

WOOD HEATER
CERTIFICATION TEST REPORT
for
BUCHANAN WELDING & FABRICATION, INC.
MODEL 2500

MAY 10, 1993

Prepared For:
Buchanan Welding & Fabrication, Inc.
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Introduction

Introduction

Apex Environmental Services, Inc. (AES) was retained by Buchanan Welding & Fabrication, Inc. to perform certification testing on the Wood Stove, Model 2500 in accordance with 40 CFR Part 60, Section 60.533 of the Standards of Performance for New Residential Wood Heaters. The model meets the Phase II emission limits for catalytic wood heaters. The adjusted weighted average certification test results are 3.05 grams per hour. This is 26% below the Phase II emission limit of 4.1 grams per hour for catalytic models.

The emission tests were conducted in accordance with Section 60.534, using EPA Methods 5G-1 and 28. The testing was conducted at the AES laboratory located at 202 East Chatham Street in Apex, North Carolina. The altitude at this location is approximately 490 feet above median sea level. The testing was conducted on April 26 through May 4, 1993 by William H. Howe and William L. Sherrill.

The EPA was notified on March 24 for the testing to begin April 26, 1993. The final test unit was received at the laboratory on April 5 for aging and certification testing.

The test stove has been sealed with stretch wrap and strapping. The strap buckles have been sealed with aluminum tape and embossed with the AES corporate seal. The stove will be returned to the manufacturer for storage.

The report is organized in accordance with the EPA recommended outline. Following a general Introduction in Section I, Results are summarized and discussed in Sections II and III, respectively. Section IV contains wood heater specific information. Section V contains brief descriptions of the methods, alternatives and deviations from the methods, and a list of equipment used during the test series. Quality assurance procedures and calibrations pertaining to this test series are provided in Appendix A. The computer generated results are in Appendix B. The raw data for each run is organized in Appendix C in ascending burn rate order. Raw data includes fuel parameters, Method 5G traverse and sampling data, pretest and test start operations and all 10 minute data. Analytical raw data for each run is included with the run data. Miscellaneous raw data, including initial tare weights, follows the run data. Appendix D contains the wood heater and catalyst aging data. Appendix E contains example calculations.

Section II
Summary Tables

Table I

SUMMARY OF EMISSIONS RESULTS

Run Number	Dry Burn Rate (kg/hr)	Method 5G Particulate Matter Emission Rate (g/hr)	Adjusted Particulate Emission Rate (g/hr)
8	0.56	0.89	1.65
5	1.03	1.31	2.28
6	1.04	1.58	2.66
7	1.87	2.72	4.18
1	2.97	4.18	5.81
Weighted Average (g/hr)			3.05
2	1.35	1.84	3.02

RUN #2 WAS NOT INCLUDED IN THE WEIGHTED AVERAGE

Table II

TEST FACILITY CONDITIONS

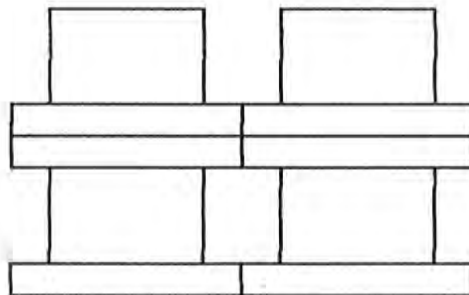
Run Number	Room Temperature		Barometric Pressure		Relative Humidity		Air Velocity	
	Pre (F)	Post	Pre (in. Hg)	Post	Pre (%)	Post	Pre (ft/min)	Post
8	66	67	29.82	29.78	50	59	10	30
7	69	74	29.90	29.84	36	42	10	30
6	72	74	29.75	29.72	28	28	10	20
5	73	71	29.88	29.82	24	21	30	40
1	87	85	29.62	29.64	59	59	10	20
2	73	68	29.64	29.68	59	51	10	20

TABLE III-A
SUMMARY OF FUEL MEASUREMENTS AND CRIB DESCRIPTION

PRETEST			
Run Number	Pretest Fuel Weight (lbs)	Pretest Moisture (Dry Basis) (%)	Coal Bed Weight (lbs)
8	12.3	20.8	4.6
5	9.9	20.9	4.6
6	10.7	20.2	4.6
7	10.8	20.5	4.6
1	19.4	22.6	4.8
2	13.5	20.6	5.5

TABLE III-B
SUMMARY OF FUEL MEASUREMENTS AND CRIB DESCRIPTION

Run Number	Test Fuel Weight Basis		Fuel Loading Density Wet Basis 3 lbs/ft	TEST	Piece Length (in)	Number of 4 x 4's
	Wet (lbs)	Dry (kgs)		Fuel Moisture Content Dry (%)		
8	22.7	8.533	6.46	20.6	22	4
5	22.6	8.310	6.43	23.3	21.5	4
6	23.0	8.554	6.55	22.0	21	4
7	22.9	8.461	6.52	22.7	21.5	4
1	22.3	8.404	6.35	20.3	21.5	4
2	24.1	9.008	6.86	21.3	21.5	4



(sideview)

Crib Configuration

TABLE IV
SUMMARY OF DILUTION TUNNEL GAS MEASUREMENTS AND SAMPLING DATA

Run Number	Average Dilution Tunnel Gas Measurements				Sampling Data	
	Length of Test Run (minutes)	Velocity (vs) (ft/min)	Volumetric Flow Rate (Qsd) (dscf/min)	Avg. Tunn. Temp. (F)	Sample Volume (Vmstd) (dscf)	Particulate Catch (mg)
8	918	810.77	148.28	81.67	427.779	42.8
5	486	809.50	144.60	95.50	225.602	34.1
6	494	811.98	144.16	96.67	229.053	41.8
7	272	818.18	143.07	107.86	127.774	40.5
1	170	806.65	139.31	110.33	79.596	38.5
2	400	794.61	142.50	89.78	186.346	40.1

Table V
SUMMARY OF HEATER OPERATION

Run Number	Average Dry Burn Rate (kg/hr)	Sample Run Time (minutes)	Average Surface Temperature Start (F)	Average Surface Temperature Finish (F)	Control Setting		Pre-test		5 Minute Start-up	
					Primary Air Setting (inches open)	Underfire Air Settings (inches open)	Fuel Wt. (lb.)	Time (min.)	Loading Door Open (sec.)	Air Adjustments
8	0.56	918	284.2	218.2	9/16	Closed	12.3	130	60	None
5	1.03	486	297.4	274.0	15/16	5/8	9.9	100	45	None
6	1.04	494	334.2	281.4	1 5/16	Closed	10.7	130	45	None
7	1.87	272	373.4	337.8	1 1/2	Closed	10.8	80	60	None
1	2.97	170	444.8	373.8	Max.	Max.	19.4	110	45	None
2	1.35	400	478.2	311.8	3/4	Closed	13.5	100	30	None

Section III
Discussion of Results

Discussion of Results

A total of eight test runs were attempted. Run 2 was not included in the weighted average, since the average surface temperatures exceeded the allowable range. Runs 3 and 4 were not included due to combustion failure.

All the other runs were used in calculating the weighted average emission rate of 3.05 grams per hour.

One emission test was achieved in each of the four burn rate categories. The average burn rates ranged from 0.56 to 2.97 dry kilograms per hour.

No specific problems were encountered during the test series.

Section IV
Wood Heater Specific Information

WOOD HEATER SPECIFIC INFORMATION

Appliance Identification

Manufacturer: Buchanan Welding & Fabrication, Inc.

Model: 2500

Type: catalytic, fireplace insert

Wood Heater Description

Materials of Construction:

Plate steel, cast iron door with glass window;
firebrick lined bottom in firebox,
plate steel firebox sides

Weight:

542 pounds

Firebox Volume:

3.514 cubic feet

Air Introduction/Combustion Control System:

Primary air enters through 2 triangleular openings located below the door. Combustion air intake is controlled by moving the control rod in or out which is attached to a plate that slides across the inlets. The combustion air is directed through channels surrounding the window. The air is directed toward the glass window, the sides and the top serving as a window wash. Underfire air may be injected in the same manner by controlling a seperate rod.

Other Features:

Blower: The test unit was supplied with a thermostatically controlled variable speed electric blower. The fan switch has a manual override switch.

Catalyst: 2, Applied Ceramics, with 25 cells per inch, nominal dimensions 2" x 6.9" x 2.75" cell length

Operating Instructions:

Followed operating procedures provided with the stove, except that the primary air settings were adjusted as necessary to achieve the desired burn rates.

Wood Heater Installation:

See Dilution Tunnel and Stove Installation schematics in Section V for details.

Wood Heater and Catalyst Aging:

The stove and catalyst were aged with catalyst exhaust temperatures greater than 500 degrees fahrenheit in excess of 50 hours. When unattended the catalyst temperatures were monitored with an Omega OM-550 DATALOGGER. The stove was aged with both dimensional Douglas fir lumber and seasoned cordwood. The aging data can be found in Appendix D.

Buchanan Welding & Fabrication, Inc.

RT. 3 - BOX 288-A
BAKERSVILLE, N. C. 28705
PHONE 785.8850

OPERATING INSTRUCTIONS FOR TESTING XTEC MODEL 25000

Once proper coal bed has been established, test fuel added and by-pass closed, the unit should be adjusted as follows:

Category 1:

1. Primary air setting "approximately $\frac{1}{2}$ " open
2. Underfire air "closed"
3. Fan speed "low"

Category 2:

1. Primary air setting "approximately $\frac{5}{8}$ " open
2. Underfire air "closed"
3. Fan speed "low"

Category 3:

1. Primary air setting "approximately $\frac{3}{4}$ " open
2. Underfire air "closed"
3. Fan speed "low"

Category 4:

1. Primary air setting 100% open
2. Underfire air 100% open
3. Fan speed high

Note:

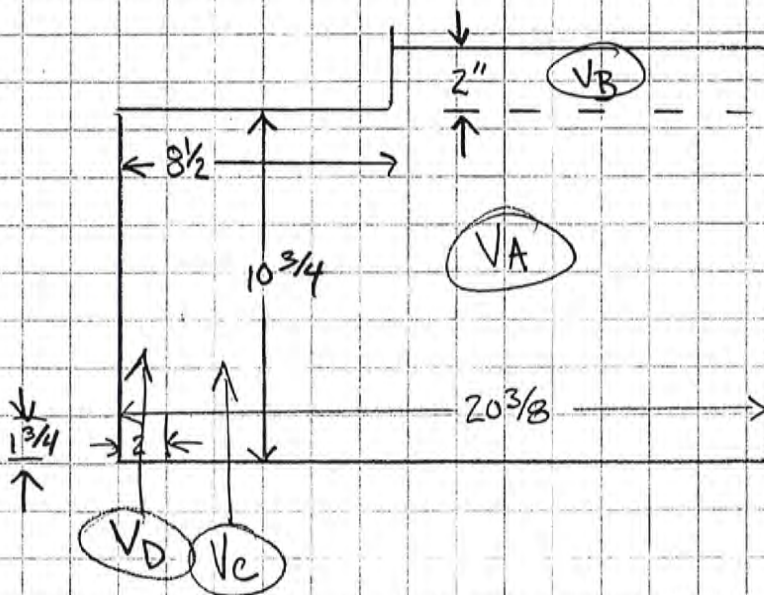
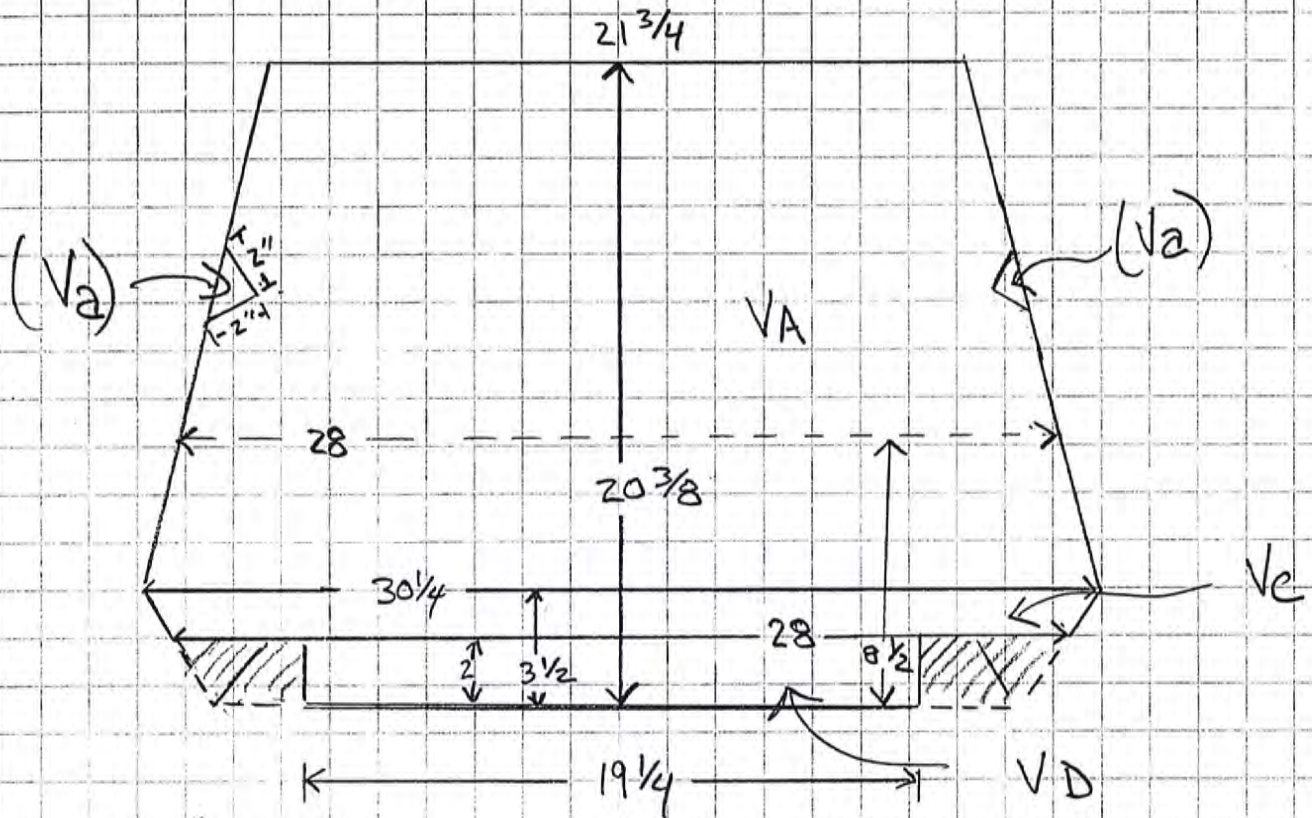
To achieve a better burn rate on category 1,2,3, the underfire air control may need to be open from $\frac{1}{8}$ " to $\frac{3}{8}$ " opening.

RECEIVED APR 22 1963
W.H.H.

Firebox Volume Calculations
and
Minimum and Maximum Air Inlet Settings

Firebox Volume Calculation

XTEC 2500
4-5-93



Fire box volume

$$V_A = \frac{1}{2}(30.25 + 21.75) \times 10.75 \times (20.375 - 3.5) = 4716.56$$

$$V_B = \frac{1}{2}(28 + 21.75) \times 2 \times (20.375 - 8.5) = 590.78$$

$$V_C = \frac{1}{2}(28 + 30.25) \times 10.75 \times 1.5 = 469.64$$

$$V_D = 19.25 \times 2 \times 9 = 346.50$$

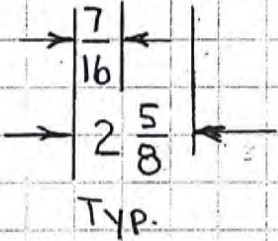
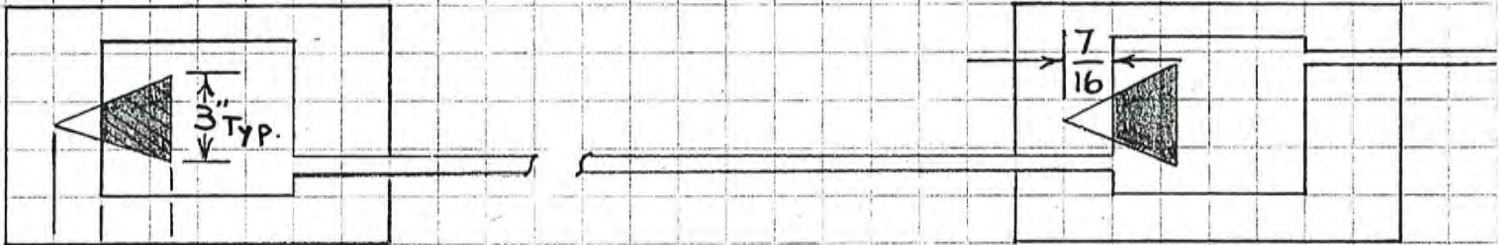
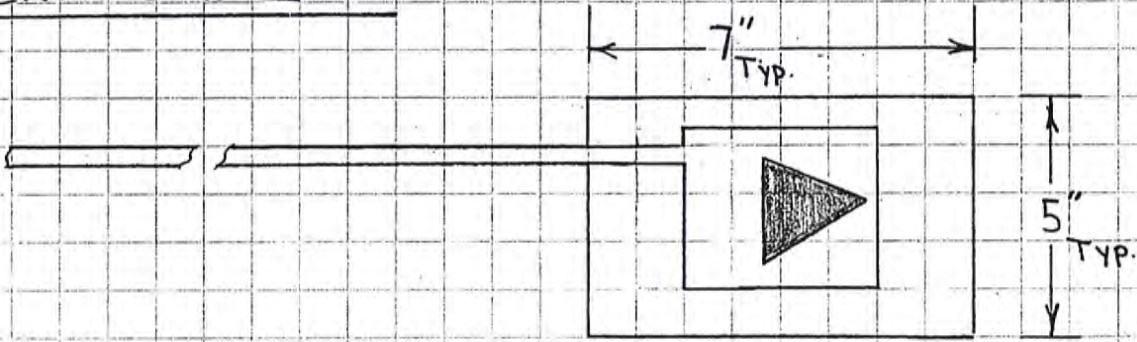
$$(V_a) = 2 \times 2 \times 12.75 = \underline{\underline{(51.00)}}$$

$$6072.48 \text{ in}$$

$$3.514 \text{ ft}^3$$

AIR INLET SETTINGS

CATEGORY 1



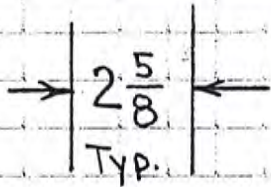
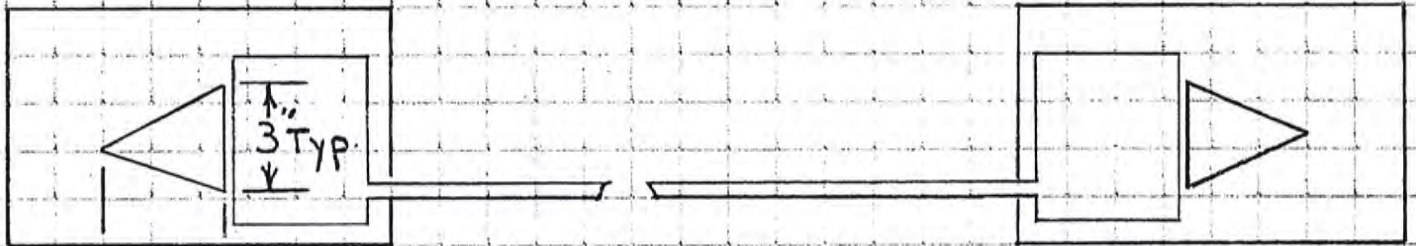
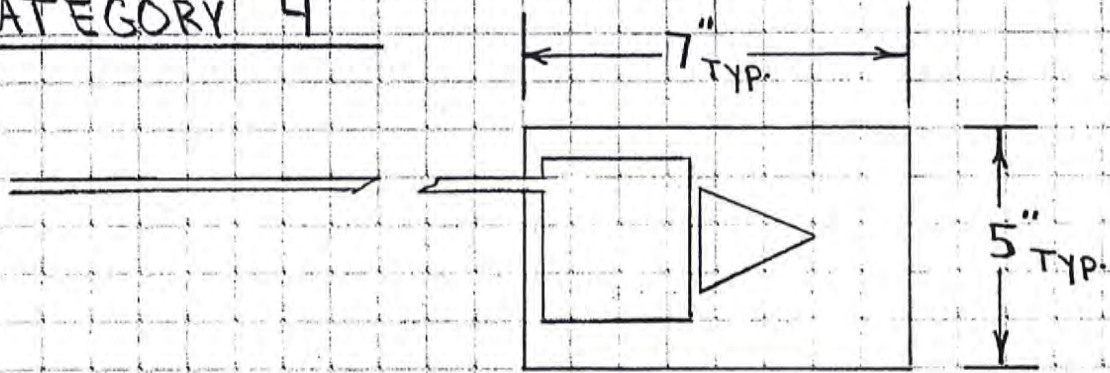
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ALL DIMENSIONS SHOWN TYPICAL
FOR ALL (3) AIR INLETS

TOP VIEW

AIR INLET SETTINGS

CATEGORY 4



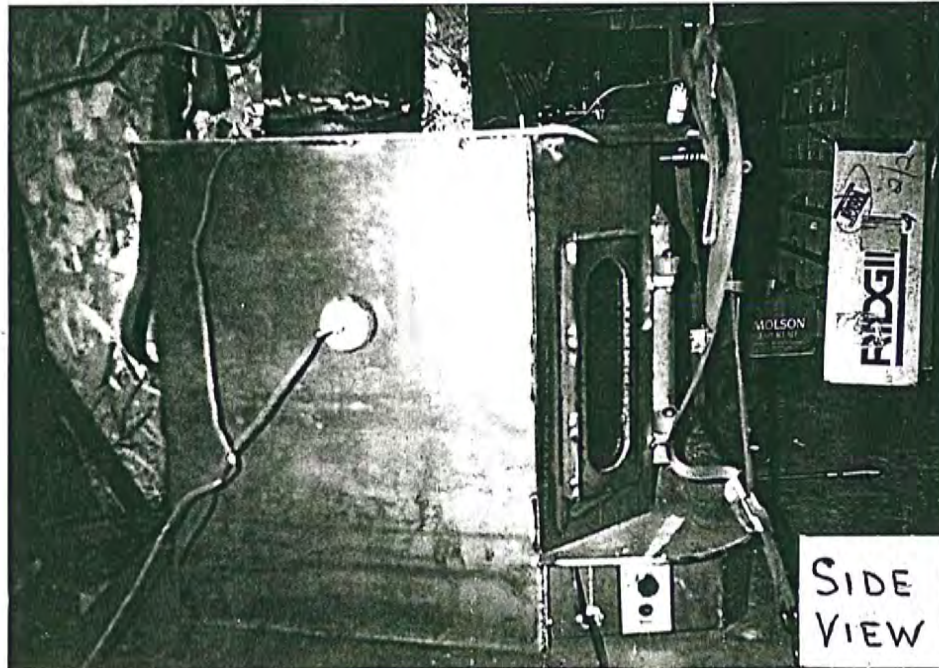
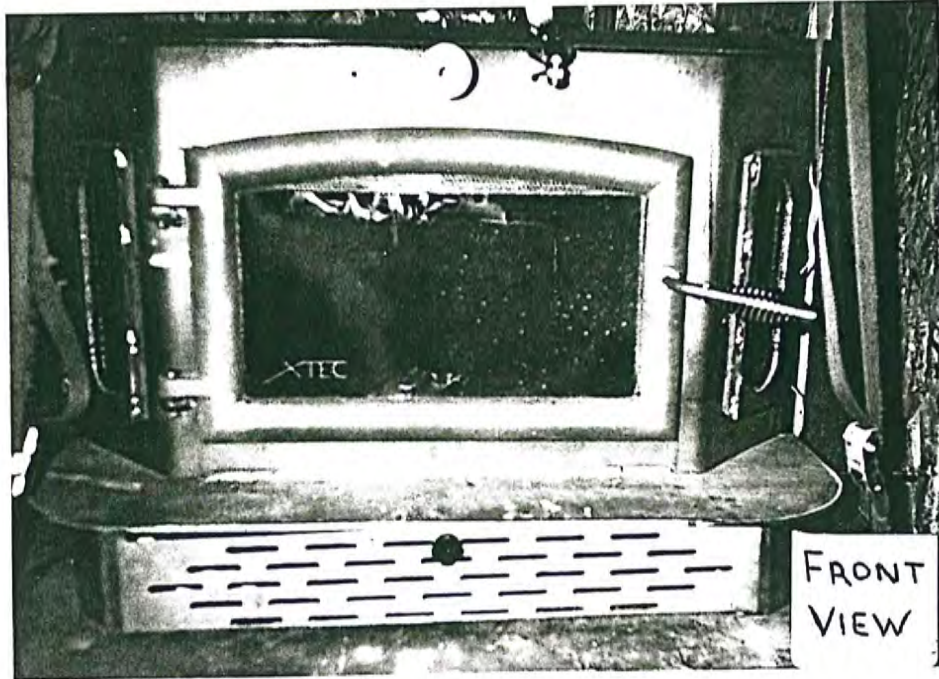
* NOTE: ALL (3) AIR INLETS
OPEN MAX.

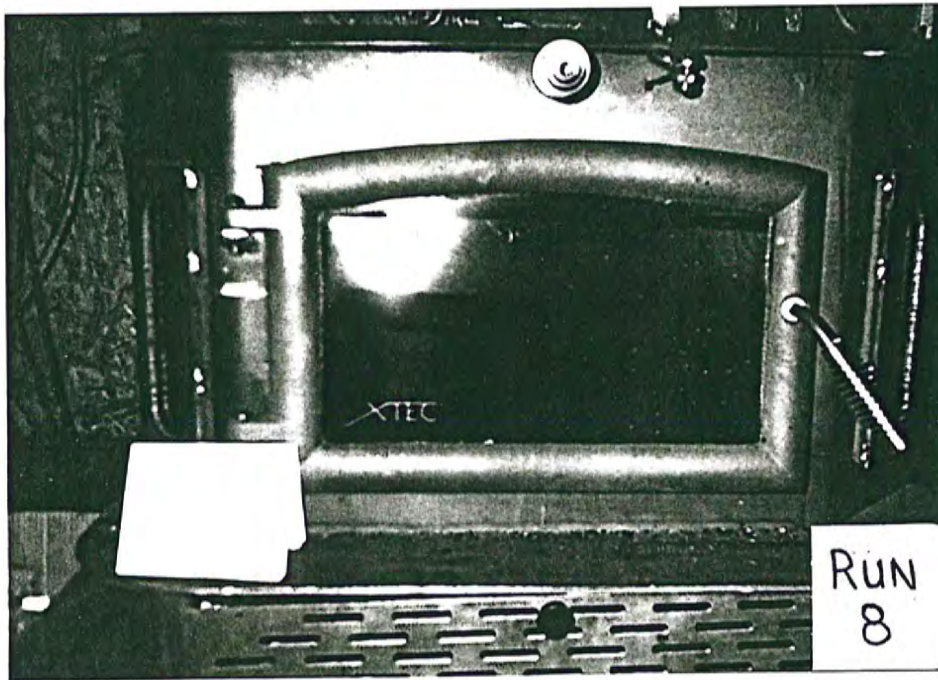
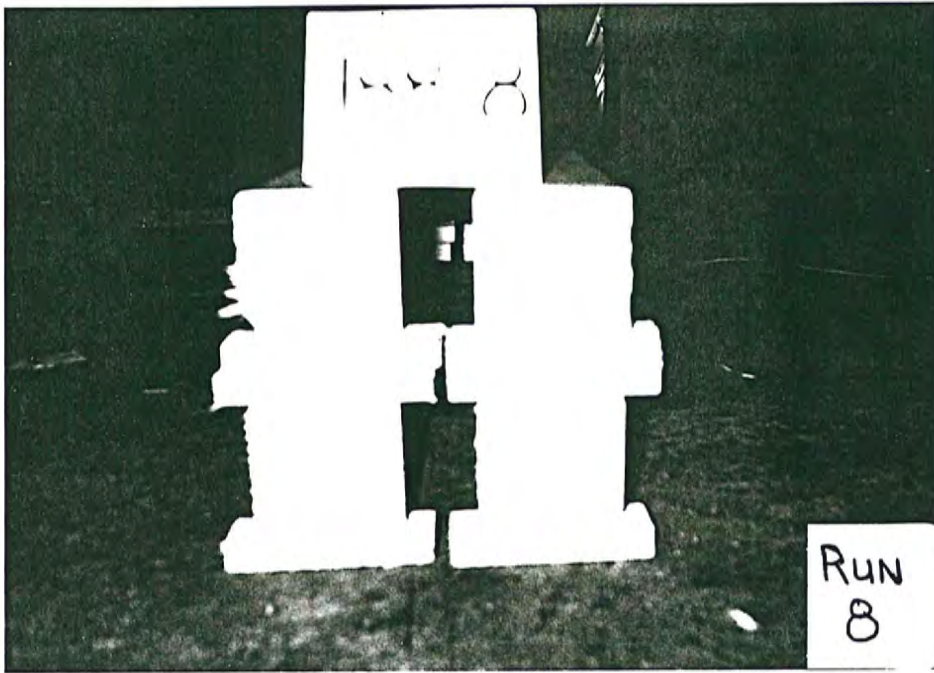
DIM. SHOWN TYPICAL FOR
ALL (3) AIR INLETS

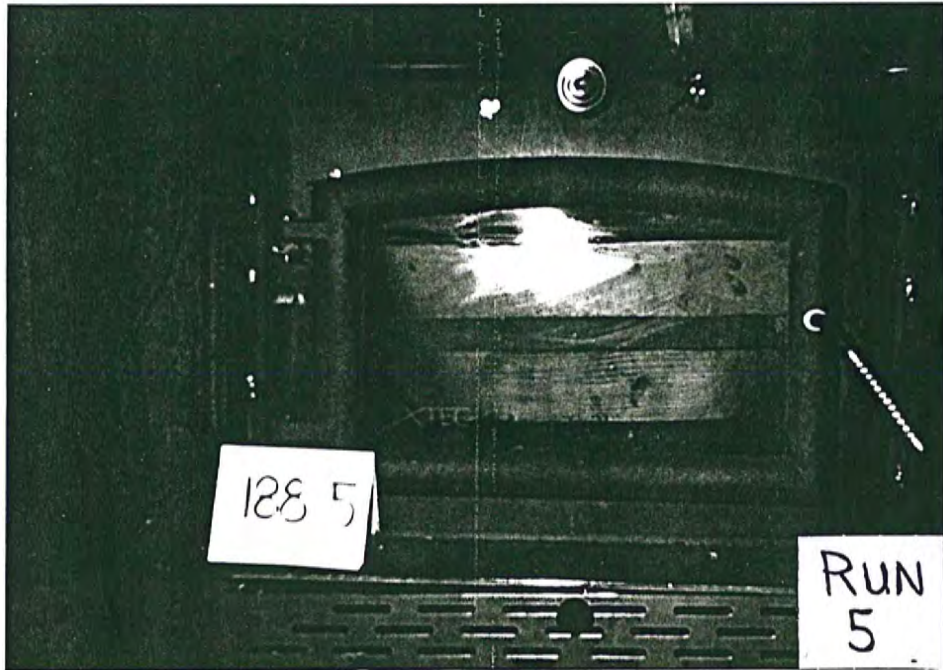
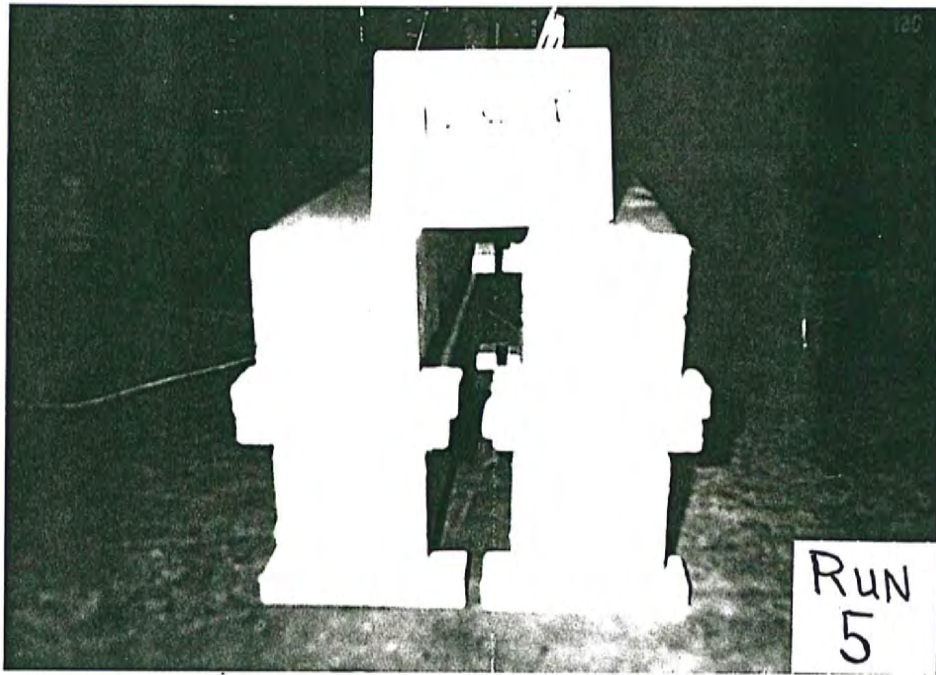
TOP VIEW

