

*Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032*

Section 4

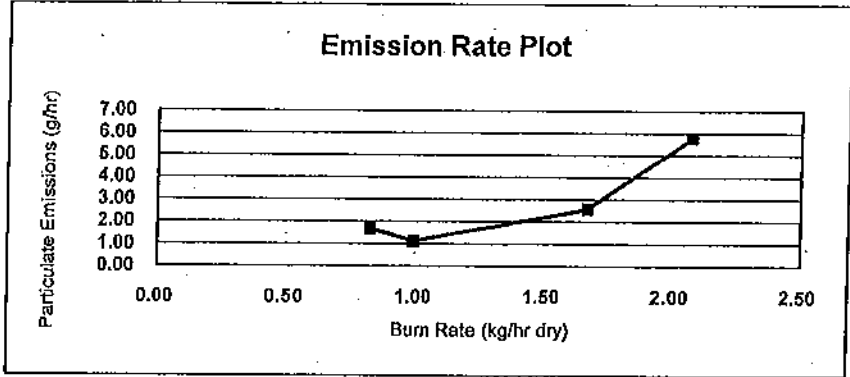
Test Data by Run

EPA Weighted Average Emissions

EPA Method 28

Client: Harman Home Heating Status: Final
 Stove Model: Oak Leaf Stove Type: Non-Catalytic Stove
 Test Dates: 7/20/10-7/22/10
 Project Number: 135-S-26-8.5
 Tracking Number: 1573
 Signature/Date: *AE* 8/10/10

Weighted Average
(g/hr)
2.2



Run #	1	
Burn Rate (dry kg/hr)	0.82	
Category	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.68	
Cap (g/hr)	15	
Weighting Factor	0.370	21.89%
Heat Output (BTU/hr)	9738	

Run #	3	
Burn Rate (dry kg/hr)	0.99	
Category	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.12	
Cap (g/hr)	15	
Weighting Factor	0.597	35.38%
Heat Output (BTU/hr)	11756	

Run #	5	
Burn Rate (dry kg/hr)	1.67	
Category	3	
Overall Efficiency (%)	63%	
Emissions (g/hr)	2.57	
Cap (g/hr)	18	
Weighting Factor	0.552	32.72%
Heat Output (BTU/hr)	19832	

Run #	6	
Burn Rate (dry kg/hr)	2.07	
Category	4	
Overall Efficiency (%)	63%	
Emissions (g/hr)	5.78	
Cap (g/hr)	18	
Weighting Factor	0.169	10.01%
Heat Output (BTU/hr)	24582	

Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 1

Wood Heater Calculation Data EPA Method 5H

Run 1

Manufacturer: Hamman Home Heating

Model/Tracking No.: Oak Leaf, 1573

Test Date: 20-JUL-10

Project Number: 135-S-26-8.3

Burn Rate (dry kg/hour) = 0.82

Emission Rate (grams/hour) = 1.68

Note: When using the CO2 tracer-gas method, 1/CF (by tracer gas) = S1

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	F ₀ (1.00 to 1.12)	CF by carbon balance (scf/minute)	CF by tracer gas (scf/minute)	CF by tracer gas (SI)	Volume Sampled (scf)	SI * Volume Sampled (scf)	Proportional Sample Rate	dH new
10	13.4	1.00	51.4	36.7	0.028	148.6	4.325	112.0	0.166
20	13.4	1.02	19.8	20.0	0.050	145.8	1.884	94.4	0.165
30	13.4	0.98	19.3	20.3	0.049	146.0	1.846	92.6	0.171
40	13.4	0.98	18.1	20.2	0.050	146.0	1.860	91.8	0.172
50	13.4	0.98	17.7	20.4	0.049	146.0	1.877	93.3	0.168
60	13.3	0.96	14.7	19.9	0.051	146.3	1.893	93.0	0.163
70	13.3	0.98	15.0	19.5	0.051	146.3	1.898	93.8	0.157
80	13.3	0.97	16.0	20.2	0.050	146.3	1.897	97.4	0.167
90	13.3	0.98	13.9	19.4	0.052	146.4	1.895	94.2	0.154
100	13.3	0.99	10.8	19.3	0.052	146.7	1.897	98.2	0.163
110	13.3	1.01	8.8	18.8	0.053	147.0	1.905	98.1	0.145
120	13.3	1.00	8.4	18.8	0.053	147.1	1.890	101.0	0.145
130	13.3	0.89	8.4	18.2	0.055	147.2	1.903	101.6	0.135
140	13.2	0.88	5.9	18.1	0.055	147.4	1.898	104.8	0.135
150	13.2	0.87	8.8	16.8	0.059	147.4	1.908	105.2	0.116
160	13.2	1.00	6.1	18.0	0.059	147.5	1.811	107.9	0.147
170	13.2	1.02	3.1	18.9	0.059	147.5	1.813	96.2	0.147
180	13.2	1.04	3.4	23.7	0.042	147.5	1.815	96.3	0.231
190	13.2	1.00	3.5	23.0	0.043	147.5	2.359	93.7	0.217
200	13.2	1.00	3.6	24.4	0.041	147.8	2.408	104.9	0.243
210	13.2	1.02	0.0	25.8	0.038	147.8	2.380	93.0	0.273
220	13.2	0.93	3.3	18.2	0.055	147.8	2.656	103.7	0.135
230	13.2	0.88	3.0	16.1	0.062	147.6	1.949	107.7	0.106
240	13.2	0.98	6.4	18.2	0.055	147.6	1.714	106.7	0.135
250	13.2	1.02	3.3	19.0	0.053	147.6	1.710	94.5	0.147
260	13.2	0.98	3.2	16.5	0.060	147.6	1.873	99.1	0.113
270	13.2	1.02	8.4	16.6	0.060	147.6	1.750	106.8	0.113
280	13.2	0.98	3.4	21.0	0.048	147.6	1.899	102.7	0.181
290	13.2	1.02	0.0	23.5	0.042	147.6	2.129	101.5	0.227
300	13.2	0.98	7.3	23.6	0.042	147.8	2.378	101.2	0.227
Averages/Totals	13.3	0.99	9.1	20.5	0.050	2.041	100.0		0.165

Woodstove Type
Yhca-1-cat, 2-n-cat, 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)
CF 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)

2	67.2
1.32	61.4
10.9	96.9
20.86	2.8
17.33	188.4
0.000	0.0031
62.332	1.68
30.16	
75.26	
0.18	
61.193	
9.08	

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Harman Home Heating Equipment Numbers: _____ Run No.: 1
 Model: Oak Leaf _____ Date: 07/20/10
 Project No.: 135-S-26-8.3 _____
 Tracking No.: _____ 1573 _____

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	D006	683.3	621.9		61.4
B. Rear filter catch	Filter	J006	152.9	150.0		2.9
C. Rinse of probe and filter assembly (FRONT)	Acetone	75	107432.2	107393.0	0.0077	38.6
D. Rinse of Impinger Set	Distilled Water	275	145447.7	145420.2	0.0000	27.5
E. Rinse of Impinger Set	Dichloromethane	150	110030.5	110000.8	0.0020	29.4
F. Rinse of filter assembly and gas train (BACK)	Acetone	175	104907.9	104878.0	0.0077	28.6
Total Particulate, mg :						188.4

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		Weights		
IMPINGERS	Final, g	Initial, g	Net, g	
1	723.5	662.8	60.7	
2	654.3	650.0	4.3	
3	446.3	445.6	0.7	
4	751.9	738.7	13.2	
		TOTAL, g:	78.9	

Analyst: *[Signature]*

Date: 7/30/10

Run Information

Run Number: 1
 Date / Start Time: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM
 Tracking Number: 7/20/10
 Manufacturer: Harman
 Model: Oak Leaf
 Project Number: 135-S-26-8.3
 Technician: SJB

Fuel Load (lbs): 10.90
 Coal Bed Range (lbs): 2.19 to 2.73
 Actual Coal Bed (lbs): 2.6
 FINAL

Test Booth: 1
 Data Collection Program: 5G3_dual 47 mm_Logger_01_19_09.vi

Velocity Traverse Data

Pt. 1	Pt. 2	Pt. 3	Pt. 4	Pt. 5	Pt. 6	Pt. 7	Pt. 8
Initial dp	.034	.038	.042	.038	.040	.044	.038
Initial Temp	92	92	92	92	92	92	92
							In-H2O
							Deg F

Barometric Pressure: 30.13
 Begin: 30.13
 Middle: 30.15
 End: 30.19
 Avg: 30.156 In-Hg

PM Control Module: 335/336
 Tunnel Velocity: 13.36 ft/sec
 Dilution Tunnel MW(dry): 29 lb/lb-mole
 Initial Tunnel Flow: 146.6 scfm
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole
 Average Tunnel Flow: 147.93 scfm
 Dilution Tunnel H2O: 4 percent
 Tunnel Area: 0.1963 ft²
 Dilution Tunnel Static: -.58 in. H2O
 Post-Test Leak Check-A: .003 @ 18 cfm @ " Hg
 Post-Test Leak Check-B: .001 @ 11.5 cfm @ " Hg
 Fuel Consumed: 10.9 lbs
 Firebox Surface Temp Change: 91
 Run Time: 300 Minutes
 Fuel Moisture (dry basis): 20.96 %

Meter Box "Y" Factor A: 1.001
 Filter Holder # A: _____
 Total Particulate A: 5.7 mg
 Avg Prop Rate A: 105.507

Meter Box "Y" Factor B: .997
 Filter Holder # B: _____
 Total Particulate B: 7.8 mg
 Avg Prop Rate B: 100.697

MFG: Harman
 Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
 Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

Emissions Results

Burn Rate	0.82	kg/hr dry
Adjusted Emissions A	2.12	grams/hour
Adjusted Emissions B	2.53	grams/hour
Upper Limit	2.085	grams/hour
Average Emissions	2.32	grams/hour
Lower Limit	2.498	grams/hour

Particulate Concentration (dry standard)	0.00013	grams/dscf
Particulate Emission Rate	1.20	grams/hour
Total Sample Volume (Standard Conditions) Yms	42.466	DSCF
Total Particulates -mp	5.7	Mg
Average Delta H	1.05	Inches H2O
Total Sample Volume -ym	43.188	Cubic Feet
Average Gas Meter Temperature	82.90	Degree Fahrenheit

Average Tunnel Temp	82.30	Degree Fahrenheit
Average Delta p	0.04	Inches H2O
Average Gas Velocity in Dilution Tunnel	13.44	feet/Second
Average Gas Flow Rate in Dilution Tunnel (std)	8935.78	DSCF/Hour
Total Time	300	Minutes

OMNI Test Laboratories Inc.

Signature/Date:

[Signature]
 7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

Fuel Data

FUEL DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD, GRADE-OR-BETTER, DIMENSIONAL NUMBER _____

OMNI EQUIPMENT ID: _____

PRE-BURN FUEL

MOISTURE CONTENT METER - DRY BASIS

CALIBRATION VALUE (1) = 23% ACTUAL READING = 12
CALIBRATION VALUE (2) = 22% ACTUAL READING = 22

PIECE	LENGTH (ft)	% MOISTURE READINGS	FUEL TYPE	PIECE LENGTH (IN)	NOTES
1	6	23.5	2X4	21.9	14 pieces @ 7.5"
2	8	24.2	2X4	23.4	
3	0	0		0	

TIME (24 HR) = 6:00 ROOM TEMPERATURE (F) = 70

TEST FUEL

FUEL TYPE: PIECE QUANTITY

3	2X4	PIECES	1	PIECES
5.8	LBS		4.1	LBS

FUEL LOAD: PIECE COUNT = 4 PIECES
ACTUAL LOAD WEIGHT = 10.9 LBS

MOISTURE CONTENT METER - DRY BASIS

PIECE	READINGS	TYPE	PIECE QUANTITY	READINGS	TYPE
1	21.9	4X4	6	0	
2	21.9	2X4	7	0	
3	18.6	2X4	8	0	
4	19.1	2X4	9	0	
5	0		10	0	

TIME (24 HR CLOCK) = 8:15 ROOM TEMPERATURE (F) = 70

AVERAGE FUEL LOAD MOISTURE = 20.96

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Signature/Date: _____

7/30/10

MFG: Harman
Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

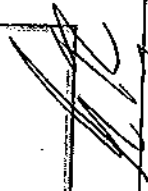
Notes

* Re positioned Fuel @ 211 min. into test

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Signature/Date:



7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

Preburn Et (min)	Scale (lbs)	Weight Change	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	AMB (oF)	Draft (In-H ₂ O)	Cat Temp (oF)	O ₂ (%)	CO ₂ (%)	CO (%)	CO Ratio
10	-0.696	315	162	151	311	302	3218	243.1	226	71	-0.030	3218	18.07	2.15	0.71	24.67	
20	-0.878	271	172	139	296	287	3218	232.9	193	70	-0.025	3218	0.68	0.03	0.01	26.59	
30	-0.958	315	178	152	297	277	3218	243.6	243	71	-0.037	3218	16.07	2.39	0.94	23.18	
40	-0.956	363	184	207	313	278	3218	269.0	273	70	-0.041	3218	15.67	5.24	0.07	1.25	
50	-0.608	358	190	245	332	266	3218	280.2	279	70	-0.041	3218	15.97	4.97	0.15	2.93	
60	1.765	419	192	230	348	295	3218	297.1	388	71	-0.029	3218	16.22	4.68	0.21	4.36	
70	-3.560	385	193	242	357	309	3218	297.1	292	71	-0.041	3218	15.86	4.93	0.03	0.59	
80	-0.231	382	195	224	365	315	3218	296.1	247	70	-0.034	3218	17.07	3.59	0.10	2.79	

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Signature/Date:

7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

Elapsed Time (min)	Gas Meter-A (ft3)	Sample Rate (cfm)	Orifice dia	Meter (deg F)	Meter Vac (in-Hg)	Dil Yrn (oF)	Dil Tunn (oF)	Pro Rate (10%)	Scale Reading (lbs)	Weight Change (lbs)	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	Filter (oF)	Imping Exit (oF)	IMB (oF)	Draft (in-H2O)	Cat Temp (oF)
0	0.000	NA	0.00	75	-0.09	88	0.040	0.0	10.9	10.37	394	195	221	366	315	3218	298.2	277	73	3218	70	-0.043	3218
10	0.639	0.064	2.08	75	1.31	91	0.040	100.7	9.5	-1.40	353	195	234	356	314	3218	290.3	295	74	3218	71	-0.044	3218
20	2.334	0.189	1.05	76	0.76	90	0.040	148.1	8.8	-0.88	328	196	235	384	302	3218	278.8	289	74	3218	70	-0.045	3218
30	3.779	0.144	1.05	78	0.77	90	0.040	115.2	7.7	-0.90	332	198	237	324	294	3218	277.1	286	75	3218	71	-0.044	3218
40	5.226	0.145	1.06	79	0.77	90	0.040	111.1	6.8	-0.85	354	198	241	325	292	3218	282.0	291	75	3218	71	-0.044	3218
50	6.676	0.145	1.05	80	0.77	89	0.040	109.3	6.0	-0.83	381	201	240	334	296	3218	290.2	276	75	3218	71	-0.044	3218
60	8.129	0.145	1.06	81	0.78	88	0.040	107.3	5.4	-0.84	402	203	227	344	302	3218	295.9	263	75	3218	71	-0.039	3218
70	9.589	0.145	1.06	82	0.77	87	0.040	106.4	4.8	-0.89	412	202	213	349	305	3218	298.2	253	75	3218	72	-0.037	3218
80	11.040	0.146	1.05	83	0.78	88	0.040	105.7	4.1	-0.72	422	201	204	348	308	3218	296.5	262	75	3218	72	-0.039	3218
90	12.497	0.146	1.06	83	0.78	87	0.040	105.0	3.5	-0.60	423	199	205	345	312	3218	297.1	255	75	3218	72	-0.039	3218
100	13.953	0.146	1.05	83	0.77	85	0.040	104.5	3.1	-0.56	421	200	196	346	317	3218	296.2	229	75	3218	71	-0.032	3218
110	15.413	0.146	1.06	83	0.78	83	0.040	104.3	2.8	-0.30	404	197	179	348	317	3218	288.5	210	76	3218	71	-0.029	3218
120	16.872	0.146	1.05	84	0.78	82	0.040	103.9	2.5	-0.30	391	198	164	345	314	3218	281.5	197	76	3218	72	-0.026	3218
130	18.333	0.146	1.05	84	0.78	81	0.040	103.8	2.2	-0.31	380	194	160	344	308	3218	276.4	188	76	3218	72	-0.024	3218
140	19.799	0.146	1.05	84	0.78	80	0.040	103.4	2.0	-0.22	367	191	144	344	304	3218	270.8	178	76	3218	72	-0.022	3218
150	21.254	0.146	1.05	84	0.78	80	0.040	103.3	1.7	-0.27	362	188	137	339	304	3218	266.0	174	76	3218	71	-0.021	3218
160	22.715	0.146	1.05	84	0.78	79	0.040	103.1	1.5	-0.20	348	185	133	330	298	3218	258.5	168	75	3218	72	-0.020	3218
170	24.178	0.146	1.05	84	0.79	79	0.040	103.0	1.4	-0.11	333	183	129	323	292	3218	252.2	163	76	3218	72	-0.018	3218
180	25.638	0.146	1.05	84	0.78	78	0.040	102.9	1.3	-0.10	317	182	125	317	285	3218	245.3	155	75	3218	72	-0.017	3218
190	27.100	0.146	1.05	84	0.78	78	0.040	102.7	1.2	-0.10	306	178	121	313	277	3218	239.3	150	75	3218	72	-0.015	3218
200	28.563	0.146	1.06	85	0.79	77	0.040	102.5	1.1	-0.07	285	175	117	309	269	3218	233.0	144	75	3218	73	-0.014	3218
210	30.024	0.146	1.05	85	0.79	78	0.040	102.4	1.0	-0.05	283	171	114	305	260	3218	228.5	140	75	3218	73	-0.013	3218
220	31.488	0.146	1.06	85	0.79	78	0.040	102.4	0.9	-0.05	264	166	111	298	248	3218	217.5	139	76	3218	73	-0.012	3218
230	32.949	0.146	1.06	85	0.79	78	0.040	102.4	0.9	-0.14	263	165	111	290	239	3218	213.5	141	76	3218	73	-0.013	3218
240	34.412	0.146	1.06	85	0.78	78	0.040	102.2	0.7	-0.16	263	166	111	284	234	3218	209.4	140	76	3218	73	-0.013	3218
250	35.873	0.146	1.06	85	0.79	78	0.040	102.0	0.6	-0.10	261	167	111	279	229	3218	208.5	141	76	3218	73	-0.013	3218
260	37.335	0.146	1.05	86	0.79	78	0.040	102.0	0.5	-0.13	261	169	112	273	227	3218	206.7	140	76	3218	73	-0.013	3218
270	38.798	0.146	1.06	86	0.79	78	0.040	102.0	0.3	-0.14	258	170	112	269	225	3218	204.5	138	77	3218	74	-0.012	3218
280	40.262	0.146	1.06	86	0.79	78	0.040	101.8	0.2	-0.09	253	170	112	264	223	3218	201.7	134	77	3218	74	-0.012	3218
290	41.725	0.146	1.05	86	0.79	78	0.040	101.8	0.0	-0.17	248	168	109	260	220	3218	199.3	130	77	3218	74	-0.010	3218
300	43.188	0.146	1.06	86	0.79	78	0.040	101.8	0.0	-0.17	248	166	109	254	218	3218	199.3	130	77	3218	74	-0.010	3218
AVG	NA	NA	1.02	83.17	0.75	82.00	0.04	102.14	2.80	NA	NA	184.57	157.87	316.70	278.03	3218.00	253.97	NA	75.58	3218.00	72.10	-0.02	3218.00

OMNI Test Laboratories Inc.

