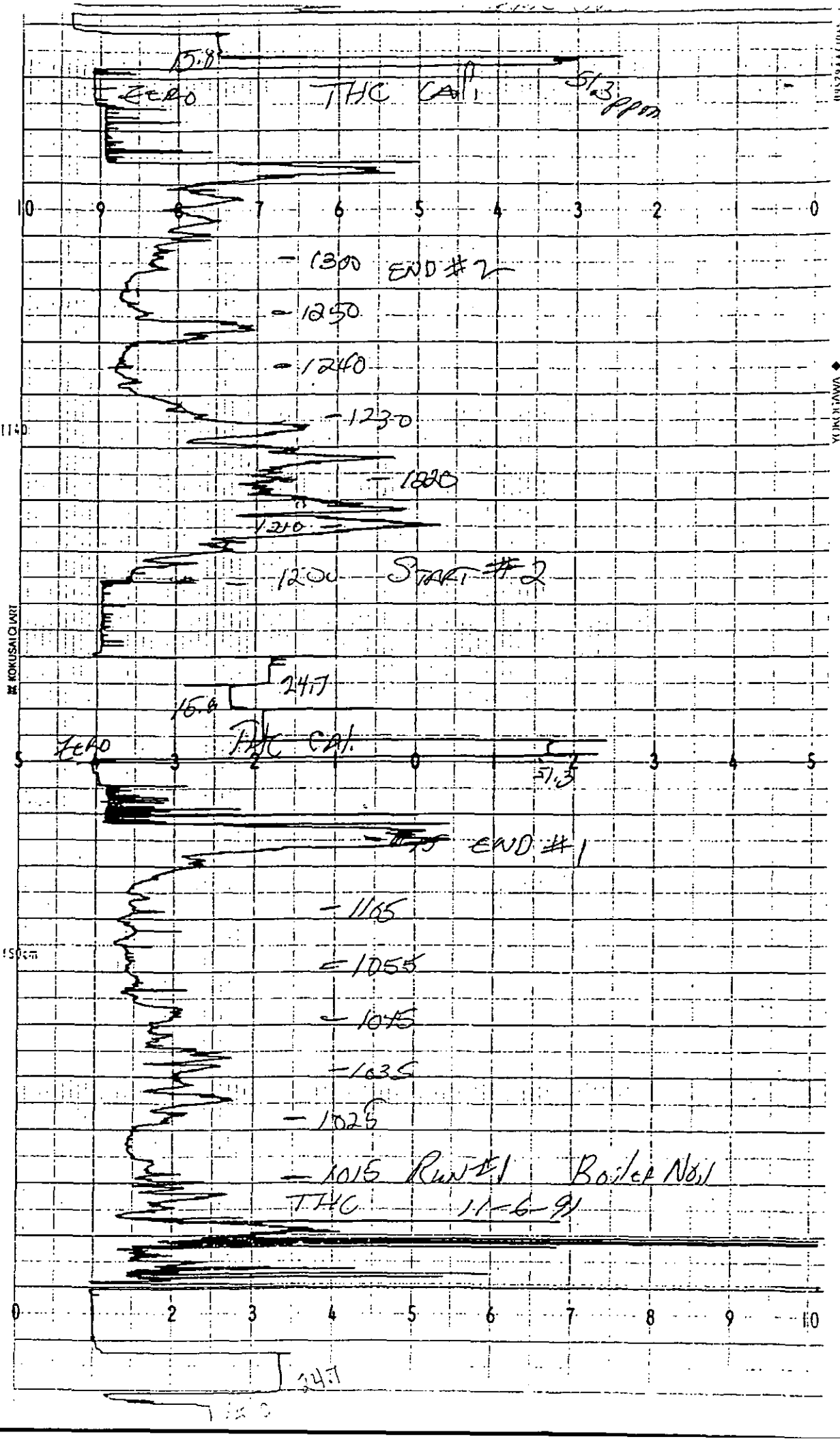

YOKOGAWA
KOKUSAI CHART
1170
1180
1190
5 4 3 2 0 2 3 4 5
0 1 2 4 5 6 7 8 9 10
1600
1590
1640
1630
1620
1610
1600
START #3
150.7
CAL. @ 1418
297.3
1410
1400
1390
1380
1370
1360
1350
START #2

