Certification Test Report

Hearth & Home Technologies

Wood Fireplace Insert

Model: 3100-I ACC

Prepared for:	Hearth & Home Technologies 1445 North Highway Colville, WA 99114
Prepared by:	OMNI-Test Laboratories, Inc. 13327 NE Airport Way Portland, OR 97230 (503) 643-3788
Test Period:	January 13-16, 2009
Report Date:	April 2009
Report Number:	061-S-74-3

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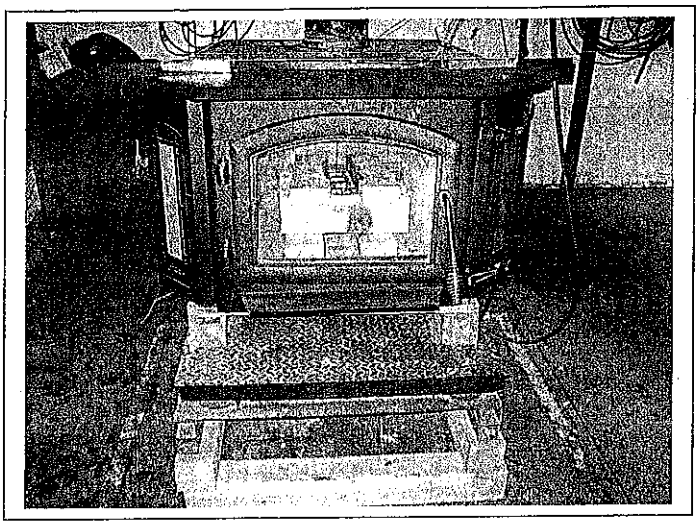
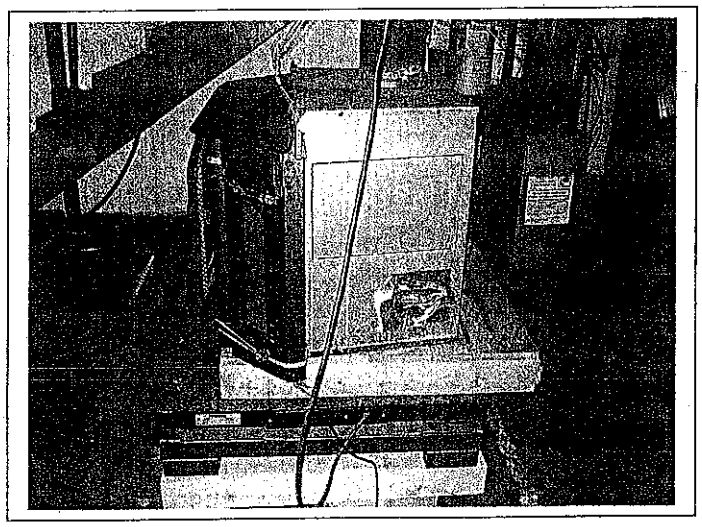
Hearth & Home Technologies

3100-I ACC

Test Dates: January 13-16, 2009





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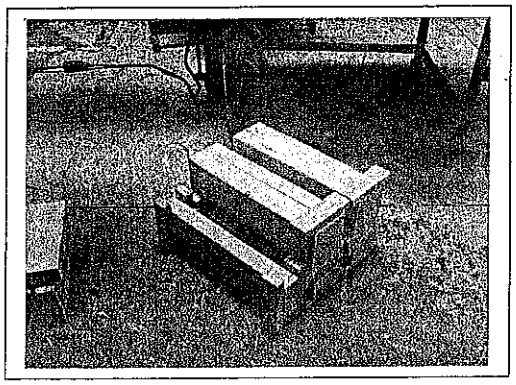
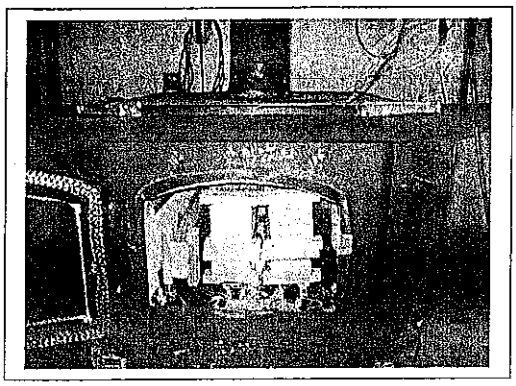
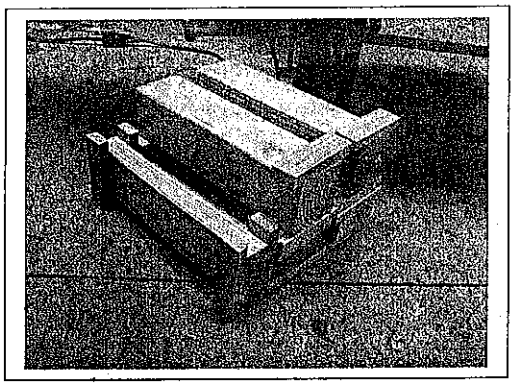
Run 1 – Fuel



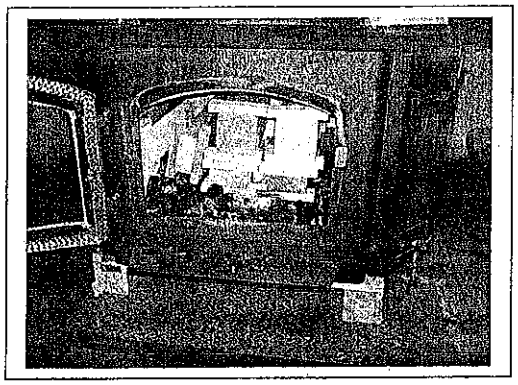
Run 1 – Newly Loaded Stove



Run 2 – Fuel



Run 2 – Newly Loaded Stove



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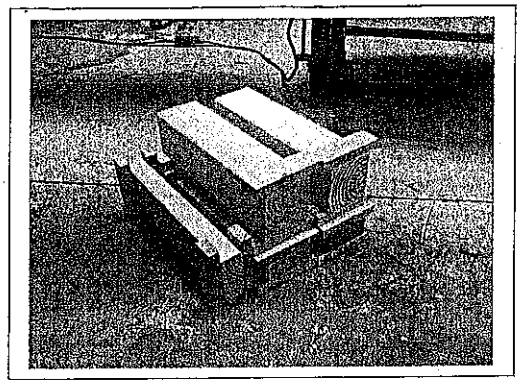
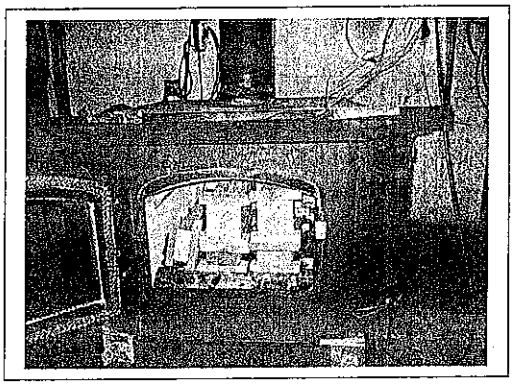
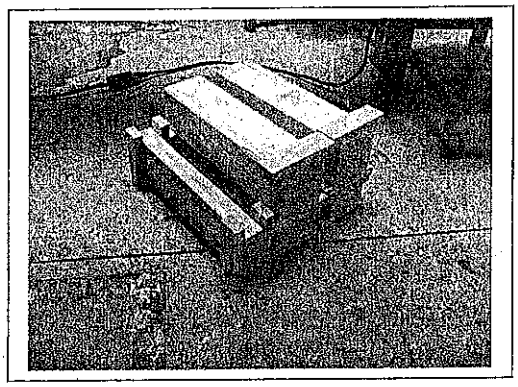
Run 3 – Fuel



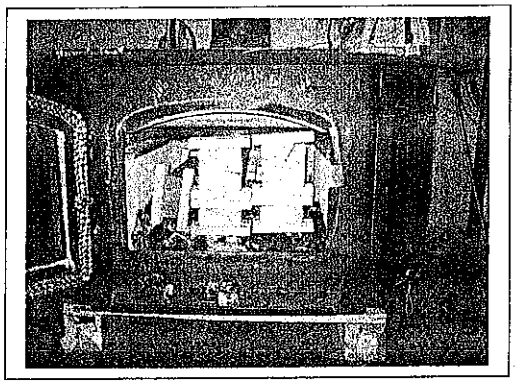
Run 3 – Newly Loaded Stove



Run 4 – Fuel



Run 4 – Newly Loaded Stove



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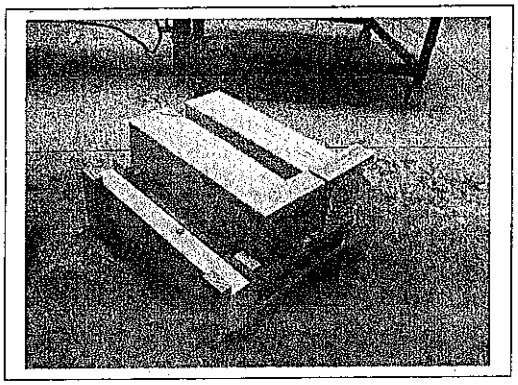
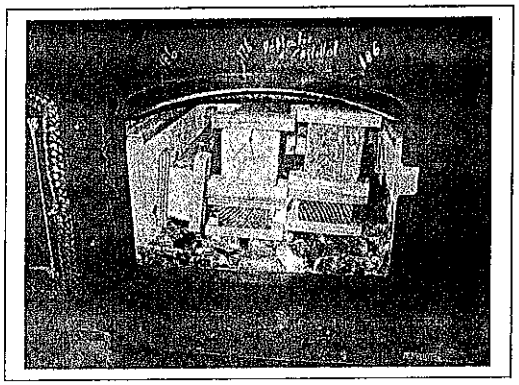
Run 5 – Fuel



Run 5 – Newly Loaded Stove



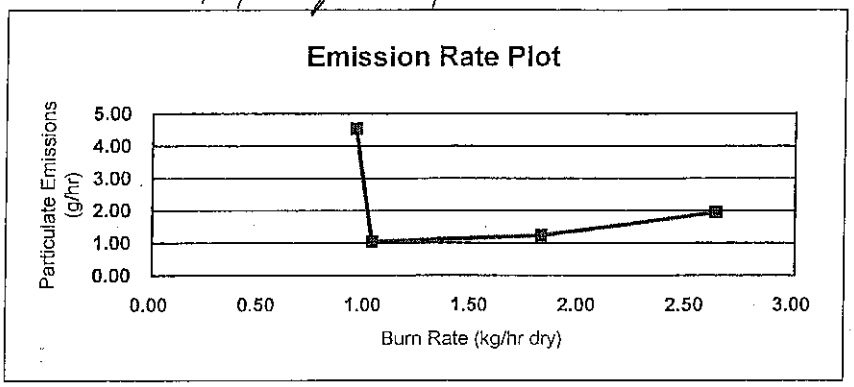
Section 4

Test Data by Run

EPA Weighted Average Emissions
EPA Method 28

Client:	Hearth & Home Tecl	Status:	Final
Stove Model:	31-I	Stove Type:	Non-Catalytic Stove
Test Dates:	1/13/09 - 1/16/09		
Project Number:	061-S-74-3		
Tracking Number:	1316		
Signature/Date:	3/20/09		

Weighted Average (g/hr)
2.0



Run #	3	
Burn Rate (dry kg/hr)	0.95	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	4.53	
Cap (g/hr)	15	
Weighting Factor	0.396	24.07%
Heat Output (BTU/hr)	11479	

Run #	1	
Burn Rate (dry kg/hr)	1.03	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.04	
Cap (g/hr)	15	
Weighting Factor	0.550	33.41%
Heat Output (BTU/hr)	12446	

Run #	5	
Burn Rate (dry kg/hr)	1.82	
Catagory	3	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.24	
Cap (g/hr)	18	
Weighting Factor	0.578	35.10%
Heat Output (BTU/hr)	21992	

Run #	4	
Burn Rate (dry kg/hr)	2.63	
Catagory	4	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.94	
Cap (g/hr)	18	
Weighting Factor	0.122	7.42%
Heat Output (BTU/hr)	31780	

