Certification Test Report

Harman Stove Company

Freestanding Wood Stove
Model: Oakwood

Prepared for: Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Prepared by: OMNI-Test Laboratories, Inc.
5465 SW Western Avenue, Suite G
Beaverton, Oregon 97005
(503) 643-3788

Test Period: May 23, 2002 – May 30, 2002

Report Date: July 2002

Project Number: 135-S-11-3

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

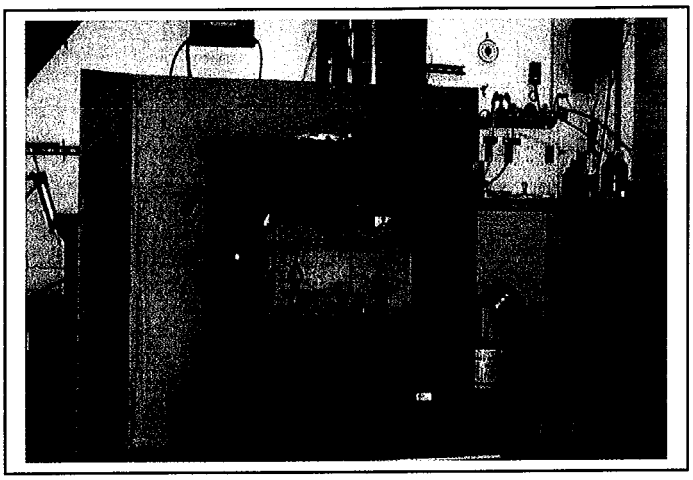
AUTHORIZED SIGNATORIES

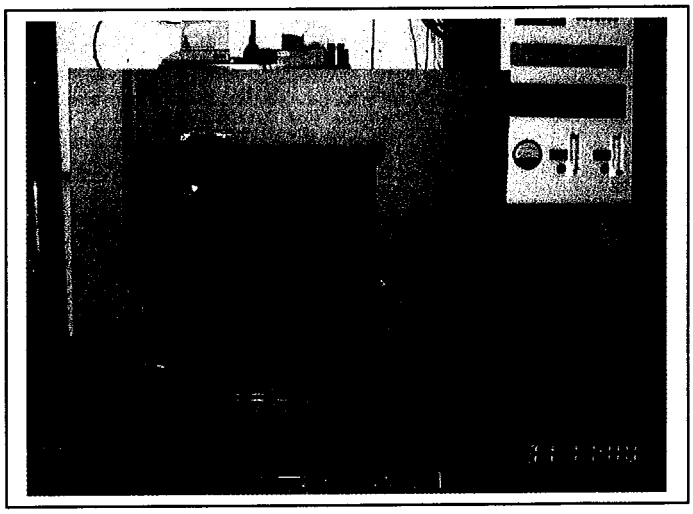
This report has been reviewed and approved by the following authorized signatories.

Paul E. Tiegs, President
OMNI-Test Laboratories, Inc.

Richard C. Sparwasser, Vice President
OMNI-Test Laboratories, Inc.

Harman Stove Company
Model: Oakwood
Test Dates: May 23, 2002 – May 30, 2002





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Section 1

Sampling Procedures and Test Results

INTRODUCTION

Harman Stove Company retained OMNI-Test Laboratories, Inc. (O-TL) to perform U.S. Environmental Protection Agency (EPA) certification testing on the Model Oakwood wood stove. The Model Oakwood wood stove is a non-catalytic, freestanding, radiant-type room heater. The firebox is constructed of cast iron and vented through a 6" diameter flue collar located at the top of the unit. The usable firebox volume was measured to be 2.2 cubic feet.

The testing was performed at the Harman Stove Company facilities in Halifax, Pennsylvania. The unit was received in good condition and assigned and labeled with OMNI ID #379 on May 27, 2002. OMNI representatives, Paul Tiegs and Ken Morgan, conducted the certification testing and completed all testing by May 30, 2002. The EPA was notified of the testing dates in a letter dated May 23, 2002. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Dane Harman of Harman Stove Company and is on file at O-TL.

The Model Oakwood wood stove was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the five test runs indicate a particulate emission level of 2.30 grams per hour. Test runs were conducted in each of three burn rate categories (0.80-1.25 kg/hr, 1.25-1.90 kg/hr, and maximum). Emissions for each of their individual test runs did not exceed the cap. The Model Oakwood results are within the emission limit of 7.5 grams per hour for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

The wood heater was sealed after completion of testing in compliance with the EPA regulation as follows:

- "DO NOT TAMPER" labels were placed on the door and all other openings;
- Plastic material sealed with "DO NOT TAMPER" labels and tape was wrapped around the unit;
- The unit was sealed in a wood box constructed for the unit and secured with steel banding; and
- "DO NOT TAMPER" labels were placed on all outer surfaces of the box.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this report.

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.90	0.61
2	1.08	3.73
3	2.00	1.49
4	1.82	2.45
5	2.53	1.40
Weighted particulate emission average of five test runs: 2.32 grams per hour.		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (in Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	84	84	30.41	30.30	<50	<50
2	87	82	30.12	30.09	<50	<50
3	81	81	30.12	30.12	<50	<50
4	84	80	30.10	30.10	<50	<50
5	84	85	30.02	30.02	<50	<50

Table 1.3.1 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lb)
1	10.6	20.4	3.7
2	11.1	20.5	3.4
3	12.8	20.6	4.0
4	11.7	20.1	3.6
5	19.0	21.7	3.7

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lb)	Firebox Volume (ft^3)	Fuel Loading Density Wet Basis (lb/ft^3)	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	16.8	2.2	7.64	20.4	16.5	4	2
2	16.4	2.2	7.45	20.9	16.5	4	2
3	16.2	2.2	7.36	22.4	16.5	4	2
4	16.5	2.2	7.50	23.4	16.25	4	2
5	16.0	2.2	7.27	23.1	16.125	4	2

Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temp (°F)
1	420	13.34	142.6	105.0
2	343	12.81	135.2	107.6
3	180	14.34	148.8	118.0
4	200	14.03	146.4	114.2
5	140	14.90	148.9	137.9

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temp Average[a]	Ending Surface Temp Average[a]	Surface Delta T[b]
1	323.8	205.8	118
2	342.0	224.2	118
3	396.4	347.6	49
4	393.4	329.4	64
5	418.2	423.8	6

a. All temperatures are in degrees F.

b. Surface Delta T represents the difference between beginning and ending average surface temperature.

Table 1.6 – Pretest Configuration

Run	Combustion Air (in)	Fuel Added	Fuel Removed	Time (min)
1	0.375" open	10.6 lbs. at start; no addition; coal bed 3.7 lbs.	N/A	90
2	¾" open (4th notch)	11.1 lbs. at start; 0.4 lb. added; coal bed 3.4 lbs.	N/A	65
3	1 ½" open (6th notch)	12.8 lbs. at start; no addition; coal bed 4.0 lbs.	N/A	80
4	1 ¼" open (5th notch)	11.7 lbs. at start; 0.3 lb. added; coal bed 3.6 lbs.	N/A	65
5	fully open	19.0 lbs. at start; no addition; coal bed 3.7 lbs.	N/A	85

Table 1.7 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (in H_2O)	Primary Air Setting (in)	Run Time (min)	Average Draft (in H_2O)
1	0.90	0	0.375" open	420	-0.028
2	1.08	0	¾" open (4th notch)	343	-0.025
3	2.00	0	1 ½" open (6th notch)	180	-0.041
4	1.82	0	1 ¼" open (5th notch)	200	-0.039
5	2.53	0	fully open	140	-0.047

TEST RESULTS AND DISCUSSION

A total of five test runs were conducted in the following categories: two in the 0.80 to 1.25 kg/hr dry category; one in the 1.26 to 1.90 kg/hr dry category; and two at maximum.

The weighted particulate emission level was measured to be 2.30 grams per hour.

The proportionality results for all five test runs were acceptable. Quality check results for each test run are presented Section 2 of this report.

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

APPLIANCE DESCRIPTION

Appliance Manufacturer: Harman Stove Company

Wood Stove Model: Oakwood

Type: Freestanding, radiant-type room heater

WOOD HEATER DESCRIPTION:

Materials of Construction: The unit is constructed of cast iron and mild steel components.

Air Introduction System: Air enters the firebox through an opening located at the front of the appliance below the fuel-loading door. Secondary air enters the appliance through the bottom/back and is channeled internally to a refractory-lined box at the bottom/back of the unit where gases are incinerated internally.