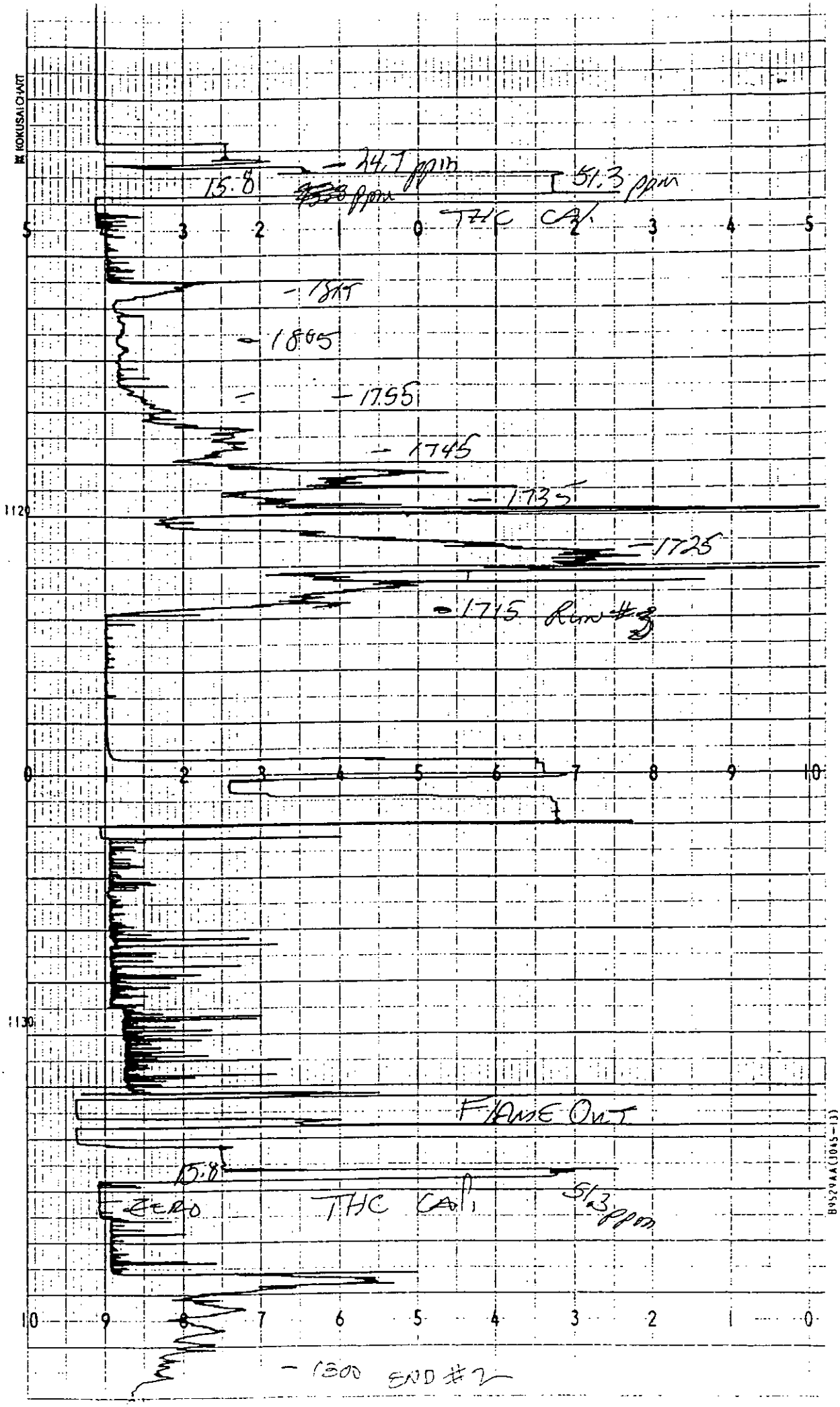

RUN #2 OUTLET 1500
15.8 ppm
24.7 ppm
51.3
THC CO2
END #1 1430
TOILET 1415
1400
1345
RUN #1 1330
11-8-91 Scrubber Out
THC CO2
24.7
15.8
51.3
51.3
Zero
B9579AA(3045-13)
YOKOGAWA
Date 11-8-91
Operator
Page 1 of 1

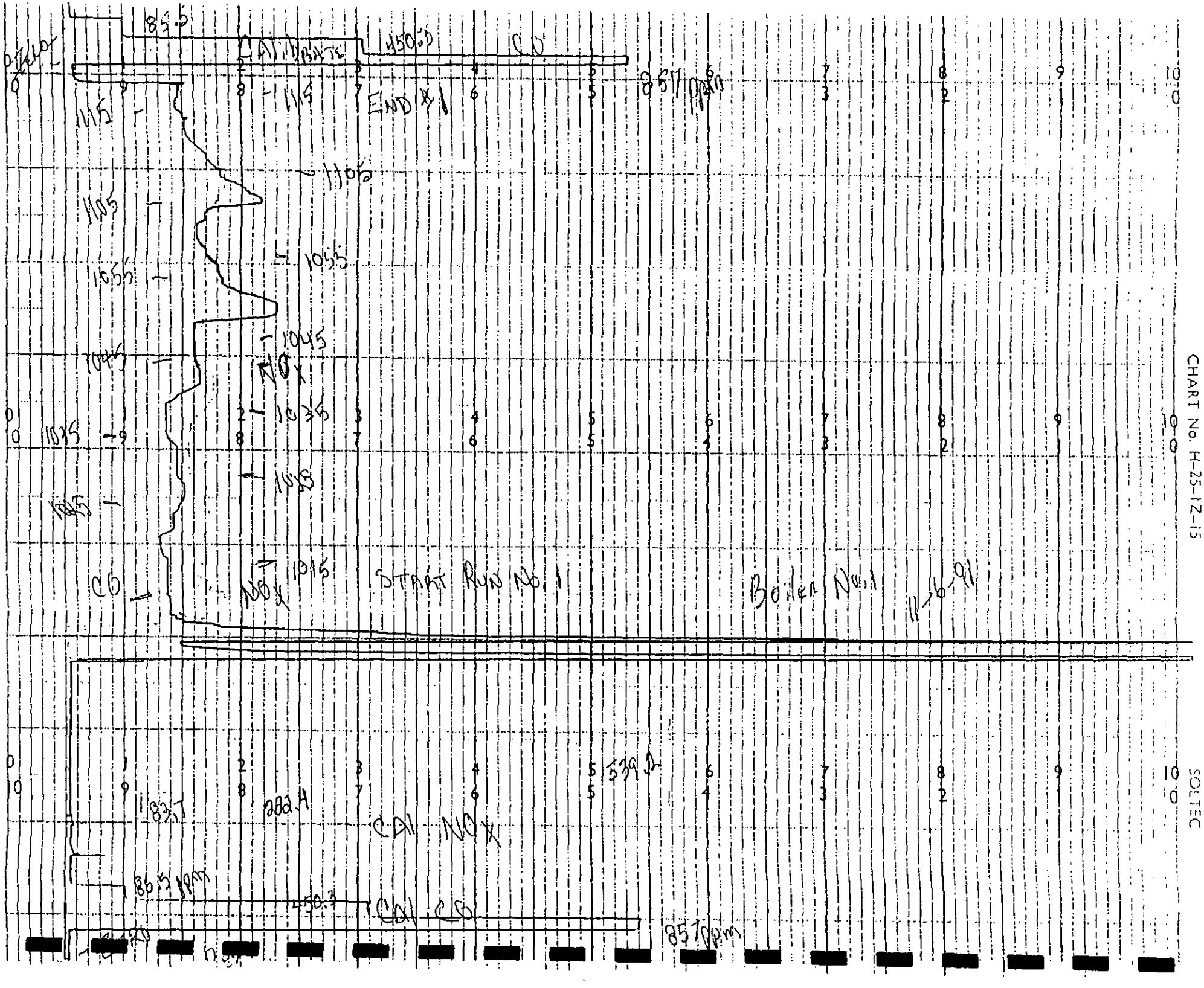

24.7
16.8
51.3
1830
10 9 8 7 6 5 4 3 2 1 0
INLET 1815
1800
1745
OUTLET RUN 3 1730
4 3 2 1 0 1 2 3 4 5
51.3
CAL. THC
ZERO
END #2 1690
INLET 1595
1530
1525
CAL INJ
1515
0 1 2 3 4 5 6 7 8 9 10
YOKOGAWA