Run 1

Wood Heater Calculation Data
EPA Method 5H

Run	1
Manufacturer:	Hearth and Home Tech
Model/Tracking No.:	31-I
Test Date:	13-Jan-09
Project Number:	061-S-74-3

Burn Rate (dry kg/hour) = 1.03

Emission Rate (grams/hour) = 1.04

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	14.0	1.04		146.8	7.7	0.129				
10	14.1	1.01	7.3	145.9	12.1	0.083	3.009	0.389	100.0	0.729
20	14.1	1.02	12.8	145.7	10.2	0.098	4.532	0.375	98.2	0.516
30	14.1	0.97	5.3	145.8	9.7	0.103	3.842	0.377	99.1	0.468
40	14.1	1.01	12.6	145.4	9.7	0.103	3.673	0.379	99.7	0.471
50	14.1	0.99	8.4	145.4	9.7	0.103	3.657	0.376	99.1	0.471
60	14.1	1.01	10.7	145.5	9.7	0.103	3.601	0.370	98.0	0.469
70	14.1	0.98	7.9	145.9	9.0	0.112	3.630	0.374	99.1	0.399
80	14.0	0.99	7.0	146.1	9.0	0.112	3.424	0.382	101.1	0.398
90	14.0	1.03	6.3	146.3	8.9	0.113	3.436	0.384	101.4	0.392
100	14.0	1.02	6.1	146.2	8.6	0.117	3.317	0.373	98.8	0.363
110	14.0	1.05	6.2	146.6	8.4	0.119	3.306	0.386	102.1	0.351
120	14.0	1.05	4.6	147.0	7.9	0.127	3.168	0.377	99.5	0.308
130	13.9	1.08	1.2	147.4	7.4	0.135	2.912	0.370	97.9	0.272
140	13.9	1.08	1.3	147.7	7.2	0.138	2.841	0.384	101.5	0.259
150	13.9	1.05	1.3	147.7	6.9	0.146	2.805	0.388	102.5	0.233
160	13.9	1.05	1.3	147.8	6.9	0.144	2.603	0.380	100.3	0.240
170	13.9	1.07	2.7	147.9	6.9	0.145	2.605	0.375	99.0	0.237
180	13.9	1.07	1.3	147.8	6.7	0.148	2.615	0.378	99.8	0.226
190	13.9	1.06	2.5	147.9	6.9	0.146	2.564	0.380	100.4	0.234
200	13.9	1.06	1.3	147.9	7.1	0.140	2.649	0.386	101.8	0.251
210	13.9	1.06	2.7	147.9	7.0	0.142	2.654	0.372	98.2	0.244
220	13.9	1.08	1.3	147.9	7.2	0.138	2.535	0.361	95.5	0.258
230	13.9	1.08	1.4	147.8	7.3	0.137	2.569	0.356	94.3	0.265
240	13.9	1.07	1.4	147.8	7.2	0.139	2.660	0.363	96.6	0.257
250	13.9	1.08	1.5	147.8	7.4	0.135	2.715	0.377	100.1	0.273
260	13.9	1.10	3.1	147.7	7.6	0.132	3.112	0.419	110.7	0.282
270	13.9	1.09	1.5	147.8	7.3	0.137	2.785	0.369	97.6	0.263
280	13.9	1.08	1.5	147.7	6.8	0.147	2.764	0.378	100.2	0.228
Averages/Totals	14.0	1.05	4.4	147.0	8.1	0.127	3.071		99.7	0.334

Woodstove Type	
Yhc>1=cat,2=ncat, 3=pellet	2
EPA's Hydrocarbon Constant (%)	1.32
Fuel Data	
Test Charge (as fired lbs)	12.7
Average Moisture (% dry basis)	19.76
Average Moisture (% wet basis)	16.50
Run Parameters	
DGM initial reading (cf)	0.000
DGM final reading (cf)	91.504
Pb (inches Hg)	28.90
Tm (avg oF)	75.38
dH (avg inches wc)	0.33
Vm (scf)	85.932
Qf by carbon balance (avg dscf/minute)	4.38
Analytical Data	
Probe/Front Wash (mg)	77.0
Front Filter (mg)	56.1
Impinger PM (mg)	197.2
Back Filter (mg)	8.1
Total Weight (mg)	340.4
Emission Results	
Cs (g/dscf)	0.0040
ER (g/hour)	1.04

Wood Heater Test Data
EPA Method 5H

Run Number 1

Manufacturer:	Hearth and Home Tech	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	31-I	Test Meter 'Y':	0.985
Stove Type (cat, ncat, or pellet):	ncat	Orifice dH@:	1.764
Project Number:	061-S-74-3	Pitot Tube Cp:	0.99
Test Date:	13-Jan-09	Average Barometric Pressure:	28.90
Test Start Time:	11:43	Average Fuel Moisture (dry basis %):	19.76
Recording Interval (minutes):	10	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	280		

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	0.042	0.044	0.040	0.036	0.038	0.044	0.044	0.040	"H2O	146.8
Initial Temp	88	88	88	88	88	88	88	88	oF	scf/minute

Signature/Date: K. J. Morg 4-23-09

Post-Test Leak Check: .006 @ 2.5 cfm@"Hg

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)	0.035
	H2O (%)	4.00	Preferred Initial Sampling Rate (cf/minute)	0.32

Flue Gas	
Impinger liquid, Vlc (g)	69.6
Volume of Water Vapor, Vw(std) (ft3)	3.28
Moisture Content, Bws	0.037

Elapsed Time	Particulate Sampling System: 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)	Fuel Weight: Scale Reading (lbs)	Weight Change (lbs)	Stove Flue-Gas Conditions: Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Stove Temperatures (oF): Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Dilution Tunnel: Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Laboratory: Ambient Temperature (F)
0	0.000		0.30		70	1	75	230	12.7		-0.030	10.1	10.0	0.81	242	10.0	390	365	323	269	392	348	88	0.041	-0.47	0.560	67
10	3.172	0.317	0.73	100.0	72	1	71	230	12.0	-0.7	-0.050	9.6	10.6	1.20	345	9.2	376	354	249	235	352	313	95	0.041	-0.47	0.910	67
20	7.963	0.479	0.52	98.2	74	1	65	230	10.7	-1.3	-0.048	8.7	11.4	1.18	351	8.7	512	338	228	230	335	329	97	0.041	-0.47	0.830	67
30	12.042	0.408	0.47	99.1	73	1	64	229	10.0	-0.7	-0.057	5.0	15.9	0.94	379	6.7	545	324	224	241	317	330	96	0.041	-0.47	1.090	67
40	15.934	0.389	0.47	99.7	74	1	66	230	8.5	-1.5	-0.050	6.0	14.6	0.30	382	7.5	583	312	231	254	320	340	99	0.041	-0.47	1.010	68
50	19.817	0.388	0.47	99.1	74	1	63	230	7.4	-1.1	-0.055	5.3	14.9	1.61	376	6.8	608	303	260	270	334	355	99	0.041	-0.47	1.030	68
60	23.640	0.382	0.47	98.0	74	1	63	229	6.2	-1.2	-0.046	7.2	13.3	0.63	360	8.0	593	297	285	288	354	363	98	0.041	-0.47	0.920	68
70	27.494	0.385	0.40	99.1	75	1	64	229	5.3	-0.9	-0.048	7.5	13.3	0.88	329	7.8	551	293	298	294	357	359	95	0.041	-0.47	0.850	70
80	31.137	0.364	0.40	101.1	75	1	63	229	4.5	-0.8	-0.050	7.4	13.0	1.20	310	7.8	529	289	307	293	375	359	94	0.041	-0.47	0.830	69
90	34.793	0.366	0.39	101.4	75	1	64	231	3.8	-0.7	-0.046	7.4	12.3	1.61	312	7.9	514	286	318	304	395	363	92	0.041	-0.47	0.780	68
100	38.322	0.353	0.36	98.8	75	1	65	229	3.0	-0.8	-0.048	4.4	15.5	1.22	334	6.7	515	280	325	301	404	365	83	0.041	-0.47	0.940	68
110	41.840	0.352	0.35	102.1	75	1	64	230	2.4	-0.6	-0.036	9.2	10.4	1.40	274	9.2	502	279	335	292	420	366	90	0.041	-0.47	0.630	67
120	45.211	0.337	0.31	99.5	75	1	65	230	2.0	-0.4	-0.034	10.7	8.9	1.56	236	10.3	415	281	331	271	428	345	87	0.041	-0.47	0.510	68
130	48.310	0.310	0.27	97.9	75	1	65	230	1.9	-0.1	-0.027	11.2	8.3	1.31	209	11.1	349	284	319	252	415	324	84	0.041	-0.47	0.450	67
140	51.334	0.302	0.26	101.5	75	1	64	228	1.8	-0.1	-0.024	11.8	7.7	1.32	188	11.7	301	286	312	237	396	306	82	0.041	-0.47	0.410	69
150	54.319	0.299	0.23	102.5	75	1	62	229	1.7	-0.1	-0.023	11.8	7.9	1.46	183	11.3	279	287	304	230	381	288	82	0.041	-0.47	0.400	71
160	57.090	0.277	0.24	100.3	75	1	62	230	1.6	-0.1	-0.021	11.9	7.8	1.44	176	11.5	264	287	297	225	368	288	81	0.041	-0.47	0.400	71
170	59.863	0.277	0.24	99.0	75	1	63	229	1.4	-0.2	-0.019	12.3	7.2	1.63	168	11.9	251	285	293	220	352	280	80	0.041	-0.47	0.370	72
180	62.646	0.278	0.23	99.8	75	1	62	228	1.3	-0.1	-0.016	11.8	7.6	1.67	165	11.4	241	283	280	216	339	272	81	0.041	-0.47	0.380	72
190	65.375	0.273	0.23	100.4	76	1	63	228	1.1	-0.2	-0.016	11.5	7.9	1.75	165	11.0	237	280	279	215	332	269	80	0.041	-0.47	0.400	72
200	68.200	0.283	0.25	101.8	77	1	65	229	1.0	-0.1	-0.016	12.1	7.4	1.65	158	11.6	234	276	280	215	326	268	80	0.041	-0.47	0.390	75
210	71.035	0.283	0.24	98.2	77	1	65	230	0.8	-0.2	-0.014	12.2	7.3	1.65	160	11.8	231	274	276	212	321	263	80	0.041	-0.47	0.380	73
220	73.743	0.271	0.26	95.5	77	1	64	231	0.7	-0.1	-0.014	12.2	7.1	1.81	159	11.8	230	272	273	210	318	261	80	0.041	-0.47	0.380	74
230	76.487	0.274	0.26	94.3	77	1	64	230	0.6	-0.1	-0.013	12.5	6.8	1.82	157	12.1	228	270	270	208	314	258	81	0.041	-0.47	0.370	73
240	79.329	0.284	0.26	96.6	77	1	63	231	0.5	-0.1	-0.013	12.6	6.7	1.99	156	12.0	225	268	267	205	312	255	81	0.041	-0.47	0.360	74
250	82.229	0.290	0.27	100.1	78	1	64	229	0.4	-0.1	-0.013	13.4	5.9	1.89	153	13.2	222	265	262	203	309	252	81	0.041	-0.47	0.330	75
260	85.560	0.333	0.28	110.7	78	1	63	230	0.2	-0.2	-0.012	13.4	5.8	1.81	153	13.5	217	262	251	196	304	246	82	0.041	-0.47	0.330	74
270	88.540	0.298	0.26	97.6	79	1	64	229	0.1	-0.1	-0.012	13.5	5.8	1.79	149	13.5	211	258	246	190	300	241	81	0.041	-0.47	0.320	74
280	91.504	0.296	0.23	100.2	79	1	65	230	0.0	-0.1	-0.011	13.4	6.0	1.79	149	13.3	207	254	241	187	296	237	82	0.041	-0.47	0.310	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 TopTemp (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)
280	91.504	0.327	0.33	99.72	75.4	1.00	64.48	229.55	12.70	-0.45	-0.03	10.21	9.56	1.42	237.17	10.33	364.14	289.38	281.52	240.10	350.55	111	86.93	0.04	-0.47	0.58	70.45

