

Model: 7100 FP
Hearth and Home Technologies
1445 North Highway
Colville, WA 99114

Certification Test Report

Hearth and Home Technologies (Aladdin
Hearth Products)

Built-In Room Heater
Model: 7100 FP

Prepared for: Hearth and Home Technologies
1445 North Highway
Colville, WA 99114

Prepared by: OMNI-Test Laboratories, Inc.
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Test Period: January 28, 2003 – February 7, 2003

Report Date: February 2003

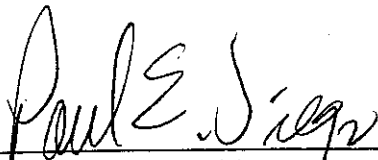
Project Number: 061-S-41-3

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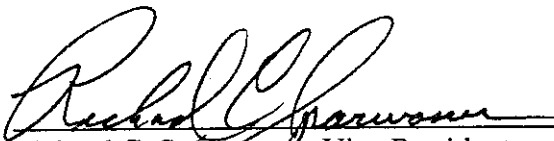
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AUTHORIZED SIGNATORIES

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



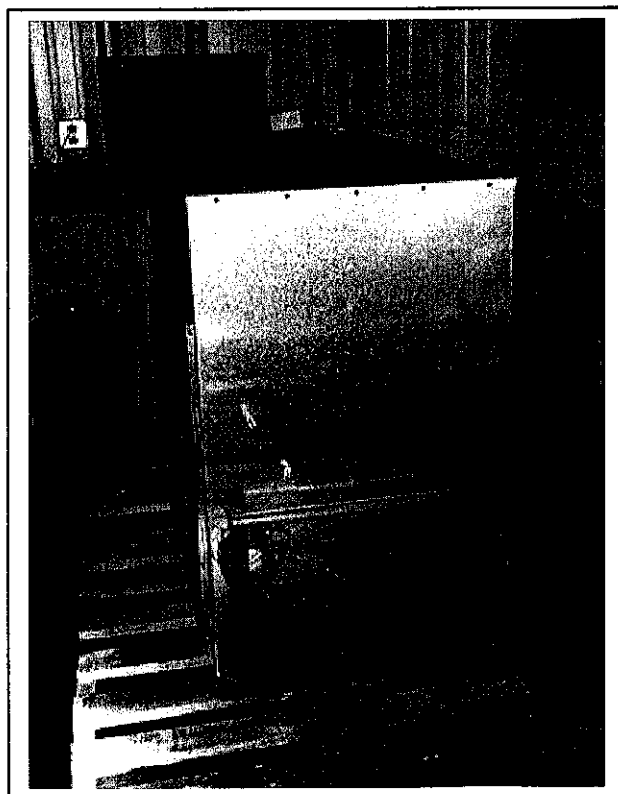
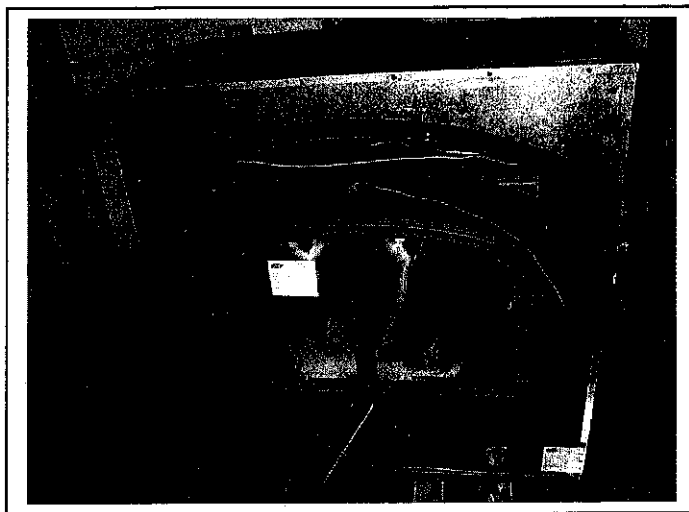
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Model: 7100 FP
Test Dates: January 28, 2003 – February 7, 2003



INTRODUCTION

Hearth and Home Technologies retained OMNI-Test Laboratories, Inc. (O-TL) to perform U.S. Environmental Protection Agency (EPA) certification testing on the model 7100 FP fireplace wood stove. The 7100 FP fireplace wood stove is a non-catalytic, built-in, room heater. The firebox is constructed of mild steel. The usable firebox volume was measured to be 3.395 cubic feet. The stove is vented through an 8" diameter flue collar located at the top of the unit.

The testing was performed on-site at Hearth and Home Technologies in Colville, Washington. The altitude of the facility is 1650 feet above sea level. The tested unit was in good condition and assigned tracking number OMNI ID #425 on February 7, 2003. O-TL representative, Bruce Davis, conducted the certification testing and completed all testing by February 7, 2003. The EPA was notified of the testing dates in a letter dated February 5, 2003. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Dan Henry of Hearth and Home Technologies and is on file at O-TL.

The 7100 FP 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 5H). Particulate emissions were measured using a Method 5H sampling train consisting of a heated front filter, an iced impinger train, and a rear filter. The weighted average emissions of the five test runs indicate a particulate emission level of 3.13 grams per hour. Run 1 was deficient, therefore omitted from the weighted average. 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 7100 FP 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 fireplace 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 5H Emissions (g/hr)
2	1.14	1.34
3	1.00	1.54
4	4.88	16.42
5	1.97	2.83
6	1.26	3.22
Weighted particulate emission average of five test runs: 3.13 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
2	68	70	28.66	28.63	<50	<50
3	69	68	28.60	28.58	<50	<50
4	71	75	28.39	28.38	<50	<50
5	68	72	28.52	28.54	<50	<50
6	73	67	28.88	28.89	<50	<50

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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)
2	6.2	19.7	4.9
3	5.9	23.1	5.2
4	24.3	21.8	5.7
5	7.4	22.2	5.3
6	7.6	21.1	5.4

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
2	21.6	3.395	6.36	20.2	19.0	0	5
3	21.6	3.395	6.36	20.0	19.0	0	5
4	22.9	3.395	6.75	21.7	19.0	0	5
5	21.8	3.395	6.42	20.5	19.0	0	5
6	22.7	3.395	6.69	22.4	19.0	0	5

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)
2	430	13.9	140.6	104
3	490	13.6	139.4	98
4	105	14.8	125.4	208
5	250	13.9	133.5	132
6	400	14.1	142.1	112

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temp Average ^a	Ending Surface Temp Average ^a	Surface Delta T ^b
2	242	162	80
3	226	138	88
4	418	414	4
5	322	226	96
6	290	226	64

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)
2	Open 0.1875; timer air closed	6.2 lbs. at start; no addition; coal bed 4.9 lbs.	N/A	80
3	Open 0.125; timer air closed	5.9 lbs. at start; no addition; coal bed 5.2 lbs.	N/A	90
4	Fully open; timer air open	24.3 lbs. at start; no addition; coal bed 5.7 lbs.	N/A	80
5	Open 0.5; timer air closed	7.4 lbs. at start; no addition; coal bed 5.3 lbs.	N/A	60
6	Open 0.4375; timer air closed	7.6 lbs. at start; no addition; coal bed 5.4 lbs.	0.6 lb.	76

Table 1.7 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (in H ₂ O)	Primary Air Setting (in)	Run Time (min)	Average Draft (in H ₂ O)
2	1.14	0	Open 0.1875; timer air open 2 hours	430	-0.03
3	1.00	0	Open 0.125; timer air open 2 hours	490	-0.03
4	4.88	0	Fully open; timer air open 2 hours	105	-0.07
5	1.97	0	Open 0.5; timer air open 2 hours	250	-0.04
6	1.26	0	Open 0.4375; timer air open 2 hours	400	-0.03

Table 1.8 – Test Configuration

Run	Five-Minute Startup	Combustion Air
2	<u>Bypass:</u> N/A. <u>Fuel Loading:</u> Loaded by 53 seconds. <u>Door:</u> Closed by 60 seconds. <u>Primary Air:</u> Fully open until 4 minutes 55 seconds, then set to test setting by 5 minutes. <u>Other:</u> At 371 minutes, fuel load adjustment due to zero weight loss. <u>Secondary:</u> Fixed. <u>Tertiary:</u> N/A. <u>Fan:</u> Off for first 30 minutes, then turned to high.	Open 0.1875 inches
3	<u>Bypass:</u> N/A. <u>Fuel Loading:</u> Loaded by 52 seconds. <u>Door:</u> Closed by 60 seconds. <u>Primary Air:</u> Fully open until 4 minutes 55 seconds, then set to test setting by 5 minutes. <u>Other:</u> At 451 minutes, repositioned fuel load due to zero weight loss. <u>Secondary:</u> Fixed. <u>Tertiary:</u> N/A. <u>Fan:</u> Off for first 30 minutes, then turned to high.	Open 0.125 inches
4	<u>Bypass:</u> N/A. <u>Fuel Loading:</u> Loaded by 49 seconds. <u>Door:</u> Closed by 55 seconds. <u>Primary Air:</u> Fully open. <u>Other:</u> At 36 minutes, changed rear filter. Leak check result 0.011 at 16 inches. <u>Secondary:</u> Fixed. <u>Tertiary:</u> N/A. <u>Fan:</u> On high.	Fully open

Table 1.8 Continued

5	<u>Bypass:</u> N/A. <u>Fuel Loading:</u> Loaded by 44 seconds. <u>Door:</u> Closed by 58 seconds. <u>Primary Air:</u> Fully open until 4 minutes 55 seconds, then set to test setting by 5 minutes. <u>Other:</u> At 51 minutes, changed rear filter. Leak check result 0.01 at 17 inches. At 101 minutes, changed rear filter. Leak check result 0.008 at 10 inches. <u>Secondary:</u> Fixed. <u>Tertiary:</u> N/A. <u>Fan:</u> Off for first 30 minutes, then turned to high.	Open 0.5 inches
6	<u>Bypass:</u> N/A. <u>Fuel Loading:</u> Loaded by 54 seconds. <u>Door:</u> Closed by 60 seconds. <u>Primary Air:</u> Fully open until 4 minutes 45 seconds, then set to test setting by 5 minutes. <u>Other:</u> At 241 minutes, repositioned fuel load due to zero weight loss. <u>Secondary:</u> Fixed. <u>Tertiary:</u> N/A. <u>Fan:</u> Off for first 30 minutes, then turned to high.	Open 0.4375 inches

TEST RESULTS AND DISCUSSION

A total of six 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; one above 1.90 kg/hr dry category; and one at maximum. Run 1 was omitted from the weighted average as deficient, as the fire expired before all fuel was consumed. Run 5 achieved a 1.97 kg/hr burn rate while attempting a category 3 burn rate. A second attempt (Run 6) did achieve a category 3 burn rate. During Runs 2, 3, and 6, the fuel door was opened and the fuel load was repositioned after the technician noted no fuel weight loss within a ten minute time period. For all runs, the stove door was open no longer than 15 seconds and only after more than 60 percent of the fuel was burned. During Runs 4 and 5, the rear filters in the 5H sampling train had to be replaced due to high vacuum. Leak checks are noted on the run notes in Section 2.

The weighted particulate emission level was measured to be 3.13 grams per hour.

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

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APPLIANCE DESCRIPTION

Appliance Manufacturer: Hearth and Home Technologies

Wood Stove Model: 7100 FP

Type: Built-In Room Heater

WOOD HEATER DESCRIPTION:

Materials of Construction: The entire unit is constructed of mild steel.

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 openings in the firebox sides and is channeled internally supplying three 0.875" diameter tubes.

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 ceramic fiber baffle is mounted in the upper portion of the firebox. The flame path is forced to the front of the firebox where it travels up through the opening between the baffle and primary air manifold.

Other Features: An automatic combustion air control is located below the fuel loading door. This air is activated when the manual combustion air slide is fully open, which causes a second combustion air orifice to open. Activation of this second air source sets a mechanical timer that holds the air control open until two hours have elapsed. The manual air control can be set to any position during the two hour time period, but acts independently of the timed air source.

Flue Outlet: The 8" diameter flue outlet is located in the top of the unit.

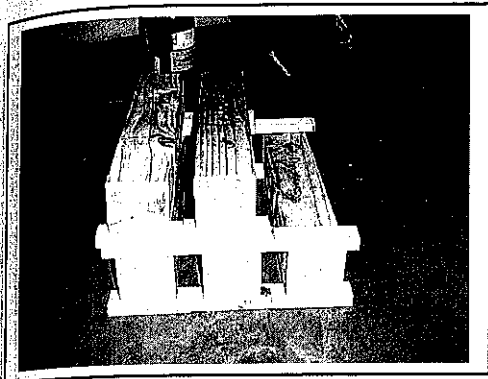
WOOD HEATER OPERATING INSTRUCTIONS

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

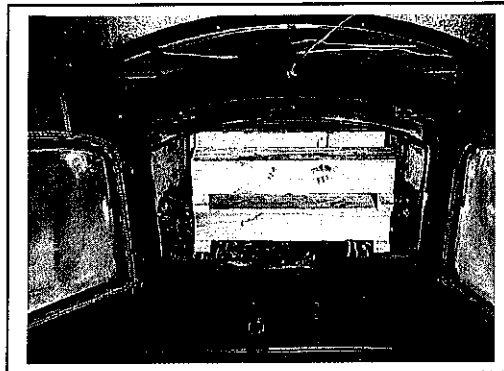
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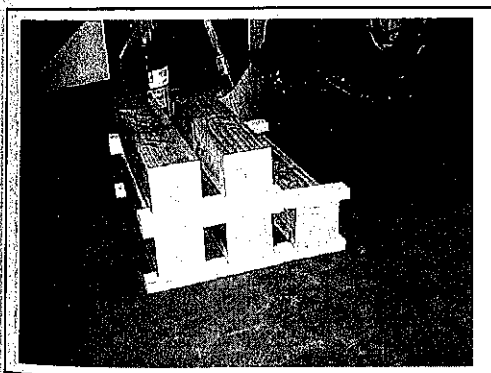
Run 1 - Fuel



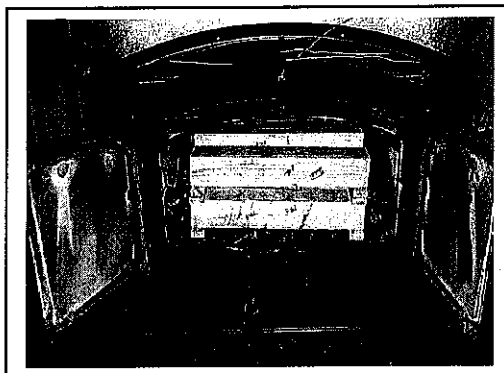
Run 1 - Newly Loaded Stove



Run 2 - Fuel



Run 2 - Newly Loaded Stove



OMNI-Test Laboratories, Inc.

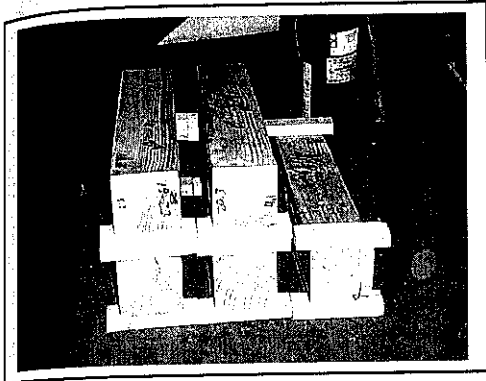
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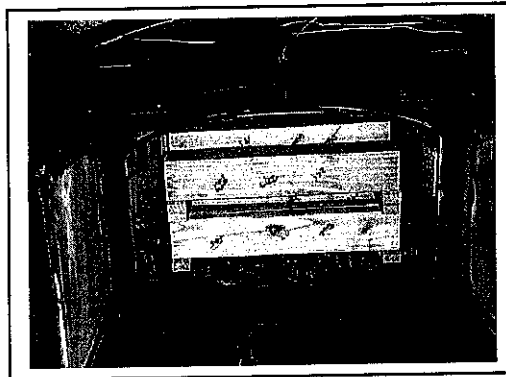
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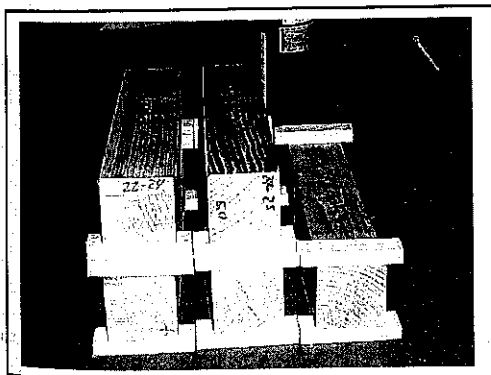
Run 3 - Fuel



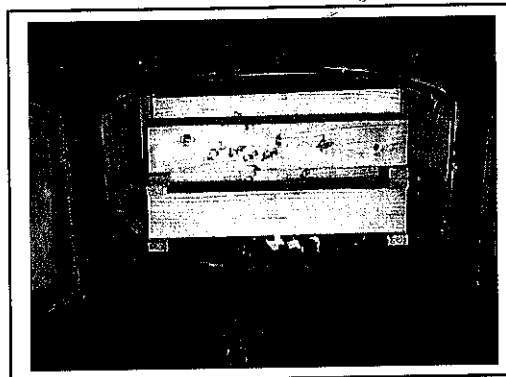
Run 3 - Newly Loaded Stove



Run 4 - Fuel



Run 4 - Newly Loaded Stove



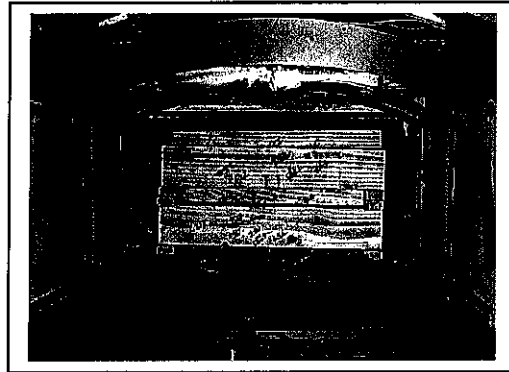
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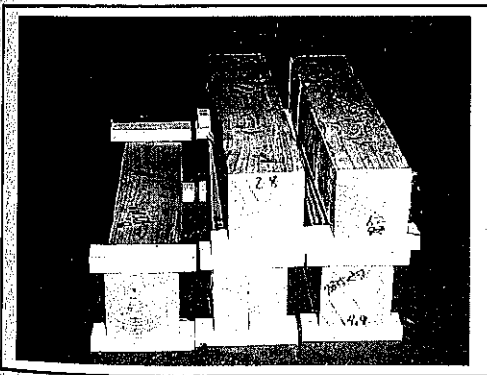
Run 5 - Fuel