Signature/Date:

[Handwritten Signature]
7/30/10

MFG: Harman
Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

	Box B ET (min)	Gas Meter-B (ft3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Pro Rate (10%)	Filter (dF)	Imping Exit (dF)	Box B dP (in-H2O)
0	0.000	NAN	0.90	76	0.9	0.0	73	3218	-0.55	
10	1.564	0.156	1.05	77	1.0	100.7	75	3218	-0.55	
20	3.145	0.158	1.05	78	1.0	101.1	75	3218	-0.55	
30	4.731	0.159	1.05	80	1.0	100.9	75	3218	-0.55	
40	6.319	0.159	1.05	81	1.0	100.9	75	3218	-0.56	
50	7.912	0.159	1.05	82	1.0	100.8	75	3218	-0.55	
60	9.504	0.159	1.05	83	1.0	100.7	75	3218	-0.55	
70	11.100	0.160	1.05	84	1.0	100.8	75	3218	-0.55	
80	12.696	0.160	1.05	84	1.0	100.7	75	3218	-0.55	
90	14.293	0.160	1.06	84	1.0	100.7	75	3218	-0.55	
100	15.887	0.159	1.05	85	1.0	100.5	75	3218	-0.55	
110	17.485	0.160	1.05	85	1.0	100.7	75	3218	-0.55	
120	19.084	0.160	1.05	85	1.0	100.8	75	3218	-0.54	
130	20.682	0.160	1.05	85	1.0	100.7	74	3218	-0.55	
140	22.281	0.160	1.06	85	1.0	100.7	74	3218	-0.55	
150	23.880	0.160	1.05	85	1.0	100.8	74	3218	-0.55	
160	25.479	0.160	1.05	85	1.0	100.7	74	3218	-0.54	
170	27.078	0.160	1.06	85	1.0	100.7	74	3218	-0.55	
180	28.678	0.160	1.05	85	1.0	100.8	74	3218	-0.55	
190	30.276	0.160	1.05	85	1.0	100.7	74	3218	-0.55	
200	31.875	0.160	1.05	85	1.0	100.7	74	3218	-0.56	
210	33.475	0.160	1.05	85	1.0	100.7	74	3218	-0.55	
220	35.073	0.160	1.05	86	1.0	100.6	74	3218	-0.55	
230	36.672	0.160	1.05	86	1.0	100.6	74	3218	-0.55	
240	38.272	0.160	1.05	86	1.0	100.7	74	3218	-0.55	
250	39.869	0.160	1.05	86	1.0	100.4	74	3218	-0.56	
260	41.468	0.160	1.05	86	1.0	100.6	74	3218	-0.55	
270	43.068	0.160	1.05	86	1.0	100.6	75	3218	-0.54	
280	44.666	0.160	1.04	86	1.0	100.5	75	3218	-0.55	
290	46.267	0.160	1.05	87	1.0	100.5	75	3218	-0.55	
300	47.867	0.160	1.05	87	1.0	100.5	75	3218	-0.54	

Signature/Date:

7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 1

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 8:41 AM (TR) 10:02 AM

Box B ET (min)	Gas Meter-B (ft ³)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Pro Rate (10%)	Filter (oF)	Imping Exit (oF)	Box B dP (in-H ₂ O)
AVG	NA	0.16	1.05	84.30	100.68	74.53	3218.00	-0.55	

OMNI Test Laboratories Inc.

8 of 8

Signature/Date:


7/20/10

Run Notes

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Run #: 1 Date: 7/20/10

Test Crew: S. Buffon

OMNI Equipment ID #(s): _____

PREBURN

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

PRIMARY:

Fully closed

SECONDARY: Fixed

TERTIARY: N/A

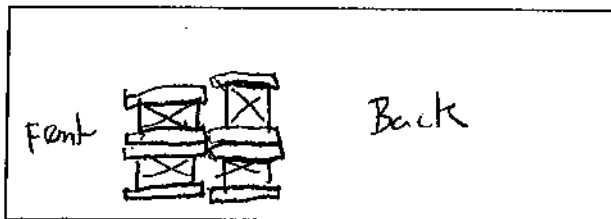
FAN: ON High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
25 min 60 min	Repositioned preburn fuel shored coals (Door open during data reading)					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: closed @ 0 sec

FUEL LOADING: Done @ 45 sec

DOOR: closed @ 90 sec

PRIMARY AIR: Set @ 5 min

OTHER: N/A

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


PRIMARY:

Fully closed
* Repositioned fuel @
211 min. into test

SECONDARY: Fixed

TERTIARY: N/A

FAN: ON High

Technician signature: 

Date: 7/20/10

Supplemental Data EPA 5G/5H

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Date: 7/20/10 Run #: 1 Booth: 1

Test Crew: S. Butten Start Time: 10:02 Stop Time: 15:02

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Initial: ∅
Final: ∅

Dilution Tunnel (Method 5G Only):

Initial: ∅
Final: ∅

Calibrations: Span Gas CO₂: 10.14 O₂: 17.00 CO: 2.518 CO₂(DT): 1.22

Time	N₂ Span	N ₂ Span	N₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	9.00	9.00	17.00	17.00			
O ₂	0.00	17.01	0.05	17.09			
CO ₂	0.00	10.16	0.00	10.08			
CO	0.00	2.520	-0.007	2.505			
CO ₂ (DT)	0.00	1.2	.05	1.175			

Stack Diameter (inches): 6"

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

Scale Audit (lbs): Pretest: 10 lbs Post Test: 10 lbs

Induced Draft: ∅ %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 7/19/10 Initials: SB

	Initial	Middle	Ending
Pb (in/Hg)	30.13	30.15	30.19
Room Temp (°F)	70	72	74

Technician signature: [Signature] Date: 7/20/10

Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 2

Wood Heater Calculation Data EPA Method 5H

Run 2

Manufacturer: Haman Home Heating
 Model/Tracking No.: Oak Leaf, 1573

Test Date: 20-Jul-10
 Project Number: 135-S-28-8.3

Burn Rate (dry kg/hour) = 0.76

Emission Rate (grams/hour) = 0.18

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

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fe (1.00 to 1.12)	CF by carbon balance (scf/minute)	CF by tracer gas (scf/minute)	CF by tracer gas (Si) (disc)	Volume Sampled (disc)	Si * Volume Sampled	Proportional Sample Rate	dH new
10	13.3	1.03	143.3	28.4	0.035				
20	13.3	1.02	142.7	20.1	0.050	4.091	0.144	104.8	0.306
30	13.3	1.00	142.8	17.7	0.057	2.812	0.140	101.7	0.237
40	13.3	0.98	142.8	17.7	0.056	2.483	0.141	102.4	0.237
50	13.3	0.99	142.8	18.1	0.055	2.459	0.139	101.1	0.237
60	13.3	1.00	142.0	20.3	0.048	2.456	0.138	100.9	0.247
70	13.3	0.99	143.1	19.8	0.050	2.729	0.135	97.7	0.296
80	13.3	0.99	143.1	21.5	0.047	2.786	0.141	102.1	0.348
90	13.3	0.97	143.0	25.9	0.039	2.832	0.136	99.0	0.506
100	13.2	1.04	143.6	27.1	0.037	3.571	0.138	100.0	0.551
110	13.2	1.03	143.6	26.2	0.038	3.753	0.139	100.3	0.515
120	13.2	1.03	143.9	26.8	0.037	3.693	0.141	102.4	0.540
130	13.2	1.03	143.9	27.8	0.036	3.640	0.138	98.5	0.582
140	13.2	1.06	144.0	26.5	0.038	4.377	0.137	114.2	0.527
150	13.2	1.03	144.0	25.6	0.039	3.852	0.145	105.5	0.469
160	13.2	1.03	144.1	26.5	0.038	3.758	0.147	106.9	0.528
170	13.2	1.06	144.1	27.6	0.036	3.849	0.145	105.3	0.570
180	13.2	1.03	144.3	27.2	0.037	3.915	0.142	103.1	0.557
190	13.2	1.06	144.3	26.5	0.038	3.977	0.146	106.0	0.524
200	13.2	1.06	144.4	23.9	0.042	3.908	0.144	104.4	0.426
210	13.2	1.05	144.4	23.3	0.043	3.496	0.145	105.5	0.408
220	13.2	1.11	144.4	26.4	0.038	3.399	0.146	105.9	0.521
230	13.2	1.06	144.5	27.4	0.038	3.617	0.137	99.5	0.563
240	13.2	1.06	144.5	23.8	0.042	3.855	0.141	102.1	0.425
250	13.1	1.10	144.7	23.1	0.043	3.467	0.146	105.7	0.400
260	13.1	1.08	144.8	24.6	0.041	3.982	0.148	105.8	0.454
270	13.1	1.07	144.8	25.5	0.039	3.398	0.137	99.5	0.490
280	13.1	1.07	144.9	24.7	0.040	3.586	0.140	102.0	0.459
290	13.1	1.10	144.9	20.6	0.048	3.551	0.144	104.3	0.319
300	13.1	1.08	144.9	19.2	0.052	3.072	0.149	106.1	0.278
310	13.1	1.18	145.1	15.2	0.066	2.760	0.145	105.3	0.175
320	13.1	1.03	145.1	9.8	0.101	2.237	0.147	106.5	0.074
330	13.1	1.05	145.2	7.6	0.132	1.311	0.132	96.1	0.043
340	13.1	1.05	145.2	8.2	0.122	1.022	0.135	99.0	0.051
Averages/Totals	13.2	1.04	144.0	22.2	0.050	3.221		102.9	0.388

Woodstove Type
 Yncp-1=ca;2=ncat; 3=pollet
 EPA's Hydrocarbon Constant (%)

Fuel Data
 Test Change (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 F)
 dH (avg inches wc)
 Vm (scf)
 CF by carbon balance (avg disc/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)

Wood Heater Test Data
EPA Method 5H

Run Number 2

Manufacturer: Harman Home Heating
Stove Model, Tracking Number: Oak Leaf, 1573
Stove Type (cat, ncat, or pellet): ncat
Project Number: 135-S-26-8.3
Test Date: 20-Jul-10
Test Start Time: 18:44
Recording Interval (minutes): 10
Total Sampling Time (minutes): 340

Sample Rate Control Module Number: 322
Test Meter Y: 0.997
Office dH@: 1.938
Pilot Tube Cp: 0.99
Average Barometric Pressure: 30.04
Average Fuel Moisture (dry basis %): 20.84
OMNI Equipment Numbers:

Table with 10 columns: PL1 to PL10. Headers: Dilution Tunnel Velocity Traverse Data, Dilution Tunnel Flow. Values include Initial dP (0.034 to 0.038) and Initial Temp (101).

Initial/Assumed Values table with columns: Dilution Tunnel, MW (lb/30-min), H2O (%), Ambient CO2 (%), Preferred Initial Sampling Rate (cf/min), Initial.

Flue Gas table with columns: Impinger Liquid, Volume of Water Vapor, Moisture Content.

Signature/Date: [Signature] 8/12/10
Post-Test Leak Check: cfm@Hg

Main data table with columns: Elapsed Time, Particulate Sampling System, Fuel Weight, Stove Flue-Gas Conditions, Stove Temperatures (oF), Dilution Tunnel, Laboratory. Rows from 0 to 340 minutes.

MFG: Harman Home Heating
Model #: Oak Leaf

Run #: 2

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 5:30 PM (TR) 6:44 PM

Run Information

Run Number: 2
Date / Start Time: 7/20/10 - (PB) 5:30 PM (TR) 6:44 PM
Tracking Number: 1573
Project Number: 135-S-26-8.3
Manufacturer: Harman Home Heating
Model: Oak Leaf
Technician: SJB
Fuel Load (lbs): 11.50
Coal Bed Range (lbs): 2.30 to 2.87
Actual Coal Bed (lbs): 2.8

Test Booth: 2
Data Collection Program: SG3_dual 47 mm_Logger_D1_19_09.vi

Velocity Traverse Data

	PL.1	PL.2	PL.3	PL.4	PL.5	PL.6	PL.7	PL.8
Initial dp	.034	.038	.042	.038	.036	.040	.042	.038
Initial Temp	101	101	101	101	101	101	101	101
				In-H2O				Deg F

Barometric Pressure

Begin	Middle	End	Avg
30.04	30.04	30.04	30.04

PM Control Module: 335/336
Tunnel Velocity: 13.29 ft/sec
Dilution Tunnel MW(dry): 29 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4 percent
Dilution Tunnel Static: -.54 in. H2O
Pitot Tube Cp: .99

Fuel Consumed: 11.5 lbs
Firebox Surface Temp Change: 136.7
Run Time: 340 Minutes
Fuel Moisture (dry basis): 20.87 %

Meter Box "y" Factor A: 1.001
Filter Holder # A: _____
Total Particulate A: _____ mg
Avg Prop Rate A: 100.73

Meter Box "y" Factor B: .997
Filter Holder # B: _____
Total Particulate B: _____ mg
Avg Prop Rate B: 100.749

OMNI Test Laboratories Inc.

1 of 8

Signature/Date: _____

7/20/10

Emissions Results

Burn Rate	0.76	kg/hr dry
Adjusted Emissions A	0.00	grams/hour
Adjusted Emissions B	0.00	grams/hour
Upper Limit		grams/hour
Average Emissions		grams/hour
Lower Limit		grams/hour
Particulate Concentration (dry standard)	0.00000	grams/dscf
Particulate Emission Rate	0.00	grams/hour
Total Sample Volume (Standard Conditions) Vms	48.164	DSCF
Total Particulates mm	0	Mg
Average Delta H	1.04	Inches H2O
Total Sample Volume Vm	49.893	Cubic Feet
Average Gas Meter Temperature	91.10	Degrees Fahrenheit
Average Tunnel Temp	88.90	Degrees Fahrenheit
Average Delta p	0.038	Inches H2O
Average Gas Velocity in Dilution Tunnel	13.21	Feet/Second
Average Gas Flow Rate in Dilution Tunnel Qsc	8640.64	DSCF/Hour
Total Time	340	Minutes
		Degrees Fahrenheit

[Signature]
 7/20/10

Fuel Data

FUEL: DOUGLASS FIR SPECIES UNREATED AIR DRIED STANDARD GRADE OR BETTER DIMENSIONAL LUMBER

ON THE EQUIPMENT: _____

PRE-BURN FUEL

MOISTURE CONTENT (MEIER DRY BASIS) _____

AVG PRE-BURN FUEL LOAD MOISTURE: 23.98 %

CALIBRATION WAREHOUSE (1) 12
 CALIBRATION WAREHOUSE (2) 22

MOISTURE CONTENT (MEIER DRY BASIS) _____

ACTUAL READING _____

ACTUAL READING _____

PIECE LENGTH NOTES: 14 Pieces @ 7.5'

PIECE LENGTH: 8 ft, 8 ft, 0 ft

FUEL TYPE: 2x4, 2x4

TIME (24 HR): 16:30

ROOM TEMPERATURE (F): 70

TEST FUEL

FUEL TYPE - PIECE QUANTITY: 3 2x4 PIECES, 1 4x4 PIECE

FUEL PIECE LENGTH: 15.5 IN

FUEL LOAD PIECE COUNT: 4

CALCULATED FUEL LOAD: 0 LBS

ACTUAL FUEL LOAD: 6.9 LBS

ACTUAL FUEL WEIGHT: 11.5 LBS

MOISTURE CONTENT (MEIER - DRY BASIS)

PIECE #	READINGS	FUEL TYPE	PIECES	READINGS	FUEL TYPE
1	21.6, 20.3, 20.1	2x4	0	0	2x4
2	20.8, 21.5, 21.4	2x4	7	0	2x4
3	19.2, 19.3, 19.1	4x4	8	0	4x4
4	23.1, 22, 22	2x4	9	0	2x4
5	0, 0, 0		10	0	

TIME (24 HR. CLOCK): 18:00

ROOM TEMPERATURE (F): 70

AVERAGE FUEL LOAD MOISTURE: 20.87

MFG: Harman Home Heating
Model #: Oak Leaf

Run #: 2

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 5:30 PM (TR) 6:44 PM

Notes

[Empty rectangular box for notes]

OMNI Test Laboratories Inc.

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Signature/Date:

[Handwritten Signature]
7/20/10

MFG: Harman Home Heating
 Model #: Oak Leaf

Run #: 2

Project #: 135-S-26-8.3
 Run Date: 7/20/10 - (PB) 5:30 PM (TR) 6:44 PM

Preburn ET (min)	Scale (lbs)	Weight Change	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	AMB (oF)	Draft (In-H2O)	Cat Temp (oF)	O2 (%)	CO2 (%)	CO (%)	CO Ratio
10	-1.025	326	203	171	330	277	3218	261.5	310	78	-0.041	3218	20.69	0.03	0.00	-0.78	
20	-1.201	323	208	208	329	281	3218	269.8	337	78	-0.045	3218	20.71	0.03	0.00	-0.24	
30	-1.098	341	212	246	339	300	3218	287.6	341	79	-0.045	3218	14.81	5.98	0.04	0.67	
40	-0.847	365	213	261	355	317	3218	302.4	321	79	-0.041	3218	15.42	5.45	0.03	0.54	
50	-0.750	394	214	258	368	328	3218	312.3	303	80	-0.038	3218	15.94	4.94	0.02	0.42	
60	-0.735	393	215	268	370	337	3218	316.7	317	81	-0.040	3218	15.27	5.39	0.02	0.42	
70	-0.264	407	220	250	364	346	3218	317.9	269	81	-0.033	3218	17.14	3.43	0.06	1.60	
73	-0.036	408	221	239	362	350	3218	316.1	259	80	-0.031	3218	17.30	3.28	0.06	2.24	

OMNI Test Laboratories Inc.

