

# Certification Test Report

## Harman Home Heating Freestanding Wood Stove

Model: TL2.6

**Prepared for:** Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

**Prepared by:** OMNI-Test Laboratories, Inc.  
13327 NE Airport Way  
Portland, OR 97230  
(503) 643-3788

**Test Period:** June 24-28, 2011

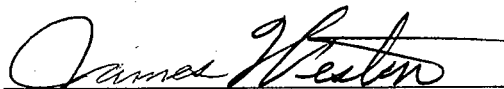
**Report Date:** July 2011


**Report Number:** 135-S-30-8.3

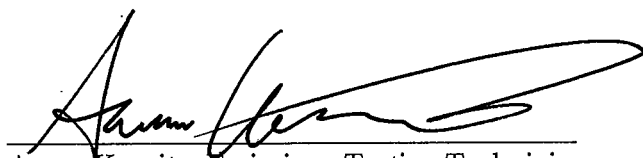
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## AUTHORIZED SIGNATORIES

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

  
James Weston, P.E., President  
OMNI-Test Laboratories, Inc.

  
Sebastian Button, Emissions Testing Manager  
OMNI-Test Laboratories, Inc.

  
Aaron Kravitz, Emissions Testing Technician  
OMNI-Test Laboratories, Inc.

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Model: TL2.6  
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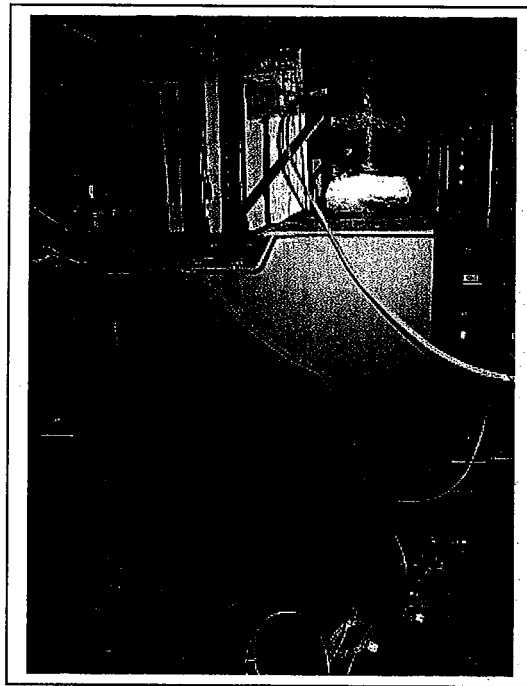
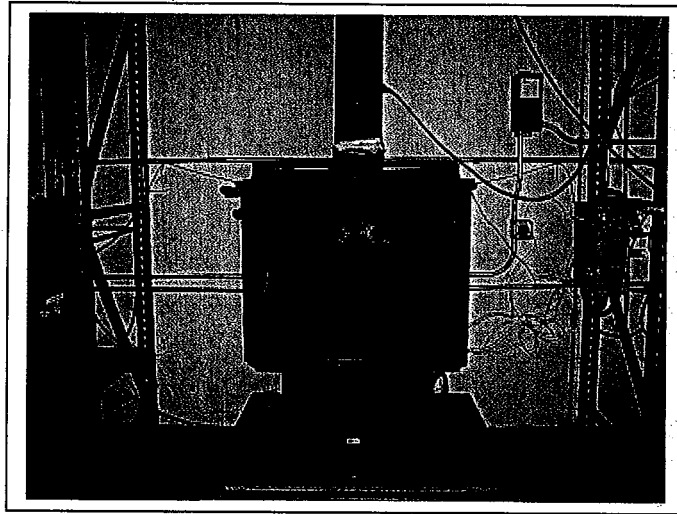
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# Section 1