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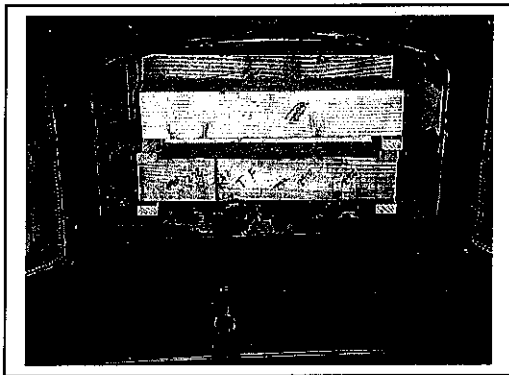
Run 5 - Newly Loaded Stove



Run 6 - Fuel



Run 6 - Newly Loaded Stove



Wood Heater Test Data EPA Method 5H

Run Number **2**

Manufacturer: Search and Home Tech

Stove Model, Tracking Number: 7100 FP

Stove Type (cat, nat, or pellet): nat

Project Number: 061-541-3

Test Date: 29-Jan-03

Test Start Time: 11:10

Recording Interval (minutes): 10

Total Sampling Time (minutes): 430

Sample Rate Control Module Number: 21

Test Meter Yr: 2992

Office SH: 1587

Pilot Tube Cpt: 239

Average Barometric Pressure: 29.55

Average Fuel Moisture (dry basis %): 20.23

OMNI Equipment Numbers: Oxygen values are calculated by 20.9-(Carbon dioxide-Carbon monoxide/2)

Dilution Tunnel Velocity Traverse Data									Dilution Tunnel Flow
	Pl.1	Pl.2	Pl.3	Pl.4	Pl.5	Pl.6	Pl.7	Pl.8	
Initial dP	0.040	0.044	0.046	0.028	0.040	0.046	0.044	0.026	141.7
Initial Temp	93	93	93	93	93	93	93	93	scf/minute

Signature/Date: *BD* 2-28-03

Post-Test Leak Check: 006 @ 2 cm Hg

Initial/Assumed Values			
Dilution	MW (lb/lb-mol)	28.56	Ambient CO2 (%)
Tunnel	H2O (%)	4.00	0.034
			Preferred Initial Sampling Rate (scf/minute)
			0.26

Flue Gas	
Impinger Liquid, Vc (g)	178.7
Volume of Water Vapor, Vw (g)	8.43
Moisture Content, Bws	0.075

Elapsed Time	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)							Dilution Tunnel				Laboratory
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Onflow dP (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg.)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Ambient Temperature (F)	
0	49.200		0.18		76	0	83	234	21.6		-0.020	17.5	3.0	0.88	159	23.3	136	207	311	225	331	242	93	0.039	-0.40	0.275	68	
10	51.920	0.272	0.37	100.0	78	2	65	241	21.1	-0.5	-0.030	17.5	3.2	0.41	200	24.7	141	271	270	254	291	245	100	0.039	-0.40	0.410	68	
20	55.680	0.376	0.80	97.3	82	2	60	241	19.6	-1.5	-0.062	10.6	10.2	0.22	401	10.4	267	280	257	256	277	267	135	0.039	-0.40	1.865	69	
30	61.090	0.541	0.70	96.3	88	2	60	240	17.1	-2.5	-0.067	9.5	11.3	0.20	463	9.5	397	281	259	271	281	298	158	0.039	-0.40	1.975	70	
40	66.080	0.499	0.72	95.1	90	2	62	239	14.8	-2.3	-0.067	8.1	12.7	0.20	493	8.6	395	204	290	242	320	290	165	0.039	-0.40	2.265	71	
50	71.260	0.518	0.73	97.4	92	2	64	238	12.5	-2.3	-0.065	9.2	11.5	0.40	464	9.2	373	191	319	252	353	298	163	0.039	-0.40	2.075	73	
60	76.470	0.521	0.69	97.0	94	2	64	240	10.3	-2.2	-0.062	9.6	11.1	0.48	425	9.4	362	190	353	277	381	313	157	0.039	-0.40	1.935	73	
70	81.580	0.511	0.58	98.1	95	2	65	238	8.5	-1.8	-0.060	9.8	10.9	0.36	417	9.7	365	192	379	299	400	327	153	0.039	-0.40	1.740	74	
80	86.200	0.462	0.58	96.9	94	2	66	237	7.1	-1.4	-0.055	11.6	9.3	0.08	392	11.4	348	193	400	316	413	334	146	0.039	-0.40	1.485	74	
90	91.070	0.487	0.51	101.8	94	2	67	238	5.7	-1.4	-0.056	10.7	10.1	0.16	388	10.5	344	196	413	327	424	341	144	0.039	-0.40	1.500	71	
100	95.350	0.428	0.40	96.4	94	2	67	241	4.8	-0.9	-0.054	11.7	8.9	0.54	380	11.3	321	198	418	337	435	342	139	0.039	-0.40	1.185	73	
110	99.330	0.398	0.37	100.1	94	2	65	238	4.0	-0.8	-0.050	12.8	7.6	1.04	344	12.2	273	200	420	355	446	339	132	0.039	-0.40	0.965	72	
120	103.200	0.387	0.32	101.9	94	2	65	234	3.5	-0.5	-0.044	14.0	6.3	1.22	306	13.7	237	205	415	361	454	334	123	0.039	-0.40	0.745	74	
130	106.850	0.365	0.22	103.1	94	2	64	236	3.2	-0.3	-0.034	15.3	4.9	1.44	250	15.8	211	208	407	354	449	326	113	0.039	-0.40	0.485	72	
140	109.950	0.310	0.14	105.8	92	2	63	240	3.1	-0.1	-0.025	16.0	4.1	1.65	202	17.1	189	207	393	337	429	311	104	0.039	-0.40	0.330	72	
150	112.480	0.253	0.12	108.8	91	2	63	230	3.0	-0.1	-0.024	16.5	3.5	1.86	186	18.1	171	200	368	311	398	290	101	0.039	-0.40	0.270	71	
160	114.760	0.228	0.11	104.4	90	2	63	236	2.9	-0.1	-0.023	16.4	3.5	2.00	176	17.7	161	193	349	293	376	274	98	0.039	-0.40	0.260	71	
170	116.970	0.221	0.10	105.2	90	2	64	239	2.8	-0.1	-0.022	16.1	3.7	2.14	171	16.8	152	184	325	275	352	258	96	0.039	-0.40	0.260	70	
180	119.110	0.214	0.09	107.1	91	2	64	240	2.6	-0.2	-0.021	16.0	3.8	2.17	169	16.5	149	176	307	262	337	246	96	0.039	-0.40	0.260	70	
190	121.020	0.191	0.09	98.2	90	2	65	237	2.5	-0.1	-0.020	15.6	4.5	1.58	162	16.3	145	171	293	252	327	238	94	0.039	-0.40	0.290	69	
200	122.970	0.195	0.08	104.7	91	2	65	239	2.4	-0.1	-0.017	15.7	4.4	1.67	157	16.4	143	164	277	247	315	229	92	0.039	-0.40	0.285	69	
210	124.740	0.177	0.09	96.5	92	2	66	241	2.3	-0.1	-0.016	15.6	4.5	1.55	156	16.4	142	162	268	244	309	225	91	0.039	-0.40	0.290	70	
220	126.540	0.180	0.08	96.3	92	2	66	238	2.2	-0.1	-0.016	15.6	4.6	1.41	153	16.5	140	161	258	240	304	221	90	0.039	-0.40	0.280	70	
230	128.280	0.174	0.08	99.0	92	2	64	240	2.1	-0.1	-0.016	15.1	5.0	1.51	153	15.5	139	161	249	235	299	217	89	0.039	-0.40	0.300	71	
240	130.070	0.179	0.09	102.3	92	2	64	241	2.0	-0.1	-0.016	15.6	4.5	1.62	155	16.3	138	161	241	227	296	213	89	0.039	-0.40	0.290	71	
250	131.850	0.178	0.09	95.2	92	2	64	237	1.9	-0.1	-0.016	15.8	4.3	1.64	154	16.7	139	163	234	217	296	210	89	0.039	-0.40	0.280	70	
260	133.640	0.179	0.08	95.4	92	2	65	238	1.8	-0.1	-0.016	15.8	4.4	1.46	151	16.9	131	161	226	206	297	204	89	0.039	-0.40	0.280	71	
270	135.420	0.178	0.07	97.2	92	2	65	241	1.7	-0.1	-0.015	15.9	4.2	1.67	149	16.8	134	158	220	198	296	201	88	0.039	-0.40	0.250	70	
280	137.230	0.181	0.07	107.0	92	2	66	242	1.6	-0.1	-0.015	15.9	4.1	1.83	147	16.7	131	155	214	187	293	196	88	0.039	-0.40	0.245	70	
290	138.930	0.170	0.07	100.4	92	2	66	243	1.5	-0.1	-0.015	15.5	4.6	1.51	145	16.3	129	152	207	179	290	191	87	0.039	-0.40	0.270	69	
300	140.580	0.155	0.08	97.8	92	2	65	238	1.4	-0.1	-0.015	15.8	4.3	1.69	145	16.5	128	160	202	174	288	188	86	0.039	-0.40	0.265	71	
310	142.250	0.167	0.08	94.7	92	2	65	237	1.3	-0.1	-0.014	16.1	3.9	1.85	143	17.1	127	148	195	168	284	184	87	0.039	-0.40	0.245	73	
320	144.050	0.180	0.08	101.2	92	2	64	238	1.2	-0.1	-0.014	16.2	3.8	1.83	141	17.4	125	143	188	162	277	179	87	0.039	-0.40	0.245	71	
330	145.690	0.164	0.07	90.1	92	2	64	239	1.1	-0.1	-0.015	15.9	3.9	2.13	139	16.4	122	140	183	158	272	175	86	0.039	-0.40	0.210	71	
340	147.440	0.175	0.08	103.4	92	2	66	242	1.0	-0.1	-0.013	16.7	3.2	1.98	135	18.6	120	138	178	155	267	172	85	0.039	-0.40	0.205	73	
350	149.270	0.183	0.08	101.0	92	2	66	240	0.9	-0.1	-0.013	16.7	3.2	2.04	133	18.4	118	137	173	152	259	168	85	0.039	-0.40	0.185	71	
360	151.150	0.188	0.07	106.6	91	2	66	235	0.8	-0.1	-0.012	17.2	2.9	1.61	129	20.7	116	135	169	151	252	165	85	0.039	-0.40	0.185	71	

2150P2-049

Wood Heater Test Data
EPA Method 5H

Run Number 2

Manufacturer:	Hearth and Home Tech	Sample Rate Control Module Number:	21
Stove Model, Tracking Number:	7100 FP	Test Meter Y:	0.992
Stove Type (cat, nuc, or pellet):	nuc	Orifice d _{avg} :	1.587
Project Number:	061-S-41-3	Pilot Tube Cp:	0.39
Test Date:	29-Jan-03	Average Barometer Pressure:	29.65
Test Start Time:	11:10	Average Fuel Moisture (dry basis %):	20.23
Recording Interval (minutes):	10	Orifice Equipment Numbers:	
Total Sampling Time (minutes):	430		

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Flow
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8		Initial
Initial dP	0.040	0.044	0.046	0.029	0.040	0.046	0.044	0.026	-H ₂ O	141.7
Initial Temp	93	93	93	93	93	93	93	93	oF	scf/minute

Signature/Date: B.D. 2-28-03Post-Test Leak Check: 00608 cfm @ 14" Hg

Initial/Assumed Values			
Dilution	MW (lb/lb-mol)	28.56	Ambient CO ₂ (%)
Tunnel	H ₂ O (%)	4.00	Preferred Initial Sampling Rate (cfm/scf)
			0.034
			0.26

Flue Gas	
Impinger Liquid, V _{ic} (g)	178.7
Volume of Water Vapor, V _w (std) (ft ³)	8.43
Moisture Content, B _{ws}	0.075

Elapsed Time	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel				Laboratory
	Dry Gas Meter Reading (scf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Ambient Temperature (F)
370	153.000	0.185	0.08	107.5	91	2	65	235	0.8	0.0	-0.011	17.7	2.5	1.38	123	23.3	113	133	164	149	243	160	84	0.039	-0.40	0.165	71
380	154.840	0.184	0.05	105.8	91	2	65	238	0.6	-0.2	-0.009	14.7	5.5	1.39	122	14.7	109	131	159	145	230	155	84	0.039	-0.40	0.280	70
390	156.420	0.158	0.05	107.0	91	2	64	240	0.5	-0.1	-0.009	14.7	5.5	1.31	127	14.9	111	133	157	144	223	154	87	0.039	-0.40	0.280	70
400	157.840	0.142	0.07	96.5	91	2	64	237	0.4	-0.1	-0.010	14.8	5.4	1.34	130	15.0	113	139	157	147	219	155	83	0.039	-0.40	0.300	70
410	159.370	0.153	0.07	94.2	91	2	63	238	0.3	-0.1	-0.010	15.2	5.0	1.46	132	15.6	116	147	158	150	217	158	83	0.039	-0.40	0.295	70
420	161.080	0.171	0.07	99.3	91	2	63	240	0.1	-0.2	-0.010	15.1	5.0	1.60	132	15.3	118	153	159	151	216	159	84	0.039	-0.40	0.290	70
430	162.800	0.172	0.07	101.3	90	2	63	238	0.0	-0.1	-0.010	15.2	4.9	1.64	132	15.4	118	159	161	154	217	162	84	0.039	-0.40	0.290	70
Total Sampling Time (minutes)	Total Sample Volume (cf)	Average Sampling Rate (cfm)	Average Orifice dH (inches wc)	Average Proportional Rate (%)	Average Meter Temp (oF)	Maximum Sample Train Vacuum (inches Hg)	Average Impinger Exit Temperature (F)	Average Hot Box Interior Temp (oF)	Total Fuel Burned (lbs)	Average Sample Interval Weight Change	Average Flue Draft (inches wc)	Average Oxygen (%) O2	Average Carbon Dioxide (%) CO2	Average Carbon Monoxide (%) CO	Average Flue Temp (oF)	Average Air to Fuel Ratio (lb/lb)	Average Firebox Top Temp (oF)	Average Firebox Bottom Temp (oF)	Average Firebox Back Temp (oF)	Average Firebox Left Side Temp (oF)	Average Firebox Right Side Temp (oF)	Difference in (Bag/End) Stove Surface Temps (oF)	Average Dilution Tunnel Temp (oF)	Average Dilution Tunnel dP (inches wc)	Average Dilution Tunnel Static Pressure (inches wc)	Average Dilution Tunnel CO2 (%)	Average Laboratory Ambient Temp (oF)
430	113.600	0.264	0.22	100.27	90.9	2.00	64.84	238.45	21.60	-0.50	-0.03	18.61	5.63	1.32	216.61	64.42	185.39	175.70	266.89	231.73	316.66	80	104.41	0.04	-0.40	0.81	70.86

2-16-03-2-64

Wood Heater Calculation Data EPA Method 5H

Run	2
Manufacturer:	Hearth and Home Tech
Model/Tracking No:	7100 FP
Test Date:	29-Jan-03
Project Number:	061-S-41-3

Burn Rate (dry kg/hour) = 1.14

Emission Rate (grams/hour) = 1.34

Note: When using the CO2 tracer-gas method, 1/Qf (by tracer gas) = Si

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fo (1.00 to 1.12)	Qf by carbon balance (scf/minute)	Qt-new (scf/minute)	Qf by tracer gas (scf/minute)	1/Qf by tracer gas (Si)	Volume Sampled (dscf)	Si * Volume Sampled	Proportional Sample Rate	dH new
5	13.7	1.00		141.7	11.5	0.087				
10	13.8	1.00	13.8	141.1	16.8	0.060	2.546	0.221	100.0	0.373
20	14.3	1.00	17.4	136.9	24.7	0.041	3.509	0.209	97.3	0.802
30	14.5	1.00	26.5	134.3	23.1	0.043	5.016	0.203	96.3	0.699
40	14.6	1.00	22.0	133.5	23.5	0.043	4.575	0.198	95.1	0.719
50	14.6	1.00	23.7	133.8	23.8	0.042	4.732	0.201	97.4	0.734
60	14.5	1.00	23.2	134.4	23.1	0.043	4.743	0.199	97.0	0.688
70	14.5	1.00	19.5	134.8	21.2	0.047	4.634	0.201	98.1	0.577
80	14.4	1.00	17.8	135.6	21.2	0.047	4.181	0.197	96.9	0.582
90	14.4	1.00	16.4	135.8	19.8	0.051	4.415	0.208	101.8	0.505
100	14.3	1.00	11.4	136.4	17.7	0.056	3.880	0.196	96.4	0.405
110	14.2	1.00	10.9	137.2	16.9	0.059	3.607	0.204	100.1	0.368
120	14.1	1.00	7.7	138.3	15.7	0.064	3.507	0.208	101.9	0.318
130	14.0	1.00	5.3	139.5	12.9	0.077	3.307	0.211	103.1	0.216
140	13.9	1.00	1.9	140.6	10.2	0.098	2.808	0.217	105.8	0.136
150	13.8	1.00	2.0	141.0	9.6	0.104	2.300	0.225	108.8	0.120
160	13.8	1.00	2.0	141.3	9.2	0.109	2.076	0.216	104.4	0.110
170	13.8	1.00	1.9	141.6	8.7	0.115	2.016	0.219	105.2	0.099
180	13.8	1.00	3.7	141.6	8.5	0.118	1.952	0.224	107.1	0.094
190	13.8	1.00	1.8	141.8	8.1	0.123	1.739	0.205	98.2	0.086
200	13.7	1.00	1.8	142.1	8.0	0.125	1.779	0.219	104.7	0.083
210	13.7	1.00	1.8	142.2	8.2	0.123	1.611	0.201	96.5	0.086
220	13.7	1.00	1.9	142.4	7.7	0.130	1.636	0.201	96.3	0.076
230	13.7	1.00	1.7	142.5	7.6	0.131	1.581	0.206	99.0	0.075
240	13.7	1.00	1.8	142.5	8.2	0.122	1.627	0.213	102.3	0.086
250	13.7	1.00	1.9	142.5	8.2	0.122	1.618	0.198	95.2	0.087
260	13.7	1.00	1.9	142.5	8.0	0.125	1.627	0.198	95.4	0.083
270	13.7	1.00	1.9	142.6	7.4	0.135	1.618	0.201	97.2	0.071