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Signature/Date:


 7/20/10

Elapsed Time (min)	Gas Meter-A (ft3)	Sample Rate (ctm)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Dil Tun (oF)	Dil Tun dP	Pro Rate (10%)	Scale Reading (lbs)	Weight Change (lbs)	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Shack (oF)	Filter (oF)	Imping Exit (oF)	AMB (oF)	Draft (In-H2O)	Cat Temp (oF)
0	0.000	NaN	0.98	84	0.78	98	0.038	0.0	11.5	11.49	412	222	236	360	350	321.8	316.3	281	79	321.8	81	-0.038	321.8
10	1.451	0.145	1.06	85	0.79	99	0.038	100.7	10.5	-1.00	359	222	235	344	340	321.8	300.0	293	81	321.8	81	-0.039	321.8
20	2.910	0.146	1.04	86	0.78	99	0.038	100.8	9.7	-0.80	353	223	229	327	321	321.8	286.5	288	81	321.8	81	-0.039	321.8
30	4.368	0.146	1.05	88	0.79	98	0.038	100.5	8.9	-0.83	346	228	228	319	303	321.8	285.3	286	82	321.8	80	-0.038	321.8
40	5.827	0.146	1.04	89	0.79	98	0.038	100.4	8.1	-0.77	368	226	228	318	303	321.8	286.5	284	83	321.8	81	-0.038	321.8
50	7.289	0.146	1.05	90	0.79	98	0.038	100.4	7.4	-0.71	363	227	228	320	299	321.8	287.5	281	83	321.8	82	-0.037	321.8
60	8.754	0.146	1.04	91	0.79	97	0.038	100.5	6.7	-0.65	375	229	225	328	300	321.8	291.5	272	83	321.8	81	-0.036	321.8
70	10.219	0.146	1.04	92	0.79	96	0.038	100.4	6.1	-0.61	389	228	217	338	301	321.8	294.5	265	83	321.8	80	-0.035	321.8
80	11.685	0.147	1.04	92	0.80	95	0.038	100.5	5.5	-0.59	390	226	209	347	303	321.8	295.2	255	83	321.8	80	-0.034	321.8
90	13.152	0.147	1.05	92	0.79	94	0.038	100.5	5.0	-0.50	390	224	200	359	305	321.8	295.7	240	83	321.8	81	-0.034	321.8
100	14.620	0.147	1.05	92	0.80	92	0.038	100.6	4.5	-0.42	386	221	186	369	304	321.8	293.3	221	83	321.8	80	-0.027	321.8
110	16.088	0.147	1.05	93	0.80	92	0.038	100.6	4.3	-0.31	389	219	173	370	300	321.8	286.2	213	83	321.8	81	-0.025	321.8
120	17.557	0.147	1.04	93	0.80	90	0.038	100.6	3.9	-0.36	357	213	164	372	295	321.8	280.4	204	82	321.8	82	-0.024	321.8
130	19.026	0.147	1.04	93	0.80	90	0.038	100.6	3.7	-0.27	347	208	156	365	292	321.8	273.7	195	82	321.8	81	-0.022	321.8
140	20.494	0.147	1.04	93	0.81	89	0.038	100.7	3.1	-0.28	341	204	150	358	287	321.8	268.0	191	82	321.8	81	-0.021	321.8
150	21.964	0.147	1.05	92	0.81	89	0.038	100.7	2.8	-0.31	325	201	143	350	283	321.8	263.4	184	81	321.8	81	-0.020	321.8
160	23.433	0.147	1.05	92	0.81	88	0.038	100.7	2.6	-0.22	322	199	140	344	279	321.8	259.0	181	82	321.8	81	-0.020	321.8
170	24.902	0.147	1.05	92	0.81	88	0.038	100.7	2.4	-0.20	317	196	137	338	274	321.8	254.6	176	82	321.8	81	-0.019	321.8
180	26.371	0.147	1.05	92	0.81	87	0.038	100.7	2.2	-0.15	307	192	133	328	266	321.8	250.5	170	82	321.8	81	-0.017	321.8
190	27.841	0.147	1.05	92	0.81	87	0.038	100.8	2.1	-0.14	303	190	130	322	262	321.8	245.3	166	82	321.8	81	-0.017	321.8
200	29.310	0.147	1.05	92	0.81	86	0.038	100.8	2.1	-0.15	296	188	128	313	259	321.8	241.8	163	82	321.8	81	-0.016	321.8
210	30.779	0.147	1.05	92	0.80	86	0.038	100.7	1.9	-0.12	284	185	126	308	255	321.8	231.4	155	82	321.8	81	-0.015	321.8
220	32.248	0.147	1.04	92	0.81	85	0.038	100.7	1.7	-0.09	279	182	123	302	250	321.8	226.0	150	82	321.8	81	-0.014	321.8
230	33.718	0.147	1.04	92	0.81	85	0.038	100.8	1.8	-0.11	285	178	120	298	243	321.8	220.9	146	82	321.8	80	-0.014	321.8
240	35.187	0.147	1.05	92	0.81	84	0.038	100.8	1.5	-0.08	280	175	117	295	238	321.8	216.8	141	82	321.8	80	-0.012	321.8
250	36.657	0.147	1.04	92	0.80	83	0.038	100.9	1.5	-0.07	252	170	114	292	231	321.8	212.1	136	81	321.8	79	-0.011	321.8
260	38.128	0.147	1.05	92	0.80	83	0.038	100.9	1.4	-0.07	242	164	112	285	224	321.8	205.4	132	81	321.8	79	-0.010	321.8
270	39.598	0.147	1.05	92	0.80	82	0.038	100.9	1.4	-0.04	232	161	109	276	217	321.8	199.0	128	81	321.8	79	-0.009	321.8
280	41.068	0.147	1.05	92	0.80	82	0.038	101.0	1.3	-0.05	223	157	107	266	209	321.8	192.5	124	81	321.8	79	-0.008	321.8
290	42.539	0.147	1.05	91	0.80	82	0.038	101.0	1.3	-0.04	214	153	104	257	202	321.8	188.1	121	81	321.8	79	-0.007	321.8
300	44.010	0.147	1.05	91	0.80	81	0.038	101.0	1.2	-0.01	204	150	102	247	195	321.8	179.7	117	81	321.8	78	-0.006	321.8
310	45.480	0.147	1.05	91	0.80	80	0.038	101.0	1.2	-0.01	196	148	100	237	188	321.8	173.9	114	81	321.8	78	-0.006	321.8
320	46.951	0.147	1.05	91	0.80	80	0.038	101.1	1.2	-0.03	188	144	99	226	182	321.8	167.3	112	80	321.8	79	-0.005	321.8
330	48.422	0.147	1.05	91	0.80	80	0.038	101.1	1.2	-0.01	183	143	98	217	176	321.8	163.3	110	80	321.8	78	-0.005	321.8
340	49.893	0.147	1.05	91	0.80	80	0.038	101.1	1.2	-0.01	175	143	98	217	176	321.8	163.3	110	80	321.8	78	-0.005	321.8
AVG	NA	NA	1.04	91.26	0.80	86.56	0.04	97.76	3.65	NA	NA	193.26	153.47	314.24	263.91	3218.00	246.16	NA	81.76	3218.00	80.25	-0.02	3218.00

OMNI Test Laboratories Inc.

Signature/Date:  7/20/10

MFG: Harman Home Heating
Model #: Oak Leaf

Run #: 2

Project #: 135-S-26-8.3
Run Date: 7/20/10 - (PB) 5:30 PM (TR) 6:44 PM

Box B ET (min)	Gas Meter-B (ft ³)	Sample Rate (g/m)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Pro Rate (10%)	Filter (oF)	Imping Exit (eF)	Box B dP (in-H ₂ O)
0	0.000	NaN	86	1.0	0.0	80	3218	-0.55	
10	1.582	1.05	87	1.0	100.7	83	3218	-0.54	
20	3.178	1.05	88	1.0	101.0	84	3218	-0.55	
30	4.773	1.04	90	1.0	100.7	84	3218	-0.54	
40	6.372	1.05	91	1.0	100.6	84	3218	-0.54	
50	7.974	1.04	92	1.0	100.6	84	3218	-0.53	
60	9.579	1.05	93	1.0	100.6	84	3218	-0.55	
70	11.184	1.05	93	1.0	100.6	84	3218	-0.54	
80	12.791	1.05	94	1.0	100.5	84	3218	-0.54	
90	14.398	1.04	94	1.0	100.6	84	3218	-0.54	
100	16.005	1.05	94	1.0	100.6	83	3218	-0.54	
110	17.613	1.05	94	1.0	100.6	83	3218	-0.55	
120	19.220	1.05	94	1.0	100.6	83	3218	-0.55	
130	20.828	1.05	94	1.0	100.5	83	3218	-0.55	
140	22.435	1.05	94	1.0	100.7	83	3218	-0.55	
150	24.042	1.05	94	1.0	100.7	82	3218	-0.56	
160	25.649	1.05	94	1.0	100.6	82	3218	-0.55	
170	27.255	1.05	94	1.0	100.7	82	3218	-0.54	
180	28.861	1.05	94	1.0	100.7	82	3218	-0.55	
190	30.468	1.05	94	1.0	100.7	82	3218	-0.55	
200	32.074	1.04	94	1.0	100.7	82	3218	-0.55	
210	33.680	1.04	94	1.0	100.7	82	3218	-0.55	
220	35.287	1.04	94	1.0	100.7	82	3218	-0.55	
230	36.893	1.05	94	1.0	100.7	81	3218	-0.56	
240	38.500	1.05	94	1.0	100.7	81	3218	-0.55	
250	40.107	1.04	94	1.0	100.8	81	3218	-0.55	
260	41.714	1.05	93	1.0	100.8	81	3218	-0.55	
270	43.321	1.05	93	1.0	100.8	81	3218	-0.55	
280	44.928	1.05	93	1.0	100.9	80	3218	-0.55	
290	46.536	1.05	93	1.0	100.9	80	3218	-0.55	
300	48.143	1.05	93	1.0	101.0	80	3218	-0.55	

[Handwritten Signature]
7/20/10

MFG: Harman Home Heating
 Model #: Oak Leaf

Run #: 2

Project #: 135-S-26-8.3
 Run Date: 7/20/10 - (PB) 5:30 PM (TR) 6:44 PM

Box B ET (min)	Gas Meters-B (ft ³)	Sample Rate (cfm)	Orifice dh	Meter (deg F)	Meter Vac (In-Hg)	Pro Rate (10%)	Filter (oF)	Imping Exit (oF)	Box B dP (In-H ₂ O)
310	49.750	0.161	92	1.0	101.0	80	3218	-0.56	
320	51.357	0.161	92	1.0	101.0	80	3218	-0.55	
330	52.964	0.161	92	1.0	101.0	79	3218	-0.56	
340	54.571	0.161	92	1.0	101.1	79	3218	-0.55	
AVG	NA	0.16	92.91	1.00	100.74	82.03	3218.00	-0.55	

OMNI Test Laboratories Inc.

8 of 8

Signature/Date:



7/20/10

Run Notes

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Run #: 2

Date: 7/20/10

Test Crew: J. Buffen

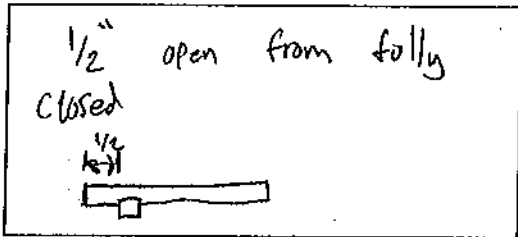
OMNI Equipment ID #(s): _____

Fire went out!

PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

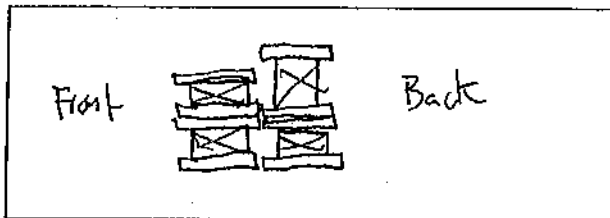
FAN: ON High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
51 min	stirred coal bed					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: closed @ 0 sec

FUEL LOADING: closed @ 90 sec

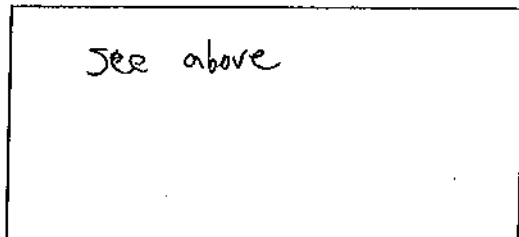
DOOR: _____

PRIMARY AIR: set @ 5 mph

OTHER: N/A

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

FAN: ON High

Technician signature: _____

Date: 7/20/10

Supplemental Data EPA 5G/5H

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Date: 7/20/10

Run #: 2 Booth: 1

Test Crew: 2, Button

Start Time: 18:44 Stop Time: _____

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: _____

Final: ∅

Final: _____

Calibrations: Span Gas CO₂: 10.14 O₂: 17.00 CO: 2.518 CO₂(DT): 1.22

	<u>N₂</u> Span	<u>N₂</u> Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>5:45</u>	<u>5:50</u>					
O ₂	<u>0.00</u>	<u>17.02</u>					
CO ₂	<u>0.00</u>	<u>10.14</u>					
CO	<u>0.00</u>	<u>2.521</u>					
CO ₂ (DT)	<u>0.00</u>	<u>1.22</u>					

Stack Diameter (inches): 6"

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

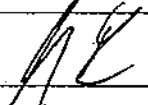
Scale Audit (lbs): Pretest: 10 16 Post Test: 10 16

Induced Draft: ∅ %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 7/19/10 Initials: JB

	Initial	Middle	Ending
Pb (in/Hg)	<u>30.04</u>	<u>30.04</u>	<u>30.04</u>
Room Temp (°F)	<u>81</u>	<u>81</u>	<u>78</u>

Technician signature:  Date: 7/21/10

*Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032*

Run 3

Wood Heater Calculation Data EPA Method 5H

Run	3
Manufacturer:	Harman Home Heating
Model/Tracking No.:	Oak Leaf, 1573
Test Date:	21-Jul-10
Project Number:	135-S-26-8.3

Burn Rate (dry kg/hour) = 0.99

Emission Rate (grams/hour) = 1.12

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

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Po (1.00 to 1.12)	CF by carbon balance (scf/minute)	CF by tracer gas (scf/minute)	1/CF by tracer gas (SI)	Volume Sampled (ft ³)	SI * Volume Sampled	Proportional Sample Rate	dh new
10	13.3	0.98	29.6	143.5	16.3	0.081	4.217	103.3	0.763
20	13.2	0.98	19.2	143.7	18.2	0.055	4.520	99.3	0.768
30	13.2	0.98	16.6	143.8	18.2	0.055	4.543	101.9	0.767
40	13.2	0.98	17.6	143.7	18.2	0.055	4.558	102.2	0.763
50	13.2	0.98	16.8	143.8	17.8	0.056	4.569	100.4	0.736
60	13.2	0.96	13.2	144.0	18.2	0.055	4.377	97.9	0.767
70	13.2	0.96	13.9	144.1	17.9	0.056	4.585	100.0	0.736
80	13.2	0.95	14.4	144.2	17.9	0.056	4.577	102.3	0.735
90	13.2	0.96	11.8	144.4	18.6	0.060	4.463	99.7	0.836
100	13.2	0.98	9.9	144.5	18.8	0.053	4.186	100.6	0.817
110	13.2	0.97	12.2	144.5	17.9	0.055	4.680	98.7	0.735
120	13.1	0.97	9.3	144.6	17.9	0.056	4.559	101.8	0.736
130	13.1	1.00	9.9	144.6	16.9	0.059	4.503	100.9	0.854
140	13.1	1.04	7.9	144.8	16.9	0.059	4.520	105.9	0.655
150	13.1	1.04	5.4	144.9	16.3	0.061	3.936	98.0	0.614
160	13.1	1.03	5.4	144.9	15.8	0.063	4.118	100.6	0.570
170	13.1	1.06	5.7	144.9	16.1	0.062	3.970	100.6	0.596
180	13.1	1.03	5.8	144.9	16.6	0.060	3.966	98.2	0.628
190	13.1	1.03	2.9	145.0	15.0	0.067	4.124	99.4	0.518
200	13.1	1.05	5.9	145.0	15.0	0.067	3.821	101.5	0.517
210	13.1	1.03	3.1	145.0	17.0	0.059	3.760	99.8	0.665
220	13.1	1.06	5.8	145.0	15.0	0.067	3.779	98.6	0.517
230	13.1	1.00	3.0	145.0	14.2	0.071	3.770	100.1	0.460
240	13.1	1.03	3.0	145.0	13.2	0.076	3.605	101.5	0.461
250	13.1	1.02	6.2	145.0	12.8	0.078	3.340	100.7	0.374
Average/Totals	13.2	1.00	10.2	144.5	16.6	0.061	4.209	100.0	0.645

Woodstove Type
Yves-Tricat, 2-meat, 3-pellet

EPA's Hydrocarbon Constant (%)
1.32

Fuel Data
Test Charge (as fired) (lb)
Average Moisture (% dry basis)
Average Moisture (% wet basis)

Run Parameters
DSM initial reading (cf)
DSM final reading (cf)
Ps (inches Hg)
Tm (avg of)
Vm (scf)
CF 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: Harman Home Heating Equipment Numbers: _____ Run No.: 3
 Model: Oak Leaf Date: 07/21/10
 Project No.: 135-S-26-8.3
 Tracking No.: 1573

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	D008	688.0	627.3		60.7
B. Rear filter catch	Filter	J008	149.9	149.5		0.4
C. Rinse of probe and filter assembly (FRONT)	Acetone	100	104588.2	104566.3	0.0077	21.1
D. Rinse of Impinger Set	Distilled Water	325	145369.1	145323.1	0.0000	46.0
E. Rinse of Impinger Set	Dichloromethane	150	97164.2	97122.1	0.0020	41.8
F. Rinse of filter assembly and gas train (BACK)	Acetone	175	98003.1	97979.6	0.0077	22.2
Total Particulate, mg :						192.2

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	Weights			
	IMPINGERS	Final, g	Initial, g	Net, g
	1	765.8	655.2	110.6
	2	662.0	650.1	11.9
	3	447.6	446.9	0.7
	4	739.2	713.4	25.8
	TOTAL, g:			149.0

Analyst: HR

Date: 7/30/10

MFG: Harman
Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Run Information

Run Number: 3
Date / Start Time: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM
Manufacturer: Harman
Model: Oak Leaf

Tracking Number: 1573
Project Number: 135-S-26-8.3
Technician: SJB

Fuel Load (lbs): 10.80
Coal Bed Range (lbs): 2.16 to 2.70
Actual Coal Bed (lbs): 2.5



Test Booth: 1
Data Collection Program: 5G3_dual 47 min Logger_01_19_09.M

Velocity Traverse Data									
	Pt. 1	Pt. 2	Pt. 3	Pt. 4	Pt. 5	Pt. 6	Pt. 7	Pt. 8	
Initial dP	.034	.038	.040	.036	.038	.040	.040	.038	In-H2O
Initial Temp	92	92	92	92	92	92	92	92	Deg F

PM Control Module: 335/536
Dilution Tunnel MW(dry): 29 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4 percent
Dilution Tunnel Static: .53 in. H2O
Pitot Tube Cp: .99

Tunnel Velocity: 13.16 ft/sec
Initial Tunnel Flow: 143.5 scfm
Average Tunnel Flow: 144.52 scfm
Tunnel Area: 0.1963 ft²
Post-Test Leak Check-A: .002 @ 18.7 cfm@".Hg
Post-Test Leak Check-B: .000 @ 11.5 cfm@".Hg

Fuel Consumed: 10.8 lbs
Firebox Surface Temp Change: -58.9
Run Time: 250 Minutes
Fuel Moisture (dry basis): 19.28 %

Meter Box "Y" Factor A: 1.001
Filter Holder # A: _____
Total Particulate A: 1.9 mg
Avg Prop Rate A: 100.536

Meter Box "Y" Factor B: .996
Filter Holder # B: _____
Total Particulate B: 2.5 mg
Avg Prop Rate B: 100.682

OMNI Test Laboratories Inc.