## Fuel Photographs/Appliance Description/Drawings

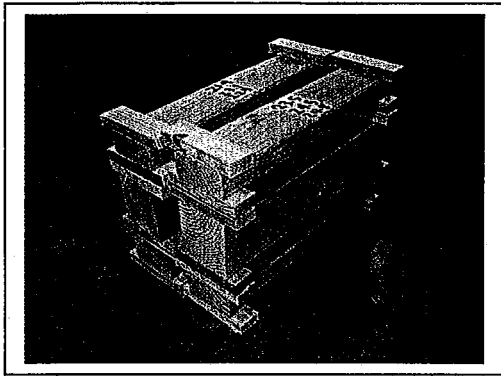
Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

**Harman Home Heating**  
**TL2.6**  
**Test Dates: June 24-28, 2011**

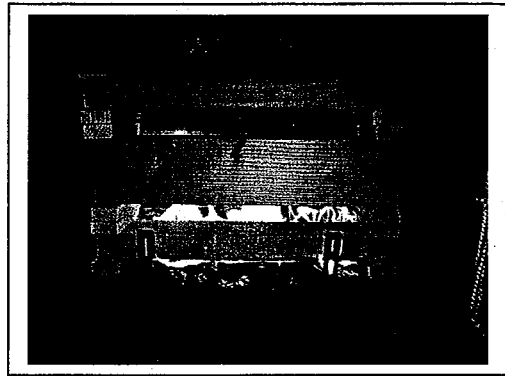


## Harman Home Heating TL2.6

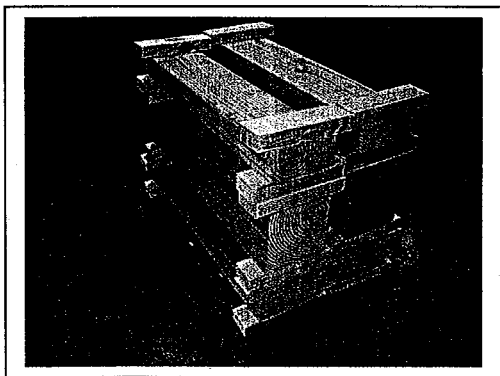
**Run 1 – Fuel**



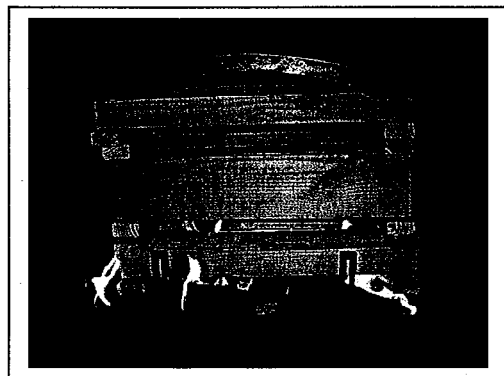
**Run 1 – Newly Loaded Stove**



**Run 2 – Fuel**

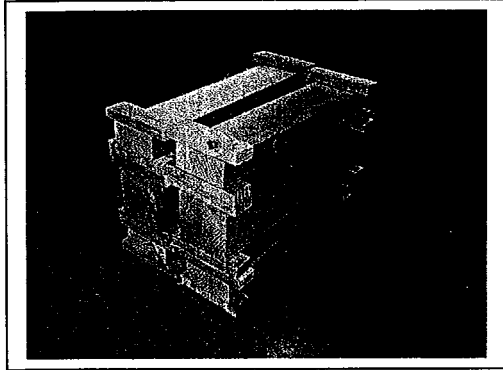


**Run 2 – Newly Loaded Stove**

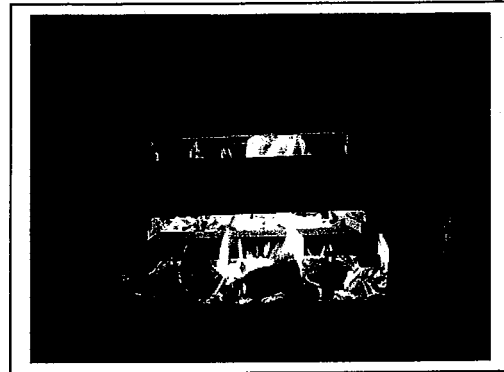


## Harman Home Heating TL2.6

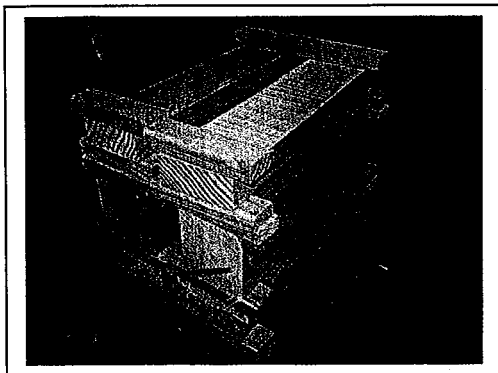
**Run 3 – Fuel**



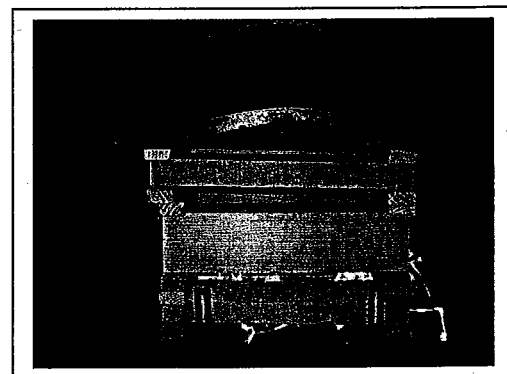
**Run 3 – Newly Loaded Stove**



**Run 4 – Fuel**

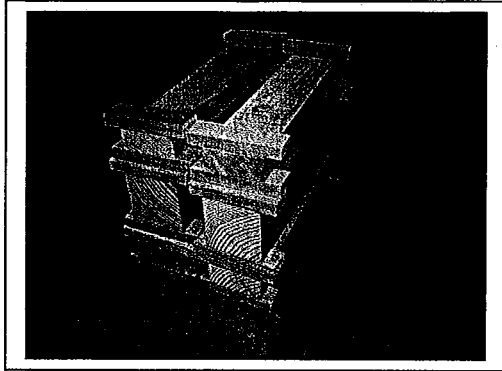


**Run 4 – Newly Loaded Stove**

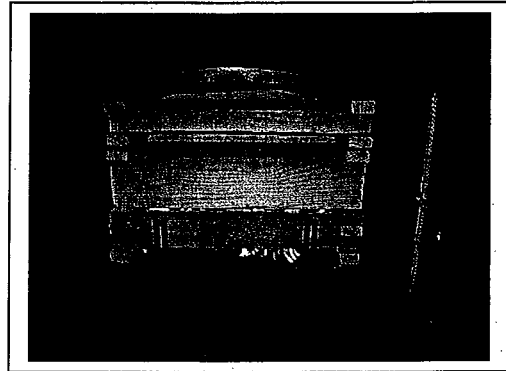


## Harman Home Heating TL2.6

**Run 5 – Fuel**



**Run 5 – Newly Loaded Stove**





## WOOD HEATER DESCRIPTION

**Appliance Manufacturer:** Harman Home Heating

**Wood Stove Model:** TL2.6

**Type:** Freestanding, radiant-type room heater

## WOOD HEATER INFORMATION

**Materials of Construction:** The unit is constructed primarily of mild steel and cast iron. The firebox is lined with refractory of various measurements. The feed door has a 16.5" by 12.5" glass panel and 0.375" rope gasket.

**Air Introduction System:** Air enters the firebox through an opening located at the rear/bottom of the appliance. Secondary air enters the appliance through the bottom/back and is channeled internally to secondary shoe brick and combustion package in the rear of the firebox.

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

**Combustor:** N/A.

**Internal Baffles:** A bypass damper is mounted in the upper portion of the firebox for use at startup. When closed, air is forced through the combustion package in the rear of the firebox.