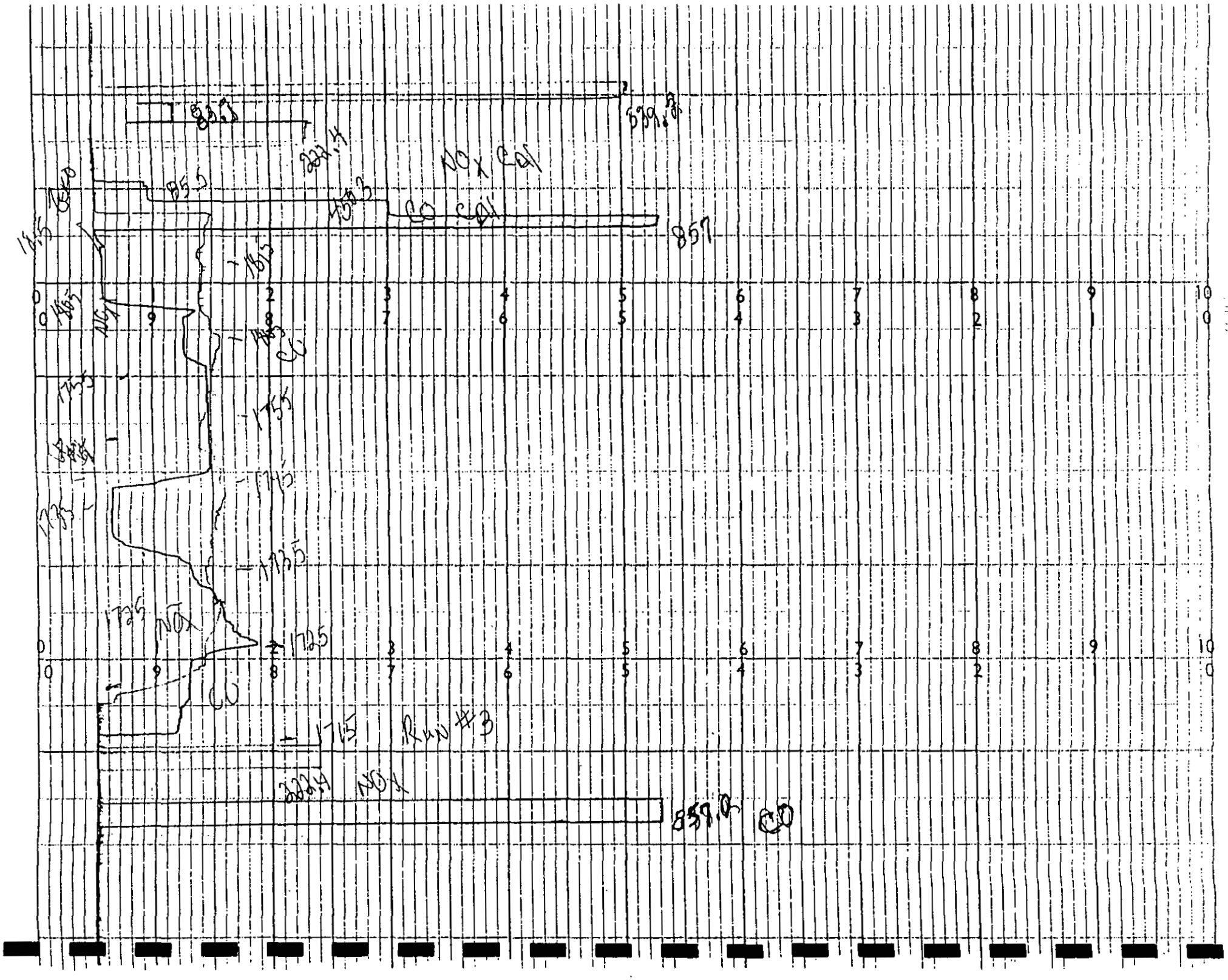

24.7
16.8
51.3
1830
10 9 8 7 6 5 4 3 2 1 0
INLET 1815
1800
1745
OUTLET RUN 3 1730
5 4 3 2 1 0 2 3 4 5
YOKOGAWA
B9529AA(3045-13)


1028
1015 Run #1 Boiler No. 1
THC 11-6-91
0
1
2
3
4
5
6
7
8
9
10
24T
15.8
Boiler #1
1160
Zero Calibration THC
513 ppm
WGCDTECH 11-6-91
10
9
8
7
6
5
4
3
2
1
0


15.8
ZERO
THC CAL.
51.3 ppm
10 9 8 7 6 5 4 3 2 1 0
1300 END #2
1250
1240
1230
1220
1210
1200 START #2
24.7
16.6
PHC CAL.
ZERO
5 4 3 2 1 0 1 2 3 4 5
51.3
END #1
1165
1155
1055
1045
1035
1025
1015 RUN #1 Boiler No.1
THC 11-6-91
0 2 3 4 5 6 7 8 9 10
24.7


KOKUSAI CHART
14.7 ppm
15.8
51.3 ppm
THC CAL
1800
1805
1755
1745
1735
1725
1715 Run #3
1120
1130
FLAME OUT
15.8
ZERO
THC CAL
51.3 ppm
1300 END #2
B9529AA(1045-13)