Woodstove Type

Yhc>1=cat, 2=ncat, 3=pellet
EPA's Hydrocarbon Constant (%)

2

1.32

Fuel Data

Test Charge (as fired lbs)
Average Moisture (% dry basis)
Average Moisture (% wet basis)

21.6

20.23

16.83

Run Parameters

DGM initial reading (cf)
DGM final reading (cf)
Pb (inches Hg)
Tm (avg oF)
dH (avg inches wc)
Vm (scf)
Qf by carbon balance (avg dscf/minute)

49.200

162.800

28.65

90.93

0.22

103.474

6.40

Analytical Data

Probe/Front Wash (mg)
Front Filter (mg)
Impinger PM (mg)
Back Filter (mg)
Total Weight (mg)

29.4

64.7

186.8

80.3

361.2

Emission Results

Cs (g/dscf)
ER (g/hour)

0.0035

1.34

Test Laboratories

280	13.7	1.00	1.9	142.6	7.4	0.135	1.645	0.222	107.0	0.071
290	13.7	1.00	1.8	142.7	7.4	0.136	1.545	0.209	100.4	0.071
300	13.7	1.00	1.9	142.6	7.7	0.129	1.499	0.203	97.8	0.077
310	13.7	1.00	1.9	142.7	7.8	0.128	1.518	0.197	94.7	0.079
320	13.7	1.00	2.0	142.7	8.0	0.125	1.636	0.210	101.2	0.083
330	13.7	1.00	1.9	142.9	7.4	0.135	1.490	0.186	90.1	0.071
340	13.6	1.00	2.1	143.0	7.9	0.126	1.590	0.214	103.4	0.082
350	13.6	1.00	2.1	143.0	7.7	0.129	1.663	0.209	101.0	0.077
360	13.6	1.00	2.3	143.0	7.5	0.133	1.708	0.221	106.6	0.074
370	13.6	1.00	0.0	143.1	7.6	0.132	1.684	0.224	107.5	0.075
380	13.6	1.00	3.3	143.1	6.4	0.155	1.675	0.220	105.8	0.054
390	13.7	1.00	1.7	142.7	6.4	0.156	1.438	0.223	107.0	0.054
400	13.6	1.00	1.7	143.3	7.1	0.141	1.293	0.201	96.5	0.065
410	13.6	1.00	1.7	143.3	7.5	0.133	1.393	0.196	94.2	0.074
420	13.6	1.00	3.4	143.1	7.4	0.136	1.557	0.207	99.3	0.071
430	13.6	1.00	1.7	143.1	7.5	0.133	1.566	0.212	101.9	0.074
Averages/Totals	13.9	1.00	6.4	140.6	11.6	0.105	2.408		100.3	0.219

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Hearth and Home Tech.
 Model: 7100 FP
 Project No.: 061-F-41-3
 Tracking No.: 425

Equipment Numbers: _____

Run No.: 2
 Date: 01/29/03

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	M159	684.0	619.3		64.7
B. Rear filter catch	Filter	C835	200.6	120.3		80.3
C. Rinse of probe and filter assembly (FRONT)	Acetone	135	108957.7	108928.3	0.0000	29.4
D. Rinse of Impinger Set	Distilled Water	370	101814.4	101725.3	0.0000	89.1
E. Rinse of Impinger Set	Dichloromethane	150	110237.2	110201.5	0.0000	35.7
F. Rinse of filter assembly and gas train (BACK)	Acetone	180	95251.9	95189.9	0.0000	62.0
Total Particulate, mg :						361.2

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 (FRONT)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
D. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
E. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
F. Rinse of filter assembly and gas train (BACK)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

CONDENSED WATER

IMPINGERS	Weights		
	Final, g	Initial, g	Net, g
1	782.0	645.8	136.2
2	587.4	570.0	17.4
3	544.4	542.8	1.6
4	845.0	821.5	23.5
TOTAL, g:			178.7

Analyst: B. D.

Date: 2-28-03

2-19-04 2-64

EPA Method 4 Analysis Worksheet

Client/Location: Health and Home Tech 7100 F.P. Project #: 061-S-41-3

Test Date: 1-29-03 Test Crew: B Davis Run #: 2

Sample Train #: A Assembled by: B Davis Cleaned by: B Davis

Filter Identification

Front Filter	1st Filter # <u>m159</u>	Back Filter	1st Filter # <u>C 835</u>
2nd Filter #	___	2nd Filter #	___
3rd Filter #	___	3rd Filter #	___

Gravimetric Analysis—Condensed Water

Impingers:	1	2	3	4	Total	By
Final:	<u>782.0</u>	<u>587.4</u>	<u>544.4</u>	<u>845.0</u>		
Initial:	<u>645.8</u>	<u>570.0</u>	<u>542.8</u>	<u>821.5</u>		
Net Weight (grams):	<u>136.2</u>	<u>17.4</u>	<u>1.6</u>	<u>23.5</u>	<u>178.7</u>	

Client/Model: Handheld Home Tech 7100 FP Project #: 061-S-41-3 Tracking #: 425
 Date: 1-29-03 Test Crew: B. Davis Run #: 2
 OMNI Equipment ID #: _____

Preburn [X]		Coal Bed:		Data:		0 = Ø		Range: 4.7 - 5.4		Actual:	
Test []										Coal Bed: 4.9	
								TEMPERATURES (oF)			
Time	Fuel Weight	Delta Weight	Stack Draft	Ambient	Top	Left	Right	Back	Bottom	Flue	Catalyst
0	6.2	✓	-0.65	80	470	326	544	419	602	438	NA
10	5.9	0.3	-0.40	76	319	324	536	421	602	267	
20	5.6	0.3	-0.35	73	232	301	493	383	555	228	
30	5.5	0.1	-0.30	70	196	282	458	353	511	210	
40	5.4	0.1	-0.26	69	170	262	421	326	465	191	
50	5.2	0.2	-0.25	70	163	251	400	312	435	183	
60	5.2	0.0	-0.22	69	152	236	369	281	397	173	
70	5.0	0.2	-0.21	69	143	222	341	253	365	166	
80	4.9	0.1	-0.20	69	139	209	315	229	336	159	
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

207
264

Technician signature: B. Davis Date: 2-4-03

2-21-02-64

FUEL DATA

Client / Model: Hawthorne Fuel 70W FP Tracking #: 425 Project #: 061-S-41-3
Date: 1-29-03 Test Crew: B. Davis Run #: 2
OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B. Davis

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
Cal Value (2) = 22% Actual Reading 22

Piece	Length		Readings		Type
1	<u>8</u> ft	<u>20.2</u>	<u>19.5</u>	<u>19.8</u>	<u>2x4</u>
2	<u>8</u> ft	<u>19.5</u>	<u>20.1</u>	<u>19.0</u>	<u>2x4</u>
3	_____ ft	_____	_____	_____	_____

Length of cut pieces: _____ inches

Pre-Burn Fuel Average Moisture: 19.7

Time (clock): 0815 Room Temperature (F): 70 Initials: B/D

TEST FUEL

FUEL TYPE AND AMOUNT: 2x4 0 4x4 5
CALCULATED LOAD WEIGHT: _____ ACTUAL LOAD WEIGHT: 0 (2x4)
21.6 (4x4)
FUEL PIECE LENGTH: 19" 21.6 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE		READINGS		TYPE
	<u>21.2</u>	<u>20.4</u>	<u>20.0</u>	
1	<u>21.7</u>	<u>21.0</u>	<u>21.5</u>	<u>4x4</u>
2	<u>22.5</u>	<u>21.2</u>	<u>18.4</u>	<u>4x4</u>
3	<u>19.7</u>	<u>18.1</u>	<u>20.8</u>	<u>4x4</u>
4	<u>20.2</u>	<u>19.0</u>	<u>19.5</u>	<u>4x4</u>
5	<u>21.1</u>	<u>21.2</u>	<u>20.1</u>	<u>4x4</u>
6	_____	_____	_____	_____
7	_____	_____	_____	_____
8	_____	_____	_____	_____
9	_____	_____	_____	_____
10	_____	_____	_____	_____

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 20.23

Time (clock): 0930 Room Temperature (F): 70 Initials: B/D

Technician signature: B. Davis Date: 2-4-03

Run Notes

Client/Model: Health and Home Tech 7100 FP

Project #: 061-S-41-2

Tracking Number: 425

Run #: 2

Date: 1-29-03

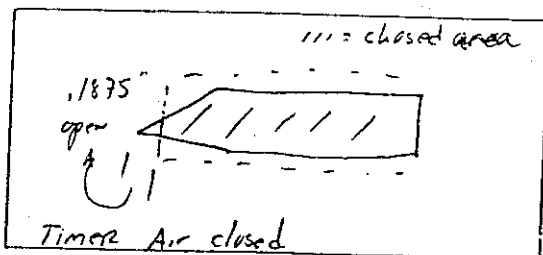
Test Crew: B. Davis

OMNI Equipment ID Numbers: _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: Fixed

TERTIARY: NA

FAN: on high

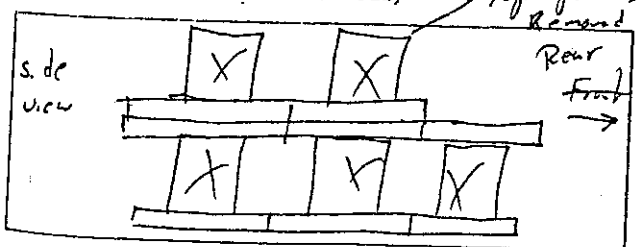
PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	Test setting					
45					X	

TEST

TEST FUEL CONFIGURATION SKETCH

(INDICATE VIEW ANGLE)



DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

Same as Above

START UP PROCEDURES

BYPASS: NA

FUEL LOADING by 53 sec

DOOR: closed by 60 sec

PRIMARY AIR: fully open w/ 4:55
then set to test setting

OTHER: Timed air is opened when Air slide is fully open closes automatically after 2 hours.

At 371 min coal bed adjustment due to weight loss.

SECONDARY: Fixed

TERTIARY: NA

FAN: off for first 30 min
Then turned to High

Technician signature: B. Davis

Date: 2-4-03

Supplemental Data EPA 5G/5H

Client / Model: Hauk and Home Tech 7100 FP Project No.: 061-5-41-3
Tracking No.: 425 Date: 1-29-03 Run No.: 2 Booth: 1
Test Crew: B Davis Start Time: 11:10 Stop Time: 18:20
OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: good

Initial: _____

Final: good

Final: _____

Calibrations: Span Gas CO₂: 9.96 O₂: _____ CO: 1.23 CO₂(DT): 1.26

Time	N ₂ Span		N ₂ Span		N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	<u>Ø</u>		<u>EOT</u>					
O ₂								
CO ₂	<u>0.0</u>	<u>90.0</u>	<u>0.0</u>	<u>10.1</u>				
CO	<u>0.00</u>	<u>1.23</u>	<u>0.01</u>	<u>1.24</u>				
CO ₂ (DT)	<u>0.00</u>	<u>1.26</u>	<u>0.00</u>	<u>1.27</u>				

Stack Diameter (inches): 8"

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

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

Induced Draft: 0.0 %Smoke Capture: 100%

Pilot Tube Leak Test: Pre: 0.0 @ 3.0 Post: 0.0 @ 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-27-03 Initials: B.D.

	Initial	Middle	Ending
Pb (in. Hg)	<u>28.66</u>	<u>28.65</u>	<u>28.63</u>
Room Temp (°F)	<u>68 68 68</u>	<u>71</u>	<u>70</u>

Technician signature: B.D. Date: 2-4-03

Wood Heater Test Data EPA Method 5H

Run Number 3

Manufacturer:
Stove Model, Tracking Number:
Stove Type (cat, nuc, or pellet):
Project Number:
Test Date:
Test Start Time:
Recording Interval (minutes):
Total Sampling Time (minutes):

Hearth and Home Tech
7100 FP
nuc
061-S-41-3
30-Jan-03
11:23
10
490

Sample Rate Control Module Number: 21
Test Meter Y: 0.992
Orifice ID: 1.587
Pilot Tube ID: 0.39
Average Barometric Pressure: 29.59
Average Fuel Moisture (dry basis %): 19.97
OAMT Equipment Numbers: Oxygen values are calculated by 20.9-(Carbon dioxide-Carbon monoxide/2)

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Flow
	Pl.1	Pl.2	Pl.3	Pl.4	Pl.5	Pl.6	Pl.7	Pl.8		Initial
Initial dP	0.042	0.046	0.042	0.028	0.036	0.044	0.042	0.030	H2O	141.4
Initial Temp	89	89	89	89	89	89	89	89	oF	scf/minute

Signature/Date: *B.D.* 2-21-03

Post-Test Leak Check: 0.08 cfm @ Hg

Initial/Assumed Values			
Dilution Tunnel	MW (lb/lb-mol)	29.56	Ambient CO2 (%)
	H2O (%)	4.00	Preferred Initial Sampling Rate (scf/minute)
			0.26

Flue Gas	
Impinger liquid, Vc (g)	181.5
Volume of Water Vapor, Vw (std) (ft3)	8.56
Moisture Content, Sws	0.068

Start Time	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel				Laboratory
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Orifice dE (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Scale Pressure (inches wc)	CO2 (%)	Ambient Temperature (F)
0	163.600		0.18		78	0	79	235	21.6		-0.015	18.5	2.0	0.77	144	29.7	130	209	277	206	308	226	89	0.038	-0.40	0.195	69
10	166.420	0.282	0.37	100.0	81	2	84	241	21.3	-0.3	-0.024	18.5	2.2	0.48	182	30.4	133	248	243	218	265	221	95	0.038	-0.40	0.295	68
20	170.130	0.371	0.32	94.7	84	2	83	247	20.8	-0.5	-0.028	16.2	4.5	0.42	204	19.5	136	279	227	229	259	226	97	0.038	-0.40	0.540	68
30	173.750	0.362	0.75	98.6	87	2	84	242	19.4	-1.4	-0.058	9.3	11.5	0.24	397	9.3	270	283	220	231	252	251	128	0.038	-0.40	2.065	69
40	178.850	0.510	0.66	93.0	91	2	84	238	17.2	-2.2	-0.064	8.3	12.5	0.16	458	8.7	344	206	244	206	282	256	153	0.038	-0.40	2.170	70
50	183.860	0.501	0.73	96.6	93	2	85	236	14.9	-2.3	-0.062	9.7	11.1	0.27	432	9.6	358	191	279	216	319	273	154	0.038	-0.40	2.030	71
60	189.010	0.515	0.67	95.0	94	2	85	242	12.8	-2.1	-0.061	9.3	11.3	0.63	421	9.2	364	189	311	232	349	289	153	0.038	-0.40	1.980	73
70	194.110	0.510	0.66	98.2	96	2	83	238	10.6	-2.2	-0.059	9.9	10.8	0.39	424	9.7	370	191	351	267	377	309	149	0.038	-0.40	1.875	73
80	199.030	0.492	0.62	95.7	96	2	82	236	8.9	-1.7	-0.058	10.3	10.5	0.22	409	10.1	365	192	379	273	392	320	156	0.038	-0.40	1.775	76
90	203.870	0.484	0.62	97.6	96	2	82	237	7.3	-1.6	-0.057	10.6	10.2	0.18	402	10.4	356	193	412	295	407	333	144	0.038	-0.40	1.705	74
100	208.680	0.481	0.55	97.4	96	2	83	231	5.9	-1.4	-0.055	10.5	10.3	0.17	389	10.3	357	195	432	311	418	343	141	0.038	-0.40	1.620	77
110	213.250	0.457	0.45	98.4	96	2	84	230	5.0	-0.9	-0.051	13.5	7.2	0.37	345	13.7	306	198	446	321	430	340	132	0.038	-0.40	1.030	75
120	217.500	0.425	0.35	100.9	95	2	85	236	4.4	-0.6	-0.041	14.7	5.9	0.58	290	15.6	251	203	448	323	434	332	118	0.038	-0.40	0.740	75
130	221.090	0.359	0.17	97.6	94	2	86	235	4.1	-0.3	-0.028	15.5	4.4	1.98	215	15.7	215	202	426	308	421	314	101	0.038	-0.40	0.400	73
140	223.860	0.277	0.14	106.1	93	2	84	236	3.9	-0.2	-0.025	15.7	4.0	2.39	204	15.6	185	201	417	293	406	300	99	0.038	-0.40	0.330	73
150	226.370	0.251	0.16	107.4	92	2	84	240	3.6	-0.3	-0.023	15.7	4.0	2.35	191	15.7	169	193	389	272	381	281	96	0.038	-0.40	0.350	72
160	228.930	0.256	0.11	102.4	91	2	83	231	3.5	-0.1	-0.022	16.0	3.8	2.26	177	16.3	158	187	366	258	364	267	93	0.038	-0.40	0.280	71
170	231.200	0.227	0.14	109.9	91	2	83	234	3.3	-0.2	-0.021	15.5	4.2	2.41	176	15.2	151	180	342	245	349	253	91	0.038	-0.40	0.350	70
180	233.710	0.251	0.11	104.2	92	2	82	241	3.2	-0.1	-0.020	15.7	4.0	2.33	173	15.8	145	174	321	235	335	242	90	0.038	-0.40	0.300	70
190	236.070	0.236	0.12	109.9	92	2	83	239	3.1	-0.1	-0.020	15.7	4.0	2.37	169	15.7	140	169	306	227	324	233	88	0.038	-0.40	0.305	70
200	238.180	0.211	0.12	96.5	91	2	83	242	3.0	-0.1	-0.020	15.9	3.8	2.37	166	16.1	141	167	293	220	315	227	88	0.038	-0.40	1.290	69
210	240.350	0.217	0.11	99.9	90	2	83	243	2.9	-0.1	-0.020	15.8	3.9	2.43	162	15.7	140	167	285	216	306	223	87	0.038	-0.40	0.285	69
220	242.500	0.215	0.11	103.6	90	2	84	235	2.7	-0.2	-0.021	15.6	4.0	2.57	161	15.3	137	167	270	211	299	217	86	0.038	-0.40	0.290	69
230	244.650	0.215	0.12	103.9	89	2	84	235	2.6	-0.1	-0.021	14.1	6.2	1.26	167	13.8	139	158	259	207	295	212	87	0.038	-0.40	0.450	69
240	246.770	0.212	0.11	98.3	89	2	85	242	2.4	-0.2	-0.024	14.3	5.9	1.45	172	14.0	141	158	249	205	300	211	87	0.038	-0.40	0.420	68
250	248.930	0.216	0.11	102.6	89	2	85	244	2.2	-0.2	-0.025	14.7	5.3	1.90	170	14.2	142	162	240	202	307	211	87	0.038	-0.40	0.375	69
260	251.120	0.219	0.11	105.5	88	2	86	240	2.1	-0.1	-0.023	15.0	5.3	1.25	166	15.4	140	166	231	199	305	208	86	0.038	-0.40	0.380	69
270	253.210	0.209	0.11	99.3	88	2	86	240	2.0	-0.1	-0.022	15.1	5.1	1.46	164	15.4	138	171	223	195	301	206	86	0.038	-0.40	0.360	69
280	255.305	0.210	0.11	101.6	88	2	85	237	1.8	-0.2	-0.021	15.1	5.0	1.66	162	15.1	138	172	216	193	298	203	86	0.038	-0.40	0.355	69
290	257.430	0.213	0.12	102.5	87	2	85	237	1.7	-0.1	-0.021	15.6	4.5	1.66	160	16.2	135	171	209	190	291	199	86	0.038	-0.40	0.335	69
300	259.570	0.214	0.10	99.2	87	2	84	240	1.6	-0.1	-0.020	15.7	4.4	1.56	156	16.6	131	169	203	187	282	194	85	0.038	-0.40	0.310	68
310	261.650	0.208	0.10	102.6	86	2	84	237	1.5	-0.1	-0.020	16.0	4.2	1.48	154	17.3	132	168	197	187	273	191	85	0.038	-0.40	0.295	67
320	263.780	0.213	0.09	106.0	86	2	84	236	1.4	-0.1	-0.020	16.1	4.0	1.57	151	17.6	130	166	191	187	266	188	86	0.038	-0.40	0.275	69
330	265.960	0.208	0.09	106.6	87	2	85	237	1.4	0.0	-0.016	16.4	3.8	1.37	145	18.7	127	164	186	187	259	185	85	0.038	-0.40	0.255	71
340	267.910	0.205	0.09	108.3	88	2	85	244	1.3	-0.1	-0.015	16.4	3.8	1.40	142	18.6	124	160	180	186	251	180	85	0.038	-0.40	0.250	72
350	269.910	0.200	0.08	105.3	89	2	84	238	1.1	-0.2	-0.015	16.4	3.8	1.47	140	18.4	122	157	175	184	245	177	85	0.038	-0.40	0.235	72
360	271.950	0.204	0.09	109.4	90	2	84	240	1.0	-0.1	-0.015	16.8	3.4	1.48	137	19.5	121	155	171	182	234	173	85	0.038	-0.40	0.235	72