**Other Features:** Optional fan accessory.

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

## WOOD HEATER OPERATING INSTRUCTIONS

**Specific Written Instructions:** See Section 3 of this report. All markings and instruction materials were reviewed for content prior to printing.

Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Hatifax, PA 17032

## Section 4

### Test Data by Run



Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

## Run 1

## Wood Heater Test Data - EPA Method 5G

**Manufacturer:** Herman  
**Model:** TL 2.6  
**Project No.:** 135-S-30-8.3  
**Tracking No.:** 1695  
**Run:** 1  
**Test Date:** 06/28/11

<b>Burn Rate</b>	<b>2.75 kg/hr dry</b>
<b>Average Tunnel Temperature</b>	<b>121 degrees Fahrenheit</b>
<b>Average Gas Velocity in Dilution Tunnel - vs</b>	<b>14.5 feet/second</b>
<b>Average Gas Flow Rate in Dilution Tunnel - Qsd</b>	<b>5999.6 dscf/hour</b>
<b>Average Delta p</b>	<b>0.044 inches H2O</b>
<b>Average Delta H</b>	<b>0.97 inches H2O</b>
<b>Total Time of Test</b>	<b>130 minutes</b>

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
<b>Total Sample Volume - Vm</b>	19.69 cubic feet	18.32 cubic feet	21.08 cubic feet
<b>Average Gas Meter Temperature</b>	82 degrees Fahrenheit	75 degrees Fahrenheit	88 degrees Fahrenheit
<b>Total Sample Volume (Standard Conditions) - Vmstd</b>	19.6 dscf	18.2 dscf	21.0 dscf
<b>Total Particulates - mn</b>		0.4 mg	0.5 mg
<b>Particulate Concentration (dry-standard)</b>	0.00002 grams/dscf	0.00002 grams/dscf	0.00002 grams/dscf
<b>Particulate Emission Rate</b>	0.21 grams/hour	0.20 grams/hour	0.21 grams/hour
<b>Adjusted Emissions</b>	0.49 grams/hour	0.47 grams/hour	0.51 grams/hour
<b>Difference from Average</b>		0.02 grams/hour	0.02 grams/hour
<b>7.5% of the average emission rate</b>	0.04		
<b>Weighted Average Emission Rate Limit</b>	4.10 grams/hour		
<b>7.5% of the weighted average emission rate limit</b>	0.31		
Results Are Acceptable			

### Wood Heater Test Data - EPA Method 5G

Run: 1  
 Manufacturer: Harman  
 Model: TL 2.6  
 Tracking No.: 1695  
 Project No.: 135-S-30-8.3  
 Test Date: 26-Jun-11  
 Beginning Clock Time: 11:43  
 Recording Interval: 10 min.  
 Total Sampling Time: 130 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.032	0.048	0.052	0.044	0.048	0.040	0.044	0.040
Initial Temp.	125	125	125	125	125	125	125	125

OMNI Equipment Numbers: 23, 131, 132, 141, 183, 185, 209, 265, 291, 296, 335, 336, 343, 410, 420, 431, 455, 507

PM Control Module: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole  
 Dilution Tunnel H2O: 4.00 percent  
 Dilution Tunnel Static: -0.560 "H2O  
 Pitot Tube Cp: 0.99  
 Meter Box Y Factor: 0.999 (1) 1.023 (2)  
 Barometric Pressure: Begin Middle End Average  
 30.16 30.16 30.14 30.15 "Hg

Signature/Date: *[Signature]* 7/14/11  
 Tunnel Velocity: 14.51 ft/sec.  
 Initial Tunnel Flow: 149.2 scfm  
 Average Tunnel Flow: 150.0 scfm  
 Tunnel Area: 0.1963 ft<sup>2</sup>  
 Post-Test Leak Check (1): 0.001 cfm@"Hg  
 Post-Test Leak Check (2): 0.007 cfm@"Hg  
 Fuel Moisture (dry basis %): 23.13  
 Total Particulate (1): 0.4  
 Total Particulate (2): 0.5