CALIBRATE
CO
END X1
NOX
START RUN NO. 1
Boiler No. 1
11-6-91
CAL NOX
CAL CO
CHART No. H-25-12-15
SOLTEC


NOx CO
CO CO
NOx
CO
Run #3
NOx
CO

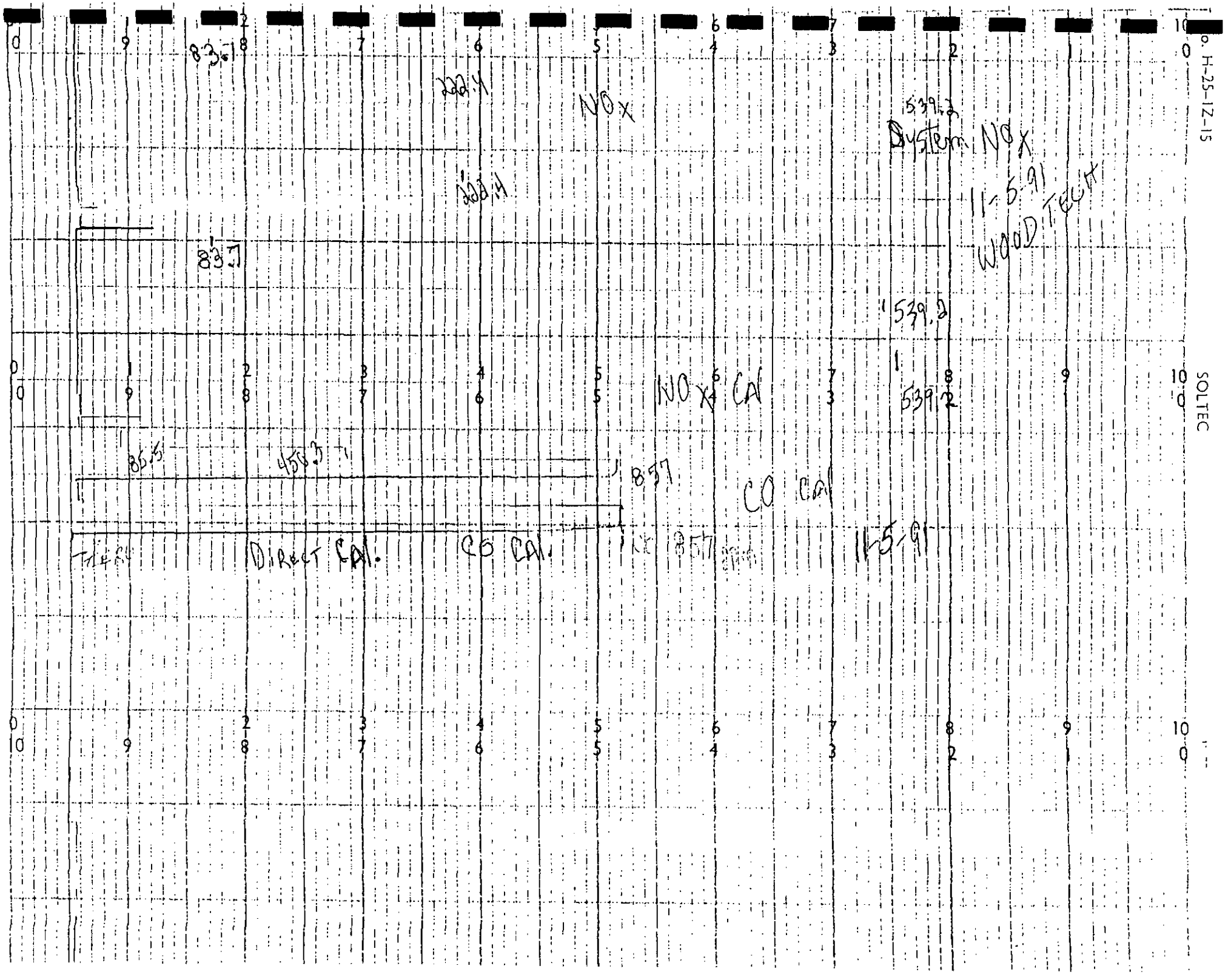

NOx
System NOx
11-5-91
WOOD TECH
NOx CAL
CO CAL
DIRECT CAL.
CO CAL.
11-5-91
SOLTEC
H-25-IZ-15

CHART No. H-25-1Z-15

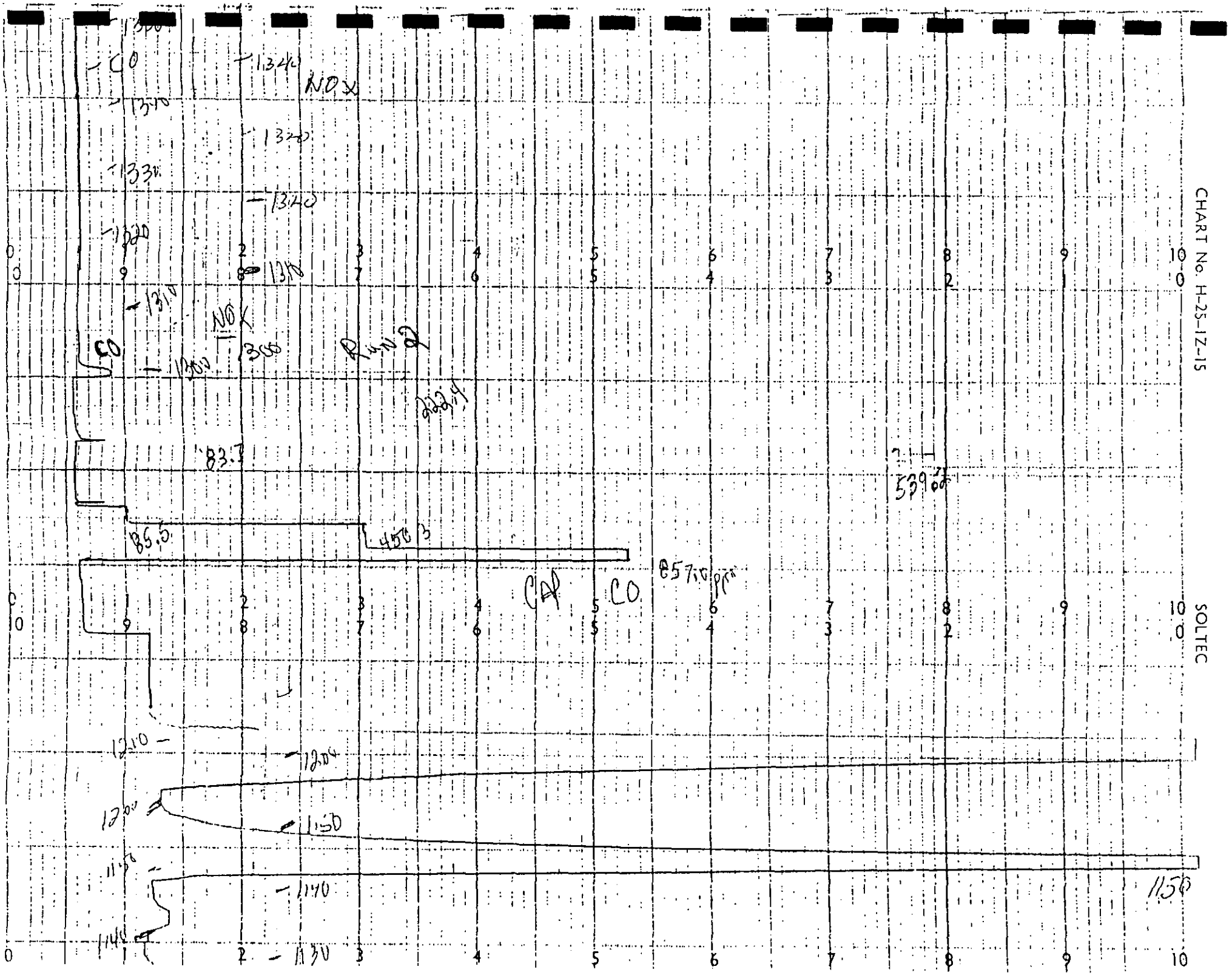


CHART No. H-25-1Z-15
SOLTEC
CO
NOx
1340
1310
1320
1330
1340
1320
1318
1310
NOx
1300
CO
1300
83.7
85.5
455.3
CO
857.5 ppm
1210
1200
1150
1140
1130
1150