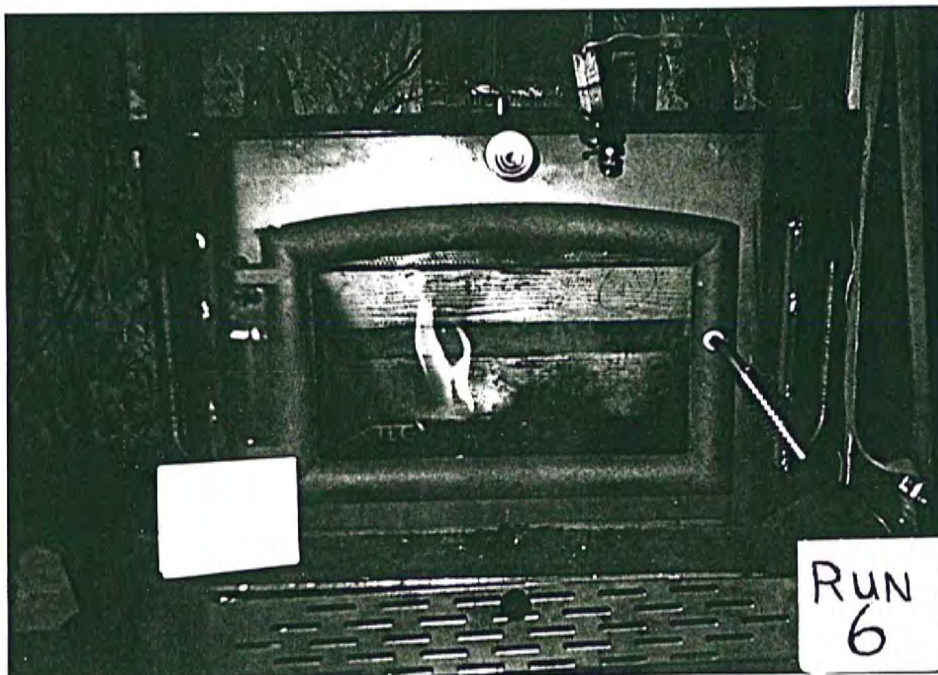
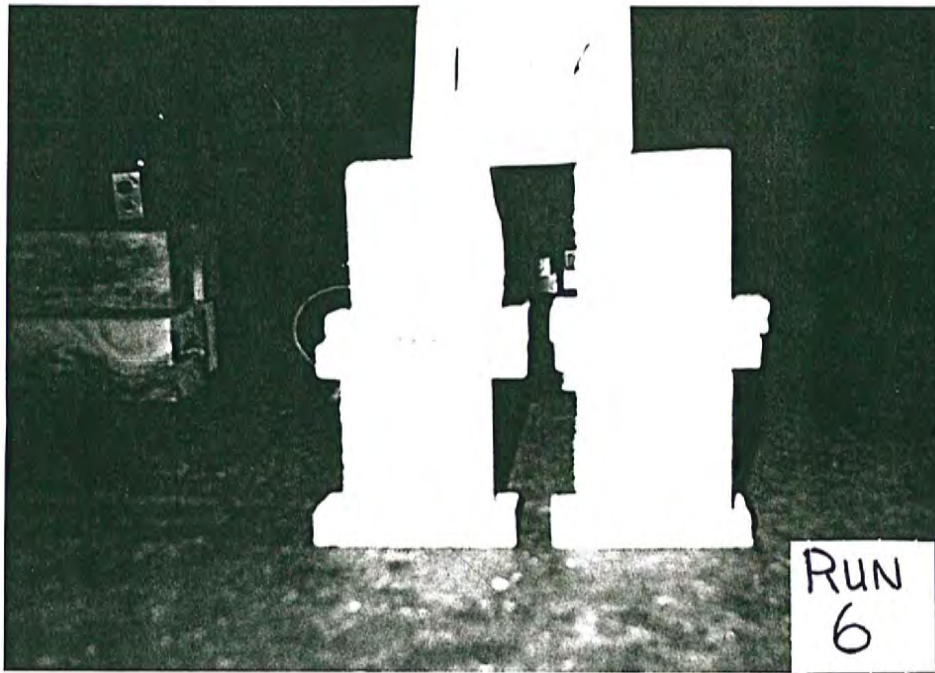
Test Crib and Wood Heater Photographs

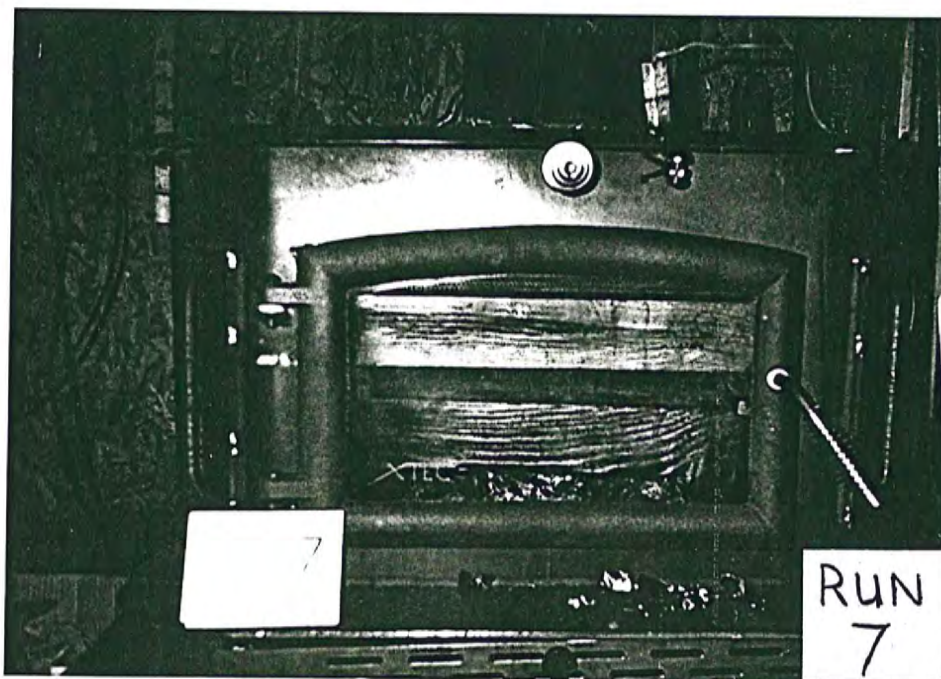
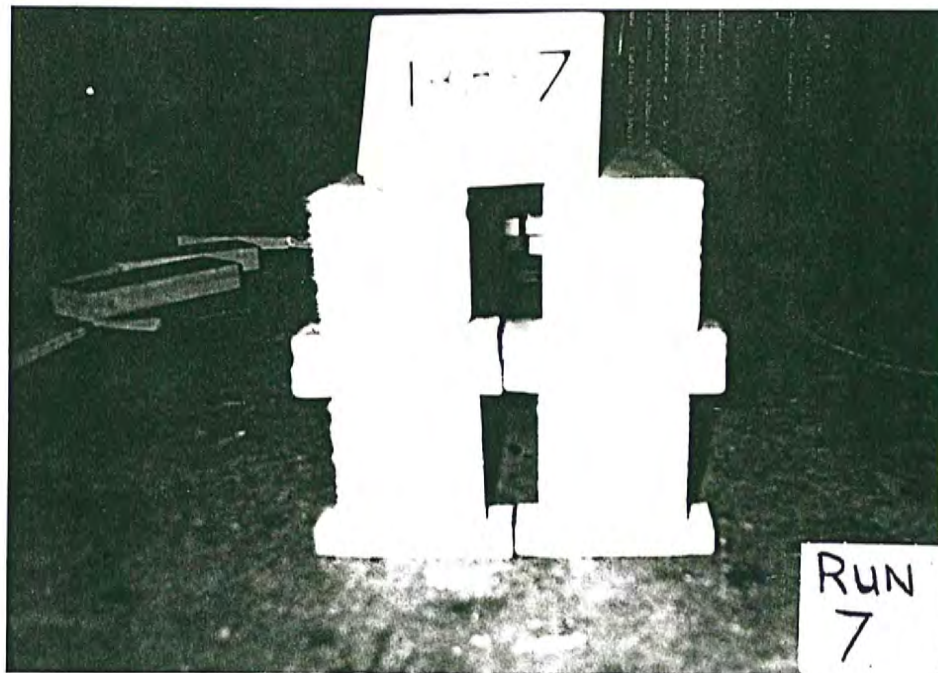
XTEC
MODEL 2500

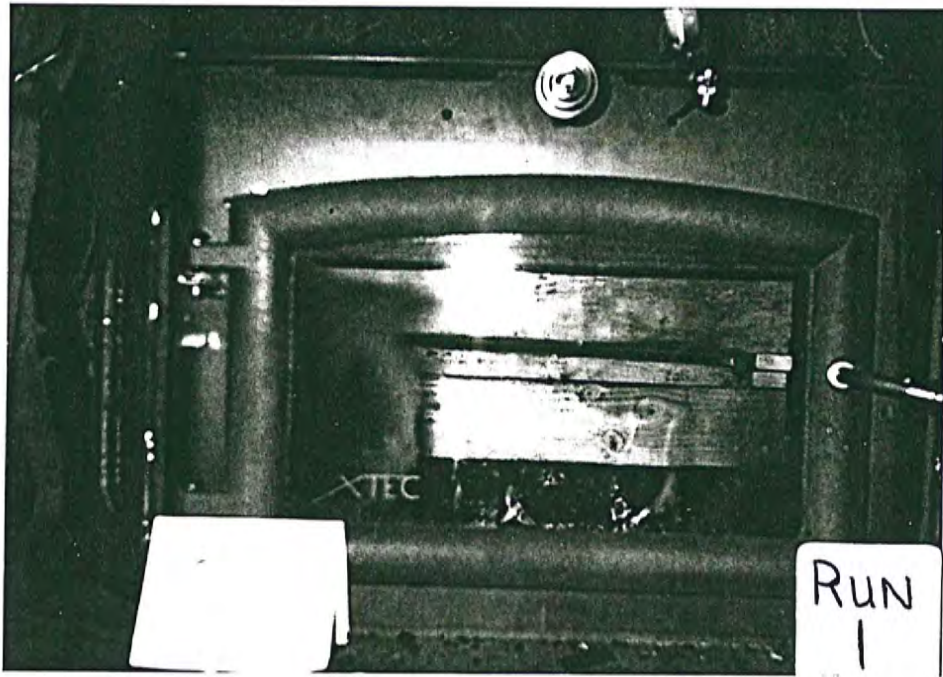
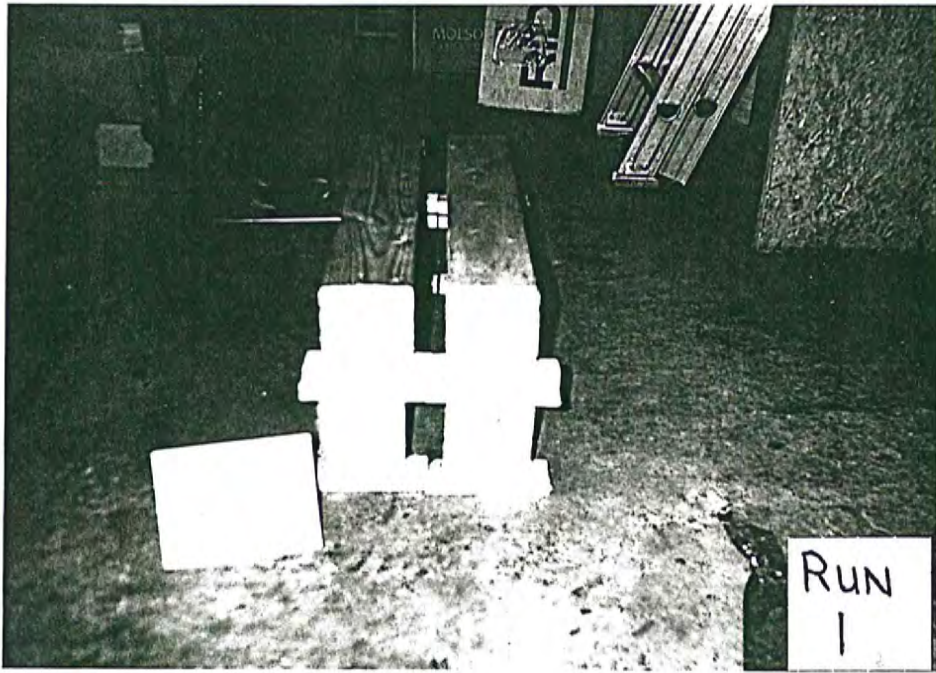


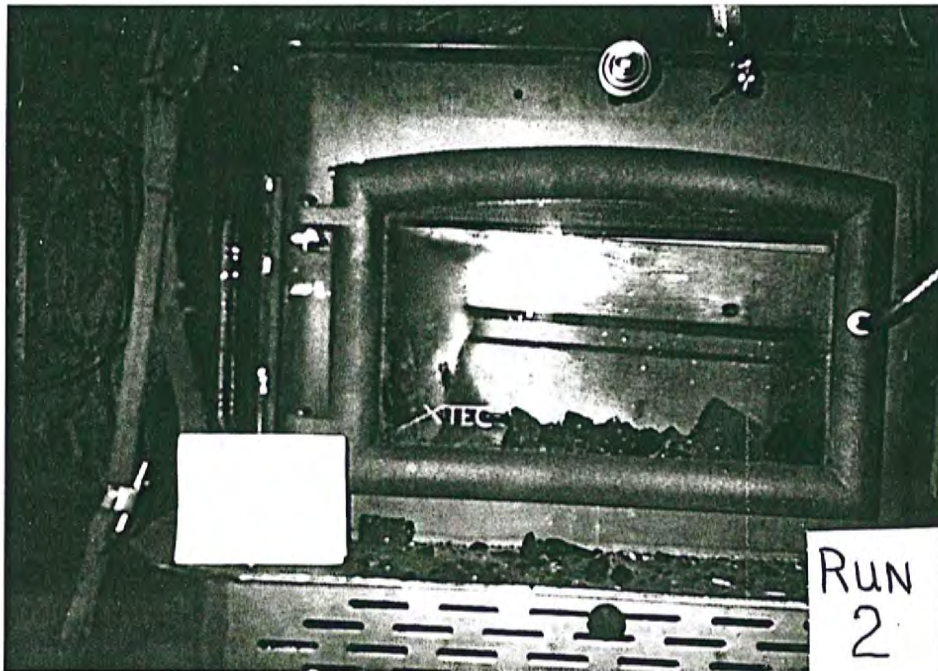
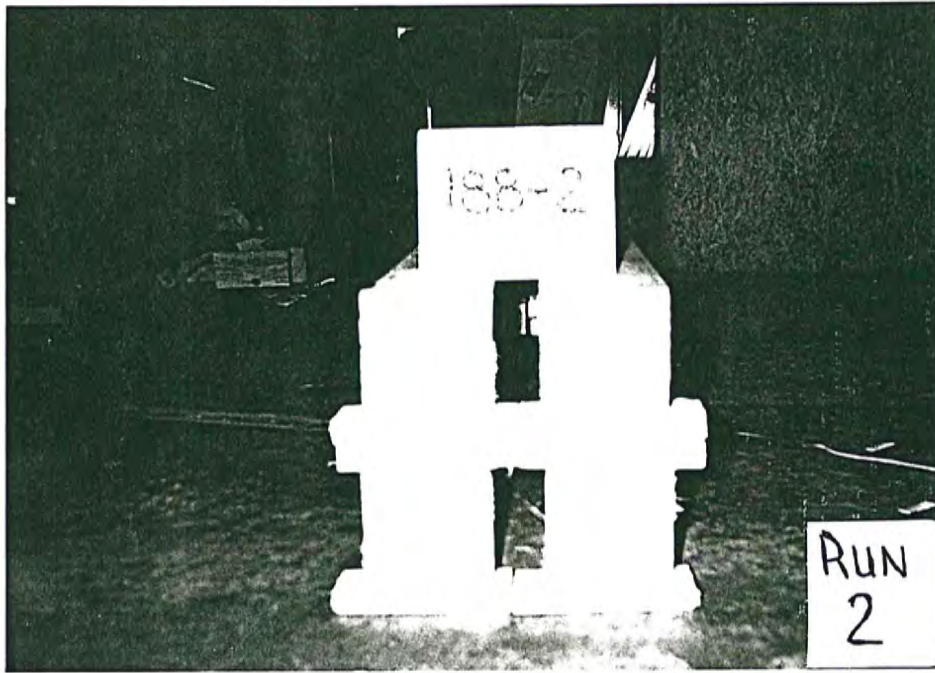


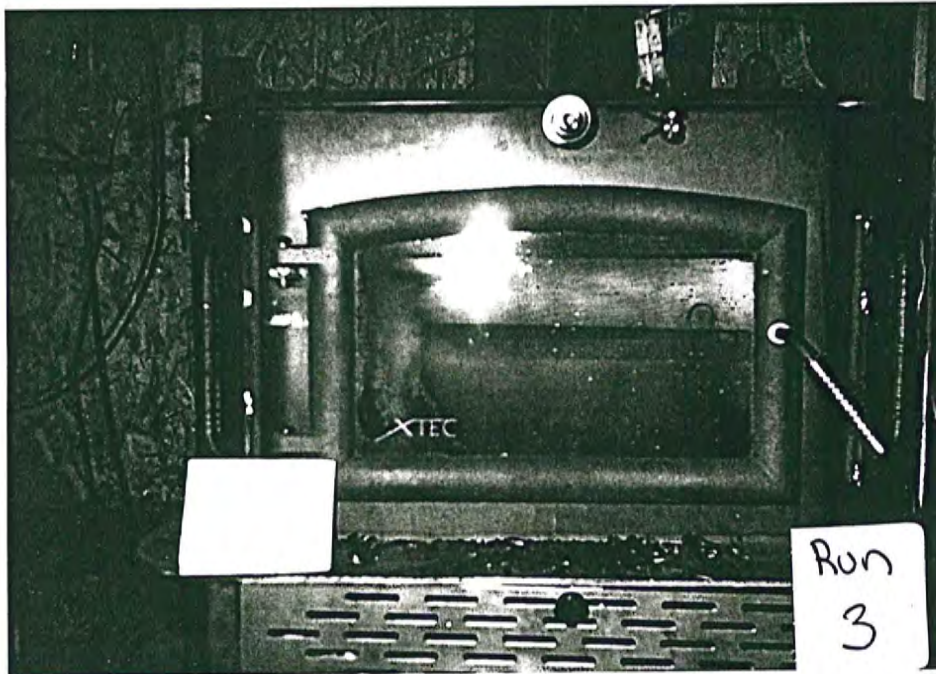
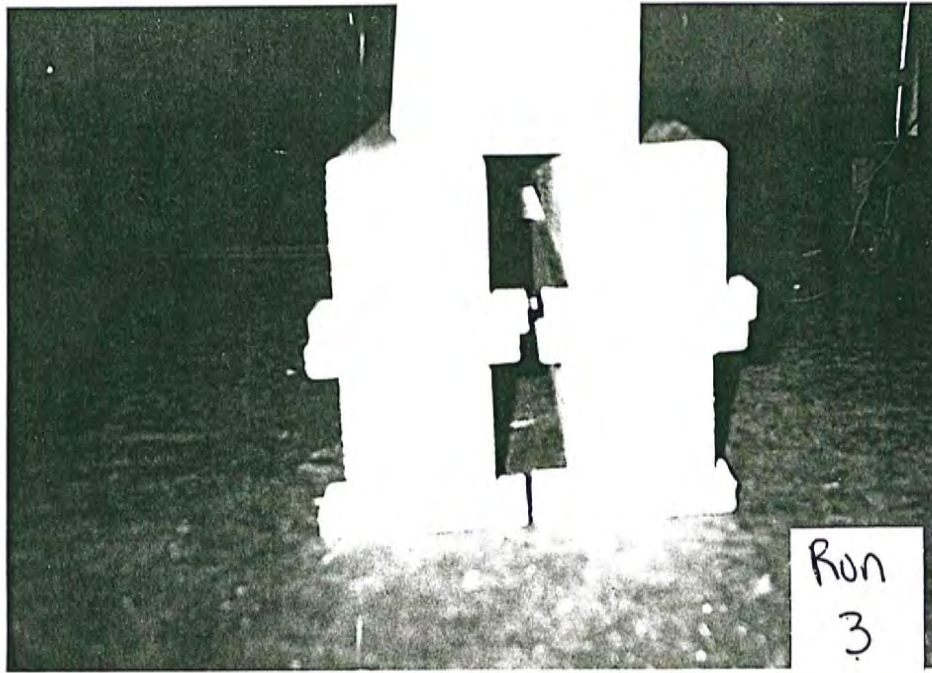


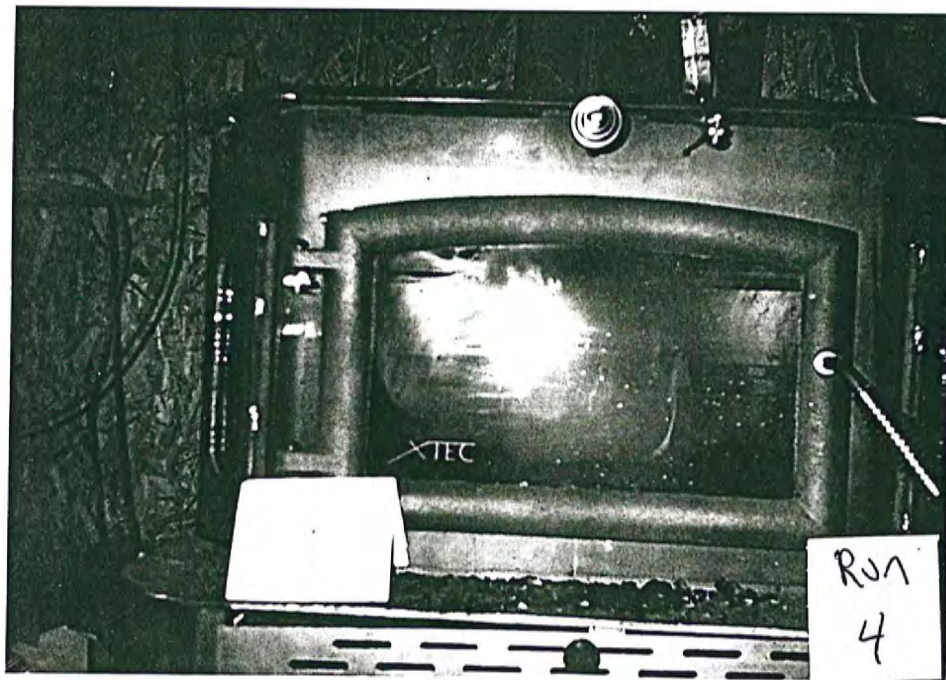
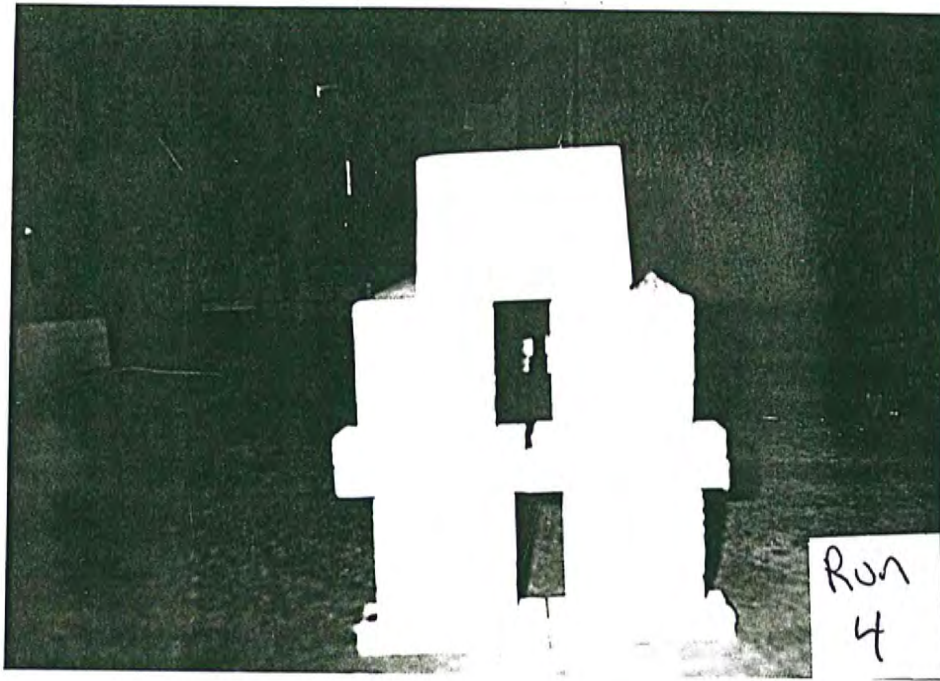












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Section V
Test Sampling Methods and Procedures

Test Sampling Methods and Procedures

Certification testing was conducted in accordance with the test methods and procedures specified in sections 60.534 of 40 CFR Part 60. Methods 28 and Method 5G option 1 were used; a brief summary of the methods, and alternatives/deviations follow:

Method 28 - Certification and Auditing of Wood Heaters

Principle: Particulate matter emissions are measured from a wood heater burning a predetermined fuel crib in a test facility maintained at specific prescribed conditions. The wood heater is installed and operated in accordance with the method.

The Xtec 2500 stove was installed on a platform scale. Clean 8 inch steel flue pipe was extended to 8.6 feet above the top of the platform scale; above this level, insulated double wall chimney pipe was installed extending to 14.6 feet above the platform scale. Five surface thermocouples and one thermocouple located downstream of the catalyst outlet were connected to a Type K thermocouple readout.

Room temperature was measured 3 to 6 feet in front of the 90 degree sector of the heater in the horizontal plane level with the primary air intake.

Each test run was started when the kindling and pretest fuel had been consumed to leave a fuel weight between 20 and 25% of the actual crib weight. At this time the scale was tared and the sampling train was started. Within 1 minute after the start, the test crib was loaded into the stove. During the first 5 minutes, the stove was manipulated to insure good ignition of the test crib. Applicable test conditions are monitored prior to, during, and at the end of each test. All data was recorded manually.

Method 5G - Determination of Particulate Emissions From Wood Heaters From a Dilution Tunnel Sampling Location

Principle: Particulate matter is withdrawn proportionally at a single point from a total collection hood and sampling tunnel that combines wood heater exhaust with ambient dilution air. The particulate matter is collected on two glass filters in series. The filters are maintained at a temperature no greater than 90 degrees F. The particulate mass is determined gravimetrically after desiccation to a constant weight at room temperature.

A dual filter dry sampling train was started within one minute prior to test fuel crib loading and continued until the test crib weight was completely consumed. The filter holder uses two 110 millimeter glass fiber filters placed in series. The sampling

train was operated at approximately 0.5 cfm. Two 4 point velocity traverses of the dilution tunnel were conducted at 90 degrees apart during the pretest burn. The standard type pitot was set at a point of average velocity for the duration of the test run. The traverse points were located 6.25 feet downstream from an elbow and 4 feet upstream from the sampling locations. The sample point was located 17.6 feet from the hood outlet, and 1.25 feet upstream from the elbow connected to the blower. The sample probe was inserted into center of the tunnel. Tape was wrapped around the probe to seal any gaps between the probe and sample port.

Sample recovery and probe/front half rinse evaporation occurred in the same room. The filters were desiccated and weighed together. The probe/front half rinse was collected directly into a tared weighing dish. The rinse was measured gravimetrically.

Dilution tunnel, sample train, test facility schematics and the pertinent equipment list are located in this section.

Alternatives/Deviations

Filter spacer is made of high density polypropylene versus teflon, glass or stainless steel.

EQUIPMENT LIST

Test Facility and Wood Heater List

Flue Pipe: 8 inch, 22 gauge black stove pipe, Elmer's black pipe permanently seamed

Insulated
Flue Pipe: 8 inch Shelkirk metalbestos, stainless steel, double wall insulated

Platform Scale: DIGI MATEX, Model DI-10, Range 1000 lbs.x 0.1 lb increments

Fuel Storage: Fuel wrapped in plastic, stored inside building

Moisture Meter: Delmhorst, Model RDX-1 with type 26-ED electrode, Range 6-60%; Built in compensation for wood species, wood temperature and electrode type; Internal calibration check, also checked with MCS-1 calibration standard

Temperature Monitors: Type K thermocouples w/Omega MK115 readout, range 0-2000 degrees F

Draft Gauge: Dwyer, Model 115, range -0.5 to 0.25 in. water, minor scale divisions .005, accuracy +/- % full scale

Anemometer: Dwyer #480 Vaneometer, range 0-400 ft./min., accurate to +/- 5% of full scale to 100 ft./min. and +/- 10% from 100ft./min. to top of scale. Pre-calibrated vane

Humidity: Princo, Pocket Sling Psychrometer; Thermometers Hg in glass; Range 30-110 F by 1 degree divisions

Barometer: Gilmont, Mercury Barometric Manometer, Range 0-80 cm by 0.1 divisions
Boston, aneroid barometer, Range 71-79 cm. Hg by 0.01 divisions

Stove/Dilution Tunnel Equipment Specifications

Dilution Tunnel: Black stove pipe and galvanized hood; Hood 18 to 30 in. diameter x 20 in. long with 6 in. collar

Tunnel Dimensions: See Dilution Tunnel Schematic

Baffles: Located midway between the elbows, spaced 12 in. apart in the semi-horizional section of the pipe

Traverse Points: Two holes drilled 90 degrees apart from each other; See Dilution Tunnel Schematic

Sample Ports: Two 3/4 in. holes drilled opposite of each other-the holes are sealed with tape

Damper: 6 in. steel damper located in blower to 6 inch adapter

Blower: Dayton, High Volume Direct Drive-1/3 hp,

Cleaning Materials: 6 & 8 in. wire flue brush, fiberglass extensions

Sampling Train 5G-1

Probe: Borosilicate glass, 5/8 in. OD x 18 in. long w/ball joint and water cooled jacket

Filter Holder: Standard 11cm glass filter bells, glass frit w/silicon gasket, joints-ball and socket 28/15, filter spacer-acetone resistant plastic w/inconel thermocouple, Type K

Filter: Whatman 934 AH, 11.0 cm disc

Gas Dryer: Stainless steel condenser with thermocouple for monitoring exit temperature

Meter Box: Apex Instruments, Model 45G, with Rockwell DGM 0.1 cu.ft./rev., diaphragm pump

Thermocouple: Type K Thermocouples; Type K extension wires; Omega MK-115 readout range 0-2000 degrees F

Pitot: Standard pitot tube, Constructed of 5/16" dia. stainless steel tubing with magnetic base and adjustable slide with locking nut

Pitot Manometer: Dwyer, Model 115, range -.05-0.25 in., minor scale divisions .005, accuracy +/- 1% full scale

Analytical Equipment

Analytical Balance: Mettler Model AE100, Range 0-110g, readability +/- 0.1 mg, linearity +/- 0.1mg