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, °F												Stack	
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter °F (1)	Meter °F (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)		Ambient
0	0.000	0.000	/	/	0.70	0.70	74	83	0.96	-0.3	125	0.044	/	/	16.2	/	385	342	345	376	413		372.2	227	79	79			77	-0.051
10	1.388	1.589	0.14	0.16	1.02	1.11	74	83	1.06	1.2	124	0.044	100	100	14.2	-2	331	337	374	383	411		367.2	240	83	84			77	-0.055
20	2.805	3.203	0.14	0.16	1.01	1.10	74	84	1.06	1.2	129	0.044	102	102	11.8	-2.4	368	323	405	389	402		377.4	250	84	86			77	-0.059
30	4.218	4.818	0.14	0.16	0.98	1.10	74	86	1.05	1.2	130	0.044	102	102	9.4	-2.4	401	323	401	418	411		390.8	261	85	86			77	-0.060
40	5.624	6.435	0.14	0.16	0.99	1.11	74	87	1.06	1.2	131	0.044	102	102	7.3	-2.1	434	332	404	453	427		410.0	269	85	86			77	-0.058
50	7.030	8.056	0.14	0.16	0.99	1.10	74	88	1.05	1.2	128	0.044	101	101	5.5	-1.8	463	351	384	476	442		423.2	245	85	86			77	-0.056
60	8.439	9.678	0.14	0.16	0.98	1.11	74	89	1.05	1.2	123	0.044	101	101	4.2	-1.3	469	374	350	486	455		426.8	233	84	85			77	-0.052
70	9.849	11.302	0.14	0.16	0.99	1.11	74	89	1.05	1.2	119	0.044	101	101	3.2	-1	450	390	309	481	455		417.0	222	84	85			77	-0.048
80	11.260	12.929	0.14	0.16	0.98	1.11	75	90	1.05	1.2	118	0.044	101	101	2.4	-0.8	436	395	276	470	447		404.8	218	84	84			78	-0.045
90	12.673	14.556	0.14	0.16	0.98	1.10	76	90	1.06	1.2	116	0.044	100	100	1.7	-0.7	425	399	255	458	446		396.6	223	84	84			78	-0.043
100	14.084	16.181	0.14	0.16	0.98	1.10	77	90	1.05	1.2	115	0.044	100	100	1.1	-0.6	414	401	245	450	452		392.4	217	84	85			78	-0.041
110	15.497	17.808	0.14	0.16	0.98	1.11	77	91	1.05	1.2	114	0.044	100	100	0.6	-0.5	395	399	234	441	454		384.6	216	84	85			79	-0.040
120	16.911	19.436	0.14	0.16	0.98	1.11	77	91	1.06	1.2	114	0.044	100	100	0.2	-0.4	385	404	227	432	453		380.2	215	84	86			79	-0.039
130	18.325	21.063	0.14	0.16	0.98	1.11	78	91	1.06	1.2	113	0.044	100	100	0.0	-0.2	390	417	224	430	451		382.4	214	84	86			79	-0.038
Avg/Total	18.325	21.063	0.14	0.16	0.97	1.08	75.14	88.00	/	/	121.36	0.044	100.73	100.67	/	/	/	/	/	/	/	/	10	/	83.79	84.79	#DIV/0!	#DIV/0!	/	-0.049

PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>1</u>
Model: <u>TL 2.6</u>		Train #: <u>A</u>
Project No.: <u>135-S-30-8.3</u>		Date: <u>06/24/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G123	121.6	121.2	0.4
B. Rear filter catch	Filter	G124	120.2	120.2	0.0
C. Probe catch	Probe	27	114272.5	114272.5	0.0