1 of 7

Signature/Date: _____

7/20/10

MFG: Harman
 Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
 Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Emissions Results

Burn Rate	0.99	kg/hr dry
Adjusted Emission A	0.95	grams/hour
Adjusted Emission B	1.16	grams/hour
Upper Limit	1.3796	grams/hour
Lower Limit	0.9791	grams/hour

Particulate Concentration (dry standard) 0.00005 grams/dscf

Particulate Emission Rate 0.46 grams/hour

Total Sample Volume (Standard Conditions) 35.832 DSCF

Total Particulates 1.9 MG

Average Delta P 1.04 Inches H2O

Total Sample Volume Vm 36.645 Cubic Feet

Average Gas Meter Temperature 83.90 Degrees Fahrenheit

Average Tunnel Temp 85.10 Degrees Fahrenheit

Average Delta p 0.038 Inches H2O

Average Gas Velocity in Dilution Tunnel v 13.16 Feet/Second

Average Gas Flow Rate in Dilution Tunnel Qd 8669.36 DSCF/Hour

Total Time 250 Minutes

OMNI Test Laboratories Inc.

Signature/Date:

[Handwritten Signature]
 7/21/10

MFG: Harman
Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Fuel Data

FUEL: DOUGLAS FIR SPECIES UNREATED AIR DRIED STAND AND GRADE FOR BETTER DIMENSIONAL LUMBER

UNTESTED

PRE-BURN FUEL

MOISTURE CONTENT (METER BASIS) %

AVG PRE-BURN LOAD/MOISTURE %

CALIBRATION: CALIBRATION VALUE (D) ACTUAL TEST (C) AGGRAVATED CALIBRATION VALUE (E) AGGRAVATED

MOISTURE CONTENT (METER BASIS) %

PIECE LENGTH: 1 FT, 2 FT, 3 FT

MOISTURE READINGS: 1 %, 2 %, 3 %, 4 %, 5 %, 6 %, 7 %, 8 %

TIME (24 HR) ROOM TEMPERATURE (F)

PIECE LENGTH NOTES:

TEST FUEL

FUEL PIECE LENGTH IN

CALCULATED FUEL LOAD LBS

FUEL PIECE QUANTITY: 1 PIECES, 2 PIECES, 3 PIECES, 4 LBS

FUEL LOAD PIECE QUANTITY: 1 PIECES, 2 LBS

WEIGHT LOAD WEIGHT LBS

MOISTURE CONTENT (METER - DRY BASIS) READINGS:

PIECE	1	2	3	4	5
1	<input type="text" value="18.6"/>	<input type="text" value="19.1"/>	<input type="text" value="19.3"/>	<input type="text" value="19.3"/>	<input type="text" value="19.3"/>
2	<input type="text" value="19"/>	<input type="text" value="19.8"/>	<input type="text" value="21.1"/>	<input type="text" value="21.1"/>	<input type="text" value="21.1"/>
3	<input type="text" value="19.3"/>	<input type="text" value="19"/>	<input type="text" value="19.1"/>	<input type="text" value="19.1"/>	<input type="text" value="19.1"/>
4	<input type="text" value="19.2"/>	<input type="text" value="18.8"/>	<input type="text" value="19"/>	<input type="text" value="19"/>	<input type="text" value="19"/>
5	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

TIME (24 HR) CLOGK ROOM TEMPERATURE (F)

AVERAGE FUEL LOAD/MOISTURE

OMNI Test Laboratories Inc.

3 of 7

Signature/Date:

[Handwritten Signature]
7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Notes

[Empty rectangular box for notes]

OMNI Test Laboratories Inc.

4 of 7

Signature/Date:

[Handwritten Signature]

7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Preburn ET (min)	Scale (lbs)	Weight Change	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	AMB (oF)	Draft (in-H2O)	Cat Temp (oF)	O2 (%)	CO2 (%)	CO (%)	CO Ratio
7.6	-1.030	341	173	163	292	274	3218	248.5	291	72	-0.043	3218	20.25	0.17	0.24	59.04	
6.3	-1.280	334	184	193	300	278	3218	257.9	309	73	-0.047	3218	-0.03	-0.00	0.00	238.19	
4.8	-1.475	365	180	247	312	288	3218	282.3	341	72	-0.050	3218	10.50	10.14	2.52	19.88	
3.6	-1.208	387	194	281	328	328	3218	305.4	330	72	-0.050	3218	13.63	5.85	1.78	23.31	
2.9	-0.724	376	198	296	334	342	3218	309.3	308	72	-0.044	3218	14.63	5.98	0.03	0.48	
2.6	-0.282	393	205	266	335	350	3218	309.8	268	72	-0.037	3218	16.53	4.14	0.03	0.66	

Signature/Date:

[Handwritten Signature]
7/21/10

MFG: Harman
Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Elapsed Time (min)	Gas Meter-A (ft3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (In-Hg)	Dil Tun (oF)	Dil Tunn gp	Pro Rate (10%)	Scale Reading (lbs)	Weight Change (lbs)	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	Filter (oF)	Imping Exit (oF)	AMB (oF)	Draft (In-H2O)	Cat Temp (oF)
0	0.000	NA	0.59	78	0.74	92	0.038	0.0	10.73	405	207	258	335	350	3218	311.0	283	74	3218	72	-0.044	3218	
10	1.454	0.145	1.08	78	0.78	93	0.038	100.7	8.5	-1.24	354	209	262	327	340	286.5	268	75	3218	72	-0.043	3218	
20	2.914	0.146	1.07	79	0.77	91	0.038	100.8	8.6	-0.87	332	214	244	313	323	285.3	279	76	3218	72	-0.043	3218	
30	4.374	0.146	1.07	80	0.78	90	0.038	100.6	7.8	-0.80	329	218	240	304	312	280.3	282	76	3218	72	-0.043	3218	
40	5.834	0.146	1.07	81	0.78	91	0.038	100.5	6.9	-0.93	324	216	245	301	309	282.9	284	76	3218	71	-0.043	3218	
50	7.298	0.146	1.07	82	0.78	89	0.038	100.6	5.2	-0.73	353	218	245	304	311	286.7	273	76	3218	72	-0.042	3218	
60	8.762	0.146	1.06	83	0.78	89	0.038	100.5	5.5	-0.68	380	219	238	310	316	282.5	266	76	3218	72	-0.040	3218	
70	10.226	0.147	1.06	83	0.78	88	0.038	100.5	4.9	-0.81	368	220	227	315	322	294.7	256	76	3218	72	-0.039	3218	
80	11.692	0.147	1.06	84	0.78	87	0.038	100.6	4.3	-0.55	398	221	215	321	331	297.0	241	76	3218	72	-0.036	3218	
90	13.159	0.147	1.06	84	0.78	86	0.038	100.6	3.6	-0.49	415	219	201	324	338	299.4	232	76	3218	72	-0.034	3218	
100	14.628	0.147	1.06	84	0.79	85	0.038	100.6	3.4	-0.46	433	217	190	328	343	302.4	227	76	3218	72	-0.034	3218	
110	16.098	0.147	1.06	84	0.79	85	0.038	100.6	2.9	-0.46	435	214	183	331	345	301.5	219	76	3218	72	-0.033	3218	
120	17.551	0.147	1.07	84	0.78	84	0.038	100.5	2.5	-0.41	428	214	176	332	345	298.9	213	76	3218	72	-0.031	3218	
130	19.023	0.147	1.07	85	0.79	84	0.038	100.6	2.1	-0.39	410	211	170	333	349	293.3	208	76	3218	72	-0.029	3218	
140	20.496	0.147	1.07	85	0.79	83	0.038	100.6	1.8	-0.31	402	210	165	332	339	289.5	201	76	3218	72	-0.028	3218	
150	21.964	0.147	1.06	85	0.79	82	0.038	100.6	1.6	-0.23	391	209	160	329	337	285.4	193	76	3218	72	-0.026	3218	
160	23.432	0.147	1.06	85	0.79	82	0.038	100.6	1.4	-0.18	383	207	154	327	336	281.5	188	77	3218	74	-0.025	3218	
170	24.899	0.147	1.06	85	0.79	82	0.038	100.5	1.2	-0.18	367	207	149	322	336	276.3	183	77	3218	74	-0.023	3218	
180	26.367	0.147	1.06	85	0.79	82	0.038	100.5	1.0	-0.17	352	206	144	317	335	270.9	177	77	3218	74	-0.022	3218	
190	27.835	0.147	1.06	85	0.79	81	0.038	100.5	0.9	-0.15	343	205	140	311	333	266.4	170	77	3218	74	-0.020	3218	
200	29.303	0.147	1.06	86	0.79	81	0.038	100.5	0.7	-0.17	337	204	135	304	332	262.3	166	77	3218	74	-0.018	3218	
210	30.772	0.147	1.06	86	0.79	81	0.038	100.5	0.6	-0.12	329	200	131	296	327	258.5	159	77	3218	74	-0.017	3218	
220	32.241	0.147	1.05	86	0.79	81	0.038	100.4	0.4	-0.16	334	197	127	291	321	254.1	157	77	3218	75	-0.016	3218	
230	33.709	0.147	1.06	87	0.79	81	0.038	100.4	0.3	-0.12	331	195	125	288	312	250.1	148	78	3218	75	-0.015	3218	
240	35.177	0.147	1.06	87	0.79	81	0.038	100.3	0.2	-0.13	321	193	122	284	302	244.5	148	78	3218	75	-0.015	3218	
250	36.645	0.147	1.05	87	0.79	81	0.038	100.3	0.0	-0.18	305	190	120	279	293	237.6	147	78	3218	76	-0.014	3218	
AVG	NA	NA	1.04	84.04	0.78	84.80	0.04	96.51	3.19	NA	NA	209.20	180.16	313.24	327.64	3218.00	280.12	NA	76.40	3218.00	72.92	-0.03	3218.00

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Signature/Date:


[Handwritten Signature]
7/30/10

MFG: Harman
Model #: Oak Leaf

Run #: 3

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 8:59 AM (TR) 10:01 AM

Box B ET (min)	Gas Meter-B (ft3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Pro Rate (10%)	Filter (oF)	Imping Exit (oF)	Box B dP (in-H2O)
0	NAN	0.31	79	0.8	0.0	74	3218	-0.55	
10	1.570	1.05	80	1.0	100.7	76	3218	-0.56	
20	3.153	1.05	81	1.0	101.0	76	3218	-0.56	
30	4.739	1.04	82	1.0	100.9	76	3218	-0.54	
40	6.328	1.04	83	1.0	100.8	76	3218	-0.55	
50	7.920	1.05	84	1.0	100.8	76	3218	-0.56	
60	9.513	1.05	84	1.0	100.8	76	3218	-0.55	
70	11.108	1.05	85	1.0	100.8	76	3218	-0.55	
80	12.704	1.04	85	1.0	100.7	76	3218	-0.55	
90	14.301	1.04	85	1.0	100.8	76	3218	-0.56	
100	15.898	1.05	85	1.0	100.7	75	3218	-0.56	
110	17.495	1.05	86	1.0	100.8	75	3218	-0.55	
120	19.093	1.05	86	1.0	100.8	75	3218	-0.55	
130	20.689	1.05	86	1.0	100.7	75	3218	-0.55	
140	22.288	1.04	86	1.0	100.8	75	3218	-0.55	
150	23.884	1.05	86	1.0	100.6	75	3218	-0.55	
160	25.480	1.04	86	1.0	100.7	75	3218	-0.56	
170	27.077	1.04	86	1.0	100.6	76	3218	-0.56	
180	28.674	1.04	87	1.0	100.8	76	3218	-0.55	
190	30.271	1.04	87	1.0	100.5	76	3218	-0.56	
200	31.867	1.04	87	1.0	100.5	76	3218	-0.55	
210	33.465	1.04	87	1.0	100.5	76	3218	-0.55	
220	35.062	1.04	87	1.0	100.5	76	3218	-0.55	
230	36.660	1.04	88	1.0	100.4	77	3218	-0.56	
240	38.258	1.04	88	1.0	100.5	77	3218	-0.56	
250	39.855	1.04	88	1.0	100.3	77	3218	-0.55	
AVG	NA	1.04	85.40	1.00	100.68	75.84	3218.00	-0.55	

Signature/Date:  7/21/10

Run Notes

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Run #: 3 Date: 7/21/10

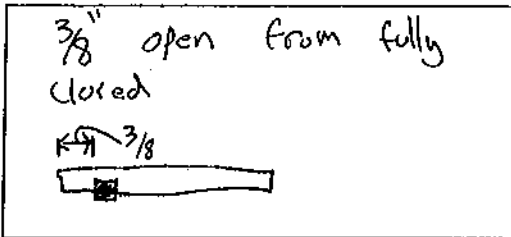
Test Crew: S. Buffon

OMNI Equipment ID #(s): _____

PREBURN

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

PRIMARY:



SECONDARY:

Fixed

TERTIARY:

N/A

FAN:

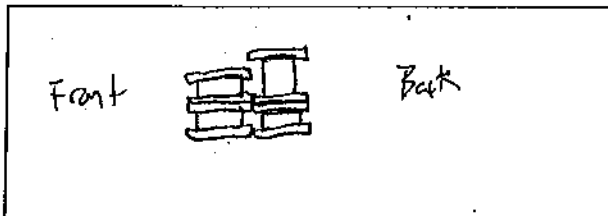
ON High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
30 min	stirred coal bed					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



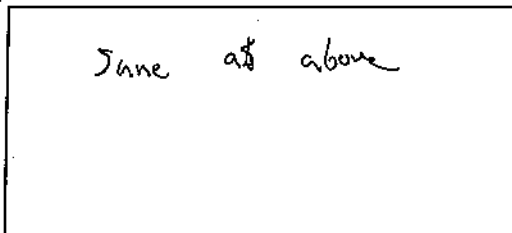
START UP PROCEDURES

BYPASS: closed @ 0 sec
 FUEL LOADING: Done @ 40 sec
 DOOR: closed @ 90 sec
 PRIMARY AIR: set @ 5 min

OTHER: _____

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

PRIMARY:



SECONDARY:

Fixed

TERTIARY:

N/A

FAN:

ON High

Technician signature: _____

Date: 7/21/10

Supplemental Data EPA 5G/5H

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Date: 7/21/10

Run #: 3 Booth: 1

Test Crew: S. Button

Start Time: 10:01 Stop Time: 14:11

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: ∅

Final: ∅

Final: ∅

Calibrations: Span Gas CO₂: 10.14 O₂: 17.00 CO: 2.518 CO₂(DT): 1.22

Time	<u>(N₂)</u> Span	N ₂ <u>(Span)</u>	<u>(N₂)</u> Span	N ₂ <u>(Span)</u>	N ₂ Span	N ₂ Span	N ₂ Span
	9:30	9:35	16:00	16:00			
O ₂	0.00	17.00	0.05	17.10			
CO ₂	0.00	10.16	0.01	10.03			
CO	0.00	2.522	-0.007	2.500			
CO ₂ (DT)	0.00	1.2	0.00	1.2			

Stack Diameter (inches): 6"

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

Scale Audit (lbs): Pretest: 10 16 Post Test: 10 16

Induced Draft: ∅ %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 7/19/10 Initials: SB

	Initial	Middle	Ending
Pb (in/Hg)	30.04	30.03	30.02
Room Temp (°F)	72	73	76

Technician signature: [Signature] Date: 7/21/10

*Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032*

Run 4

Wood Heater Calculation Data EPA Method 5H

Run 4 **Burn Rate (dry kg/hour) =** 1.10

Manufacturer: Hamman Home Heating
 Model/Tracking No.: Oak Leaf, 1572
 Test Date: 21-Jul-10
 Project Number: 155-S-26-8.3