Combustion Control Mechanisms: The combustion air inlet is controlled by a handle located below the fuel-loading door in the center of the appliance.

Combustor: NA.

Internal Baffles: A refractory baffle is mounted in the upper portion of the firebox. The flame path is forced to the back of the firebox where it travels down through a refractory-lined box at the bottom/back of the unit where gases are incinerated internally.

Other Features: None.

Flue Outlet: The 6" diameter flue outlet is located in the top of the unit.

WOOD HEATER OPERATING INSTRUCTIONS

Specific written instructions: See Section 4 of this report. All markings and instruction materials were reviewed for content prior to printing.

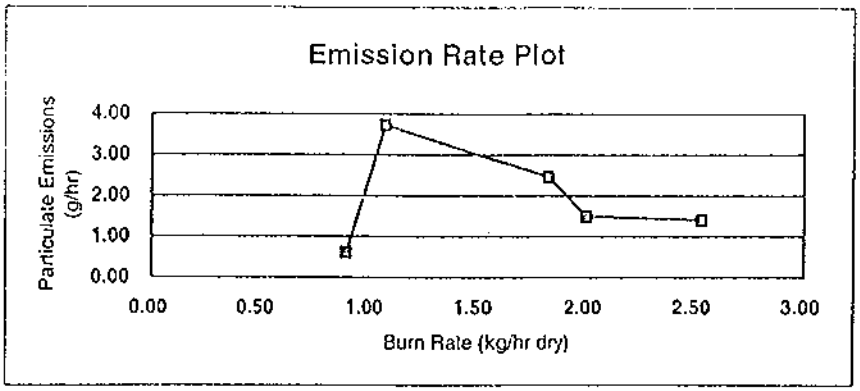
Section 2

Test Data by Run

EPA Weighted Average Emissions
EPA Method 28

Client:	Harman	Status:	FINAL
Stove Model:	OakWood	Stove Type:	Non-Catalytic Stove
Test Dates:	5/23/02 - 5/30/02		
Project Number:	135-S-11-3		
Tracking Number:	379		
Signature/Date:			

Weighted Average (g/hr)
2.30



Run #	1		Run #	5	
Burn Rate (dry kg/hr)	0.90		Burn Rate (dry kg/hr)	2.53	
Catagory	2		Catagory	4	
Overall Efficiency (%)	63%		Overall Efficiency (%)	63%	
Emissions (g/hr)	0.61		Emissions (g/hr)	1.4	
Cap (g/hr)	15		Cap (g/hr)	18	
Weighting Factor	0.439	26.33%	Weighting Factor	0.088	5.28%
Heat Output (BTU/hr)	10313		Heat Output (BTU/hr)	28990	

Run #	2	
Burn Rate (dry kg/hr)	1.08	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	3.73	
Cap (g/hr)	15	
Weighting Factor	0.578	34.67%
Heat Output (BTU/hr)	12375	

Run #	4	
Burn Rate (dry kg/hr)	1.82	
Catagory	3	
Overall Efficiency (%)	63%	
Emissions (g/hr)	2.45	
Cap (g/hr)	18	
Weighting Factor	0.473	28.40%
Heat Output (BTU/hr)	20854	

Run #	3	
Burn Rate (dry kg/hr)	2.00	
Catagory	4	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.49	
Cap (g/hr)	18	
Weighting Factor	0.089	5.32%
Heat Output (BTU/hr)	22917	

K. J. Murray
7-31-02

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Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Run 1

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman Stove Company
Model: Oakwood
Project No.: 379
Tracking No.: 135-S-11-3
Run: 1
Test Date: 05/22/02

Burn Rate	0.90 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00003 grams/dscf 0.27 grams/hour 0.61 grams/hour
Average Tunnel Temperature	105 degrees Fahrenheit
Average Delta p	0.038 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	204.34 cubic feet 90 degrees Fahrenheit 13.34 feet/second 8568.52 dscf/hour 197.83 dscf
Total Particulates - mn Average Delta H Total Time of Test	6.2 mg 0.80 inches H20 420 minutes

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Harman Stove Company, Inc.
Model: Oakwood
Project No.: 135-S-11-3
Tracking No.: 379

Equipment Numbers:

Run #: 1
Date: 05/23/02

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	001	575.0	570.1		4.9
B. Rear filter catch	Filter	002	574.8	574.9		-0.1
C. Rinse of probe and filter assembly	Acetone	100	64866.9	64864.3	0.0	1.4

Total Particulate, mg :	6.2

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: [signature] Date: 6-31-02

Wood Heater Test Data - EPA Method 5G

Run: 1

Manufacturer:	Harman Stove Company
Model:	Oakwood
Tracking No.:	379
Project No.:	135-S-11-3
Test Date:	22-May-02
Beginning Clock Time:	11:02
Recording Interval:	10 min.
Total Sampling Time:	420 min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.016	0.031	0.039	0.046	0.051	0.047	0.038	0.033	"H2O
Initial Temp.	71	71	71	71	71	71	71	71	oF

OMNI Equipment Numbers:

PM Control Module:	141
Dilution Tunnel MW(dry):	29.00 lb/lb-mole
Dilution Tunnel MW(wet):	28.56 lb/lb-mole
Dilution Tunnel H2O:	4.00 percent
Dilution Tunnel Static:	-0.540 "H2O
Pitot Tube Cp:	0.99
Meter Box Y Factor:	0.992

Barometric Pressure:	Begin	Middle	End	Average
	30.41	30.35	30.3	30.35 "Hg

Signature/Date: Paul Trego 5/22/02

Tunnel Velocity:	13.34 ft/sec.
Intial Tunnel Flow:	144.5 scfm
Average Tunnel Flow:	142.6 scfm
Tunnel Area:	0.196 ft2
Post-Test Leak Check:	0.00 @ 13.5" cfm@"Hg
Fuel Moisture (dry basis	20.4 %
Total Particulate:	6.2 mg
Filter Holder No.:	1