Total Particulate, mg :	0.4
-------------------------	-----

Component	Equations:
A. Front filter catch	$Final (mg) - Tare (mg) = Particulate, mg$
B. Rear filter catch	$Final (mg) - Tare (mg) = Particulate, mg$
C. Probe catch	$Final (mg) - Tare (mg) = Particulate, mg$

Analyst: *[Signature]*      Date: 7/5/14

PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: Harman      Equipment Numbers: 23, 343, 131, 291      Run #: 1  
 Model: TL 2,6      Train #: B  
 Project No.: 135-S-30-8.3      Date: 06/24/11  
 Tracking No.: 1695

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G125	119.2	119.0	0.2
B. Rear filter catch	Filter	G126	122.0	121.7	0.3
C. Probe catch	Probe	58	121958.5	121958.5	0.0

Total Particulate, mg :	0.5
-------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *Am No*      Date: 7/5/11



STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Project #: 135-S-30-8.3 Tracking #: 1695  
 Date: 6/24/11 Test Crew: A. Kravitz Run #: 1  
 OMNI Equipment ID #: 185.355.356

Preburn Test	Coal Bed				TEMPERATURES (oF)						Actual	
	Fuel Weight	Delta Weight	Stack Draft	Coal Bed	Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	15.7	-	-0.057		74	237	220	194	138	129	892	n/a
10	13	-2.7	-0.037		74	244	240	170	186	182	232	n/a
20	10	-3	-0.058		75	280	255	256	222	228	294	n/a
30	8	-2	-0.058		75	315	266	346	265	286	291	n/a
40	6.3	-1.7	-0.054		75	357	303	357	308	340	276	n/a
50	4.5	-1.8	-0.053		76	387	334	366	344	386	249	n/a
60	3.3	-1.2	-0.051		76	384	338	347	374	412	227	n/a

Technician signature: *[Signature]* Date: 7/15/11

### FUEL DATA

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3 Tracking #: 1695

Date: 6/29/11 Test Crew: A. Kravitz Run #: 1

OMNI Equipment ID #: 183, 185, 431

FUEL LOAD PREPARED BY: A. Kravitz

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

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:	Cal Value (1) = 12%	Actual Reading	<u>17.0</u>		
	Cal Value (2) = 22%	Actual Reading	<u>21.0</u>		
Piece	Length	Readings			Type
1	<u>8</u> ft	<u>23.7</u>	<u>24.1</u>	<u>20.0</u>	<u>2x4</u>
2	<u>8</u> ft	<u>16.8</u>	<u>24.2</u>	<u>23.7</u>	<u>2x4</u>
3	<u>8</u> ft				
Length of cut pieces: <u>8</u> inches		Pre-Burn Fuel Average Moisture: <u>22.08</u>			
Time (clock): <u>1038</u>		Room Temperature (F): <u>72</u>	Initials: <u>AK</u>		

TEST FUEL				
FUEL TYPE AND AMOUNT:	<u>2x4</u>	<u>4</u>	<u>4x4</u>	<u>2</u>
CALCULATED LOAD WEIGHT:	<u>16.3</u>	ACTUAL LOAD WEIGHT:	<u>17.7</u>	(2x4)
			<u>8.6</u>	(4x4)
FUEL PIECE LENGTH:	<u>16.5"</u>		<u>12.3</u>	Total
MOISTURE CONTENT (METER -- DRY BASIS)				
PIECE	READINGS			TYPE
1	<u>21.8</u>	<u>21.4</u>	<u>22.0</u>	<u>2x4 4x4</u>
2	<u>23.4</u>	<u>22.4</u>	<u>24.1</u>	<u>4x4</u>
3	<u>24.4</u>	<u>23.7</u>	<u>23.6</u>	<u>2x4</u>
4	<u>23.5</u>	<u>24.5</u>	<u>24.8</u>	<u>2x4</u>
5	<u>21.8</u>	<u>23.1</u>	<u>22.4</u>	<u>2x4</u>
6	<u>22.1</u>	<u>22.2</u>	<u>22.0</u>	<u>2x4</u>
7				
8				
9				
10				
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>23.13</u>				
Time (clock): <u>1013</u>		Room Temperature (F): <u>71</u>	Initials: <u>AK</u>	