Emission Rate (grams/hour) = 0.50

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

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	Fo (1.00 to 1.12)	CF by carbon balance (scf/minute)	CF by tracer gas (scf/minute)	1/CF by tracer gas (SI)	Volume Sampled (disc)	SI = Volume Sampled	Proportional Sample Rate	dh new
10	13.5	1.02	25.2	15.0	0.067	3.952	0.263	89.3	0.786
20	13.4	1.00	20.4	16.6	0.060	4.526	0.265	99.0	0.737
30	13.4	1.02	16.9	17.0	0.059	4.530	0.274	102.3	0.772
40	13.4	1.03	22.1	16.4	0.061	4.456	0.263	98.4	0.717
50	13.4	1.02	18.4	16.4	0.061	4.397	0.263	100.3	0.716
60	13.4	1.00	14.7	15.8	0.063	4.391	0.268	100.2	0.667
70	13.4	1.00	15.2	14.17	0.061	4.286	0.271	101.3	0.724
80	13.4	1.00	14.5	15.5	0.064	4.380	0.266	99.3	0.640
90	13.4	1.01	12.2	14.19	0.062	4.145	0.267	99.8	0.702
100	13.4	1.02	7.5	16.2	0.062	4.341	0.257	99.6	0.697
110	13.4	1.03	10.1	15.6	0.064	4.348	0.268	100.3	0.645
120	13.4	1.04	7.9	17.0	0.059	4.256	0.273	102.0	0.770
130	13.3	1.06	5.5	16.5	0.061	4.544	0.267	99.7	0.719
140	13.3	1.09	5.7	142.5	0.061	4.488	0.273	101.9	0.711
150	13.3	1.09	5.7	142.5	0.061	4.488	0.273	101.9	0.711
160	13.3	1.09	3.0	15.2	0.065	4.384	0.267	100.0	0.813
170	13.3	1.09	6.0	16.3	0.061	4.504	0.296	110.8	0.705
180	13.3	1.08	2.9	142.9	0.061	4.003	0.245	91.8	0.705
190	13.3	1.08	5.1	142.9	0.067	4.353	0.267	96.7	0.599
200	13.3	1.08	3.0	143.0	0.065	4.191	0.279	104.3	0.579
210	13.3	1.04	5.7	143.0	0.065	3.917	0.258	96.4	0.630
220	13.3	1.05	6.0	143.1	0.072	3.905	0.247	92.3	0.517
Averages/Totals	13.4	1.05	10.9	142.2	0.063	4.259	0.273	100.0	0.675

Woodstove Type
 Ytter-1-cat, 2-coat, 3-pellet
 EPA's Hydrocarbon Constant (%)

Fuel Data
 Test Charge (as fired lbs) 10.8
 Average Moisture (% dry basis) 21.32
 Average Moisture (% wet basis) 17.57

Run Parameters
 DGM initial reading (cf) 0.000
 DGM final reading (cf) 98.006
 Pz (inches Hg) 30.00
 Trn (avg of P) 86.30
 dh (avg inches wc) 0.57
 Vm (scf) 93.895
 CF by carbon balance (avg disc/minute) 10.89

Analytical Data
 Probe/Front Wash (mg) 14.3
 Front Filter (mg) 23.8
 Impinger PIV (mg) 34.4
 Back Filter (mg) 0.0
 Total Weight (mg) 72.5

Emission Results
 Cs (g/disc) 0.0008
 ER (g/hour) 0.50

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Harman Home Heating Equipment Numbers: _____ Run No.: 4
 Model: Oak Leaf Date: 07/21/10
 Project No.: 135-S-26-8.3
 Tracking No.: 1573

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	D009	650.7	626.9		23.8
B. Rear filter catch	Filter	J009	152.0	152.0		0.0
C. Rinse of probe and filter assembly (FRONT)	Acetone	125	96617.0	96608.7	0.0113	6.9
D. Rinse of Impinger Set	Distilled Water	350	123132.3	123107.8	0.0000	24.5
E. Rinse of Impinger Set	Dichloromethane	150	110211.0	110200.8	0.0020	9.9
F. Rinse of filter assembly and gas train (BACK)	Acetone	175	109187.4	109178.0	0.0113	7.4
Total Particulate, mg :						72.5

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	777.4	661.7	115.7	
2	665.9	653.5	12.4	
3	447.2	446.5	0.7	
4	768.4	743.7	24.7	
		TOTAL, g:	153.5	

Analyst: *AL* Date: 8/3/10

MFG: Harman
Model #: Oak Leaf

Run #: 4

Project #: 135-S-26-8.3
Run Date: (TR) 5:15 PM

Run Information

Run Number: 4
 Date/Start Time: (TR) 5:15 PM
 Tracking Number: 1573
 Project Number: 135-S-26-8.3
 Technician: SJB
 Manufacturer: Harman
 Model: Oak Leaf
 Fuel Load (lbs): 10.80
 Coal Bed Range (lbs): 2.16 to 2.70
 Actual Coal Bed (lbs): 2.5



Test Booth: 1
 Data Collection Program: 563_dual 47 mm_Logger_01_19_09.vi
 Barometric Pressure: 30.02
 Begin: 30 Middle: 29.98 End: 30 Avg: 30 In-Hg

Velocity Traverse Data								
	Pt. 1	Pt. 2	Pt. 3	Pt. 4	Pt. 5	Pt. 6	Pt. 7	Pt. 8
Initial dp								
Initial Temp								
								In-H2O Deg F

PM Control Module: 335/336
 Dilution Tunnel MW(dry): 29
 Dilution Tunnel MW(wet): 28.56
 Dilution Tunnel H2O: 34
 Dilution Tunnel Static: -53
 Pitot Tube Cp: .99
 Tunnel Velocity: 0.00 ft/sec
 Initial Tunnel Flow: 0.0 scfm
 Average Tunnel Flow: NaN scfm
 Tunnel Area: 0.1963 ft2
 Post-Test Leak Check-A: .002 @ 17.7 cfm@"Hg
 Post-Test Leak Check-B: .000 @ 11.8 cfm@"Hg
 Fuel Consumed: 10.8 lbs
 Firebox Surface Temp Change: -64.7
 Run Time: 220 Minutes
 Fuel Moisture (dry basis): 21.32 %

Meter Box "y" Factor A: 1.001
 Filter Holder # A:
 Total Particulate A: mg
 Avg Prop Rate A: NaN

Meter Box "y" Factor B: .997
 Filter Holder # B:
 Total Particulate B: mg
 Avg Prop Rate B: NaN

OMNI Test Laboratories Inc.

1 of 7

Signature/Date:

[Signature]
4/19/10

MFG: Harman
 Model #: Oak Leaf.

Run #: 4

Project #: 135-S-26-8.3
 Run Date: (TR) 5:15 PM

Emissions Results	
Burn Rate	1.10 lb/hr dry
Adjusted Emissions A	0.00 grams/hour
Adjusted Emissions B	0.00 grams/hour
Particulate Concentration (dry standard)	0.00000 grams/dscf
Particulate Emission Rate	0.00 grams/hour
Total Sample Volume (Standard Conditions) Vm	31.015 DSCF
Total Particulates mp	0 Mg
Average Delta H	1.02 Inches H2O
Total Sample Volume Vm	32.296 Cubic Feet
Average Gas Meter Temperature	93.20 Degree Fahrenheit
Average Tunnel Temp	103.00 Degree Fahrenheit
Average Delta p	0 Inches H2O
Average Gas Velocity in Dilution Tunnel vs	0 Feet/Second
Average Gas Flow Rate in Dilution Tunnel Qscf	0 DSCF/Hour
Total Time	220 Minutes
Average Emissions	0.00000 grams/hour
Average Emissions	0.00 grams/hour
Average Emissions	33.39 DSCF
Average Emissions	0 Mg
Average Emissions	1.03 Inches H2O
Average Emissions	35.071 Cubic Feet
Average Emissions	95.80 Degree Fahrenheit

OMNI Test Laboratories Inc.

2 of 7

Signature/Date:

[Handwritten Signature]
 7/20/10

MFG: Harman
Model #: Oak Leaf

Run #: 4

Project #: 135-S-26-8.3
Run Date: (TR) 5:15 PM

Fuel Data

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

PRE-BURN FUEL

OMNI EQUIPMENT ID: []

MOISTURE CONTENT (MEERDRY BASIS): []

PRE-BURN LOAD MOISTURE: [23.03] %

CALIBRATION: CALIBRATION VALUE (1) = [12] ACTUAL READING [22]

CALIBRATION VALUE (2) = [22] ACTUAL READING []

MOISTURE READINGS

PIECE	1	2	3	4
LENGTH	8	8	0	0
	24.9	25.1	0	0
	21.6	20.9	0	0

FUEL TYPE: [2X4] [2X4] [] []

PIECE LENGTHS (INCHES): [] [] [] []

14 pieces @ 7.5

TIME (24 HR CLOCK): [15:30] ROOM TEMPERATURE (F): [70]

TEST FUEL

FUEL TYPE: PIECE QUANTITY

3	2X4	1	4X4
6.4	165	4.4	165

FUEL LENGTH: [15.5] IN

CALCULATED FUEL LOAD: [0] LBS

FUEL LOAD PIECE COUNT: [4] PIECE

ACTUAL LOAD WEIGHT: [10.8] LBS

MOISTURE CONTENT (MEERDRY BASIS) READINGS

PIECE #	1	2	3	4	5
LENGTH	19.1	19.6	19.4	22.9	22.5
	22.7	21.1	20.8	21.8	22
	22.1	21.8	22	0	0

FUEL TYPE: [4X4] [2X4] [2X4] [2X4] []

PIECE QUANTITY: [6] [7] [8] [9] [10]

READINGS: [] [] [] [] [] [] [] [] [] []

TIME (24 HR CLOCK): [16:00] ROOM TEMPERATURE (F): [70]

AVERAGE PRE-BURN MOISTURE: [21.32]

Signature/Date: AK
5/14/10

3 of 7

OMNI Test Laboratories Inc.

MFG: Harman
Model #: Oak Leaf

Run #: 4

Project #: 135-S-26-8.3
Run Date: (TR) 5:15 PM

Notes

Power Failure just prior to start of test run (Circuit broke when turning on sampling equipment) preburn data was lost, sampling not affected. There was only a 4 minute lapse between end of preburn and start of test run.

OMNI Test Laboratories Inc.

4 of 7

Signature/Date:

[Signature]
7/30/10


MFG: Harman
Model #: Oak Leaf

Run #: 4

Project #: 135-S-26-8.3
Run Date: (TR) 5:15 PM

5 of 7

Signature/Date:


7/31/10

MFG: Harman
Model #: Oak Leaf

Run #: 4

Project #: 135-S-26-8.3
Run Date: (TR) 5:15 PM

Elapsed Time (min)	Gas Meter-A (ft3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (In-Hg)	Dil Tun (oF)	Dil Turn dp	Pro Rate (10%)	Scale Reading (lbs)	Weight Change (lbs)	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	Filter (oF)	Imping Exit (oF)	AMB (oF)	Draft (In-H2O)	Cat Temp (oF)
0	0.000	NAN	0.43	85	0.75	119	0.000	0.0	10.7	10.75	535	244	384	396	412	3218	394.1	338	81	3218	82	-0.044	3218
10	1.403	0.140	1.06	86	0.82	114	0.000	NAN	9.6	-1.19	443	247	357	390	400	3218	375.3	332	87	3218	81	-0.046	3218
20	2.859	0.145	1.05	88	0.79	107	0.000	NAN	8.5	-1.00	410	249	393	368	375	3218	359.1	329	82	3218	81	-0.046	3218
30	4.321	0.146	1.04	89	0.79	107	0.000	NAN	7.5	-1.11	414	248	406	355	360	3218	356.5	339	83	3218	82	-0.047	3218
40	5.786	0.146	1.04	91	0.79	108	0.000	NAN	6.3	-1.14	432	248	428	350	357	3218	368.2	347	84	3218	82	-0.048	3218
50	7.252	0.147	1.05	92	0.80	108	0.000	NAN	5.3	-1.01	465	249	445	353	362	3218	374.5	351	84	3218	82	-0.048	3218
60	8.720	0.147	1.04	93	0.80	107	0.000	NAN	4.6	-0.72	493	249	445	353	371	3218	383.4	329	85	3218	88	-0.045	3218
70	10.190	0.147	1.05	93	0.80	106	0.000	NAN	3.9	-0.87	512	252	428	364	382	3218	387.5	319	85	3218	84	-0.043	3218
80	11.661	0.147	1.05	94	0.80	105	0.000	NAN	3.2	-0.71	520	251	412	368	395	3218	389.2	319	85	3218	84	-0.043	3218
90	13.133	0.147	1.04	94	0.80	105	0.000	NAN	2.7	-0.47	527	250	396	375	406	3218	390.6	301	85	3218	84	-0.040	3218
100	14.605	0.147	1.04	94	0.79	103	0.000	NAN	2.4	-0.34	517	248	378	378	411	3218	385.4	287	85	3218	84	-0.038	3218
110	16.078	0.147	1.04	94	0.80	102	0.000	NAN	2.0	-0.37	509	247	348	379	415	3218	378.7	271	85	3218	84	-0.036	3218
120	17.551	0.147	1.05	95	0.80	101	0.000	NAN	1.7	-0.31	491	245	326	377	418	3218	371.3	256	85	3218	84	-0.032	3218
130	19.024	0.147	1.05	95	0.80	100	0.000	NAN	1.5	-0.23	488	241	308	373	411	3218	364.5	243	85	3218	84	-0.031	3218
140	20.498	0.147	1.04	95	0.80	99	0.000	NAN	1.3	-0.18	474	240	294	371	404	3218	356.5	242	85	3218	84	-0.032	3218
150	21.972	0.147	1.04	95	0.80	99	0.000	NAN	1.1	-0.16	467	238	282	368	394	3218	349.9	233	85	3218	84	-0.029	3218
160	23.446	0.147	1.04	95	0.80	98	0.000	NAN	1.0	-0.13	455	236	271	365	386	3218	342.7	230	85	3218	84	-0.028	3218
170	24.921	0.147	1.03	95	0.80	97	0.000	NAN	0.8	-0.18	445	234	262	362	377	3218	336.1	222	85	3218	84	-0.027	3218
180	26.396	0.147	1.04	96	0.80	97	0.000	NAN	0.7	-0.11	435	232	255	359	369	3218	329.9	216	85	3218	84	-0.026	3218
190	27.871	0.148	1.04	96	0.80	97	0.000	NAN	0.5	-0.18	425	229	249	355	361	3218	323.8	210	85	3218	84	-0.025	3218
200	29.346	0.148	1.05	96	0.80	96	0.000	NAN	0.4	-0.14	419	227	243	350	354	3218	318.5	208	85	3218	84	-0.025	3218
210	30.820	0.147	1.04	96	0.80	96	0.000	NAN	0.2	-0.16	413	224	236	347	347	3218	313.5	202	85	3218	84	-0.024	3218
220	32.296	0.148	1.04	96	0.80	95	0.000	NAN	0.0	-0.22	405	223	230	345	340	3218	308.6	198	85	3218	85	-0.023	3218
AVG	NA	NA	1.02	93.55	0.80	102.41	0.00	NAN	3.02	NA	NA	241.05	337.00	364.36	382.14	3218.00	358.11	N/A	84.50	3218.00	83.50	-0.04	3218.00

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OMNI Test Laboratories Inc.

Signature/Date:

MFG: Harman
Model #: Oak Leaf

Run #: 4

Project #: 135-S-26-8.3
Run Date: (TR) 5:15 PM

	Box B ET (min)	Gas Meter-B (m3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Pro Rate (10%)	Filter (OF)	Imping Exit (OF)	Box B gP (In-H2O)
0	0.000	NaN	0.45	90	1.0	0.0	82	3218	-0.04	
10	1.519	0.152	1.03	90	1.1	NaN	86	3218	-0.55	
20	3.097	0.158	1.03	91	1.1	NaN	85	3218	-0.55	
30	4.685	0.159	1.03	92	1.1	NaN	85	3218	-0.55	
40	6.276	0.159	1.03	94	1.1	NaN	86	3218	-0.55	
50	7.869	0.159	1.03	95	1.1	NaN	86	3218	-0.55	
60	9.465	0.160	1.03	96	1.1	NaN	86	3218	-0.55	
70	11.061	0.160	1.03	96	1.1	NaN	86	3218	-0.53	
80	12.659	0.160	1.04	97	1.1	NaN	86	3218	-0.54	
90	14.258	0.160	1.03	97	1.1	NaN	86	3218	-0.54	
100	15.857	0.160	1.03	97	1.1	NaN	86	3218	-0.54	
110	17.457	0.160	1.03	97	1.1	NaN	86	3218	-0.55	
120	19.057	0.160	1.03	97	1.1	NaN	86	3218	-0.54	
130	20.657	0.160	1.03	98	1.1	NaN	86	3218	-0.55	
140	22.258	0.160	1.03	98	1.1	NaN	86	3218	-0.54	
150	23.859	0.160	1.04	98	1.1	NaN	86	3218	-0.55	
160	25.461	0.160	1.03	98	1.1	NaN	86	3218	-0.55	
170	27.062	0.160	1.03	98	1.1	NaN	86	3218	-0.55	
180	28.664	0.160	1.03	98	1.1	NaN	86	3218	-0.55	
190	30.266	0.160	1.03	98	1.1	NaN	86	3218	-0.54	
200	31.870	0.160	1.04	98	1.1	NaN	86	3218	-0.55	
210	33.470	0.160	1.03	98	1.1	NaN	85	3218	-0.55	
220	35.071	0.160	1.03	98	1.1	NaN	85	3218	-0.55	
AVG	NA	0.16	1.03	96.32	1.10	NaN	85.31	3218.00	-0.55	

Signature/Date:

[Handwritten Signature]
7/30/10

Run Notes

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Run #: 4

Date: 7/21/10

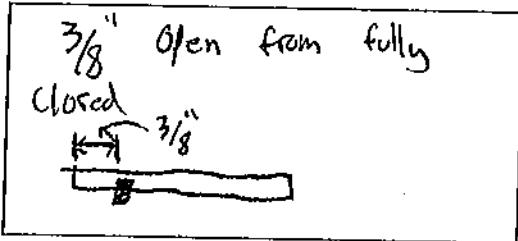
Test Crew: S. Buffon

OMNI Equipment ID #(s): _____

PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

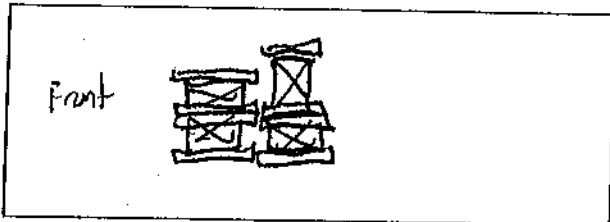
FAN: OFF
- Fan Confirmation

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
35 min	Adjusted coals					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: closed @ 0 sec