720 feet elevation at Harma

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel d	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O
0	0.000		0.80	94	2	112	0.038		16.8		468	193	343	310	305		323.8	367	83	83	84	-0.040
10	4.750	0.48	0.80	94	2	121	0.038	100	15.4	-1.4	401	196	400	295	295		317.4	442	93	61	84	-0.040
20	9.580	0.48	0.80	93	2	118	0.038	101	14.6	-0.8	369	199	376	284	288		303.2	415	94	69	85	-0.040
30	14.650	0.51	0.80	93	2	117	0.038	106	13.6	-1	371	199	366	273	280		297.8	417	93	68	85	-0.040
40	19.450	0.48	0.80	93	2	116	0.038	100	12.8	-0.8	386	198	367	267	276		298.8	417	92	67	84	-0.040
50	24.150	0.47	0.80	93	2	113	0.038	98	12.1	-0.7	393	197	352	264	274		296.0	390	92	66	83	-0.040
60	28.910	0.48	0.80	94	2	111	0.038	99	11.4	-0.7	388	193	332	263	271		289.4	380	93	65	83	-0.040
70	33.740	0.48	0.80	92	2	110	0.038	101	10.7	-0.7	399	193	328	262	274		291.2	384	94	64	82	-0.040
80	38.610	0.49	0.80	91	2	110	0.040	99	9.9	-0.8	389	192	331	263	281		291.2	386	92	64	82	-0.040
90	43.470	0.49	0.80	91	2	109	0.040	98	9.2	-0.7	392	191	319	263	288		290.6	381	91	63	83	-0.040
100	48.430	0.50	0.80	91	2	111	0.040	101	8.4	-0.8	399	192	334	266	290		296.2	400	91	63	82	-0.040
110	53.350	0.49	0.80	91	2	110	0.040	100	7.6	-0.8	404	191	341	277	294		301.4	393	92	63	83	-0.040
120	58.400	0.51	0.80	92	2	111	0.040	102	6.9	-0.7	419	191	340	280	298		305.6	392	92	63	83	-0.040
130	63.500	0.51	0.80	92	2	112	0.040	103	6.1	-0.8	436	191	343	282	302		310.8	416	92	63	83	-0.040
140	68.110	0.46	0.80	91	2	111	0.040	93	5.6	-0.5	447	192	356	284	303		316.4	416	93	62	83	-0.040
150	72.710	0.46	0.80	90	2	111	0.038	96	5.1	-0.5	452	191	343	288	306		316.0	387	93	62	84	-0.040
160	77.710	0.50	0.80	91	2	109	0.038	104	4.6	-0.5	452	193	320	290	309		312.8	360	91	62	83	-0.040
170	82.460	0.48	0.80	91	2	108	0.040	96	4.3	-0.3	457	197	304	290	310		311.6	349	90	62	85	-0.030
180	87.340	0.49	0.80	91	2	106	0.038	102	3.9	-0.4	451	198	289	289	310		307.4	337	90	62	83	-0.030
190	92.220	0.49	0.80	91	2	106	0.038	102	3.6	-0.3	447	198	277	286	308		303.2	331	89	61	83	-0.030
200	97.090	0.49	0.80	91	2	106	0.038	101	3.2	-0.4	440	198	271	285	306		300.0	341	88	61	83	-0.030
210	102.300	0.52	0.80	91	2	105	0.038	108	2.9	-0.3	436	198	276	288	303		300.2	339	89	61	84	-0.030
220	106.880	0.46	0.80	91	2	103	0.038	95	2.6	-0.3	443	197	268	286	301		299.0	307	88	61	82	-0.030
230	111.790	0.49	0.80	91	2	101	0.038	102	2.5	-0.1	439	196	247	283	297		292.4	285	88	61	82	0.030
240	116.620	0.48	0.80	92	2	101	0.038	100	2.3	-0.2	432	196	230	279	293		286.0	272	87	61	84	-0.030
250	121.520	0.49	0.80	92	2	101	0.038	101	2.2	-0.1	422	196	218	273	288		279.4	261	87	60	83	-0.020
260	126.400	0.49	0.80	93	2	101	0.038	101	2.1	-0.1	410	195	209	268	283		273.0	252	87	60	84	-0.020
270	131.280	0.49	0.80	93	2	100	0.038	101	1.9	-0.2	398	191	201	262	279		266.2	245	87	60	84	-0.020
280	136.170	0.49	0.80	94	2	99	0.038	101	1.8	-0.1	384	188	195	256	275		259.6	241	87	60	84	-0.020
290	141.050	0.49	0.80	93	2	99	0.038	101	1.6	-0.2	376	185	191	250	273		255.0	235	87	60	83	-0.020
300	145.940	0.49	0.80	92	2	99	0.038	101	1.5	-0.1	370	183	187	246	269		251.0	232	87	60	83	-0.020
310	150.890	0.49	0.80	92	2	99	0.038	102	1.3	-0.2	361	182	184	240	265		246.4	225	87	60	84	-0.020
320	155.500	0.46	0.80	92	2	98	0.038	95	1.2	-0.1	358	180	180	236	262		243.2	220	87	60	82	-0.020
330	160.000	0.45	0.80	92	2	98	0.038	93	1.0	-0.2	352	176	176	232	257		238.6	214	86	60	85	-0.020
340	165.000	0.50	0.80	92	2	97	0.038	103	0.9	-0.1	347	173	173	229	254		235.2	210	86	60	84	-0.020
350	170.000	0.50	0.80	92	2	97	0.038	103	0.8	-0.1	339	171	169	225	249		230.6	204	86	59	84	-0.020
360	175.220	0.52	0.80	92	2	97	0.038	108	0.7	-0.1	330	168	165	221	244		225.6	199	86	60	84	-0.020
370	180.090	0.49	0.80	92	2	97	0.038	100	0.6	-0.1	323	164	161	216	238		220.4	193	86	59	84	-0.020
380	184.990	0.49	0.80	92	2	97	0.038	101	0.5	-0.1	316	159	158	209	227		213.8	193	86	59	84	-0.020
390	189.990	0.50	0.80	92	2	97	0.038	103	0.4	-0.1	318	157	155	207	220		211.4	193	86	59	84	-0.020
400	195.000	0.50	0.80	92	2	97	0.038	103	0.2	-0.2	317	157	154	206	216		210.0	191	86	60	84	-0.020
410	199.950	0.49	0.80	92	2	97	0.038	102	0.1	-0.1	315	156	152	205	212		208.0	189	6	60	84	-0.020
420	204.339	0.44	0.80	2	2	97	0.038	108	0.0	-0.1	309	151	155	204	210		205.8	188	86	59	84	-0.020
Avg/Total	204.339	0.49	0.80	89.91		105.00	0.038	100.80									118		87.12	62.16		-0.028

[illegible]-Tes[illegible]orat[illegible] Inc.
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Oakwood Project #: 135-5-11-3 Tracking #: 379

Date: 5/23/02 Test Crew: RT Run #: 1

OMNI Equipment ID #:

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 3.4-4.2 Actual: Coal Bed: 3.7

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	10.5		0.04	77	426	187	406	251	225	635	✓
10	8.427		0.04	79	384	203	431	271	243	488	✓
20	7.9		0.04	79	389	200	436	278	250	468	NA
30	7.0		0.04	81	408	196	431	285	255	468	NA
40	6.3		0.04	81	432	188	511	289	281	523	NA
50	5.1		0.04	80	414	189	493	286	271	570	NA
60	4.7		0.04	81	431	191	521	294	288	541	NA
70	4.1		0.04	83	459	196	431	311	302	423	NA
80	3.8		0.04	83	466	195	396	313	303	403	NA
90	3.7		0.03	84	469	194	366	313	305	382	NA
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: Paul Trapp Date: 5/23/02

OMNI-Test Laboratories, Inc
Beaverton, OR Phone (503) 643-3788

FUEL DATA

Client / Model: Herman Oakwood Tracking #: 379 Project #: 135-5-11-3

Date: 5/23/02 Test Crew: PT Run #: 1

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: Paul Tiegs

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length	Readings			Type
1	8 ft	20.3	19.5	19.3	2x4
2	8 ft	19.4	21.2	21.4	2x4
3	8 ft	20.6	20.8	21.5	2x4

Length of cut pieces: 8½ inches Pre-Burn Fuel Average Moisture: 20.44%

Time (clock): 0900 Room Temperature (F): 71° Initials: PT

TEST FUEL

FUEL TYPE AND ~~AMOUNT~~ NUMBER of Pieces: 2 × 4 4 4 × 4 2

CALCULATED LOAD WEIGHT: 15.4 ACTUAL LOAD WEIGHT: 8.0 (2 × 4) w/feet attached
8.8 (4 × 4) w/feet attached
16.8 Total

FUEL PIECE LENGTH: 16½"

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	20.7	19.3	20.7	2x4
2	19.6	18.2	20.8	2x4
3	21.8	21.1	20.4	2x4
4	20.0	20.4	20.4	2x4
5	20.8	21.2	22.4	4x4
6	19.6	20.1	19.7	4x4
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 20.4% PT

Time (clock): 0930 Room Temperature (F): 71° Initials: PT

Technician signature: Paul Tiegs Date: 5/23/02

OMNI-Test Laboratories, I.
Beaverton, OR (503) 643-3788

Supplemental Data EPA 5G/5H

Client / Model: HARMAN OAKWOOD Project No.: 135 - S - 11-3

Tracking No.: 379 Date: 5-23-02 Run No.: 1 Booth: _____

Test Crew: K. Morgan, P. Tiegs Start Time: 11:02 Stop Time: 18:02

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack: Dilution Tunnel (Method 5G Only):

Initial: N/A Initial: N/A

Final: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: _____ CO: N/A CO_2(DT): _____

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2							
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: < 50 Final: < 50

Scale Audit (lbs.): Pretest: 10.0 Post Test: 10.0

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.25" w.c. Post: Ø @ 3.5" WC.

Flue Pipe Cleaned Prior to First Test in Series: Date: 5-27-02 Initials: K

	Initial	Middle	Ending
Pb (in. Hg)	30.41	30.35	30.30
Room Temp (°F)	84	82	84

Technician signature: Paul Tiegs Date: ~~6/22/02~~ 5/22/02 P.T.