CHART No. H-25-1Z-15

SOLTEC

APPENDIX I

LABORATORY DATA

Tue, Dec 3, 1991

ANALYTICAL REPORT

Submitted To:	Dan Scheffel PES 4700 Duke Drive Suite 150 Mason, Ohio 45040
Submitted By:	Tami S. Miller

Reference Data:

Analysis of:	Formaldehyde
Method Reference:	NIOSH 2541
Sample Set ID:	91-C-3536
DataChem Lab No.:	91-29234 through 91-29251

Eighteen ORBO-22 tubes were submitted to this laboratory for the analysis of formaldehyde. The samples were desorbed in 1.0 mL of toluene. The analytes were separated using a DB1301 capillary column. The oven temperature was programmed from 70°C to 260°C.

The results are given on the enclosed tables.

Tami S. Miller
Analyst

Edward J. Slick
Group Leader

Tue, Dec 3, 1991
Set I.D. No.: 91-C-3536

RESULTS

Client I.D.	Lab I.D.	ug/sample front	ug/sample back
SI-1	91-29234	4.9	2.2*
SI-2	91-29235	4.8	2.8
SI-3	91-29236	4.5	2.7
SO-1	91-29237	1.0	2.6
SO-2	91-29238	2.8	2.9
SO-3	91-29239	4.1	NA
D1-1	91-29240	5.3	4.6
D1-2	91-29241	4.6	2.8
D1-3	91-29242	2.8	NA
D2-1	91-29243	3.2	4.8
D2-2	91-29244	4.2	4.8
D2-3	91-29245	3.0	NA
1-1	91-29246	5.4	6.0
1-2	91-29247	4.9	4.0
1-3	91-29248	3.7	NA
2-H-1	91-29249	3.6	3.1
2-H-2	91-29250	3.7	ND
2-H-3	91-29251	3.8	NA
	Limit of Detection	1.0	

* 3.1 ug of formaldehyde was found in the "C" section.

ND - Not Detected

Tami S. Miller
Analyst

The above data is based upon retention time matching only.
Any compound with a similar retention time will interfere.

ANALYTICAL REQUEST AND CHAIN OF CUSTODY

PLANT: Wood Tech

PROJECT NO.: 4533.001

RECOVERY PERSON: D. Scheffel

SAMPLE TECHNICIAN:

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	SAMPLE NAME	NUMBER OF CONTAINERS	NIOSH 2541	Formaldehyde (GC/FID)	COMMENTS (Type of container, special preparation, special handling, etc.)
XAD-2 Tubes			Boiler No. 1	3 Samples	↓	↓	
↓			Boiler No. 2	"	↓	↓	
↓			Dryer No. 1	"	↓	↓	Refrigerate
↓			Dryer No. 2	"	↓	↓	
↓			Scrubber IN	"	↓	↓	
↓			Scrubber Out	"	↓	↓	
1 BLANK Tube					"	"	

RELINQUISHER'S NAME:	DATE / TIME	RELINQUISHER'S SIGNATURE	SHIPPER'S NAME AND IDENTIFICATION NUMBER
Jay Morgan	8/10/91 9:30	Jay Morgan	
RECEIVER'S NAME: Chris Carlson	8/11/91 10:30	Dale Ch...	

SOURCE TEST FILTER LOG

Filter No. 300732 PES No. _____ P.N. _____
Client _____ Date _____
Run No. _____ Method _____ Date/Time Desiccated _____

TARE WEIGHTS			FINAL WEIGHTS		
Date/Time	Analyst	Weight	Date/Time	Analyst	Weight
#1 10.2.91/400	SG	340.3 mg	#1		mg
#2 10.3.91/280	SG	340.3 mg	#2		mg
#3		mg	#3		mg
#4		mg	#4		mg
#5		mg	#5		mg

Avg. Tare Wt. 340.3 mg
Avg. Final Wt. _____ mg
Net Gain _____ mg

Filter No. 300733 PES No. 91-1270 P.N. 4533
Client _____ Date _____
Run No. 82-1 Method _____ Date/Time Desiccated _____

TARE WEIGHTS			FINAL WEIGHTS		
Date/Time	Analyst	Weight	Date/Time	Analyst	Weight
#1 10.2.91/400	SG	353.9 mg	#1 11-13-935	[illegible]	491.7 mg
#2 10.3.91/230	SG	353.9 mg	#2 11-14 935	[illegible]	491.3 mg
#3		mg	#3		mg
#4		mg	#4		mg
#5		mg	#5		mg

Avg. Tare Wt. 353.9 mg
Avg. Final Wt. 491.7 mg
Net Gain _____ mg

Filter No. 300734 PES No. 91-1261 P.N. 4633
Client [illegible] Date _____
Run No. 81-1 Method _____ Date/Time Desiccated _____

TARE WEIGHTS			FINAL WEIGHTS		
Date/Time	Analyst	Weight	Date/Time	Analyst	Weight
#1 10.2.91/400	SG	354.7 mg	#1 11-13 935	[illegible]	493.7 mg
#2 10.3.91/250	SG	355.1 mg	#2 11-14 935	[illegible]	493.3 mg
#3		mg	#3		mg
#4		mg	#4		mg
#5		mg	#5		mg

Avg. Tare Wt. 354.9 mg
Avg. Final Wt. 493.3 mg
Net Gain _____ mg

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

SOURCE TEST FILTER LOG

Filter No. 300735 PES No. 91-1276 P.N. 4533
Client [illegible] Date
Run No. B2-3 Method Date/Time Desiccated

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time	Analyst	Weight		Date/Time	Analyst	Weight	
#1 10.2.91/400	SG	361.8	mg	#1 [illegible]	[illegible]	499.3	mg
#2 10.3.91/230	SG	361.8	mg	#2 [illegible]	[illegible]	499.7	mg
#3			mg	#3			mg
#4			mg	#4			mg
#5			mg	#5			mg

Avg. Tare Wt. 361.8 mg
Avg. Final Wt. 499.3 mg
Net Gain mg

Filter No. 300736 PES No. 91-1264 P.N. 4533
Client Date
Run No. B1-2 Method Date/Time Desiccated