2-26-02-64

Run Number 3

Manufacturer:

Hearth and Home Tech

Stove Model, Tracking Number:

7100 FP

Stove Type (cat, ncat, or pellet):

ncat

Project Number:

061-S-41-3

Test Date:

30-Jan-03

Test Start Time:

11:23

Recording interval (minutes):

10

Total Sampling Time (minutes):

490

Sample Rate Control Module Number:

21

Test Meter Y:

0.392

Orifice dH:

1.587

Pilot Tube Co:

0.39

Average Barometric Pressure:

28.59

Average Fuel Moisture (dry basis %):

19.97

O&M Equipment Numbers:

Wood Heater Test Data
EPA Method 5H

Oxygen values are calculated by 20.9-(Carbon dioxide-Carbon monoxide/2)

Signature/Date:

B.D. 2-27-03

Post-Test Leak Check:

008.66 cfm @ 74g

Dilution Tunnel Velocity Traverse Data									Dilution Tunnel Flow
	Pt. 1	Pt. 3	Pt. 4	Pt. 5	Pt. 6	Pt. 7	Pt. 8		
Initial dP	0.042	0.042	0.028	0.036	0.044	0.042	0.030	H ₂ O	141.4
Initial Temp	89	89	89	89	89	89	89	oF	scfm/min

Initial/Assumed Values			
Dilution	MW (lb/lb-mol)	28.56	Ambient CO ₂ (%)
Tunnel	H ₂ O (%)	4.00	Preferred Initial Sampling Rate (cfm/min)
			0.034
			0.26

Flue Gas	
Impinger liquid, V _{ic} (g)	181.5
Volume of Water Vapor, V _w (ft ³)	8.56
Moisture Content, B _{ws}	0.068

Elapsed Time	Particulate Sampling System								Fuel Weight		Gas Conditions					Stove Temperatures (oF)						Dilution Tunnel				Laboratory Ambient Temperature (F)
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	CO ₂ (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO ₂ (%)	
370	273.810	0.186	0.08	95.7	90	2	63	244	1.0	0.0	-0.014	3.0	1.83	134	19.6	119	152	167	179	233	170	85	0.038	-0.40	0.200	72
380	275.550	0.174	0.08	95.6	90	2	63	242	0.9	-0.1	-0.014	3.0	1.85	131	19.6	117	148	162	174	227	166	85	0.038	-0.40	0.196	73
390	277.270	0.172	0.07	97.5	90	2	63	238	0.8	-0.1	-0.013	3.2	2.04	129	18.4	115	143	158	168	222	161	84	0.038	-0.40	0.200	73
400	279.060	0.179	0.06	104.7	90	2	64	241	0.7	-0.1	-0.013	3.1	1.97	126	18.9	112	138	153	162	217	156	84	0.038	-0.40	0.185	72
410	280.630	0.157	0.06	98.0	90	2	64	238	0.6	-0.1	-0.012	3.0	1.91	123	19.4	110	134	150	158	212	153	84	0.038	-0.40	0.175	72
420	282.250	0.162	0.04	104.6	90	2	64	237	0.5	-0.1	-0.011	2.8	1.70	120	20.8	108	132	147	156	208	150	84	0.038	-0.40	0.150	72
430	283.550	0.130	0.05	95.3	90	2	64	243	0.5	0.0	-0.010	2.7	1.60	116	21.5	105	128	144	154	201	146	84	0.038	-0.40	0.150	72
440	284.960	0.131	0.05	92.7	90	2	65	237	0.4	-0.1	-0.010	2.5	1.40	114	23.2	104	126	143	152	198	145	83	0.038	-0.40	0.145	73
450	286.265	0.140	0.04	96.1	90	2	65	236	0.4	0.0	-0.010	2.5	1.34	112	23.5	102	124	140	149	193	142	83	0.038	-0.40	0.130	71
460	287.580	0.132	0.04	103.9	90	2	64	234	0.3	-0.1	-0.010	3.0	2.21	109	18.5	99	122	138	146	186	138	82	0.038	-0.40	0.150	69
470	288.970	0.139	0.04	109.0	90	2	64	237	0.2	-0.1	-0.010	3.7	2.77	111	15.4	98	122	136	142	183	136	83	0.038	-0.40	0.100	72
480	290.260	0.129	0.04	99.4	90	2	63	239	0.1	-0.1	-0.010	5.2	1.28	118	15.5	101	121	137	139	183	136	83	0.038	-0.40	0.235	70
490	291.545	0.129	0.06	101.4	90	2	63	236	0.0	-0.1	-0.010	4.6	1.41	122	16.5	102	120	139	137	190	136	82	0.038	-0.40	0.250	68
Total Sampling Time (minutes)	Total Sample Volume (cf)	Average Sampling Rate (cfm)	Average Orifice dH (inches wc)	Average Proportional Rate (%)	Average Meter Temp (oF)	Maximum Sample Train Vacuum (inches Hg)	Average Impinger Exit Temperature (F)	Average Hot Box Interior Temp (oF)	Total Fuel Burned (lbs)	Average Sample Interval Weight Change	Average Flue Draft (inches wc)	Average Carbon Dioxide (% CO ₂)	Average Carbon Monoxide (% CO)	Average Flue Temp (oF)	Average Air to Fuel Ratio (lb/lb)	Average Firebox Top Temp (oF)	Average Firebox Bottom Temp (oF)	Average Firebox Back Temp (oF)	Average Firebox Left Side Temp (oF)	Average Firebox Right Side Temp (oF)	Difference in (Beg./End) Stove Surface Temps (oF)	Average Dilution Tunnel Temp (oF)	Average Dilution Tunnel dP (inches wc)	Average Dilution Tunnel Static Pressure (inches wc)	Average Dilution Tunnel CO ₂ (%)	Average Laboratory Ambient Temp (oF)
490	127.945	0.261	0.21	100.99	90.0	2.00	64.26	238.26	21.60	-0.44	-0.03	5.14	1.45	200.84	60.99	171.46	171.82	250.56	210.18	231.12	88	98.30	0.04	-0.40	0.56	70.86

Impinger Liquid, Vol (g)181.5

Volume of Water Vapor, VwStd (ft3)8.56

Moisture Content, Bws0.068

Signature/Date:BDL 2-28-03

Post-Test Leak Check:008.06 cmHg

Oxygen values are calculated by 20.9-(Carbon dioxide-Carbomonoxyde/2)

Initial Temp:89 89

Wood Heater Calculation Data
EPA Method 5H

Run	3
Manufacturer	Hearth and Home Tech
Model/Tracking No.	7100 FP
Test Date	30-Jan-03
Project Number	061-S-41-3

Burn Rate (dry kg/hour) = 1.00

Emission Rate (grams/hour) = 1.54

Note: When using the CO2 tracer-gas method, $1/Q_f$ (by tracer gas) = S_i

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fo (1.00 to 1.12)	Qf by carbon balance (scf/minute)	Qt-new (scf/minute)	Qf by tracer gas (scf/minute)	1/Qf by tracer gas (Si)	Volume Sampled (dscf)	Si * Volume Sampled	Proportional Sample Rate	dH new
0	13.6	1.00		141.4	11.6	0.086				
10	13.6	1.00	10.2	139.7	16.8	0.059	2.625	0.227	100.0	0.370
20	13.6	1.00	10.9	139.5	15.8	0.063	3.435	0.204	94.7	0.324
30	14.0	1.00	14.6	135.8	24.0	0.042	3.333	0.211	98.6	0.746
40	14.3	1.00	21.5	133.0	22.8	0.044	4.675	0.194	93.0	0.665
50	14.3	1.00	24.7	132.9	24.0	0.042	4.559	0.200	96.6	0.733
60	14.3	1.00	21.6	133.0	23.0	0.044	4.670	0.195	95.0	0.672
70	14.3	1.00	24.0	133.4	22.8	0.044	4.615	0.201	98.2	0.661
80	14.3	1.00	19.2	132.6	22.1	0.045	4.436	0.194	95.7	0.618
90	14.2	1.00	18.6	134.0	22.0	0.045	4.364	0.198	97.6	0.615
100	14.2	1.00	16.2	134.3	20.7	0.048	4.337	0.197	97.4	0.546
110	14.1	1.00	13.8	135.3	18.8	0.053	4.120	0.199	98.4	0.449
120	13.9	1.00	10.5	136.9	16.5	0.061	3.830	0.204	100.9	0.345
130	13.7	1.00	5.3	139.0	11.7	0.086	3.240	0.197	97.6	0.173
140	13.7	1.00	3.5	139.2	10.4	0.096	2.504	0.215	106.1	0.138
150	13.6	1.00	5.3	139.6	11.1	0.090	2.272	0.219	107.4	0.158
160	13.6	1.00	1.8	140.0	9.1	0.109	2.322	0.209	102.4	0.107
170	13.6	1.00	3.4	140.2	10.6	0.094	2.062	0.226	109.9	0.145
180	13.5	1.00	1.8	140.4	9.4	0.106	2.281	0.214	104.2	0.113
190	13.5	1.00	1.8	140.6	9.6	0.104	2.140	0.227	109.9	0.118
200	13.5	1.00	1.8	140.6	9.6	0.105	1.914	0.199	96.5	0.117
210	13.5	1.00	1.8	140.8	9.1	0.109	1.972	0.206	99.9	0.107
220	13.5	1.00	3.5	140.9	9.1	0.110	1.957	0.214	103.6	0.106
230	13.5	1.00	1.6	140.8	9.5	0.105	1.957	0.215	103.9	0.116
240	13.5	1.00	3.1	140.8	9.3	0.108	1.933	0.204	98.3	0.110
250	13.5	1.00	3.2	140.8	9.1	0.110	1.970	0.213	102.6	0.107
260	13.5	1.00	1.7	140.9	9.3	0.108	1.997	0.219	105.5	0.110
270	13.5	1.00	1.7	140.9	9.1	0.110	1.909	0.206	99.3	0.106

Woodstove Type

Yhc>1=cat, 2=ncat, 3=pellet
EPA's Hydrocarbon Constant (%)

Fuel Data

Test Charge (as fired lbs)
Average Moisture (% dry basis)
Average Moisture (% wet basis)

Run Parameters

DGM initial reading (cf)
DGM final reading (cf)
Pb (inches Hg)
Tm (avg oF)
dH (avg inches wc)
Vm (scf)
Qf by carbon balance (avg dscf/minute)

Analytical Data

Probe/Front Wash (mg)
Front Filter (mg)
Impinger PM (mg)
Back Filter (mg)
Total Weight (mg)

Emission Results

Cs (g/dscf)
ER (g/hour)

MANI-Test Laboratories

280	13.5	1.00	3.4	140.9	9.1	0.110	1.914	0.211	101.6	0.107
290	13.5	1.00	1.8	140.9	9.5	0.105	1.941	0.213	102.5	0.116
300	13.5	1.00	1.9	141.0	8.9	0.112	1.959	0.206	99.2	0.103
310	13.5	1.00	1.9	141.0	8.8	0.113	1.904	0.214	102.6	0.101
320	13.5	1.00	2.0	140.9	8.6	0.117	1.953	0.221	106.0	0.095
330	13.5	1.00	0.0	141.0	8.3	0.121	1.907	0.223	106.6	0.088
340	13.5	1.00	2.1	141.0	8.3	0.121	1.876	0.227	108.3	0.088
350	13.5	1.00	4.1	141.0	8.1	0.124	1.827	0.221	105.3	0.084
360	13.5	1.00	2.2	141.0	8.4	0.119	1.860	0.230	109.4	0.091
370	13.5	1.00	0.0	141.0	7.9	0.127	1.693	0.201	95.7	0.080
380	13.5	1.00	2.2	141.0	7.7	0.131	1.584	0.201	95.6	0.075
390	13.5	1.00	2.1	141.1	7.4	0.135	1.565	0.205	97.5	0.070
400	13.5	1.00	2.1	141.1	7.0	0.144	1.626	0.220	104.7	0.062
410	13.5	1.00	2.2	141.1	6.7	0.149	1.429	0.206	98.0	0.058
420	13.5	1.00	2.3	141.1	5.9	0.169	1.474	0.220	104.6	0.045
430	13.5	1.00	0.0	141.1	6.1	0.163	1.183	0.200	95.3	0.048
440	13.5	1.00	2.6	141.3	6.4	0.157	1.192	0.194	92.7	0.052
450	13.5	1.00	0.0	141.3	5.5	0.182	1.279	0.201	96.1	0.039
460	13.4	1.00	2.1	141.4	5.5	0.181	1.197	0.218	103.9	0.039
470	13.5	1.00	1.7	141.3	5.6	0.178	1.265	0.229	109.0	0.041
480	13.5	1.00	1.7	141.3	5.5	0.182	1.174	0.209	99.4	0.039
490	13.4	1.00	1.9	141.4	6.7	0.149	1.169	0.213	101.4	0.057
Averages/Totals	13.6	1.00	5.9	139.4	11.4	0.106	2.376		101.0	0.207

2-29082-64

Final Laboratory Report - Method 5H

Dilution Tunnel Particulate Calculations

Client Name: Hearth and Home Tech. Equipment Numbers: _____ Run No.: 3
 Model: 7100 FP Date: 01/30/03
 Project No.: 061-F-41-3
 Tracking No.: 425

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	M160	681.5	619.7		61.8
B. Rear filter catch	Filter	C836	224.2	120.3		103.9
C. Rinse of probe and filter assembly (FRONT)	Acetone	145	95803.5	95759.2	0.0000	44.3
D. Rinse of Impinger Set	Distilled Water	375	213250.7	213128.9	0.0000	121.8
E. Rinse of Impinger Set	Dichloromethane	150	106034.2	105971.6	0.0000	62.6
F. Rinse of filter assembly and gas train (BACK)	Acetone	175	93933.1	93818.4	0.0000	114.7
Total Particulate, mg :						509.1

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 (FRONT)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
D. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
E. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
F. Rinse of filter assembly and gas train (BACK)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

CONDENSED WATER		Weights		
IMPINGERS	Final, g	Initial, g	Net, g	
1	775.6	645.4	130.2	
2	593.4	568.1	25.3	
3	544.8	542.2	2.6	
4	868.4	845.0	23.4	
		TOTAL, g:	181.5	

Analyst: BACDate: 2-28-03

2-30-03-64

EPA Method 4 Analysis Worksheet

Client/Location: Health and Home Tech 7100 FP Project #: 061-S-41-3

Test Date: 1-30-03 Test Crew: B. Davis Run #: 3

Sample Train #: A Assembled by: B. Davis Cleaned by: B. Davis

Filter Identification

Front Filter	1st Filter # <u>m160</u>	Back Filter	1st Filter # <u>C836</u>
2nd Filter #	___	2nd Filter #	___
3rd Filter #	___	3rd Filter #	___

Gravimetric Analysis—Condensed Water

Impingers:	1	2	3	4	Total	By
Final:	<u>775.6</u>	<u>593.4</u>	<u>544.8</u>	<u>868.4</u>		
Initial:	<u>645.4</u>	<u>568.1</u>	<u>542.2</u>	<u>845.0</u>		
Net Weight (grams):	<u>130.2</u>	<u>25.3</u>	<u>2.6</u>	<u>23.4</u>	<u>181.5</u>	