FUEL LOADING Done @ 45 ~~sec~~ sec

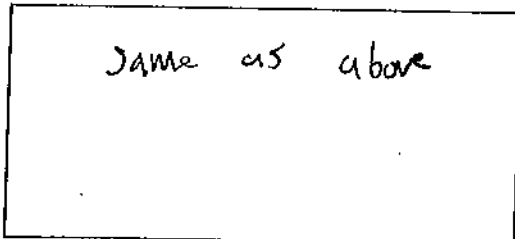
DOOR: closed @ 90 sec

PRIMARY AIR: Set @ 5 min

OTHER: _____

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

FAN: OFF
- Fan Confirmation

Technician signature: [Signature]

Date: 7/21/10

Supplemental Data EPA 5G/5H

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Date: 7/21/10

Run #: 4

Booth: 1

Test Crew: S. Button

Start Time: 17:15

Stop Time: 20:55

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: ∅

Final: ∅

Final: ∅

Calibrations: Span Gas CO₂: 10.14 O₂: 17.00 CO: 2.518 CO₂(DT): 1.22

Time	<u>N₂</u> Span	N ₂ <u>Span</u>	<u>N₂</u> Span	N ₂ <u>Span</u>	N ₂ Span	N ₂ Span	N ₂ Span
16:05	16:05	16:05	21:05	21:05			
O ₂	0.00	17.04	0.02	17.07			
CO ₂	0.00	10.14	-0.01	10.10			
CO	0.00	2.518	-0.006	2.501			
CO ₂ (DT)	0.00	1.2	0.00	1.2			

Stack Diameter (inches): 6"

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

Scale Audit (lbs): Pretest: 10 16 Post Test: 10 16

Induced Draft: ∅ %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 7/19/10 Initials: SB

	Initial	Middle	Ending
Pb (in/Hg)	<u>30.02</u>	<u>30.00</u>	<u>29.98</u>
Room Temp (°F)	<u>84</u>	<u>84</u>	<u>84</u>

Technician signature: [Signature] Date: 7/21/10

*Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032*

Run 5

Wood Heater Calculation Data EPA Method 5H

Run 5

Manufacturer: Harman Home Heating
Model/Tracking No.: Oak Leaf, 1673

Test Date: 21-Jul-10
Project Number: 135-S-26-8.3

Burn Rate (dry kg/hour) = 1.67

Emission Rate (grams/hour) = 2.57

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

Elapsed Time (minutes)	Dilution Tunnel Velocity (feet/second actual)	F _o (1.00 to 1.12)	Q _t by carbon balance (scf/minute)	Q _t -new gas (scf/minute)	C _t by tracer gas (scf/minute)	1/QC by tracer gas (SI)	Volume Sampled (dscf)	SI * Volume Sampled	Proportional Sample Rate	dH, new
10	13.2	0.88	37.2	140.7	30.8	0.033	3.730	0.124	94.4	0.709
20	13.3	0.91	38.4	139.6	34.9	0.029	4.249	0.129	98.5	0.796
30	13.3	0.90	41.9	138.2	33.3	0.030	4.536	0.130	99.1	0.727
40	13.4	0.93	31.7	138.5	32.1	0.031	4.458	0.133	101.4	0.868
50	13.3	0.93	27.4	139.0	30.2	0.033	4.287	0.133	101.8	0.590
60	13.2	0.90	19.6	139.9	32.6	0.031	4.048	0.134	102.3	0.688
70	13.2	0.91	11.7	140.5	30.2	0.033	4.284	0.131	96.7	0.589
80	13.1	0.92	14.9	140.8	29.0	0.034	4.009	0.133	101.2	0.543
90	13.1	0.91	8.8	141.0	29.1	0.034	3.850	0.132	100.5	0.543
100	13.1	0.91	14.6	141.0	28.1	0.034	3.825	0.132	100.3	0.543
110	13.1	0.97	11.4	141.0	29.7	0.034	3.832	0.132	100.5	0.587
120	13.1	0.91	11.4	141.0	27.4	0.036	3.928	0.129	98.4	0.488
130	13.1	0.94	8.6	141.1	27.5	0.035	3.673	0.134	102.1	0.485
140	13.1	0.94	8.6	141.1	28.3	0.035	3.954	0.131	99.3	0.446
150	13.1	0.94	8.3	141.1	27.2	0.037	3.499	0.132	101.0	0.476
160	13.1	0.89	6.0	141.1	26.5	0.038	3.534	0.130	96.1	0.457
Averages/Totals	13.2	0.92	13.6	140.4	29.9	0.034	3.952	0.130	100.0	0.592

Woodstove Type
Yhts-1rcat,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
DSM initial reading (cf)
DSM final reading (cf)
Pb (inches Hg)
Tm (avg of)
dH (avg inches wc)
Vm (scf)
C_t 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)

2	0.600
1.32	65.334
11.9	30.11
21.13	83.12
17.44	0.58
	63.178
	18.81
	45.5
	35.4
	60.2
	2.4
	143.6
	0.0023
	2.57

Wood Heater Test Data EPA Method 5H

Run Number **5**

Manufacturer:	Harman Home Heating	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	Oak Leaf, 1973	Test Meter Y:	0.987
Stove Type (cal, ncal, or pellet):	ncal	Orifice dH@:	1.938
Project Number:	135-S-28-8.3	Pilot Tube Cp:	0.99
Test Date:	21-Jul-10	Average Barometric Pressure:	30.11
Test Start Time:	12:49	Average Fuel Moisture (dry basis %):	21.13
Recording Interval (minutes):	10	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	180		

Dilution Tunnel Velocity Traverse Data										Dilution Tunnel Elow:
	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8		Initial
Initial dP	0.036	0.042	0.044	0.038	0.030	0.038	0.040	0.034	H ₂ O	140.7
Initial Temp	107	107	107	107	107	107	107	107	oF	scf/minute

Signature/Date: *[Signature]* 8/12/10

Post-Test Leak Check: .001 @ .9 cfm @ 1 Hg

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO ₂ (%)	0.034
	H ₂ O (%)	4.00	Preferred Initial Sampling Rate (cf/minute)	0.43

Flue Gas	
Impinger liquid, V _{ic} (g)	129.3
Volume of Water Vapor, V _w (std) (ft ³)	6.10
Moisture Content, Bws	0.088

Elapsed Time	Particulate Sampling System							Fuel Weight		Stove Flue-Gas Conditions						Stove Temperatures (oF)						Dilution Tunnel				Laboratory	
	Dry Gas Motor Reading (cf)	Sample Rate (cfm)	Orifice dH (inches wc)	Proportional Rate (%)	Dry Gas Motor 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)
0	0.000		0.62		72	-1	60	225	11.9		-0.060	17.2	3.9	0.00	372	23.4	562	234	317	381	471	393	107	0.037	-0.55	0.875	79
10	3.839	0.384	0.71	94.4	77	-3	49	226	10.8	-1.3	-0.060	17.9	3.4	0.00	360	25.8	425	232	310	367	446	358	107	0.037	-0.55	0.825	80
20	8.182	0.434	0.80	98.5	78	-3	48	226	9.0	-1.6	-0.060	17.0	4.3	0.00	376	21.7	523	231	299	355	423	366	110	0.037	-0.55	1.100	80
30	12.626	0.454	0.73	99.1	78	-3	49	229	7.1	-1.9	-0.070	16.8	4.8	0.00	385	19.9	590	228	315	357	419	382	113	0.037	-0.55	1.176	80
40	17.369	0.454	0.67	101.4	82	-3	53	233	5.5	-1.6	-0.070	15.8	5.5	0.00	432	17.9	647	226	335	371	428	401	118	0.037	-0.55	1.300	80
50	21.792	0.442	0.59	101.8	83	-3	55	225	4.3	-1.2	-0.600	16.6	4.8	0.00	398	20.6	660	221	336	387	440	409	115	0.037	-0.55	1.025	82
60	25.977	0.419	0.69	102.3	83	-3	58	231	3.6	-0.7	-0.050	18.0	3.0	0.60	334	25.2	648	216	297	394	445	400	108	0.037	-0.55	0.725	82
70	30.384	0.441	0.59	99.7	84	-3	58	230	3.2	-0.4	-0.050	18.1	2.9	0.40	297	26.3	594	214	249	396	440	379	103	0.037	-0.55	0.650	81
80	34.537	0.415	0.54	101.2	86	-2	60	227	2.7	-0.5	-0.050	18.1	2.9	0.30	281	26.9	557	209	217	394	428	361	100	0.037	-0.56	0.825	81
90	38.519	0.398	0.55	100.5	85	-2	57	227	2.4	-0.3	-0.040	18.1	2.9	0.40	270	26.3	539	210	199	392	416	351	99	0.037	-0.55	0.625	80
100	42.489	0.397	0.54	100.3	87	-2	57	228	1.9	-0.5	-0.040	18.1	2.9	0.40	266	26.3	532	209	189	391	409	348	99	0.037	-0.55	0.625	81
110	46.481	0.399	0.57	100.5	86	-2	54	229	1.5	-0.4	-0.040	17.7	3.2	0.20	270	25.8	519	209	188	393	402	342	99	0.037	-0.55	0.700	81
120	50.481	0.389	0.49	98.4	85	-2	54	227	1.1	-0.4	-0.040	17.9	3.2	0.20	265	25.8	510	208	186	393	396	339	99	0.037	-0.55	0.650	82
130	54.273	0.381	0.48	102.1	87	-2	57	231	0.8	-0.3	-0.040	17.8	3.2	0.20	268	25.8	495	211	186	392	390	335	98	0.037	-0.55	0.650	82
140	58.017	0.374	0.45	99.8	87	-2	58	228	0.5	-0.3	-0.040	17.8	3.2	0.20	261	25.8	489	213	185	390	390	333	98	0.037	-0.55	0.625	82
150	61.652	0.364	0.48	101.0	87	-2	58	228	0.2	-0.3	-0.040	17.9	3.1	0.20	259	26.4	480	218	182	388	389	331	98	0.037	-0.55	0.625	82
160	65.334	0.368	0.46	99.1	86	-2	60	230	0.0	-0.2	-0.040	18.2	2.9	0.30	253	26.9	468	216	180	385	386	327	98	0.037	-0.55	0.575	83
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 (% 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)
160	65.334	0.408	0.58	100.00	83.1	-1.00	55.00	228.24	11.90	-0.74	-0.08	17.58	3.62	0.19	315.00	24.53	543.18	217.82	245.18	383.88	418.71	66	104.06	0.04	-0.55	0.79	81.06

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Harman Home Heating Equipment Numbers: _____ Run No.: 5
 Model: Oak Leaf Date: 07/22/10
 Project No.: 135-S-26-8.3
 Tracking No.: 1573

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	D010	656.3	620.9		35.4
B. Rear filter catch	Filter	J010	153.1	150.7		2.4
C. Rinse of probe and filter assembly (FRONT)	Acetone	150	94824.4	94799.9	0.0113	22.8
D. Rinse of Impinger Set	Distilled Water	300	173208.0	173174.9	0.0000	33.1
E. Rinse of Impinger Set	Dichloromethane	150	110807.4	110780.0	0.0020	27.1
F. Rinse of filter assembly and gas train (BACK)	Acetone	150	110700.4	110675.9	0.0113	22.8
Total Particulate, mg :						143.6

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	644.4	541.3	103.1
2	667.2	657.5	9.7
3	560.7	559.8	0.9
4	767.1	751.5	15.6
	TOTAL, g		129.3

Analyst: *[Signature]*

Date: 8/3/10

MFG: Harman
Model #: Oak Leaf

Run #: 5

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 11:47 AM (TR)
12:49 PM

Run Information

Run Number: 5
Date / Start Time: 7/21/10 - (PB) 11:47 AM (TR) 12:49 PM
Manufacturer: Harman
Model: Oak Leaf

Tracking Number: 1573
Project Number: 135-5-26-8.3
Technician: SJB

Fuel Load (lbs): 11.90
Coal Bed Range (lbs): 2.38 to 2.98
Actual Coal Bed (lbs): 2.27

Velocity Traverse Data

	PL 1	PL 2	PL 3	PL 4	PL 5	PL 6	PL 7	PL 8
Initial dp	.036	.042	.044	.036	.030	.038	.040	.034
In-H2O	107	107	107	107	107	107	107	107
Temp	107	107	107	107	107	107	107	107
								Deg F

Test Booth: 1
Data Collection Program: 5G3_dial 47 mm_Logger_01_19_09.vi
Barometric Pressure: 30.10
Begin: 30.11
Middle: 30.12
End: 30.11
Avg: 30.11
In-Hg: 30.11

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29
Dilution Tunnel MW(wet): 28.56
Dilution Tunnel H2O: 4
Dilution Tunnel Static: 3.55
Pitot Tube Cp: .99

Tunnel Velocity: 13.29
Initial Tunnel Flow: 140.7
Average Tunnel Flow: 141.26
Tunnel Area: 0.1963
Post-Test Leak Check-A: .001@18.6
Post-Test Leak Check-B: .000@11.9

Rt/sec: 11.9
Firebox Surface Temp Change: -29.3
Run Time: 160
Fuel Consumed: 11.9 lbs
Fuel Moisture (dry basis): 21.12 %

Meter Box "Y" Factor A: 1.001
Filter Holder # A: []
Total Particulate A: 2.2 mg
Avg Prop Rate A: 100.325

Meter Box "Y" Factor B: 1.997
Filter Holder # B: []
Total Particulate B: 2.3 mg
Avg Prop Rate B: 100.549

OMNI Test Laboratories Inc.

1 of 7

Signature/Date: [Signature]

7/20/10

MFG: Harman
 Model #: Oak Leaf

Run #: 5

Project #: 135-S-26-8.3
 Run Date: 7/21/10 - (PB) 11:47 AM (TR)
 12:49 PM

Emissions Results

Burn Rate	1.67	kg/hr dry	Adjusted Emissions A	1.55	grams/hour	Upper Limit	1.55	grams/hour
			Adjusted Emissions B	1.51	grams/hour	Stage Emissions	1.51	grams/hour
						Lower Limit	1.4539	grams/hour
Particulate Concentration (dry standard)	0.00010	grams/dscf					0.00009	grams/dscf
Particulate Emission Rate	0.82	grams/hour					0.80	grams/hour
Total Sample Volume (Standard Conditions) / m ³	22.802	DSCF					24.528	DSCF
Total Particulates / mg	2.2	Mg					2.3	Mg
Average Delta H	1.04	Inches H2O					1.04	Inches H2O
Total Sample Volume / m ³	23.545	Cubic Feet					25.529	Cubic Feet
Average Gas Meter Temperature	90.60	Degrees Fahrenheit					92.90	Degrees Fahrenheit
Average Tunnel Temp	104.10	Degrees Fahrenheit						
Average Delta P	0.038	Inches H2O						
Average Gas Velocity in Dilution Tunnel / vs	13.37	Feet/Second						
Average Gas Flow Rate in Dilution Tunnel / gsd	8533.26	DSCF/Hour						
Total Time	160	Minutes						

OMNI Test Laboratories Inc.

Signature/Date:

[Signature]
 7/21/10

MFG: Harman
Model #: Oak Leaf

Run #: 5

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 11:47 AM (TR)
12:49 PM

Fuel Data

FUEL: DOUGLAS FIR SPECIES, UNTREATED, AIR DRIED, STANDARD END USE, OR BETTER, DIMENSIONAL NUMBER: _____

PRE-BURN FUEL

MOISTURE CONTENT (MEYER-DRY BASIS) _____

AVG PRE-BURN LOAD (MOISTURE) _____

MOISTURE CONTENT (MEYER-DRY BASIS) _____

CALIBRATION VALUE (%) = 12.0 ACTUATING CUAL READ: _____

CALIBRATION VALUE (%) = 22.0 CUAL READ: _____

PIECE LENGTH: 8, 8, 0

MOISTURE READINGS: 24.8, 22.5, 23.7, 23.4, 21.6, 22.8, 0

PIECE LENGTH (INCHES): 2x4, 2x4

PIECE LENGTH (FEET): 14 pieces @ 7.5'

TIME (24HR CLOCK): 11:30 ROOM TEMPERATURE (°F): 70

TEST FUEL

FUEL PIECE QUANTITY: 3

FUEL LOAD (PIECE COUNT): 4

PIECE TYPE: 2x4

PIECE WEIGHT (LBS): 5.9

MEAN LOAD WEIGHT: 11.9

MOISTURE CONTENT (MEYER-DRY BASIS)

PIECE	READINGS	PIECE	READINGS
1	20.2	6	0
2	22.7	7	0
3	19.5	8	0
4	19.4	9	0
5	0	10	0

TIME (24HR CLOCK): 12:00 ROOM TEMPERATURE (°F): 70

AVG FUEL LOAD (MOISTURE): 21.12

OMNI Test Laboratories Inc.

3 of 7

Signature/Date: _____

7/30/10

MFG: Harman
Model #: Oak Leaf

Run #: 5

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 11:47 AM (TR)
12:49 PM

Notes

[Empty rectangular box for notes]

OMNI Test Laboratories Inc.

4 of 7

Signature/Date:

[Handwritten Signature]
7/21/10

MFG: Harman
Model #: Oak Leaf

Run #: 5


Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 11:47 AM (TR)
12:49 PM

Preburn ET (min)	Scale (lbs)	Weight Change	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	AMS (oF)	Draft (lb-H ₂ O)	Car Temp (oF)	O ₂ (%)	CO ₂ (%)	CO (%)	CO Ratio
10	-1.298	344	232	232	356	368	3218	306.3	325	76	-0.046	3218	0.56	0.02	0.00	-2.10	
20	-1.351	372	236	249	340	369	3218	313.1	333	77	-0.047	3218	17.26	4.01	0.02	0.51	
30	-1.274	409	237	262	335	394	3218	327.5	336	76	-0.047	3218	16.97	4.36	0.03	0.63	
40	-1.182	458	236	270	337	426	3218	345.3	348	78	-0.047	3218	16.64	4.67	0.03	0.63	
50	-1.603	568	235	296	348	451	3218	379.5	397	78	-0.054	3218	15.12	5.99	0.42	6.61	
60	-0.979	566	233	318	377	471	3218	398.2	372	79	-0.048	3218	17.23	3.94	0.01	0.34	

OMNI Test Laboratories Inc.