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time	Analyst	Weight		Date/Time	Analyst	Weight	
#1 10.2.91/400	SG	359.8	mg	#1 [illegible]	[illegible]	495.2	mg
#2 10.3.91/230	SG	359.8	mg	#2 [illegible]	[illegible]	495.3	mg
#3			mg	#3			mg
#4			mg	#4			mg
#5			mg	#5			mg

Avg. Tare Wt. 359.8 mg
Avg. Final Wt. 495.3 mg
Net Gain mg

Filter No. 300737 PES No. 911261 P.N. 4533
Client Weyerhaeuser Date
Run No. B1-1 Method Date/Time Desiccated

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time	Analyst	Weight		Date/Time	Analyst	Weight	
#1 10.2.91/400	SG	361.8	mg	#1 [illegible]	[illegible]	477.2	mg
#2 10.3.91/230	SG	361.8	mg	#2 [illegible]	[illegible]	477.2	mg
#3			mg	#3			mg
#4			mg	#4			mg
#5			mg	#5			mg

Avg. Tare Wt. 361.8 mg
Avg. Final Wt. 477.2 mg
Net Gain mg

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

SOURCE TEST FILTER LOG

Filter No. 300741 PES No. _____ P.N. _____
Client _____ Date _____
Run No. _____ Method _____ Date/Time Desiccated _____

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time	Analyst	Weight		Date/Time	Analyst	Weight	
#1 10.2.91/400	SG	351.3	mg	#1			mg
#2 10.3.91/230	SG	351.3	mg	#2			mg
#3			mg	#3			mg
#4			mg	#4			mg
#5			mg	#5			mg

Avg. Tare Wt. 351.3 mg
Avg. Final Wt. _____ mg
Net Gain _____ mg

Filter No. 300742 PES No. _____ P.N. _____
Client _____ Date _____
Run No. _____ Method _____ Date/Time Desiccated _____

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time	Analyst	Weight		Date/Time	Analyst	Weight	
#1 10.2.91/400	SG	353.1	mg	#1			mg
#2 10.3.91/230	SG	353.1	mg	#2			mg
#3			mg	#3			mg
#4			mg	#4			mg
#5			mg	#5			mg

Avg. Tare Wt. 353.1 mg
Avg. Final Wt. _____ mg
Net Gain _____ mg

Filter No. 300743 PES No. 91-1267 P.N. 4553
Client Weyerhaeuser Date _____
Run No. B1-3 Method _____ Date/Time Desiccated _____

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time	Analyst	Weight		Date/Time	Analyst	Weight	
#1 10.2.91/400	SG	352.0	mg	#1 11-17 9:40	[illegible]	445.1	mg
#2 10.2.91/230	SG	352.0	mg	#2 11-18 9:41	[illegible]	445.1	mg
#3			mg	#3			mg
#4			mg	#4			mg
#5			mg	#5			mg

Avg. Tare Wt. 352.0 mg
Avg. Final Wt. 445.1 mg
Net Gain _____ mg

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

Beaker No. 586 PES No. 91-1267 Company Woodtech
Run No. B-1 Contents Acetone 150mL

P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time [illegible] Wt. 1 99493.4 mg		Date/Time [illegible] Wt. 1 99525.2 mg	
Date/Time [illegible] Wt. 2 99493.4 mg		Date/Time [illegible] Wt. 2 99525.6 mg	
Date/Time Wt. 3 mg		Date/Time Wt. 3 mg	
Date/Time Wt. 4 mg		Date/Time Wt. 4 mg	
Date/Time Wt. 5 mg		Date/Time Wt. 5 mg	
Avg. Tare Wt. 99493.6 mg		Avg. Tare Wt. 99525.4 mg	
		Net Gain mg	

Beaker No. 587 PES No. 91-1263 Company Woodtech
Run No. B-1 Contents H2O
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time [illegible] Wt. 1 100339.1 mg		Date/Time [illegible] Wt. 1 100339.9 mg	
Date/Time [illegible] Wt. 2 100339.1 mg		Date/Time [illegible] Wt. 2 100339.3 mg	
Date/Time Wt. 3 mg		Date/Time Wt. 3 mg	
Date/Time Wt. 4 mg		Date/Time Wt. 4 mg	
Date/Time Wt. 5 mg		Date/Time Wt. 5 mg	
Avg. Tare Wt. 100339.1 mg		Avg. Tare Wt. 100339.0 mg	
		Net Gain mg	

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

PES

SOURCE TEST BEAKER LOG

Beaker No. 584 PES No. 91-1265 Company WOOD TECH
Run No. B-2 Contents ACETONE 150 mL
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 9a2	Wt. 1 103390.9 mg	Date/Time 11-13 9a4	Wt. 1 103415.4 mg
Date/Time 11-11 9a2	Wt. 2 103390.3 mg	Date/Time 11-14 9a2	Wt. 2 103415.9 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 103390.6 mg		Avg. Tare Wt. 103415.6 mg	
		Net Gain mg	

Beaker No. 599 PES No. 91-1266 Company WOOD TECH
Run No. B-2 Contents H2O
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 9a2	Wt. 1 107010.6 mg	Date/Time 11-15-1156	Wt. 1 107012.3 mg
Date/Time 11-11 9a2	Wt. 2 107010.4 mg	Date/Time 11-14 9a4	Wt. 2 107012.4 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 107010.5 mg		Avg. Tare Wt. 107012.3 mg	
		Net Gain mg	

Beaker No. 590 PES No. 91-1268 Company WOOD TECH
Run No. B-3 Contents ACETONE 150 mL
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 9a2	Wt. 1 100029.4 mg	Date/Time 11-12 9a5	Wt. 1 100065.6 mg
Date/Time 11-11 9a2	Wt. 2 100029.3 mg	Date/Time 11-14 9a6	Wt. 2 100065.3 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 100029.3 mg		Avg. Tare Wt. 100065.7 mg	
		Net Gain mg	

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

PES

SOURCE TEST BEAKER LOG

Beaker No. 591 PES No. 91-1269 Company WOOD TECH
Run No. B1-3 Contents H2O
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time 11-11 902	Wt. 1	100113.7	mg	Date/Time 11-15 1201	Wt. 1	100115.5	mg
Date/Time 11-11 903	Wt. 2	100113.6	mg	Date/Time 11-19 903	Wt. 2	100115.8	mg
Date/Time	Wt. 3		mg	Date/Time	Wt. 3		mg
Date/Time	Wt. 4		mg	Date/Time	Wt. 4		mg
Date/Time	Wt. 5		mg	Date/Time	Wt. 5		mg
Avg. Tare Wt.		100113.6	mg	Avg. Tare Wt.		100115.7	mg
				Net Gain			mg