STOVE TEMPERATURE TEST DATA - METHOD 5G

Page 1 of 1

Client/Model: Hewlett and Howe Tech. 7100 FP Project #: 061-3-41-3

Date: 1-30-03 Test Crew: BDavis Tracking #: 425

OMNI Equipment ID #: _____ Run #: 3

Preburn [X]		Coal Bed:		Range: 44-54		Actual:					
Test []		Data:		0 = Ø		Coal Bed: 5.2					
Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF)					Catalyst		
				Ambient	Top	Left	Right	Back		Bottom	Flue
0	5.9		-0.60	82	484	365	528	442	659	451	NA
10	5.6	0.3	-0.40	72	330	365	531	437	644	262	
20	5.5	0.1	-0.32	73	233	335	483	395	577	223	
30	5.4	0.1	-0.27	72	201	314	453	348	534	208	
40	5.3	0.1	-0.25	71	179	289	415	336	481	201	
50	5.2	0.1	-0.23	71	167	279	391	323	452	187	
60	5.2	0.0	-0.20	70	155	262	358	288	410	172	
70	5.2	0.0	-0.18	70	143	241	325	253	368	160	
80	5.2	0.0	-0.16	69	135	226	303	231	341	156	
90	5.2	0.0	-0.15	69	131	210	279	208	310	144	
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: BD

Date: 1-30-03

2-32 of 2-64

FUEL DATA

Client / Model: Heath and Home Tech 7100 FP Tracking #: 425 Project #: 061-3-41-3

Date: 1-30-03 Test Crew: B. Davis Run #: 3

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B. Davis

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	<u>12</u>			
	Cal Value (2) = 22%	Actual Reading	<u>22</u>			
Piece	Length	Readings			Type	
1	<u>8</u> ft	<u>19.9</u>	<u>22.4</u>	<u>23.3</u>	<u>2x4</u>	1 20.5 0630
2	<u>8</u> ft	<u>24.3</u>	<u>24.6</u>	<u>23.8</u>	<u>2x4</u>	
3	<u>8</u> ft	<u>24.3</u>	<u>24.6</u>	<u>23.8</u>	<u>2x4</u>	2 19.3 07:40
Length of cut pieces: _____ inches		Pre-Burn Fuel Average Moisture: <u>23.1</u>				
Time (clock): <u>0825</u>		Room Temperature (F): <u>70</u>	Initials: <u>B. Davis</u>			

TEST FUEL				
FUEL TYPE AND AMOUNT:	2 x 4	<u>0</u>	4 x 4	<u>5</u>
CALCULATED LOAD WEIGHT:	_____		ACTUAL LOAD WEIGHT:	<u>0</u>
FUEL PIECE LENGTH:	<u>19"</u>	_____		
MOISTURE CONTENT (METER -- DRY BASIS)				
PIECE	READINGS			TYPE
1	<u>20.1</u>	<u>22.2</u>	<u>18.8</u>	<u>4x4</u>
2	<u>19.9</u>	<u>19.2</u>	<u>18.8</u>	<u>4x4</u>
3	<u>20.1</u>	<u>19.9</u>	<u>19.3</u>	<u>4x4</u>
4	<u>20.5</u>	<u>20.2</u>	<u>20.6</u>	<u>4x4</u>
5	<u>19.8</u>	<u>20.1</u>	<u>20.3</u>	<u>4x4</u>
6	_____	_____	_____	_____
7	_____	_____	_____	_____
8	_____	_____	_____	_____
9	_____	_____	_____	_____
10	_____	_____	_____	_____
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>19.97</u>				
Time (clock): <u>0915</u>	Room Temperature (F): <u>70</u>		Initials: <u>B. Davis</u>	

Technician signature: B. Davis Date: 2-4-03

Run Notes

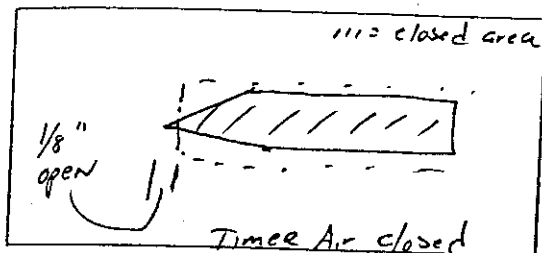
Client/Model: Health and Home Tech 7100 FP
Tracking Number: 425
Date: 1-30-03
OMNI Equipment ID Numbers: _____

Project #: 061-S-41-3
Run #: 3
Test Crew: B. Davis

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: fixed

TERTIARY: NA

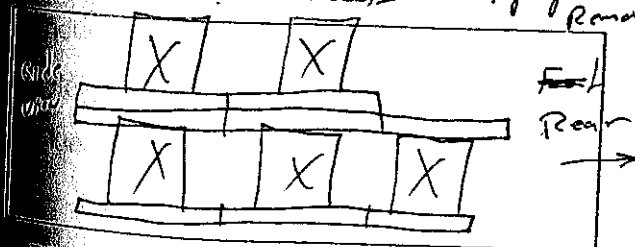
FAN: on High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
4:45	Test setting				X	

TEST FUEL CONFIGURATION SKETCH

(INDICATE VIEW ANGLE)



TEST

START UP PROCEDURES

BYPASS: NA
FUEL LOADING: by 52 sec.
DOOR: closed by 60 sec.
PRIMARY AIR: fully open until 4:55 then set to test setting by 5:00
OTHER: Second timed Air opened when Air slide opened fully closed @ 2 hours automatically.

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

Same as Above

At 4:51 min
Repositioned
fuel load
due to weight loss

SECONDARY: fixed
TERTIARY: NA

FAN: Low off for first 30 min - then turned to High

Technician signature: B. Davis

Date: 2-4-03

Supplemental Data EPA 5G/5H

Client / Model: Hen-H and Home tech 7/01 FR Project No.: 061-S-41-3
Tracking No.: 425 Date: 1-30-03 Run No.: 3 Booth: 1
Test Crew: B. Davis Start Time: 11:23 Stop Time: 19:33
OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: good

Initial: _____

Final: good

Final: _____

Calibrations: Span Gas CO₂: 9.96 O₂: _____ CO: 1.23 CO₂(DT): 1.26

	N ₂ Span		N ₂ Span		N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>0</u>		<u>EOT</u>					
O ₂								
CO ₂	<u>0.0</u>	<u>10.0</u>	<u>0.0</u>	<u>9.7</u>				
CO	<u>0.00</u>	<u>1.23</u>	<u>0.00</u>	<u>1.22</u>				
CO ₂ (DT)	<u>0.00</u>	<u>1.26</u>	<u>0.00</u>	<u>1.25</u>				

Stack Diameter (inches): 8"

Air Velocity (ft/min): Initial: 250 ft/min Final: 250 ft/min

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

Induced Draft: 0.0 %Smoke Capture: 100%

Pilot Tube Leak Test: Pre: 0.0 @ 3.2 Post: 0.0 @ 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-27-03 Initials: B/D

	Initial	Middle	Ending
Pb (in. Hg)	<u>28.60</u>	<u>28.59</u>	<u>28.58</u>
Room Temp (°F)	<u>69</u>	<u>70</u>	<u>72.68 air</u>

Technician signature: B. Davis Date: 2-4-03

Wood Heater Test Data EPA Method 5H

Run Number 4

Manufacturer: Hearth and Home Tech

Stove Model, Tracking Number: 7100 FP

Stove Type (cat, nuc, or pellet): nuc

Project Number: 061-S-41-3

Test Date: 31-Jan-03

Test Start Time: 10:14

Recording Interval (minutes): 5

Total Sampling Time (minutes): 105

Sample Rate Control Module Number: 21

Test Meter Y: 0.992

Orifice dH: 1.587

Pitot Tube Cp: 0.99

Average Barometric Pressure: 29.39

Average Fuel Moisture (dry basis %): 21.72

OMNI Equipment Numbers: Oxygen values are calculated by 20.3-(Carbon dioxide-Carbon monoxide/2)

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Flow
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8		Initial
Initial dP	0.034	0.038	0.042	0.032	0.040	0.042	0.040	0.030	H ₂ O	129.2
Initial Temp	181	181	181	180	180	179	179	179	°F	scf/minute

Signature/Date: *[Signature]* 2-21-03

Post-Test Leak Check: 0.14 @ 17 cmHg

Initial/Assumed Values			
Dilution	MW (lb/lb-mol)	28.56	Ambient CO ₂ (%) 0.034
Tunnel	H ₂ O (%)	4.00	Preferred Initial Sampling Rate (cfm/scf) 0.25

Flue Gas	
Impinger liquid, V _{ic} (g)	82.9
Volume of Water Vapor, V _w (std) (ft ³)	3.91
Moisture Content, B _{ws}	0.125

Elapsed Time	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel				Laboratory
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Ambient Temperature (F)
0	292.200		0.16		68	0	75	238	22.9		-0.055	11.2	9.6	0.27	386	10.9	270	282	515	430	593	418	180	0.037	-0.40	1.875	71
5	293.490	0.258	0.27	100.0	70	2	68	233	21.7	-1.2	-0.065	9.5	11.0	0.80	420	9.3	287	283	506	424	578	416	172	0.037	-0.40	2.740	70
10	295.080	0.318	0.26	97.6	73	2	66	242	19.4	-2.3	-0.075	3.2	16.3	2.81	614	5.9	405	282	497	404	556	429	227	0.037	-0.40	4.150	70
15	296.670	0.318	0.26	99.1	75	2	64	243	17.2	-2.2	-0.076	2.8	16.4	3.38	635	5.7	478	278	485	364	541	433	243	0.037	-0.40	4.180	73
20	298.270	0.320	0.24	100.3	77	2	64	245	15.1	-2.1	-0.076	3.0	16.2	3.40	634	5.7	502	274	482	377	537	434	246	0.037	-0.40	4.060	74
25	299.780	0.302	0.25	96.9	79	8	63	243	12.9	-2.2	-0.076	3.1	16.1	3.36	633	5.8	515	270	483	378	539	437	247	0.037	-0.40	4.060	75
30	301.350	0.314	0.23	99.4	80	10	63	244	10.8	-2.1	-0.076	3.1	16.4	2.88	628	5.8	515	267	486	369	549	441	248	0.037	-0.40	3.960	73
35	302.870	0.304	0.22	100.8	81	15	64	243	8.7	-2.1	-0.073	4.2	15.8	1.85	621	6.4	513	266	498	411	558	449	242	0.037	-0.40	3.770	75
40	304.210	0.298	0.22	99.6	81	2	65	238	7.2	-1.5	-0.075	4.5	15.8	1.27	615	6.6	514	267	508	430	571	458	239	0.037	-0.40	3.720	76
45	305.560	0.270	0.21	93.1	84	2	63	241	5.9	-1.3	-0.075	5.8	14.9	0.33	612	7.4	513	268	529	467	594	474	237	0.037	-0.40	3.460	76
50	306.950	0.278	0.19	96.9	84	2	64	243	4.7	-1.2	-0.073	8.8	14.0	0.14	597	7.9	497	268	538	483	605	478	232	0.037	-0.40	3.120	75
55	308.370	0.284	0.20	102.6	85	2	65	241	3.7	-1.0	-0.070	9.0	11.8	0.15	541	9.2	450	268	553	506	626	481	220	0.037	-0.40	2.650	75
60	309.870	0.300	0.20	106.0	85	2	65	243	3.1	-0.6	-0.067	9.4	11.4	0.14	526	9.3	425	269	588	517	639	482	212	0.037	-0.40	2.520	75
65	311.350	0.296	0.17	105.2	85	2	65	244	2.5	-0.6	-0.067	10.4	10.4	0.11	507	10.3	397	271	560	525	650	481	201	0.037	-0.40	2.150	73
70	312.640	0.258	0.16	97.7	85	2	66	241	2.0	-0.5	-0.065	11.0	9.9	0.07	500	10.8	372	275	561	521	652	476	194	0.037	-0.40	1.980	74
75	314.010	0.274	0.18	106.3	85	2	66	242	1.6	-0.4	-0.062	12.6	8.2	0.20	451	12.5	344	281	557	502	645	466	188	0.037	-0.40	1.720	75
80	315.500	0.298	0.16	109.2	86	2	66	240	1.2	-0.4	-0.062	12.1	8.6	0.31	466	11.9	326	286	550	486	637	457	184	0.037	-0.40	1.700	74
85	316.670	0.234	0.16	91.1	86	2	64	242	1.0	-0.2	-0.060	12.2	8.6	0.30	462	11.9	314	290	540	467	626	447	180	0.037	-0.40	1.680	74
90	317.950	0.256	0.17	100.5	86	2	64	241	0.7	-0.3	-0.060	12.7	8.0	0.48	439	12.4	302	295	531	450	616	439	179	0.037	-0.40	1.620	74
95	319.370	0.294	0.17	107.1	87	2	63	238	0.4	-0.3	-0.056	13.7	6.9	0.59	399	13.8	283	298	520	434	604	428	170	0.037	-0.40	1.390	75
100	320.650	0.256	0.18	96.7	87	2	63	234	0.2	-0.2	-0.055	13.7	6.9	0.57	390	13.8	274	298	516	427	595	422	167	0.037	-0.40	1.430	74
105	322.110	0.292	0.18	106.5	88	2	64	233	0.0	-0.2	-0.054	13.8	6.8	0.57	380	14.0	265	297	508	418	580	414	164	0.037	-0.40	1.390	75
Total Sampling Time (minutes)	Total Sample Volume (cf)	Average Sampling Rate (cfm)	Average Orifice dH (inches wc)	Average Proportional Rate (%)	Average Meter Temp (oF)	Maximum Sample Train Vacuum (inches Hg)	Average Impinger Exit Temperature (F)	Average Hot Box Interior Temp (oF)	Total Fuel Burned (lbs)	Average Sample Interval Weight Change	Average Flue Draft (inches wc)	Average Oxygen (%) O2	Average Carbon Dioxide (%) CO2	Average Carbon Monoxide (%) CO	Average Flue Temp (oF)	Average Air to Fuel Ratio (lb/lb)	Average Firebox Top Temp (oF)	Average Firebox Bottom Temp (oF)	Average Firebox Back Temp (oF)	Average Firebox Left Side Temp (oF)	Average Firebox Right Side Temp (oF)	Difference in (Beg./End) Stove Surface Temps (oF)	Average Dilution Tunnel Temp (oF)	Average Dilution Tunnel dP (inches wc)	Average Dilution Tunnel Static Pressure (inches wc)	Average Dilution Tunnel CO2 (%)	Average Laboratory Ambient Temp (oF)
105	29.910	0.285	0.20	100.18	81.7	15.00	65.00	240.55	22.90	-1.09	-0.07	18.55	11.82	1.09	520.73	77.26	398.23	278.77	521.86	446.82	595.05	4	207.82	0.04	-0.40	2.70	73.91

2-374264

Wood Heater Calculation Data EPA Method 5H

Run **4**

Manufacturer: **Hearth and Home Tech**

Tracking No: **7100 FP**

Test Date: **31-Jan-03**

Project Number: **061-S-41-3**

Burn Rate (dry kg/hour) = **4.88**

Emission Rate (grams/hour) = **16.42**

Note: When using the CO2 tracer-gas method, 1/Qf (by tracer gas) = Si

Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fo (1.00 to 1.12)	Qf by carbon balance (scf/minute)	Qf-new (scf/minute)	Qf by tracer gas (scf/minute)	1/Qf by tracer gas (Si)	Volume Sampled (dscf)	Si * Volume Sampled	Proportional Sample Rate	dH new
5	14.4	1.00	24.6	128.8	31.8	0.031	1.215	0.049	100.0	0.272
10	15.0	1.00	30.3	123.5	31.3	0.032	1.492	0.047	97.6	0.262
15	15.2	1.00	28.0	122.1	30.9	0.032	1.484	0.047	99.1	0.255
20	15.2	1.00	27.0	121.8	30.3	0.033	1.487	0.048	100.3	0.245
25	15.2	1.00	28.4	121.7	30.7	0.033	1.398	0.046	96.9	0.249
30	15.2	1.00	27.4	121.7	29.2	0.034	1.449	0.047	99.4	0.225
35	15.2	1.00	29.7	122.2	29.0	0.035	1.400	0.048	100.8	0.221
40	15.1	1.00	21.9	122.4	28.6	0.035	1.232	0.043	90.6	0.216
45	15.1	1.00	21.1	122.6	28.3	0.035	1.241	0.043	93.1	0.210
50	15.0	1.00	20.9	123.1	27.2	0.037	1.271	0.045	96.9	0.194
55	14.9	1.00	20.2	124.1	27.6	0.036	1.298	0.048	102.6	0.200
60	14.8	1.00	12.5	124.9	27.3	0.037	1.369	0.050	106.0	0.195
65	14.7	1.00	13.6	125.9	25.7	0.039	1.350	0.049	105.2	0.173
70	14.6	1.00	11.9	126.6	25.0	0.040	1.177	0.046	97.7	0.163
75	14.6	1.00	11.1	127.2	26.3	0.038	1.250	0.050	106.3	0.181
80	14.5	1.00	10.5	127.6	24.8	0.040	1.359	0.052	109.2	0.161
85	14.5	1.00	5.3	128.0	24.6	0.041	1.065	0.043	91.1	0.158
90	14.5	1.00	8.2	128.1	25.5	0.039	1.166	0.047	100.5	0.170
95	14.4	1.00	9.2	129.0	25.5	0.039	1.293	0.051	107.1	0.169
100	14.3	1.00	6.1	129.3	26.3	0.038	1.163	0.046	96.7	0.180
105	14.3	1.00	6.2	129.6	26.0	0.039	1.327	0.050	106.5	0.176
Test Completion	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet
No Further Data Input	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet
No Further Data Input	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet	No Data Yet
Averages/Totals	14.8	1.00	17.8	125.4	27.6	0.037	1.309		100.2	0.204

Woodstove Type

Yhc>1=cat,2=ncat, 3=pellet
EPA's Hydrocarbon Constant (%)

2
1.32

Fuel Data

Test Charge (as fired lbs)
Average Moisture (% dry basis)
Average Moisture (% wet basis)

22.9
21.72
17.84

Run Parameters

DGM initial reading (cf)
DGM final reading (cf)
Pb (inches Hg)
Tm (avg oF)
dH (avg inches wc)
Vm (scf)
Qf by carbon balance (avg dscf/minute)

292.200
322.110
28.39
81.68
0.20
27.457
17.81

Analytical Data

Probe/Front Wash (mg)
Front Filter (mg)
Impinger PM (mg)
Back Filter (mg)
Total Weight (mg)

86.6
137.0
107.8
90.4
421.8

Emission Results

Cs (g/dscf)
ER (g/hour)