5 of 7

Signature/Date:


7/30/10

MFG: Harman
Model #: Oak Leaf

Run #: 5

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 11:47 AM (TR)
12:49 PM

Elapsed Time (min)	Gas Meter-A (#3)	Sample Rate (cfm)	Orifice dh	Meter (deg F)	Meter Vac (in-Hg)	Dil Tun (oF)	Dil Tun dp	Pro Rate (10%)	Scale Reading (lbs)	Weight Change (lbs)	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	Filter (oF)	Imping Exit (oF)	AMB (oF)	Draft (in-H2O)	Cat Temp (oF)
0	0.000	NaN	0.76	82	0.76	107	0.037	0.0	11.8	11.80	562	234	317	381	471	3218	393.1	356	78	3218	78	-0.050	3218
10	1.468	0.147	1.07	83	0.78	107	0.037	100.7	10.6	-1.24	425	232	310	367	446	3218	355.9	360	80	3218	80	-0.050	3218
20	2.933	0.147	1.06	85	0.78	110	0.037	100.4	9.1	-1.51	523	231	299	355	422	3218	366.2	376	81	3218	80	-0.054	3218
30	4.398	0.146	1.06	87	0.78	113	0.037	100.2	7.3	-1.74	590	228	315	357	419	3218	381.9	395	82	3218	81	-0.055	3218
40	5.863	0.147	1.05	89	0.79	118	0.037	100.1	5.6	-1.71	647	226	335	371	428	3218	401.4	432	83	3218	80	-0.057	3218
50	7.330	0.147	1.05	90	0.79	115	0.037	100.2	4.4	-1.22	680	221	336	387	440	3218	408.8	398	84	3218	82	-0.043	3218
60	8.799	0.147	1.05	91	0.78	108	0.037	100.2	3.7	-0.72	646	216	297	394	445	3218	398.5	394	84	3218	82	-0.043	3218
70	11.745	0.147	1.05	93	0.78	103	0.037	100.2	3.2	-0.49	594	214	249	396	440	3218	378.6	297	83	3218	81	-0.039	3218
80	13.219	0.147	1.05	93	0.79	100	0.037	100.3	2.8	-0.40	557	209	217	394	428	3218	361.1	281	83	3218	81	-0.036	3218
90	14.695	0.148	1.05	93	0.79	99	0.037	100.4	2.4	-0.41	539	210	199	392	416	3218	351.1	270	83	3218	80	-0.035	3218
100	16.170	0.148	1.05	93	0.79	99	0.037	100.4	1.9	-0.46	532	209	189	391	409	3218	346.2	266	83	3218	81	-0.035	3218
110	17.642	0.147	1.05	94	0.79	99	0.037	100.2	1.5	-0.44	519	209	186	393	402	3218	341.6	270	83	3218	81	-0.035	3218
120	19.117	0.148	1.06	94	0.79	98	0.037	100.4	1.1	-0.36	510	208	186	396	396	3218	338.5	265	83	3218	82	-0.035	3218
130	20.593	0.148	1.06	94	0.79	98	0.037	100.4	0.8	-0.31	485	211	186	392	390	3218	335.0	266	83	3218	82	-0.034	3218
140	22.069	0.148	1.05	94	0.79	98	0.037	100.4	0.5	-0.30	489	213	185	390	390	3218	333.5	261	83	3218	82	-0.033	3218
150	23.545	0.148	1.05	94	0.79	98	0.037	100.4	0.2	-0.32	460	216	182	388	389	3218	331.0	259	83	3218	82	-0.033	3218
160	NA	NA	1.03	91.12	0.79	103.87	0.04	94.03	3.52	NA	NA	216.94	241.12	384.94	417.00	3218.00	362.13	NA	82.89	3218.00	81.19	-0.04	3218.00

OMNI Test Laboratories Inc.

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Signature/Date:

MFG: Harman
Model #: Oak Leaf

Run #: 5

Project #: 135-S-26-8.3
Run Date: 7/21/10 - (PB) 11:47 AM (TR)
12:49 PM

Box B ET (mb)	Gas Meter-B (ft3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (In-Hg)	Pro Rate (10%)	Filter (eF)	Imping Exit (eF)	Box B dP (In-H2O)
0	0.000	0.85	85	1.0	0.0	78	3218	-0.56	
10	1.580	1.04	86	1.0	100.7	82	3218	-0.56	
20	3.166	1.04	88	1.0	100.7	83	3218	-0.57	
30	4.753	1.04	89	1.0	100.5	85	3218	-0.57	
40	6.341	1.04	91	1.1	100.3	86	3218	-0.56	
50	7.932	1.04	93	1.1	100.3	87	3218	-0.56	
60	9.527	1.04	94	1.1	100.4	86	3218	-0.56	
70	11.125	1.04	95	1.1	100.5	86	3218	-0.56	
80	12.724	1.04	95	1.1	100.5	85	3218	-0.56	
90	14.324	1.05	95	1.1	100.6	85	3218	-0.57	
100	15.926	1.04	95	1.1	100.7	84	3218	-0.56	
110	17.527	1.04	95	1.1	100.6	84	3218	-0.57	
120	19.125	1.04	95	1.1	100.5	84	3218	-0.56	
130	20.726	1.04	95	1.1	100.6	84	3218	-0.56	
140	22.328	1.04	95	1.1	100.7	84	3218	-0.55	
150	23.928	1.04	95	1.1	100.6	85	3218	-0.57	
160	25.529	1.04	95	1.1	100.5	85	3218	-0.56	
AVG	NA	1.04	93.31	1.08	100.55	84.69	3218.00	-0.56	

[Handwritten Signature]
7/20/10

Signature/Date:

7 of 7

OMNI Test Laboratories Inc.

Run Notes

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Run #: 5 Date: 7/22/10

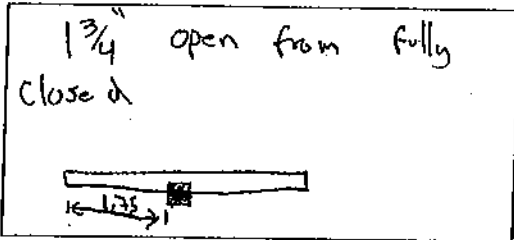
Test Crew: S. Button

OMNI Equipment ID #(s): _____

PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

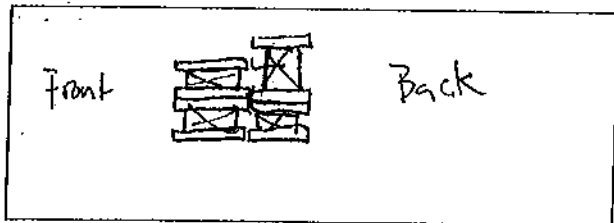
FAN: ON

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
40 min stirred	coals					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: closed @ 0 sec

FUEL LOADING: Done @ 40 sec

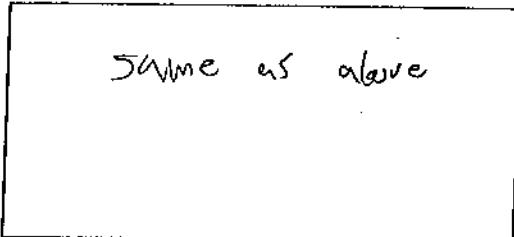
DOOR: closed @ 90 sec

PRIMARY AIR: Set @ 5 mph

OTHER: N/A

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

FAN: ON

Technician signature:

Date: 7/22/10

Supplemental Data EPA 5G/5H

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Date: 7/22/10

Run #: 5 Booth: 1

Test Crew: S. Button

Start Time: 12:49 Stop Time: 15:29

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: ∅

Final: ∅

Final: ∅

Calibrations: Span Gas CO₂: 10.14 O₂: 17.00 CO: 2.518 CO₂(DT): 1.22

	(N ₂) Span	N ₂ Span	(N ₂) Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	12:00	12:00	16:30	16:30			
O ₂	0.00	16.95	-0.11	16.88			
CO ₂	0.00	10.11	0.00	10.05			
CO	0.00	2.522	0.005	2.508			
CO ₂ (DT)	0.00	1.2	0.00	1.2			

Stack Diameter (inches): 6"

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

Scale Audit (lbs): Pretest: 10 lbs Post Test: 10 lbs

Induced Draft: ∅ %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 7/19/10 Initials: SB

	Initial	Middle	Ending
Pb (in/Hg)	30.10	30.11	30.12
Room Temp (°F)	79	81	85

Technician signature: [Signature] Date: 7/22/10

Model: Oakleaf
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 6

Wood Heater Calculation Data EPA Method 5H

Run	6
Manufacturer:	Harman Home Heating
Model/Tracing No.:	Oak Leaf, 1573
Test Date:	22-Jul-10
Project Number:	135-S-28-8.3

Burn Rate (dry kg/hour) = 2.07

Emission Rate (grams/hour) = 5.78

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)	Qf-new gas (scf/minute)	Qf by tracer gas (scf/minute)	1/Qf by tracer gas (Si)	Volume Sampled (gscf)	Si * Volume Sampled	Proportional Sample Rate	dH new
10	13.5	1.02	13.2	141.1	16.4	0.061	3.991	0.243	101.2	0.288
20	13.6	1.01	15.0	139.9	11.5	0.087	2.897	0.251	104.5	0.358
30	13.7	1.01	15.3	139.0	12.6	0.079	2.897	0.220	95.6	0.417
40	13.7	0.99	15.5	139.1	13.2	0.078	3.221	0.236	98.5	0.367
50	13.5	0.99	13.6	140.8	13.6	0.073	3.211	0.244	101.8	0.416
60	13.5	1.01	8.7	141.3	13.4	0.075	3.179	0.233	97.2	0.400
70	13.4	1.01	7.6	141.5	13.0	0.077	2.150	0.235	98.0	0.375
80	13.4	1.00	7.8	141.6	13.2	0.076	3.063	0.237	98.0	0.366
90	13.4	0.99	6.7	141.8	13.4	0.075	3.144	0.238	98.4	0.399
100	13.4	0.99	8.3	141.3	13.4	0.075	3.315	0.247	103.1	0.398
110	13.4	0.99	7.4	142.1	13.9	0.072	3.632	0.249	103.9	0.431
120	13.4	0.97	7.8	142.3	13.9	0.072	3.295	0.237	98.8	0.430
130	13.4	0.98	6.8	142.4	15.6	0.064	3.277	0.236	99.4	0.388
140	13.3	0.97	1.9	142.5	14.2	0.070	3.745	0.241	100.3	0.450
Averages/Totals										
	13.5	0.99	9.7	141.2	13.7	0.074	3.266	7.558	100.0	0.406

Woodstove Type
Yhoc-1-car,2-incat, 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)

Analytical Data
Qf by carbon balance (avg dscf/minute)

Emission Results
Probe/Front Wash (mg)
Front Filter (mg)
Impinger PM (mg)
Back Filter (mg)
Total Weight (mg)
Cs (g/dscf)
ER (g/hour)

2	0.000
1.32	47.588
13	90.12
22.18	86.73
18.15	0.42
	45.720
	9.66
	168.1
	118.1
	130.4
	98.2
	454.8
	0.0099
	5.78

Wood Heater Test Data EPA Method 5H

Run Number **6**

Manufacturer:	Harman Home Heating	Sample Rate Control Module Number:	322
Stove Model, Tracking Number:	Oak Leaf, 1573	Test Meter Y:	0.997
Stove Type (cat, ncat, or pellet):	ncat	Orifice dH@:	1.938
Project Number:	135-S-26-8.3	Pitot Tube Cp:	0.99
Test Date:	22-Jul-10	Average Barometric Pressure:	30.12
Test Start Time:	18:01	Average Fuel Moisture (dry basis %):	22.18
Recording Interval (minutes):	10	OMNI Equipment Numbers:	
Total Sampling Time (minutes):	140		

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	0.036	0.042	0.042	0.038	0.030	0.040	0.038	0.036	H2O	141.1
Initial Temp	108	108	108	108	108	108	108	108	oF	scf/minute

Initial/Assumed Values				
Dilution Tunnel	MW (lb/lb-mol)	28.56	Ambient CO2 (%)	0.034
	H2O (%)	4.00	Preferred Initial Sampling Rate (scf/minute)	0.43

Flue Gas	
Impinger Liquid, Vic (g)	88.6
Volume of Water Vapor, Vw(std) (ft3)	4.65
Moisture Content, Bws	0.092

Signature/Date: *[Signature]* 8/12/10
 Post-Test Leak Check: .002 @ -12" cfm@7Hg

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	0.000		0.61		84	-2	62	226	13.0		-0.050	12.9	7.8	0.50	313	12.5	656	252	230	406	445	378	108	0.038	-0.53	0.950	84	
10	4.132	0.413	0.30	101.2	83	-2	60	226	11.6	-1.4	-0.060	7.8	12.8	0.10	383	8.6	422	249	242	383	415	342	113	0.038	-0.52	1.075	83	
20	7.118	0.299	0.35	104.6	84	-1	64	228	9.5	-2.1	-0.070	4.1	16.0	1.40	383	6.5	505	242	291	371	404	363	123	0.038	-0.54	1.475	84	
30	10.124	0.301	0.42	85.8	84	-1	60	227	7.3	-2.2	-0.070	3.8	16.0	1.90	502	8.3	602	237	345	381	416	396	131	0.038	-0.53	1.600	85	
40	13.481	0.334	0.39	98.5	86	-1	59	234	5.6	-1.7	-0.070	8.3	12.1	1.30	495	8.2	644	232	370	401	441	418	130	0.038	-0.53	1.175	85	
50	16.900	0.334	0.42	101.8	85	-3	59	229	4.5	-1.1	-0.070	12.1	8.2	1.38	375	11.2	669	229	328	417	467	422	116	0.038	-0.54	0.825	85	
60	20.099	0.330	0.40	97.2	88	-3	61	229	3.8	-0.7	-0.050	11.6	8.9	0.60	351	11.2	611	230	276	420	468	401	112	0.038	-0.54	0.875	85	
70	23.388	0.329	0.38	98.0	88	-4	62	224	3.2	-0.6	-0.050	11.6	9.2	0.10	343	11.5	610	230	251	428	481	396	110	0.038	-0.53	0.875	85	
80	26.603	0.322	0.39	99.0	89	-6	63	226	2.8	-0.6	-0.050	12.0	8.8	0.20	333	11.8	594	232	242	438	452	391	109	0.038	-0.53	0.850	85	
90	29.890	0.329	0.40	99.4	89	-6	63	223	2.1	-0.5	-0.050	12.5	8.4	0.30	329	12.1	584	233	236	444	448	389	103	0.038	-0.54	0.825	84	
100	33.356	0.347	0.40	103.1	88	-5	63	224	1.5	-0.6	-0.050	12.9	7.9	0.40	323	12.6	583	235	230	441	442	386	107	0.038	-0.54	0.775	84	
110	36.833	0.348	0.43	103.9	87	-8	65	227	1.0	-0.5	-0.050	13.6	7.1	0.60	311	13.5	581	236	223	433	442	383	105	0.038	-0.54	0.725	83	
120	40.285	0.343	0.43	98.8	88	-7	67	229	0.5	-0.5	-0.050	14.2	6.6	0.70	301	14.1	585	236	214	428	439	380	104	0.038	-0.54	0.675	83	
130	43.684	0.342	0.54	98.4	89	-8	67	229	0.1	-0.4	-0.050	14.8	5.9	0.60	296	15.5	537	235	206	421	432	366	103	0.038	-0.54	0.675	82	
140	47.598	0.391	0.45	100.3	89	-8	67	228	0.0	-0.1	-0.050	15.5	5.2	0.70	281	16.8	500	236	197	410	418	352	102	0.038	-0.54	0.550	82	
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)	
140	47.598	0.340	0.42	100.00	86.7	-1.00	62.80	227.13	13.00	-0.93	-0.06	11.18	9.40	0.71	354.60	11.50	572.20	236.27	258.73	414.53	439.20	26	112.07	0.04	-0.54	0.93	83.93	

Final Laboratory Report - Method 5H Dilution Tunnel Particulate Calculations

Client Name: Harman Home Heating Equipment Numbers: _____ Run No.: 6
 Model: Oak Leaf Date: 07/22/10
 Project No.: 135-S-26-8.3
 Tracking No.: 1573

PARTICULATE COMPONENTS

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	D011	742.0	623.9		118.1
B. Rear filter catch	Filter	J011	187.8	149.6		38.2
C. Rinse of probe and filter assembly (FRONT)	Acetone	200	113182.7	113073.6	0.0113	106.8
D. Rinse of Impinger Set	Distilled Water	300	176809.5	176745.2	0.0000	64.3
E. Rinse of Impinger Set	Dichloromethane	150	144634.5	144568.1	0.0020	66.1
F. Rinse of filter assembly and gas train (BACK)	Acetone	175	106459.8	106396.6	0.0113	61.2
Total Particulate, mg :						454.8

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	623.1	545.2	77.9	
2	659.1	653.6	5.5	
3	560.9	560.5	0.4	
4	751.0	736.2	14.8	
		TOTAL, g:	98.6	

Analyst: [Signature]

Date: 7/28/10
SB

MFG: Harman
Model #: Oak Leaf

Run #: 6

Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

Run Information

Run Number: 6
Date / Start Time: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

Tracking Number: 1573

Manufacturer: Harman
Model: Oak Leaf

Project Number: 135-S-26-8.3
Technician: SJB

Fuel Load (lbs): 13.00
Coal Bed Range (lbs): 2.60 to 3.25
Actual Coal Bed (lbs): 2.6

Test Booth: 1

Data Collection Program: 5G3_dual 47 mm_Logger_01_19_09.vi

Velocity Traverse Data

	Pt. 1	Pt. 2	Pt. 3	Pt. 4	Pt. 5	Pt. 6	Pt. 7	Pt. 8
Initial dp	.036	.042	.038	.030	.040	.036	.036	.036
Initial Temp	108	108	108	108	108	108	108	108

Barometric Pressure	Begin	Middle	End	Avg
	30.12	30.12	30.12	30.12

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29
Dilution Tunnel MW(wet): 28.56
Dilution Tunnel H2O: 4
Dilution Tunnel Static: .56
Pitot Tube Cp: .99

Tunnel Velocity: 13.43
Initial Tunnel Flow: 141.1
Average Tunnel Flow: 140.78
Tunnel Area: 0.1963
Post-Test Leak Check-A: .001 @ 18.5"
Post-Test Leak Check-B: .000 @ 11.9"

ft./sec: Fuel Consumed: 13 lbs
scfm: Firebox Surface Temp Change: 9.8
scfm: Run Time: 140 Minutes
ft²: Fuel Moisture (dry basis): 22.18 %
cfm@" Hg
cfm@" Hg