Balance: Ohaus, Model 760w, Triple Beam, capacity 2610g, sensitivity 0.1 g

Fume Hood: Galvanized steel w/plexiglass shield

Calibration Weights: Class S, stainless steel

Brushes: Nylon bristle, various lengths

Desiccator: Fisher brand, glass and stainless steel construction

Reagents

Acetone: Fisher Optima, certified grade

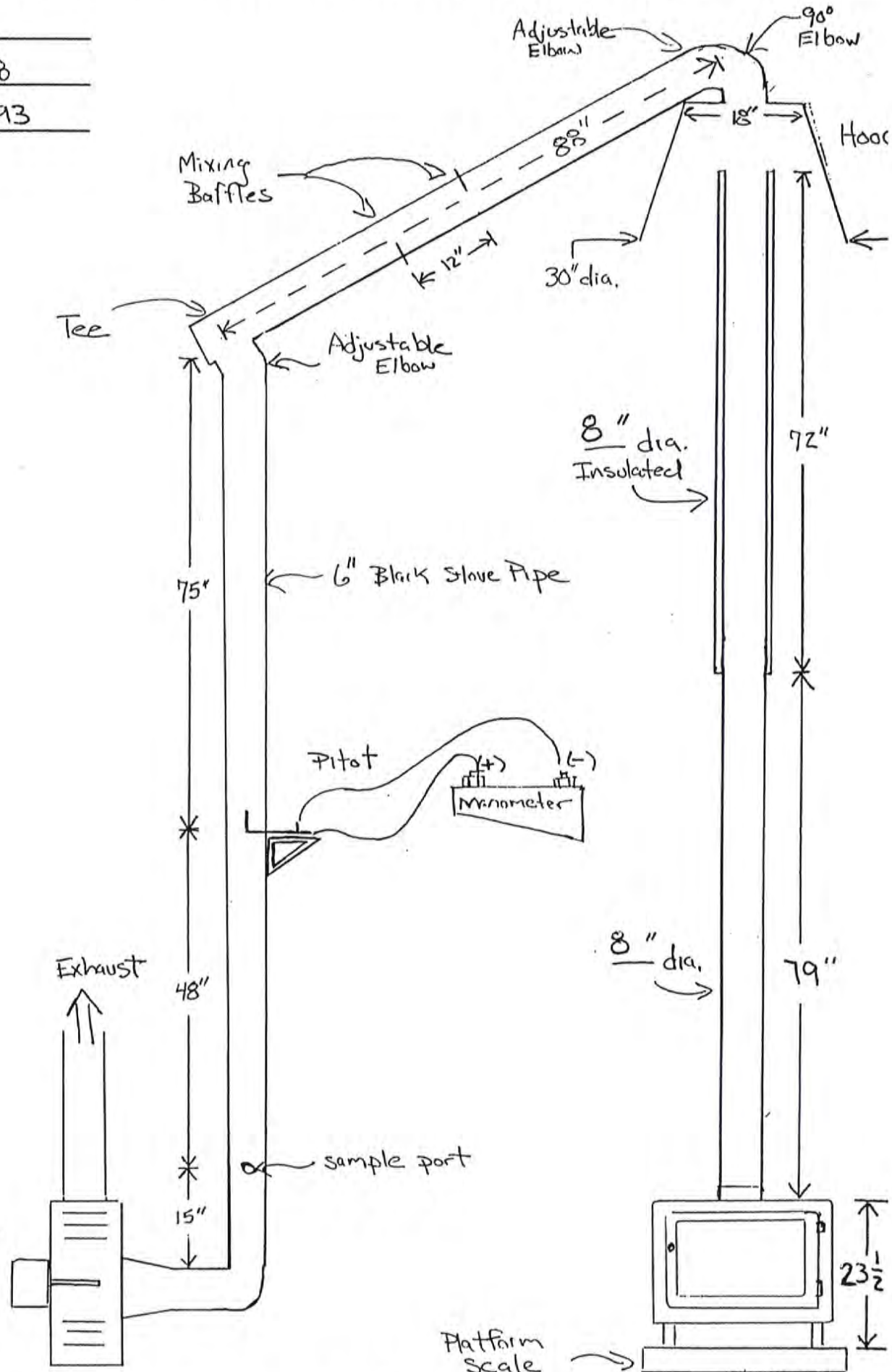
Desiccant: Drierite, Anhydrous Calcium Sulfate, 8 mesh
Silica Gel, indicating 6-16 mesh

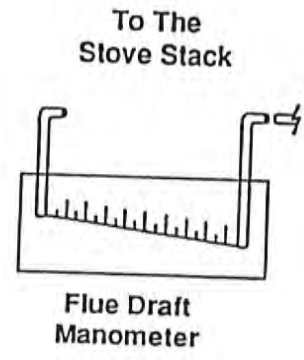
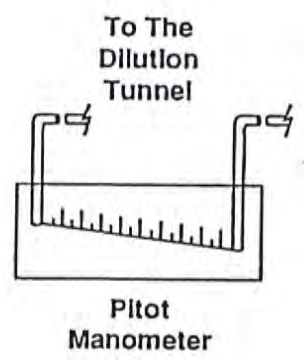
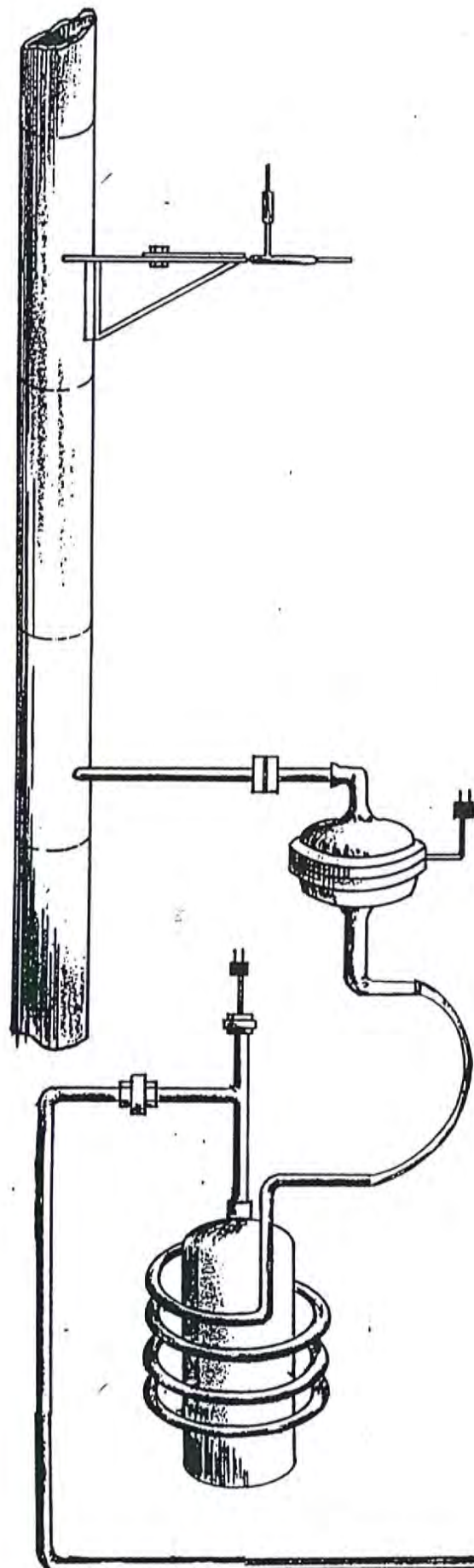
EPA METHOD 5G DILUTION TUNNEL & STOVE INSTALLATION

MODEL: 2500

PROJECT #: 188

DATE: 4-26-93

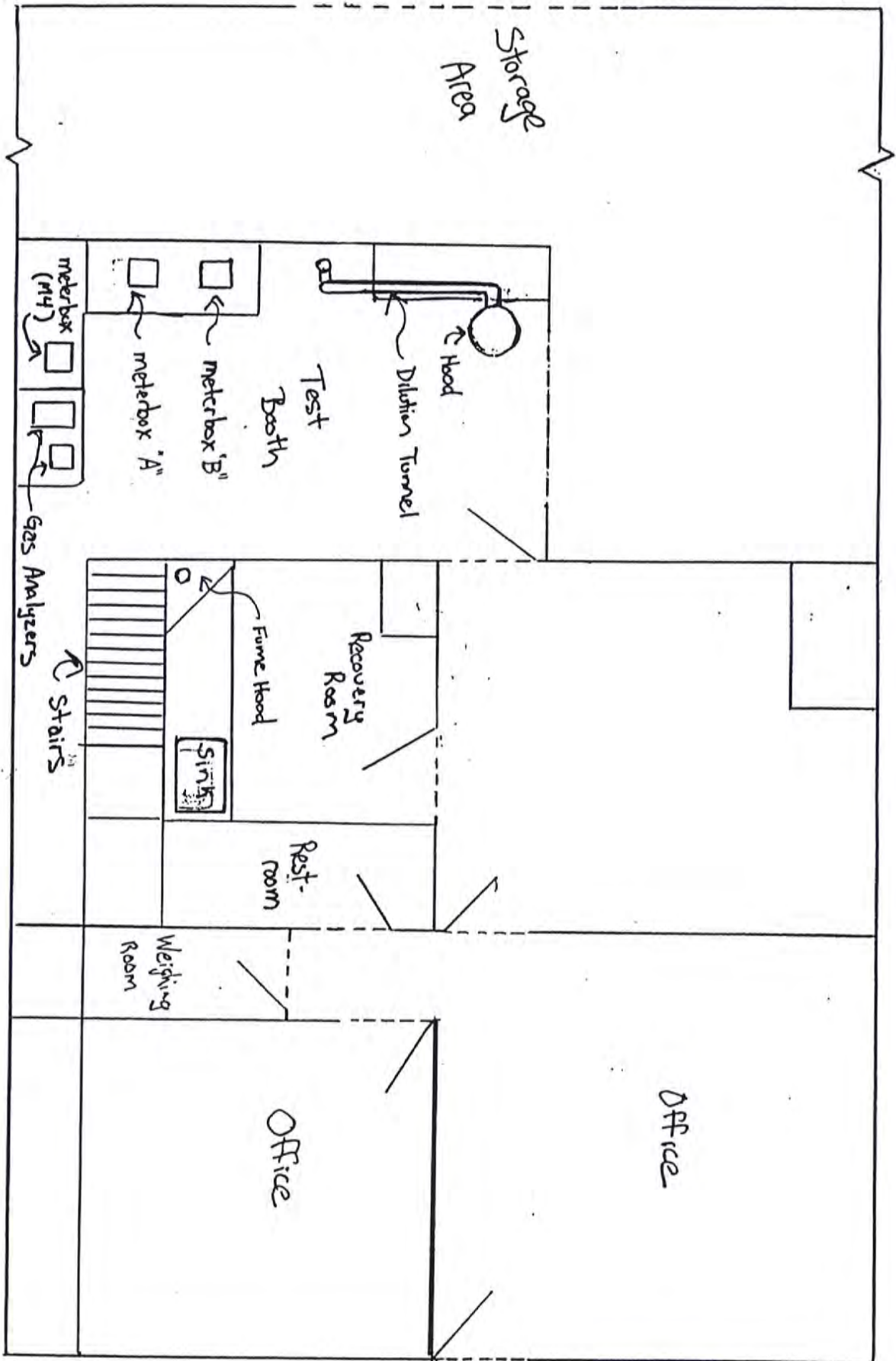




Dual Filter Holder with Thermocouple In the Spacer

Vacuum Line

Meter Box



Apex Test Facility

Appendix A
Quality Assurance Procedures and Calibration Results

Quality Assurance Procedures

Each item of test equipment purchased or constructed is inspected before its initial use and prior to each test series. Equipment calibrations are conducted in a manner and within the recommended frequencies specified by the U.S. EPA. Apex Environmental Services, Inc. (AES) follows the calibration procedures outlined in EPA Reference Methods, and the those recommended within the Quality Assurance Procedures: Method 28 CERTIFICATION AND AUDITING OF WOOD HEATERS and Method 5G DETERMINATION OF PARTICULATE EMISSIONS FROM WOOD HEATERS FROM A DILUTION TUNNEL SAMPLING LOCATION (EPA 600/3-89-049 and EPA 600/3-89-050, respectively), and the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977).

Test personnel are encouraged to consult the reference methods, QA manuals, and the applicability questions/responses whenever any questions arise. All data, test results and calibration data are reviewed by the Project Manager.

Data reduction and calculations are performed using the EPA computer programs. Computer results are compared with the raw data and manually reduced results for accuracy.

Calibration Summary

<u>Item</u>	<u>Calibration Date</u>	<u>Result</u>	<u>Next Calibration Due</u>
Std. Pitot	N.A.	spec.s met	
Wet Test Meter	7/92	1.0023	7/93
Reference (std) DGM #1039897	3/27/92	1.0054	3/27/93
Sample DGM:			
Apex #45G-P	pre: 3/25/93 post: 5/6/93	Y= 1.014 Y= 1.007	9/25/93
Temperature Gauge	12/12/92	*	6/12/93
Hg Barometer	NA		
Boston Aneroid	12/10/92	*	9/6/93
Analytical Balances: AE-100	12/10/92	*	5/10/93
Platform scale: DI-10	1/18/91	*	Audit each run
Moisture Meter	by Mfg.	*	Audit each run
Anemometer	pre-calibrated vane		Inspected daily
Humidity Gauge	Hg in glass thermometers		NA
Manometers	inclined		NA

3-27-92

Apex- REFERENCE METER- S-110

1039897

70°F P_b = 29.81"

$$2.00 \times 1.0000 \times 29.81 \times (460 + 70)$$

31598.60 yd.

$$V_T \times \left(\frac{\Delta H}{13.6} + 29.81 \right) (460 + 70)$$

ΔH	FLOW RATE	Volume	yd	Ave. yd.
.50"		1.9955	1.0010	
		1.9960	1.0007	1.0009
		1.9950	1.0012	
.70"	96 cuft/hr.	1.992	1.0022	
		1.994	1.0012	1.0018
		1.9925	1.0020	
1.00"	22.5 cuft/hr.	1.9975	1.0088	
		1.9775	1.0088	1.0090
		1.9760	1.0096	
1.50"	24 cuft/hr.	1.9760	1.0084	
		1.9775	1.0076	1.0077
		1.9780	1.0073	
2.00"	12 cuft/hr.	1.975	1.0076	
		1.976	1.0071	1.0076
		1.974	1.0081	

0.46

Overall Ave. yd =

1.0054

APEX INSTRUMENTS
EPA METHOD 5
Meter Box Calibration

Model #: 45-G-P Date: 3/25/93
Serial #: 45-G-P Barometric Pressure 29.85

dH	T i m e	DRY GAS METER VOLUME			CALIBRATION METER VOLUME (Yc= 1.0054)			Temp.		DGM Tmo	DGM Temp	Cal. Temp.		
		Initial	Final	Total	Initial	Final	Total	Init.	Final					
0.75	12.0	945.000	950.387	5.387	683.800	689.057	5.257	74	74	65	63	537.50	537.50	524.00
								81	81					
0.90	10.0	950.387	955.577	5.190	689.057	694.075	5.018	82	82	63	64	544.50	544.50	523.50
								87	87					
0.90	10.0	955.577	960.768	5.191	694.075	699.075	5.000	87	87	63	63	548.50	548.50	523.00
								90	90					
0.90	10.0	960.768	965.937	5.169	699.075	704.060	4.985	93	93	62	63	553.50	553.50	522.50
								94	94					
1.50	8.0	965.937	971.307	5.370	704.060	709.202	5.142	93	93	62	63	554.00	554.00	522.50
								95	95					

METER Y	DEL H
1.0046 -0.01	2.097 0.17
1.0088 0.00	1.890 -0.04
1.0134 0.00	1.886 -0.04
1.0249 0.01	1.877 -0.05
1.0170 0.00	1.880 -0.05
AVG. 1.014	AVG. 1.926

DRY GAS METER CALIBRATION DATA

Date 3-2-93 Calibration Meter # 1039847 Console Leak Check Front ✓
 Model # 45-G-P Yc = 1.0054 Back ✓
 Serial # 45-G-P Barometric Pressure, Pb = 29.85 Pitot Leak Check ✓
 Initials DRG Dry Gas Meter # 45-G-P Electrical Check ✓

Orifice (dH) in. H ₂ O	Gas Volume			Temperature			Time (0), min.	
		Dry Gas Meter (Vd) ft ³	Cal. Meter (Vc), ft ³	Cal. Meter (Tc), F	Dry Gas Meter			
					Inlet (Tm ₁), F	Outlet (Tm ₂), F		
.75	init.	945.000	683.800	init.	65	/	74	12
	final	950.387	689.057	final	63	/	81	
	total	5.387	5.257	avg.	64		77.5	
.9	init.	950.387	689.057	init.	63	/	82	10
	final	955.577	694.075	final	64	/	87	
	total	5.190	5.018	avg.	63.5		84.5	
.9	init.	955.577	694.075	init.	63	/	87	10
	final	960.768	699.075	final	63	/	90	
	total	5.191	5.000	avg.	63		88.5	
.9	init.	960.768	699.075	init.	62	/	93	10
	final	965.937	704.060	final	63	/	94	
	total	5.169	4.985	avg.	62.5		93.5	
1.5	init.	965.937	704.060	init.	62	/	93	8
	final	971.007	709.202	final	63	/	95	
	total	5.370	5.142	avg.	62.5		94	

$$Y = \frac{YcVc Pb(Tm + 460)}{Vd(Pb + dH/13.6) (Tc + 460)}$$

$$dH@ = \frac{0.0317 dH [(Tc + 460) 0/YcVc]^2}{Pb(Tm_1 + 460)}$$

APEX INSTRUMENTS
EPA METHOD 5
Meter Box Post Test Calibration

Model # 456P
Serial # 456P
Vacuum: 1.0

Date: 5-6-93
Barometric Pressure: 29.78

DRY GAS METER VOLUME

CALIBRATION METER VOLUME

(Yc= 1.0023)

dH	Time	Initial	Final	Total	Temp		Initial	Final	Total	Temp.		DGM Tno	DGM Temp	Cal. Temp.
					Tmi	Tmo				Init.	Final			
0.90	10.0	915.300	920.400	5.100	93	93	366.740	371.680	4.940	74	74	555.00	555.00	534.00
					97	97								
0.90	10.0	920.400	925.538	5.138	97	97	371.680	376.620	4.940	74	74	558.00	558.00	534.00
					99	99								
0.90	10.0	925.538	930.686	5.148	99	99	376.620	381.560	4.940	74	74	561.00	561.00	534.00
					103	103								

METER Y

DEL H

1.0068	0.00	2.026	0.01
1.0048	0.00	2.015	0.00
1.0082	0.00	2.005	-0.01

AVG. 1.007 AVG. 2.015

POST TEST

DRY GAS METER CALIBRATION DATA

Date 5-6-93 Calibration Meter # 11 AEL6 DGM Leak Check Front
 Model # 45GP Yc = 1.0023 Back
 Serial # 45GP Barometric Pressure, Pb = 29.78 Pitot Leak Check
 Calibrated by WJS Dry Gas Meter # 45GP Electrical Check
 Vacuum 1 Hg "

Orifice (dH) in. H2O	Gas Volume			Temperature			Time (t), min.	
		Dry Gas Meter (Vc) ft ³	Cal. Meter (Vc) ft ³		Cal. Meter (Tc), F	Dry Gas Meter		
						Inlet (Tm _i), F		Outlet (Tm _o), F
.9	init.	915.300	366.74	init.	74	/	93	10
	final	920.400	371.68	final	74		97	
	total	5.1	4.94	avg.	74		95	
.9	init.	920.400	371.68	init.	74	/	97	10
	final	925.538	376.62	final	74		99	
	total	5.138	4.94	avg.	74		98	
.9	init.	925.538	376.62	init.	74	/	99	10
	final	930.686	381.56	final	74		103	
	total	5.148	4.94	avg.	74		101	

$$Y = \frac{YcVc Pb(Tm + 460)}{Vd(Pb + dH/13.6) (Tc + 460)}$$

Back-Half Leak Check (Diaphragm Pump Only)					
Gas Volume					
	Cal. Meter (VC), cu. ft.	Dry Gas Meter (VM), cu. ft.	Difference (Cal. Meter minus DGM)	Time (Minutes)	Leak Rate (cfm)
initial	381.86	931.000			
final	381.94	931.097			
total	.08	.097	.017	10	.0017

THERMOCOUPLE CALIBRATION DATA SHEET

Date 4-1-93

Calibrator W.L. SHERILL

Ambient Temperature (F°) 66

Reference Thermometer Fisher

Barometric Pressure (in. Hg) 29.81

Thermocouple Readout 115 KF

Thermocouple Id.	Freezing Point		Ambient		Boiling Point		OMEGA Simulator	
	Reference Thermometer	Thermocouple Readout	Reference Thermometer	Thermocouple Readout	Reference Thermometer	Thermocouple Readout	Reference Thermometer	Thermocouple Readout
SC11307 PTCAL 1404 P	32	32	67	66	212	212	0	100
HCH 909 PHAL 012	32	32	67	65	212	212	200	200
TCH 2021 PTCAL 1971 P	32	- 31	67	66	212	211	300	300
HCH 2035 PHAL 2036 P	32	31	67	64	212	211	400	401
TCH 1309 PTC AL 1005 P	32	32	67	67	212	213	500	500
CC114027 PCAL 407CP	32	31	67	66	212	212	600	600
TCH 409 PHAL 5035 P	32	32	67	67	212	212	700	698
							800	800
							900	900
							1000	1001
							1100	1100
							1200	1200
							1300	1300
							1400	1400
							1500	1500
							1600	1600
							1700	1698
							1800	1800
							1900	1900
							2000	2001

**ANEROID BAROMETER CALIBRATION
DATA**

Barometer: Brand Boston Identification # 1-79-4
 Range 71-79 cm Scale Divisions 0.1 cm

Reference Barometer			Aneroid		Calibrated	
Type	Source	Value	Initial	Adjusted	Date	Initials
Hg	AES	762mm	760	76.2	3-16-91	WHA
Hg	AES	755mm	755	NA	9-16-91	WHA
Hg	AES	760	760	NA	3-6-92	WHA
Hg	AES	755	755	NA	9-21-92	WHA
Hg	AES	744	744	NA	12-16-92	WHA

ANALYTICAL BALANCE CALIBRATION FORM

Balance name Mettler AE100 Number SNR K04827

Classification of standard weights "S"

Date	0.5000g	10.0000 g	30.0000g	60.0000 g	100.0000 g	Analyst
5/9/90	.5000	10.0000	30.0000	60.0000	100.0000	WtH
11/12/90	.5000	10.0000	30.0000	60.0000	100.0000	WtH
5/12/91	.5000	10.0001	30.0001	60.0000	100.0000	WtH
11/14/91	.5000	10.0000	30.0001	60.0001	100.0000	WtH
5/9/92	.5000	10.0000	30.0001	60.0000	100.0000	WtH
12/10/92	.5000	10.0000	30.0000	60.0001	100.0000	WtH

BALANCE CALIBRATION FORM

Balance name Ohaus Triple Beam Number #1

Classification of standard weights S 215 WtH 11/12/90

Date	5 g	30 g	100 g	200 g	235 g	Analyst
1-11-90	5.05	30.05	100.05/99.95	199.95	234.90	WtH
5-9-90	5.05	30.05	100.05/99.95	199.95	234.95	WtH
11/12/90	5.05	30.05	100.05/100.000	2000	215.0	WtH
5-12-91	5.00	30.00	100.05/100.00	199.95	214.80	WtH
11/14/91	<u>Beam #1</u> $\frac{5g}{11}$ <u>Beam #2 #1</u> $\frac{10g}{10.1}$ <u>Beam #3 #1</u> $\frac{100g}{100.0}$	$\frac{5g}{5.2}$ $\frac{50g}{50.0}$ $\frac{500g}{500+}$	$\frac{10g}{10+(10.3)}$ $\frac{100g}{100.0}$ 500.0 w/ All 3 beams			WtH
5/9/92	5.00	30.05	100.00	199.95	500.00	WtH
12/10/92	5.00	30.05	100.00	199.95	500.00	WtH

INTRODUCTION

The Model RDX-1 Digital Wood Moisture Detector is the latest and finest addition to the line of well-known Delmhorst Instruments in the field. It has been designed and manufactured in the USA, utilizing up-to-date technology to meet high quality standards both in its manufacture and its performance. To take full advantage of the RDX-1 capabilities, read the Owners' Manual thoroughly. You will find the RDX-1 to be a sophisticated instrument, yet one which is quite simple to use.

The Moisture Detector is covered by a 1-year warranty. If for any reason service is required, return the instrument directly to the manufacturer. Attempts to repair the Meter by unauthorized persons will void the warranty.

OPERATION

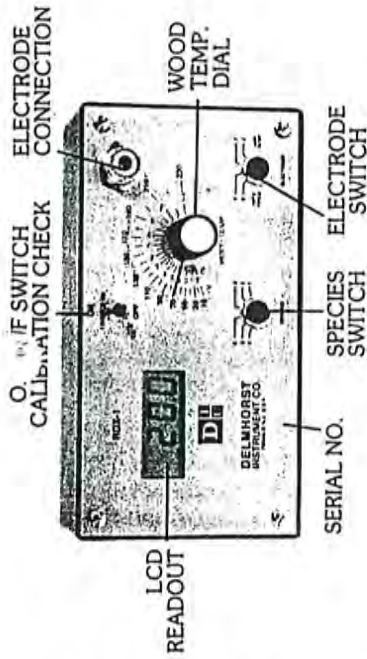
A) On/Off Switch

This switch is used to turn the Meter "ON" or "OFF", and to check the Meter calibration. The Meter is turned on, and remains on for four minutes when the switch is pushed up to the "ON" position and released. The timer is reactivated for four minutes with each subsequent test with a reading of 8% or higher. If readings are below 8% push the switch "ON" from time to time to prevent the Meter from turning "OFF" automatically. The Meter may be turned off manually by pushing the switch to the "OFF" position. When the Meter is "ON" and the Electrode pins are not in contact with the wood, a minus (-) sign is displayed.

The RDX-1 is designed to maintain its calibration even under changing temperature conditions. However, the operator may still check the Meter calibration by setting the "Species" switch to position "A", the Electrode switch to "4 - 70° Fixed", and pushing and holding the ON-OFF switch to "ON", until the display stabilizes. The Meter is in calibration if "20.0" (± 0.2) is displayed. If the Electrode switch is positioned to "2 - 70° F Fixed" the Meter is in calibration if "21.6" ($\pm .5$) is displayed.

B) "Species" Switch

Consult the chart "Species Grouping" to determine to which "group" the species which you are testing belongs. Select the



"group" by turning the slotted switch "Species" to the letter (A, B, C, D, E or F) corresponding to the appropriate "group".

The Meter is calibrated for Douglas Fir (Group A). For a more precise determination, the operator may elect to use the chart of individual species corrections; in this case the "Species" switch should be placed to "A" - Douglas Fir, and the correction is obtained from the chart.

Use of the "Group Species Correction" is a convenience which eliminates consulting the individual correction chart. However, "Group" correction is an average of the corrections for the species in the group. The "prime" species of each group is the first one listed, the other species may vary from their individual nominal correction — by a value of 1 to 1½%. For all practical purposes the group correction is more than adequate for obtaining reliable data.

C) "Electrode" Switch and "Wood Temp." Dial

The calibration of the Meter is based on using a 4-pin Electrode and having a wood temperature of 70°F. Set the "Electrode" switch to the "70° Fixed" positioning on either "2" or "4" mark, for measurements on wood with a temperature of around 70°F (20°C). The built-in temperature-adjustment device is thus disconnected.

NOTE: The "2" pin - "4" pin pins automatically compensate for the differences between readings obtained with either a 4-pin (4-E) or 2-pin (26-E, 2-E) Electrode. Two-pin Electrodes read lower than the four-pin ones. The difference is small below 10% moisture content; it increases with an increasing level of moisture content.

This point is being stressed in the current ASTM, #D4444-84, standard on portable moisture meters.

When the wood temperature varies from 70°F (20°C), precise measurements may be made by using the "Wood Temp" correction control to compensate for the effect of wood temperature on the Meter reading. The "Wood Temp" dial is set by aligning the indicator line with the temperature of the wood as marked on the panel. Note that this adjustment is operative only when the "Electrode" switch is set to the "Var. Temp." position, at either "2" or "4", depending on the Electrode.

NOTE: When the "Electrode" switch is set to either "2" or "4" on "Var. Temp.", the "Wood Temp." correction control must be set to the appropriate wood temperature to obtain an accurate indication of the moisture content.

HOW TO MAKE A TEST

After taking care of all the settings as described in previous paragraphs, such as "Species", "Temperature", and types of Electrodes, the Meter is ready for use.

Connect an Electrode to the Meter. Drive the pins into the wood and read the moisture content on the Meter display. Contact pins should be placed so that current between the pins (or sets of pins in the case of the multiple-pin Electrodes) runs with the grain.

NOTE: When uncoated pins are used they should be driven their full length into the wood. If insulated pins are used they may be driven to any depth.

The Meter will display a "corrected" moisture content reading depending upon the settings chosen with the "Species" and "Electrode" switches, and the "Wood Temp." dial.

INSTRUCTIONS
for
No. 480 VANEOMETER™
AIR VELOCITY METER



Use a Vaneometer to measure velocity of air flow into laboratory fume hoods and...

...at paint spray booths to determine when to change filters. Or wherever needed to meet OSHA standards of ventilation for smoke, dust or fume removal.



Use this sensitive new Dwyer Vaneometer™ to measure low air velocities—at low cost.

THE PROBLEM: How can you insure that OSHA, EPA and other safety ventilation requirements are met—at paint spray booths and at fume, smoke and dust exhaust hoods—in the plant, laboratory or restaurant? To do this, you need to measure low air velocities—from 25 to 400 feet per minute.*

Until now, instruments for this purpose have been complex and costly—from four to ten times the modest price of this unit.

SOLUTION: The new Dwyer Vaneometer™. It's pocket-size and light in weight—only four ounces. So it's handy to carry from one work station to another to make spot checks of air flow.* And it's easy to use—for untrained personnel. Just hold meter parallel to air flow—the pendulum vane/pointer indicates air velocity in feet per minute on a large, easy-to-read scale.

It can be hand held—or permanently mounted if continuous monitoring of face velocity is desired. A versatile steel mounting bracket and operating instructions are included. It's sensitive and accurate to $\pm 10\%$ of full scale. The Vaneometer has a bubble level and scale visible on both sides.

With housing of tough ABS plastic, it is durable and easy to clean with soap and water. The polyester vane can be cleaned with lacquer thinner. A spare vane is provided.

The Vaneometer is a tested, practical instrument for daily use—sensibly designed by Dwyer—"The Low Pressure People". Try one—and judge for yourself.

*For horizontal air flows only at this time.

+Metric scales are available. Range: 0 to 2.0 meters per second.



The Vaneometer's large scales are easy to read. Both sides have factory calibrated scales. Recessed bubble level at top helps insure accurate readings.



A versatile steel mounting bracket is included.

Left—Shows overhead mounting of Vaneometer for continuous monitoring.



The same bracket permits wall mounting. Bolts, nuts and screws are included.

How to Operate Meter

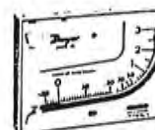


To install vane, pull vane holder from end of Vaneometer. Carefully remove vane from plastic bag and cardboard envelope. (Two vanes are enclosed, one is a spare.) Hang the vane by the wire in the two slots provided in the vane holder, then re-install the vane holder in the meter. Either side of vane may face the air flow. The meter is now ready to take readings. It is precalibrated. If vane becomes damaged, it is easily replaced with spare vane.

The Vaneometer is accurate to $\pm 5\%$ of full scale from bottom of scale to 100 FPM and $\pm 10\%$ from 100 FPM to top of scale.

For permanent mounting with bracket, Vaneometer should be located at least 6 inches from wall or side of duct. For accurate readings be sure to keep meter level at all times.

To determine face velocity, take the average of six readings. Readings should be taken at the center of six equal sections, three across top and three across the bottom. When conditions are such that the Vaneometer cannot be permanently mounted, it may be more practical to install a Dwyer Mark II differential pressure manometer and calibrate it to indicate a dirty filter condition. To calibrate a Dwyer Mark II No. 25 Manometer with the Vaneometer, first follow Mark II installation instructions, (Bulletin D-58 included with the gage). Install new filters, start spray booth fan, note and record manometer reading and face velocity. Block-off filter media until face velocity reaches 100 feet per minute or conforms to OSHA, EPA or governing agency. Record and mark this point on the manometer, then replace filters at this point.