0.0154
16.42

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Hearth and Home Tech. Equipment Numbers: _____ Run No.: 4
 Model: 7100 FP Date: 01/31/03
 Project No.: 061-F-41-3
 Tracking No.: 425

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	M161	753.1	616.1		137.0
B. Rear filter catch	Filter	C837/C838	332.1	241.7		90.4
C. Rinse of probe and filter assembly (FRONT)	Acetone	230	115932.6	115846.0	0.0000	86.6
D. Rinse of Impinger Set	Distilled Water	275	99643.1	99621.2	0.0000	21.9
E. Rinse of Impinger Set	Dichloromethane	150	109805.2	109798.2	0.0000	7.0
F. Rinse of filter assembly and gas train (BACK)	Acetone	180	110023.6	109944.7	0.0000	78.9
Total Particulate, mg :						421.8

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 (FRONT)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
D. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
E. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
F. Rinse of filter assembly and gas train (BACK)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

CONDENSED WATER		Weights		
IMPINGERS	Final, g	Initial, g	Net, g	
1	710.0	644.9	65.1	
2	576.2	568.0	8.2	
3	542.8	542.2	0.6	
4	899.8	890.8	9.0	
		TOTAL, g:	82.9	

Analyst: BDDate: 2-25-03

EPA Method 4 Analysis Worksheet

Client/Location: Health and Home Tech. 7100 FP

Project #: 061-3-41-3

Test Date: 1-31-03

Test Crew: BR

Run #: 4

Sample Train #: A

Assembled by: BR

Cleaned by: BR

Filter Identification

Front Filter 1st Filter # M161

Back Filter 1st Filter # C837

2nd Filter #

2nd Filter #

3rd Filter #

3rd Filter #

Gravimetric Analysis—Condensed Water

Impingers:	1	2	3	4	Total	By
Final:	710.0	576.2	542.8	899.8		
Initial:	644.9	568.0	542.2	890.8		
Net Weight (grams):	65.1	8.2	0.6	9.0	82.9	BR

Client/Model: Hendh and Home Tech 7600FP Project #: 061-S-4103 Tracking #: 425
 Date: 1-31-03 Test Crew: B Davis Run #: 4
 OMNI Equipment ID #: _____

Preburn ☒		Coal Bed:		Data: 0 = 0		Range: 4.6 - 5.7		Actual:		Coal Bed: 5.7	
Test ☐											

FUEL DATA

Client / Model: Health and Home Tech 700FP Tracking #: 425 Project #: 061-S-41-3

Date: 1-31-03 Test Crew: B. Davis Run #: 4

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B. Davis

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
Cal Value (2) = 22% Actual Reading 22

Piece	Length	Readings	Type
1	<u>8</u> ft	<u>19.4</u> <u>20.2</u> <u>19.2</u>	<u>2x4</u>
2	<u>8</u> ft	<u>23.8</u> <u>23.8</u> <u>24.3</u>	<u>2x4</u>
3	_____ ft	_____	_____

Length of cut pieces: _____ inches

Pre-Burn Fuel Average Moisture: 21.8

Time (clock): 0805 Room Temperature (F): 70 Initials: BR

TEST FUEL

FUEL TYPE AND AMOUNT: 2x4 8 4x4 5
CALCULATED LOAD WEIGHT: _____ ACTUAL LOAD WEIGHT: 8 (2x4)
22.9 (4x4)

FUEL PIECE LENGTH: 19" 22.9 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE	READINGS	TYPE
	<u>23.8</u> <u>21.4</u> <u>23.8</u>	
1	<u>19.0</u> <u>19.5</u> <u>19.0</u>	<u>4x4</u>
2	<u>21.1</u> <u>20.0</u> <u>19.9</u>	<u>4x4</u>
3	<u>23.1</u> <u>21.5</u> <u>24.2</u>	<u>4x4</u>
4	<u>21.6</u> <u>22.1</u> <u>20.9</u>	<u>4x4</u>
5	<u>20.1</u> <u>20.9</u> <u>21.4</u>	<u>4x4</u>
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.72

Time (clock): 0815 Room Temperature (F): 70 Initials: BR

Technician signature: B. Davis Date: 2-4-03

Run Notes

Client/Model: Handland Home tech 7100 F01

Project #: 061-S-41-3

Tracking Number: 425

Run #: 4

Date: 1-31-03

Test Crew: B Davis

OMNI Equipment ID Numbers: _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

fully open

Timer Air was open

SECONDARY: fixed

TERTIARY: NA

FAN: on High

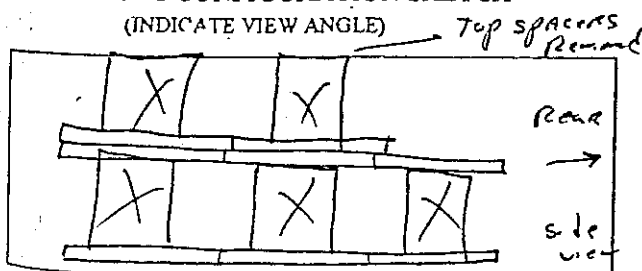
PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
<u>0</u>	<u>Test setting</u>					
<u>45</u>					<u>x</u>	

TEST

TEST FUEL CONFIGURATION SKETCH

(INDICATE VIEW ANGLE)



DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

fully open

START UP PROCEDURES

BYPASS: NA

FUEL LOADING by 49 sec

DOOR: closed by 55 sec

PRIMARY AIR: fully open full 5:00
No adjustments made.

OTHER: Timer Air open

at 36 min changed
Rear filter leak check .011 @ 16"

SECONDARY: fixed

TERTIARY: NA

FAN: on high

Technician signature: B Davis

Date: 2-4-03

Supplemental Data EPA 5G/5H

Client / Model: Hawth and Home Tech 7/00 FB Project No.: 041-S-41-2
Tracking No.: 425 Date: 1-31-03 Run No.: 4 Booth: 1
Test Crew: B Davis Start Time: 10:14 Stop Time: 11:59
OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: good

Initial: _____

Final: good

Final: _____

Calibrations: Span Gas CO₂: 9.9% O₂: _____ CO: 1.23 CO₂(DT): 1.26

	N ₂ Span		N ₂ Span		N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>Ø</u>		<u>EOT</u>					
O ₂								
CO ₂	<u>0.0</u>	<u>10.0</u>	<u>0.0</u>	<u>9.7</u>				
CO	<u>0.00</u>	<u>1.23</u>	<u>-0.01</u>	<u>1.21</u>				
CO ₂ (DT)	<u>0.00</u>	<u>1.26</u>	<u>-0.02</u>	<u>1.25</u>				

Stack Diameter (inches): 8"

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

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

Induced Draft: 0.0 %Smoke Capture: 100

Pilot Tube Leak Test: Pre: 0.0 @ 3.0 Post: 0.0 @ 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 1.27-03 Initials: B/D

	Initial	Middle	Ending
Pb (in. Hg)	<u>28.39</u>	<u>28.39</u>	<u>28.38</u>
Room Temp (°F)	<u>71</u>	<u>75</u>	<u>75</u>

Technician signature: B/D Date: 2-4-03

Number 5

Wood Heater Test Data
EPA Method 5H

Manufacturer: Hearth and Home Tech
Model, Tracking Number: 7100 FP
Serial Type (cat, ncat, or pellet): ncat
Project Number: 061-S-41-3
Test Date: 01-Feb-03
Test Start Time: 11:50
Sampling Interval (minutes): 10
Sampling Time (minutes): 250

Sample Rate Control Module Number: 21
Test Meter Y: 0.992
Orifice dH: 1.587
Pilot Tube Cp: 0.39
Average Barometric Pressure: 29.53
Average Fuel Moisture (dry basis %): 20.48
OMNI Equipment Numbers: Oxygen values are calculated by 20.3-(Carbon Dioxide-Carbon Monoxide/2)

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Flow
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8		
Initial dP	0.038	0.044	0.038	0.026	0.038	0.044	0.046	0.028	H2O	137.6
Initial Temp	103	103	103	103	102	102	102	102	oF	137.6

Signature: *B. D. ...* 2-24-03
Post-Test Leak Check: 011 @ 15 cm Hg

Initial/Assumed Values			
Dilution	MW (lb/lb-mol)	29.56	Ambient CO2 (%)
Tunnel	H2O (%)	4.00	Preferrred Initial Sampling Rate (cfm/min)

Flue Gas	
Impinger Liquid, Vol (g)	134.1
Volume of Water Vapor, Vol (std) (ft3)	6.32
Moisture Content, Btu	0.081

	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel ¹				Laboratory
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O ₂ (%)	CO ₂ (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO ₂ (%)	Ambient Temperature (F)
	323.700		0.16		75	0	75	242	21.8		-0.027	15.2	5.2	1.07	215	16.0	190	281	396	317	427	322	103	0.037	-0.40	0.530	68
	326.370	0.267	0.39	100.0	78	2	68	238	20.5	-1.3	-0.047	15.1	5.4	0.76	335	16.2	219	370	346	360	381	335	130	0.037	-0.40	0.855	69
	330.280	0.391	0.77	97.0	83	4	61	243	18.4	-2.1	-0.067	10.8	10.0	0.19	493	10.6	383	380	319	353	357	358	169	0.037	-0.40	2.265	70
	335.370	0.509	0.54	91.9	89	5	60	244	15.6	-2.8	-0.074	9.4	15.0	1.04	601	7.0	481	330	326	338	371	365	192	0.037	-0.40	2.910	72
	339.830	0.446	0.59	95.8	91	8	62	244	12.5	-3.1	-0.072	9.4	14.0	0.95	556	7.5	453	261	367	307	419	361	196	0.037	-0.40	2.840	74
	344.150	0.432	0.68	90.7	94	15	63	246	9.8	-2.7	-0.068	9.1	11.5	0.54	524	9.1	448	245	398	313	450	371	192	0.037	-0.40	2.510	75
	349.150	0.500	0.65	97.4	98	3	64	245	7.7	-2.1	-0.066	10.1	10.7	0.19	491	10.0	434	234	429	323	468	378	192	0.037	-0.40	2.300	75
	354.110	0.496	0.48	97.9	100	3	65	243	6.1	-1.6	-0.062	10.6	10.3	0.05	459	10.4	393	236	456	337	483	381	169	0.037	-0.40	1.875	76
	358.440	0.433	0.36	99.1	100	3	66	237	4.7	-1.4	-0.060	10.2	10.6	0.15	445	10.1	361	231	465	352	494	381	166	0.037	-0.40	1.670	76
	362.250	0.381	0.34	100.7	99	5	64	235	3.7	-1.0	-0.055	12.9	7.8	0.49	388	12.7	323	235	470	361	503	378	152	0.037	-0.40	1.180	75
	366.020	0.377	0.32	103.2	98	8	65	235	3.1	-0.6	-0.047	13.7	6.9	0.54	341	13.9	275	234	470	360	500	368	142	0.037	-0.40	1.020	74
	369.550	0.353	0.33	98.7	98	3	65	234	2.5	-0.6	-0.043	14.1	6.5	0.60	319	14.4	247	234	463	350	486	356	134	0.037	-0.40	0.970	74
	373.170	0.362	0.30	99.8	98	3	63	236	2.1	-0.4	-0.042	14.1	6.4	0.81	310	14.2	229	235	455	341	475	347	130	0.037	-0.40	0.900	74
	376.750	0.358	0.25	104.3	98	3	64	234	1.7	-0.4	-0.030	14.5	5.9	0.96	292	14.8	215	235	442	330	464	337	124	0.037	-0.40	0.770	73
	380.250	0.350	0.13	109.2	98	3	64	232	1.5	-0.2	-0.030	14.7	5.6	1.21	243	14.9	199	232	420	313	449	323	114	0.037	-0.40	0.535	72
	382.710	0.246	0.14	105.6	97	3	64	237	1.4	-0.1	-0.030	15.0	5.3	1.18	230	15.5	190	228	400	302	438	312	110	0.037	-0.40	0.520	72
	385.050	0.234	0.13	97.9	96	3	62	230	1.2	-0.2	-0.027	15.2	5.2	0.92	223	16.3	181	220	374	292	426	299	108	0.037	-0.40	0.495	72
	387.400	0.235	0.11	101.6	96	3	62	234	1.0	-0.2	-0.026	14.8	5.5	1.20	214	15.1	179	213	351	279	411	287	106	0.037	-0.40	0.485	71
	389.450	0.205	0.10	95.8	94	3	63	238	0.9	-0.1	-0.025	14.5	5.8	1.18	210	14.6	172	211	334	269	393	276	105	0.037	-0.40	0.485	69
	391.550	0.210	0.10	103.7	93	3	63	233	0.8	-0.1	-0.025	14.6	5.6	1.35	206	14.6	163	211	320	259	378	266	104	0.037	-0.40	0.460	69
	393.580	0.203	0.12	102.4	91	3	64	230	0.6	-0.2	-0.025	15.3	5.0	1.20	203	16.1	158	210	309	250	363	258	103	0.037	-0.40	0.450	69
	395.550	0.197	0.10	91.5	89	3	65	234	0.4	-0.2	-0.025	15.4	4.9	1.28	195	16.1	156	209	298	243	349	251	102	0.037	-0.40	0.415	72
	397.450	0.190	0.11	94.9	88	3	65	230	0.3	-0.1	-0.025	15.2	5.0	1.35	195	15.8	146	205	292	237	340	244	100	0.037	-0.40	0.440	67
	399.360	0.191	0.10	91.7	87	3	65	236	0.2	-0.1	-0.025	15.5	4.8	1.52	188	16.3	147	204	283	231	332	239	100	0.037	-0.40	0.385	71
	401.300	0.194	0.09	99.3	87	3	65	233	0.1	-0.1	-0.025	15.4	4.9	1.27	185	16.2	144	203	274	225	322	234	100	0.037	-0.40	0.380	72
	402.980	0.168	0.10	93.2	87	3	66	238	0.0	-0.1	-0.024	15.4	4.7	1.53	184	16.0	137	200	263	217	313	226	100	0.037	-0.40	0.385	72
Total Sample Volume (cf)	Average Sampling Rate (cfm)	Average Orifice dH (inches wc)	Average Proportional Rate (%)	Average Meter Temp (oF)	Maximum Sample Train Vacuum (inches Hg)	Average Impinger Exit Temperature (F)	Average Hot Box Interior Temp (oF)	Total Fuel Burned (lbs)	Average Sample Interval Weight Change	Average Flue Draft (inches wc)	Average Oxygen (% O ₂)	Average Carbon Dioxide (% CO ₂)	Average Carbon Monoxide (%CO)	Average Flue Temp (oF)	Average Air to Fuel Ratio (lb/lb)	Average Firebox Top Temp (oF)	Average Firebox Bottom Temp (oF)	Average Firebox Back Temp (oF)	Average Firebox Left Side Temp (oF)	Average Firebox Right Side Temp (oF)	Difference in (Beg./End) Stove Surface Temps (oF)	Average Dilution Tunnel Temp (oF)	Average Dilution Tunnel dP (inches wc)	Average Dilution Tunnel Static Pressure (inches wc)	Average Dilution Tunnel CO ₂ (%)	Average Laboratory Ambient Temp (oF)	
	79.280	0.317	0.29	98.54	92.4	15.00	64.35	236.96	21.80	-0.87	-0.04	13.25	7.24	0.91	317.15	75.42	253.96	241.81	373.85	302.27	415.08	96	132.40	0.04	-0.40	1.08	72.04

2-46082-04

Wood Heater Calculation Data EPA Method 5H

Run	5
Manufacturer:	Hearth and Home Tech
Model/Tracking No:	7100 FP
Test Date:	01-Feb-03
Project Number:	061-S-41-3

Burn Rate (dry kg/hour) = 1.97

Emission Rate (grams/hour) = 2.83

Note: When using the CO2 tracer-gas method, 1/Qf (by tracer gas) = Si

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fo (1.00 to 1.12)	Qf by carbon balance (scf/minute)	Qt-new (scf/minute)	Qf by tracer gas (scf/minute)	1/Qf by tracer gas (Si)	Volume Sampled (dscf)	Si * Volume Sampled	Proportional Sample Rate	dH new
5	13.6	1.00		137.6	13.2	0.076				
10	13.9	1.00	23.6	133.6	20.4	0.049	2.494	0.189	100.0	0.389
20	14.3	1.00	24.8	129.4	29.0	0.035	3.633	0.178	97.0	0.773
30	14.6	1.00	21.9	127.1	24.4	0.041	4.691	0.162	91.9	0.543
40	14.6	1.00	25.9	126.7	25.5	0.039	4.063	0.166	95.8	0.588
50	14.6	1.00	27.4	127.1	27.4	0.036	3.922	0.154	90.7	0.680
60	14.6	1.00	23.3	127.1	27.0	0.037	4.516	0.165	97.4	0.654
70	14.3	1.00	18.6	129.4	23.2	0.043	4.447	0.165	97.9	0.481
80	14.3	1.00	15.7	129.7	20.1	0.050	3.867	0.167	99.1	0.360
90	14.1	1.00	14.1	131.2	19.4	0.052	3.401	0.169	100.7	0.335
100	14.0	1.00	9.3	132.3	19.0	0.053	3.371	0.174	103.2	0.323
110	13.9	1.00	9.7	133.1	19.3	0.052	3.162	0.166	98.7	0.333
120	13.9	1.00	6.4	133.6	18.2	0.055	3.243	0.168	99.8	0.296
130	13.8	1.00	6.6	134.3	16.8	0.059	3.207	0.176	104.3	0.254
140	13.7	1.00	3.3	135.4	12.2	0.082	3.135	0.186	109.2	0.133
150	13.6	1.00	1.7	135.9	12.5	0.080	2.203	0.181	105.6	0.141
160	13.6	1.00	3.6	136.2	12.2	0.082	2.099	0.167	97.9	0.133
170	13.6	1.00	3.4	136.4	11.3	0.089	2.112	0.174	101.6	0.114
180	13.6	1.00	1.6	136.5	10.7	0.094	1.842	0.164	95.9	0.103
190	13.6	1.00	1.6	136.6	10.5	0.096	1.894	0.177	103.7	0.099
200	13.5	1.00	3.6	136.8	11.5	0.087	1.834	0.175	102.4	0.119
210	13.5	1.00	3.6	136.9	10.7	0.093	1.786	0.156	91.5	0.105
220	13.5	1.00	1.8	137.1	11.2	0.089	1.729	0.161	94.9	0.115
230	13.5	1.00	1.8	137.1	10.5	0.095	1.741	0.155	91.7	0.102
240	13.5	1.00	1.8	137.1	9.8	0.103	1.772	0.168	99.3	0.087
250	13.5	1.00	1.8	137.1	10.3	0.097	1.534	0.157	93.2	0.097
Averages/Totals	13.9	1.00	10.3	133.5	16.8	0.068	2.868		98.5	0.294

Woodstove Type

Yhc>1=cat, 2=ncat, 3=pellet

EPA's Hydrocarbon Constant (%)

Fuel Data

Test Charge (as fired lbs)

Average Moisture (% dry basis)

Average Moisture (% wet basis)

Run Parameters

DGM initial reading (cf)

DGM final reading (cf)

Pb (inches Hg)

Tm (avg oF)

dH (avg inches wc)

Vm (scf)

Qf by carbon balance (avg dscf/minute)

Analytical Data

Probe/Front Wash (mg)

Front Filter (mg)

Impinger PM (mg)

Back Filter (mg)

Total Weight (mg)

Emission Results

Cs (g/dscf)

ER (g/hour)

Final Laboratory Report - Method 5H

Dilution Tunnel Particulate Calculations

Client Name: Hearth and Home Tech.
 Model: 7100 FP
 Project No.: 061-F-41-3
 Tracking No.: 425

Equipment Numbers: _____

Run No.: 5
 Date: 02/01/03

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	M163	688.8	622.6		66.2
B. Rear filter catch	Filter	839.840.841	460.9	359.6		101.3
C. Rinse of probe and filter assembly (FRONT)	Acetone	150	102614.9	102580.6	0.0000	34.3
D. Rinse of Impinger Set	Distilled Water	320	175231.7	175184.5	0.0000	47.2
E. Rinse of Impinger Set	Dichloromethane	150	93367.3	93343.4	0.0000	23.9
F. Rinse of filter assembly and gas train (BACK)	Acetone	190	104449.4	104393.9	0.0000	55.5
Total Particulate, mg :						328.4

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 (FRONT)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
D. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
E. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
F. Rinse of filter assembly and gas train (BACK)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

CONDENSED WATER

IMPINGERS	Weights		
	Final, g	Initial, g	Net, g
1	748.4	644.4	104.0
2	581.5	567.9	13.6
3	542.8	542.5	0.3
4	916.0	899.8	16.2
TOTAL, g:			134.1

Analyst: B. D. -

Date: 3-10-03

EPA Method 4 Analysis Worksheet

Client/Location: Health and Home Tech 7100 FP

Project #: 061-S-41-3

Test Date: 2-1-03

Test Crew: B. Davis

Run #: 5

Sample Train #: A

Assembled by: B. Davis

Cleaned by: B.R.