Final Laboratory Report - Method 5H
Dilution Tunnel Particulate Calculations

Client Name: Hearth & Home Technologies
Model: 31-I
Project No.: 061-S-74-3
Tracking No.: 1316

Equipment Numbers:

Run No.: 1
Date: 01/13/09

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	A6	693.9	635.8		58.1
B. Rear filter catch	Filter	6	160.2	152.1		8.1
C. Rinse of probe and filter assembly (FRONT)	Acetone	125	105674.1	105596.0	0.0090	77.0
D. Rinse of Impinger Set	Distilled Water	300	138969.6	138898.4	0.0000	71.2
E. Rinse of Impinger Set	Dichloromethane	150	107013.9	106968.1	0.0000	45.8
F. Rinse of filter assembly and gas train (BACK)	Acetone	150	96690.6	96609.1	0.0090	80.2
			Total Particulate, mg :			340.3

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	701.5	661.7	39.8
2	663.6	653.5	10.1
3	448.0	445.8	2.2
4	847.4	829.9	17.5
		TOTAL, g:	69.6

Analyst: K. J. Morgan Date: 2-06-09

STOVE TEMPERATURE TEST DATA - METHOD 5G

Page ___ of ___

Client/Model: Heath & Home Technologies / 3100 I **Project #:** 061-S-74.3 **Tracking #:** 1316

Date: 1-13-09 Test Crew: K. Morgan Run #: 1

OMNI Equipment ID #: _____

Added 2.5 lb @ 15

Preburn Test [X] [ ]

Coal Bed: Data: 0 = Range: 2.6 - 3.1

Actual: Coal Bed: 2.9 <2907

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	3.1		-.056	67	767	442	582	430	575	415	
10	3.0	0.1	-.042	67	539	457	502	387	563	298	
20	5.4	0.1	-.039	66	429	457	437	348	518	269	
30	4.7	0.7	-.042	65	417	438	394	313	468	325	
40	4.1	0.6	-.035	67	418	415	375	301	459	257	
50	3.6	0.5	-.038	67	402	392	341	288	433	272	
60	3.1	0.5	-.033	67	424	371	336	278	447	230	
65 ~~70~~	2.9	0.2	-.030	67	390	365	323	269	392	242	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. Morgan Date: 1-13-09

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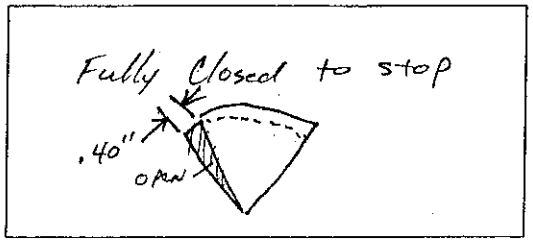
Run Notes

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3
Tracking #: 1316
Run #: 1 Date: 1-13-09
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:



SECONDARY: FIXED

TERTIARY: NONE

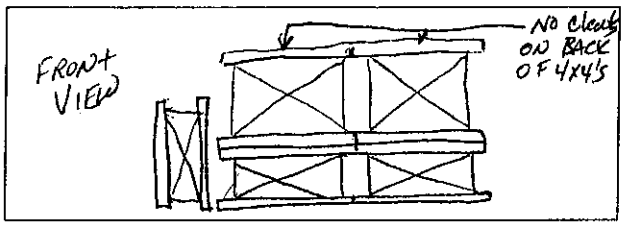
FAN: ON - High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
8	test setting					
15			2.5			
65					X	STIR

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING 45 sec
DOOR: 50 sec
PRIMARY AIR: Not Used. LEFT At test setting during start-up.

OTHER: — Fuel adjust at 4.0 min.

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

PRIMARY:

SAME AS ABOVE

SECONDARY: FIXED

TERTIARY: Timed Air Inlet Initiated At Start of test.

FAN: On - High

Technician signature: K. Morgan Date: 1-13-09

FUEL DATA

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3 Tracking #: 1316
Date: 1-13-09 Test Crew: K. Morgan Run #: 1
OMNI Equipment ID #: _____
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

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

Piece	Length	Readings			Type
1	8 ft	19.8	19.9	19.7	2x4
2	ft				
3	ft				

Length of cut pieces: 14.0 inches Pre-Burn Fuel Average Moisture: 19.80%

Time (clock): 10:10 Room Temperature (F): 66 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 X 4 3 4 x 4 2
CALCULATED LOAD WEIGHT: _____ ACTUAL LOAD WEIGHT: 6.0 (2 X 4)
6.7 ~~12.7~~ (4 X 4)
FUEL PIECE LENGTH: 14.0 12.7 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	20.6	19.1	19.1	2x4
2	19.1	19.7	19.1	2x4
3	19.4	23.2	22.4	2x4
4	19.7	19.1	18.6	4x4
5	19.5	18.8	19.0	4x4
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 19.76%

Time (clock): 10:05 Room Temperature (F): 65 Initials: K

Technician signature: K. Morgan Date: 1-13-09

Supplemental Data EPA 5G/5H

Client: Hearth & Home Technologies

Model: 3100 I

Project #: 061-S-74-3 Tracking #: 1316

Date: 1-13-09 Run #: 1 Booth: _____

Test Crew: K. Morgan Start Time: 11:43 Stop Time: 16:23

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Initial: Ø

Final: Ø

Dilution Tunnel (Method 5G Only):

Initial: Ø

Final: Ø

Calibrations: Span Gas CO_2: 9.956 O_2: 20.9 CO: 1.249 CO_2(DT): 2.483

Time	N_2 Span		N_2 Span	N_2 Span		N_2 Span	N_2 Span	N_2 Span	N_2 Span
	Ø			END					
O_2	00.0	20.9		00.0	20.8				
CO_2	00.0	10.0		00.0	9.9				
CO	0.00	1.25		0.00	1.25				
CO_2 (DT)	00.0	2.50		-00.1	2.48				

Stack Diameter (inches): 6.0

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

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

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: ~~1-13-09~~ K Ø @ 3.3" w.c. Post: Ø @ 3.1" W.C.

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-13-09 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	28.90	28.90	28.90
Room Temp (°F)	67	71	75

Technician signature: K. Morgan Date: 1-13-09

Run 2

Wood Heater Calculation Data
EPA Method 5H

Run	2
Manufacturer:	Heath & Home
Model/Tracking No.:	1316
Test Date:	14-Jan-09
Project Number:	061-S-74-3

Burn Rate (dry kg/hour) = 1.02

Emission Rate (grams/hour) = 5.38

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	13.1	1.06		136.6	8.9	0.113				
10	13.1	1.00	4.6	137.0	10.8	0.093	2.937	0.332	96.8	0.496
20	13.2	1.07	14.2	136.7	11.0	0.091	3.631	0.337	98.4	0.514
30	13.1	0.94	6.1	137.4	8.0	0.125	3.683	0.336	98.0	0.272
40	13.2	1.00	8.2	136.7	9.1	0.110	2.722	0.341	99.5	0.355
50	13.2	0.99	12.2	136.4	8.5	0.117	3.075	0.337	98.4	0.311
60	13.3	0.96	5.1	135.9	8.0	0.124	2.859	0.335	97.8	0.276
70	13.2	0.94	11.4	136.2	7.6	0.131	2.732	0.340	99.2	0.248
80	13.2	0.94	8.5	136.3	7.4	0.134	2.556	0.335	97.7	0.237
90	13.2	0.94	7.2	136.7	7.2	0.140	2.534	0.341	99.4	0.219
100	13.2	0.99	6.8	136.8	7.2	0.138	2.422	0.338	98.8	0.223
110	13.1	1.03	5.4	137.2	7.5	0.133	2.401	0.332	97.0	0.242
120	13.1	1.02	4.7	137.5	7.2	0.140	2.490	0.331	96.6	0.219
130	13.1	1.03	3.6	137.8	6.9	0.146	2.481	0.346	101.1	0.200
140	13.1	1.04	2.5	138.0	6.8	0.148	2.397	0.350	102.2	0.195
150	13.0	1.04	1.3	138.2	6.6	0.152	2.412	0.356	104.0	0.185
160	13.0	1.01	2.5	138.4	6.6	0.151	2.285	0.346	101.1	0.186
170	13.0	1.02	1.3	138.6	6.4	0.156	2.357	0.357	104.3	0.175
180	13.0	1.00	1.3	138.6	6.6	0.152	2.156	0.336	98.3	0.186
190	13.0	1.01	2.6	138.6	6.6	0.152	2.305	0.350	102.1	0.185
200	13.0	1.02	1.3	138.6	6.8	0.147	2.301	0.349	102.0	0.196
210	13.0	1.02	0.0	138.6	6.4	0.156	2.332	0.344	100.4	0.174
220	13.0	1.02	2.7	138.6	6.5	0.154	2.270	0.355	103.7	0.179
230	13.0	1.00	1.4	138.6	6.4	0.157	2.115	0.326	95.3	0.173
240	13.0	0.99	2.6	138.7	6.3	0.159	2.211	0.347	101.2	0.169
250	13.0	0.99	1.3	138.6	6.3	0.160	2.189	0.348	101.6	0.167
260	13.0	0.98	1.3	138.6	6.3	0.160	2.201	0.351	102.5	0.167
270	13.0	0.97	2.9	138.6	6.6	0.153	2.168	0.346	101.0	0.183
280	13.0	0.99	1.5	138.6	6.3	0.159	2.231	0.340	99.3	0.169
290	13.0	1.01	1.6	138.6	6.5	0.154	2.207	0.350	102.2	0.179
Averages/Totals	13.1	1.00	4.4	137.7	7.3	0.140	2.505	0.342	100.0	0.230

Woodstove Type	
Yhc>1=cat,2=ncat, 3=pellet	2
EPA's Hydrocarbon Constant (%)	1.32
Fuel Data	
Test Charge (as fired lbs)	13.1
Average Moisture (% dry basis)	21
Average Moisture (% wet basis)	17.36
Run Parameters	
DGM initial reading (cf)	0.000
DGM final reading (cf)	77.451
Pb (inches Hg)	28.93
Tm (avg oF)	76.43
dH (avg inches wc)	0.23
Vm (scf)	72.648
Qf by carbon balance (avg dscf/minute)	4.35
Analytical Data	
Probe/Front Wash (mg)	204.0
Front Filter (mg)	457.1
Impinger PM (mg)	739.3
Back Filter (mg)	95.9
Total Weight (mg)	1,496.3
Emission Results	
Cs (g/dscf)	0.0206
ER (g/hour)	5.38

A-12 OF 4-42

Wood Heater Test Data
EPA Method 5H

Run Number 2

Manufacturer:	Heath & Home	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	1316	Test Meter Y:	0.985
Stove Type (cat, ncat, or pellet):	ncat	Orifice dH@:	1.764
Project Number:	061-S-74-3	Pitot Tube Cp:	0.99
Test Date:	14-Jan-09	Average Barometric Pressure:	28.93
Test Start Time:	10:40	Average Fuel Moisture (dry basis %):	21.00
Recording Interval (minutes):	10	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	290		

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	0.032	0.036	0.038	0.036	0.034	0.036	0.038	0.034	"H2O	136.6
Initial Temp	92	92	92	92	92	92	92	92	oF	scf/minute

Signature/Date: K. J. Morgan 4-23-09

Post-Test Leak Check: .003 @ 4 cfm@"Hg

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)	0.034
	H2O (%)	4.00	Preferred Initial Sampling Rate (cf/minute)	0.34

Flue Gas	
Impinger liquid, Vlc (g)	141.4
Volume of Water Vapor, Vw(std) (ft3)	6.67
Moisture Content, Bws	0.084