Meter Box "Y" Factor A: 1.001
Filter Holder # A:
Total Particulate A: 13.4 mg
Avg Prop Rate A: 100.461

Meter Box "Y" Factor B: .997
Filter Holder # B:
Total Particulate B: 14.2 mg
Avg Prop Rate B: 100.582

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1 of 7

Signature/Date: *[Signature]*

7/18/10

MFG: Harman
Model #: Oak Leaf

Run #: 6

Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

Emissions Results

Burn Rate	2.07	kg/hr dry
Adjusted Emissions A	7.78	grams/hour
Adjusted Emissions B	7.62	grams/hour
Upper Limit	27833	grams/hour
Average Emissions	77083	grams/hour
Lower Limit	222	grams/hour

Particulate Concentration (dry standard)	0.00066	grams/dscf
Particulate Emission Rate	5.75	grams/hour
Total Sample Volume (Standard Conditions) Vm	19.735	DSCF
Total Particulates - m	13.4	mg
Average Delta P	1.01	Inches H2O
Total Sample Volume Vm	20.531	Cubic Feet
Average Gas Meter Temperature	94.90	Degrees Fahrenheit
Average Tunnel Temp	112.10	Degrees Fahrenheit
Average Delta P	0.038	Inches H2O
Average Gas Velocity in Dilution Tunnel w	13.46	Feet/Second
Average Gas Flow Rate in Dilution Tunnel Qsd	8474.69	DSCF/Hour
Total Time	140	Minutes

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2 of 7

Signature/Date:

[Signature]
7/22/10

MFG: Harman
Model #: Oak Leaf

Run #: 6

Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

Field Data

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

PRE-BURN FUEL

MOISTURE CONTENT (MEASUREMENT) %

AVG PRE-BURN LOAD MOISTURE %

MOISTURE CONTENT (MEASUREMENT) %

ACTUAL READING %

CALIBRATION VALUE (1) %

CALIBRATION VALUE (2) %

CALIBRATION VALUE (3) %

CALIBRATION VALUE (4) %

CALIBRATION VALUE (5) %

MOISTURE READING

PIECE 1 IN

PIECE 2 IN

PIECE 3 IN

PIECE 4 IN

PIECE 5 IN

PIECE 6 IN

PIECE 7 IN

PIECE 8 IN

PIECE 9 IN

PIECE 10 IN

PIECE 11 IN

PIECE 12 IN

PIECE 13 IN

PIECE 14 IN

PIECE 15 IN

PIECE 16 IN

PIECE 17 IN

PIECE 18 IN

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PIECE 90 IN

PIECE 91 IN

PIECE 92 IN

PIECE 93 IN

PIECE 94 IN

PIECE 95 IN

PIECE 96 IN

PIECE 97 IN

PIECE 98 IN

PIECE 99 IN

PIECE 100 IN

TIME (24 HR) ROOM TEMPERATURE (F)

TEST FUEL

FUEL PIECE LENGTH IN

FUEL PIECE QUANTITY PIECES

ACTUAL FUEL LOAD LBS

ACTUAL FUEL LOAD PIECES

ACTUAL FUEL LOAD LBS

ACTUAL FUEL LOAD PIECES

ACTUAL FUEL LOAD LBS

MOISTURE CONTENT METER - DRY BASIS

PIECE	READING	TYPE	PIECE	READING	TYPE
1	22.9	2x4	6	0	
2	23.2	2x4	7	0	
3	20.3	2x4	8	0	
4	20.2	4x4	9	0	
5	22.7	2x4	10	0	
	0			0	

TIME (24 HR CLOCK) ROOM TEMPERATURE (F)

AVERAGE FUEL LOAD MOISTURE

14 Pieces @ 7.5'

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3 of 7

Signature/Date:

[Signature]
7/22/10

MFG: Harman
Model #: Oak Leaf

Run #: 6

Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

Notes

[Empty rectangular box for notes]

OMNI Test Laboratories Inc.

4 of 7

Signature/Date:

[Handwritten Signature]

7/22/10

MFG: Harman
Model #: Oak Leaf

Run #: 6


Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB)5:00 PM (TR) 6:01 PM

Preburn ET (min)	Scale (lbs)	Weight Change	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int (oF)	Avg Surf (oF)	Stack (oF)	AMB (oF)	Draft (in-H2O)	Cat Temp (oF)	O2 (%)	CO2 (%)	CO (%)	CO Ratio
10	-2.611	541	247	248	350	378	3218	352.9	478	84	-0.062	3218	19.19	2.02	0.22	9.35	
20	-2.113	600	250	270	364	406	3218	377.9	428	83	-0.056	3218	21.50	0.15	0.00	1.13	
30	-1.854	854	251	277	375	432	3218	397.9	446	84	-0.055	3218	8.60	12.00	1.26	9.52	
40	-1.389	649	254	287	398	451	3218	407.7	382	83	-0.048	3218	17.00	3.95	0.27	8.47	
50	-0.322	585	251	281	408	454	3218	381.5	385	83	-0.042	3218	13.10	7.49	0.52	6.45	
60	-0.396	559	252	232	407	446	3218	379.0	315	84	-0.039	3218	13.20	7.82	0.46	5.74	

OMNI Test Laboratories Inc.

5 of 7

Signature/Date:


7/22/10

MFG: Harman
Model #: Oak Leaf

Run #: 6

Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

Elapsed Time (min)	Gas Meter-A (ft3)	Sample Rate (cfm)	Office dH	Meter (deg F)	Meter Vac (in-Hg)	Dil Tun (oF)	Dil Tunn dP	Pro Rate (10%)	Scale Reading (lbs)	Weight Change (lbs)	FB Top (oF)	FB Bot (oF)	FB Back (oF)	FB Left (oF)	FB Right (oF)	FB Int. (oF)	Avg Surf (oF)	Stack (oF)	Filter (oF)	Imping Exit (oF)	AMB (oF)	Draft (in-H2O)	Cat Temp (oF)
0	0.000	NaN	0.63	90	0.83	107	0.038	0.0	13.1	13.08	556	252	230	406	445	3218	377.9	313	84	3218	84	-0.041	3218
10	1.467	0.147	1.05	91	0.84	113	0.038	100.7	11.5	-1.51	422	249	242	363	415	3218	342.3	383	84	3218	83	-0.054	3218
20	2.933	0.147	1.05	92	0.85	123	0.038	100.6	9.5	-2.03	505	242	291	371	404	3218	362.5	455	85	3218	84	-0.062	3218
30	4.396	0.146	1.03	93	0.88	131	0.038	100.3	7.3	-2.21	502	237	345	381	415	3218	386.4	502	85	3218	85	-0.066	3218
40	5.856	0.146	1.04	94	0.87	130	0.038	100.1	5.6	-1.73	644	232	370	401	441	3218	417.7	495	85	3218	85	-0.059	3218
50	7.322	0.147	1.04	95	0.87	116	0.038	100.4	4.5	-1.13	689	229	328	417	467	3218	421.9	375	85	3218	85	-0.047	3218
60	8.787	0.147	1.04	96	0.87	112	0.038	100.3	3.3	-0.73	611	230	276	420	468	3218	401.0	351	85	3218	85	-0.046	3218
70	10.254	0.147	1.04	97	0.87	110	0.038	100.3	3.2	-0.59	610	230	251	426	461	3218	395.5	343	84	3218	85	-0.045	3218
80	11.722	0.147	1.04	97	0.88	109	0.038	100.5	2.6	-0.57	594	232	242	436	452	3218	391.0	333	84	3218	85	-0.044	3218
90	13.190	0.147	1.04	97	0.86	108	0.038	100.5	2.1	-0.52	584	233	236	444	446	3218	388.5	323	84	3218	85	-0.043	3218
100	14.658	0.147	1.04	97	0.88	107	0.038	100.5	1.5	-0.58	563	235	230	441	442	3218	386.4	323	83	3218	84	-0.043	3218
110	16.128	0.147	1.04	97	0.88	105	0.038	100.6	1.0	-0.51	581	238	223	433	442	3218	383.2	311	83	3218	83	-0.041	3218
120	17.597	0.147	1.03	97	0.89	104	0.038	100.6	0.5	-0.49	585	236	214	428	439	3218	380.4	301	83	3218	83	-0.040	3218
130	19.064	0.147	1.03	97	0.90	103	0.038	100.5	0.1	-0.37	537	235	206	421	432	3218	366.3	296	83	3218	82	-0.039	3218
140	20.531	0.147	1.03	96	0.90	102	0.038	100.5	0.0	-0.14	500	236	197	410	418	3218	352.1	281	83	3218	82	-0.037	3218
AVG	NA	NA	1.01	95.36	0.87	111.93	0.04	93.26	3.91	NA	NA	235.36	259.92	418.79	440.93	3218.00	367.21	NA	94.14	3218.00	84.00	-0.05	3218.00

6 of 7

Signature/Date:

[Handwritten Signature]
7/29/10

OMNI Test Laboratories Inc.

MFG: Harman
Model #: Oak Leaf

Run #: 6

Project #: 135-S-26-8.3
Run Date: 7/22/10 - (PB) 5:00 PM (TR) 6:01 PM

	Box B ET (min)	Gas Meter-B (ft3)	Sample Rate (cfm)	Orifice dH	Meter (deg F)	Meter Vac (in-Hg)	Pro Rate (10%)	Filter (oF)	Imping Exit (oF)	Box B dP (in-H2O)
0	0.000	NA	0.88	93	1.0	0.0	86	3218	-0.53	
10	1.597	0.160	1.06	93	1.0	100.8	87	3218	-0.53	
20	3.202	0.160	1.05	94	1.0	100.9	88	3218	-0.55	
30	4.801	0.160	1.04	95	1.1	100.3	90	3218	-0.55	
40	6.397	0.160	1.05	97	1.0	100.1	90	3218	-0.55	
50	8.001	0.160	1.05	98	1.0	100.4	88	3218	-0.55	
60	9.606	0.161	1.05	99	1.0	100.4	87	3218	-0.55	
70	11.214	0.161	1.05	99	1.0	100.5	87	3218	-0.55	
80	12.820	0.161	1.05	99	1.0	100.5	86	3218	-0.55	
90	14.427	0.161	1.05	99	1.0	100.6	86	3218	-0.55	
100	16.036	0.161	1.05	99	1.0	100.6	86	3218	-0.55	
110	17.645	0.161	1.05	99	1.0	100.7	86	3218	-0.55	
120	19.254	0.161	1.04	99	1.0	100.8	86	3218	-0.55	
130	20.862	0.161	1.05	98	1.1	100.7	86	3218	-0.55	
140	22.469	0.161	1.05	98	1.1	100.8	86	3218	-0.55	
AVG	NA	0.16	1.05	97.57	1.02	100.58	87.07	3218.00	-0.55	

Signature/Date:

[Handwritten Signature]
7/30/10

Run Notes

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Run #: 6

Date: 7/22/10

Test Crew: S. Buttan

OMNI Equipment ID #(s): _____

PREBURN

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

PRIMARY:

Fully open

SECONDARY: Fixed

TERTIARY: N/A

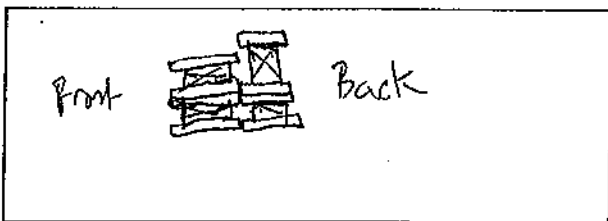
FAN: ON

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
35min	Started coals					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: closed @ 0 sec

FUEL LOADING: Done @ 40 sec

DOOR: closed @ 90 sec

PRIMARY AIR: set @ 0 sec

OTHER: N/A

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

PRIMARY:

Fully open

SECONDARY: Fixed

TERTIARY: N/A

FAN: ON

Technician signature: [Signature]

Date: 7/22/10

Supplemental Data EPA 5G/5H

Client: Harman Home Heating

Model: Oak Leaf

Project #: 135-S-26-8.3

Tracking #: 1573

Date: 7/22/10

Run #: 6

Booth: 1

Test Crew: S. Button

Start Time: 18:01

Stop Time: 20:21

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: ∅

Final: ∅

Final: ∅

Calibrations: Span Gas

CO₂: 10.14

O₂: 17.00

CO: 2.518

CO₂(DT): 1.22

	<u>N₂</u> Span	<u>N₂</u> Span	<u>N₂</u> Span	<u>N₂</u> Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>17:05</u>	<u>17:05</u>	<u>21:00</u>	<u>21:00</u>			
O ₂	<u>0.00</u>	<u>17.08</u>	<u>0.10</u>	<u>16.92</u>			
CO ₂	<u>0.00</u>	<u>10.11</u>	<u>0.00</u>	<u>10.09</u>			
CO	<u>0.001</u>	<u>2.525</u>	<u>0.008</u>	<u>2.512</u>			
CO ₂ (DT)	<u>0.0</u>	<u>1.2</u>	<u>0.00</u>	<u>1.2</u>			

Stack Diameter (inches): 6"

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

Scale Audit (lbs): Pretest: 10 lb Post Test: 10 lb

Induced Draft: ∅ %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 7/19/10 Initials: SB

	Initial	Middle	Ending
Pb (in/Hg)	<u>30.12</u>	<u>30.12</u>	<u>30.12</u>
Room Temp (°F)	<u>84</u>	<u>85</u>	<u>82</u>

Technician signature: [Signature] Date: 7/22/10

Section 5

Sampling Procedures and Test Results

INTRODUCTION

Harman Home Heating retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the Oakleaf wood stove. The Oakleaf wood stove is a non-catalytic, freestanding, radiant-type room heater. The firebox is constructed of cast iron. Usable firebox volume was measured to be 1.7 cubic feet and the stove is vented through a 6-inch diameter flue collar located at the top of the unit.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The unit was received in good condition and logged in on July 19, 2010, then assigned and labeled with *OMNI* ID #1573. *OMNI* representative Sebastian Button conducted the certification testing and completed all testing by July 22, 2010. The EPA was notified of the testing dates in a letter dated July 19, 2010. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Larry Gross of Harman Home Heating and is on file at *OMNI*'s testing facility.

The Oakleaf wood stove was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 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 four test runs included in the results indicate a particulate emission level of 2.2 grams per hour. Run #4, a fan confirmation test run, was performed and was not used in the weighted average emission results. Run #2 was exempted from the weighted average emissions results because the fire went out during testing. 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 Oakleaf results are within the emission limit of 7.5 grams per hour for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

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

- “DO NOT TAMPER” labels were placed on the door and on 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.
- “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. The results in this report are limited to the item submitted.

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5H Emissions (g/hr)
1	0.82	1.68
3	0.99	1.12
5	1.67	2.57
6	2.07	5.78
Weighted particulate emission average of four test runs: 2.2 grams per hour.		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	70	74	30.13	30.19	<50	<50
3	72	76	30.04	30.02	<50	<50
5	79	83	30.10	30.12	<50	<50
6	84	82	30.12	30.12	<50	<50

Table 1.3.1 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight in lbs)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lbs)
1	7.9	22.9	2.6
3	7.6	23.3	2.5
5	9.3	23.2	2.3
6	8.7	23.5	2.6

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft ³)	Fuel Loading Density Wet Basis (lbs/ft ³)	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	10.9	1.7	6.41	21.0	15.5	3	1
3	10.8	1.7	6.35	19.3	15.5	3	1
5	11.9	1.7	7.00	21.1	15.5	3	1
6	13.0	1.7	7.65	22.2	15.5	3	1

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)	Temperature (°F)
1	300	13.3	147.1	82.5
3	250	13.2	144.5	85.1
5	160	13.2	140.4	104.1
6	140	13.5	141.2	112.1

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average ^a	Ending Surface Temperature Average ^a	Surface Delta T ^b
1	298	199	99
3	311	237	74
5	393	327	66
6	378	352	26

a. All temperatures are in degrees F.
 b. Represents the difference between beginning and ending average surface temperatures.

Table 1.6 – Pretest Configuration

Run	Combustion Air (in)	Fuel Added	Fuel Removed	Time (min)
1	Fully Closed	7.9 lbs at start; no addition; coal bed 2.6 lbs	0.0	80
3	3/8" Open	7.6 lbs at start; no addition; coal bed 2.5 lbs	0.0	60
5	1-3/4" Open	9.3 lbs at start; no addition; coal bed 2.3 lbs	0.0	60
6	Fully Open	8.7 lbs at start; no addition; coal bed 2.6 lbs	0.0	60

Table 1.7 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (H ₂ O)	Primary Air Setting (in)	Run Time (min)	Average Draft (H ₂ O)
1	0.82	0	Fully Closed	300	-0.04
3	0.99	0	3/8" Open	250	-0.04
5	1.67	0	1-3/4" Open	160	-0.08
6	2.07	0	Fully Open	140	-0.06

Table 1.8 – Test Configurations

Run	Five-Minute Startup	Combustion Air
1	<u>Bypass</u> : Closed at 0 seconds. <u>Fuel Loading</u> : Completed by 45 seconds. <u>Door</u> : Closed at 90 seconds. <u>Primary Air</u> : Set at 5 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Fully Closed
3	<u>Bypass</u> : Closed at 0 seconds. <u>Fuel Loading</u> : Completed by 40 seconds. <u>Door</u> : Closed at 90 seconds. <u>Primary Air</u> : Set at 5 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	3/8" Open
5	<u>Bypass</u> : Closed at 0 seconds. <u>Fuel Loading</u> : Completed by 40 seconds. <u>Door</u> : Closed at 90 seconds. <u>Primary Air</u> : Set at 5 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On.	1-3/4" Open
6	<u>Bypass</u> : Closed at 0 seconds. <u>Fuel Loading</u> : Completed by 40 seconds. <u>Door</u> : Closed at 90 seconds. <u>Primary Air</u> : Set at 0 seconds. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On.	Fully Open

TEST RESULTS AND DISCUSSION

A total of six test runs were performed on the Oakleaf wood stove. Four test runs were conducted in the following categories and included in the weighted average emission level results: two in the 0.80 to 1.25 kg/hr dry category; one in the 1.25 to 1.90 kg/hr dry category; and one at maximum.

The weighted particulate emission level was measured to be **2.2 g/hr**.

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