For replacement Vanes, order Part No. A390, package of two. MARK II MANOMETER

Appendix B
Computer Results

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Wood Heater Emission Test Summary

Laboratory/Wood Heater Information

Stove Manufacturer: BUCHANAN WELDING & FABRICATION
 Model Identification: 2500
 Stove Type> 1=cat,
 2=noncat, 3=pellet: 1

Laboratory Name: APEX ENVIRONMENTAL
 Laboratory Contact: WILLIAM H. HOWE
 Telephone no.: 919-387-0462

Test Dates: 4/26-5/4/93

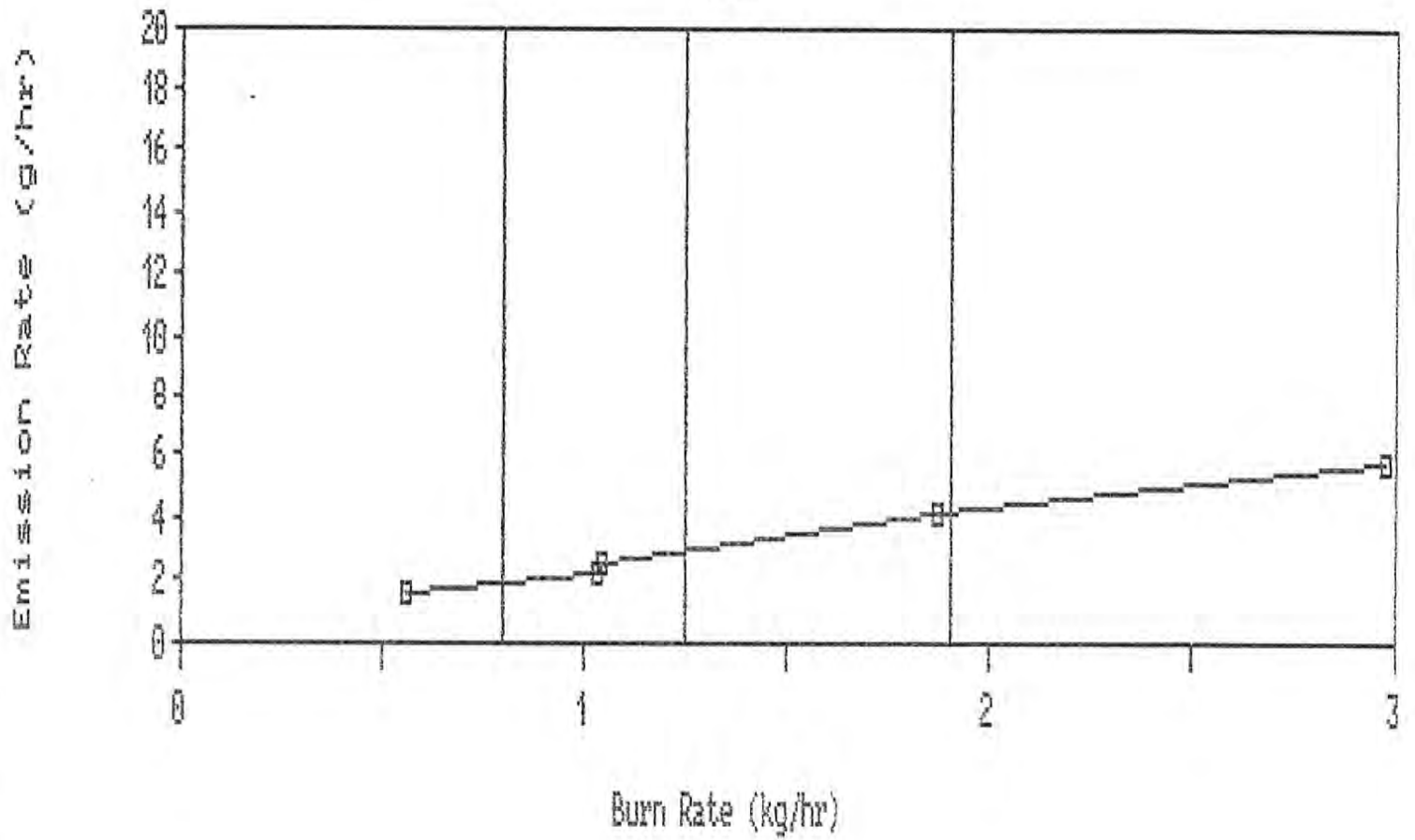
Test Methods Used

Method 28/Other: M28
 Sampling Method: M5G-1

=====

Run no.	Burn Rate (kg/hr)	Emission Rate (g/hr)	Heat Output (Btu/hr)	Wtd Avg (g/hr)
				3.05
8	0.56	1.65	7717	
5	1.03	2.28	14194	
6	1.04	2.66	14332	
7	1.87	4.18	25770	
1	2.97	5.81	40929	

BUCHANAN WELDING & FABRICATION
2500



METHOD 5G EMISSION RATE CALCULATIONS

Stv manu: XTEC 188
 Model No: 2500 2
 Lab name: APEX ENVIRONMENTAL 1
 Tst Date: 4-26-93 490

Run No.:	188-1	188-2	188-5	188-6	188-7	188-8
Pb(____Hg):	29.63	29.66	29.85	29.73	29.87	29.80
Tm(avg):	105.2	111.8	114.3	115.6	110.4	114.7
dH(avg):	0.900	0.900	0.900	0.900	0.900	0.900
DGM, Y :	1.014	1.014	1.014	1.014	1.014	1.014
DGMi :	82.003	167.300	809.400	51.600	299.100	435.400
DGMf :	166.552	367.589	1051.387	298.770	435.026	895.507
mg(frnt):	34.00	38.40	31.80	39.30	38.30	41.10
mg(fl#1):	4.50	1.70	2.30	2.50	2.20	1.70
mg(fl#2):	0.00	0.00	0.00	0.00	0.00	0.00
Qs(avg) :	139.31	142.50	144.60	144.16	143.07	148.28
ER(g/hr):	4.05	1.84	1.31	1.58	2.72	0.89
ER(M5H) :	5.81	3.02	2.28	2.66	4.18	1.65

Method 5G Proportionality Rate, Flow Rate,
Burn Rate, and Sample Volume Calculations

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-----
Stv manu: X-TEC          Units 1=metric,          Samp vol
Model no: 2500          2=English:          2          (sm3,scf)
Lab name: APEX ENVIRONMENTAL      Y, DGM: 1.014          427.779          85.49
Tst date: 5-4-93          Pitot co: 0.99          17.640
Run no : 188-8          Gas MW : 28.56          Flow rate
Tst time          Pb (mm,in. Hg): 29.80          (dsm3m,dscfm)          460.00
  (min): 918.00          Tunnel area (m2,ft2): 0.1963          148.28          1850.00
Chrg wt          Wood moist (% wet): 17.11
(lb wet): 22.70          Burn rate (dry kg/hr): 0.56
-----

```

run time (min)	vel dp (mm H2O) (in. H2O)	tunnel temp (C,F)	DGM rdg	DGM temp (C,F)	DGM dH (mm H2O) (in. H2O)	vel (m/min) (ft/min)	PR (%)	dDGM vol std (m3,ft3)	vs/VmTs	vs ave	tunnel ave temp (C,F)	DGM ave temp (C,F)
0	0.040	88	435.400	71	0.900	814.96						
10	0.040	85	440.200	73	0.900	812.72	103.7	4.829	0.00	810.77	81.67	114.74
20	0.040	82	445.300	79	0.900	810.48	109.5	5.112				
30	0.040	79	450.400	88	0.900	808.24	108.0	5.055				
40	0.040	78	455.400	93	0.900	807.49	104.2	4.874				
50	0.040	76	460.500	99	0.900	805.98	105.0	4.927				
60	0.040	76	465.600	102	0.900	805.98	104.1	4.874				
70	0.040	76	470.600	103	0.900	805.98	101.5	4.753				
80	0.040	76	475.700	106	0.900	805.98	103.4	4.839				
90	0.040	75	480.700	108	0.900	805.23	100.6	4.719				
100	0.040	76	485.700	109	0.900	805.98	100.5	4.703				
110	0.040	77	490.700	111	0.900	806.74	100.5	4.694				
120	0.040	77	495.800	112	0.900	806.74	102.0	4.771				
130	0.040	78	500.900	113	0.900	807.49	102.0	4.763				
140	0.040	77	505.900	114	0.900	806.74	99.6	4.662				
150	0.040	77	510.900	114	0.900	806.74	99.5	4.653				
160	0.040	77	515.900	115	0.900	806.74	99.5	4.653				
170	0.040	79	520.900	115	0.900	808.24	99.7	4.645				
180	0.040	80	525.900	116	0.900	808.99	99.7	4.645				
190	0.040	79	530.900	116	0.900	808.24	99.2	4.637				
200	0.040	78	535.900	117	0.900	807.49	99.2	4.637				
210	0.040	78	540.900	117	0.900	807.49	99.1	4.629				
220	0.040	77	545.900	117	0.900	806.74	98.9	4.629				
230	0.040	77	550.900	118	0.900	806.74	99.0	4.629				
240	0.040	77	555.900	118	0.900	806.74	98.8	4.621				
250	0.040	77	560.800	118	0.900	806.74	96.8	4.529				
260	0.040	80	565.800	118	0.900	808.99	99.4	4.621				
270	0.040	82	570.800	118	0.900	810.48	99.4	4.621				
280	0.040	80	575.800	118	0.900	808.99	98.9	4.621				
290	0.040	82	580.700	119	0.900	810.48	97.5	4.529				
300	0.040	81	585.700	119	0.900	809.74	98.9	4.613				
310	0.040	82	590.800	119	0.900	810.48	101.2	4.706				
320	0.040	83	595.800	118	0.900	811.23	99.3	4.613				
330	0.040	83	600.900	118	0.900	811.23	101.3	4.714				
340	0.040	83	605.800	118	0.900	811.23	97.4	4.529				
350	0.040	83	610.800	118	0.900	811.23	99.4	4.621				
360	0.040	82	615.800	119	0.900	810.48	99.2	4.621				
370	0.040	82	620.800	119	0.900	810.48	99.1	4.613				
380	0.040	81	625.800	119	0.900	809.74	98.9	4.613				
390	0.040	81	630.800	119	0.900	809.74	99.0	4.613				

400	0.040	81	635.800	119	0.900	809.74	99.0	4.613
410	0.040	83	640.800	120	0.900	811.23	99.4	4.613
420	-0.040	84	645.800	120	0.900	811.98	99.2	4.605
430	0.040	83	650.800	120	0.900	811.23	98.9	4.605
440	0.040	82	655.800	120	0.900	810.48	98.8	4.605
450	0.040	82	660.800	120	0.900	810.48	98.9	4.605
460	0.040	82	665.800	120	0.900	810.48	98.9	4.605
470	0.040	83	670.800	120	0.900	811.23	99.1	4.605
480	0.040	83	675.700	120	0.900	811.23	97.0	4.513
490	0.040	84	680.700	120	0.900	811.98	99.2	4.605
500	0.040	85	685.700	120	0.900	812.72	99.3	4.605
510	0.040	88	690.700	120	0.900	814.96	99.7	4.605
520	0.040	92	695.700	120	0.900	817.93	100.2	4.605
530	0.040	96	700.700	119	0.900	820.88	100.6	4.605
540	0.040	94	705.700	119	0.900	819.41	100.0	4.613
550	0.040	93	710.700	119	0.900	818.67	100.0	4.613
560	0.040	92	715.700	119	0.900	817.93	99.9	4.613
570	0.040	91	720.700	119	0.900	817.18	99.8	4.613
580	0.040	91	725.600	119	0.900	817.18	97.9	4.521
590	0.040	90	730.600	119	0.900	816.44	99.7	4.613
600	0.040	89	735.600	119	0.900	815.70	99.6	4.613
610	0.040	89	740.700	119	0.900	815.70	101.7	4.706
620	0.040	89	745.700	119	0.900	815.70	99.7	4.613
630	0.040	88	750.800	119	0.900	814.96	101.5	4.706
640	0.040	87	755.800	119	0.900	814.21	99.5	4.613
650	0.040	86	760.800	119	0.900	813.47	99.4	4.613
660	0.040	86	765.900	119	0.900	813.47	101.4	4.706
670	0.040	86	770.900	119	0.900	813.47	99.5	4.613
680	0.040	86	776.000	118	0.900	813.47	101.4	4.706
690	0.040	86	781.000	118	0.900	813.47	99.6	4.621
700	0.040	85	786.000	117	0.900	812.72	99.4	4.621
710	0.041	85	791.000	117	0.900	822.82	99.7	4.629
720	0.041	85	796.000	117	0.900	822.82	98.5	4.629
730	0.041	83	801.100	116	0.900	821.31	100.1	4.722
740	0.041	82	806.100	117	0.900	820.55	98.3	4.637
750	0.041	84	811.100	116	0.900	822.06	98.6	4.629
760	0.040	84	816.100	117	0.900	811.98	98.6	4.637
770	0.040	84	821.100	117	0.900	811.98	99.6	4.629
780	0.040	82	826.200	117	0.900	810.48	101.2	4.722
790	0.040	80	831.200	117	0.900	808.99	99.1	4.629
800	0.040	79	836.200	117	0.900	808.24	99.1	4.629
810	0.040	79	841.200	117	0.900	808.24	99.2	4.629
820	0.040	78	846.200	117	0.900	807.49	99.0	4.629
830	0.040	78	851.200	116	0.900	807.49	99.1	4.629
840	0.040	76	856.300	116	0.900	805.98	100.9	4.730
850	0.040	75	861.300	115	0.900	805.23	98.9	4.637
860	0.040	74	866.300	115	0.900	804.48	99.0	4.645
870	0.040	73	871.300	115	0.900	803.73	98.9	4.645
880	0.040	73	876.300	115	0.900	803.73	99.0	4.645
890	0.040	73	881.400	115	0.900	803.73	100.9	4.738
900	0.040	72	886.400	115	0.900	802.97	98.8	4.645
910	0.040	72	891.400	115	0.900	802.97	98.9	4.645
918	0.040	71	895.507	114	0.900	802.22	101.3	3.816

Method 56 Proportionality Rate, Flow Rate,
Burn Rate, and Sample Volume Calculations

Stv manu: XTEC	Units 1=metric,	Samp vol	
Model no: 2500	2=English: 2	(sm3,scf)	
Lab name: APEX ENVIRONMENTAL	Y, DGM: 1.014	225.602	85.49
Tst date: 4-29-93	Pitot co: 0.99		17.640
Run no : 188-5	Gas MW : 28.56	Flow rate	
Tst time	Pb (mm,in. Hg): 29.85	(dsm3m,dscfm)	460.00
(min): 486.00	Tunnel area (m2,ft2): 0.1963	144.60	1850.00
Chrg wt	Wood moist (% wet): 18.92		
(lb wet): 22.60	Burn rate (dry kg/hr): 1.03		

run time (min)	vel dp (mm H2O) (in.H2O)	tunnel temp (C,F)	DGM rdg (m3,ft3)	DGM temp (C,F)	DGM dH (mm H2O) (in.H2O)	vel (m/min) (ft/min)	PR (%)	dDGM vol std (m3,ft3)	vs/VmTs	vs ave tunnel	DGM ave temp (C,F)	DGM ave temp (C,F)
0	0.039	106	809.400	68	0.900	817.13						
10	0.039	102	813.500	72	0.900	814.24	89.7	4.155	0.01	809.50	95.50	114.30
20	0.039	96	818.600	79	0.900	809.88	110.0	5.130				
30	0.039	93	823.400	88	0.900	807.69	102.1	4.765				
40	0.039	90	828.200	92	0.900	805.50	100.2	4.687				
50	0.039	88	833.300	98	0.900	804.03	105.6	4.944				
60	0.039	89	838.400	102	0.900	804.76	104.8	4.891				
70	0.039	88	843.400	106	0.900	804.03	101.8	4.761				
80	0.039	88	848.400	108	0.900	804.03	101.1	4.727				
90	0.039	88	853.400	110	0.900	804.03	100.8	4.710				
100	0.039	87	858.300	112	0.900	803.30	98.2	4.600				
110	0.039	87	863.300	114	0.900	803.30	100.0	4.678				
120	0.039	87	868.200	114	0.900	803.30	97.6	4.568				
130	0.039	88	873.200	115	0.900	804.03	99.8	4.661				
140	0.039	89	878.200	116	0.900	804.76	99.7	4.653				
150	0.039	90	883.200	116	0.900	805.50	99.7	4.645				
160	0.039	91	888.200	116	0.900	806.23	99.7	4.645				
170	0.039	91	893.300	116	0.900	806.23	101.7	4.738				
180	0.039	94	898.300	116	0.900	808.42	100.2	4.645				
190	0.039	97	903.300	116	0.900	810.61	100.5	4.645				
200	0.039	98	908.200	117	0.900	811.33	98.4	4.552				
210	0.039	104	913.200	118	0.900	815.68	101.2	4.637				
220	0.039	100	918.200	119	0.900	812.79	99.8	4.629				
230	0.039	101	923.200	119	0.900	813.51	100.1	4.621				
240	0.039	102	928.200	119	0.900	814.24	100.2	4.621				
250	0.039	102	933.200	120	0.900	814.24	100.1	4.621				
260	0.039	102	938.200	120	0.900	814.24	100.0	4.613				
270	0.039	102	943.200	121	0.900	814.24	100.0	4.613				
280	0.039	101	948.200	121	0.900	813.51	99.6	4.605				
290	0.039	102	953.200	122	0.900	814.24	99.9	4.605				
300	0.039	102	958.200	122	0.900	814.24	99.6	4.597				
310	0.039	102	963.200	122	0.900	814.24	99.6	4.597				
320	0.039	101	968.200	122	0.900	813.51	99.4	4.597				
330	0.039	102	973.200	122	0.900	814.24	99.7	4.597				
340	0.039	102	978.200	122	0.900	814.24	99.6	4.597				
350	0.039	100	983.100	123	0.900	812.79	97.3	4.505				
360	0.039	99	988.100	123	0.900	812.06	99.1	4.589				
370	0.039	99	993.100	123	0.900	812.06	99.2	4.589				
380	0.039	98	998.200	123	0.900	811.33	101.0	4.681				
390	0.039	96	1003.200	123	0.900	809.88	98.7	4.589				

400	0.039	96 1008.200	123	0.900	809.88	98.9	4.589
410	0.039	95 1013.300	122	0.900	809.15	100.7	4.681
420	0.039	95 1018.300	121	0.900	809.15	99.0	4.597
430	0.039	95 1023.300	122	0.900	809.15	99.2	4.605
440	0.039	93 1028.400	122	0.900	807.69	100.6	4.689
450	0.039	93 1033.400	122	0.900	807.69	98.8	4.597
460	0.039	93 1038.400	122	0.900	807.69	98.8	4.597
470	0.039	91 1043.400	122	0.900	806.23	98.5	4.597
480	0.039	90 1048.400	122	0.900	805.50	98.5	4.597
486	0.039	90 1051.387	122	0.900	805.50	98.1	2.746

Method 5G Proportionality Rate, Flow Rate,
Burn Rate, and Sample Volume Calculations

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Stv manu: XTEC          Units 1=metric,          Samp vol
Model no: 2500          2=English:          2          (sm3,scf)
Lab name: APEX ENVIRONMENTAL  Y, DGM: 1.014      229.053      85.49
Tst date: 4-30-93      Pitot co: 0.99      17.640
Run no : 188-6          Gas MW : 28.56      Flow rate
Tst time                Pb (mm,in. Hg): 29.73 (dsm3m,dscfm) 460.00
(min): 494.00          Tunnel area (m2,ft2): 0.1963      144.16      1850.00
Chrg wt                Wood moist (% wet): 17.99
(ib wet): 23.00          Burn rate (dry kg/hr): 1.04
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run time (min)	vel dp (mm H2O) (in. H2O)	tunnel temp (C,F)	DGM rdg (m3,ft3)	DGM temp (C,F)	DGM dH (mm H2O) (in. H2O)	vel (m/min) (ft/min)	PR (%)	dDGM vol std (m3,ft3)	vs/VmTs	vs ave	tunnel ave temp (C,F)	DGM ave temp (C,F)
0	0.039	111	51.600	71	0.900	822.39						
10	0.039	95	56.400	76	0.900	810.78	102.3	4.818	0.01	811.98	96.67	115.63
20	0.039	92	61.200	81	0.900	808.59	102.2	4.773				
30	0.039	90	66.200	86	0.900	807.12	105.4	4.926				
40	0.039	88	71.200	92	0.900	805.65	104.2	4.881				
50	0.039	87	76.400	102	0.900	804.92	107.2	5.021				
60	0.039	86	81.500	104	0.900	804.18	103.2	4.836				
70	0.039	87	86.600	107	0.900	804.92	103.1	4.819				
80	0.039	87	91.600	109	0.900	804.92	100.5	4.700				
90	0.039	86	96.500	111	0.900	804.18	97.9	4.590				
100	0.039	86	101.500	113	0.900	804.18	99.7	4.667				
110	0.039	86	106.500	114	0.900	804.18	99.3	4.651				
120	0.039	86	111.500	115	0.900	804.18	99.2	4.643				
130	0.039	87	116.500	116	0.900	804.92	99.2	4.634				
140	0.039	89	121.500	116	0.900	806.39	99.3	4.626				
150	0.039	90	126.400	117	0.900	807.12	97.3	4.534				
160	0.039	91	131.400	117	0.900	807.85	99.2	4.618				
170	0.039	92	136.400	117	0.900	808.59	99.3	4.618				
180	0.039	93	141.400	118	0.900	809.32	99.4	4.618				
190	0.039	97	146.300	118	0.900	812.24	97.8	4.518				
200	0.039	97	151.200	119	0.900	812.24	97.5	4.518				
210	0.039	99	156.200	119	0.900	813.70	99.6	4.602				
220	0.039	100	161.200	119	0.900	814.43	99.6	4.602				
230	0.039	101	166.200	119	0.900	815.15	99.7	4.602				
240	0.039	103	171.300	119	0.900	816.60	102.0	4.694				
250	0.039	104	176.300	121	0.900	817.33	100.0	4.602				
260	0.039	106	181.300	121	0.900	818.78	99.9	4.587				
270	0.039	106	186.300	121	0.900	818.78	99.7	4.587				
280	0.039	105	191.300	122	0.900	818.05	99.6	4.587				
290	0.039	105	196.300	122	0.900	818.05	99.5	4.579				
300	0.039	105	201.300	122	0.900	818.05	99.5	4.579				
310	0.039	105	206.300	123	0.900	818.05	99.5	4.579				
320	0.039	105	211.300	123	0.900	818.05	99.3	4.571				
330	0.039	104	216.300	123	0.900	817.33	99.1	4.571				
340	0.039	104	221.300	123	0.900	817.33	99.2	4.571				
350	0.039	104	226.300	123	0.900	817.33	99.2	4.571				
360	0.039	102	231.300	123	0.900	815.88	98.9	4.571				
370	0.039	102	236.300	124	0.900	815.88	99.0	4.571				
380	0.039	101	241.300	124	0.900	815.15	98.7	4.563				
390	0.039	100	246.400	124	0.900	814.43	100.6	4.654				

400	0.039	101	251.400	124	0.900	815.15	98.9	4.563
410	0.039	101	256.500	123	0.900	815.15	100.8	4.654
420	0.039	100	261.500	124	0.900	814.43	98.8	4.571
430	0.039	98	266.600	124	0.900	812.97	100.3	4.654
440	0.039	98	271.600	124	0.900	812.97	98.5	4.563
450	0.039	98	276.600	124	0.900	812.97	98.5	4.563
460	0.039	96	281.600	124	0.900	811.51	98.2	4.563
470	0.039	94	286.600	124	0.900	810.05	98.0	4.563
480	0.039	94	291.600	124	0.900	810.05	98.2	4.563
490	0.039	93	296.600	124	0.900	809.32	98.0	4.563
494	0.039	93	298.770	124	0.900	809.32	106.4	1.980

Method 5G Proportionality Rate, Flow Rate,
Burn Rate, and Sample Volume Calculations

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Stv manu: XTEC           Units 1=metric,           Samp vol
Model no: 2500           2=English:           2           (sm3,scf)
Lab name: APEX ENVIRONMENTAL   Y, DGM: 1.014       127.774       85.49
Tst date: 5-3-93         Pitot co: 0.99      17.640
Run no : 188-7           Gas MW : 28.56       Flow rate
Tst time                 Pb (mm,in. Hg): 29.87   (dsm3m,dscfm)   460.00
  (min): 272.00         Tunnel area (m2,ft2): 0.1963   143.07       1850.00
Chrg wt                  Wood moist (% wet): 18.53
(lb wet): 22.90         Burn rate (dry kg/hr): 1.87
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run time (min)	vel dp (mm H2O) (in. H2O)	tunnel temp (C,F)	DGM rdg (m3,ft3)	DGM temp (C,F)	DGM dH (mm H2O) (in. H2O)	vel (m/min) (ft/min)	PR (%)	dDGM vol std (m3,ft3)	vs/VmTs	vs ave	tunnel ave temp (C,F)	DGM ave temp (C,F)
0	0.039	120	299.100	76	0.900	826.90						
10	0.039	112	304.200	81	0.900	821.17	108.1	5.095	0.01	818.18	107.86	110.41
20	0.039	109	309.200	87	0.900	819.02	105.2	4.949				
30	0.039	106	314.000	93	0.900	816.86	99.6	4.699				
40	0.039	108	318.900	97	0.900	818.30	101.2	4.745				
50	0.039	110	323.800	101	0.900	819.74	100.6	4.711				
60	0.039	113	328.900	105	0.900	821.89	104.4	4.868				
70	0.039	112	334.000	108	0.900	821.17	103.2	4.833				
80	0.039	111	339.000	111	0.900	820.46	100.5	4.714				
90	0.039	112	343.900	112	0.900	821.17	98.3	4.595				
100	0.039	114	348.900	115	0.900	822.61	100.4	4.681				
110	0.039	114	353.900	116	0.900	822.61	99.7	4.656				
120	0.039	114	359.000	116	0.900	822.61	101.5	4.741				
130	0.039	114	364.100	117	0.900	822.61	101.5	4.741				
140	0.039	113	369.000	117	0.900	821.89	97.2	4.547				
150	0.039	114	374.000	118	0.900	822.61	99.4	4.640				
160	0.039	113	379.100	117	0.900	821.89	100.9	4.725				
170	0.039	111	384.100	117	0.900	820.46	98.9	4.640				
180	0.039	109	389.000	117	0.900	819.02	96.7	4.547				
190	0.039	106	394.000	117	0.900	816.86	98.4	4.640				
200	0.039	105	399.000	118	0.900	816.13	98.4	4.640				
210	0.039	103	404.000	118	0.900	814.69	98.0	4.632				
220	0.039	101	409.100	119	0.900	813.24	99.8	4.725				
230	0.039	99	414.000	118	0.900	811.79	95.5	4.532				
240	0.039	99	418.900	118	0.900	811.79	95.9	4.539				
250	0.039	97	423.900	118	0.900	810.34	97.5	4.632				
260	0.039	96	428.900	118	0.900	809.61	97.5	4.632				
270	0.039	96	433.900	118	0.900	809.61	97.6	4.632				
272	0.039	97	435.026	119	0.900	810.34	110.1	1.043				

Method 5B Proportionality Rate, Flow Rate,
Burn Rate, and Sample Volume Calculations

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Stv manu: XTEC                Units 1=metric,                Saap vol
Model no: 2500                2=English:                2                (m3,scf)
Lab name: APEX ENVIRONMENTAL  Y, DGM: 1.014            79.596            85.49
Tst date: 4-26-93            Pitot co: 0.99            17.640
Run no : 188-1                Gas MW : 28.56            Flow rate
Tst time                      Pb (mm,in. Hg): 29.63    (dsm3m,dscfm)    460.00
  (min): 170.00              Tunnel area (m2,ft2): 0.1963            139.31            1850.00
Chrg wt                        Wood moist (% wet): 16.90
(lb wet): 22.30                Burn rate (dry kg/hr): 2.97
=====

```

run time {min}	vel dp (mm H2O) (in.H2O)	tunnel temp (C,F)	DGM rdg (m3,ft3)	DGM temp (C,F)	DGM dH (mm H2O) (in.H2O)	vel (m/min) (ft/min)	PR (%)	dDGM vol std (m3,ft3)	vs/VmTs	vs ave tunnel ave temp (C,F)	DGM ave temp (C,F)	
0	0.038	124	82.003	74	0.900	822.35						
10	0.038	114	87.000	77	0.900	815.28	104.6	4.971	0.02	806.65	110.33	105.17
20	0.038	110	91.900	83	0.900	812.43	102.4	4.847				
30	0.038	110	96.600	90	0.900	812.43	97.4	4.598				
40	0.038	109	101.500	98	0.900	811.72	100.1	4.732				
50	0.038	108	106.300	101	0.900	811.00	96.6	4.569				
60	0.038	108	111.300	106	0.900	811.00	100.2	4.734				
70	0.038	107	116.300	109	0.900	810.29	99.1	4.692				
80	0.038	109	121.200	111	0.900	811.72	97.0	4.574				
90	0.038	110	126.200	113	0.900	812.43	98.7	4.651				
100	0.038	110	131.300	114	0.900	812.43	100.2	4.728				
110	0.038	111	136.400	115	0.900	813.14	100.2	4.719				
120	0.038	110	141.400	116	0.900	812.43	97.8	4.619				
130	0.036	110	146.400	116	0.900	790.76	97.7	4.611				
140	0.036	110	151.300	116	0.900	790.76	98.4	4.519				
150	0.036	109	156.200	118	0.900	790.07	98.2	4.519				
160	0.036	108	161.300	118	0.900	789.37	101.8	4.687				
170	0.036	109	166.552	118	0.900	790.07	105.1	4.827				

Method 56 Proportionality Rate, Flow Rate,
Burn Rate, and Sample Volume Calculations

Stv manu: XTEC Units 1=metric, Samp vol
Model no: 2500 2=English: 2 (sm3,scf)
Lab name: APEX ENVIRONMENTAL Y, DGM: 1.014 186.346 85.49
Tst date: 4-27-93 Pitot co: 0.99 17.640
Run no : 188-2 Gas MW : 28.56 Flow rate
Tst time Pb (mm, in. Hg): 29.66 (dsm3m,dscfm) 460.00
(min): 400.00 Tunnel area (m2,ft2): 0.1963 142.50 1850.00
Chrg wt Wood moist (% wet): 17.58
(lb wet): 24.10 Burn rate (dry kg/hr): 1.35

run time (min)	vel dp (mm H2O) (in. H2O)	tunnel temp (C,F)	DGM rdg (m3,ft3)	DGM temp (C,F)	DGM dH (mm H2O) (in. H2O)	vel (m/min) (ft/min)	PR (%)	dDGM vol std (m3,ft3)	vs/VmTs	vs ave	tunnel ave temp (C,F)	DGM ave temp (C,F)
0	0.038	95	167.300	80	0.900	801.26						
10	0.038	96	172.500	83	0.900	801.99	110.2	5.120	0.01	794.61	89.78	111.80
20	0.038	94	177.600	89	0.900	800.54	107.0	4.994				
30	0.038	93	182.500	94	0.900	799.82	101.7	4.746				
40	0.038	91	187.500	99	0.900	798.37	102.6	4.799				
50	0.038	91	192.400	103	0.900	798.37	99.8	4.661				
60	0.038	91	197.400	106	0.900	798.37	101.1	4.722				
70	0.038	91	202.300	108	0.900	798.37	98.6	4.603				
80	0.038	92	207.300	111	0.900	799.10	100.4	4.681				
90	0.038	94	212.300	112	0.900	800.54	100.1	4.656				
100	0.038	94	217.300	113	0.900	800.54	99.8	4.648				
110	0.038	94	222.300	114	0.900	800.54	99.6	4.640				
120	0.038	95	227.200	114	0.900	801.26	97.6	4.539				
130	0.038	95	232.300	114	0.900	801.26	101.5	4.724				
140	0.038	95	237.500	116	0.900	801.26	103.5	4.817				
150	0.038	94	242.400	115	0.900	800.54	97.0	4.523				
160	0.038	94	247.300	115	0.900	800.54	97.3	4.531				
170	0.038	93	252.400	116	0.900	799.82	101.1	4.716				
180	0.038	92	257.500	116	0.900	799.10	100.8	4.708				
190	0.038	91	262.500	116	0.900	798.37	98.7	4.616				
200	0.038	89	267.400	116	0.900	796.92	96.5	4.523				
210	0.038	87	272.400	116	0.900	795.47	98.3	4.616				
220	0.038	86	277.400	116	0.900	794.74	98.3	4.616				
230	0.038	84	282.200	116	0.900	793.28	94.1	4.431				
240	0.038	88	287.100	115	0.900	796.19	96.9	4.523				
250	0.038	89	292.100	116	0.900	796.92	98.9	4.624				
260	0.038	89	297.100	116	0.900	796.92	98.6	4.616				
270	0.038	88	302.000	116	0.900	796.19	96.5	4.523				
280	0.038	87	307.000	117	0.900	795.47	98.4	4.616				
290	0.038	87	312.100	117	0.900	795.47	100.3	4.700				
300	0.038	87	317.100	117	0.900	795.47	98.3	4.608				
310	0.038	87	322.100	118	0.900	795.47	98.3	4.608				
320	0.038	87	327.200	118	0.900	795.47	100.1	4.692				
330	0.038	87	332.200	117	0.900	795.47	98.1	4.600				
340	0.038	87	337.300	117	0.900	795.47	100.3	4.700				
350	0.038	87	342.300	117	0.900	795.47	98.3	4.608				
360	0.037	87	347.400	117	0.900	784.93	100.3	4.700				
370	0.037	85	352.400	117	0.900	783.49	99.3	4.608				
380	0.037	84	357.500	117	0.900	782.78	101.2	4.700				
390	0.037	82	362.500	117	0.900	781.34	99.0	4.608				
400	0.037	82	367.589	117	0.900	781.34	100.9	4.690				

Appendix C
Raw Test Data

CLIENT XTEC
 MODEL 2500

PROJECT # 188
 OPERATORS WLS

RUN # 8
 DATE 5-4-93

TEST FACILITY CONDITIONS

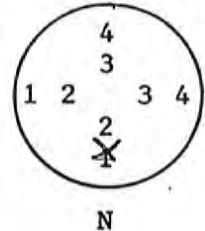
	PRE	POST
Induced Draft (in. Water)	.002	
Room Air Velocity (ft./min.)	10	30
Barometric Pressure (in. Hg)	29.82	29.78
Relative Humidity (%)	50	59
Scale Audit (cal. wt. <u>11.0</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	284.2	218.2
Room Temp. (degrees F)	66	67

VELOCITY TRAVERSE

POINT	LOCATION	dP	TEMP.
N-1	0.5"	.037	84
2	1.5"	.044	83
3	4.5"	.044	83
4	5.5"	.036	83
E-1	0.5"	.034	85
2	1.5"	.040	87
3	4.5"	.042	87
4	5.5"	.041	87
AVG.		.040	85

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

Qs 148.28 dscf/min.