Elapsed Time	Particulate Sampling System: 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)	Fuel Weight: Scale Reading (lbs)	Weight Change (lbs)	Stove Flue-Gas Conditions: Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Stove Temperatures (oF): Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Dilution Tunnel: Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Laboratory: Ambient Temperature (F)
0	0.000		0.33		77	1	78	215	13.1		-0.031	9.9	10.0	0.70	255	10.1	391	380	315	277	411	355	92	0.036	-0.51	0.690	70
10	3.134	0.313	0.50	96.8	76	1	63	229	12.7	-0.4	-0.046	10.7	9.9	0.59	301	10.3	345	371	243	235	362	311	93	0.036	-0.51	0.810	69
20	6.999	0.387	0.51	98.4	76	1	56	229	11.5	-1.2	-0.045	10.5	9.2	0.90	329	10.6	427	356	219	217	333	310	96	0.036	-0.51	0.770	70
30	10.920	0.392	0.27	98.0	76	1	55	231	10.9	-0.6	-0.038	10.2	10.8	1.18	249	9.1	370	334	200	204	317	285	90	0.036	-0.51	0.660	66
40	13.819	0.290	0.36	99.5	76	1	58	227	9.9	-1.0	-0.054	6.0	14.5	0.69	370	7.4	504	315	201	208	315	309	96	0.036	-0.51	1.000	68
50	17.094	0.328	0.31	98.4	75	1	60	230	8.3	-1.6	-0.052	5.0	15.8	0.56	383	6.9	600	299	224	243	317	337	98	0.036	-0.51	1.020	69
60	20.133	0.304	0.28	97.8	77	1	61	230	7.6	-0.7	-0.054	4.5	16.7	0.68	391	6.5	636	290	268	288	347	366	102	0.036	-0.51	1.020	67
70	23.048	0.292	0.25	99.2	77	1	62	231	6.1	-1.5	-0.050	6.0	15.3	1.23	343	6.8	590	286	293	313	375	371	100	0.036	-0.51	0.890	67
80	25.776	0.273	0.24	97.7	75	1	63	229	5.0	-1.1	-0.045	6.4	14.8	1.28	330	7.0	560	283	313	330	393	376	99	0.036	-0.51	0.840	66
90	28.470	0.269	0.22	99.4	75	1	64	231	4.1	-0.9	-0.044	7.1	13.9	1.62	309	7.2	532	282	325	333	407	376	96	0.036	-0.51	0.760	69
100	31.045	0.258	0.22	98.8	76	1	60	230	3.3	-0.8	-0.042	7.0	13.4	1.28	297	7.6	509	283	335	332	418	375	95	0.036	-0.51	0.740	72
110	33.603	0.256	0.24	97.0	76	1	58	230	2.8	-0.5	-0.038	10.1	9.8	1.38	254	9.7	459	286	331	321	414	362	92	0.036	-0.51	0.570	71
120	36.255	0.265	0.22	96.6	77	1	57	229	2.4	-0.4	-0.032	11.4	8.4	1.82	224	10.5	394	289	313	290	401	337	89	0.036	-0.51	0.470	71
130	38.903	0.265	0.20	101.1	77	1	58	229	2.1	-0.3	-0.027	11.7	8.0	1.88	202	10.8	330	292	298	257	388	313	87	0.036	-0.51	0.430	71
140	41.461	0.256	0.20	102.2	77	1	58	230	1.9	-0.2	-0.024	12.0	7.7	1.64	187	11.3	297	292	293	241	382	301	85	0.036	-0.51	0.410	71
150	44.035	0.257	0.19	104.0	77	1	57	229	1.8	-0.1	-0.022	12.0	7.7	1.71	179	11.3	273	290	287	228	375	291	84	0.036	-0.51	0.400	70
160	46.474	0.244	0.19	101.1	76	1	58	229	1.6	-0.2	-0.022	12.4	7.5	1.82	175	11.4	260	287	282	220	369	284	82	0.036	-0.51	0.390	69
170	48.985	0.251	0.18	104.3	76	1	57	230	1.5	-0.1	-0.021	12.4	7.3	1.94	170	11.4	251	283	274	214	361	277	81	0.036	-0.51	0.370	68
180	51.262	0.230	0.19	98.3	75	1	56	230	1.4	-0.1	-0.020	12.8	7.1	2.02	166	11.6	245	280	268	210	352	271	81	0.036	-0.51	0.370	69
190	53.733	0.245	0.19	102.1	76	1	60	230	1.2	-0.2	-0.018	12.8	7.1	1.82	162	11.8	240	276	268	209	343	267	81	0.036	-0.51	0.370	69
200	56.184	0.245	0.20	102.0	76	1	61	229	1.1	-0.1	-0.017	12.8	6.9	1.96	160	11.9	236	273	272	209	335	265	81	0.036	-0.51	0.370	70
210	58.668	0.248	0.17	100.4	76	1	61	230	1.1	0.0	-0.017	12.9	7.1	1.49	155	12.2	232	271	275	208	327	263	81	0.036	-0.51	0.360	70
220	61.096	0.243	0.18	103.7	77	1	62	230	0.9	-0.2	-0.014	12.9	7.0	1.68	153	12.1	229	271	276	208	322	261	81	0.036	-0.51	0.360	71
230	63.354	0.226	0.17	95.3	77	1	61	229	0.8	-0.1	-0.014	13.1	6.9	1.78	156	12.1	227	270	275	208	318	260	81	0.036	-0.51	0.350	71
240	65.714	0.236	0.17	101.2	77	1	62	229	0.6	-0.2	-0.014	13.0	7.0	1.99	149	11.7	227	270	277	208	315	259	80	0.036	-0.51	0.350	72
250	68.051	0.234	0.17	101.6	77	1	62	230	0.5	-0.1	-0.014	13.2	6.8	1.96	150	12.0	225	269	271	208	311	257	81	0.036	-0.51	0.340	73
260	70.400	0.235	0.17	102.5	77	1	63	230	0.4	-0.1	-0.014	13.3	6.8	1.91	150	12.0	224	269	264	208	305	254	81	0.036	-0.51	0.340	73
270	72.714	0.231	0.18	101.0	77	1	63	229	0.2	-0.2	-0.014	13.8	6.5	1.63	153	12.8	222	270	259	207	299	251	81	0.036	-0.51	0.340	73
280	75.095	0.238	0.17	99.3	77	1	64	230	0.1	-0.1	-0.014	14.0	6.1	1.70	149	13.3	219	271	247	204	292	247	81	0.036	-0.51	0.310	74
290	77.451	0.236	0.18	102.2	77	1	65	229	0.0	-0.1	-0.013	14.8	5.5	1.49	144	14.6	214	271	236	196	284	240	81	0.036	-0.51	0.290	74
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 TopTemp (oF0	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)
290	77.451	0.267	0.23	100.00	76.4	1.00	60.83	229.10	13.10	-0.45	-0.03	10.82	9.38	1.48	226.50	10.45	348.93	291.97	273.40	241.07	345.74	115	87.60	0.04	-0.51	0.55	70.10

Final Laboratory Report - Method 5H
Dilution Tunnel Particulate Calculations

Client Name: Hearth & Home Technologies
Model: 31-1
Project No.: 061-S-74-3
Tracking No.: 1316

Equipment Numbers:

Run No.: 2
Date: 01/14/09

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	A7	1098.9	641.8		457.1
B. Rear filter catch	Filter	7	248.5	152.6		95.9
C. Rinse of probe and filter assembly (FRONT)	Acetone	125	101128.0	100922.9	0.0090	204.0
D. Rinse of Impinger Set	Distilled Water	400	175640.4	175304.2	0.0000	336.2
E. Rinse of Impinger Set	Dichloromethane	150	117564.2	117383.1	0.0000	181.1
F. Rinse of filter assembly and gas train (BACK)	Acetone	200	111255.0	111031.2	0.0090	222.0
			Total Particulate, mg :			1496.3

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	664.4	547.7	116.7
2	666.3	661.6	4.7
3	541.8	541.5	0.3
4	851.2	831.5	19.7
		TOTAL, g:	141.4

Analyst: [illegible] Date: 2-06-09

STOVE TEMPERATURE TEST DATA - METHOD 5G

Page ___ of ___

Client/Model: Heath & Home Technologies / 3100 I **Project #:** 061-S-74.3 **Tracking #:** 1316

Date: 1-14-09 Test Crew: K. Morgan Run #: 2

OMNI Equipment ID #: _____

2.3 lb. Added @ 15 min

<300>

Preburn Test [X] [ ] Coal Bed: Data: 0 = Range: 2.7 - 3.2 Actual: 2.8 Coal Bed: ~~3.0~~ K

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	3.2		-.065	69	751	467	594	452	571	387	
10	3.1	0.1	-.036	70	505	478	463	379	538	260	
20	5.0	*0.4	-.034	69	424	470	409	341	498	242	
30	4.5	0.5	-.033	71	385	443	359	296	447	242	
HB 40	3.9	0.6	-.039	69	405	416	330	277	420	271	
50	3.4	0.5	-.032	70	448	399	326	280	418	267	
60	3.0	0.4	-.032	71	414	383	319	280	413	236	
62 70	2.9	0.1	-.031	70	391	380	315	277	411	255	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. J. Morg Date: 1-14-09

A-15 OF 4-42

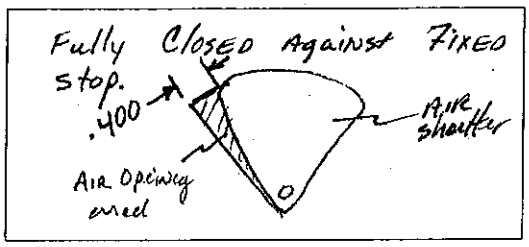
Run Notes

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3
Tracking #: 1316
Run #: 2 Date: 1-14-09
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: None

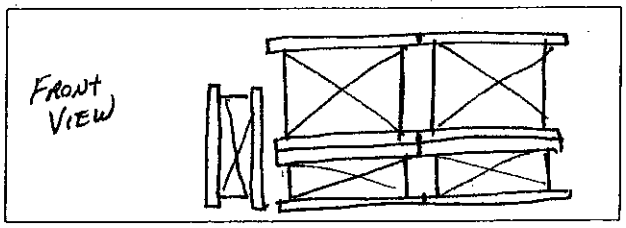
FAN: On - High Duration of testing

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					
15			*2.3			

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING by 45 sec
DOOR: at 55 sec
PRIMARY AIR: Not changed

OTHER: Adjust fuel load at 4.0 min

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

SAME AS ABOVE

SECONDARY: Fixed

TERTIARY: Timed start-up Air Device Initiated at t=0

FAN: On - High Duration of test.

Technician signature: K. Morgan Date: 1-14-09

FUEL DATA

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3 Tracking #: 1316
Date: 1-14-09 Test Crew: K. Morgan Run #: 2
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER -- DRY BASIS)

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

Piece	Length	Readings			Type
1	8 ft	19.2	19.7	22.4	2x4
2	8 ft	19.6	21.4	19.8	2x4
3	ft				

Length of cut pieces: 5@12", 4@15", 3@8" inches Pre-Burn Fuel Average Moisture: 20.35%

Time (clock): 09:00 Room Temperature (F): 70 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2X4 3 4X4 2
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 5.7 (2x4)
7.4 (4x4)
FUEL PIECE LENGTH: 14.0 13.1 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE	READINGS			TYPE
1	19.8	19.3	19.2	2x4
2	19.7	19.1	19.6	2x4
3	23.3	22.8	21.1	2x4
4	21.2	22.8	20.0	4x4
5	23.6	22.5	21.0	4x4
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.0%

Time (clock): 08:50 Room Temperature (F): 70 Initials: K

Technician signature: K. Morgan Date: 1-14-09

Supplemental Data EPA 5G/5H

Client: Hearth & Home Technologies

Model: 3100 I

Project #: 061-S-74-3 Tracking #: 1316

Date: 1-14-09 Run #: 2 Booth: _____

Test Crew: K. Morgan Start Time: 10:40 Stop Time: 15:30

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Initial: Ø

Final: Ø

Dilution Tunnel (Method 5G Only):

Initial: Ø

Final: Ø

Calibrations: Span Gas CO_2: 9.956 O_2: 20.9 CO: 1.249 CO_2(DT): 2.483

	N_2 Span		N_2 Span	N_2 Span		N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time	Ø			END					
O_2	00.0	20.9		00.1	21.0				
CO_2	00.0	9.9		00.0	10.0				
CO	0.00	1.25		0.00	1.25				
CO_2 (DT)	00.0	2.49		-00.1	2.50				

Stack Diameter (inches): 6.0

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

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

Induced Draft: Ø %Smoke Capture: 100

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

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-13-09 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	28.95	28.93	28.92
Room Temp (°F)	70	70	74