2-9&2-37

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Run 2

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman Stove Company
Model: Oakwood
Project No.: 379
Tracking No.: 135-S-11-3
Run: 2
Test Date: 05/28/02

Burn Rate	1.08 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00029 grams/dscf 2.37 grams/hour 3.73 grams/hour
Average Tunnel Temperature	108 degrees Fahrenheit
Average Delta p	0.035 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	172.91 cubic feet 86 degrees Fahrenheit 12.81 feet/second 8126.91 dscf/hour 167.18 dscf
Total Particulates - mn Average Delta H Total Time of Test	48.8 mg 0.83 inches H20 343 minutes

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Harman Stove Company, Inc.
Model: Oakwood
Project No.: 135-S-11-3
Tracking No.: 379

Equipment Numbers:

Run #: 2
Date: 05 28 02

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	003	612.5	574.2		38.3
B. Rear filter catch	Filter	004	574.1	574.2		-0.1
C. Rinse of probe and filter assembly	Acetone	80	66417.5	66405.9	0.0	10.6

Total Particulate, mg :	48.8

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: K. J. Morgan Date: 6-31-02

Wood Heater Test Data - EPA Method 5G

Run: 2

Manufacturer:	Harman Stove Company	
Model:	Oakwood	
Tracking No.:	379	
Project No.:	135-S-11-3	
Test Date:	28-May-02	
Beginning Clock Time:	13:44	
Recording Interval:	10	min.
Total Sampling Time:	343	min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.044	0.038	0.028	0.010	0.048	0.042	0.032	0.028	"H2O
Initial Temp	128	128	128	128	128	128	128	128	oF

OMNI Equipment Numbers:

PM Control Module:	141
Dilution Tunnel MW(dry):	29.00 lb/lb-mole
Dilution Tunnel MW(wet):	28.56 lb/lb-mole
Dilution Tunnel H2O:	4.00 percent
Dilution Tunnel Static:	-0.300 "H2O
Pitot Tube Cp:	0.99
Meter Box Y Factor:	0.992

Barometric Pressure:	Begin	Middle	End
	30.12	30.09	30.09

Average 30.10 "Hg

Signature/Date: [signature]

Tunnel Velocity:	12.81 ft/sec.
Initial Tunnel Flow:	128.7 scfm
Average Tunnel Flow:	135.2 scfm
Tunnel Area:	0.196 ft2
Post-Test Leak Check:	.002 @ 14 cfm@"Hg
Fuel Moisture (dry basis	20.9 %
Total Particulate:	48.8 mg
Filter Holder No.:	1

720 feet elevation at Harma

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel d	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O
0	1000.000		0.00	87	0	128	0.034		16.4		508	206	362	318	316		342.0	385	86	86	87	-0.030
10	1005.100	0.51	0.80	87	3	123	0.035	103	14.9	-1.5	421	209	408	301	304		328.6	466	95	78	87	-0.040
20	1010.200	0.51	0.85	89	3	120	0.034	104	13.9	-1	398	211	395	289	297		318.0	448	98	78	87	-0.040
30	1015.310	0.51	0.85	89	3	120	0.034	104	12.8	-1.1	407	210	398	280	290		317.0	463	98	75	87	-0.040
40	1020.240	0.49	0.85	88	3	121	0.036	98	11.6	-1.2	420	209	429	276	288		324.4	477	95	74	87	-0.040
50	1025.200	0.50	0.85	89	3	118	0.034	100	10.8	-0.8	430	208	415	276	290		323.8	451	94	73	86	-0.040
60	1030.000	0.48	0.85	89	3	116	0.036	94	9.9	-0.9	431	208	396	278	292		321.0	440	94	68	87	-0.040
70	1034.910	0.49	0.85	88	3	117	0.034	100	9.1	-0.8	445	209	393	280	294		324.2	448	94	61	86	-0.040
80	1039.990	0.51	0.85	87	3	118	0.034	104	8.2	-0.9	461	212	401	284	299		331.4	458	94	59	87	-0.040
90	1045.040	0.50	0.85	86	3	119	0.036	100	7.1	-1.1	474	215	421	288	304		340.4	472	94	60	87	-0.040
100	1050.070	0.50	0.85	85	3	118	0.036	100	6.3	-0.8	489	219	431	294	311		348.8	467	95	60	86	-0.040
110	1055.200	0.51	0.85	85	3	117	0.036	102	5.5	-0.8	488	222	423	300	319		350.4	461	95	60	87	-0.040
120	1060.200	0.50	0.85	85	3	116	0.036	99	4.9	-0.6	485	224	406	304	336		351.0	434	92	60	87	-0.030
130	1065.180	0.50	0.85	84	3	113	0.034	102	4.6	-0.3	484	224	362	305	351		345.2	399	89	60	87	-0.030
140	1070.180	0.50	0.85	84	3	111	0.034	102	4.3	-0.3	485	223	334	303	354		339.8	385	86	60	87	-0.030
150	1075.210	0.50	0.85	84	3	110	0.036	99	4.0	-0.3	480	220	317	299	353		333.8	380	84	60	87	-0.030
160	1080.240	0.50	0.85	83	3	110	0.036	99	3.6	-0.4	478	216	308	296	350		329.6	379	83	60	86	-0.030
170	1085.300	0.51	0.85	83	3	108	0.036	100	3.3	-0.3	478	214	293	294	352		326.2	347	82	60	86	-0.020
180	1090.310	0.50	0.85	83	3	105	0.036	99	3.0	-0.3	476	210	271	291	352		320.0	325	80	60	85	-0.020
190	1095.500	0.52	0.85	82	3	103	0.036	102	2.7	-0.3	462	204	247	285	340		307.6	299	79	60	85	-0.020
200	1100.450	0.50	0.85	82	3	101	0.036	97	2.5	-0.2	456	200	234	280	331		300.2	291	78	60	84	-0.020
210	1105.450	0.50	0.85	82	3	101	0.036	98	2.2	-0.3	451	197	226	276	320		294.0	292	78	60	84	-0.020
220	1110.400	0.50	0.85	82	3	100	0.036	97	2.0	-0.2	446	192	221	272	312		288.6	291	79	60	83	-0.020
230	1115.410	0.50	0.85	82	3	98	0.034	101	1.8	-0.2	434	191	217	269	309		284.0	283	81	59	83	-0.020
240	1120.400	0.50	0.85	82	3	98	0.034	101	1.6	-0.2	427	188	216	265	304		280.0	274	82	59	83	-0.020
250	1125.460	0.51	0.85	83	3	98	0.034	102	1.4	-0.2	413	189	207	260	297		273.2	265	83	59	82	-0.010
260	1130.490	0.50	0.85	84	3	99	0.034	102	1.3	-0.1	397	187	202	256	292		266.8	257	84	59	82	-0.010
270	1135.500	0.50	0.85	86	3	98	0.034	100	1.1	-0.2	389	183	195	252	285		260.8	248	85	59	82	-0.010
280	1140.550	0.50	0.85	88	3	98	0.034	101	0.9	-0.2	391	179	190	250	280		258.0	241	85	59	81	-0.010
290	1145.600	0.50	0.85	89	3	97	0.034	101	0.7	-0.2	380	174	184	246	275		251.8	231	85	59	82	-0.010
300	1150.700	0.51	0.85	90	3	97	0.034	102	0.6	-0.1	373	173	179	242	271		247.6	225	85	59	82	-0.010
310	1155.750	0.50	0.85	91	3	97	0.034	100	0.4	-0.2	363	171	174	239	266		242.6	218	85	59	83	-0.010
320	1160.820	0.51	0.85	91	3	96	0.034	101	0.3	-0.1	353	168	170	234	260		237.0	212	85	59	83	-0.010
330	1165.790	0.50	0.85	90	3	96	0.034	99	0.2	-0.1	342	164	166	230	254		231.2	207	85	59	82	-0.010
340	1170.810	0.50	0.85	90	3	95	0.034	100	0.1	-0.1	331	160	162	225	248		225.2	200	85	59	83	-0.010
343	1172.914	0.21	0.85	90	3	95	0.034	42	0.0	-0.1	329	160	161	225	246		224.2	198	85	59	82	-0.010
Avg/Total	172.914	0.49	0.83	86.08		107.64	0.035	98.70									118		87.14	62.75		-0.025

2-12-17-37

OMNI Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Oakwood Project #: 135-5-11-2 Tracking #: 379

Date: 5-28-02 Test Crew: K. Morgan Run #: 2

OMNI Equipment ID #: _____

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 3.3 - 4.1 Actual: Coal Bed: 3.4

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	11.1		-.05	76	381	208	372	242	226	549	
10	10.0	1.1	-.05	76	357	228	411	253	24[1]357	502	
20	8.5	1.5	-.05	81	361	227	450	260	248	513	
30	7.4	1.1	-.05	83	375	222	466	266	260	498	
40	5.6	1.8	-.05	85	418	219	509	277	276	581	
50	4.6	1.0	-.045	86	461	220	535	296	295	563	
60	3.6	1.0	-.043	86	512	207	410	323	316	420	
65 70	3.4	0.2	-.040	87	508	206	362	318	316	385	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Stir at 45 minutes; added 0.4 lb
Stir at 31 minutes
78 min
2-14-03