APPLIANCE OPERATION

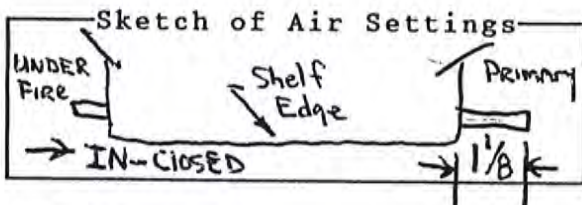
Sampling Time 918 min.
 Attempted Burn Category 1
 Actual Burn Rate .558 Kg/hr

Control Settings:

Primary air Open 9/16" from closed
 Secondary air N/A
 Fan Auto/Low
 Other Underfire Closed

START-UP PROCEDURE (first 5 min.)

By-pass Open for loading
 Loading Door Open 1 min.
 Air Adjustments N/A



Comments _____

TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514
 Actual Crib Wt. (lbs.) 22.7
 Actual Coal Bed Wt. (lbs.) 4.6
 Avg. Fuel Moisture Dry% 20.64 Wet% 17.11

Crib Wt. Range 22.2 to 27.0
 (6.3 to 7.7 lbs/cu. ft.)
 Coal Bed Range 4.6 to 5.6
 (20 to 25% actual crib wt.)
 Crib Wt. Dry Kg. 8.533
 (100-Wet%/100 * act.wt./2.205)

CLIENT XTEC PROJECT # 188 RUN # 8
 MODEL 2500 PREPARED BY WLS DATE 5-4-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.0 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 68 test fuel 68

PRE-BURN FUEL (2X4's)

Time of Measurement 0635

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>6</u>	<u>22.3</u>	<u>21.9</u>	<u>21.7</u>
2	<u>6</u>	<u>19.2</u>	<u>20.0</u>	<u>19.8</u>
3	---	---	---	---
4	---	---	---	---

Cut into 9 inch pieces (min. length 1/3 test fuel) avg. moisture 20.82

TEST FUEL

Time of Measurement 0745

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4x4</u>	<u>22</u>	<u>21.5</u>	<u>22.1</u>	<u>19.8</u>
2	<u>4x4</u>	<u>22</u>	<u>21.9</u>	<u>23.6</u>	<u>22.8</u>
3	<u>4x4</u>	<u>22</u>	<u>19.3</u>	<u>19.8</u>	<u>19.4</u>
4	<u>4x4</u>	<u>22</u>	<u>18.7</u>	<u>19.7</u>	<u>19.1</u>
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---

avg. moisture 20.64

TEST CRIB WT. 22.7 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 8
DATE 5-4-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)						
24hr	E.T.			Combustor(s)	Surface					
					Top	Rear	Bottom	Left	Right	
0630		11.5#	Kindling	Air MAX	Fan Auto	Low	ByPass	Open		
0650			0650	Closed	ByPASS					
0710			Added Pretest	2.5-14.8	12.3#					
0715			Set Air	Adjusts.						
0725	10	10.8	.053	921	576	535	239	358	432	
0735	20	10.1	.044	883	560	300	247	326	373	
0745	30	9.6	.038	862	538	275	240	303	344	
0755	40	9.0	.035	845	512	260	230	283	324	
0805	50	8.7	.032	831	496	254	226	274	316	
0815	60	8.5	.030	861	480	246	222	263	306	
0825	70	8.2	.026	740	449	240	214	252	296	
			0827	Raked	COAL	BED				
0835	80	7.4	.033	724	421	243	210	249	303	
0845	90	6.8	.029	758	414	239	202	246	295	
0855	100	6.4	.026	744	411	240	201	243	294	
			0900	Raked	COAL	BED				
0905	110	5.5	.035	739	423	260	202	253	324	
0915	120	5.1	.026	722	409	250	197	250	306	
			0917	Raked	COAL	BED				
0925	130	4.7	.028	744	410	254	197	250	318	

STOVE TEST DATA
METHOD 28

F28-3

1 of 5

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 8
DATE 5-4-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
0927	00	22.7	.032	742	408	255	197	248	313
0937	10	22.3	.030	678	398	209	192	221	266
0947	20	22.0	.026	607	363	186	189	200	235
0957	30	21.8	.022	534	321	172	178	186	214
1007	40	21.6	.020	479	279	163	171	178	208
1017	50	21.4	.020	467	272	157	163	168	190
1027	60	21.3	.018	450	256	152	158	162	184
1037	70	21.2	.017	440	246	149	153	158	179
1047	80	21.1	.016	430	236	145	146	153	172
1057	90	21.0	.015	416	227	143	142	148	166
1107	100	20.9	.015	405	220	141	139	145	163
1117	10	20.8	.015	389	214	139	136	142	159
1127	20	20.7	.016	384	209	139	132	141	158
1137	30	20.6	.018	375	204	138	132	139	156
1147	40	20.5	.022	374	201	138	129	139	155
1157	50	20.4	.020	382	200	137	130	138	154
1207	60	20.2	.018	388	201	138	130	139	156
1217	70	20.1	.016	389	201	138	129	139	157
1227	80	20.0	.013	388	200	138	131	139	158
1237	90	19.9	.013	391	199	139	130	139	159

075

STOVE TEST DATA
METHOD 28

F28-3

2 of 5

CLIENT XTEC

PROJECT # 198

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1247	200	19.7	.013	387	199	139	129	139	158
1257	10	19.6	.013	383	199	139	130	137	158
1307	20	19.5	.013	383	197	138	126	138	160
1317	30	19.4	.013	382	196	138	122	137	160
1327	40	19.3	.012	372	197	139	125	138	159
1337	50	19.2	.011	368	195	139	123	138	159
1347	60	19.1	.011	373	195	140	122	137	158
1357	70	19.0	.010	384	196	140	122	139	155
1407	80	18.8	.010	391	198	140	124	142	153
1417	90	18.7	.010	391	199	141	123	145	154
1427	300	18.6	.010	398	205	142	125	150	152
1437	310	18.4	.014	446	212	144	124	155	156
1447	20	18.2	.016	481	236	148	124	163	160
1457	30	17.9	.018	503	242	150	125	167	161
1507	40	17.7	.017	538	251	154	126	172	163
1517	50	17.4	.018	607	274	160	126	180	168
1527	60	17.1	.018	593	298	170	127	189	172
1537	70	16.9	.020	571	297	176	137	194	174
1547	80	16.7	.020	578	299	186	133	200	179
1557	390	16.4	.020	576	301	191	134	203	180

076

STOVE TEST DATA
METHOD 28

F28-3

3 of 5

CLIENT XTEC

PROJECT # 188

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1607	400	16.1	.020	641	312	203	133	208	184
1617	10	15.8	.022	676	338	210	133	219	191
1627	20	15.4	.023	676	350	217	135	227	195
1637	30	15.1	.021	690	361	229	135	238	202
1647	40	14.7	.020	701	367	236	140	243	206
1657	50	14.4	.020	686	368	242	138	248	210
1707	60	14.2	.020	682	367	255	140	263	213
1717	70	13.8	.022	706	370	264	140	269	216
1727	80	13.6	.024	788	391	275	143	275	222
1737	90	13.0	.029	869	427	284	143	282	232
1747	500	12.4	.032	960	470	312	143	291	241
1757	10	11.7	.036	1082	536	339	145	318	258
1807	20	10.9	.040	1103	571	369	151	369	331
1817	30	10.0	.038	1064	584	386	160	417	343
1827	40	9.2	.038	989	561	410	162	442	370
1837	50	8.6	.038	924	546	429	177	472	379
1847	60	7.9	.038	943	564	406	188	456	371
1857	70	7.4	.035	957	578	393	201	438	371
1907	80	6.9	.035	992	572	386	209	431	369
1917	590	6.5	.035	972	560	381	214	427	368

077

STOVE TEST DATA
METHOD 28

F28-3

4 of 5

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 8
DATE 5-4-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1927	600	6.1	.035	948	541	374	219	419	367
1937	10	5.7	.035	942	538	372	224	412	364
1947	20	5.3	.035	928	521	364	232	395	354
1957	30	5.0	.034	903	501	355	233	393	351
2007	40	4.6	.034	878	489	351	236	385	348
2017	50	4.3	.034	864	467	347	238	369	344
2027	60	4.0	.032	839	440	336	240	358	337
2037	70	3.7	.031	811	434	338	240	351	334
2047	80	3.4	.028	796	423	329	238	346	321
2057	90	3.1	.030	784	418	329	230	338	318
2107	100	2.8	.030	769	411	328	228	342	316
2117	10	2.5	.029	753	407	321	232	329	308
2127	20	2.2	.029	731	400	311	240	329	310
2137	30	2.0	.026	717	398	310	244	328	313
2147	40	1.8	.026	699	397	308	251	328	314
2157	50	1.6	.024	687	394	309	255	328	314
2207	60	1.5	.021	679	392	312	250	319	308
2217	70	1.3	.022	668	386	315	247	315	299
2227	80	1.1	.021	663	378	306	241	306	311
2237	90	1.0	.020	657	369	303	249	308	307

078

STOVE TEST DATA
METHOD 28

F28-3

5 of 5

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 8
DATE 5-4-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
2247	800	.9	.020	631	357	299	248	303	302
2257	10	.8	.018	613	349	297	240	296	297
2307	20	.7	.017	604	343	297	239	291	293
2317	30	.6	.014	595	332	294	242	291	307
2327	40	.5	.014	584	324	286	238	285	298
2337	50	.4	.013	547	311	276	231	275	287
2347	60	.4	.012	525	306	264	223	265	276
2357	70	.3	.012	511	299	257	211	257	269
2407	80	.2	.011	492	278	248	197	253	263
2417	90	.2	.012	479	269	243	184	246	252
2427	900	.1	.010	463	261	238	182	237	245
2437	10	.1	.010	430	250	236	178	224	235
2445	20 918	0	.01	410	243	233	175	216	224
	30								
	40								
	50								
	60								
	70								
	80								
	90								

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

1 of 5

CLIENT XTEC

PROJECT # 188

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
0927	00	435.400	.040	.9	71	88	1	73	42	69
0937	10	440.2	.040	.9	73	85	1	73	42	69
0947	20	445.3	.040	.9	79	82	1	73	42	69
0957	30	450.4	.040	.9	88	79	1	73	40	69
1007	40	455.4	.040	.9	93	78	1	72	38	69
1017	50	460.5	.040	.9	99	76	1	71	37	68
1027	60	465.6	.040	.9	102	76	1	71	38	68
1037	70	470.6	.040	.9	103	76	1	70	38	68
1047	80	475.7	.040	.9	106	76	1	71	39	68
1057	90	480.7	.040	.9	108	75	1	70	34	68
1107	00	485.7	.040	.9	109	76	1	70	32	68
1117	10	490.7	.040	.9	111	77	1	71	32	68
1127	20	495.8	.040	.9	112	77	1	71	32	68
1137	30	500.9	.040	.9	113	78	1	71	32	68
1147	40	505.9	.040	.9	114	77	1	71	32	68
1157	50	510.9	.040	.9	114	77	1	71	32	68
1207	60	515.9	.040	.9	115	77	1	72	32	68
1217	70	520.9	.040	.9	115	79	1	72	32	68
1227	80	525.9	.040	.9	116	80	1	72	32	69
1237	90	530.9	.040	.9	116	79	1	73	32	69

AVG. 114.74 81.67

080

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

2 of 5

CLIENT XTEC

PROJECT # 1000

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Meter Box # 456-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1247	2 00	535.9	.040	.9	117	78	1	73	32	69
1257	10	540.9	.040	.9	117	78	1	73	32	69
1307	20	545.9	.040	.9	117	77	1	72	32	69
1317	30	550.9	.040	.9	118	77	1	72	32	69
1327	40	555.9	.040	.9	118	77	1	72	32	69
1337	50	560.8	.040	.9	118	77	1	72	32	69
1347	60	565.8	.040	.9	118	80	1	73	32	69
1357	70	570.8	.040	.9	118	82	1	74	32	69
1407	80	575.8	.040	.9	118	80	1	74	32	69
1417	90	580.7	.040	.9	119	82	1	75	32	69
1427	3 00	585.7	.040	.9	119	81	1	75	31	70
1437	10	590.8	.040	.9	119	82	1	75	31	70
1447	20	595.8	.040	.9	118	83	1	76	31	72
1457	30	600.9	.040	.9	118	83	1	76	31	72
1507	40	605.8	.040	.9	118	83	1	76	31	72
1517	50	610.8	.040	.9	118	83	1	77	31	72
1527	60	615.8	.040	.9	119	82	1	76	31	71
1537	70	620.8	.040	.9	119	82	1	76	31	71
1547	80	625.8	.040	.9	119	81	1	75	31	71
1557	3 90	630.8	.040	.9	119	81	1	75	31	71

AVG. _____

081

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

3 of 5

CLIENT XTEC

PROJECT # 188

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = .050 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1607	4 00	635.8	.040	.9	119	81	1	75	32	71
1617	10	640.8	.040	.9	120	83	1	75	33	72
1627	20	645.8	.040	.9	120	84	1	76	33	72
1637	30	650.8	.040	.9	120	83	1	76	34	72
1647	40	655.8	.040	.9	120	82	1	76	34	71
1657	50	660.8	.040	.9	120	82	1	76	38	71
1707	60	665.8	.040	.9	120	82	1	76	32	71
1717	70	670.8	.040	.9	120	83	1	76	32	71
1727	80	675.7	.040	.9	120	83	1	76	32	71
1737	90	680.7	.040	.9	120	84	1	76	32	70
1747	5 00	685.7	.040	.9	120	85	1	76	32	70
1757	10	690.7	.040	.9	120	88	1	77	32	70
1807	20	695.7	.040	.9	120	92	1	76	32	71
1817	30	700.7	.040	.9	119	96	1	76	32	71
1827	40	705.7	.040	.9	119	94	1	76	32	71
1837	50	710.7	.040	.9	119	93	1	75	31	71
1847	60	715.7	.040	.9	119	92	1	77	31	71
1857	70	718.7	.040	.9	119	91	1	78	31	71
1907	80	725.6	.040	.9	119	91	1	78	32	71
1917	5 90	730.6	.040	.9	119	90	1	77	32	71

AVG. _____

082

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

4 of 5

CLIENT XTEC

PROJECT # 198

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = 000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1927	600	735.6	.040	.9	119	89	1	77	33	71
1937	10	740.7	.040	.9	119	89	1	77	33	71
1947	20	745.7	.040	.9	119	89	1	77	34	71
1957	30	750.8	.040	.9	119	88	1	77	34	71
2007	40	755.8	.040	.9	119	87	1	77	35	71
2017	50	760.8	.040	.9	119	86	1	76	34	71
2027	60	765.9	.040	.9	119	86	1	76	34	70
2037	70	770.9	.040	.9	119	86	1	76	32	70
2047	80	776.0	.040	.9	118	86	1	75	32	70
2057	90	781.0	.040	.9	118	86	1	75	32	70
2107	100	786.0	.040	.9	117	85	1	75	32	69
2117	10	791.0	.041	.9	117	85	1	75	32	69
2127	20	796.0	.041	.9	117	85	1	76	32	70
2137	30	801.1	.041	.9	116	83	1	75	32	70
2147	40	806.1	.041	.9	117	82	1	75	33	70
2157	50	811.1	.041	.9	116	84	1	75	33	68
2207	60	816.1	.040	.9	117	84	1	75	33	68
2217	70	821.1	.040	.9	117	84	1	75	34	68
2227	80	826.2	.040	.9	117	82	1	75	34	68
2237	190	831.2	.040	.9	117	80	1	74	35	68

AVG. _____

083

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

5 of 5

CLIENT XTEC

PROJECT # 1000

RUN # 8

MODEL 2500

OPERATORS WLS

DATE 5-4-93

Meter Box # 45G-P

Meter Y 1014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dp	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
2247	000	836.2	.040	.9	117	79	1	73	35	67
2257	10	841.2	.040	.9	117	79	1	72	38	67
2307	20	846.2	.040	.9	117	78	1	71	39	67
2317	30	851.2	.040	.9	116	78	1	71	39	67
2327	40	856.3	.040	.9	114	76	1	70	41	68
2337	50	861.3	.040	.9	115	75	1	70	43	67
2347	60	866.3	.040	.9	115	74	1	70	36	67
2357	70	871.3	.040	.9	115	73	1	69	33	67
2407	80	876.3	.040	.9	115	73	1	69	32	67
2417	90	881.4	.040	.9	115	73	1	69	32	66
2427	000	886.4	.040	.9	115	72	1	69	32	66
2437	10	891.4	.040	.9	115	72	1	69	32	67
2445	20	895.507	.040	.9	114	71	1	69	32	67
	30									
	40									
	50									
	60									
	70									
	80									
	90									

AVG. _____

084

CLIENT/MODEL XTEC PROJECT # 188 RUN # 8Prepared by: WLS date/time 5-4-3 0845 Filters: size-11.0 cmRecovered by: WLS date/time 5-5-3 0050 brand-Whatman 934AHPlaced in Desiccator: date/time filters 5-5-3 0100 beaker 55-3 1100Acetone lot # 910302 Acetone rinse: beaker wt. w/rinse 16 gAcetone blank concentration 0.01 mg/g beaker tare wt. 3 gnet rinse 13 gBlank Adjustment = blank conc. 0.01 mg/g x net rinse 13 g = 0.13 mg

	Date/time	Filter #'s front <u>339</u> rear <u>337</u>	Beaker # <u>300</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	5-5-93 1715	1.2805	2.5341	49	76	.5000 2.000
wt.2	5-6-93 1010	1.2804	2.5341	50	70	.5000 2.000
wt.3						
wt.4						
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.

1.28042.5341

Filter gain

41.1

mg

Tare wt(s).

front, .61802.5323

Beaker gain

+ 1.8

mg

rear .6213

Blank adjust.

- 0.1

mg

Net gain

41.1

mg

1.8

mg

TOTAL

= 42.8

mg

085

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 5
DATE 4-29-93

TEST FACILITY CONDITIONS

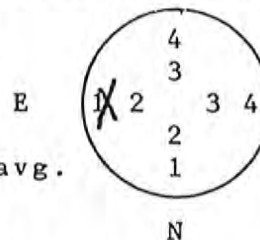
VELOCITY TRAVERSE

	PRE	POST
Induced Draft (in. Water)	.002	
Room Air Velocity (ft./min.)	30	40
Barometric Pressure (in. Hg)	29.88	29.82
Relative Humidity (%)	24	21
Scale Audit (cal. wt. <u>11.0</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	277.4	274
Room Temp. (degrees F)	73	71

POINT	LOCATION	dP	TEMP.
N-1	0.5"	.038	113
2	1.5"	.041	112
3	4.5"	.040	112
4	5.5"	.036	111
E-1	0.5"	.035	110
2	1.5"	.042	111
3	4.5"	.041	111
4	5.5"	.037	111
AVG.		.039	111

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

Qs 144.60 dscf/min.

APPLIANCE OPERATION

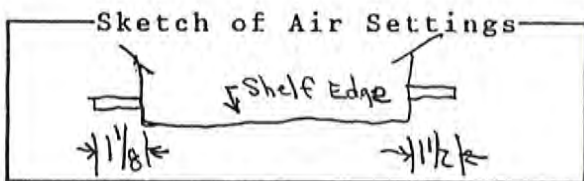
Sampling Time 486 min.
Attempted Burn Category 2
Actual Burn Rate 1.026 Kg/hr

Control Settings:

Primary air Open ¹⁵/₁₆ from closed
Secondary air _____
Fan Auto. / low
Other Underfire open ⁵/₈" from closed

START-UP PROCEDURE (first 5 min.)

By-pass Open for start
Loading Door Open 45 sec's
Air Adjustments N/A



Comments _____

TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514
Actual Crib Wt. (lbs.) 22.6
Actual Coal Bed Wt. (lbs.) 4.6
Avg. Fuel Moisture Dry% 23.34 Wet% 18.92

Crib Wt. Range 22.2 to 27.0
(6.3 to 7.7 lbs/cu. ft.)
Coal Bed Range 4.6 to 5.6
(20 to 25% actual crib wt.)
Crib Wt. Dry Kg. 8.310
(100-Wet%/100 * act.wt./2.205)

086

CLIENT XTEC PROJECT # 108 RUN # 5
 MODEL 2500 PREPARED BY WS DATE 4-29-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 68 test fuel 68

PRE-BURN FUEL (2X4's)

Time of Measurement 0830

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>6</u>	<u>21.8</u>	<u>21.9</u>	<u>22.3</u>
2	<u>6</u>	<u>23.4</u>	<u>24.2</u>	<u>23.8</u>
3	---	---	---	---
4	---	---	---	---

Cut into 9 inch pieces (min. length 1/3 test fuel) avg. moisture 22.9

TEST FUEL

Time of Measurement 0910

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4x4</u>	<u>21.5</u>	<u>22.2</u>	<u>24.6</u>	<u>22.3</u>
2	<u>4x4</u>	<u>21.5</u>	<u>24.8</u>	<u>24.9</u>	<u>24.2</u>
3	<u>4x4</u>	<u>21.5</u>	<u>23.7</u>	<u>24.0</u>	<u>22.3</u>
4	<u>4x4</u>	<u>21.5</u>	<u>22.3</u>	<u>23.0</u>	<u>21.8</u>
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---

avg. moisture 23.34

TEST CRIB WT. 22.6 lbs.

STOVE PRE-TEST DATA
METHOD 2B

F2B-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 5
DATE 4-29-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)						
24hr	E.T.			Combustor(s)	Surface					
					Top	Rear	Bottom	Left	Right	
0830		4.5								
4.5# Kindling, ByPass Open, Air MAX., Fan Auto/Low										
0840		2.9		6.4	2.9	3.5				
0845		3.0								
Set Air Settings • Prim: Air 15/16 Underfire 5/8"										
0850		2.1								
Added Pretest 9.1 / 2.1 - 7.1 # Pretest										
0854		9.0	.055	694	226	392	128	363	364	
0904	10	8.1	.043	824	380	314	200	322	298	
0914	20	7.6	.038	827	428	279	186	291	286	
0924	30	7.0	.037	834	442	248	182	273	273	
0934	40	6.5	.035	796	429	242	181	265	272	
0936 Raked Coals										
0944	50	5.6	.038	879	436	258	186	284	291	
0950 Added Pretest 7.7 / 4.9 = 2.8 #										
0954	60	7.6	.048	781	450	293	186	296	329	
1004	70	7.1	.042	820	446	274	190	305	310	
1014	80	6.7	.037	812	439	261	188	297	292	
1017 Raked Coals										
1024	90	5.8	.036	777	433	269	189	297	309	
1034	100	5.4	.034	808	438	262	188	290	301	
1044										

300

STOVE TEST DATA
METHOD 28

F28-3

1 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 5
DATE 4-29-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1043	00	22.6	.039	848	433	271	182	299	302
1053	10	22.0	.036	724	427	229	180	255	257
1103	20	21.8	.032	594	376	196	175	225	231
1113	30	21.7	.027	535	326	179	166	203	209
1123	40	21.5	.027	574	312	173	163	193	202
1133	50	21.3	.026	611	312	171	157	186	196
1143	60	20.9	.027	578	312	168	154	186	199
1153	70	20.5	.027	565	302	165	151	183	207
1203	80	20.1	.029	551	297	165	150	183	210
1213	90	19.8	.026	555	291	165	148	183	213
1223	100	19.4	.027	574	295	166	147	182	228
1233	10	18.8	.027	616	310	172	148	190	233
1243	20	18.4	.030	643	318	176	147	193	241
1253	30	17.7	.032	702	338	183	141	199	247
1303	40	16.8	.034	768	371	194	142	208	254
1313	50	16.1	.036	792	398	206	141	216	267
1323	60	15.3	.036	821	424	216	143	227	289
1333	70	14.5	.038	814	428	229	144	235	316
1343	80	13.9	.038	819	440	239	147	244	320
1353	90	13.1	.038	882	471	279	150	260	341

089

STOVE TEST DATA
METHOD 28

F28-3

2 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 5
DATE 4-29-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1403	200	12.3	.038	900	482	289	150	264	344
1413	10	11.5	.038	911	511	304	154	282	386
1423	20	10.4	.042	953	529	318	156	296	407
1433	30	9.6	.043	992	553	362	161	315	424
1443	40	8.6	.043	980	563	413	163	336	416
1453	50	7.7	.043	965	571	394	170	343	468
1503	60	7.0	.040	887	551	410	177	344	425
1513	70	6.6	.040	882	548	411	177	341	423
1523	80	6.1	.040	868	539	411	178	343	409
1533	90	5.5	.040	850	527	420	182	349	405
1543	300	4.6	.042	914	531	454	184	374	408
1553	10	4.1	.040	912	541	473	185	384	402
1603	20	3.6	.040	858	545	483	183	393	391
1613	30	3.1	.038	818	524	472	188	402	377
1623	40	2.7	.037	804	513	474	191	408	370
1633	50	2.3	.032	761	493	466	191	429	366
1643	60	1.9	.032	732	463	458	194	417	351
1653	70	1.7	.032	724	458	453	194	412	350
1703	80	1.5	.032	713	442	442	197	397	343
1713	390	1.3	.031	705	430	427	192	386	333

090

STOVE TEST DATA
METHOD 28

F28-3

3 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WS

RUN # 5
DATE 4-29-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1723	400	1.2	.030	688	414	400	190	370	325
1733	10	1.0	.030	696	404	370	189	348	321
1743	20	.9	.028	691	399	352	189	330	317
1753	30	.7	.025	673	388	343	186	315	307
1803	40	.6	.026	667	379	333	184	301	306
1813	50	.5	.025	656	371	327	184	297	302
1823	60	.4	.025	642	361	312	180	286	295
1833	70	.2	.025	628	350	306	176	280	287
1843	80	.1	.024	621	345	304	174	277	282
1849	90	.0	.023	618	341	302	172	276	279
	00								
	10								
	20								
	30								
	40								
	50								
	60								
	70								
	80								
	90								

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

1 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 198
OPERATORS WLS

RUN # 5
DATE 4-29-93

Meter Box # 456-P Meter Y 1.014

Filter #s _____

Pretest leak rate = .001 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = 000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1043	00	809.400	.039	.9	68	106	1	67	45	73
1053	10	813.5	.039	.9	72	102	1	78	42	72
1103	20	818.6	.039	.9	79	96	1	78	39	71
1113	30	823.4	.039	.9	82	93	1	77	38	71
1123	40	828.2	.039	.9	92	90	1	78	36	71
1133	50	833.3	.039	.9	98	88	1	77	35	71
1143	60	838.4	.039	.9	102	89	1	77	35	71
1153	70	843.4	.039	.9	106	88	1	76	35	70
1203	80	848.4	.039	.9	108	88	1	76	35	70
1213	90	853.4	.039	.9	110	88	1	77	36	70
1223	00	858.3	.039	.9	112	87	1	76	37	70
1233	10	863.3	.039	.9	114	87	1	76	38	70
1243	20	868.2	.039	.9	114	87	1	76	38	71
1253	30	873.2	.039	.9	115	88	1	76	39	70
1303	40	878.2	.039	.9	116	89	1	76	39	70
1313	50	883.2	.039	.9	116	90	1	76	39	70
1323	60	888.2	.039	.9	116	91	1	77	39	70
1333	70	893.3	.039	.9	116	91	1	77	39	70
1343	80	898.3	.039	.9	116	94	1	78	40	71
1353	90	903.3	.039	.9	116	97	1	79	40	72

AVG. ~~114.30~~ 95.5

090

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

2 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 5
DATE 4-29-93

Meter Box # 45G-P Meter Y 1.014

Filter #s _____

Pretest leak rate = .001 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .000 cfm @ 5 in. Hg

Probe length 18'

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1403	200	908.2	.039	.9	117	98	1	80	40	72
1413	10	913.2	.039	.9	118	104	1	83	40	72
1423	20	918.2	.039	.9	119	100	1	83	40	73
1433	30	923.2	.039	.9	119	101	1	83	41	73
1443	40	928.2	.039	.9	119	102	1	83	36	73
1453	50	933.2	.039	.9	120	102	1	83	32	72
1503	60	938.2	.039	.9	120	102	1	84	32	72
1513	70	943.2	.039	.9	121	102	1	84	32	72
1523	80	948.2	.039	.9	121	101	1	85	32	72
1533	90	953.2	.039	.9	122	102	1	85	32	72
1543	300	958.2	.039	.9	122	102	1	85	32	73
1553	10	963.2	.039	.9	122	102	1	85	32	74
1603	20	968.2	.039	.9	122	101	1	84	32	74
1613	30	973.2	.039	.9	122	102	1	84	32	75
1623	40	978.2	.039	.9	122	102	1	84	32	75
1633	50	983.1	.039	.9	123	100	1	84	32	75
1643	60	988.1	.039	.9	123	99	1	84	32	75
1653	70	993.1	.039	.9	123	99	1	84	32	75
1703	80	998.2	.039	.9	123	98	1	84	33	74
1713	390	1003.2	.039	.9	123	96		82	33	74

AVG. ~~114.4~~ 95.1

090

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

3 of 3

CLIENT XTEC

PROJECT # 188

RUN # 5

MODEL 2500

OPERATORS WLS

DATE 4-29-93

Meter Box # 45G-P

Meter Y 1-014

Filter #s _____

Pretest leak rate = .001 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = 0.00 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1723	400	1008.2	.039	.9	123	96	1	82	34	73
1733	10	1013.3	.039	.9	122	95	1	81	35	73
1743	20	1018.3	.039	.9	121	95	1	81	36	73
1753	30	1023.3	.039	.9	122	95	1	82	37	73
1803	40	1028.4	.039	.9	122	93	1	81	38	72
1813	50	1033.4	.039	.9	122	93	1	81	38	72
1823	60	1038.4	.039	.9	122	93	1	81	38	72
1833	70	1043.4	.039	.9	122	91	1	81	39	71
1843	80	1048.4	.039	.9	122	90	1	80	40	71
1849	⁴⁸⁰ 90	1051.387	.039	.9	122	90	1	80	40	71
	00									
	10									
	20									
	30									
	40									
	50									
	60									
	70									
	80									
	90									

AVG. _____

ng

GRAVIMETRIC ANALYSIS

F5G-2

CLIENT/MODEL XTEC PROJECT # 188 RUN # 5

Prepared by: WLS date/time 4-29-93 1000 Filters: size-11.0 cm

Recovered by: WLS date/time 4-29-93 1751 brand-Whatman 934AH

Placed in Desiccator: date/time filters 4-29 1759 beaker 4-30 0830

Acetone lot # 910302 Acetone rinse: beaker wt. w/rinse 14 g

Acetone blank concentration 0.01 mg/g beaker tare wt. 3 g

net rinse 11 g

Blank Adjustment = blank conc. 0.01 mg/g x net rinse 11 g = 0.11 mg

	Date/time	Filter #'s front <u>332</u> rear <u>331</u>	Beaker # <u>297</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	<u>4/30</u> <u>1730</u>	<u>1.2642</u>	<u>2.5844</u>	<u>36</u>	<u>72</u>	<u>.5000</u> <u>2.0000</u>
wt.2	<u>5/1</u> <u>1130</u>	<u>1.2640</u>	<u>2.5844</u>	<u>38</u>	<u>67</u>	<u>.5000</u> <u>2.0000</u>
wt.3						
wt.4						
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.	<u>1.2640</u>	<u>2.5844</u>
Tare wt(s).	front <u>.6159</u>	<u>2.5820</u>
	rear <u>.6163</u>	

Filter gain 31.8 mg
 Beaker gain + 2.4 mg
 Blank adjust. - 0.1 mg

Net gain 31.8 mg 2.4 mg

TOTAL = 34.1 mg

095

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 6
DATE 4-30-93

TEST FACILITY CONDITIONS

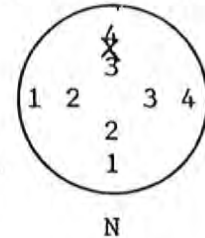
	PRE	POST
Induced Draft (in. Water)	.001	
Room Air Velocity (ft./min.)	10	20
Barometric Pressure (in. Hg)	29.75	29.72
Relative Humidity (%)	28	28
Scale Audit (cal. wt. <u>11.0</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	334.2	281.4
Room Temp. (degrees F)	72	74

VELOCITY TRAVERSE

POINT	LOCATION	dP	TEMP.
N-1	0.5"	.037	101
2	1.5"	.041	102
3	4.5"	.042	102
4	5.5"	.038	101
E-1	0.5"	.036	103
2	1.5"	.040	103
3	4.5"	.042	102
4	5.5"	.038	100
AVG.		.039	102

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

Qs 144.30 dscf/min.

APPLIANCE OPERATION

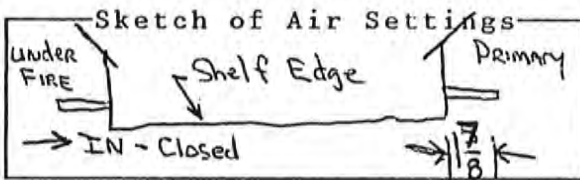
Sampling Time ~~399~~ 494 min.
Attempted Burn Category 3
Actual Burn Rate 1.039 Kg/hr

Control Settings:

Primary air Open 9/16" from closed
Secondary air N/A
Fan Auto - low
Other Under fire - closed

START-UP PROCEDURE (first 5 min.)