Beaker No. 592 PES No. 91-1271 Company WOOD TECH
Run No. B3-1 Contents ACETONE 150 ml
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time 11-11 903	Wt. 1	96779.3	mg	Date/Time 11-15 902	Wt. 1	96903.4	mg
Date/Time 11-11 836	Wt. 2	96779.2	mg	Date/Time 11-19 907	Wt. 2	96903.9	mg
Date/Time	Wt. 3		mg	Date/Time	Wt. 3		mg
Date/Time	Wt. 4		mg	Date/Time	Wt. 4		mg
Date/Time	Wt. 5		mg	Date/Time	Wt. 5		mg
Avg. Tare Wt.		96779.2	mg	Avg. Tare Wt.		96903.6	mg
				Net Gain			mg

Beaker No. 593 PES No. 91-1272 Company WOOD TECH
Run No. B2-1 Contents H2O
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS				FINAL WEIGHTS			
Date/Time 11-11 0909	Wt. 1	105493.0	mg	Date/Time 11-15 0900	Wt. 1	105494.1	mg
Date/Time 11-11 931	Wt. 2	105493.0	mg	Date/Time 11-19 903	Wt. 2	105494.5	mg
Date/Time	Wt. 3		mg	Date/Time	Wt. 3		mg
Date/Time	Wt. 4		mg	Date/Time	Wt. 4		mg
Date/Time	Wt. 5		mg	Date/Time	Wt. 5		mg
Avg. Tare Wt.		105493.0	mg	Avg. Tare Wt.		105494.3	mg
				Net Gain			mg

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

PES

SOURCE TEST BEAKER LOG

Beaker No. 594 PES No. 91-1274 Company WOOD TECH
Run No. B-2 Contents ACETONE 150 ML
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 905	Wt. 1 97271.1 mg	Date/Time 11-15-91 902	Wt. 1 97305.1 mg
Date/Time 11-11 455	Wt. 2 97271.1 mg	Date/Time 11-14-909	Wt. 2 97305.2 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 97271.1 mg		Avg. Tare Wt. 97305.2 mg	
		Net Gain mg	

Beaker No. 595 PES No. 91-1275 Company WOODTECH
Run No. B-2 Contents H2O
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 9:09	Wt. 1 101969.2 mg	Date/Time 11-15-91	Wt. 1 101971.3 mg
Date/Time 11-11 910	Wt. 2 101969.2 mg	Date/Time 11-14 9:00	Wt. 2 101971.5 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 101969.2 mg		Avg. Tare Wt. 101971.4 mg	
		Net Gain mg	

Beaker No. 596 PES No. 91-1277 Company WOOD TECH
Run No. B-2-3 Contents ACETONE 150 ML
P.N. 4533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 950	Wt. 1 100722.0 mg	Date/Time 11-15 9:00	Wt. 1 100749.6 mg
Date/Time 11-11 952	Wt. 2 100722.0 mg	Date/Time 11-14-909	Wt. 2 100750.0 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 100722.0 mg		Avg. Tare Wt. 100749.8 mg	
		Net Gain mg	

Note: Samples must be weighed until two weights (within 0.5 mg) are obtained.

PES

SOURCE TEST BEAKER LOG

Beaker No. 597 PES No. 91-1278 Company WOOPTCCP
Run No. 02-3 Contents H2O
P.N. A533 Visual Inspection
Date and Time Desiccated

TARE WEIGHTS		FINAL WEIGHTS	
Date/Time 11-11 961	Wt. 1 97.635.2 mg	Date/Time 11-15 1262	Wt. 1 976361 mg
Date/Time 11-11 955	Wt. 2 97635.2 mg	Date/Time 1114 902	Wt. 2 976364 mg
Date/Time	Wt. 3 mg	Date/Time	Wt. 3 mg
Date/Time	Wt. 4 mg	Date/Time	Wt. 4 mg
Date/Time	Wt. 5 mg	Date/Time	Wt. 5 mg
Avg. Tare Wt. 976357 mg		Avg. Tare Wt. 976363 mg	
		Net Gain mg	

APPENDIX J

EQUIPMENT CALIBRATION SHEETS

ORIFICE # 27 PROJECT: EQM Bluefield # 4533.001

INITIAL CALIBRATION :

DATE 9/12/91

P bar 29.37 VACUUM 27"

TEMP oF 72.° FLOWMETER Calibrator

FINAL CALIBRATION :

DATE 11/11/91

P bar 29.40 VACUUM 27"

TEMP oF 71 FLOWMETER Calibrator

VOLUME MEASURED	TIME (SECONDS)	Qa CC/MIN	Qstd CC/MIN	VOLUME MEASURED	TIME (SECONDS)	Qa CC/MIN	Qstd CC/MIN
130.1				132.5			
130.0				132.4			
130.4				132.9			
AVERAGE	130.2		126.8	AVERAGE	132.6		129.6

Average of 3 runs using Calibrator

$$Qa = 60 \times \frac{\text{vol. meas.}}{\text{time}}$$

$$Qstd = Qa \times 17.647 \times \frac{P\ bar}{ToR}$$

Qa(init) = 60 x ---------- = 130.2 / [illegible]

Qstd(init) = 17.647 x 130.2 x [illegible] / 532 = 126.8

Qa(fin) = 60 x ---------- = [illegible]

Qa(fin) = 17.647 x [illegible] x [illegible] = 129.6

ORIFICE # 28 PROJECT: EQM Belmefield # 4533.001

INITIAL CALIBRATION :

DATE 9/12/91

P bar 29.37 VACUUM 27"

TEMP oF 72° FLOWMETER Gilibrator

FINAL CALIBRATION :

DATE 11/11/91

P bar 29.40 VACUUM 27"

TEMP oF 71 FLOWMETER Gilibrator

VOLUME MEASURED	TIME (SECONDS)	Qa CC/MIN	Qstd CC/MIN	VOLUME MEASURED	TIME (SECONDS)	Qa CC/MIN	Qstd CC/MIN
127.6				128.4			
127.8				128.6			
127.8				128.7			
AVERAGE	127.8		124.4	AVERAGE	128.6		125.7

Average of 3 runs using Gilibrator

$$Qa = 60 \times \frac{\text{vol. meas.}}{\text{time}}$$

$$Qstd = Qa \times 17.647 \times \frac{P\ bar}{ToR}$$

Qa(init) = 60 x --------- = 27.3

Qstd(init) = 17.647 x 27.8 x ---------- = 124.5

Qa(fin) = 60 x --------- = 28.0

Qa(fin) = 17.647 x 128.6 x ---------- = 125.7

POSTTEST DRY GAS METER CALIBRATION

MB #: MB-10 BAROMETRIC PRESS. 29.46 (in. hg.)