Technician signature: K. Morgan Date: 5-28-02

OMNI-Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

FUEL DATA

Client / Model: HARMAN OAKWOOD Tracking #: 379 Project #: X 135-5-11-2

Date: 5-28-02 Test Crew: K. Morgan Run #: 2

OMNI Equipment ID #:

FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES. UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER. DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings		Type
1	8 ft	19.1	22.6	19.0	2x4
2	8 ft	19.0	22.0	21.4	2x4
3	ft				

14@8½ 2@16

Length of cut pieces: 16.5" inches Pre-Burn Fuel Average Moisture: ~~20.7~~ 20.5 AS

Time (clock): 11:10 Room Temperature (F): 73 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 2
CALCULATED LOAD WEIGHT: 15.4 ACTUAL LOAD WEIGHT: 7.5 (2 × 4)
8.9 (4 × 4)
16.4 Total

FUEL PIECE LENGTH: 16.5

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE	
1	21.0	21.4	20.6	2x4	21.0
2	21.3	20.1	20.4	2x4	20.6
3	20.7	20.9	20.9	4x4	20.8
4	21.4	20.1	20.3	4x4	20.6
5	22.0	21.1	22.0	2x4	21.7
6	20.8	20.1	20.6	2x4	20.5
7					
8					
9					
10					

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 20.9

Time (clock): 10:50 Room Temperature (F): 73 Initials: K

Technician signature: K. J. Morgan Date: 5-28-02

OMNI-Test Laboratories,
Beaverton, OR (503) 643-3788

Supplemental Data EPA 5G/5H

Client / Model: Harman Oakwood Project No.: 135 - 5 - 11 - 2

Tracking No.: 379 Date: 5-28-02 Run No.: 2 Booth: _____

Test Crew: K. Morgan Start Time: 13:44 Stop Time: 19:27

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Initial: N/A

Final: N/A

Dilution Tunnel (Method 5G Only):

Initial: N/A

Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2			N/A				
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: < 50 Final: < 50

Scale Audit (lbs.): Pretest: 10.0 Post Test: 10.0

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: ~~Ø~~ Ø @ 3.5" w.c. Post: Ø @ 3.5" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 5-21-02 Initials: JC

	Initial	Middle	Ending
Pb (in. Hg)	30.12	30.09	30.09
Room Temp (°F)	87	85	82

Technician signature: K. A. Morgan Date: 5-28-02

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Run 3

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman Stove Company
Model: Oakwood
Project No.: 379
Tracking No.: 135-S-11-3
Run: 3
Test Date: 05/29/02

Burn Rate	2.00 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00009 grams/dscf 0.78 grams/hour 1.49 grams/hour
Average Tunnel Temperature	118 degrees Fahrenheit
Average Delta p	0.043 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	88.43 cubic feet 79 degrees Fahrenheit 14.34 feet/second 8939.00 dscf/hour 86.68 dscf
Total Particulates - mn Average Delta H Total Time of Test	7.6 mg 0.79 inches H20 180 minutes

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 3

Manufacturer: Harman Stove Company
Model: Oakwood
Tracking No.: 379
Project No.: 135-S-11-3
Test Date: 29-May-02
Beginning Clock Time: 11:46
Recording Interval: 10 min.
Total Sampling Time: 180 min.

OMNI Equipment Numbers:

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.038	0.044	0.052	0.060	0.054	0.048	0.036	0.016	"H2O
Initial Temp.	128	128	128	128	128	128	128	128	oF

PM Control Module: 141
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4.00 percent
Dilution Tunnel Static: -0.300 "H2O
Pitot Tube Cp: 0.99
Meter Box Y Factor: 0.992

Barometric Pressure:	Begin	Middle	End	Average
	30.12	30.13	30.12	30.12 "Hg

Signature/Date: 5/29/02

Tunnel Velocity:	14.34	ft/sec.
Intial Tunnel Flow:	147.0	scfm
Average Tunnel Flow:	148.8	scfm
Tunnel Area:	0.196	ft2
Post-Test Leak Check:	.002 @ 16	cfm@"Hg
Fuel Moisture (dry basis	22.4	%
Total Particulate:	7.6	mg
Filter Holder No.:	1	

720 feet elevation at Harma

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel d	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O
0	1000.000		0.00	80	0	127	0.043		16.2		584	292	423	331	352		396.4	500	82	81	81	-0.050
10	1004.910	0.49	0.80	77	3.5	123	0.043	101	14.7	-1.5	449	282	438	319	339		365.4	540	89	54	81	-0.050
20	1009.680	0.48	0.80	77	3.5	124	0.043	99	13.2	-1.5	430	276	452	308	329		359.0	547	91	57	80	-0.050
30	1014.440	0.48	0.80	77	3.5	124	0.043	99	11.6	-1.6	465	274	469	305	326		367.8	564	91	57	81	-0.050
40	1019.350	0.49	0.80	77	3.5	131	0.043	102	9.6	-2	542	276	492	308	331		389.8	649	88	58	81	-0.060
50	1024.010	0.47	0.80	78	3.5	131	0.043	97	7.6	-2	644	266	502	327	354		418.6	610	87	59	82	-0.050
60	1028.990	0.50	0.85	77	3.5	130	0.043	104	6.1	-1.5	674	253	496	340	373		427.2	591	86	59	83	-0.050
70	1034.120	0.51	0.85	79	3.5	128	0.043	106	4.7	-1.4	677	243	479	351	384		426.8	559	85	59	83	-0.050
80	1039.450	0.53	0.85	79	3.5	122	0.043	110	3.9	-0.8	684	247	410	357	383		416.2	481	82	59	83	-0.040
90	1044.210	0.48	0.85	80	3.5	118	0.043	97	3.3	-0.6	654	259	364	357	376		402.0	455	81	59	82	-0.040
100	1049.100	0.49	0.85	80	3.5	115	0.043	100	2.8	-0.5	654	273	337	355	368		397.4	438	82	59	82	-0.040
110	1054.080	0.50	0.85	80	3.5	115	0.043	102	2.3	-0.5	656	277	318	352	361		392.8	426	84	59	82	-0.040
120	1059.050	0.50	0.85	80	3.5	111	0.043	101	1.9	-0.4	613	277	306	350	355		380.2	406	84	59	82	-0.030
130	1064.040	0.50	0.85	80	3.5	109	0.043	101	1.6	-0.3	567	273	287	342	346		363.0	396	84	59	82	-0.030
140	1069.030	0.50	0.85	80	3.5	109	0.043	101	1.3	-0.3	547	272	285	334	343		356.2	395	84	58	82	-0.030
150	1074.000	0.50	0.85	80	3.5	108	0.043	101	1.0	-0.3	543	274	278	328	341		352.8	383	84	58	82	-0.030
160	1078.980	0.50	0.85	80	3.5	106	0.043	101	0.7	-0.3	532	272	274	327	336		348.2	385	84	58	81	-0.030
170	1083.950	0.50	0.85	80	3.5	106	0.043	101	0.3	-0.4	529	272	273	329	332		347.0	378	84	58	81	-0.030
180	1088.427	0.45	0.85	80	3.5	106	0.043	91	0.0	-0.3	538	273	268	332	327		347.6	370	83	58	81	-0.030
Avg/Total	88.427	0.49	0.79	79.00		118.03	0.043	100.73									49		85.00	59.37		-0.041

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Harman Stove Company, Inc.
Model: Oakwood
Project No.: 135-S-11-3
Tracking No.: 379

Equipment Numbers:

Run #: 3
Date: 05 29 02

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	005	581.0	577.6		3.4
B. Rear filter catch	Filter	006	576.5	577.1		-0.6
C. Rinse of probe and filter assembly	Acetone	80	65140.4	65134.6	0.0	4.8

Total Particulate, mg :	7.6

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: M. J. Morgan Date: 6-31-02

I-Te[illegible]orat[illegible] Inc
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: HARMAN OAKWOOD Project #: 135-5-11-2 Tracking #: 379

Date: 5-29-02 Test Crew: K. MORGAN Run #: 3

OMNI Equipment ID #:

Stir at 2 min.

Shr at 47 min.