Technician signature: K. J. Morgan Date: 1-14-09

Run 3

Wood Heater Test Data
EPA Method 5H

Run Number 3

Manufacturer:	Hearth and Home Tech	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	31-I	Test Meter Y:	0.985
Stove Type (cat, ncat, or pellet):	ncat	Orifice dH@:	1.764
Project Number:	061-S-74-3	Pitot Tube Cp:	0.99
Test Date:	15-Jan-09	Average Barometric Pressure:	29.02
Test Start Time:	10:40	Average Fuel Moisture (dry basis %):	21.44
Recording Interval (minutes):	10	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	300		

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	0.030	0.038	0.034	0.028	0.028	0.036	0.036	0.032	"H2O	131.6 scf/minute
Initial Temp	86	86	86	86	86	86	86	86	oF	

Signature/Date: K. T. Morgan 4-23-09

Post-Test Leak Check: .003@2.5 cfm@"Hg

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)	0.034
	H2O (%)	4.00	Preferred Initial Sampling Rate (cf/minute)	0.32

Flue Gas	
Impinger liquid, Vlc (g)	150.9
Volume of Water Vapor, Vw(std) (ft3)	7.12
Moisture Content, Bws	0.075

Elapsed Time	Particulate Sampling System: 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)	Fuel Weight: Scale Reading (lbs)	Weight Change (lbs)	Stove Flue-Gas Conditions: Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Stove Temperatures (oF): Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Dilution Tunnel: Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Laboratory: Ambient Temperature (F)
0	0.000		0.30		69	0	78	226	12.7		-0.032	10.4	9.4	0.69	228	10.6	342	385	298	256	432	343	86	0.033	-0.42	0.580	67
10	2.995	0.300	0.49	100.0	70	1	66	231	12.1	-0.6	-0.048	12.1	8.2	0.84	286	11.7	496	372	234	222	377	340	91	0.033	-0.42	0.640	67
20	6.820	0.383	0.36	100.1	70	1	62	229	11.2	-0.9	-0.043	12.4	8.0	1.29	261	11.4	422	350	206	203	335	303	88	0.033	-0.42	0.540	67
30	10.095	0.328	0.39	99.9	70	1	62	230	10.2	-1.0	-0.054	8.3	12.4	0.82	349	8.4	530	328	200	210	310	316	91	0.033	-0.42	0.850	67
40	13.503	0.341	0.33	100.2	71	1	63	229	9.1	-1.1	-0.054	7.3	13.6	0.32	340	8.0	576	310	211	228	307	326	93	0.033	-0.42	0.870	66
50	16.707	0.320	0.35	100.7	70	1	65	231	8.0	-1.1	-0.057	7.4	13.5	0.40	344	8.0	595	297	233	250	317	338	95	0.033	-0.42	0.880	67
60	19.915	0.321	0.30	99.4	72	1	61	229	7.0	-1.0	-0.046	7.4	13.6	0.55	326	7.9	586	288	257	265	334	346	95	0.033	-0.42	0.830	68
70	22.947	0.303	0.28	100.2	72	1	59	230	6.2	-0.8	-0.044	7.4	13.5	1.01	304	7.7	564	282	279	273	362	352	95	0.033	-0.42	0.800	68
80	25.877	0.293	0.27	99.9	71	1	60	230	5.4	-0.8	-0.042	8.9	11.8	1.06	285	8.6	540	278	289	279	379	353	93	0.033	-0.42	0.690	69
90	28.788	0.289	0.27	100.4	71	1	61	230	4.7	-0.7	-0.041	9.8	10.8	1.28	260	9.0	541	275	290	281	388	355	91	0.033	-0.42	0.630	71
100	31.636	0.287	0.28	100.2	72	1	63	230	4.2	-0.5	-0.040	10.2	10.0	1.50	242	9.4	523	272	294	272	388	350	90	0.033	-0.42	0.590	72
110	34.512	0.288	0.28	99.5	72	1	63	230	3.6	-0.6	-0.038	8.9	11.5	1.28	247	8.6	520	268	289	264	388	346	88	0.033	-0.42	0.680	73
120	37.440	0.283	0.26	100.1	72	1	64	230	3.1	-0.5	-0.040	8.1	12.2	1.01	255	8.3	527	266	296	258	420	353	90	0.033	-0.42	0.690	73
130	40.286	0.285	0.23	101.7	73	1	64	231	2.6	-0.5	-0.038	9.4	10.7	1.31	235	9.1	522	266	306	261	447	360	88	0.033	-0.42	0.580	74
140	43.041	0.276	0.27	103.0	73	1	58	231	2.2	-0.4	-0.030	12.6	8.9	2.02	201	11.8	523	266	304	253	443	358	86	0.033	-0.42	0.410	74
150	45.912	0.287	0.28	100.2	74	1	57	229	2.0	-0.2	-0.026	12.7	6.4	2.16	183	12.2	569	266	276	233	399	349	85	0.033	-0.42	0.390	74
160	48.812	0.290	0.28	99.9	75	1	57	230	1.8	-0.2	-0.023	12.9	6.2	2.13	172	12.5	644	264	264	221	378	354	84	0.033	-0.42	0.380	74
170	51.763	0.295	0.25	100.0	76	1	58	231	1.7	-0.1	-0.019	12.8	6.5	1.66	165	12.7	732	260	261	210	368	366	83	0.033	-0.42	0.380	74
180	54.618	0.286	0.24	101.1	76	1	59	230	1.6	-0.1	-0.019	12.7	6.7	1.62	160	12.5	782	256	261	205	367	374	82	0.033	-0.42	0.380	73
190	57.383	0.277	0.23	100.8	76	1	59	231	1.4	-0.2	-0.019	12.8	6.6	1.72	158	12.5	825	251	259	199	362	379	81	0.033	-0.42	0.370	71
200	60.125	0.274	0.25	101.2	76	1	60	230	1.3	-0.1	-0.019	12.8	6.6	1.83	156	12.4	855	246	257	195	354	381	80	0.033	-0.42	0.380	71
210	62.971	0.285	0.23	101.9	76	1	61	230	1.2	-0.1	-0.019	12.6	6.8	1.99	158	11.9	229	241	268	193	343	255	79	0.033	-0.42	0.380	71
220	65.718	0.275	0.49	101.2	76	1	62	231	1.1	-0.1	-0.019	15.3	4.7	1.39	157	16.3	228	239	277	194	340	256	80	0.033	-0.42	0.380	72
230	69.496	0.378	0.33	96.3	75	1	62	231	0.9	-0.2	-0.018	14.3	5.4	1.59	157	14.5	229	238	281	194	336	256	79	0.033	-0.42	0.360	70
240	72.772	0.328	0.34	101.9	75	1	62	230	0.8	-0.1	-0.019	14.2	5.5	1.64	161	14.3	233	237	286	196	336	258	79	0.033	-0.42	0.370	71
250	76.086	0.329	0.35	101.2	75	1	63	230	0.6	-0.2	-0.019	14.4	5.4	1.63	160	14.5	235	237	294	199	330	259	80	0.033	-0.42	0.370	73
260	79.420	0.335	0.35	101.2	75	1	63	230	0.4	-0.2	-0.019	14.6	4.9	1.79	158	15.1	236	238	290	201	324	258	80	0.033	-0.42	0.340	73
270	82.749	0.333	0.38	100.0	76	1	63	229	0.3	-0.1	-0.017	14.8	4.7	1.75	153	15.5	231	240	281	200	318	254	81	0.033	-0.42	0.340	73
280	86.223	0.347	0.36	100.0	76	1	64	230	0.2	-0.1	-0.017	14.9	4.7	1.65	151	15.8	225	242	272	196	312	249	81	0.033	-0.42	0.330	73
290	89.625	0.340	0.37	101.2	77	1	64	230	0.1	-0.1	-0.017	15.2	4.5	1.77	150	15.9	221	242	269	192	306	246	80	0.033	-0.42	0.320	72
300	93.048	0.342	0.41	100.5	77	1	64	230	0.0	-0.1	-0.017	15.6	4.1	1.82	147	16.7	216	242	262	187	299	241	80	0.033	-0.42	0.310	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 TopTemp (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)
300	93.048	0.310	0.32	100.42	73.5	1.00	62.16	229.97	12.70	-0.42	-0.03	11.72	8.25	1.40	216.42	11.74	467.65	272.32	269.16	225.46	358.03	101	85.61	0.03	-0.42	0.52	70.90

4-21 OF 4-42 Run 3

Wood Heater Calculation Data
EPA Method 5H

Run	3
Manufacturer:	Hearth and Home Tech
Model/Tracking No.:	31-I
Test Date:	15-Jan-09
Project Number:	061-S-74-3

Burn Rate (dry kg/hour) = 0.95

Emission Rate (grams/hour) = 4.53

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	12.4	1.07		131.6	7.7	0.130				
10	12.5	1.02	7.8	131.7	9.8	0.102	2.858	0.373	100.0	0.488
20	12.5	0.98	11.4	132.0	8.4	0.119	3.645	0.373	100.1	0.360
30	12.5	0.98	9.3	131.7	8.7	0.115	3.120	0.372	99.9	0.386
40	12.6	0.99	9.7	131.4	8.1	0.123	3.247	0.374	100.2	0.335
50	12.6	0.99	9.7	131.2	8.2	0.121	3.046	0.376	100.7	0.347
60	12.6	0.97	8.7	131.2	7.7	0.130	3.056	0.371	99.4	0.302
70	12.6	0.97	6.8	131.2	7.5	0.134	2.877	0.374	100.2	0.284
80	12.6	0.97	7.6	131.4	7.3	0.136	2.780	0.373	99.9	0.274
90	12.5	0.97	7.0	131.7	7.3	0.137	2.746	0.375	100.4	0.271
100	12.5	1.00	5.3	131.8	7.4	0.136	2.728	0.374	100.2	0.275
110	12.5	0.99	5.7	132.0	7.4	0.134	2.729	0.371	99.5	0.282
120	12.5	1.01	4.6	131.8	7.1	0.141	2.778	0.373	100.1	0.257
130	12.5	1.01	5.1	132.0	6.8	0.148	2.700	0.380	101.7	0.232
140	12.5	1.04	5.3	132.3	7.2	0.138	2.609	0.388	103.0	0.267
150	12.5	1.08	2.7	132.4	7.4	0.135	2.719	0.375	100.2	0.278
160	12.5	1.09	2.8	132.5	7.4	0.134	2.741	0.370	98.9	0.280
170	12.5	1.09	1.4	132.6	7.1	0.141	2.784	0.374	100.0	0.255
180	12.4	1.08	1.4	132.8	6.9	0.145	2.689	0.379	101.1	0.240
190	12.4	1.08	2.8	132.9	6.8	0.147	2.604	0.378	100.8	0.234
200	12.4	1.07	1.4	133.0	7.0	0.143	2.582	0.380	101.2	0.248
210	12.4	1.06	1.3	133.1	6.8	0.147	2.680	0.382	101.9	0.234
220	12.4	1.03	1.8	133.0	9.9	0.101	2.587	0.380	101.2	0.492
230	12.4	1.06	3.2	133.1	8.1	0.124	3.560	0.361	96.3	0.331
240	12.4	1.05	1.6	133.1	8.2	0.122	3.091	0.382	101.9	0.339
250	12.4	1.04	3.2	133.0	8.3	0.120	3.108	0.380	101.2	0.351
260	12.4	1.08	3.4	133.0	8.4	0.120	3.165	0.380	101.2	0.354
270	12.4	1.08	1.7	132.9	8.7	0.115	3.142	0.376	100.0	0.384
280	12.4	1.07	1.8	132.9	8.4	0.119	3.273	0.376	100.0	0.359
290	12.4	1.05	1.8	133.0	8.5	0.117	3.205	0.380	101.2	0.366
300	12.4	1.05	1.9	133.0	9.0	0.111	3.218	0.378	100.5	0.411
Averages/Totals	12.5	1.03	4.6	132.3	7.9	0.129	2.936		100.4	0.317

Woodstove Type

Yhc>1=cat,2=ncat, 3=pellet	2
EPA's Hydrocarbon Constant (%)	1.32

Fuel Data

Test Charge (as fired lbs)	12.7
Average Moisture (% dry basis)	21.44
Average Moisture (% wet basis)	17.65

Run Parameters

DGM initial reading (cf)	0.000
DGM final reading (cf)	93.048
Pb (inches Hg)	29.02
Tm (avg oF)	73.52
dH (avg inches wc)	0.32
Vm (scf)	88.047
Qf by carbon balance (avg dscf/minute)	4.61

Analytical Data

Probe/Front Wash (mg)	212.5
Front Filter (mg)	379.3
Impinger PM (mg)	770.7
Back Filter (mg)	78.9
Total Weight (mg)	1,441.4

Emission Results

Cs (g/dscf)	0.0164
ER (g/hour)	4.53

5-30 OF 4-42

OMNI-Test Laboratories, Inc.