Technician signature: [Signature] Date: 6/29/11

## Run Notes

Client: Harman  
 Model: TL 2.6  
 Project #: 135-S-30-8.3  
 Tracking #: 1695  
 Run #: 1 Date: 6/24/11  
 Test Crew: A. Kowitz  
 OMNI Equipment ID #(s): See next page (supplemental data)

### PREBURN

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

PRIMARY:

wide open

SECONDARY:

fixed

TERTIARY:

N/A

FAN:

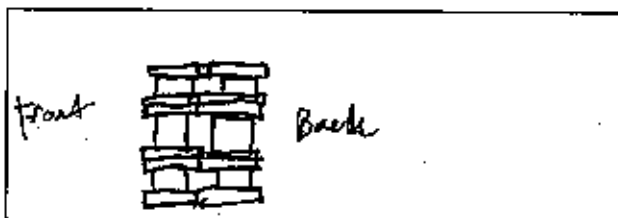
on high

### PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
04:00					stirred coals	

### TEST

TEST FUEL CONFIGURATION SKETCH  
 (INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: Not used  
 FUEL LOADING: Done @ 1:00  
 DOOR: closed @ 1:00  
 PRIMARY AIR: with open fire whole time  
 OTHER: N/A

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

PRIMARY:

wide open

SECONDARY:

fixed

TERTIARY:

N/A

FAN:

on high

Technician signature: *A. Kowitz*

Date: 6/24/11

Supplemental Data EPA 5G/5H

A: .001  
B: .007

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1965

Date: 6/24/11

Run #: 1 Booth: E1

Test Crew: A. Kravitz Start Time: 1244 Stop Time: 1454

OMNI Equipment #(s): 23, 31, 132, 141, 153, 155, 209, 212, 265, 281, 286, 335, 336, 343, 400, 420, 431, 455, 507

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: NA

Final: ∅

Final: NA

Calibrations: Span Gas CO<sub>2</sub>: 4.667 O<sub>2</sub>: N/A CO: 4.280 CO<sub>2</sub>(DT): N/A  
Mid 5.06 N/A 2.500A

Time	<del>N<sub>2</sub></del> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	<del>N<sub>2</sub></del> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span
	1106	1109	1111	1504	1506	1508	
O <sub>2</sub>	N/A	N/A	N/A	N/A	N/A	N/A	
CO <sub>2</sub>	<del>N/A</del> 0.00	<del>N/A</del> 5.10	5.25	.04	17.06	5.24	
CO	0.000	4.280	2.481	.005	4.250	2.458	
CO <sub>2</sub> (DT)	N/A	N/A	N/A	N/A	N/A	N/A	

Stack Diameter (inches): 6"

Air Velocity (ft/min): Initial: 450 ft/min Final: 550 ft/min

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

Induced Draft: ∅ %Smoke Capture: 100

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 6/24/11 Initials: AK

	Initial	Middle	Ending
Pb (in/Hg)	30.16	30.16	30.14
Room Temp (°F)	<del>77</del> 77	76	79

Technician signature: [Signature] Date: 6/24/11

Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

## Run 2

# Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman  
 Model: TL 2.6  
 Project No.: 135-S-30-8.3  
 Tracking No.: 1695  
 Run: 2  
 Test Date: 06/26/11