Preburn [X] Coal Bed:
Test [ ] Data: 0 = Range: 3,3 – 4.0 Actual: Coal Bed:

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	12.8		-0.09	77	343	197	445	232	225	634	
10	10.5	2.3	-0.08	78	358	258	486	256	252	581	
20	9.3	2.2	-0.07	79	365	277	450	265	270	538	
30	8.4	0.9	-0.06	81	376	297	425	267	279	518	
40	7.3	0.9	-0.05	81	424	332	415	272	289	524	
50	5.8	1.5	-0.06	82	505	343	429	287	303	607	
60	4.6	1.2	-0.05	81	584	313	487	309	331	574	
70	4.1	0.5	-0.05	81	586	292	432	329	350	503	
80	4.0										
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. J. Morgan Date: 5-29-02

03-0912-6

OMNI-Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

FUEL DATA

Client / Model: HARMAN Oakwood Tracking #: 379 Project #: 135-5-11-2

Date: 5-29-02 Test Crew: K. Morgan Run #: 3

OMNI Equipment ID #:

FUEL LOAD PREPARED BY: K. Morgan

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0

Cal Value (2) = 22% Actual Reading 22.0

Piece	Length	Readings			Type
1	8 ft	20.2	20.4	20.0	2x4
2	8 ft	23.4	18.8	20.6	2x4
3	ft				

20 16"

Length of cut pieces: 15@ 8.5 inches Pre-Burn Fuel Average Moisture: 20.576 %

Time (clock): 09:20 Room Temperature (F): 74 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 2

CALCULATED LOAD WEIGHT: 15.4 ACTUAL LOAD WEIGHT: 8.5 (2 × 4)

7.7 (4 × 4)

FUEL PIECE LENGTH: ~~16.75"~~ 16.50" K ~~16.5~~ Total

16.2

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE	
1	23.4	24.4	22.3	4.4	23.4
2	24.3	21.5	21.6	4x4	22.5
3	24.1	22.6	22.3	2x4	23.0
4	23.2	21.7	23.3	2x4	22.7
5	22.5	20.6	22.1	2x4	21.7
6	20.2	21.3	21.3	2x4	20.9
7					
8					
9					
10					

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 22.4

Time (clock): 09:00 Room Temperature (F): 74 Initials: K

Technician signature: K. J. Morgan Date: 5-29-02

OMNI-Test Laboratories, Inc.
Beaverton, OR (503) 643-3788

Supplemental Data EPA 5G/5H

Client / Model: Harman Oak Wood Project No.: 135 - 5 - 11 - 2

Tracking No.: 379 Date: 5-29-02 Run No.: 3 Booth:

Test Crew: K. Morgan Start Time: 11:46 Stop Time: 14:46

OMNI Equipment #'s:

Gas Analyzer Train Leak Check:

Stack: Initial: N/A Final: N/A

Dilution Tunnel (Method 5G Only): Initial: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

Time	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
O_2			N/A				
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: < 50 Final: < 50

Scale Audit (lbs.): Pretest: 10.0 Post Test: 10.0

Induced Draft: Ø %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: Ø @ 3.5" w.c. Post: Ø @ 3.25" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 5-22-02 Initials: K

	Initial	Middle	Ending
Pb (in. Hg)	30.12	30.13	30.12
Room Temp (°F)	81	82	81

Technician signature: K. Morgan Date: 5-29-02

2-23 of 2-37

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Run 4

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman Stove Company
Model: Oakwood
Project No.: 379
Tracking No.: 135-S-11-3
Run: 4
Test Date: 05/29/02

Burn Rate	1.82 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00016 grams/dscf 1.43 grams/hour 2.45 grams/hour
Average Tunnel Temperature	114 degrees Fahrenheit
Average Delta p	0.041 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	101.26 cubic feet 80 degrees Fahrenheit 14.03 feet/second 8798.68 dscf/hour 98.98 dscf
Total Particulates - mn Average Delta H Total Time of Test	16.1 mg 0.76 inches H20 200 minutes

2-25 of 2-37

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 4

Signature/Date: L. L. Morgan 7-31-02

Manufacturer:	Harman Stove Company
Model:	Oakwood
Tracking No.:	379
Project No.:	135-S-11-3
Test Date:	29-May-02
Beginning Clock Time:	16:50
Recording Interval:	10 min.
Total Sampling Time:	200 min.

OMNI Equipment Numbers: _____

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.034	0.038	0.052	0.054	0.054	0.044	0.036	0.014	"H2O
Initial Temp.	123	123	123	123	123	123	128	128	oF

PM Control Module:	141		
Dilution Tunnel MW(dry):	29.00	lb/lb-mole	
Dilution Tunnel MW(wet):	28.56	lb/lb-mole	
Dilution Tunnel H2O:	4.00	percent	
Dilution Tunnel Static:	-0.360	"H2O	
Pitot Tube Cp:	0.99		
Meter Box Y Factor:	0.992		
Barometric Pressure:	Begin	Middle	End
	30.10	30.1	30.1

Average 30.10 "Hg

Tunnel Velocity:	14.03	ft/sec.
Intial Tunnel Flow:	142.0	scfm
Average Tunnel Flow:	146.4	scfm
Tunnel Area:	0.196	ft2
Post-Test Leak Check:	.002 @ 20	cfm@"Hg
Fuel Moisture (dry basis	23.4	%
Total Particulate:	16.3	mg
Filter Holder No.:	1	

720 feet elevation at Harman

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O
0	1000.000		0.60	73	0	127	0.040		16.5		573	257	434	345	358		393.4	462	86	34	84	-0.050
10	1004.310	0.48	0.30	77	9	124	0.040	98	15.0	-1.5	447	253	437	328	338		360.6	505	91	62	85	-0.050
20	1009.750	0.49	0.30	78	9	122	0.041	100	13.7	-1.3	412	252	438	314	345		350.2	502	87	64	83	-0.050
30	1014.750	0.50	0.30	78	10	122	0.042	100	12.3	-1.4	422	253	441	308	307		346.2	519	85	64	84	-0.050
40	1019.340	0.51	0.30	79	10	124	0.042	101	10.7	-1.6	460	256	468	305	307		359.2	549	86	66	84	-0.050
50	1024.350	0.50	0.30	80	10	123	0.042	99	9.4	-1.3	485	255	476	307	309		366.4	521	87	67	84	-0.050
60	1029.900	0.51	0.30	80	10	119	0.042	100	8.3	-1.1	488	258	438	313	312		361.8	491	87	67	83	-0.040
70	1034.960	0.51	0.30	80	10	120	0.042	100	7.2	-1.1	486	258	423	319	315		360.2	494	87	68	83	-0.040
80	1040.020	0.51	0.30	80	10	119	0.042	100	6.1	-1.1	486	260	415	318	338		363.4	491	87	69	83	-0.040
90	1045.070	0.50	0.30	80	10	124	0.044	98	4.7	-1.4	655	256	453	326	362		410.4	554	88	70	84	-0.050
100	1050.140	0.51	0.30	81	10	117	0.042	100	3.9	-0.8	619	242	385	340	373		391.8	436	87	71	84	-0.040
110	1055.220	0.51	0.30	81	10	115	0.042	100	3.2	-0.7	586	233	349	338	371		375.4	415	85	67	84	-0.040
120	1060.300	0.51	0.30	81	10	110	0.040	102	2.7	-0.5	555	235	308	330	367		359.0	378	84	66	84	-0.030
130	1065.390	0.51	0.30	81	10	108	0.040	102	2.3	-0.4	526	242	291	321	360		348.0	375	83	65	82	-0.030
140	1070.470	0.51	0.30	81	10	106	0.040	101	1.9	-0.4	519	250	279	313	356		343.4	362	82	63	81	-0.030
150	1075.560	0.51	0.30	81	10	105	0.040	101	1.4	-0.5	508	255	272	306	353		338.8	364	81	62	81	-0.030
160	1080.640	0.51	0.30	81	10	104	0.040	101	1.0	-0.4	518	257	273	301	351		340.0	361	80	61	80	-0.030
170	1085.700	0.51	0.30	81	10	103	0.040	101	0.7	-0.3	503	257	263	298	347		333.6	343	80	61	80	-0.030
180	1090.760	0.51	0.30	81	10	102	0.040	101	0.4	-0.3	511	261	257	295	346		334.0	346	79	61	80	-0.030
190	1095.810	0.50	0.30	81	10	102	0.040	100	0.2	-0.2	504	265	257	294	338		331.6	344	79	60	80	-0.030
200	1101.256	0.54	0.30	81	10	102	0.040	108	0.0	-0.2	506	263	253	292	333		329.4	334	80	60	80	-0.030
Avg/Total	101.256	0.51	0.76	80.05		114.17	0.041	100.65									64		84.33	65.62		-0.039

2-27682-37

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Harman Stove Company, Inc.
Model: Oakwood
Project No.: 135-S-11-3
Tracking No.: 379

Equipment Numbers:

Run #: 4
Date: 05-29-02

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	007	582.2	572.9		9.3
B. Rear filter catch	Filter	008	579.1	578.7		0.4
C. Rinse of probe and filter assembly	Acetone	80	65202.8	65195.4	0.0	6.4

Total Particulate, mg :	16.1

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: K. J. Morgan Date: 7-31-02

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-Tes- orat- Inc.
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Oak Wood Project #: 135-B-11-2 Tracking #: 379

Date: 5-29-02 Test Crew: K. Morgan Run #: 4

OMNI Equipment ID #:

* Stir @ 45 min Added 0.3 lb fuel
stir @ 31 min

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 3.3 - 4.1 lb Actual: Coal Bed:

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	11.7		-.05	82	370	270	370	286	288	603	
10	10.2	1.5	-.05	82	374	297	438	284	295	538	
20	8.5	1.7	-.06	82	395	296	490	286	301	567	
30	7.1	1.4	-.05	83	439	295	492	295	314	533	
40	5.6	1.5	-.05	84	525	296	506	309	330	560	
50	4.7 *	1.2	-.05	84	565	293	507	322	342	570	
60	3.8	0.9	-.05	85	595	269	491	340	356	513	
65 70	3.6	0.7	-.05	84	573	257	434	345	355	462	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. Morgan Date: 5-29-02

2-2842-37

OMNI-Test Laboratories, Inc
Beaverton, OR Phone (503) 643-3788

FUEL DATA

Client / Model: HARMAN OAKWOOD Tracking #: 379 Project #: 135-5-11-2

Date: 5-29-02 Test Crew: K. Morgan Run #: 4

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: K. Morgan

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER. DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading _____
Cal Value (2) = 22% Actual Reading _____

Piece	Length		Readings			Type
1	8 ft	19.0	21.3	19.5		2x4
2	9 ft	20.2	21.0	19.6		2x4
3	____ ft	____	____	____		____

Length of cut pieces: 2@16" 11@8.5" inches Pre-Burn Fuel Average Moisture: 20.1

Time (clock): 3:30 pm Room Temperature (F): 82 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 2

CALCULATED LOAD WEIGHT: 15.4 ACTUAL LOAD WEIGHT: 8.5 (2 × 4)
8.0 (4 × 4)
16.5 Total

FUEL PIECE LENGTH: 16.25"

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE	
1	24.1	23.2	23.1	2x4	23.5
2	23.1	22.8	23.2	2x4	23.0
3	23.1	24.7	24.5	4x4	24.1
4	24.1	24.6	24.5	4x4	24.4
5	23.1	21.9	23.5	2x4	22.8
6	21.6	22.5	23.5	2x4	22.5
7	____	____	____	____	
8	____	____	____	____	
9	____	____	____	____	
10	____	____	____	____	

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 23.4

Time (clock): 3:34 pm Room Temperature (F): 82 Initials: K

Technician signature: K. Morgan Date: 5-29-02

OMNI-Test Laboratories,
Beaverton, OR (503) 643-3788

Supplemental Data EPA 5G/5H

Client / Model: HARMAN OAKWOOD Project No.: 135-5-11-2

Tracking No.: 379 Date: 5-29-02 Run No.: 4 Booth: _____

Test Crew: K. MORGAN Start Time: 16:50 Stop Time: 20:10

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Initial: N/A

Final: N/A

Dilution Tunnel (Method 5G Only):

Initial: N/A

Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2			N/A				
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs.): Pretest: 10.0 Post Test: 10.0

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.5 "w.c. Post: Ø @ 3.5 "w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 5-21-02 Initials: JC

	Initial	Middle	Ending
Pb (in. Hg)	30.1	30.1	30.1
Room Temp (°F)	84	84	80

Technician signature: JC K. Morgan Date: 5/29/02

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Run 5

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman Stove Company
Model: Oakwood
Project No.: 379
Tracking No.: 135-S-11-3
Run: 5
Test Date: 05/30/02

Burn Rate	2.53 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00008 grams/dscf 0.73 grams/hour 1.40 grams/hour
Average Tunnel Temperature	138 degrees Fahrenheit
Average Delta p	0.044 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	71.53 cubic feet 79 degrees Fahrenheit 14.90 feet/second 8948.75 dscf/hour 69.86 dscf
Total Particulates - mn Average Delta H Total Time of Test	5.7 mg 0.79 inches H20 140 minutes

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 5

Manufacturer: Harman Stove Company
Model: Oakwood
Tracking No.: 379
Project No.: 135-S-11-3
Test Date: 30-May-02
Beginning Clock Time: 13:48
Recording Interval: 10 min.
Total Sampling Time: 140 min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.036	0.036	0.047	0.054	0.052	0.044	0.035	0.015	"H2O
Initial Temp.	140	140	140	140	140	140	140	140	oF

OMNI Equipment Numbers:

PM Control Module: 141
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4.00 percent
Dilution Tunnel Static: -0.330 "H2O
Pitot Tube Cp: 0.99
Meter Box Y Factor: 0.992

Barometric Pressure:	Begin	Middle	End	Average
	30.02	30.02	30.03	30.02 "Hg

Signature/Date: K.J. Morgan

Tunnel Velocity: 14.90 ft/sec.
Intial Tunnel Flow: 139.3 scfm
Average Tunnel Flow: 148.9 scfm
Tunnel Area: 0.196 ft2
Post-Test Leak Check: .001 @ 8 cfm@"Hg
Fuel Moisture (dry basis: 23.1 %
Total Particulate: 5.7 mg
Filter Holder No.: 1
720 feet elevation at Harmar

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O
0	1000.000		0.00	81	0	140	0.040		16.0		646	248	404	395	398		418.2	529	85	85	84	-0.050
10	1005.060	0.51	0.35	78	3	144	0.044	101	13.8	-2.2	516	258	445	371	368		391.6	630	93	62	84	-0.060
20	1010.200	0.51	0.35	78	3	146	0.044	103	11.3	-2.5	594	259	476	357	356		408.4	660	97	65	80	-0.060
30	1015.200	0.50	0.35	77	3	151	0.042	103	8.9	-2.4	713	266	496	359	360		438.8	701	97	67	83	-0.060
40	1020.250	0.50	0.35	78	3	150	0.042	104	6.9	-2	724	275	505	371	373		449.6	660	96	69	86	-0.060
50	1025.270	0.50	0.35	78	3	147	0.044	100	5.3	-1.6	770	282	469	384	384		457.8	631	93	71	87	-0.050
60	1030.270	0.50	0.35	79	3	143	0.044	100	4.1	-1.2	769	286	444	389	391		455.8	577	90	72	86	-0.050
70	1035.280	0.50	0.35	79	3	138	0.045	98	3.4	-0.7	731	288	390	393	394		439.2	535	86	72	85	-0.040
80	1040.340	0.51	0.35	79	3	134	0.045	99	2.6	-0.8	683	290	366	391	395		425.0	531	84	72	85	-0.040
90	1045.420	0.51	0.35	80	3	133	0.046	98	1.8	-0.8	681	300	364	397	396		427.6	530	82	72	85	-0.040
100	1050.390	0.50	0.35	80	3	131	0.046	96	1.4	-0.4	679	319	351	400	398		429.4	510	81	71	85	-0.040
110	1055.450	0.51	0.35	80	3	130	0.046	97	1.0	-0.4	672	344	334	399	402		430.2	488	84	69	85	-0.040
120	1060.430	0.50	0.35	80	3	128	0.046	96	0.6	-0.4	655	368	323	395	402		428.6	479	88	68	86	-0.040
130	1065.440	0.50	0.35	80	3	127	0.046	96	0.2	-0.4	644	395	314	388	400		428.2	472	91	67	86	-0.040
140	1071.528	0.61	0.35	80	3	126	0.046	117	0.0	-0.2	625	412	307	381	394		423.8	455	93	67	85	-0.040
Avg/Total	71.528	0.51	0.79	79.13		137.87	0.044	100.44									6		89.33	69.93		-0.047

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Harman Stove Company, Inc.
Model: Oakwood
Project No.: 135-S-11-3
Tracking No.: 379

Equipment Numbers:

Run #: 5
Date: 05/30/02

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	009	576.8	574.9		1.9
B. Rear filter catch	Filter	010	568.7	569.5		-0.8
C. Rinse of probe and filter assembly	Acetone	80	66581.5	66575.9	0.0	4.6

Total Particulate, mg :	5.7

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: K. J. Morgan Date: 6-30-02

[illegible]-Technical, Inc.
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Oakwood Project #: 135-5-11-2 Tracking #: 379