Final Laboratory Report - Method 5H
Dilution Tunnel Particulate Calculations

Client Name: Hearth & Home Technologies
Model: 31-I
Project No.: 061-S-74-3
Tracking No.: 1316

Equipment Numbers:

Run No.: 3
Date: 01/15/09

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	A8	1021.8	642.5		379.3
B. Rear filter catch	Filter	8	229.7	150.8		78.9
C. Rinse of probe and filter assembly (FRONT)	Acetone	125	104268.4	104054.8	0.0090	212.5
D. Rinse of Impinger Set	Distilled Water	400	141008.6	140629.6	0.0000	379.0
E. Rinse of Impinger Set	Dichloromethane	150	110345.6	110154.6	0.0000	191.0
F. Rinse of filter assembly and gas train (BACK)	Acetone	200	108402.2	108199.7	0.0090	200.7
			Total Particulate, mg :			1441.4

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	666.5	549.0	117.5
2	655.2	648.1	7.1
3	561.1	560.0	1.1
4	839.0	813.8	25.2
		TOTAL, g:	150.9

Analyst: K. A. Morg Date: 2-06-09

STOVE TEMPERATURE TEST DATA - METHOD 5G

Page ___ of ___

Client/Model: Heath & Home Technologies / 3100 I **Project #:** 061-S-74.3 **Tracking #:** 1316

Date: 1-15-09 Test Crew: K. Morgan Run #: 3

OMNI Equipment ID #: _____

< 2907

Preburn [x]
Test [ ]

Coal Bed: Data: 0 = Range: 2.6-3.1

Actual: Coal Bed: 3.0

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	3.1		-.072	69	853	474	576	451	563	548	
10	3.0	0.1	-.043	69	613	503	501	409	579	272	
20	5.2	+ 0.4	-.041	67	441	498	402	339	509	248	
30	4.5	0.7	-.041	67	426	472	354	299	465	252	
40	4.0	0.5	-.032	67	396	438	327	273	434	223	
50	3.6	0.4	-.032	66	380	408	306	258	415	255	
60	3.1	0.5	-.035	67	442	388	309	258	435	229	
61 70	3.0	0.1	-.032	67	474	385	298	256	432	228	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. J. Morgan Date: 1-15-09

A-23 OF 4-42

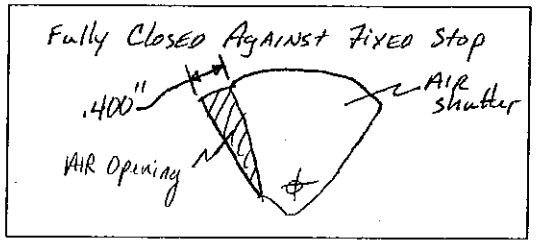
Run Notes

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3
Tracking #: 1316
Run #: 3 Date: 1-15-09
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: None

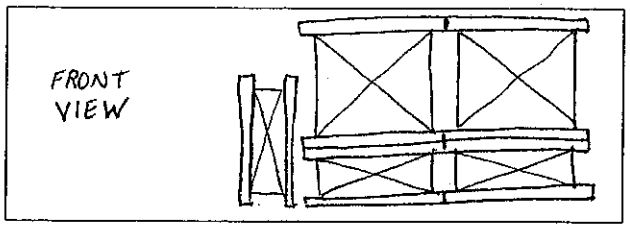
FAN: On - High

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					
15			2.6			
60					X	

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Loaded by 40 sec.
DOOR: Closed at 50 sec.
PRIMARY AIR: Not Adjusted - Left at test Setting

OTHER: Timed Start-up Air Device initiated At T=0. Fuel adjust at +1.0 min

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

PRIMARY:

Same as Above

SECONDARY: Fixed

TERTIARY: None

FAN: On - High Duration of test.

Technician signature: K. J. Morgan Date: 1-15-09

FUEL DATA

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3 Tracking #: 1316
Date: 1-15-09 Test Crew: K. Morgan Run #: 3
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER -- DRY BASIS)

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

Piece	Length	Readings			Type
1	8 ft	23.6	17.5	23.4	2x4
2	8 ft				2x4
3	ft				

Length of cut pieces: 5@12" 4@15" 3@8" inches Pre-Burn Fuel Average Moisture: 21.50 %

Time (clock): 08:00 Room Temperature (F): 67 Initials: lh

TEST FUEL

FUEL TYPE AND AMOUNT: 2 x 4 3 4 x 4 2
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 5.5 (2 x 4)
7.2 (4 x 4)
FUEL PIECE LENGTH: 14.0" ~~12.4~~ 12.7 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE		READINGS		TYPE
1	23.9 ~~21.2~~ lk	23.5 ~~19.1~~ lk	23.7	2 x 4
2	18.8	19.1	19.9	2 x 4
3	20.3	19.2	19.5	2 x 4
4	23.0	23.9	22.7	4 x 4
5	19.9	22.3	20.9	4 x 4
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.44%

Time (clock): 08:50 Room Temperature (F): 67 Initials: lk

Technician signature: K. Morgan Date: 1-15-09

Supplemental Data EPA 5G/5H

Client: Hearth & Home Technologies

Model: 3100 I

Project #: 061-S-74-3 Tracking #: 1316

Date: 1-15-09 Run #: 3 Booth: _____

Test Crew: K. Morgan Start Time: 10:40 Stop Time: 15:40

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Initial: Ø

Final: Ø

Dilution Tunnel (Method 5G Only):

Initial: Ø

Final: Ø

Calibrations: Span Gas CO_2: 9.956 O_2: 20.9 CO: 1.249 CO_2(DT): 2.483

Time	N_2 Span		N_2 Span	N_2 Span		N_2 Span	N_2 Span	N_2 Span	N_2 Span
	Ø			END					
O_2	00.0	20.9		00.0	21.0				
CO_2	00.0	10.0		00.0	9.9				
CO	0.00	1.25		0.00	1.24				
CO_2 (DT)	00.0	2.49		-00.1	2.48				

Stack Diameter (inches): 6.0

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

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

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.2" w.c. Post: Ø @ 3.1" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-13-09 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	29.04	29.01	29.00
Room Temp (°F)	67	74	70

Technician signature: K. Morgan Date: 1-15-09

Run 4

Wood Heater Calculation Data
EPA Method 5H

Run	4
Manufacturer:	Hearth and Home Tech
Model/Tracking No.:	1316
Test Date:	16-Jan-09
Project Number:	061-S-74-3

Burn Rate (dry kg/hour) = 2.63

Emission Rate (grams/hour) = 1.94

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	14.9	1.13		146.7	17.7	0.057				
5	15.0	0.97	14.7	147.2	17.1	0.058	1.351	0.077	100.0	0.249
10	15.3	0.98	20.7	144.2	17.8	0.056	1.308	0.076	99.8	0.268
15	15.4	0.97	17.2	143.1	17.3	0.058	1.361	0.076	100.0	0.255
20	15.4	0.99	18.7	142.7	17.0	0.059	1.317	0.076	99.5	0.246
25	15.4	1.00	16.2	142.7	17.1	0.059	1.315	0.077	100.9	0.247
30	15.4	1.02	20.8	142.8	17.3	0.058	1.315	0.077	100.5	0.252
35	15.4	1.02	13.8	143.3	17.3	0.058	1.307	0.076	99.0	0.253
40	15.3	1.05	17.3	143.6	16.4	0.061	1.317	0.076	99.7	0.228
45	15.2	1.06	15.9	144.9	15.8	0.063	1.287	0.078	102.3	0.209
50	15.1	1.08	10.2	145.9	16.2	0.062	1.231	0.078	101.8	0.223
55	15.0	1.07	8.2	146.8	16.3	0.061	1.254	0.077	100.5	0.225
60	14.9	1.05	8.3	147.3	16.2	0.062	1.260	0.077	100.4	0.222
65	14.9	1.04	8.3	147.7	16.1	0.062	1.261	0.078	101.0	0.218
70	14.9	1.07	8.7	147.9	16.6	0.060	1.259	0.078	101.6	0.232
75	14.8	1.08	9.2	148.4	16.6	0.060	1.293	0.078	101.2	0.232
80	14.8	1.08	3.2	148.8	16.8	0.060	1.280	0.077	100.2	0.236
85	14.8	1.06	6.5	148.9	16.6	0.060	1.289	0.077	99.8	0.232
90	14.8	1.04	3.3	149.1	16.4	0.061	1.320	0.080	103.0	0.226
95	14.7	1.04	6.7	149.4	16.5	0.061	1.304	0.080	102.9	0.228
100	14.7	1.06	3.5	149.5	16.6	0.060	1.305	0.079	102.3	0.232
105	14.7	1.04	3.5	149.7	16.6	0.060	1.318	0.079	102.4	0.232
End of Test										
Averages/Totals	15.0	1.04	11.2	146.4	16.7	0.060	1.298		100.9	0.235

Woodstove Type	
Yhc>1=cat,2=ncat, 3=pellet	2
EPA's Hydrocarbon Constant (%)	1.32
Fuel Data	
Test Charge (as fired lbs)	12.4
Average Moisture (% dry basis)	22.42
Average Moisture (% wet basis)	18.31
Run Parameters	
DGM initial reading (cf)	0.000
DGM final reading (cf)	28.755
Pb (inches Hg)	29.00
Tm (avg oF)	72.32
dH (avg inches wc)	0.24
Vm (scf)	27.246
Qf by carbon balance (avg dscf/minute)	11.19
Analytical Data	
Probe/Front Wash (mg)	8.9
Front Filter (mg)	18.1
Impinger PM (mg)	45.7
Back Filter (mg)	6.1
Total Weight (mg)	78.8
Emission Results	
Cs (g/dscf)	0.0029
ER (g/hour)	1.94

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Wood Heater Test Data
EPA Method 5H

Run Number 4

Manufacturer:	Hearth and Home Tech	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	1316	Test Meter 'y':	0.985
Stove Type (cat, ncat, or pellet):	ncat	Orifice dH@:	1.764
Project Number:	061-S-74-3	Pitot Tube Cp:	0.99
Test Date:	16-Jan-09	Average Barometric Pressure:	29.00
Test Start Time:	10:02	Average Fuel Moisture (dry basis %):	22.42
Recording Interval (minutes):	5	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	105		

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	0.038	0.044	0.042	0.040	0.050	0.052	0.046	0.038	"H2O	146.7
Initial Temp	126	126	126	126	126	126	126	126	oF	scf/minute

Signature/Date: K. J. Morgan 4-23-09

Post-Test Leak Check: .001 @ 2.5 cfm@ Hg

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)	0.034
	H2O (%)	4.00	Preferred Initial Sampling Rate (cf/minute)	0.30

Flue Gas	
Impinger liquid, Vlc (g)	59.8
Volume of Water Vapor, Vw(std) (ft3)	2.82
Moisture Content, Bws	0.094