By-pass Open for loading
Loading Door Open 45 sec.
Air Adjustments N/A



Comments _____

TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514
Actual Crib Wt. (lbs.) 23.0
Actual Coal Bed Wt. (lbs.) 4.8
Avg. Fuel Moisture Dry% 21.95 Wet% 17.99

Crib Wt. Range 22.2 to 27.0
(6.3 to 7.7 lbs/cu. ft.)
Coal Bed Range 4.6 to 5.7
(20 to 25% actual crib wt.)
Crib Wt. Dry Kg. 8.554
(100-Wet%/100 * act.wt./2.205)

CLIENT XTEC PROJECT # 188 RUN # 6
 MODEL 2500 PREPARED BY WLS DATE 4-30-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 69 test fuel 71

PRE-BURN FUEL (2X4's)

Time of Measurement 0810

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>6</u>	<u>23.4</u>	<u>23.1</u>	<u>24.3</u>
2	<u>6</u>	<u>22.7</u>	<u>23.4</u>	<u>22.9</u>
3	---	---	---	---
4	---	---	---	---

Cut into 12 inch pieces (min. length 1/3 test fuel) avg. moisture 23.3

TEST FUEL

Time of Measurement 0845

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4x4</u>	<u>21"</u>	<u>19.8</u>	<u>21.9</u>	<u>20.5</u>
2	<u>4x4</u>	<u>21"</u>	<u>22.3</u>	<u>24.6</u>	<u>21.2</u>
3	<u>4x4</u>	<u>21"</u>	<u>22.3</u>	<u>23.6</u>	<u>22.8</u>
4	<u>4x4</u>	<u>21"</u>	<u>20.8</u>	<u>21.6</u>	<u>22.0</u>
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---

avg. moisture 21.95

TEST CRIB WT. 230 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 6
DATE 4-30-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					Top	Rear	Bottom	Left	Right
0805		8.4		8.4 # Kindling	BP Open	Air MAX.	FAN Auto	low	
				0820	By PASS Closed				
0835		13.4	.043	Added Pretest	13.4 / 1.9	11.5 #	Set Air Adjustments		
0845	10	12.0	.040		721	336	210	128	297 288
0855	20	10.4	.048		721	468	338	157	336 336
0905	30	9.5	.046		897	488	297	174	323 329
0915	40	8.7	.046		898	511	290	187	328 342
0925	50	7.8	.045		948	521	299	197	339 361
0935	60	6.6	.045		942	526	327	209	357 387
				0940	Raked Coals				
0945	70	5.3	.051		828	517	365	265	381 404
				0950	Added Pretest	4.5 / 8.7	4.2 # P.T.		
0955	80	8.4	.047		958	528	325	203	372 379
1005	90	7.8	.045		964	538	304	199	350 360
1015	100	7.0	.043		892	527	293	192	342 347
1025	110	6.4	.040		848	511	286	181	331 331
				1030	Raked Coals				
1035	120	5.4	.043		869	489	304	179	341 347
1045	130	5.1	.040		819	479	282	179	323 321
1048					Raked Coals				

STOVE TEST DATA
METHOD 28

F28-3

1 of 3

CLIENT XTEC

PROJECT # 188

RUN # 6

MODEL 2500

OPERATORS WHS

DATE 4-30-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1050	00	23.0	.042	803	484	352	189	340	356
1100	10	22.4	.040	754	457	246	191	291	293
1110	20	22.1	.036	679	433	218	191	261	264
1120	30	21.9	.035	636	401	201	185	241	245
1130	40	21.6	.032	623	373	187	179	223	226
1140	50	21.3	.030	613	353	178	174	210	214
1150	60	21.0	.030	587	341	173	166	204	206
1200	70	20.7	.028	594	330	170	163	199	201
1210	80	20.3	.028	606	329	169	162	197	201
1220	90	19.9	.029	601	329	170	160	198	204
1230	100	19.4	.029	603	328	172	158	201	205
1240	10	19.0	.029	605	329	173	155	203	206
1250	20	18.6	.029	608	330	176	155	205	205
1300	30	18.1	.029	619	333	180	151	200	203
1310	40	17.7	.029	632	334	184	151	204	207
1320	50	17.3	.029	621	333	191	149	200	213
1330	60	16.8	.029	651	345	210	144	203	230
1340	70	16.4	.033	718	358	242	143	214	250
1350	80	15.7	.035	768	372	254	143	218	259
1400	90	15.3	.038	851	412	276	143	232	281

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 6
DATE 4-30-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1410	200	14.9	.040	903	458	306	145	253	332
1420	10	14.1	.043	931	504	317	145	269	361
1430	20	13.2	.044	954	525	309	148	287	380
1440	30	12.1	.046	987	553	320	151	306	419
1450	40	10.9	.048	1034	580	348	156	336	447
1500	50	9.9	.040	1019	599	372	164	354	458
1510	60	8.8	.048	1006	611	383	173	368	454
1520	70	7.8	.042	977	608	410	177	391	457
1530	80	6.9	.041	947	602	432	180	396	454
1540	90	6.1	.047	912	600	442	189	410	444
1550	300	5.3	.046	904	590	446	193	421	442
1600	10	4.6	.045	892	585	453	199	435	430
1610	20	4.0	.045	893	581	456	204	442	432
1620	30	3.4	.045	895	576	451	209	434	434
1630	40	2.9	.044	867	557	423	216	432	417
1640	50	2.5	.042	841	542	409	223	437	401
1650	60	2.2	.042	811	517	404	222	432	389
1700	70	1.9	.040	768	493	372	225	433	369
1710	80	1.7	.041	739	467	357	228	432	352
1720	90	1.6	.041	714	448	343	227	426	343

CLIENT XTEC

PROJECT # 188

RUN # 6

MODEL 2500

OPERATORS WLS

DATE 4-30-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1730	00	1.4	.037	699	434	332	225	421	330
1740	10	1.2	.035	699	425	336	222	413	325
1750	20	1.0	.035	686	417	341	215	393	322
1800	30	.9	.033	666	405	332	209	377	312
1810	40	.7	.030	649	393	319	206	361	300
1820	50	.6	.032	638	383	313	199	349	296
1830	60	.4	.031	624	371	307	194	331	288
1840	70	.3	.031	616	365	300	190	323	281
1850	80	.2	.030	604	362	297	185	312	276
1900	90	.1	.030	593	357	297	183	308	275
1904	00	0	.030	588	351	297	181	304	274
	10								
	20								
	30								
	40								
	50								
	60								
	70								
	80								
	90								

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

1 of 3

CLIENT XTEC

PROJECT # 188

RUN # 6

MODEL 2500

OPERATORS WLS

DATE 4-30-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .001 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1050	00	051.600	.039	.9	71	111	1	76	45	72
1100	10	056.4	.039	.9	76	95	1	79	45	72
1110	20	061.2	.039	.9	81	92	1	78	45	72
1120	30	066.2	.039	.9	86	90	1	77	45	72
1130	40	071.2	.039	.9	92	88	1	76	45	72
1140	50	076.4	.039	.9	102	87	1	75	45	72
1150	60	081.5	.039	.9	104	86	1	75	38	71
1200	70	086.6	.039	.9	107	87	1	75	35	71
1210	80	091.6	.039	.9	109	87	1	76	35	71
1220	90	096.5	.039	.9	111	86	1	75	34	71
1230	00	101.5	.039	.9	113	86	1	76	34	71
1240	10	106.5	.039	.9	114	86	1	75	32	71
1250	20	111.5	.039	.9	115	86	1	75	32	71
1300	30	116.5	.039	.9	116	87	1	76	32	71
1310	40	121.5	.039	.9	116	89	1	76	32	71
1320	50	126.4	.039	.9	117	90	1	77	32	71
1330	60	131.4	.039	.9	117	91	1	78	32	72
1340	70	136.4	.039	.9	117	92	1	79	32	72
1350	80	141.4	.039	.9	118	93	1	79	31	73
1400	90	146.3	.039	.9	118	97	1	80	31	72

AVG. 115.63 96.66

102

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

2 of 3

CLIENT XTEC

PROJECT # 108

RUN # 6

MODEL 2500

OPERATORS WLS

DATE 4-30-93

Meter Box # 45G-P

Meter Y 1014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = .001 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1410	2 00	151.2	.039	.9	119	97	1	81	31	74
1420	10	156.2	.039	.9	119	99	1	82	31	74
1430	20	161.2	.039	.9	119	100	1	83	31	74
1440	30	166.2	.039	.9	119	101	1	83	31	74
1450	40	171.3	.039	.9	119	103	1	84	31	73
1500	50	176.3	.039	.9	121	104	1	85	32	75
1510	60	181.3	.039	.9	121	106	1	85	32	74
1520	70	186.3	.039	.9	121	106	1	86	33	76
1530	80	191.3	.039	.9	122	105	1	86	33	76
1540	90	196.3	.039	.9	122	105	1	86	33	76
1550	00	201.3	.039	.9	122	105	1	86	34	77
1600	10	206.3	.039	.9	123	105	1	86	35	78
1610	20	211.3	.039	.9	123	105	1	86	35	78
1620	30	216.3	.039	.9	123	104	1	86	35	77
1630	40	221.3	.039	.9	123	104	1	87	34	77
1640	50	226.3	.039	.9	123	104	1	87	34	77
1650	60	231.3	.039	.9	123	102	1	86	33	76
1700	70	236.3	.039	.9	124	102	1	87	33	77
1710	80	241.3	.039	.9	124	101	1	86	34	76
1720	90	246.4	.039	.9	124	100	1	85	35	75

AVG. _____

103

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

3 of 3

CLIENT XTEC

PROJECT # 188

RUN # 6

MODEL 2500

OPERATORS WLS

DATE 4-30-93

Meter Box # 45G-P Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = .001 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1730	00	251.4	.039	.9	124	101	1	84	36	76
1740	10	256.5	.039	.9	123	101	1	85	36	74
1750	20	261.5	.039	.9	124	100	1	84	36	74
1800	30	266.6	.039	.9	124	98	1	83	36	74
1810	40	271.6	.039	.9	124	98	1	83	33	74
1820	50	276.6	.039	.9	124	98	1	83	34	73
1830	60	281.6	.039	.9	124	96	1	83	34	72
1840	70	286.6	.039	.9	124	94	1	83	35	74
1850	80	291.6	.039	.9	124	94	1	83	36	74
1900	90	296.6	.039	.9	124	93	1	83	36	74
1904	00	298.770	.039	.9	124	93	1	83	37	74
	10									
	20									
	30									
	40									
	50									
	60									
	70									
	80									
	90									

AVG. _____

CLIENT/MODEL XTEC PROJECT # 188 RUN # 6Prepared by: WIS date/time 4-30-3 0905 Filters: size-11.0 cmRecovered by: WIS date/time 4-30-3 1915 brand-Whatman 934AHPlaced in Desiccator: date/time filters 4-30-3 1925 beaker 5-1-3 0910Acetone lot # 910302 Acetone rinse: beaker wt. w/rinse 15 gAcetone blank concentration 0.01 mg/g beaker tare wt. 3 gnet rinse 12 gBlank Adjustment = blank conc. 0.01 mg/g x net rinse 12 g = 0.12 mg

	Date/time	Filter #'s front <u>334</u> rear <u>333</u>	Beaker # <u>298</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	5-1 1040	1.2666	2.5685	36	66	.5000 2.000
wt.2	5-2 1130	1.2661	2.5684	38	67	.5000 2.000
wt.3						
wt.4						
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.

1.26612.5684

Filter gain

39.3 mg

Tare wt(s).

front .61262.5658

Beaker gain

+ 2.6 mgrear .6142

Blank adjust.

- 0.1 mg

Net gain

39.3 mg2.6 mg

TOTAL

= 41.8 mg

105

CLIENT XTEC

PROJECT # 188

RUN # 7

MODEL 2500

OPERATORS WHS

DATE 5-3-93

TEST FACILITY CONDITIONS

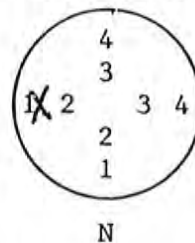
	PRE	POST
Induced Draft (in. Water)	.002	
Room Air Velocity (ft./min.)	10	30
Barometric Pressure (in. Hg)	29.90	29.84
Relative Humidity (%)	34	42
Scale Audit (cal. wt. <u>110</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	373.4	337.8
Room Temp. (degrees F)	69	74

VELOCITY TRAVERSE

	POINT LOCATION	dP	TEMP.
N-1	0.5"	.038	114
	1.5"	.041	114
	4.5"	.042	114
	5.5"	.039	115
E-1	0.5"	.036	114
	1.5"	.040	114
	4.5"	.041	115
	5.5"	.038	114
	AVG.	.039	114

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

Qs 143.07 dscf/min.

APPLIANCE OPERATION

Sampling Time 272 min.

Attempted Burn Category 3

Actual Burn Rate 1.87 Kg/hr

Control Settings:

Primary air Open 1/2" from closed

Secondary air N/A

Fan Auto/low

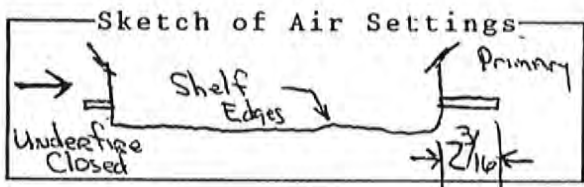
Other Underfire - closed

START-UP PROCEDURE (first 5 min.)

By-pass Open for loading

Loading Door Open 1 min

Air Adjustments N/A



Comments _____

TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514

Actual Crib Wt. (lbs.) 22.9

Actual Coal Bed Wt. (lbs.) 4.6

Avg. Fuel Moisture Dry% 22.74 Wet% 18.53

Crib Wt. Range 22.2 to 27.0
(6.3 to 7.7 lbs/cu. ft.)

Coal Bed Range 4.6 to 5.7
(20 to 25% actual crib wt.)

Crib Wt. Dry Kg. 8.461
(100-Wet%/100 * act.wt./2.205)

CLIENT XTEC PROJECT # 188 RUN # 7
 MODEL 2500 PREPARED BY WLS DATE 5-3-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.0 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 66 test fuel 67

PRE-BURN FUEL (2X4's)

Time of Measurement 1000

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>6</u>	<u>19.8</u>	<u>20.2</u>	<u>19.2</u>
2	<u>6</u>	<u>21.4</u>	<u>20.6</u>	<u>21.8</u>
3	---	---	---	---
4	---	---	---	---

Cut into 9 inch pieces (min. length 1/3 test fuel) avg. moisture 20.5

TEST FUEL

Time of Measurement 1035

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4x4</u>	<u>21.5</u>	<u>22.7</u>	<u>21.9</u>	<u>22.3</u>
2	<u>4x4</u>	<u>21.5</u>	<u>22.9</u>	<u>23.7</u>	<u>23.1</u>
3	<u>4x4</u>	<u>21.5</u>	<u>20.8</u>	<u>21.5</u>	<u>20.7</u>
4	<u>4x4</u>	<u>21.5</u>	<u>24.3</u>	<u>24.5</u>	<u>24.5</u>
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---

avg. moisture 22.74

TEST CRIB WT. 22.9 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 7
DATE 5-3-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					Top	Rear	Bottom	Left	Right
1015		6.8#	Knudding	BPOpen	AirMax	FAN	Auto/low		
1025			Closed	By-Pass	1025				
1045		11.0	Added Pretest	1.8 - 11.0 / 9.2#	Set Air	Adjustments			
1055	10	9.6	.045	694	390	265	167	258	287
1105	20	9.3	.045	701	396	257	170	257	287
1115	30	8.6	.045	728	423	252	177	256	294
1125	40	7.8	.047	805	442	269	179	267	313
1135	50	6.7	.049	856	477	307	184	297	358
1145	60	5.8	.049	886	510	329	185	319	389
1155	70	4.3	.052	930	543	346	181	324	396
1205	80	4.9	.052	957	546	369	184	353	403
1215	90								

STOVE TEST DATA
METHOD 28

F28-3

1 of 2

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WHS

RUN # 7
DATE 5-3-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					top	rear	bottom	left	right
1215	00	22.9	.052	892	530	389	186	352	410
1225	10	22.1	.051	802	529	278	200	293	326
1235	20	20.5	.053	882	512	246	200	259	288
1245	30	19.6	.054	910	520	258	199	264	292
1255	40	18.9	.054	967	537	262	197	272	308
1305	50	17.5	.054	1040	614	301	194	306	330
1315	60	15.9	.055	1063	658	348	196	326	353
1325	70	14.1	.057	1133	675	398	200	355	404
1335	80	12.6	.056	1182	723	453	196	364	418
1345	90	11.0	.052	1039	698	570	194	397	441
1355	100	9.7	.055	1086	695	580	198	419	463
1405	10	8.5	.054	1124	710	539	200	427	457
1415	20	7.2	.056	1100	700	527	206	428	496
1425	30	6.1	.062	1052	691	523	209	423	498
1435	40	5.4	.053	994	642	559	211	438	501
1445	50	4.6	.059	989	626	537	219	439	513
1455	60	3.4	.054	997	634	478	228	440	514
1505	70	2.6	.047	971	623	437	249	419	469
1515	80	2.1	.045	937	608	417	252	411	449
1525	190	1.7	.045	889	581	400	261	399	433

STOVE TEST DATA
METHOD 28

F28-3

2 of 2

CLIENT XTEC

PROJECT # 188

RUN # 7

MODEL 7500

OPERATORS WLS

DATE 5-3-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1535	200	1.4	.047	855	552	376	264	381	412
1545	10	1.2	.040	818	525	361	272	371	397
1555	20	1.0	.042	803	508	355	274	365	390
1605	30	.8	.038	780	492	347	267	357	383
1615	40	.6	.040	764	477	342	265	349	381
1625	50	.3	.032	744	460	338	258	340	370
1635	60	.2	.034	741	452	331	253	334	365
1645	70	.1	.032	729	445	327	247	327	360
1647	80	0.00	.030	726	439	323	247	324	356
	272								
	90								
	00								
	10								
	20								
	30								
	40								
	50								
	60								
	70								
	80								
	90								

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

1 of 2

CLIENT XTEC
MODEL 2500

PROJECT # 198
OPERATORS WLS

RUN # 7
DATE 5-3-93

Meter Box # 45G-P Meter Y 1.014

Pretest leak rate = .001 cfm @ 10 in. Hg

Post test leak rate = .000 cfm @ 5 in. Hg

Filter #s _____

Filter size: 11 cm

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1215	00	299.100	.039	.9	76	120	1	78	44	78
1225	10	304.2	.039	.9	81	112	1	83	44	77
1235	20	309.2	.039	.9	87	109	1	83	44	75
1245	30	314.0	.039	.9	93	106	1	83	39	73
1255	40	318.9	.039	.9	97	108	1	84	39	73
1305	50	323.8	.039	.9	101	110	1	83	38	74
1315	60	328.9	.039	.9	105	113	1	84	36	74
1325	70	334.0	.039	.9	108	112	1	84	35	73
1335	80	339.0	.039	.9	111	111	1	85	33	74
1345	90	343.9	.039	.9	112	112	1	85	33	74
1355	00	348.9	.039	.9	115	114	1	86	33	74
1405	10	353.9	.039	.9	116	114	1	87	33	75
1415	20	359.0	.039	.9	116	114	1	87	33	76
1425	30	364.1	.039	.9	117	114	1	87	32	76
1435	40	369.0	.039	.9	117	113	1	87	32	75
1445	50	374.0	.039	.9	118	114	1	87	32	75
1455	60	379.1	.039	.9	117	113	1	87	32	77
1505	70	384.1	.039	.9	117	111	1	86	32	77
1515	80	389.0	.039	.9	117	109	1	86	32	76
1525	190	394.0	.039	.9	118	106	1	85	32	76

AVG. 110.41 107.86

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PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

2 of 2

CLIENT XTEC

PROJECT # 188

RUN # 7

MODEL 2500

OPERATORS WHS

DATE 5-3-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .001 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1535	200	399.0	.039	.9	118	105	1	85	32	76
1545	10	404.0	.039	.9	119	103	1	83	32	75
1555	20	409.1	.039	.9	118	101	1	83	32	74
1605	30	414.0	.039	.9	118	99	1	82	32	75
1615	40	418.9	.039	.9	118	99	1	81	32	75
1625	50	423.9	.039	.9	118	97	1	81	32	74
1635	60	428.9	.039	.9	118	96	1	81	32	73
1645	70	433.9	.039	.9	118	96	1	80	32	74
1647	80	435.026	.039	.9	119	97	1	81	32	74
	90									
	00									
	10									
	20									
	30									
	40									
	50									
	60									
	70									
	80									
	90									

AVG. _____

112

CLIENT/MODEL XTEC 2500 PROJECT # 188 RUN # 7Prepared by: WLS date/time 5-3-93 1005 Filters: size-11.0 cmRecovered by: WLS date/time 5-3-3 1650 brand-Whatman 934AHPlaced in Desiccator: date/time filters 5-3-3 1700 beaker 1740 5-3-3Acetone lot # 910302 Acetone rinse: beaker wt. w/rinse 15 gAcetone blank concentration 0.01 mg/g beaker tare wt. 3 gnet rinse 12 gBlank Adjustment = blank conc. 0.01 mg/g x net rinse 12 g = 0.12 mg

	Date/time	Filter #'s front <u>336</u> rear <u>335</u>	Beaker # <u>299</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	<u>5-4-3</u> <u>1720</u>	<u>1.2699</u>	<u>2.5798</u>	<u>36</u>	<u>74</u>	<u>.5000</u> <u>2.000</u>
wt.2	<u>5-5-3</u> <u>1720</u>	<u>1.2698</u>	<u>2.5799</u>	<u>49</u>	<u>77</u>	<u>.5000</u> <u>2.000</u>
wt.3						
wt.4						
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.

1.26982.5799Filter gain 38.3 mg

Tare wt(s).

front .61572.5776Beaker gain + 2.3 mgrear .6158Blank adjust. - 0.1 mg

Net gain

38.3 mg2.3 mgTOTAL = 40.5 mg

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CLIENT XTEC

PROJECT # 188

RUN # 1

MODEL 2500

OPERATORS WLS, WHH

DATE 4-26-93

TEST FACILITY CONDITIONS

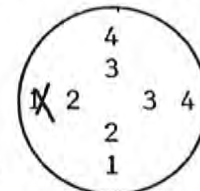
	PRE	POST
Induced Draft (in. Water)	.002	
Room Air Velocity (ft./min.)	10	20
Barometric Pressure (in. Hg)	29.62	29.64
Relative Humidity (%)	59	59
Scale Audit (cal. wt. <u>11.0</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	444.8	373.8
Room Temp. (degrees F)	87	85

VELOCITY TRAVERSE

	POINT LOCATION	dP	TEMP.
N-1	0.5"	.037	111
	1.5"	.039	112
	4.5"	.038	111
	5.5"	.036	110
E-1	0.5"	.036	109
	1.5"	.039	109
	4.5"	.041	109
	5.5"	.037	109
	AVG.	.038	110

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

N

Qs 139.31 dscf/min.

APPLIANCE OPERATION

Sampling Time 170 min.

Attempted Burn Category 4

Actual Burn Rate 2.97 Kg/hr

Control Settings:

Primary air MAX.

Secondary air NC

Fan Auto / MAX

Other Underfire / MAX.

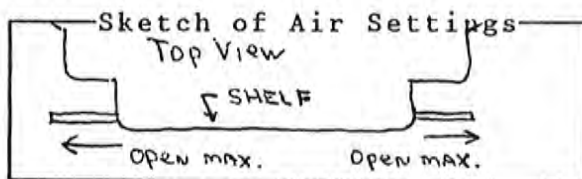
START-UP PROCEDURE (first 5 min.)

By-pass open for loading

Loading Door Open 45 sec.

Air Adjustments N/A

Comments _____



TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514

Actual Crib Wt. (lbs.) 22.3

Actual Coal Bed Wt. (lbs.) 4.8

Avg. Fuel Moisture Dry% 20.34 Wet% 16.9

Crib Wt. Range 22.2 to 27.0
(6.3 to 7.7lbs/cu. ft.)

Coal Bed Range 4.5 to 5.5
(20 to 25% actual crib wt.)

Crib Wt. Dry Kg. 8.404
(100-Wet%/100 * act.wt./2.205)

CLIENT XTEC PROJECT # 188 RUN # 1

MODEL 2500 PREPARED BY WLS DATE 4-26-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 68 test fuel 68

PRE-BURN FUEL (2X4's)

Time of Measurement 0850

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>3</u>	<u>19.1</u>	<u>20.2</u>	<u>18.4</u>
2	<u>3</u>	<u>23.1</u>	<u>24.5</u>	<u>24.1</u>
3	<u>3</u>	<u>24.3</u>	<u>25.2</u>	<u>24.4</u>
4	_____	_____	_____	_____

avg. moisture 22.59
Cut into 12 inch pieces (min. length 1/3 test fuel)

TEST FUEL

Time of Measurement 0915

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4 x 4</u>	<u>21.5</u>	<u>19.9</u>	<u>20.6</u>	<u>20.0</u>
2	<u>4 x 4</u>	<u>21.5</u>	<u>19.4</u>	<u>20.4</u>	<u>19.0</u>
3	<u>4 x 4</u>	<u>21.5</u>	<u>20.8</u>	<u>21.5</u>	<u>21.3</u>
4	<u>4 x 4</u>	<u>21.5</u>	<u>19.2</u>	<u>21.1</u>	<u>20.9</u>
5	_____	_____	_____	_____	_____
6	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____
8	_____	_____	_____	_____	_____

avg. moisture 20.34

TEST CRIB WT. 22.3 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS, WAA

RUN # 1
DATE 4-26-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					Top	Rear	Bottom	Left	Right
0840		6.8							
				Kindling - Air Max, Fan - Auto/High					
				FP closed @ 0850					
0905		1.2							
				Added Kindling 6.2 - 1.2 = 5.0					
0915		3.5	.053	894	463	294	146	331	359
0925		2.7							
				Added Pretest 14.7 - 2.7 = 12.0					
0930	10	14.0	.060	1068	515	290	155	344	361
0939	20	11.5							
				Raked Coals					
0940	30	11.3	.072	1064	577	316	163	340	372
0950	40	9.6	.061	1080	584	295	205	362	378
				0952 - raked coals					
1000	50	6.2	.06	1039	582	358	221	381	438
1010	60	4.3							
				Added Pretest 8.0 - 4.3 = 3.7					
1015	70	7.8	.065	1028	592	420	248	421	497
1025	80	6.2	.062	1078	610	375	245	414	486
				Raked Coals 1032 8.3/4.6 = 3.7 # added					
1035	90	8.1	.065	996	604	403	244	424	502
1045	100	7.0	.062	1011	603	413	244	432	503
1055	110	5.6	.066	1025	601	453	246	442	509

1056 Raked Coals

STOVE TEST DATA
METHOD 28

F28-3

1 of 1

CLIENT XTEC

PROJECT # 188

RUN # 1

MODEL 2500

OPERATORS WLS

DATE 4-26-93

Time		Fuel Wt. lbs.	Draft ins. water	Combus(tor) (s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1100	00	22.3	.062	994	593	436	244	437	514
1110	10	20.2	.065	1087	592	270	234	334	444
1120	20	18.2	.065	1232	654	246	227	322	450
1130	30	16.8	.065	1187	650	242	226	322	456
1140	40	15.0	.063	1180	639	253	216	308	480
1150	50	13.6	.063	1198	654	271	210	309	497
1200	00	12.6	.063	1153	650	291	207	319	535
1210	70	10.7	.061	1174	645	298	205	340	550
1220	80	8.9	.061	1190	657	331	202	374	532
1230	00	6.6	.061	1159	649	361	206	398	535
1240	00	5.2	.061	1131	648	367	210	427	541
1250	10	3.9	.060	1105	645	362	209	444	514
1300	20	2.7	.057	1048	616	346	212	426	478
1310	30	2.0	.055	1002	587	350	216	423	460
1320	40	1.5	.055	970	561	351	221	420	440
1330	50	.9	.053	930	545	333	221	409	437
1340	00	.5	.052	894	512	337	222	420	417
1350	70	0	.052	883	497	330	222	414	406
	80								
	90								

**PARTICULATE SAMPLING DATA
METHOD 5G**

F5G-1

1 of 1

CLIENT XTEC

PROJECT # 188

RUN # 1

MODEL 2500

OPERATORS WLS

DATE 4-26-93

Meter Box # 456-P

Meter Y 1.014

Filter #s 321 324

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = 000 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dp	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1100	00	087.003	.038	.9	74	124	1	75	44	87
1110	10	087.0	.038	.9	77	114	1	84	43	89
1120	20	091.9	.038	.9	83	110	1	84	38	91
1130	30	096.6	.038	.9	90	110	1	83	37	92
1140	40	101.5	.038	.9	98	109	1	83	35	84
1150	50	106.3	.038	.9	101	108	1	83	34	88
1200	00	111.3	.038	.9	106	108	1	83	34	88
1210	70	116.3	.038	.9	109	107	1	82	33	84
1220	80	121.2	.038	.9	111	109	1	83	33	84
1230	00	126.2	.038	.9	113	110	1	84	34	87
1240	00	131.3	.038	.9	114	110	1	84	34	85
1250	10	136.4	.038	.9	115	111	1	85	34	82
1300	20	141.4	.036	.9	116	110	1	85	34	83
1310	30	146.4	.036	.9	116	110	1	85	34	85
1320	40	151.3	.036	.9	116	110	1	85	34	85
1330	50	156.2	.036	.9	118	109	1	86	35	88
1340	00	161.3	.036	.9	118	108	1	86	35	84
1350	70	166.552	.036	.9	118	109	1	86	35	85
	80									
	90									

AVG. 105.17 110.33

CLIENT/MODEL XTEC PROJECT # 188 RUN # 1

Prepared by: WLS date/time 4-26-3 0950 Filters: size-11.0 cm

Recovered by: WLS date/time 4-26-3 1415 brand-Whatman 034AH

Placed in Desiccator: date/time filters 4-26-3 1422 beaker 4-27-3 1150

Acetone lot # 91030Z Acetone rinse: beaker wt. w/rinse 20 g

Acetone blank concentration 0.01 mg/g beaker tare wt. 3 g

net rinse 17 g

Blank Adjustment = blank conc. 0.01 mg/g x net rinse 17 g = 0.17 mg

	Date/time	Filter #'s front <u>324</u> rear <u>321</u>	Beaker # <u>293</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	4-27-3 1200	1.2764	⁴⁻²⁸⁻⁹³ 2.5477 ₁₃₃₀	41	64	.5000 2.000
wt.2	4-28-3 1335	1.2761		35	66	.5000 2.000
wt.3	4-29-3 1145	1.2758	2.5478	36	64	.5000 2.000
wt.4	4-30-3 1010	1.2759	2.5478	37	66	.5000 2.000
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.	1.2761	2.5478
Tare wt(s).	front .6201	2.5432
	rear .6220	

Filter gain 34.0 mg
 Beaker gain + 4.6 mg
 Blank adjust. - 0.2 mg

Net gain 34.0 mg 4.6 mg

TOTAL = ~~38.5~~ mg

38.4
119

CLIENT XTEC

PROJECT # 188

RUN # 2

MODEL 2500

OPERATORS WLS

DATE 4-26-93

TEST FACILITY CONDITIONS

VELOCITY TRAVERSE

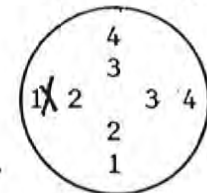
	PRE	POST
Induced Draft (in. Water)	Hot-start	
Room Air Velocity (ft./min.)	108	204
Barometric Pressure (in. Hg)	29.64	29.68
Relative Humidity (%)	59	51
Scale Audit (cal. wt. <u>11.0</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	478.2	311.8
Room Temp. (degrees F)	73	68

AT-166.4

POINT	LOCATION	dP	TEMP.
N-1	0.5"	.035	98
2	1.5"	.039	99
3	4.5"	.040	98
4	5.5"	.038	98
E-1	0.5"	.038	97
2	1.5"	.040	97
3	4.5"	.040	97
4	5.5"	.037	97
AVG.		.038	98

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

N

Qs 142.50 dscf/min.

APPLIANCE OPERATION

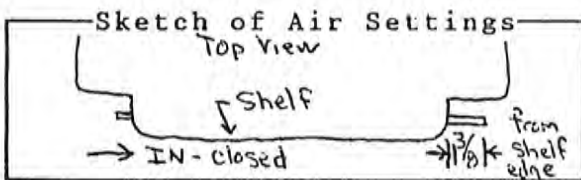
Sampling Time 400 min.
 Attempted Burn Category 3
 Actual Burn Rate 1,351 Kg/hr

Control Settings:

Primary air Open 3/4" from closed position
 Secondary air NC
 Fan AUTO/low
 Other underfire closed

START-UP PROCEDURE (first 5 min.)