Date: 5-30-02 Test Crew: K. Morgan Run #: 5

OMNI Equipment ID #:

stir at 63 min, stir at 53 min, stir at 28 min, stir at 21 min

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 3.2 - 4.0 Actual: Coal Bed: 3.7

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	19.0		-0.06	80	574	116	218	257	132	571	N/A
10	17.0	2.0	-0.06	80	440	172	249	279	215	271	N/A
20	15.3	1.7	-0.06	80	396	237	294	272	239	541	N/A
30	13.2	2.1	-0.06	81	454	256	356	273	268	636	N/A
40	10.9	2.3	-0.07	82	494	259	449	287	297	662	N/A
50	8.8	2.1	-0.07	83	556	257	502	301	341	688	N/A
60	6.1	2.7	-0.07	84	687	259	498	331	381	721	N/A
70											
80	3.9		-0.05	86	660	246	431	393	403	552	N/A
85 90	3.7	0.2	-0.05	84	646	248	404	395	398	529	N/A
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. J. Morgan Date: 5-30-02

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OMNI-Test Laboratories, Inc.
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FUEL DATA

Client / Model: HARMAN OAK WOOD Tracking #: 379 Project #: 135-5-11-2

Date: 5-30-02 Test Crew: K. MORGAN Run #: ~~379~~ 1K 5

OMNI Equipment ID #:

FUEL LOAD PREPARED BY: K. MORGAN

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER - - DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0

Cal Value (2) = 22% Actual Reading 22.0

Piece	Length	1K 23.5	Readings	21.8 K	Type
1	8 ft	~~19.7~~	22.6	~~19.0~~	2x4
2	8 ft	19.0	22.0	21.4	2x4
3	ft				

140 ~~16~~ 1K

Length of cut pieces: 20 16 inches Pre-Burn Fuel Average Moisture: 21.7

Time (clock): 10:30 Room Temperature (F): 75 Initials: 1K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 2

CALCULATED LOAD WEIGHT: 15.4 ACTUAL LOAD WEIGHT: 8.7 (2 × 4)

7.3 (4 × 4)

FUEL PIECE LENGTH: 16.125" 16.0 Total

MOISTURE CONTENT (METER - - DRY BASIS)

PIECE	READINGS			TYPE	
1	24.8	24.9	22.1	2x4	23.9
2	22.0	22.8	22.2	2x4	22.3
3	21.8	21.9	23.3	2x4	22.3
4	21.0	23.0	22.1	2x4	22.0
5	23.8	24.9	23.9	4x4	24.2
6	23.3	24.3	24.2	4x4	23.9
7					
8					
9					
10					

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 23.1

Time (clock): 10:15 Room Temperature (F): 75 Initials: 1K

Technician signature: K. J. Morgan Date: 5-30-02

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Supplemental Data EPA 5G/5H

Client / Model: HARMAN OAKWOOD Project No.: 135 - 5 - 11 - 2

Tracking No.: 379 Date: 5-30-02 Run No.: 5 Booth: _____

Test Crew: K. Morgan Start Time: 13:48 Stop Time: 16:08

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Initial: N/A

Final: N/A

Dilution Tunnel (Method 5G Only):

Initial: N/A

Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

Time	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
O_2			N/A				
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs.): Pretest: 10.0 Post Test: 10.0

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.1 "w.c. Post: Ø @ 3.25 "w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 5-21-02 Initials: JK

	Initial	Middle	Ending
Pb (in. Hg)	30.02	30.02	30.02
Room Temp (°F)	84	86	85

Technician signature: K. J. Morgan Date: 5-30-02

Section 3

Drawings and Fuel Photographs

Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Harman Stove Company
Model: Oakwood

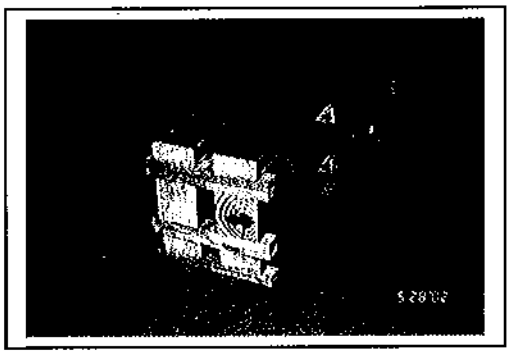
Run 1 - Fuel

File corrupted. Photo not available.

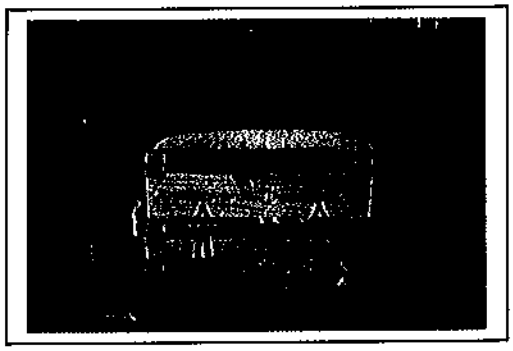
Run 1 - Newly Loaded Stove

File corrupted. Photo not available.

Run 2 - Fuel



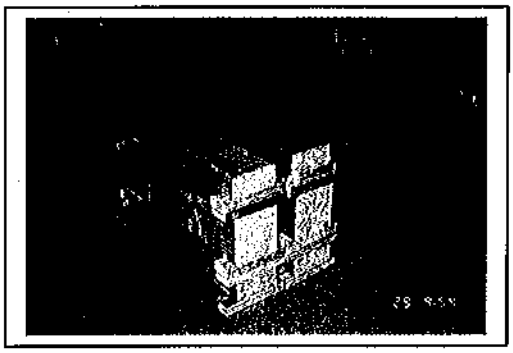
Run 2 – Newly Loaded Stove



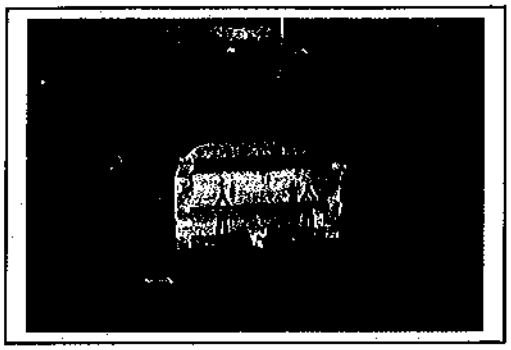
Model: Oakwood
Harman Stove Company
352 Mountain House Road
Halifax, PA 17032

Harman Stove Company
Model: Oakwood

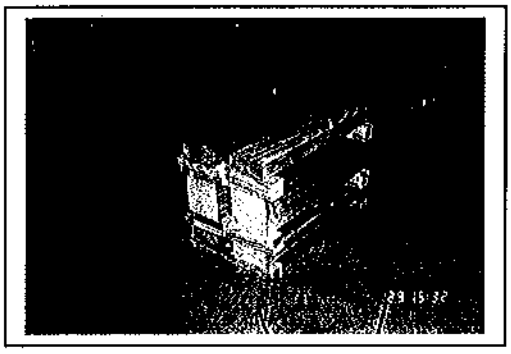
Run 3 - Fuel



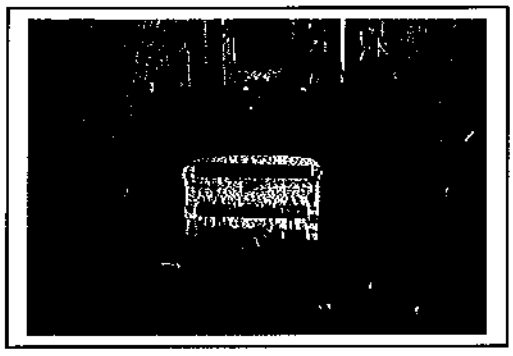
Run 3 – Newly Loaded Stove



Run 4 - Fuel

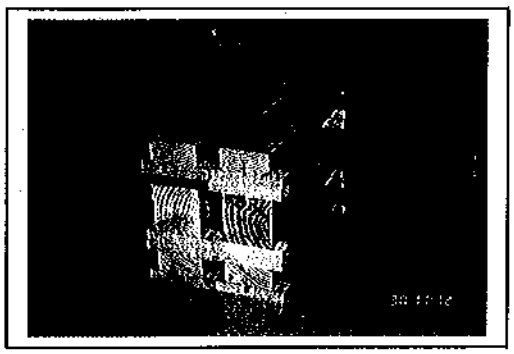


Run 4 – Newly Loaded Stove



Harman Stove Company
Model: Oakwood

Run 5 - Fuel



Run 5 – Newly Loaded Stove