	Particulate Sampling System								Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel				Laboratory
Elapsed Time	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	0.000		0.26		70	0	78	226	12.4		-0.056	14.1	5.9	0.24	404	18.3	571	466	533	397	565	506	126	0.044	-0.58	0.740	71
5	1.420	0.284	0.25	100.0	70	1	68	230	11.5	-0.9	-0.077	6.5	14.6	0.47	579	7.4	543	468	456	372	538	475	127	0.044	-0.58	1.730	71
10	2.794	0.275	0.27	99.8	71	1	66	230	10.1	-1.4	-0.090	4.7	16.2	0.54	694	6.7	707	464	415	349	515	490	152	0.044	-0.58	2.030	69
15	4.227	0.267	0.25	100.0	71	1	61	231	8.9	-1.2	-0.085	4.2	17.0	0.28	710	6.5	824	455	410	359	522	514	161	0.044	-0.58	2.090	69
20	5.613	0.277	0.25	99.5	71	1	59	230	7.6	-1.3	-0.086	3.9	17.0	0.24	712	6.6	881	445	419	380	537	532	165	0.044	-0.58	2.060	69
25	6.997	0.277	0.25	100.9	71	1	59	230	6.5	-1.1	-0.084	4.1	16.7	0.13	692	6.7	908	436	433	406	554	547	165	0.044	-0.58	2.030	70
30	8.381	0.277	0.25	100.5	71	1	59	230	5.2	-1.3	-0.082	5.2	15.3	0.11	671	7.3	929	432	449	423	568	560	164	0.044	-0.58	1.880	70
35	9.757	0.275	0.25	99.0	71	1	60	228	4.3	-0.9	-0.080	4.6	16.0	0.10	664	7.0	913	429	468	440	584	567	160	0.044	-0.58	1.960	70
40	11.143	0.277	0.23	99.7	72	1	61	230	3.4	-0.9	-0.078	7.7	12.5	0.11	622	8.7	901	428	481	447	593	570	157	0.044	-0.58	1.460	70
45	12.501	0.272	0.21	102.3	72	1	62	230	2.7	-0.7	-0.074	9.9	10.3	0.13	545	10.4	804	430	506	456	599	559	146	0.044	-0.58	1.150	71
50	13.799	0.280	0.22	101.8	72	1	61	229	2.3	-0.4	-0.069	11.2	8.8	0.33	495	11.6	719	433	522	451	598	545	138	0.044	-0.58	1.010	71
55	15.122	0.265	0.22	100.5	73	1	60	230	2.0	-0.3	-0.063	12.1	8.0	0.46	462	12.4	628	437	529	429	585	522	130	0.044	-0.58	0.920	71
60	16.453	0.266	0.22	100.4	73	1	59	230	1.7	-0.3	-0.060	12.4	7.8	0.52	447	12.6	579	439	525	409	574	505	126	0.044	-0.58	0.890	70
65	17.786	0.267	0.22	101.0	73	1	57	230	1.4	-0.3	-0.058	12.5	7.8	0.50	442	12.6	540	440	514	390	562	489	123	0.044	-0.58	0.880	70
70	19.116	0.266	0.23	101.6	73	1	56	230	1.1	-0.3	-0.058	12.7	7.4	0.52	441	13.1	528	441	509	377	553	482	122	0.044	-0.58	0.850	70
75	20.462	0.273	0.23	101.2	73	1	56	229	0.8	-0.3	-0.056	13.2	6.8	0.58	419	14.0	496	441	493	362	545	467	118	0.044	-0.58	0.790	70
80	21.835	0.271	0.24	100.2	74	1	56	230	0.7	-0.1	-0.054	13.7	6.3	0.70	392	14.8	461	439	473	347	533	451	115	0.044	-0.58	0.740	70
85	23.200	0.273	0.23	99.8	74	1	56	231	0.5	-0.2	-0.054	14.0	6.1	0.77	386	14.8	448	438	460	342	526	443	114	0.044	-0.58	0.710	70
90	24.597	0.279	0.23	103.0	74	1	56	230	0.4	-0.1	-0.052	14.2	6.0	0.84	387	14.9	431	436	442	334	515	432	112	0.044	-0.58	0.690	70
95	25.978	0.276	0.23	102.9	74	1	57	231	0.2	-0.2	-0.052	14.4	5.8	0.89	378	15.1	412	433	426	323	502	419	110	0.044	-0.58	0.670	70
100	27.360	0.276	0.23	102.3	74	1	56	230	0.1	-0.1	-0.050	14.7	5.4	0.86	363	16.0	398	431	417	315	489	410	109	0.044	-0.58	0.630	71
105	28.755	0.279	0.23	102.4	74	1	57	229	0.0	-0.1	-0.049	14.8	5.4	0.93	353	15.9	383	428	405	308	478	400	108	0.044	-0.58	0.630	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 TopTemp (oF0	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	28.755	0.274	0.24	100.90	72.3	1.00	60.00	229.82	12.40	-0.59	-0.07	10.22	10.14	0.47	511.73	11.42	636.55	440.41	467.50	382.55	546.95	108	134.00	0.04	-0.58	1.21	70.14

Final Laboratory Report - Method 5H
Dilution Tunnel Particulate Calculations

Client Name: Hearth & Home Technologies
Model: 31-I
Project No.: 061-S-74-3
Tracking No.: 1316

Equipment Numbers:

Run No.: 4
Date: 01/16/09

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	A9	656.7	638.6		18.1
B. Rear filter catch	Filter	9	157.3	151.2		6.1
C. Rinse of probe and filter assembly (FRONT)	Acetone	100	104352.1	104342.3	0.0090	8.9
D. Rinse of Impinger Set	Distilled Water	325	145030.9	145008.1	0.0000	22.8
E. Rinse of Impinger Set	Dichloromethane	150	98618.4	98613.0	0.0000	5.4
F. Rinse of filter assembly and gas train (BACK)	Acetone	150	101710.9	101692.0	0.0090	17.5
			Total Particulate, mg :			78.8

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

IMPINGERS	Weights		
	Final, g	Initial, g	Net, g
1	597.0	546.5	50.5
2	656.4	655.1	1.3
3	560.0	558.7	1.3
4	815.7	809.0	6.7
		TOTAL, g:	59.8

Analyst: K. J. Morg Date: 2-06-09

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STOVE TEMPERATURE TEST DATA - METHOD 5G

Page ___ of ___

Client/Model: Heath & Home Technologies / 3100 I **Project #:** 061-S-74.3 **Tracking #:** 1316

Date: 1-16-09 Test Crew: K. Morgan Run #: 4

OMNI Equipment ID #: _____

Preburn [x]
Test [ ]

Coal Bed: Data: 0 = Range: 2.5 - 3.1

Actual: Coal Bed: 2.8

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	16.7		-.056	67	507	423	568	454	514	304	
10	15.3	1.4	-.054	67	500	451	485	450	430	377	
20	13.6	1.7	-.065	71	547	445	399	349	388	447	
30	11.1	2.5	-.071	67	701	422	357	304	376	607	
40	8.6	2.5	-.079	67	828	416	413	342	412	649	
50	6.3	2.3	-.080	68	870	421	480	385	462	628	
60	4.4	1.9	-.077	69	878	432	542	399	504	617	
70	3.1	1.3	-.070	69	856	449	602	413	562	536	
72 80	2.8	0.3	-.056	71	571	466	533	397	565	404	
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. Morgan Date: 1-16-09

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Run Notes

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3
Tracking #: 1316
Run #: 4 Date: 1-16-09
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:

Fully OPEN

SECONDARY: FIXED

TERTIARY: ~~None~~ 1/4 OPEN (Lower Control)

FAN: ON-High

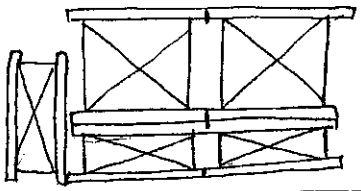
PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	test setting					
~~70~~ 72					X	Levelled

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

FRONT VIEW



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Loaded by 30 sec.
DOOR: Closed At 40 sec.
PRIMARY AIR: Not touched → Left Fully open Duration of test.
OTHER:

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

SAME As ABOVE

SECONDARY: FIXED

TERTIARY: NONE

FAN: ON-High DURATION OF test

Technician signature: K. Morgan Date: 1-16-09

FUEL DATA

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3 Tracking #: 1316
Date: 1-16-08 Test Crew: K. Morgan Run #: 4
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

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

Piece	Length	Readings			Type
1	8 ft	23.4	25.4	23.1	2x4
2	8 ft	23.8	21.6	25.7	2x4
3	ft				

Length of cut pieces: 7+10 inches 1@ 5@12" 4@15"
Pre-Burn Fuel Average Moisture: 23.83 %

Time (clock): 08:15 Room Temperature (F): 65 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 3 4 × 4 2
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 6.2 (2 × 4)
6.2 (4 × 4)
FUEL PIECE LENGTH: 14.0" 12.4 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	22.6	21.1	22.8	2x4
2	23.4	23.2	23.4	2x4
3	24.8	24.9	25.2	2x4
4	19.4	22.4	22.3	4x4
5	21.5	19.3	20.0	4x4
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 22.42 %

Time (clock): 08:25 Room Temperature (F): 67 Initials: K

Technician signature: K. J. Morgan Date: 1-16-09

Supplemental Data EPA 5G/5H

Client: Hearth & Home Technologies

Model: 3100 I

Project #: 061-S-74-3 Tracking #: 1316

Date: 1-16-08 Run #: 4 Booth: _____

Test Crew: K. Morgan Start Time: 10:02 Stop Time: 11:47

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Initial: Ø

Final: Ø

Dilution Tunnel (Method 5G Only):

Initial: Ø

Final: Ø

Calibrations: Span Gas CO_2: 9.956 O_2: 20.9 CO: 1.249 CO_2(DT): 2.483

Time	N_2 Span		N_2 Span	N_2 Span		N_2 Span	N_2 Span	N_2 Span	N_2 Span
	Ø			END					
O_2	00.0	20.9		00.0	21.0				
CO_2	00.0	10.0		00.0	9.9				
CO	0.00	1.25		0.00	1.24				
CO_2 (DT)	00.0	2.48		00.0	2.46				

Stack Diameter (inches): 6.0

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

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

Induced Draft: Ø %Smoke Capture: 100

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

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-13-09 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	K ~~28.95~~ 29.00	29.00	29.00
Room Temp (°F)	71	71	70

Technician signature: K. Morgan Date: 1-16-08

Run 5

Wood Heater Calculation Data
EPA Method 5H

Run	5
Manufacturer:	Hearth and Home Tech
Model/Tracking No.:	31-I
Test Date:	16-Jan-09
Project Number:	061-S-74-3

Burn Rate (dry kg/hour) = 1.82

Emission Rate (grams/hour) = 1.24

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	13.1	1.05		134.3	17.0	0.059				
10	13.4	0.99	17.9	130.9	17.8	0.056	3.023	0.178	100.0	0.348
20	13.5	0.98	20.5	130.2	17.0	0.059	3.143	0.177	99.7	0.318
30	13.5	0.99	17.8	130.2	16.8	0.059	3.009	0.177	99.9	0.311
40	13.4	1.00	19.7	130.8	15.6	0.064	2.958	0.176	99.4	0.267
50	13.3	0.99	13.9	131.6	15.6	0.064	2.807	0.180	101.5	0.268
60	13.3	1.04	15.0	132.0	16.4	0.061	2.822	0.181	101.5	0.295
70	13.2	1.04	10.0	132.3	16.0	0.063	2.889	0.176	99.1	0.280
80	13.2	1.06	10.0	132.9	15.8	0.063	2.851	0.179	100.4	0.275
90	13.1	1.07	5.4	133.6	16.0	0.062	2.804	0.177	99.6	0.282
100	13.1	1.08	5.7	134.1	16.1	0.062	2.828	0.176	99.2	0.284
110	13.0	1.07	6.1	134.5	16.1	0.062	2.859	0.178	100.0	0.283
120	13.0	1.08	4.0	134.7	15.8	0.063	2.855	0.178	99.9	0.272
130	13.0	1.06	4.0	134.8	15.5	0.064	2.842	0.180	101.4	0.264
140	13.0	1.05	4.1	134.9	15.5	0.064	2.783	0.179	100.7	0.265
150	13.0	1.05	4.3	135.1	15.4	0.065	2.747	0.177	99.3	0.261
End of Test										
Averages/Totals	13.2	1.04	10.6	132.9	16.2	0.062	2.881		100.1	0.285