By-pass open for loading
 Loading Door open 30 sec.
 Air Adjustments NONE



Comments _____

TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3514
 Actual Crib Wt. (lbs.) 24.1
 Actual Coal Bed Wt. (lbs.) 5.5
 Avg. Fuel Moisture Dry% 21.33 Wet% 17.58

Crib Wt. Range 22.2 to 27.0
 (6.3 to 7.71lbs/cu. ft.)
 Coal Bed Range 4.9 to 6.0
 (20 to 25% actual crib wt.)
 Crib Wt. Dry Kg. 9.008
 (100-Wet%/100 * act.wt./2.205)

CLIENT XTEC PROJECT # 188 RUN # 2
 MODEL 2500 PREPARED BY WLS DATE 4-26-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)
 Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 69 test fuel 71

PRE-BURN FUEL (2X4's)

Time of Measurement 1315

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>2</u>	<u>20.0</u>	<u>19.9</u>	<u>19.8</u>
2	<u>2</u>	<u>22.0</u>	<u>22.7</u>	<u>21.7</u>
3	<u>2</u>	<u>19.9</u>	<u>20.0</u>	<u>19.8</u>
4	_____	_____	_____	_____

avg. moisture 20.64
 Cut into 8 inch pieces (min. length 1/3 test fuel)

TEST FUEL

Time of Measurement 1330

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4 x 4</u>	<u>21.5</u>	<u>19.9</u>	<u>20.0</u>	<u>19.8</u>
2	<u>4 x 4</u>	<u>21.5</u>	<u>22.7</u>	<u>22.0</u>	<u>21.7</u>
3	<u>4 x 4</u>	<u>21.5</u>	<u>23.2</u>	<u>24.5</u>	<u>23.1</u>
4	<u>4 x 4</u>	<u>21.5</u>	<u>19.1</u>	<u>20.0</u>	<u>20.0</u>
5	_____	_____	_____	_____	_____
6	_____	_____	_____	_____	_____
7	_____	_____	_____	_____	_____
8	_____	_____	_____	_____	_____

avg. moisture 21.33

TEST CRIB WT. 24.1 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 2
DATE 4-26-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					Top	Rear	Bottom	Left	Right
1355		4.8							
Added Pretest				13.5 - 4.8 = 8.7		Set Air Adjustments			
1400	10	13.1	.045	939	513	345	270	393	432
1410	20	12.3	.042	936	510	361	323	382	446
1420	30	11.5	.040	933	518	374	353	385	456
1430	40	10.6	.040	950	530	393	353	407	484
1440	50	9.6	.039	982	549	437	355	436	518
1448 Raked Coals									
1450	60	8.8	.050	940	549	455	357	447	523
1500	70	7.9	.040	980	544	468	364	463	550
1510	80	7.4	.037	924	551	491	365	484	572
1515 Raked Coals									
1520	90	6.0	.040	942	543	511	370	499	573
1530	100	5.8	.035	931	550	500	367	490	551

CLIENT XTEC

PROJECT # 188

RUN # 2

MODEL 2500

OPERATORS WLS

DATE 4-26-93

* NOTE: Time Recorded (1) hour earlier than actual test time

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1441	00	24.1	.043	816p	538	483	365	478	527
1451	10	23.1	.045	980	552	392	363	407	436
1501	20	21.9	.045	1032	581	378	357	390	450
1511	30	20.5	.045	1075	600	380	349	388	453
1521	40	19.8	.045	1112	616	383	338	390	460
1531	50	19.3	.045	1109	624	393	329	398	486
1541	60	17.9	.045	1129	636	393	317	401	475
1551	70	17.0	.045	1112	636	388	309	401	461
1601	80	16.0	.043	1060	619	388	301	403	465
1611	90	14.6	.045	1015	610	394	297	409	480
1621	100	13.8	.045	1028	603	408	285	421	508
1631	10	13.3	.043	1035	604	414	282	426	518
1641	20	12.8	.045	1043	605	439	280	442	534
1651	30	12.0	.045	1061	604	465	277	456	544
1701	40	10.1	.045	1054	608	484	279	470	549
1711	50	8.6	.045	1041	609	487	280	477	548
1721	60	8.3	.042	1066	620	495	281	485	548
1731	70	6.7	.040	1084	630	500	282	495	548
1741	80	6.0	.040	1053	634	507	284	503	543
1751	90	5.4	.040	971	625	505	286	504	537

STOVE TEST DATA
METHOD 28

F28-3

2 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 2
DATE 4-26-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					top	rear	bottom	left	right
1801	200	4.8	.040	959	606	502	287	503	522
1811	10	4.3	.038	950	596	498	287	502	509
1821	20	3.9	.036	912	580	487	288	501	496
1831	30	3.7	.035	858	556	481	286	491	484
1841	40	3.4	.032	823	532	475	290	485	480
1851	50	3.1	.031	801	503	464	290	480	469
1901	60	2.9	.030	758	481	465	291	482	463
1911	70	2.7	.030	745	465	467	294	481	461
1921	80	2.5	.030	746	461	467	295	480	452
1931	90	2.2	.030	744	458	465	295	480	444
1941	300	2.0	.030	755	459	464	292	483	443
1951	10	1.8	.030	757	457	462	292	483	437
2001	20	1.6	.030	753	459	451	289	487	430
2011	30	1.4	.030	751	457	428	292	484	411
2021	40	1.2	.030	748	452	411	297	478	389
2031	50	1.0	.030	739	448	401	299	473	381
2041	60	.8	.028	727	440	390	302	468	370
2051	70	.6	.026	723	419	312	232	387	321
2101	80	.4	.025	692	377	252	204	333	287
2111	90	.3	.025	679	389	281	219	365	309

STOVE TEST DATA
METHOD 28

F28-3

3 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 2
DATE 4-26-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
2121	400	0	.025	658	382	291	218	358	310
	10								
	20								
	30								
	40								
	50								
	60								
	70								
	80								
	90								
	00								
	10								
	20								
	30								
	40								
	50								
	60								
	70								
	80								
	90								

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

1 of 3

CLIENT XTEC

PROJECT # 188

RUN # 2

MODEL 2500

OPERATORS WLS

DATE 4-26-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s 325 326

Pretest leak rate = .001 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = .001 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu. ft.	PITOT dp	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1441	00	167.300	.038	.9	80	95	1	75	49	73
1451	10	172.5	.038	.9	83	96	1	78	47	71
1501	20	177.6	.038	.9	89	94	1	78	37	71
1511	30	182.5	.038	.9	94	93	1	78	36	70
1521	40	187.5	.038	.9	99	91	1	78	35	70
1531	50	192.4	.038	.9	103	91	1	77	34	69
1541	60	197.4	.038	.9	106	91	1	76	34	69
1551	70	202.3	.038	.9	108	91	1	76	33	68
1601	80	207.3	.038	.9	111	92	1	76	34	68
1611	90	212.3	.038	.9	112	94	1	77	34	69
1621	00	217.3	.038	.9	113	94	1	77	34	68
1631	10	222.3	.038	.9	114	94	1	77	34	69
1641	20	227.2	.038	.9	114	95	1	78	34	70
1651	30	232.3	.038	.9	114	95	1	78	34	70
1701	40	237.5	.038	.9	116	95	1	78	36	70
1711	50	242.4	.038	.9	115	94	1	78	36	70
1721	60	247.3	.038	.9	115	94	1	78	33	69
1731	70	252.4	.038	.9	116	93	1	78	33	69
1741	80	257.5	.038	.9	116	92	1	77	33	69
1751	90	262.5	.038	.9	116	91	1	77	33	68

AVG. ~~11.80~~ 89.78

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PARTICULATE SAMPLING DATA
METHOD 5G

P5G-1

2 of 3

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WLS

RUN # 2
DATE 4-26-93

Meter Box # 456-P Meter Y 1.014
Pretest leak rate = .001 cfm @ 10 in. Hg
Post test leak rate = .001 cfm @ 5 in. Hg

Filter #s 325 326
Filter size: 11 cm
Probe length 18"

TIME		METER reading cu.ft.	PITOT dp	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1801	00	267.4	.038	.9	116	89	1	75	33	68
1811	10	272.4	.038	.9	116	87	1	74	33	69
1821	20	277.4	.038	.9	116	86	1	73	33	69
1831	30	282.2	.038	.9	116	84	1	72	33	69
1841	40	287.1	.038	.9	115	88	1	72	33	70
1851	50	292.1	.038	.9	116	89	1	73	34	70
1901	60	297.1	.038	.9	116	89	1	74	34	71
1911	70	302.0	.038	.9	116	88	1	75	34	71
1921	80	307.0	.038	.9	117	87	1	76	34	71
1931	00	312.1	.038	.9	117	87	1	76	34	71
1941	00	317.1	.038	.9	117	87	1	76	34	71
1951	10	322.1	.038	.9	118	87	1	76	35	71
2001	20	327.2	.038	.9	118	87	1	76	36	71
2010	30	332.2	.038	.9	117	87	1	75	37	71
2021	40	337.3	.038	.9	117	87	1	75	37	70
2031	50	342.3	.038	.9	117	87	1	75	38	70
2041	60	347.4	.037	.9	117	87	1	75	38	70
2051	70	352.4	.037	.9	117	85	1	75	39	70
2101	80	357.5	.037	.9	117	84	1	75	39	69
2111	00	362.5	.037	.9	117	82	1	75	39	69

AVG. _____

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PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

3 of 3

CLIENT XTEC

PROJECT # 188

RUN # 2

MODEL 2500

OPERATORS WLS

DATE 4-26-93

Meter Box # 45G-P

Meter Y 1-014

Filter #s 325 326

Pretest leak rate = .001 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .001 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dp	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
2121	400	367.589	.037	.9	117	82	1	75	39	68
	10									
	20									
	30									
	40									
	50									
	60									
	70									
	80									
	90									
	00									
	10									
	20									
	30									
	40									
	50									
	60									
	70									
	80									
	90									

AVG. _____

GRAVIMETRIC ANALYSIS

F5G-2

CLIENT/MODEL XTEC PROJECT # 188 RUN # 2

Prepared by: WHS date/time 4-26-93 1450 Filters: size-11.0 cm

Recovered by: WHS date/time 4-26-93 2240 brand-Whatman 034AH

Placed in Desiccator: date/time filters 4-26-93 2252 beaker 4-27-93 1150

Acetone lot # 910302 Acetone rinse: beaker wt. w/rinse 18 g

Acetone blank concentration 0.01 mg/g beaker tare wt. 3 g

net rinse 15 g

Blank Adjustment = blank conc. 0.01 mg/g x net rinse 15 g = 0.15 mg

	Date/time	Filter #'s front <u>326</u> rear <u>325</u>	Beaker # <u>294</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	<u>4-27-93</u> <u>2320</u>	<u>1.2745</u>		<u>38</u>	<u>62</u>	<u>.5000</u> <u>2.000</u>
wt.2	<u>4-28-93</u> <u>1340</u>		<u>2.5535</u>	<u>35</u>	<u>66</u>	<u>.5000</u> <u>2.000</u>
wt.3	<u>4-29-93</u> <u>1150</u>	<u>1.2746</u>	<u>2.5535</u>	<u>36</u>	<u>64</u>	<u>.5000</u> <u>2.000</u>
wt.4	<u>4-30-93</u> <u>1015</u>	<u>1.2746</u>	<u>-</u>			
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.	<u>1.2746</u>	<u>2.5535</u>
Tare wt(s).	front <u>.6190</u>	<u>2.5518</u>
	rear <u>.6172</u>	

Net gain 38.4 mg 1.7 mg

Filter gain 38.4 mg
 Beaker gain + 1.7 mg
 Blank adjust. - 0.2 mg
 TOTAL = 39.9 mg

CLIENT XTEC PROJECT # 188 RUN # 3
 MODEL 2500 OPERATORS WHL, WLS DATE 4-27-93

TEST FACILITY CONDITIONS

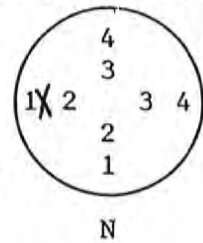
	PRE	POST
Induced Draft (in. Water)	.003	
Room Air Velocity (ft./min.)	20	40
Barometric Pressure (in. Hg)	29.88	29.94
Relative Humidity (%)	48	34
Scale Audit (cal. wt. <u>11.0</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	391.4	183
Room Temp. (degrees F)	67	69

VELOCITY TRAVERSE

POINT	LOCATION	dP	TEMP.
N-1	0.5"	.037	85
2	1.5"	.040	85
3	4.5"	.040	84
4	5.5"	.038	84
E-1	0.5"	.034	83
2	1.5"	.038	84
3	4.5"	.041	83
4	5.5"	.040	83
AVG.		.039	84

Pitot Leak Check pre post

Cp = .99



point of avg. dP

APPLIANCE OPERATION

Sampling Time 730 min.
 Attempted Burn Category 2
 Actual Burn Rate _____ Kg/hr

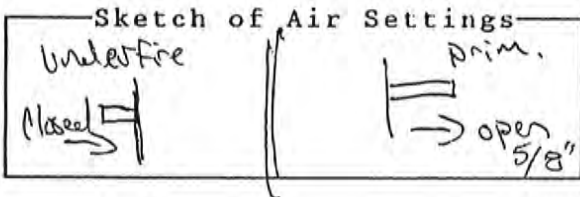
*Combustion Failure**

Control Settings:

Primary air open 5/8"
 Secondary air NC
 Fan Fan Auto/Low
 Other under fire closed

START-UP PROCEDURE (first 5 min.)

By-pass open for loading
 Loading Door open 45 sec.
 Air Adjustments N/A



Comments _____

TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514
 Actual Crib Wt. (lbs.) 23.4
 Actual Coal Bed Wt. (lbs.) 4.7
 Avg. Fuel Moisture Dry% 22.53 Wet% 18.39

Crib Wt. Range 22.2 to 27.0
 (6.3 to 7.71lbs/cu. ft.)
 Coal Bed Range 4.7 to 5.8
 (20 to 25% actual crib wt.)
 Crib Wt. Dry Kg. 8.661
 (100-Wet%/100 * act.wt./2.205)

CLIENT XTEC PROJECT # 188 RUN # 3
 MODEL 2500 PREPARED BY WJS DATE 4-27-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 68° test fuel 70°

PRE-BURN FUEL (2X4's)

Time of Measurement 0820

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>6</u>	<u>22.7</u>	<u>23.4</u>	<u>22.9</u>
2	<u>6</u>	<u>23.4</u>	<u>24.3</u>	<u>23.1</u>
3	—	—	—	—
4	—	—	—	—

Cut into 9 inch pieces (min. length 1/3 test fuel) avg. moisture 23.3

TEST FUEL

Time of Measurement 1030

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4 x 4</u>	<u>21.5</u>	<u>23.1</u>	<u>24.3</u>	<u>23.4</u>
2	<u>4 x 4</u>	<u>21.5</u>	<u>21.5</u>	<u>22.0</u>	<u>20.8</u>
3	<u>4 x 4</u>	<u>21.5</u>	<u>22.4</u>	<u>22.9</u>	<u>21.0</u>
4	<u>4 x 4</u>	<u>21.5</u>	<u>22.9</u>	<u>23.4</u>	<u>22.7</u>
5	—	—	—	—	—
6	—	—	—	—	—
7	—	—	—	—	—
8	—	—	—	—	—

avg. moisture 22.53

TEST CRIB WT. 23.4 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC

PROJECT # 188

RUN # 3

MODEL 2500

OPERATORS WHA, WLS

DATE 4-27-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					Top	Rear	Bottom	Left	Right
		8.2							
		8.2# Kindling - Air Max, Fan - Auto Low, BP-open							
0835	0	18.9	.064	631	250	480	144	336	343
		18.9/1.4 - 17.5# pre-test added, BP closed							
0845	10	15.6	.066	1135	503	396	215	296	348
0855	20	12.6	.068	1099	609	438	259	321	415
0905	30	9.3	.064	1118	675	504	301	386	513
0915	40	7.5	.063	1086	709	532	330	424	559
		0910 - underfire closed, Prim. Air set @ 5/8" open							
		11.5/7.0 - 4.5# pre-test added @ 0919							
0925	50	10.6	.061	953	678	496	376	418	524
0935	60	9.5	.050	875	622	452	390	387	471
0945	70	8.8	.046	868	576	430	382	371	441
0955	80	8.2	.037	882	557	414	371	427	419
1005	90	7.6	.034	892	542	401	363	417	400
1015	100	7.4	.033	898	534	390	355	403	383
1025	110	7.1	.030	916	528	381	347	393	371
1035	120	6.8	.030	843	515	371	338	392	388
1045	130	6.5	.028	827	497	370	329	387	382
		1047 Raked Coals							
1055	140	5.6	.034	772	485	386	325	401	378
1105	150	5.3	.030	879	478	371	323	391	373

STOVE TEST DATA
METHOD 28

F28-3

1 of 1

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WHS

RUN # 3
DATE 4-27-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1110	00	23.4	.04	797	482	381	321	397	376
1120	10	23.0	.035	721	463	330	316	357	325
1130	20	22.7	.028	657	425	297	308	324	291
1140	30	22.5	.026	615	391	279	293	304	272
1150	40	22.3	.026	589	370	269	283	294	262
1200	50	22.1	.028	571	349	262	268	282	252
1210	60	21.9	.022	551	335	255	260	274	244
1220	70	21.7	.025	535	322	249	251	267	237
1230	80	21.4	.020	518	309	243	243	260	231
1240	90	21.2	.020	508	299	237	236	255	225
1250	00	21.0	.020	533	290	228	226	247	217
1300	10	20.8	.020	569	293	223	220	243	213
1310	20	20.6	.020	556	294	220	214	240	211
1320	30	20.3	.020	532	291	216	209	238	209
1330	40	20.1	.020	523	285	212	206	235	206
1340	50	19.8	.017	541	282	210	202	234	203
1350	60	19.6	.019	563	285	209	198	234	203
1400	70	19.4	.019	574	287	210	196	234	202
1410	80	19.1	.019	591	293	210	195	235	204
1420	90	18.8	.020	599	298	213	195	238	206

STOVE TEST DATA
METHOD 28

F28-3

2 of

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WHS

RUN # 3
DATE 4-27-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1430	00	18.5	.020	598	303	216	194	240	209
1440	10	18.3	.020	591	304	219	193	243	211
1450	20	18.0	.020	583	304	222	193	246	213
1500	30	17.8	.020	585	304	222	191	247	214
1510	40	17.5	.020	600	307	225	189	251	215
1520	50	17.2	.020	621	314	228	186	254	216
1530	60	16.9	.020	633	321	231	185	256	216
1540	70	16.6	.020	647	330	237	181	261	217
1550	80	16.3	.020	670	338	245	178	266	218
1600	90	15.9	.020	690	348	254	176	273	220
1610	00	15.6	.021	712	359	264	173	281	223
1620	10	15.3	.021	723	364	268	172	285	225
1630	20	14.9	.021	734	374	277	170	293	229
1640	30	14.6	.021	746	381	283	169	299	233
1650	40	14.2	.023	761	387	289	168	309	237
1700	50	13.8	.023	790	401	296	166	316	240
1710	60	13.1	.028	819	432	305	165	328	248
1720	70	12.3	.030	879	459	313	166	343	259
1730	80	11.7	.030	884	468	316	167	351	266
1740	90	11.0	.030	886	478	323	170	363	278

STOVE TEST DATA
METHOD 28

F28-3

3 of

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WHS

RUN # 3
DATE 4-27-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1750	00	10.4	.027	894	487	333	173	374	289
1800	10	9.9	.027	898	495	341	175	381	296
1810	20	9.3	.030	903	502	349	179	386	302
1820	30	8.4	.030	899	507	358	182	391	310
1830	40	8.0	.030	897	508	366	184	396	316
1840	50	7.5	.030	895	508	372	186	399	322
1850	60	6.9	.030	810	500	370	189	418	324
1900	70	6.4	.029	804	487	372	195	427	345
1910	80	6.0	.027	827	487	373	201	420	343
1920	90	5.6	.027	824	486	375	209	413	345
1930	00	5.4	.025	807	478	369	216	408	347
1940	10	5.2	.024	793	462	361	223	401	349
1950	20	5.0	.023	802	449	353	230	392	356
2000	30	4.8	.022	796	440	358	232	385	355
2010	40	4.6	.020	700	402	298	192	317	329
2020	50	4.5	.019	677	380	284	188	302	322
2030	60	4.4	.018	633	359	270	181	288	303
2040	70	4.3	.017	598	336	255	175	273	292
2050	80	4.3	.015	577	318	250	171	263	276
2100	90	4.1	.016	581	305	259	162	253	276

STOVE TEST DATA
METHOD 28

F28-3

4 of

CLIENT XTEC

PROJECT # 188

RUN # 3

MODEL 2500

OPERATORS WJS

DATE 4-27-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					top	rear	bottom	left	right
2110	00	4.1	.014	563	297	255	159	247	261
2120	10	4.0	.016	550	292	253	155	242	259
2130	20	4.0	.014	545	287	253	156	239	256
2140	30	3.9	.016	508	281	242	149	231	250
2150	40	3.8	.016	518	272	235	147	229	248
2200	50	3.6	.014	519	267	225	145	225	245
2210	60	3.5	.016	517	264	221	144	221	241
2220	70	3.4	.014	507	260	213	142	213	234
2230	80	3.3	.010	489	253	208	141	208	229
2240	90	3.2	.008	461	246	202	137	200	217
2250	00	3.2	.007	441	235	201	135	193	207
2300	10	3.2	.007	430	226	199	133	188	200
2310	20	3.2	.005	416	211	186	129	183	196
.	30								
	40								
	50								
	60								
	70								
	80								
	90								

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

CLIENT XTEC

PROJECT # 188

1 of _____
RUN # 3

MODEL 2500

OPERATORS WLS

DATE 4-27-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = _____ cfm @ _____ in. Hg

Probe length 18"

TIME		METER reading cu. ft.	PITOT dp	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1110	00	368.208	.039	.9	66	98	1	67	45	67
1120	10	373.4	.039	.9	69	85	1	70	44	66
1130	20	378.0	.039	.9	75	85	1	70	38	67
1140	30	383.1	.039	.9	83	85	1	72	35	67
1150	40	388.2	.039	.9	89	84	1	72	33	67
1200	50	393.3	.039	.9	92	84	1	72	33	67
1210	60	398.3	.039	.9	99	83	1	73	32	68
1220	70	403.2	.039	.9	102	84	1	73	32	68
1230	80	408.2	.039	.9	105	84	1	73	32	68
1240	90	413.2	.039	.9	107	83	1	73	32	67
1250	00	418.2	.039	.9	109	81	1	73	32	67
1300	10	423.0	.039	.9	111	81	1	73	32	67
1310	20	428.9	.039	.9	113	81	1	73	32	66
1320	30	432.7	.039	.9	114	80	1	73	32	65
1330	40	437.7	.039	.9	115	80	1	72	32	66
1340	50	442.7	.039	.9	116	81	1	72	32	66
1350	60	447.6	.039	.9	116	81	1	73	32	67
1400	70	452.6	.039	.9	116	80	1	73	32	66
1410	80	457.5	.039	.9	116	81	1	73	32	67
1420	90	462.5	.039	.9	116	81	1	73	32	68

AVG. _____

137

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

2 of

CLIENT XTEC

PROJECT # 188

RUN # 3

MODEL 2500

OPERATORS WLS

DATE 4-27-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11 cm

Post test leak rate = _____ cfm @ _____ in. Hg

Probe length 18"

TIME		METER reading cu. ft.	PITOT dp	METER dh	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1430	00	467.5	.039	.9	117	83	1	74	32	70
1440	10	472.6	.039	.9	116	85	1	75	32	69
1450	20	477.6	.039	.9	116	85	1	76	32	69
1500	30	482.7	.039	.9	116	85	1	76	32	69
1510	40	487.7	.039	.9	117	86	1	76	32	69
1520	50	492.7	.039	.9	117	86	1	78	32	70
1530	60	497.7	.039	.9	117	85	1	78	32	70
1540	70	502.7	.039	.9	117	85	1	78	32	69
1550	80	507.7	.039	.9	117	85	1	78	32	69
1600	00	512.7	.039	.9	117	83	1	77	32	69
1610	00	517.8	.039	.9	117	82	1	76	32	68
1620	10	522.9	.039	.9	117	82	1	75	32	68
1630	20	527.9	.039	.9	118	83	1	74	32	68
1640	30	532.9	.039	.9	118	84	1	74	32	67
1650	40	537.9	.039	.9	118	83	1	74	31	67
1700	50	542.8	.039	.9	118	83	1	74	32	67
1710	60	547.8	.039	.9	118	85	1	75	32	67
1720	70	552.8	.039	.9	118	86	1	75	32	67
1730	80	557.7	.039	.9	118	85	1	75	32	67
1740	90	562.7	.039	.9	119	86	1	75	32	67

AVG. _____

188

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

3 of _____

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WHS

RUN # 3
DATE 4-27-93

Meter Box # 45G-P Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = _____ cfm @ _____ in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1750	00	567.7	.039	.9	119	86	1	75	33	67
1800	10	572.8	.039	.9	119	86	1	75	33	67
1810	20	577.8	.039	.9	119	86	1	75	33	67
1820	30	582.8	.039	.9	119	87	1	75	33	67
1830	40	587.7	.039	.9	119	88	1	76	35	67
1840	50	592.8	.039	.9	119	88	1	76	36	67
1850	60	597.8	.039	.9	119	88	1	77	34	68
1900	70	602.8	.039	.9	119	88	1	78	33	68
1910	80	607.8	.039	.9	119	88	1	78	33	68
1920	90	612.8	.039	.9	120	86	1	76	32	67
1930	00	617.8	.039	.9	120	84	1	76	32	67
1940	10	622.8	.039	.9	120	84	1	75	32	67
1950	20	627.8	.039	.9	120	82	1	75	32	67
2000	30	632.9	.039	.9	120	82	1	75	32	67
2010	40	637.9	.039	.9	120	81	1	75	32	67
2020	50	642.9	.039	.9	120	81	1	75	32	67
2030	60	647.9	.039	.9	120	81	1	75	33	67
2040	70	652.9	.039	.9	120	80	1	74	33	67
2050	80	657.9	.039	.9	120	76	1	73	33	66
2100	90	662.9	.039	.9	120	72	1	73	33	66

AVG. _____

100

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

4 of

CLIENT XTEC

PROJECT # 108

RUN # 3

MODEL 2500

OPERATORS WLS

DATE 4-27-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = .001 cfm @ 5 in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
2110	00	667.9	.039	.9	119	71	1	73	34	66
2120	10	672.9	.039	.9	119	70	1	72	34	66
2130	20	677.9	.039	.9	118	70	1	72	34	66
2140	30	682.8	.039	.9	118	70	1	72	35	66
2150	40	687.9	.039	.9	116	71	1	70	35	66
2200	50	693.0	.039	.9	116	71	1	71	35	66
2210	60	698.1	.039	.9	114	70	1	70	35	66
2220	70	703.2	.039	.9	114	69	1	69	35	66
2230	80	708.2	.039	.9	114	70	1	69	36	66
2240	90	713.2	.039	.9	114	72	1	70	38	67
2250	00	718.2	.039	.9	114	71	1	70	38	68
2300	10	723.3	.039	.9	114	71	1	70	38	69
2310	20	728.314	.039	.9	114	71	1	69	38	69
	30									
	40									
	50									
	60									
	70									
	80									
	90									

AVG. _____

140

CLIENT XTEC

PROJECT # 188

RUN # 4

MODEL 2500

OPERATORS WHA

DATE 4-28-83

TEST FACILITY CONDITIONS

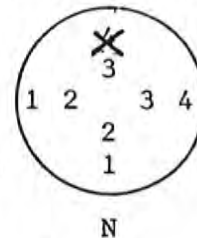
	PRE	POST
Induced Draft (in. Water)	.002	
Room Air Velocity (ft./min.)	10	10
Barometric Pressure (in. Hg)	29.90	29.90
Relative Humidity (%)	17	18
Scale Audit (cal. wt. <u>11</u> lbs.)	11.0	11.0
Surface Temp Avg. (degrees F)	302.2	122.2
Room Temp. (degrees F)	73	69

VELOCITY TRAVERSE

POINT	LOCATION	dP	TEMP.
N-1	0.5"	.038	92
2	1.5"	.042	92
3	4.5"	.041	92
4	5.5"	.030	91
E-1	0.5"	.035	94
2	1.5"	.040	94
3	4.5"	.042	93
4	5.5"	.039	92
AVG.		.039	93

Pitot Leak Check pre post

Cp = .99



* point of avg. dP

APPLIANCE OPERATION

Sampling Time 160 min.

Attempted Burn Category 3

Actual Burn Rate 3.15 Kg/hr

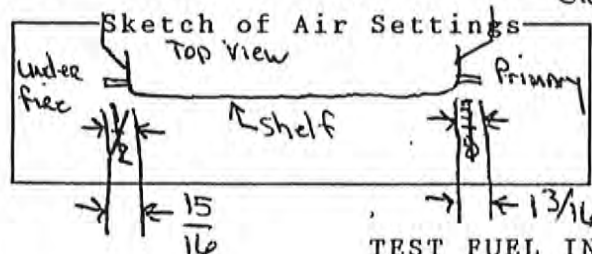
Control Settings:

Primary air Open 5/8" out from closed

Secondary air NC

Fan Auto/Low

Other Under fire open 1/2" out from closed



TEST FUEL INFORMATION

Firebox volume (cu.ft.) 3.514

Actual Crib Wt. (lbs.) 22.7

Actual Coal Bed Wt. (lbs.) 4.7

Avg. Fuel Moisture Dry% 22.73 Wet% 18.37

Crib Wt. Range 22.2 to 27.0
(6.3 to 7.7lbs/cu. ft.)

Coal Bed Range 4.6 to 5.6
(20 to 25% actual crib wt.)

Crib Wt. Dry Kg. 8.404
(100-Wet%/100 * act.wt./2.205)

START-UP PROCEDURE (first 5 min.)

By-pass Open for loading

Loading Door open 45 secs

Air Adjustments N/A

Comments _____

CLIENT XTEC PROJECT # 188 RUN # 4

MODEL 2500 PREPARED BY WLS DATE 4-28-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel 68 test fuel 70

PRE-BURN FUEL (2X4's)

Time of Measurement 1010

Piece	Length (ft.)	Moisture Readings (Dry Basis)		
1	<u>6</u>	<u>23.8</u>	<u>24.5</u>	<u>23.9</u>
2	<u>6</u>	<u>21.9</u>	<u>22.4</u>	<u>22.0</u>
3	---	---	---	---
4	---	---	---	---

Cut into 9 inch pieces (min. length 1/3 test fuel) avg. moisture 23.8

TEST FUEL

Time of Measurement 1150

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)		
1	<u>4x4</u>	<u>21.5</u>	<u>22.1</u>	<u>23.4</u>	<u>22.5</u>
2	<u>4x4</u>	<u>21.5</u>	<u>21.9</u>	<u>22.5</u>	<u>21.8</u>
3	<u>4x4</u>	<u>21.5</u>	<u>21.8</u>	<u>22.7</u>	<u>22.3</u>
4	<u>4x4</u>	<u>21.5</u>	<u>24.1</u>	<u>23.6</u>	<u>24.0</u>
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---

avg. moisture 22.73

TEST CRIB WT. 22.70 lbs.

STOVE PRE-TEST DATA
METHOD 28

F28-3P

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS WHA, WLS

RUN # 4
DATE 4-28-93

Time		Fuel Wt. lbs.	Draft ins. water	Temperatures (F)					
24hr	E.T.			Combustor(s)	Surface				
					Top	Rear	Bottom	Left	Right
0920		8.1							
		8.1 # Kindling, BP-open, Air Max, Fan-Auto/Low							
0930		7.7							
		7.7/4.1 3.6 # Kindling Added - BP closed							
0936									
		Prim. Air set @ 5/8" open, Underfire open (out) 1/2"							
1055		2.8							
		Added Pretest 13.7 - 2.8 10.9 lbs							
1100		13.5	.037	716	369	299	232	309	301
1110		12.8	.035	785	404	278	238	304	283
1120		12.4	.034	807	422	277	242	307	281
1130		11.8	.033	792	432	279	250	313	282
1140		11.1	.035	846	448	297	254	337	292
1150		10.3	.035	825	461	322	253	369	311
		1155 Raked Coals							
1200		9.4	.038	841	476	333	252	380	330
1210		8.7	.036	917	491	344	255	385	357
1220		8.0	.035	928	509	359	258	392	359
1230		7.4	.034	933	529	374	258	399	360
1240		7.0	.030	920	509	329	225	358	351
		1243 Raked Coals							
1250		6.2	.033	876	503	300	203	332	340
1300		5.9	.030	876	501	285	206	321	332

PARTICULATE SAMPLING DATA
METHOD 5G

F5G-1

1 of

CLIENT XTEC

PROJECT # 188

RUN # 4

MODEL 2500

OPERATORS WLS

DATE 4-28-93

Meter Box # 45G-P

Meter Y 1.014

Filter #s _____

Pretest leak rate = .002 cfm @ 10 in. Hg

Filter size: 11cm

Post test leak rate = _____ cfm @ _____ in. Hg

Probe length 18"

TIME		METER reading cu.ft.	PITOT dP	METER dH	METER TEMP. F	TUNN. TEMP. F	VAC in. Hg	FILTER TEMP. F	CONDENS TEMP. F	ROOM F
clock	elapsed									
1330	00	729.000	.039	.9	73	93	1	71	33	73
1340	10	733.9	.039	.9	76	91	1	76	33	73
1350	20	739.0	.039	.9	81	90	1	76	33	72
1400	30	744.0	.039	.9	88	86	1	75	32	72
1410	40	749.0	.039	.9	95	85	1	75	32	72
1420	50	754.0	.039	.9	100	85	1	75	32	71
1430	60	759.0	.039	.9	104	84	1	75	30	71
1440	70	764.0	.039	.9	108	83	1	74	30	71
1450	80	769.0	.039	.9	110	83	1	74	30	70
1500	90	774.0	.039	.9	112	83	1	74	30	70
1510	00	779.0	.039	.9	113	83	1	74	30	70
1520	10	783.9	.039	.9	114	82	1	74	30	70
1530	20	788.9	.039	.9	115	82	1	74	30	70
1540	30	793.9	.039	.9	116	82	1	74	30	70
1550	40	799.0	.039	.9	116	82	1	74	30	70
1600	50	804.1	.039	.9	116	82	1	74	30	69
1610	60	809.082	.039	.9	116	81	1	73	30	69
1620	70									
1630	80									
1640	90									

AVG. 90.88 84.52

145

STOVE TEST DATA
METHOD 28

F28-3

1 of

CLIENT XTEC
MODEL 2500

PROJECT # 188
OPERATORS W.S.