Filter Identification

Front Filter	1st Filter # ____	Back Filter	1st Filter # ____
	2nd Filter # ____		2nd Filter # ____
	3rd Filter # ____		3rd Filter # ____

Gravimetric Analysis—Condensed Water

Impingers:	1	2	3	4	Total	By
Final:	748.4	581.5	542.8	916.0		
Initial:	644.4	567.9	542.5	899.8		
Net Weight (grams):	104.0	13.6	0.3	16.2	134.1	

SIZE TEMPERATURE TEST DATA METHOD 5G

Client/Model: Hawthorne and Home Tech 7100 FP Project #: 066-S-41-3 Tracking #: 425

Date: 2-1-03 Test Crew: BAJAS Run #: 5

OMNI Equipment ID #: _____

Preburn ☒		Coal Bed:		Actual:							
Test ☐		Data:		Coal Bed: S.3							
		0 = Ø		Range: 4.4 - 5.4							
				TEMPERATURES (oF)							
Time	Fuel Weight	Delta Weight	Stack Draft	Ambient	Top	Left	Right	Back	Bottom	Flue	Catalyst
0	7.4		-0.65	70	496	359	545	427	623	517	
10	6.4	1.0	-0.50	69	372	367	549	439	625	319	
20	6.1	0.3	-0.40	68	271	346	519	415	590	259	
30	5.9	0.2	-0.35	69	215	322	482	384	539	241	
40	5.7	0.2	-0.31	68	190	305	450	357	495	228	
50	5.5	0.2	-0.30	68	178	292	424	338	461	221	
60	5.3	0.2	-0.27	68	172	283	402	320	433	216	
70											
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

388
358
322

2-50 at 2-64

Technician signature: BAJAS Date: 2-4-03

FUEL DATA

Client / Model: Health and Home Tech 7100 FP Tracking #: 425 Project #: 061-S-41-3

Date: 2-4-03 Test Crew: B. Davis Run #: 5

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B. Davis

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
Cal Value (2) = 22% Actual Reading 22

Piece	Length		Readings		Type
1	<u>8</u> ft	<u>19.8</u>	<u>21.1</u>	<u>23.2</u>	<u>2x4</u>
2	<u>8</u> ft	<u>22.2</u>	<u>24.3</u>	<u>22.6</u>	<u>2x4</u>
3	_____ ft	_____	_____	_____	_____

Length of cut pieces: _____ inches

Pre-Burn Fuel Average Moisture: 22.2

Time (clock): 0825 Room Temperature (F): 70 Initials: BR

TEST FUEL

FUEL TYPE AND AMOUNT: 2x4 0 4x4 5
CALCULATED LOAD WEIGHT: _____ ACTUAL LOAD WEIGHT: 0 (2x4)
21.8 (4x4)

FUEL PIECE LENGTH: 19" 21.8 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE		READINGS		TYPE
1	<u>21.3</u>	<u>21.2</u>	<u>21.5</u>	<u>4x4</u>
2	<u>19.2</u>	<u>19.7</u>	<u>20.1</u>	<u>4x4</u>
3	<u>21.4</u>	<u>20.5</u>	<u>20.5</u>	<u>4x4</u>
4	<u>19.7</u>	<u>19.2</u>	<u>19.7</u>	<u>4x4</u>
5	<u>21.3</u>	<u>21.4</u>	<u>20.5</u>	<u>4x4</u>
6	_____	_____	_____	_____
7	_____	_____	_____	_____
8	_____	_____	_____	_____
9	_____	_____	_____	_____
10	_____	_____	_____	_____

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 20.48

Time (clock): 0850 Room Temperature (F): 70 Initials: BR

Technician signature: B. Davis Date: 2-4-03

Run Notes

Client/Model: Hearth and Home Tech 7100 FP

Project #: 061-S-41-3

Tracking Number: 425

Run #: 5

Date: 2-1-03

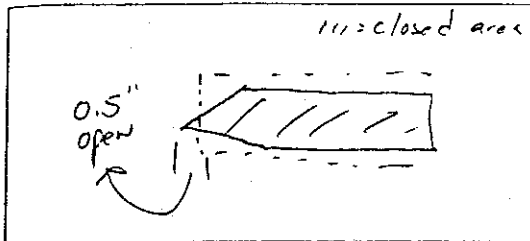
Test Crew: B. Davis

OMNI Equipment ID Numbers: _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
 (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: Fixed

TERTIARY: NA

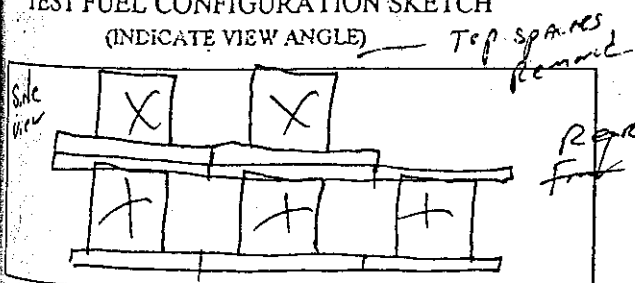
FAN: on High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
061	Test setting				X	

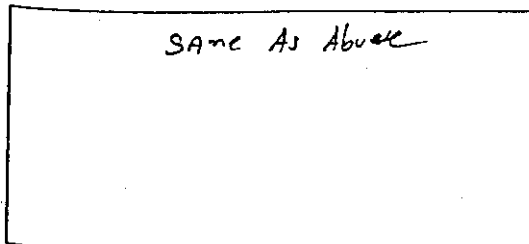
TEST

TEST FUEL CONFIGURATION SKETCH
 (INDICATE VIEW ANGLE)



DESCRIBE OR SKETCH TEST SETTINGS BELOW:
 (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



START UP PROCEDURES

BYPASS: NA

FUEL LOADING by 44 sec

DOOR: closed by 58 sec

PRIMARY AIR: fully open until 4:55
Then set to Test setting
combustion

OTHER: Timed Air set when Comb Air
opened fully. Automatically closes after
Leakcheck 2 hours.

changed Rear
 filter @ 51 min .01 @ 17"

SECONDARY: fixed

changed Rear
 filter @ 101 min .008 @ 10" Leakcheck

TERTIARY: NA

FAN:

off for first 30 min
Then turned to High

Technician signature: B. Davis

Date: 2-4-03

Supplemental Data EPA 5G/5H

Client / Model: Health and Home Tech 7100 FP Project No.: 061-S-41-3
Tracking No.: 425 Date: 2-1-03 Run No.: 5 Booth: 1
Test Crew: B. Davis Start Time: 11:50 Stop Time: 16:00
OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: good

Initial: _____

Final: good

Final: _____

Calibrations: Span Gas CO₂: 9.96 O₂: _____ CO: 1.23 CO₂(DT): 1.26

	N ₂ Span		N ₂ Span		N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	Ø		EOT					
O ₂								
CO ₂	0.0	10.0	0.0	10.1				
CO	0.00	1.23	0.00	1.25				
CO ₂ (DT)	0.00	1.26	0.00	1.25				

Stack Diameter (inches): 8"

Air Velocity (ft/min): Initial: 250 ft/min Final: 250 ft/min

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

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 @ 3.0 Post: 0.0 @ 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-27-03 Initials: B.D.

	Initial	Middle	Ending
Pb (in. Hg)	28.52	28.53	28.54
Room Temp (°F)	68	74	72

Technician signature: B.D. Date: 2-4-03

Run Number 6

Manufacturer: Hearth and Home Tech
Stove Model, Tracking Number: 7100 EP
Stove Type (cat, wood, or pellet): wood
Project Number: 067-S-41-3
Test Date: 05-Feb-03
Test Start Time: 14:50
Recording Interval (minutes): 10
Total Sampling Time (minutes): 400

Sample Rate Control Module Number: 21
Test Meter Yr: 0392
Orifice dH: 1.587
Pilot Tube Cp: 0.99
Average Barometric Pressure: 29.88
Average Fuel Moisture (dry basis %): 22.43
OMNI Equipment Numbers: Oxygen values are calculated by 20.9-(Carbon Dioxide-Carbon Monoxide/2)

Wood Heater Test Data
EPA Method 5H

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Flow
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8		Initial
Initial dP	0.036	0.048	0.044	0.034	0.038	0.046	0.046	0.032	7420	142.9
Initial Temp	108	108	108	108	108	108	108	108	°F	scf/minute

Signature/Date: *BD* 2-28-03

Post-Test Leak Check: 0.10 @ 7 cmHg

Initial/Assumed Values			
Dilution	MW (lb/lb-mol)	29.56	Ambient CO2 (%)
Tunnel	H2O (%)	4.00	Preferred Initial Sampling Rate (scf/minute)
			0.27

Flue Gas	
Impinger liquid, Visc (g)	162.4
Volume of Water Vapor, Wvstd (ft3)	7.66
Moisture Content, Bws	0.068

Elapsed Time	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (°F)						Dilution Tunnel				Laboratory
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (°F)	Sample Train Vacuum (inches Hg)	Impinger Exit Temperature (°F)	Hot Box Temperature (°F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (°F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (°F)	Temperature (°F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Ambient Temperature (°F)
0	408.500		0.19		81	0	87	232	22.7		-0.020	18.1	2.4	0.86	165	26.5	242	229	346	255	377	290	108	0.040	-0.39	0.260	73
10	411.425	0.293	0.43	100.0	85	2	68	235	22.1	-0.6	-0.028	17.5	3.2	0.47	205	24.4	262	287	304	280	332	293	110	0.040	-0.39	0.490	74
20	415.425	0.400	0.43	95.0	90	2	50	234	21.5	-0.6	-0.035	16.9	3.7	0.52	237	21.9	303	296	284	276	309	294	114	0.040	-0.39	0.570	73
30	419.520	0.409	0.54	96.8	93	2	62	232	19.4	-2.1	-0.062	8.7	12.1	0.18	461	9.0	665	296	274	277	300	362	162	0.040	-0.39	2.095	73
40	424.050	0.453	0.60	96.2	96	2	63	235	17.0	-2.4	-0.063	9.2	11.7	0.10	450	9.3	709	212	301	238	329	358	171	0.040	-0.39	2.150	73
50	428.770	0.472	0.54	95.6	99	2	62	238	15.1	-1.9	-0.061	9.3	11.0	0.08	418	9.8	683	197	321	237	350	358	166	0.040	-0.39	1.920	74
60	433.250	0.448	0.48	95.6	100	2	62	237	13.1	-2.0	-0.060	9.1	11.8	0.10	412	9.2	677	193	343	245	370	366	163	0.040	-0.39	1.935	75
70	437.650	0.440	0.47	99.6	100	2	63	238	11.2	-1.9	-0.057	10.4	10.4	0.17	402	10.2	659	191	366	257	386	372	152	0.040	-0.39	1.680	76
80	441.950	0.430	0.42	98.4	101	2	64	234	9.7	-1.5	-0.055	11.0	9.9	0.10	378	10.8	636	189	380	263	393	372	153	0.040	-0.39	1.515	74
90	446.250	0.430	0.42	103.5	101	2	65	237	8.5	-1.2	-0.054	11.1	9.7	0.12	380	10.9	625	188	389	268	398	374	151	0.040	-0.39	1.485	75
100	450.530	0.428	0.42	102.6	100	2	65	238	7.0	-1.5	-0.055	9.8	11.1	0.08	399	9.7	650	188	396	276	406	383	150	0.040	-0.39	1.695	75
110	454.470	0.394	0.39	95.0	100	2	66	242	6.0	-1.0	-0.052	11.3	9.5	0.15	388	11.1	648	190	401	290	418	387	149	0.040	-0.39	1.395	75
120	458.360	0.389	0.32	98.0	100	2	66	238	5.3	-0.7	-0.045	13.4	7.2	0.55	324	13.4	546	191	408	285	428	372	127	0.040	-0.39	0.955	71
130	462.050	0.369	0.22	101.9	98	2	65	241	4.9	-0.4	-0.035	14.6	5.8	0.91	261	15.1	460	197	405	282	423	353	123	0.040	-0.39	0.650	73
140	465.250	0.320	0.15	105.8	97	2	66	238	4.6	-0.3	-0.027	14.9	5.4	1.29	217	15.1	385	199	389	268	406	329	112	0.040	-0.39	0.495	72
150	467.870	0.262	0.16	106.4	96	2	65	240	4.4	-0.2	-0.025	15.1	5.1	1.47	206	15.3	347	198	373	257	389	313	109	0.040	-0.39	0.485	72
160	470.440	0.257	0.14	100.6	95	2	65	242	4.2	-0.2	-0.025	14.9	5.2	1.70	199	14.7	324	195	356	249	374	299	106	0.040	-0.39	0.460	71
170	472.930	0.249	0.13	104.8	94	2	64	238	4.0	-0.2	-0.025	14.6	5.3	1.93	193	14.1	305	190	337	241	358	286	104	0.040	-0.39	0.450	71
180	475.310	0.238	0.13	104.3	93	2	64	238	3.7	-0.3	-0.024	14.7	5.2	2.01	187	14.1	291	186	321	235	344	275	102	0.040	-0.39	0.450	71
190	477.570	0.226	0.13	97.3	92	2	63	235	3.5	-0.2	-0.023	14.7	5.1	2.13	184	14.1	283	183	311	233	334	269	100	0.040	-0.39	0.430	70
200	479.770	0.220	0.12	97.7	92	2	63	242	3.3	-0.2	-0.023	15.1	4.8	2.02	178	14.8	272	181	301	231	324	262	98	0.040	-0.39	0.400	69
210	481.970	0.220	0.12	99.3	91	2	64	241	3.1	-0.2	-0.021	15.4	4.5	2.03	173	15.4	253	179	292	229	311	263	97	0.040	-0.39	0.375	68
220	484.130	0.216	0.12	98.3	90	2	64	242	3.0	-0.1	-0.020	15.5	4.4	2.02	169	15.6	249	177	282	228	308	249	96	0.040	-0.39	0.360	68
230	486.250	0.212	0.11	98.8	91	2	65	238	2.9	-0.1	-0.019	15.8	4.1	2.00	165	16.3	241	174	275	225	302	243	96	0.040	-0.39	0.330	68
240	488.360	0.211	0.12	100.6	91	2	65	245	2.8	-0.1	-0.017	16.1	3.8	1.92	162	17.2	240	170	267	221	296	239	94	0.040	-0.39	0.325	68
250	490.470	0.211	0.12	94.8	91	2	65	241	2.4	-0.4	-0.017	14.2	6.1	1.25	163	14.0	240	168	260	218	290	235	93	0.040	-0.39	0.485	68
260	492.550	0.208	0.11	97.2	90	2	65	245	2.2	-0.2	-0.016	14.2	6.1	1.17	163	14.1	244	168	255	214	288	234	93	0.040	-0.39	0.465	68
270	494.600	0.205	0.11	100.4	90	2	66	240	2.0	-0.2	-0.017	14.1	6.2	1.16	165	14.0	248	170	253	212	288	234	93	0.040	-0.39	0.490	68
280	496.650	0.205	0.11	96.6	91	2	65	241	1.9	-0.1	-0.017	14.2	6.2	1.08	168	14.1	253	174	251	210	289	235	93	0.040	-0.39	0.490	68
290	498.680	0.203	0.12	95.6	91	2	65	240	1.7	-0.2	-0.018	14.2	6.1	1.15	167	14.1	260	177	251	210	291	238	93	0.040	-0.39	0.490	68
300	500.700	0.202	0.12	93.8	92	2	65	243	1.5	-0.2	-0.017	14.4	5.9	1.20	165	14.4	264	180	251	209	293	239	93	0.040	-0.39	0.480	68
310	502.870	0.217	0.12	99.4	93	2	65	246	1.4	-0.1	-0.017	14.9	5.3	1.41	165	15.1	263	181	251	208	294	239	93	0.040	-0.39	0.440	67
320	505.105	0.224	0.11	100.8	93	2	64	235	1.2	-0.2	-0.017	14.7	5.6	1.22	164	14.9	258	182	251	206	294	238	93	0.040	-0.39	0.440	67
330	507.330	0.222	0.12	105.9	93	2	64	239	1.0	-0.2	-0.017	14.7	5.5	1.31	163	14.9	257	182	250	205	292	237	92	0.040	-0.39	0.440	67
340	509.550	0.222	0.11	103.5	93	2	64	236	0.9	-0.1	-0.017	14.2	6.1	1.26	163	14.0	263	183	250	203	290	238	92	0.040	-0.39	0.480	68
350	511.820	0.227	0.12	106.7	92	2	64	233	0.7	-0.2	-0.017	14.7	5.4	1.52	165	14.7	266	184	249	200	297	237	92	0.040	-0.39	0.440	68
360	514.020	0.220	0.12	100.7	93	2	62	235	0.5	-0.2	-0.016	14.9	5.3	1.44	162	15.0	262	185	249	199	296	236	92	0.040	-0.39	0.430	68