Woodstove Type	
Yhc>1=cat,2=ncat, 3=pellet	2
EPA's Hydrocarbon Constant (%)	1.32
Fuel Data	
Test Charge (as fired lbs)	12.3
Average Moisture (% dry basis)	22.33
Average Moisture (% wet basis)	18.25
Run Parameters	
DGM initial reading (cf)	0.000
DGM final reading (cf)	45.707
Pb (inches Hg)	29.00
Tm (avg oF)	73.63
dH (avg inches wc)	0.29
Vm (scf)	43.208
Qf by carbon balance (avg dscf/minute)	10.55
Analytical Data	
Probe/Front Wash (mg)	8.5
Front Filter (mg)	19.9
Impinger PM (mg)	52.5
Back Filter (mg)	3.4
Total Weight (mg)	84.3
Emission Results	
Cs (g/dscf)	0.0020
ER (g/hour)	1.24

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Wood Heater Test Data
EPA Method 5H

Run Number 5

Manufacturer:	Hearth and Home Tech	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	31-I	Test Meter Y:	0.985
Stove Type (cat, ncat, or pellet):	ncat	Orifice dH@:	1.764
Project Number:	061-S-74-3	Pitot Tube Cp:	0.99
Test Date:	16-Jan-09	Average Barometric Pressure:	29.00
Test Start Time:	14:52	Average Fuel Moisture (dry basis %):	22.33
Recording Interval (minutes):	10	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	150		

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	0.038	0.032	0.032	0.036	0.038	0.034	"H2O	134.3
Initial Temp	105	105	105	105	104	104	104	104	oF	scf/minute

Signature/Date: L. J. Morg 4-23-09

Post-Test Leak Check: .001 @ 3.0 cfm@"Hg

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)	0.034
	H2O (%)	4.00	Preferred Initial Sampling Rate (cf/minute)	0.33

Flue Gas	
Impinger liquid, Vlc (g)	82.7
Volume of Water Vapor, Vw(std) (ft3)	3.90
Moisture Content, Bws	0.083

Elapsed Time	Particulate Sampling System: 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)	Fuel Weight: Scale Reading (lbs)	Weight Change (lbs)	Stove Flue-Gas Conditions: Draft Pressure (inches wc)	O2 (%)	CO2 (%)	CO (%)	Temperature (F)	Air to Fuel Ratio (lb/lb)	Stove Temperatures (oF): Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Average Surface Temperature (F)	Dilution Tunnel: Temperature (F)	dP Velocity Pressure (inches wc)	Static Pressure (inches wc)	CO2 (%)	Laboratory: Ambient Temperature (F)
0	0.000		0.32		72	0	74	231	12.3		-0.042	15.5	4.9	0.45	294	18.2	340	438	345	290	422	367	105	0.035	-0.44	0.850	68
10	3.188	0.319	0.35	100.0	72	1	53	229	10.6	-1.7	-0.072	9.7	11.2	0.20	572	9.6	576	424	295	271	390	391	131	0.035	-0.44	1.550	69
20	6.502	0.331	0.32	99.7	72	1	53	230	8.6	-2.0	-0.073	9.5	11.5	0.21	571	9.3	787	398	329	316	420	450	137	0.035	-0.44	1.530	69
30	9.675	0.317	0.31	99.9	73	1	54	230	6.8	-1.8	-0.072	8.9	12.0	0.23	574	9.0	807	382	359	348	441	467	137	0.035	-0.44	1.580	70
40	12.800	0.313	0.27	99.4	73	1	56	229	5.2	-1.6	-0.068	11.4	9.4	0.13	514	11.2	770	372	393	379	457	474	132	0.035	-0.44	1.150	69
50	15.766	0.297	0.27	101.5	73	1	58	230	4.1	-1.1	-0.068	11.8	9.1	0.17	484	11.5	576	367	398	382	476	460	125	0.035	-0.44	1.110	69
60	18.748	0.298	0.30	101.5	73	1	55	230	3.0	-1.1	-0.063	12.2	8.3	0.19	477	12.4	618	361	424	360	493	451	121	0.035	-0.44	1.060	69
70	21.800	0.305	0.28	99.1	73	1	55	229	2.3	-0.7	-0.060	12.7	7.8	0.23	459	13.0	603	358	432	355	494	448	118	0.035	-0.44	0.970	69
80	24.812	0.301	0.27	100.4	74	1	55	230	1.7	-0.6	-0.054	14.0	6.3	0.39	402	15.2	535	353	414	334	492	426	113	0.035	-0.44	0.780	70
90	27.780	0.297	0.28	99.6	74	1	57	230	1.4	-0.3	-0.052	14.7	5.5	0.55	361	16.5	451	353	391	309	467	394	107	0.035	-0.44	0.690	70
100	30.774	0.299	0.28	99.2	74	1	58	230	1.1	-0.3	-0.045	15.1	5.0	0.73	331	17.2	400	351	381	294	444	374	103	0.035	-0.44	0.630	71
110	33.800	0.303	0.28	100.0	75	1	58	230	0.8	-0.3	-0.043	15.6	4.6	0.68	310	18.4	358	348	372	281	426	357	100	0.035	-0.44	0.580	72
120	36.828	0.303	0.27	99.9	75	1	59	230	0.6	-0.2	-0.041	15.4	4.7	0.73	300	18.0	331	345	358	268	413	343	98	0.035	-0.44	0.580	71
130	39.842	0.301	0.26	101.4	75	1	59	229	0.4	-0.2	-0.040	15.6	4.6	0.71	296	18.3	316	341	355	261	410	337	97	0.035	-0.44	0.560	72
140	42.794	0.295	0.26	100.7	75	1	59	230	0.2	-0.2	-0.039	15.7	4.6	0.66	291	18.5	307	336	348	256	410	331	96	0.035	-0.44	0.580	73
150	45.707	0.291	0.26	99.3	75	1	60	229	0.0	-0.2	-0.038	16.1	4.2	0.73	280	19.4	300	332	338	251	418	328	95	0.035	-0.44	0.510	72
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 TopTemp (oF0	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)
150	45.707	0.305	0.29	100.11	73.6	1.00	57.69	229.75	12.30	-0.82	-0.05	13.37	7.11	0.44	407.25	14.73	510.94	366.19	370.75	309.69	442.06	39	113.41	0.04	-0.44	0.91	70.19

Final Laboratory Report - Method 5H
Dilution Tunnel Particulate Calculations

Client Name:	Hearth & Home Technologies	Equipment Numbers:		Run No.:	5
Model:	31-I			Date:	01/16/09
Project No.:	061-S-74-3				
Tracking No.:	1316				

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	A10	657.0	637.1		19.9
B. Rear filter catch	Filter	10	153.9	150.5		3.4
C. Rinse of probe and filter assembly (FRONT)	Acetone	125	109187.2	109177.6	0.0090	8.5
D. Rinse of Impinger Set	Distilled Water	275	134341.8	134312.7	0.0000	29.1
E. Rinse of Impinger Set	Dichloromethane	150	106405.3	106398.1	0.0000	7.2
F. Rinse of filter assembly and gas train (BACK)	Acetone	200	104967.4	104949.4	0.0090	16.2
			Total Particulate, mg :			84.3

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	611.1	541.9	69.2
2	647.2	642.6	4.6
3	560.8	560.0	0.8
4	826.6	818.5	8.1
		TOTAL, g:	82.7

Analyst: K. J. Morgan Date: 2-06-09

STOVE TEMPERATURE TEST DATA - METHOD 5G

Page ___ of ___

Client/Model: Heath & Home Technologies / 3100 I **Project #:** 061-S-74.3 **Tracking #:** 1316

Date: 1-16-09 Test Crew: K. Morgan Run #: 5

OMNI Equipment ID #: _____

2.5 lb. Added at Ø

Preburn [X]
Test [ ]

Coal Bed: Data: 0 = Range: 2.5 - 3.0 ~~2.6 - 3.1~~ K

Actual: Coal Bed: 2.9

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	4.0		-.068	71	787	444	524	451	550	569	
10	5.2	*1.3	-.068	70	753	449	498	422	562	516	
20	4.3	0.9	-.062	70	669	446	458	388	536	488	
30	3.7	0.6	-.055	70	584	441	422	360	502	425	
40	3.4	0.3	-.049	70	469	443	393	333	473	355	
50	3.2	0.2	-.045	69	402	445	378	313	448	332	
60	2.9	0.3	-.044	68	359	441	358	301	427	305	
64 ~~70~~	2.9	Ø	-.042	68	340	438	345	290	422	294	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Leak ck: .001 @ 3.0

Technician signature: K. J. Morgan Date: 1-16-09

A-39 OF 4-42

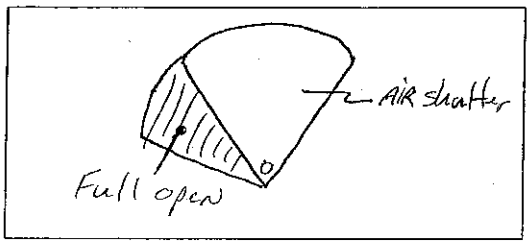
Run Notes

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3
Tracking #: 1316
Run #: 5 Date: 1-16-09
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:



SECONDARY: FIXED

TERTIARY: NONE

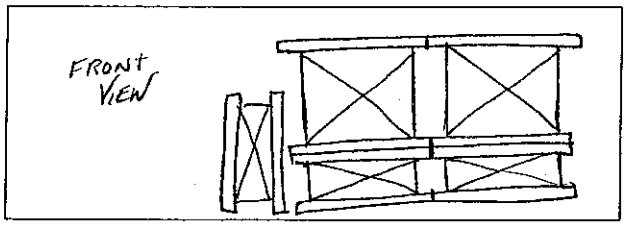
FAN: ON - High

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					
0			2.5			
58					X	Levelled

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING Loaded by 30 sec.
DOOR: Closed at 35 sec.
PRIMARY AIR: ~~Full Open~~ K test setting

OTHER: TIMED START-UP DEVICE INITIATED AT T=0

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

PRIMARY:

SAME AS ABOVE

SECONDARY: FIXED

TERTIARY: NONE

FAN: ON - High

Technician signature: K. Morgan Date: 1-16-09

FUEL DATA

Client: Hearth & Home Technologies
Model: 3100 I
Project #: 061-S-74-3 Tracking #: 1316
Date: 1-16-09 Test Crew: K. Morgan Run #: 5
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER -- DRY BASIS)

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

Piece	Length	Readings			Type
1	ft	24.5	24.5	21.5	2x4
2	ft				
3	ft				

Length of cut pieces: inches Pre-Burn Fuel Average Moisture: 23.50 %

Time (clock): 13:15 Room Temperature (F): 70 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 x 4 3 4 x 4 2
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 6.2 (2 x 4)
K ~~6.5~~ 6.1 (4 x 4)
FUEL PIECE LENGTH: 14.0 12.3 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE	READINGS			TYPE
1	23.3	19.3	25.3	2x4
2	25.0	24.5	23.3	2x4
3	23.2	20.4	25.0	2x4
4	20.4	20.9	20.5	4x4
5	20.9	21.9	21.1	4x4
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 22.33%

Time (clock): 13:10 Room Temperature (F): 70 Initials: K

Technician signature: K. Morgan Date: 1-16-09

Supplemental Data EPA 5G/5H

Client: Hearth & Home Technologies

Model: 3100 I

Project #: 061-S-74-3 Tracking #: 1316

Date: 1-16-09 Run #: 5 Booth: _____

Test Crew: K. Morgan Start Time: 14:52 Stop Time: 17:22

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack: Initial: Ø Final: Ø

Dilution Tunnel (Method 5G Only): Initial: Ø Final: Ø

Calibrations: Span Gas CO_2: 9.956 O_2: 20.9 CO: 1.249 CO_2(DT): 2.483

Time	N_2 Span		N_2 Span	N_2 Span		N_2 Span	N_2 Span	N_2 Span	N_2 Span
	Ø			End					
O_2	00.0	20.9		00.1	20.9				
CO_2	00.0	10.0		00.0	9.9				
CO	0.00	1.25		0.00	1.26				
CO_2 (DT)	00.0	2.48		-00.1	2.46				

Stack Diameter (inches): 6.0

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

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

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.1" w.c. Post: Ø @ 3.2" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-13-09 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	29.00	29.00	29.01
Room Temp (°F)	68	69	72

Technician signature: K. L. Morgan Date: 1-16-09