RUN # 4
DATE 4-28-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1330	00	22.7	.029	790	426	266	190	296	325
1340	10	22.5	.034	711	408	210	195	251	264
1350	20	22.3	.030	627	374	190	189	229	241
1400	30	22.2	.027	554	332	175	181	209	220
1410	40	22.1	.026	519	303	166	174	198	206
1420	50	21.9	.025	480	278	159	166	187	196
1430	60	21.8	.023	453	260	153	164	178	187
1440	70	21.7	.021	426	241	148	158	170	180
1450	80	21.6	.020	400	225	142	150	163	171
1500	90	21.5	.020	382	213	140	150	156	165
1510	00	21.5	.018	366	203	134	145	151	159
1520	10	21.4	.016	351	194	130	142	145	152
1530	20	21.4	.016	339	185	125	138	140	147
1540	30	21.3	.016	291	177	122	131	136	141
1550	40	21.3	.016	251	164	119	127	131	138
1600	50	21.3	.015	222	150	115	120	125	131
1610	60	21.3	.015	205	140	111	115	120	125
1620	70								
1630	80								
1640	90								

80

FILTER TARE WEIGHTS

Date/Time 3-29-93 1500 4-7-93 1600

Temp./RH% 70 39% 72 36%

Can. wt. .5000 .5000

Pre: .5000 .5000

Post: .5000

Int. WLS

Filter*

315 .6182

316 .6217

317 .6181

318 .6152

319 .6148

320 .6185

321 .6219 .6220

322 .6171 .6171

323 .6166 .6166

324 .6201 .6201

325 .6208 .6208

326 .6190 .6190

327 .6172 .6172

328 .6158 .6158

329 .6165 .6165

330 .6137 .6138

331 .6163 .6163

332 .6159 .6159

333 .6142 .6142

BEAKER TARE WEIGHTS

DATE TIME	3-31-92 1436	4-23-92 1003	207
INITIALS	GTW	GTW	
CALIBRE PRE	2.0000	2.0000	
-POST	2.0000	2.0000	
H ₂ O / F°	36% / 69°	47% / 70°	
281	2.5479	2.5480	
282	2.5814	2.5815	
283	2.5805	2.5806	
284	2.5506	2.5508	
285	2.5325	2.5326	
286	2.5671	2.5673	
287	2.5897	2.5898	
288	2.5332	2.5334	
289	2.5812	2.5814	
290	2.5739	2.5740	
291	2.5343	2.5344	
292	2.5678	2.5679	
293	2.5432	2.5433	
294	2.5518	2.5518	
295	2.5850	2.5850	
296	2.5401	2.5401	
297	2.5820	2.5821	
298	2.5658	2.5657	
299	2.5776	2.5776	
300	2.5323	2.5323	
301	2.6031	2.6030	
302	2.5796	2.5796	
303	2.5114	2.5117	
304	2.6000	2.6010	

Des.
1-24-92

CLIENT/MODEL Xtec 2500 PROJECT # 188 RUN # Blank

Prepared by: WLS date/time 5-6-93 Filters: size-11.0 cm

Recovered by: _____ date/time _____ brand-Whatman 934AH

Placed in Desiccator: date/time filters _____ beaker 5-6-3 0900

Acetone lot # 910302 Acetone rinse: beaker wt. w/rinse _____ g

Acetone blank concentration _____ mg/g beaker tare wt. _____ g

0.8/50 = 0.01 net rinse 50 g

Blank Adjustment = blank conc. _____ mg/g x net rinse _____ g = _____ mg

	Date/time	Filter #'s front _____ rear _____	Beaker # <u>301</u>	Room conditions		Cal. audit
				R.H.%	temp.	
wt.1	<u>5-7-93</u> <u>1010</u>		<u>2.6038</u>	<u>38</u>	<u>69</u>	<u>.5000</u> <u>2.000</u>
wt.2	<u>5-7-93</u> <u>1530</u>		<u>2.6038</u>	<u>39</u>	<u>72</u>	<u>.5000</u> <u>2.000</u>
wt.3						
wt.4						
wt.5						
wt.6						
wt.7						
wt.8						
wt.9						

Final wt.		<u>2.6038</u>
Tare wt(s).	front	<u>2.6030</u>
	rear	

Filter gain _____ mg
 Beaker gain + _____ mg
 Blank adjust. - _____ mg

Net gain _____ mg 0.8 mg TOTAL = _____ mg

Appendix D
Wood Heater and Catalyst Aging Data

17:15:44 04/08/93
1 0370.1 F

18:15:44 04/08/93
1 0591.5 F

19:15:44 04/08/93
1 0955.9 F

20:15:44 04/08/93
1 1063.2 F

21:15:44 04/08/93
1 0938.5 F

22:15:44 04/08/93
1 0774.4 F

23:15:44 04/08/93
1 0590.1 F

00:15:44 04/09/93

12:15:44 04/09/93
1 0856.1 F

13:15:44 04/09/93
1 0887.5 F

14:15:44 04/09/93
1 0930.9 F

15:15:44 04/09/93
1 0872.7 F

16:15:44 04/09/93
1 0906.8 F

17:15:44 04/09/93
1 0858.6 F

18:15:44 04/09/93
1 0988.1 F

19:15:44 04/09/93
1 0815.4 F

20:15:44 04/09/93
1 0655.0 F

21:15:44 04/09/93
1 0527.1 F

22:15:44 04/09/93
1 0406.0 F

23:15:44 04/09/93
1 0337.9 F

00:15:44 04/10/93

16 0800 4/10/93 (20)
771 F

17 0900 4/10/93 (21)
807 F

18 1000 4/10/93
638 F

19 1100 4/10/93
613 F

*** RUN *****
Log Interval=01:00:00
Full in 0291:16:00:00
Print data? (Yes/No)

10:03:24 04/12/93
1 1105.0 F

22 11:03:24 04/12/93
1 1156.3 F

23 12:03:24 04/12/93
1 0803.0 F

24 13:03:24 04/12/93
1 0636.3 F

25 14:03:24 04/12/93
1 0645.0 F

26 15:03:24 04/12/93
1 0645.8 F

27 16:03:24 04/12/93
1 0905.5 F

28 17:03:24 04/12/93
1 0859.5 F

29 18:03:24 04/12/93
1 0917.6 F

30 19:03:24 04/12/93
1 0982.5 F

31 20:03:24 04/12/93
1 0968.6 F

32 21:03:24 04/12/93
1 0927.3 F

33 22:03:24 04/12/93
1 0694.3 F

34 23:03:24 04/12/93
1 0710.6 F

35 00:03:24 04/13/93
1 0706.3 F

36 01:03:24 04/13/93
1 0764.3 F

37 02:03:24 04/13/93
1 0523.6 F

1200 4/10/93
661 F

1300 4/10/93
554 F

08:03:24 04/13/93
1 0229.6 F

09:03:24 04/13/93
1 0939.9 F

38 10:03:24 04/13/93
1 0832.9 F

39 11:03:24 04/13/93
1 0733.7 F

40 12:03:24 04/13/93
1 0807.0 F

41 13:03:24 04/13/93
1 0885.4 F

42 14:03:24 04/13/93
1 0863.2 F

43 15:03:24 04/13/93
1 0750.5 F

44 16:03:24 04/13/93
1 0827.0 F

45 17:03:24 04/13/93
1 0755.4 F

46 18:03:24 04/13/93
1 0648.7 F

47 19:03:24 04/13/93
1 0635.8 F

***** RUN *****
Log Interval=01:00:00
Full in 0291:16:00:00
Print data? (Yes/No)

09:05:20 04/14/93
1 0891.0 F

48 10:05:20 04/14/93
1 1144.0 F

49 11:05:20 04/14/93
1 0797.8 F

50 12:05:20 04/14/93
1 0999.4 F

51 13:05:20 04/14/93
1 0721.2 F

52 14:05:20 04/14/93
1 0987.2 F

53 15:05:20 04/14/93
1 0621.6 F

54 16:05:20 04/14/93
1 0490.6 F

17:05:20 04/14/93
1 0377.1 F

*** ON (RUNNING) ***

***** STOP *****

18:00:02 04/14/93

Run statistics N=00009

Min Ave Max

1 0377.1 0781.1 1144.0

18:00:03 04/14/93

CLIENT XTEC PROJECT # 188 DATE 4-9-93
 MODEL 2500 PREPARED BY G.T.W.

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)
 Check with meter set @ 70 F fixed/4 probe

actual/std. 11.9 / 12, 21.9 / 22

AGING FUEL

Piece	DATE/TIME	WEIGHT	Moisture Reading (Dry Basis)		
1	<u>4-9/1030</u>	<u>7 lbs.</u>	<u>20.9</u>	<u>24.7</u>	<u>20.9</u>
2		<u>9</u>	<u>26.1</u>	<u>25.9</u>	<u>28.1</u>
3		<u>10</u>	<u>24.3</u>	<u>24.5</u>	<u>27.1</u>
4		<u>6</u>	<u>19.0</u>	<u>20.5</u>	<u>19.9</u>
5		<u>5</u>	<u>25.3</u>	<u>24.7</u>	<u>26.5</u>
6		<u>4</u>	<u>29.1</u>	<u>28.0</u>	<u>27.5</u>
7		<u>6</u>	<u>20.1</u>	<u>21.1</u>	<u>25.1</u>
8		<u>8</u>	<u>26.1</u>	<u>24.8</u>	<u>25.0</u>
9		<u>8</u>	<u>24.8</u>	<u>23.3</u>	<u>24.2</u>
10	<u>1200</u>	<u>3</u>	<u>23.4</u>	<u>24.6</u>	<u>20.9</u>
11		<u>2</u>	<u>26.1</u>	<u>24.3</u>	<u>19.8</u>
12		<u>4</u>	<u>24.8</u>	<u>24.6</u>	<u>25.9</u>
13		<u>4</u>	<u>25.0</u>	<u>25.1</u>	<u>27.6</u>
14	<u>1300</u>	<u>5</u>	<u>27.0</u>	<u>21.1</u>	<u>23.1</u>
15		<u>6</u>	<u>26.4</u>	<u>25.7</u>	<u>24.6</u>
16		<u>7</u>	<u>25.5</u>	<u>26.8</u>	<u>27.6</u>
17		<u>4</u>	<u>24.8</u>	<u>25.8</u>	<u>25.6</u>
18	<u>1500</u>	<u>5</u>	<u>27.9</u>	<u>26.8</u>	<u>27.8</u>
19		<u>7</u>	<u>26.0</u>	<u>25.9</u>	<u>25.8</u>
20		<u>6</u>	<u>24.3</u>	<u>25.7</u>	<u>27.6</u>

Total Wt. _____ Kg. Avg. moisture _____

Corrected Wt. _____ Kg/Dry Avg. Burn Rate _____ Kg/hr

CLIENT XTEC

PROJECT # 188

DATE 4-9-93

MODEL 2500

PREPARED BY GTW

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 11.9 /12, 21.9 /22

AGING FUEL

Piece	DATE/TIME	WEIGHT	Moisture Reading (Dry Basis)		
1	<u>4-9/1537</u>	<u>2 lbs.</u>	<u>27.8</u>	<u>26.9</u>	<u>25.8</u>
2		<u>5 lbs.</u>	<u>26.5</u>	<u>26.7</u>	<u>24.7</u>
3		<u>4 lbs.</u>	<u>19.0</u>	<u>19.0</u>	<u>19.4</u>
4	" <u>1700</u>	<u>3</u>	<u>19.4</u>	<u>19.4</u>	<u>20.4</u>
5		<u>5</u>	<u>19.7</u>	<u>19.7</u>	<u>19.7</u>
6		<u>5</u>	<u>19.8</u>	<u>19.6</u>	<u>19.7</u>
7		<u>4</u>	<u>19.7</u>	<u>20.1</u>	<u>21.1</u>
8	<u>#</u>				
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Total Wt. _____ Kg.

Avg. moisture _____

Corrected Wt. _____ Kg/Dry

Avg. Burn Rate _____ Kg/hr

CLIENT XTEC PROJECT # 188 DATE 4-12-93
 MODEL 2500 PREPARED BY GJW

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)
 Check with meter set @ 70 F fixed/4 probe

actual/std. 12.0 /12, 21.9 /22

AGING FUEL

Piece	DATE/TIME	WEIGHT	Moisture Reading (Dry Basis)		
1	<u>4-12/0935</u>	<u>4</u>	<u>24.8</u>	<u>24.7</u>	<u>24.8</u>
2		<u>6</u>	<u>23.4</u>	<u>23.7</u>	<u>23.3</u>
3		<u>3</u>	<u>25.0</u>	<u>24.8</u>	<u>25.0</u>
4		<u>5</u>	<u>20.9</u>	<u>19.0</u>	<u>19.7</u>
5	<u>11/1107</u>	<u>4</u>	<u>23.9</u>	<u>23.8</u>	<u>23.9</u>
6		<u>2</u>	<u>24.0</u>	<u>24.6</u>	<u>24.8</u>
7		<u>4</u>	<u>22.4</u>	<u>21.9</u>	<u>22.1</u>
8		<u>3</u>	<u>19.0</u>	<u>19.0</u>	<u>19.1</u>
9		<u>2</u>	<u>19.8</u>	<u>19.7</u>	<u>19.0</u>
10	<u>11/1315</u>	<u>2</u>	<u>19.1</u>	<u>19.0</u>	<u>19.0</u>
11		<u>3</u>	<u>21.4</u>	<u>21.3</u>	<u>21.4</u>
12		<u>3</u>	<u>22.0</u>	<u>22.7</u>	<u>22.6</u>
13	<u>11/1645</u>	<u>6</u>	<u>19.9</u>	<u>19.8</u>	<u>19.9</u>
14		<u>17</u>	<u>21.1</u>	<u>21.2</u>	<u>21.4</u>
15		<u>4</u>	<u>20.4</u>	<u>20.5</u>	<u>20.6</u>
16		<u>5</u>	<u>19.0</u>	<u>19.4</u>	<u>19.3</u>
17		<u>4</u>	<u>24.8</u>	<u>24.0</u>	<u>24.0</u>
18	<u>4-12/2048</u>	<u>36.3</u>	<u>22.9</u>	<u>18.8</u>	<u>19.0</u>
19	_____	_____	_____	_____	_____
20	_____	_____	_____	_____	_____

Total Wt. _____ Kg.

Avg. moisture _____

Corrected Wt. _____ Kg/Dry

Avg. Burn Rate _____ Kg/hr

CLIENT XTEC

PROJECT # 188

DATE 4-13-93

MODEL 2500

PREPARED BY GTL

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 120 /12, 21.9 /22

AGING FUEL

Piece	DATE/TIME	WEIGHT	Moisture Reading (Dry Basis)		
1	<u>4-13/0823</u>	<u>2</u>	<u>20.1</u>	<u>20.3</u>	<u>20.0</u>
2	<u> </u>	<u>2</u>	<u>21.9</u>	<u>21.8</u>	<u>21.4</u>
3	<u> </u>	<u>3</u>	<u>26.1</u>	<u>26.9</u>	<u>26.4</u>
4	<u>4-13/0859</u>	<u>12</u>	<u>28.7</u>	<u>28.6</u>	<u>28.7</u>
5	<u>" / 1110</u>	<u>8 $\frac{1}{2}$</u>	<u>22.6</u>	<u>22.7</u>	<u>22.4</u>
6	<u> </u>	<u>7</u>	<u>26.9</u>	<u>26.8</u>	<u>26.7</u>
7	<u> </u>	<u>8</u>	<u>22.9</u>	<u>22.5</u>	<u>22.4</u>
8	<u>" / 1527</u>	<u>9</u>	<u>27.8</u>	<u>28.4</u>	<u>29.1</u>
9	<u> </u>	<u>10</u>	<u>26.8</u>	<u>25.7</u>	<u>28.1</u>
10	<u> </u>	<u>10</u>	<u>27.4</u>	<u>27.5</u>	<u>27.6</u>
11	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
12	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
13	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
14	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
15	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
16	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
17	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
18	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
19	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
20	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>

Total Wt. _____ Kg.

Avg. moisture _____

Corrected Wt. _____ Kg/Dry

Avg. Burn Rate _____ Kg/hr

CLIENT XTEC

PROJECT # 188

DATE 4-14-93

MODEL 2500

PREPARED BY GTW

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)

Check with meter set @ 70 F fixed/4 probe

actual/std. 12.0 /12, 21.9 /22

AGING FUEL

Piece	DATE/TIME	WEIGHT	Moisture Reading (Dry Basis)		
1	<u>4-14/0845</u>	<u>3</u>	<u>23.2</u>	<u>23.5</u>	<u>23.7</u>
2	<u> </u>	<u>2</u>	<u>21.9</u>	<u>21.0</u>	<u>21.8</u>
3	<u> </u>	<u>4</u>	<u>26.7</u>	<u>26.6</u>	<u>26.7</u>
4	<u>" /1015</u>	<u>3</u>	<u>28.6</u>	<u>28.7</u>	<u>28.5</u>
5	<u> </u>	<u>2</u>	<u>21.9</u>	<u>21.8</u>	<u>21.7</u>
6	<u> </u>	<u>3</u>	<u>19.0</u>	<u>20.3</u>	<u>19.9</u>
7	<u>✓</u>	<u>4</u>	<u>19.3</u>	<u>19.4</u>	<u>19.0</u>
8	_____	_____	_____	_____	_____
9	_____	_____	_____	_____	_____
10	_____	_____	_____	_____	_____
11	_____	_____	_____	_____	_____
12	_____	_____	_____	_____	_____
13	_____	_____	_____	_____	_____
14	_____	_____	_____	_____	_____
15	_____	_____	_____	_____	_____
16	_____	_____	_____	_____	_____
17	_____	_____	_____	_____	_____
18	_____	_____	_____	_____	_____
19	_____	_____	_____	_____	_____
20	_____	_____	_____	_____	_____

Total Wt. _____ Kg.

Avg. moisture _____

Corrected Wt. _____ Kg/Dry

Avg. Burn Rate _____ Kg/hr

CLIENT XTEC PROJECT # 188

DATE 4-14-93

MODEL 2500 PREPARED BY GTW

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)
Check with meter set @ 70 F fixed/4 probe

actual/std. 12.0 /12, 21.9 /22

AGING FUEL

Piece	DATE/TIME	WEIGHT	Moisture Reading (Dry Basis)		
1	<u>4-14/0845</u>	<u>3</u>	<u>23.2</u>	<u>23.5</u>	<u>23.7</u>
2	<u> </u>	<u>2</u>	<u>21.9</u>	<u>21.0</u>	<u>21.8</u>
3	<u> </u>	<u>4</u>	<u>26.7</u>	<u>26.6</u>	<u>26.7</u>
4	<u>" /1015</u>	<u>3</u>	<u>28.6</u>	<u>28.7</u>	<u>28.5</u>
5	<u> </u>	<u>2</u>	<u>21.9</u>	<u>21.8</u>	<u>21.7</u>
6	<u> </u>	<u>3</u>	<u>19.0</u>	<u>20.3</u>	<u>19.9</u>
7	<u> </u>	<u>4</u>	<u>19.3</u>	<u>19.4</u>	<u>19.0</u>
8	_____	_____	_____	_____	_____
9	_____	_____	_____	_____	_____
10	_____	_____	_____	_____	_____
11	_____	_____	_____	_____	_____
12	_____	_____	_____	_____	_____
13	_____	_____	_____	_____	_____
14	_____	_____	_____	_____	_____
15	_____	_____	_____	_____	_____
16	_____	_____	_____	_____	_____
17	_____	_____	_____	_____	_____
18	_____	_____	_____	_____	_____
19	_____	_____	_____	_____	_____
20	_____	_____	_____	_____	_____

Total Wt. _____ Kg.

Avg. moisture _____

Corrected Wt. _____ Kg/Dry

Avg. Burn Rate _____ Kg/hr

CLIENT XTEC PROJECT # 187 RUN # 3
 MODEL 2500 PREPARED BY WLS DATE 4-8-93

MOISTURE METER CALIBRATION (MODEL RDX-1 w/MCS-1 Std.)
 Check with meter set @ 70 F fixed/4 probe

actual/std. 12.1 /12, 21.9 /22

FUEL TEMP./TEMP. SETTING (degrees F)

pre-burn fuel _____ test fuel 60

PRE-BURN FUEL (2X4's)

Time of Measurement _____

Piece	Length (ft.)	Moisture Readings (Dry Basis)
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____

avg. moisture _____
 Cut into _____ inch pieces (min. length 1/3 test fuel)

TEST FUEL

Time of Measurement 0815 4-8-93

Piece	Dimension	Length (in.)	Moisture Reading (Dry Basis)
1	<u>4 x 4</u>	<u>22</u>	<u>22.8</u> <u>23.6</u> <u>23.1</u>
2	<u>4 x 4</u>		<u>19.3</u> <u>20.0</u> <u>19.9</u>
3	<u>4 x 4</u>		<u>23.3</u> <u>24.6</u> <u>24.2</u>
4	<u>4 x 4</u>		<u>20.0</u> <u>21.9</u> <u>20.0</u>
5	_____		_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____

avg. moisture 21.89

TEST CRIB WT. 22.4 lbs.

STOVE TEST DATA
METHOD 28

F28-3

1 of 2

CLIENT XTEC
MODEL 2500

PROJECT # 187
OPERATORS WLS

RUN # 3
DATE 4-8-93

Time		Fuel Wt. lbs.	Draft ins. water	Combus (s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
0854	00	22.4	.057	771	493	402	374	340	511
0904	10	21.0	.055	807	464	335	412	290	470
0914	20	19.8	.053	765	458	302	462	258	504
0924	30								
0934	40	18.0	.052	736	436	286	365	242	479
0944	50	16.9	.054	771	449	294	341	241	462
	60								
	70								
1044	80	14.5	.05	708	417	284	300	236	369
	90								
	00								
	10								
1054	20	12.0	.048	638	375	295	267	246	367
	30								
	40								
	50								
	60								
	70								
1154	80	9.4	.042	613	344	253	237	225	272
	90								

STOVE TEST DATA
METHOD 28

F28-3

2 of 2

CLIENT XTEC

PROJECT # 187

RUN # 3

MODEL 2500

OPERATORS WLS

DATE 4-8-93

Time		Fuel Wt. lbs.	Draft ins. water	Combustor(s)	Temperatures (F)				
24hr	E.T.				Surface				
					top	rear	bottom	left	right
1214	200								
1224	10	7.9	.043	579	327	280	279	291	277
	20								
	30								
	40								
	50								
1314	60	5.1	.045	661	361	299	232	319	283
	70								
	80								
1344	90	2.4	.047	746	438	346	244	412	338
	300								
	10								
	20								
	30								
	40								
	50								
1454	60	.6	.037	575	345	291	278	317	281
1504	70	.4	.037	554	327	278	279	306	272
1514	80	.2	.037	543	319	270	279	301	260
1524	90	.1	.035	534	310	263	277	293	254
1526	Stop	.035		527	311	262	276	292	252

Appendix E
Example Calculations

Dry Burn Rate, (BR)

$$BR = \left(\frac{W_{\text{Dry Kg}}}{\Theta} \right) \times 60$$

BR = Dry wood burn rate, Kg/hr

$W_{\text{Dry Kg}}$ = Total mass of wood, dry Kg.

Θ = Total time of Test Run, minutes

Note: To convert actual crib weight lbs. to dry Kg

$$\text{Dry Kg} = \frac{\left[1 - \left(\frac{\% \text{ Dry basis}}{100 + \% \text{ Dry basis}} \right) \right] \times \text{actual crib wt. lbs.}}{2.205}$$

Sample Calculation

$$\text{Dry Kg} = \frac{\left[1 - \left(\frac{21.28}{121.28} \right) \right] \times 11.3}{2.205} = 4.226 \text{ Dry Kg}$$

$$BR = \left(\frac{4.226}{396} \right) \times 60 = 0.640 \text{ Kg/hr}$$

Total Amount of Particulate
Matter Collected

$$M_n = F_{1+2} + R - \left(\frac{m_a V_{aw}}{V_a} \right)$$

m_n = Total amount of particulate matter collected, mg

F_{1+2} = Combined particulate matter collected on front & second filter, mg

R = Residue from evaporated probe & front filter bell rinse, mg

m_a = mass of residue of acetone solvent blank, mg

V_{aw} = weight of acetone used in probe and front filter holder rinses, g

V_a = weight of acetone blank, g

Sample Calculation:

$$m_n = 500.1 + 8.4 - \left(\frac{(0) \times (50.1)}{100} \right) = 508.5$$

Particulate Concentration (C_s)

$$C_s = (0.001 \text{ g/mg}) \times (m_n / V_m(\text{std}))$$

C_s = concentration of particulate matter in dilution tunnel, corrected to standard conditions, (g/dscf)

m_n = total particulate matter collected

$V_m(\text{std})$ = volume of sample, corrected to standard conditions

$$C_s = (0.001) \left(\frac{508.5}{189,188} \right) = 0.00269 \text{ g/dscf}$$

Average Dilution Tunnel Gas Velocity (V_s)

$$V_s = K_p C_p (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_s (avg)}{P_s M_s}}$$

V_s = Average dilution tunnel gas velocity (ft/sec)

K_p = Pitot tube constant; 85.49 ft/sec $\left[\frac{(\text{lb/lb-mole})^{1/2} (\text{in Hg})^{1/2}}{(^{\circ}\text{R})(\text{in H}_2\text{O})^{1/2}} \right]$

C_p = .99 std. pitot coefficient

$\sqrt{\Delta P}_{avg}$ = average square root of each individual velocity head (ΔP)

P_{bar} = Barometric pressure

P_g = stack static pressure

P_s = Absolute stack pressure, $P_{bar} + P_g$

M_s = molecular weight tunnel gas, wet basis
lb/lb mole assume to be 28.56

T_s = Absolute dilution tunnel temperature, $^{\circ}\text{R}$

Sample Calculation:

$$V_s = (85.49)(.99)(0.184) \sqrt{\frac{547.9}{(29.36)(28.56)}} = 12.588 \text{ ft/sec}$$

Average Dilution Tunnel
Gas Flow Rate (Q_{sd})

$$Q_{sd} = 3600 (1 - B_{ws}) V_s A \left(\frac{T_{std}}{T_{s(avg)}} \right) \left(\frac{P_s}{P_{std}} \right)$$

Q_{sd} = Total gas flow rate corrected to dry
Standard Conditions

B_{ws} = Water vapor percent

A = cross sectional area (ft^2)

T_{std} = Standard absolute temperature (528°R)

$(T_s)_{avg}$ = Average absolute gas temperature

P_s = Absolute dilution tunnel gas pressure (in. Hg)

P_{std} = Standard absolute pressure (29.92 in. Hg)

$$Q_{sd} = (3600 \text{ sec/hr})(1 - .04) \times (12.598 \text{ ft/sec}) \times (0.1963) \left(\frac{528}{547.9} \right) \left(\frac{29.36}{29.92} \right)$$

$$Q_{sd} = 8075.657 \text{ dscf/hr}$$

Particulate Emission Rate (E)

$$E = C_s Q_{sd}$$

E = Particulate Emission Rate, (g/hr)

C_s = Concentration of particulate matter in dilution tunnel gas, dry basis corrected to standard conditions

Q_{sd} = Total gas flow rate, dry basis corrected to standard conditions (dscf/hr)

$$E = (0.00269 \text{ g/dscf})(8075.657 \text{ dscf/hr})$$

$$E = 21.72$$

Adjusted PM Emission Rate (E_{adj})

$$E_{adj} = 1.82(E)^{0.83}$$

E_{adj} = MS6 emission rate adjusted to MS6 equivalent

E = emission rate (g/hr)

$$E_{adj} = 1.82(21.72)^{0.83}$$

$$= 23.42 \text{ g/hr.}$$

Weighted Emission Rate, (E_w)

$$E_w = \frac{\sum_{i=1}^n (K_i E_i)}{\sum_{i=1}^n K_i}$$

E_w = Weighted average emission rate, g/hr

E_i = Emission rate for test run, i , adjusted MSH equivalent (g/hr)

K_i = Test run weighting factor = $P_{i+1} - P_{i-1}$

n = Total number of test runs

P_i = Probability for burn rate during test run, i

$$E_w = \frac{(.213 \times 23.45) + (.279 \times 18.38) + (.355 \times 19.65) + (.291 \times 20.02) + (.199 \times 11.25) + (.219 \times 17.82) + (.148 \times 14.36) + (.085 \times 4.91)}{(.213) + (.279) + (.355) + (.291) + (.199) + (.219) + (.148) + (.085)}$$

$$E_w = \frac{31.6084}{1.789} = 17.67 \text{ g/hr}$$

Volume of Gas Sample
Corrected to Dry Standard Conditions

$$V_m(\text{std}) = K_1 V_m Y \left(\frac{P_{\text{bar}} + \left(\frac{\Delta H}{13.6} \right)}{T_m} \right)$$

$V_m(\text{std})$ = volume of gas sample corrected to standard conditions (dscf)

$$K_1 = 17.64 \text{ } ^\circ\text{R}/\text{in. Hg}$$

V_m = volume of gas sample, measured by dry gas meter (dscf)

Y = Dry gas meter calibration factor

P_{bar} = barometric pressure

ΔH = differential orifice pressure (in. H₂O)

T_m = Absolute average dry gas meter temperature ($^\circ\text{R}$)

Sample calculation:

$$V_m(\text{std}) = \frac{(17.64)(201.933)(0.998) \left[29.36 + \left(\frac{0.8}{13.6} \right) \right]}{552.8} = 189.188 \text{ scf}$$

Percent of Proportional Sampling Rate (PR)

$$PR = \left(\frac{\theta (V_{mi} V_s T_m T_{si})}{10 (V_m V_{si} T_s T_{mi})} \right) \times 100$$

PR = Percent of proportional sampling rate

θ = Total sampling time, (min.)

V_{mi} = Volume of gas sample as measured by dry gas meter during each 10 minute interval, i , of the test run, (dscf).

V_s = average gas velocity in dilution tunnel (ft/min)

T_m = absolute average dry gas meter temperature ($^{\circ}R$)

T_{si} = average absolute gas temperature in the dilution tunnel during interval, i , ($^{\circ}R$)

10 = length of sampling interval

V_m = volume of gas sample (dscf)

V_{si} = average gas velocity during interval, i , (ft/min)

T_s = average absolute gas temperature in dilution tunnel, ($^{\circ}R$)

T_{mi} = average absolute meter temperature during interval i , ($^{\circ}R$)

PR - continued

Sample Data

$$V_s = 756.89 \quad T_s = 547.9 \quad T_m = 552.8$$

$$\theta = 396 \quad V_m = 201.933$$

<u>i</u>	<u>θ_i</u>	<u>V_{si}</u>	<u>T_{mi}</u>	<u>V_{mi}</u>	<u>T_{si}</u>
1	10	763.15	545	5.186	557
2	20	764.52	543	5.100	559
3	30	761.78	544	5.100	555

$$PR_1 = \left(\frac{396(5.186)(756.89)(552.8)(557)}{10(201.933)(763.15)(547.9)(545)} \right) \times 100 = 104.0\%$$

$$PR_2 = \left(\frac{396(5.100)(756.89)(552.8)(559)}{10(201.933)(764.52)(547.9)(543)} \right) \times 100 = 102.8\%$$

$$PR_3 = \left(\frac{396(5.100)(756.89)(552.8)(555)}{10(201.933)(761.78)(547.9)(544)} \right) \times 100 = 102.3$$