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Wood Heater Test Data
EPA Method 5H

Run Number 6

Manufacturer: Hearth and Home Tech

Stove Model, Tracking Number: 7100 FP

Stove Type (cat, wood, or pellet): wood

Project Number: 061-S-41-3

Test Date: 06-Feb-03

Test Start Time: 14:50

Recording Interval (minutes): 10

Total Sampling Time (minutes): 400

Sample Rate Control Module Number: 21

Test Meter Y: 0.392

Orifice dH: 1.587

Pilot Tube Cp: 0.39

Average Barometric Pressure: 29.38

Average Fuel Moisture (dry basis %): 22.43

OMNI Equipment Numbers: Oxygen values are calculated by 20.9-(Carbon dioxide-Carbon monoxide/Z)

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Flow Initial
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8		
Initial dP	0.036	0.048	0.044	0.034	0.038	0.046	0.046	0.032	H2O	142.3
Initial Temp	108	108	108	108	108	108	108	108	OF	scf/minute

Signature/Date: BDO 2-25-03

Post-Test Leak Check: 0.010 @ 7 cmHg

Initial/Assumed Values			
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)
	H2O (%)	4.00	Preferred Initial Sampling Rate (cfm/scf)
			0.27

Flue Gas	
Impinger Liquid, Vol (g)	162.4
Volume of Water Vapor, Wv (std) (ft3)	7.66
Moisture Content, Bws	0.068

Elapsed Time	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel				Laboratory	
	Dry Gas Meter Reading (cf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Meter Temperature (F)	Sample Train Vacuum (inches Hg.)	Impinger Exit Temperature (F)	Hot Box Temperature (F)	Scale Reading (lbs)	Weight Change (lbs)	Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)		Ambient Temperature (F)
370	516.270	0.225	0.11	103.3	93	2	62	233	0.4	-0.1	-0.016	14.8	5.4	1.36	159	15.0	258	184	248	196	284	234	91	0.040	-0.39	0.430	68	
380	518.500	0.223	0.11	104.1	91	2	63	229	0.2	-0.2	-0.016	14.9	5.2	1.56	159	15.0	253	185	247	193	280	232	91	0.040	-0.39	0.410	68	
390	520.750	0.225	0.11	106.7	90	2	63	233	0.1	-0.1	-0.016	15.2	4.9	1.69	153	15.3	248	185	245	190	277	229	91	0.040	-0.39	0.390	67	
400	523.010	0.226	0.11	106.7	90	2	64	237	0.0	-0.1	-0.015	15.7	4.5	1.49	152	16.6	240	184	244	188	273	226	90	0.040	-0.39	0.360	67	
Total Sampling Time (minutes)	Total Sample Volume (cf)	Average Sampling Rate (cfm)	Average Orifice dH (inches wc)	Average Proportional Rate (%)	Average Meter Temp (oF)	Maximum Sample Train Vacuum (inches Hg)	Average Impinger Exit Temperature (F)	Average Hot Box Interior Temp (oF)	Total Fuel Burned (lbs)	Average Sample Interval Weight Change	Average Flue Draft (inches wc)	Average Oxygen (%) O2	Average Carbon Dioxide (%) CO2	Average Carbon Monoxide (%) CO	Average Flue Temp (oF)	Average Air to Fuel Ratio (lb/lb)	Average Firebox Top Temp (oF)	Average Firebox Bottom Temp (oF)	Average Firebox Back Temp (oF)	Average Firebox Left Side Temp (oF)	Average Firebox Right Side Temp (oF)	Difference in (Bag/End) Stove Surface Temps (oF)	Average Dilution Tunnel Temp (oF)	Average Dilution Tunnel dP (inches wc)	Average Dilution Tunnel Static Pressure (inches wc)	Average Dilution Tunnel CO2 (%)	Average Laboratory Ambient Temp (oF)	
400	114.510	0.286	0.22	100.21	93.5	2.00	64.68	237.95	22.70	-0.57	-0.03	18.34	6.40	1.13	231.93	65.95	366.63	193.85	303.07	234.07	330.78	64	111.90	0.04	-0.39	0.74	70.37	

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Wood Heater Calculation Data EPA Method 5H

Run	6
Manufacturer:	Hearth and Home Tech
Model/Tracking No	7100 FP
Test Date:	06-Feb-03
Project Number:	061-S-41-3

Burn Rate (dry kg/hour) = 1.26

Emission Rate (grams/hour) = 3.22

Note: When using the CO2 tracer-gas method, 1/Qf (by tracer gas) = Si

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fo (1.00 to 1.12)	Qf by carbon balance (scf/minute)	Qt-new (scf/minute)	Qf by tracer gas (scf/minute)	1/Qf by tracer gas (Si)	Volume Sampled (dscf)	Si * Volume Sampled	Proportional Sample Rate	dH new
0	14.1	1.00		142.9	13.7	0.073				
10	14.1	1.00	16.1	142.2	20.5	0.049	2.735	0.200	100.0	0.425
20	14.1	1.00	14.5	141.7	20.7	0.048	3.715	0.181	95.0	0.431
30	14.7	1.00	20.6	136.1	23.2	0.043	3.768	0.182	96.8	0.540
40	14.8	1.00	24.4	135.1	24.5	0.041	4.147	0.178	96.2	0.597
50	14.8	1.00	20.5	135.7	23.3	0.043	4.298	0.175	95.6	0.538
60	14.7	1.00	20.2	136.0	22.0	0.046	4.057	0.174	95.6	0.477
70	14.6	1.00	21.3	137.2	21.8	0.046	3.977	0.181	99.6	0.469
80	14.6	1.00	17.7	137.1	20.6	0.049	3.887	0.178	98.4	0.417
90	14.6	1.00	14.4	137.3	20.6	0.049	3.879	0.188	103.5	0.419
100	14.6	1.00	16.0	137.4	20.6	0.048	3.861	0.187	102.6	0.420
110	14.6	1.00	12.2	137.6	19.8	0.051	3.561	0.173	95.0	0.386
120	14.3	1.00	10.3	140.1	18.0	0.056	3.515	0.178	98.0	0.320
130	14.2	1.00	6.7	140.6	15.0	0.067	3.334	0.185	101.9	0.224
140	14.1	1.00	5.0	141.9	12.2	0.082	2.901	0.193	105.8	0.148
150	14.1	1.00	3.4	142.3	12.7	0.079	2.379	0.195	106.4	0.160
160	14.0	1.00	3.3	142.7	11.8	0.085	2.338	0.185	100.6	0.138
170	14.0	1.00	3.1	142.9	11.3	0.089	2.269	0.193	104.8	0.127
180	14.0	1.00	4.7	143.2	11.5	0.087	2.173	0.192	104.3	0.133
190	14.0	1.00	3.1	143.5	11.2	0.089	2.067	0.179	97.3	0.126
200	13.9	1.00	3.3	143.7	11.0	0.091	2.016	0.180	97.7	0.122
210	13.9	1.00	3.4	143.8	11.0	0.091	2.016	0.183	99.3	0.121
220	13.9	1.00	1.7	144.0	10.7	0.093	1.983	0.181	98.3	0.116
230	13.9	1.00	1.8	144.0	10.5	0.095	1.949	0.181	98.8	0.110
240	13.9	1.00	1.9	144.2	11.1	0.090	1.937	0.185	100.6	0.125
250	13.9	1.00	6.2	144.4	10.7	0.093	1.937	0.174	94.8	0.116
260	13.9	1.00	3.1	144.4	10.3	0.097	1.909	0.178	97.2	0.106
270	13.9	1.00	3.1	144.4	10.7	0.094	1.885	0.184	100.4	0.115

Woodstove Type

Yhc>1=cat,2=ncat, 3=pellet
EPA's Hydrocarbon Constant (%)

2
1.32

Fuel Data

Test Charge (as fired lbs)-
Average Moisture (% dry basis)
Average Moisture (% wet basis)

22.7
22.43
18.32

Run Parameters

DGM initial reading (cf)
DGM final reading (cf)
Pb (inches Hg)
Tm (avg oF)
dH (avg inches wc)
Vm (scf)
Qf by carbon balance (avg dscf/minute)

408.500
523.010
28.88
93.46
0.22
104.660
7.36

Analytical Data

Probe/Front Wash (mg)
Front Filter (mg)
Impinger PM (mg)
Back Filter (mg)
Total Weight (mg)

70.5
86.8
416.5
188.8
762.6

Emission Results

Cs (g/dscf)
ER (g/hour)

0.0073
3.22

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OMNI-Test Laboratories

280	13.9	1.00	1.6	144.4	10.7	0.094	1.885	0.177	95.6	0.114
290	13.9	1.00	3.1	144.4	10.9	0.092	1.863	0.175	95.6	0.118
300	13.9	1.00	3.2	144.4	11.0	0.091	1.854	0.171	93.8	0.121
310	13.9	1.00	1.7	144.4	11.1	0.090	1.988	0.181	99.4	0.124
320	13.9	1.00	3.3	144.4	10.5	0.095	2.044	0.184	100.8	0.111
330	13.9	1.00	3.3	144.5	10.7	0.093	2.035	0.193	105.9	0.115
340	13.9	1.00	1.5	144.5	10.6	0.094	2.030	0.189	103.5	0.113
350	13.9	1.00	3.2	144.5	10.9	0.091	2.076	0.195	106.7	0.120
360	13.9	1.00	3.3	144.5	10.9	0.092	2.016	0.184	100.7	0.118
370	13.8	1.00	1.7	144.6	10.7	0.094	2.058	0.189	103.3	0.114
380	13.8	1.00	3.3	144.6	10.5	0.095	2.039	0.191	104.1	0.111
390	13.8	1.00	1.7	144.6	10.6	0.095	2.065	0.196	106.7	0.113
400	13.8	1.00	1.8	144.7	10.6	0.095	2.078	0.196	106.7	0.112
Averages/Totals	14.1	1.00	7.4	142.1	14.2	0.077	2.613		100.2	0.223

2-58042-64

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Hearth and Home Tech. Equipment Numbers: _____ Run No.: 6
 Model: 7100 FP Date: 02/06/03
 Project No.: 061-F-41-3
 Tracking No.: 425

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	M181	698.5	611.7		86.8
B. Rear filter catch	Filter	C842	308.4	119.6		188.8
C. Rinse of probe and filter assembly (FRONT)	Acetone	130	117894.7	117824.2	0.0000	70.5
D. Rinse of Impinger Set	Distilled Water	335	143744.8	143568.7	0.0000	176.1
E. Rinse of Impinger Set	Dichloromethane	150	104475.0	104396.0	0.0000	79.0
F. Rinse of filter assembly and gas train (BACK)	Acetone	150	137378.2	137216.8	0.0000	161.4
Total Particulate, mg :						762.6

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 (FRONT)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
D. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
E. Rinse of Impinger Set	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
F. Rinse of filter assembly and gas train (BACK)	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

CONDENSED WATER

IMPINGERS	Weights		
	Final, g	Initial, g	Net, g
1	765.0	641.1	123.9
2	580.1	566.5	13.6
3	548.2	547.2	1.0
4	941.5	917.6	23.9
TOTAL, g:			162.4

Analyst: BJD

Date: 2-28-03

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EPA Method 4 Analysis Worksheet

Client/Location: Hamill and Hone Tech 7100 RP

Project #: 061-S-71-3

Test Date: 2-6-03

Test Crew: B DAVIS

Run #: 6

Sample Train #: A Assembled by: B D

Cleaned by: B D

Filter Identification

Front Filter	1st Filter # <u>M181</u>	Back Filter	1st Filter # <u>C842</u>
2nd Filter #	___	2nd Filter #	___
3rd Filter #	___	3rd Filter #	___

Gravimetric Analysis—Condensed Water

Impingers:	1	2	3	4	Total	By
Final:	<u>765.0</u>	<u>580.1</u>	<u>548.2</u>	<u>941.5</u>		
Initial:	<u>641.1</u>	<u>566.5</u>	<u>547.2</u>	<u>917.6</u>		
Net Weight (grams):	<u>123.9</u>	<u>13.6</u>	<u>1.0</u>	<u>23.9</u>	<u>162.4</u>	

Tracking #: 425

Test Crew: A Davis

Run #: 6

Technician signature:

Date: 2-26-03

2-6122-64

FUEL DATA

Client / Model: Handhand Home tech 7100 FP Tracking #: 425 Project #: 061-5413

Date: 2-6-03 Test Crew: B Davis Run #: 6

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B Davis

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	<u>12</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22</u>		
Piece	Length	Readings		Type	
1	<u>8</u> ft	<u>22.2</u>	<u>21.1</u>	<u>22.5</u>	<u>2x4</u>
2	<u>8</u> ft	<u>21.5</u>	<u>20.9</u>	<u>18.6</u>	<u>2x4</u>
3	<u>4 @ 20"</u>				
Length of cut pieces: <u>8 @ 12"</u> inches		Pre-Burn Fuel Average Moisture: <u>21.1</u>			
Time (clock): <u>12:30</u>		Room Temperature (F): <u>75</u>	Initials: <u>BD</u>		

TEST FUEL				
FUEL TYPE AND AMOUNT:	2 x 4 <u>6</u>	4 x 4 <u>5</u>		
CALCULATED LOAD WEIGHT:		ACTUAL LOAD WEIGHT:	<u>22.7</u>	(2 x 4)
FUEL PIECE LENGTH: <u>19'</u>			<u>22.7</u>	(4 x 4)
			<u>22.7</u>	Total
MOISTURE CONTENT (METER -- DRY BASIS)				
PIECE	READINGS			TYPE
1	<u>23.8</u>	<u>24.1</u>	<u>23.9</u>	<u>4x4</u>
2	<u>17.1</u>	<u>21.0</u>	<u>21.2</u>	<u>4x4</u>
3	<u>24.9</u>	<u>23.1</u>	<u>24.7</u>	<u>4x4</u>
4	<u>20.4</u>	<u>21.1</u>	<u>21.0</u>	<u>4x4</u>
5	<u>23.1</u>	<u>22.5</u>	<u>22.5</u>	<u>4x4</u>
6				
7				
8				
9				
10				
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>22.43</u>				
Time (clock): <u>12:31</u>		Room Temperature (F): <u>75</u>	Initials: <u>BD</u>	

Technician signature: BD Date: 2-16-03

Run Notes

Client/Model: Health and Home Tech 2100 FP

Project #: 041-S-41-3

Tracking Number: 425

Run #: 6

Date: 2-6-03

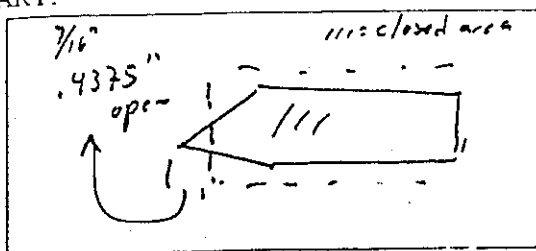
Test Crew: B. Davis

OMNI Equipment ID Numbers: _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: fixed

TERTIARY: NA

FAN: on high

Timer Air on

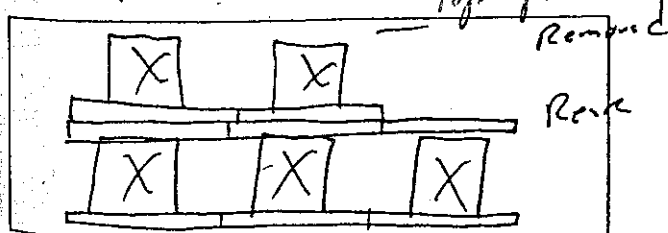
PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	Test setting					
45				0.6	X	

TEST

TEST FUEL CONFIGURATION SKETCH

(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: NA

FUEL LOADING By 54 sec

DOOR: closed by 60

PRIMARY AIR: fully open until 4:45
then 1st to test setting at 5:00 min.

OTHER:

Timer Air set when manual
slide fully open. Automatically closed
@ 2 hrs.

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

SAME as Above

241 min Repositioned
coals due to weight
loss in 10 min.

SECONDARY: fixed

TERTIARY: NA

FAN:

off for first 30 min
then turned to High

Technician signature: B. Davis

Date: 2-26-03

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Supplemental Data EPA 5G/5H

Client / Model: Health and Home Tech 7600 R/B Project No.: 061-S - Y1 - 3
 Tracking No.: 425 Date: 2-6-03 Run No.: 6 Booth: 1
 Test Crew: B. Davis Start Time: 14:50 Stop Time: 21:30
 OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack:

Initial: good

Final: good

Dilution Tunnel (Method 5G Only):

Initial: _____

Final: _____

Calibrations: Span Gas CO₂: 9.96 O₂: _____ CO: 1.23 CO₂(DT): 1.26

Time	N ₂ Span		N ₂ Span		N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	Ø		EOT					
O ₂								
CO ₂	0.0	10.0	0.0	9.9				
CO	0.00	1.23	0.00	1.26				
CO ₂ (DT)	0.00	1.26	0.00	1.27				

Stack Diameter (inches): 8"

Air Velocity (ft/min): Initial: 250 ft/min Final: < 50 ft/min

Scale Audit (lbs.): Pretest: 10.0 Post Test: 14.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 @ 3.0" Post: 0.0 @ 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 2-27-03 Initials: B.R.

	Initial	Middle	Ending
Pb (in. Hg)	<u>28.88</u>	<u>28.88</u>	<u>28.87</u>
Room Temp (°F)	<u>73</u>	<u>71</u>	<u>67</u>

Technician signature: B. Davis Date: 2-6-03