DATE: 11-25-91 PERFORMED BY: D. MACHUGA

PLANT: EQM PRETEST Y 0.996
BLUEFIELD, VA.

	RUN 1	RUN 2	RUN 3
VACUUM ("Hg)	2.00	2.00	2.00
/\H ("H2O)	1.70	1.70	1.70
INITIAL RTM	308.339	315.655	322.968
FINAL RTM	315.655	322.968	330.249
INITIAL DGM	421.609	428.986	436.239
FINAL DGM	428.986	436.239	443.619
TEMP. RTM (F)	67.0	65.0	65.0
TEMP. DGM (F)	63.0	67.0	70.0
TEST TIME (MIN.)	10.0	10.0	10.0

****

NET VOLUME RTM	7.316	7.313	7.281
NET VOLUME DGM	7.377	7.253	7.380
Y	0.980	1.008	0.992
/\H@	1.815	1.789	1.794

****

PRIOR Y = 0.996
RECHECK Y = 0.993
% DIFFERENCE = -0.279

AVERAGE /\H@ = 1.799

Y = (Vw x Pb x (Td + 460)) / (Vd (Pb + (dHd / 13.6))x(Tw + 460)

/\H@ = 0.0317 x /\H / (Pb (Td + 460)) x ((Tw + 460) x time) / Vw)^2

BALANCE CALIBRATION

Date: 2.12.91 Balance #: Ainsworth

Std. Wt.	Tolerance	Observed Weight
100.000g	± 0.001g	99.9988
10.000g	± 0.001g	10.0000
1.000g	± 0.0005g	.9997
0.100g	± 0.0005g	.0993
0.010g	± 0.0001g	.0099
0.001g	± 0.0001g	

Date: 9.20.91 Balance #: SP182

Std. Wt.	Tolerance	Observed Weight
100.000g	± 0.001g	99.9999
10.000g	± 0.001g	9.9999
1.000g	± 0.0005g	1.0000
0.100g	± 0.0005g	.0999
0.010g	± 0.0001g	.010
0.001g	± 0.0001g	.001

Date: Balance #:

Std. Wt.	Tolerance	Observed Weight
100.000g	± 0.001g	
10.000g	± 0.001g	
1.000g	± 0.0005g	
0.100g	± 0.0005g	
0.010g	± 0.0001g	
0.001g	± 0.0001g	

APPENDIX K

CORRESPONDENCE WITH SAPCB
(i.e., Test Protocol)

Ron

ENVIRONMENTAL QUALITY MANAGEMENT, INC.
3109 University Drive • Suite B
Durham, North Carolina 27707
(919) 489-5299
FAX (919) 489-5552

October 11, 1991

Mr. Rob Feagins
Department of Air Pollution Control
Commonwealth of Virginia
Region I
Post Office Box 1190
121 Russell Road
Abington, Virginia 24210

Re: Woodtech Compliance Tests
PN 5015-2

Dear Feagins:

This letter is to advise you that Woodtech proposes to stack test their wood-fired boilers, hot press scrubber, and veneer dryer during the week of November 4, 1991. The tests will be conducted as a requirement of the operating permit.

Testing will be conducted by Pacific Environmental Services, Inc. (PES) under contract to Environmental Quality Management, Inc. (EQ). EQ will coordinate test activities, gather process data, documentation, and prepare a final submittal to the State Air Pollution Control Board (SAPCB) for review.

The agency is welcome to observe all tests and operations during the week. All attempts will be made to operate at maximum process rates during the tests in accordance with the permit conditions. A final test schedule has not been completed for the individual stacks at this time. When a final schedule is prepared it will be provided to you. At the present time set-up is planned for Monday, November 4 with testing on November 5 to 8 as required to complete all runs.

Per our recent telephone conversation, the test protocols listed in Table 1 will be observed. Process data as indicated in Tables 2, 3, and 4 will collected during each run.

Method 9 observation per conversation with Don Hilt will be conducted by SAPCB. If this is not possible, EQ or Woodtech staff may be used for Method 9 observations.

TABLE 1. TEST PROTOCOLS

Source	Pollutant	Method	No. of Runs	Notes
Boiler No. 1	TSP	EPA 5	3	
	CO	EPA 10	3	a
	NO_x	EPA 7E	3	
	VOC	EPA 25A	3	b
	Formaldehyde	NIOSH 2541	3	b
Boiler No. 2	TSP	EPA 5	3	
	CO	EPA 10	3	a
	NO_x	EPA 7E	3	
	VOC	EPA 25A	3	b
	Formaldehyde	NIOSH 2541	3	b
Scrubber[c] Inlet	VOC	EPA 25A	3	b
	Formaldehyde	NIOSH 2541	3	b
Scrubber[c] Outlet	VOC	EPA 25A	3	b
	Formaldehyde	NIOSH 2541	3	b
Dryer Stack No. 1[d]	VOC	EPA 25A	3	b
	Formaldehyde	NIOSH 2541	3	b
Dryer Stack No. 2[d]	VOC	EPA 25A	3	b
	Formaldehyde	NIOSH 2541	3	b

[a]An integrated CO sample will be collected during Method 5 tests runs and analyzed on-site.
[b]EPA 25A/NIOSH 2541 will be conducted simultaneously.
[c]Inlet and outlet will be sampled simultaneously.
[d]Stacks will be conducted separately at identical operating conditions.

TABLE 2. DOCUMENT BOILER

Item	Method
Steam flow	Integrator, charts
Steam temperature	Log, inst.
Steam pressure	Log, inst.
FD air temperature	Log, inst.
Feedwater temperature	Log, inst.
M/C ΔP	Log, inst.
Fuel analysis	Ultimate

TABLE 3. DOCUMENT DRYER

Item	Method
Feed rate	Veneer sheets/h
Dryer temperature	Chart

TABLE 4. DOCUMENT HOT PRESS

Item	Method
Process weight	m^3/h, log
Glue usage	Glue line usage rate
Type	Log, time
Cycles	Log, time
Scrubber pH	Log, inst.
Scrubber ΔP	Log, inst.
Nozzle press	Log, inst.

If you have any questions or need additional data, please give me a call at (919) 489-5299.

Sincerely,

ENVIRONMENTAL QUALITY MANAGEMENT, INC.

Ronald Hawks

Ronald L. Hawks

RLH/tlp

cc: Chuck Blevins