Burn Rate	0.95 kg/hr dry
Average Tunnel Temperature	90 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.7 feet/second
Average Gas Flow Rate in Dilution Tunnel - Q <sub>gd</sub>	8943.7 dscf/hour
Average Delta p	0.041 inches H2O
Average Delta H	0.93 inches H2O
Total Time of Test	390 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - V <sub>m</sub>	58.58 cubic feet	53.86 cubic feet	63.33 cubic feet
Average Gas Meter Temperature	83 degrees Fahrenheit	77 degrees Fahrenheit	89 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - V <sub>mstd</sub>	58.0 dscf	53.3 dscf	62.8 dscf
Total Particulates - m <sub>m</sub>		21.8 mg	26.1 mg
Particulate Concentration (dry-standard)	0.00041 grams/dscf	0.00041 grams/dscf	0.00042 grams/dscf
Particulate Emission Rate	3.69 grams/hour	3.66 grams/hour	3.72 grams/hour
Adjusted Emissions	5.38 grams/hour	5.34 grams/hour	5.41 grams/hour
Difference from Average		0.04 grams/hour	0.04 grams/hour
7.5% of the average emission rate	0.40		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
<b>Results Are Acceptable</b>			

### Wood Heater Test Data - EPA Method 5G

Run: 2  
 Manufacturer: Harman  
 Model: TL 2.6  
 Tracking No.: 1695  
 Project No.: 135-S-30-8.3  
 Test Date: 26-Jun-11  
 Beginning Clock Time: 10:06  
 Recording Interval: 10 min.  
 Total Sampling Time: 390 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.040	0.040	0.038	0.036	0.050	0.048	0.046	0.028
Initial Temp.	98	98	98	98	98	98	98	98

OMNI Equipment Numbers: 23, 131, 132, 141, 183, 185, 209, 265, 291, 296, 335, 336, 343, 410, 420, 431, 455, 507

PM Control Module: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole  
 Dilution Tunnel H2O: 4.00 percent  
 Dilution Tunnel Static: -0.560 "H2O  
 Pitot Tube Cp: 0.99  
 Meter Box Y Factor: 0.999 (1) 1.023 (2)  
 Barometric Pressure: 30.09 30.05 30 Average

Signature/Date: [Signature] 7/15/11  
 Tunnel Velocity: 13.68 ft/sec.  
 Initial Tunnel Flow: -147.4 scfm  
 Average Tunnel Flow: 149.1 scfm  
 Tunnel Area: 0.1963 ft<sup>2</sup>  
 Post-Test Leak Check (1): 0 cfm@"Hg  
 Post-Test Leak Check (2): 0.004 cfm@"Hg  
 Fuel Moisture (dry basis %): 22.96  
 Total Particulate (1): 21.8  
 Total Particulate (2): 26.1

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, °F														Stack	
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O		
0	0.000	0.000	/	/	0.70	0.70	74	80	0.78	0.7	98	0.041	/	/	16.8	/	277	285	270	328	334		298.8	219	78	79			76	-0.039		
10	1.375	1.611	0.14	0.16	0.95	1.10	74	80	1.07	1.2	103	0.041	102	103	15.5	-1.3	242	291	290	331	336		298.0	188	79	80			76	-0.043		
20	2.750	3.226	0.14	0.16	0.94	1.10	75	82	1.07	1.2	101	0.041	102	103	14.6	-0.9	215	288	261	321	329		282.8	176	79	81			77	-0.041		
30	4.124	4.843	0.14	0.16	0.94	1.10	75	84	1.07	1.2	100	0.041	102	102	13.6	-1	212	283	254	310	322		276.2	177	80	81			77	-0.040		
40	5.500	6.462	0.14	0.16	0.94	1.09	75	85	1.07	1.2	100	0.041	102	102	12.6	-1	218	278	259	306	317		275.6	179	80	81			77	-0.037		
50	6.878	8.084	0.14	0.16	0.94	1.10	76	86	1.08	1.2	98	0.041	101	102	11.7	-0.9	231	277	242	308	319		275.4	169	80	81			77	-0.037		
60	8.258	9.708	0.14	0.16	0.95	1.10	76	87	1.08	1.2	97	0.041	102	102	11.0	-0.7	237	276	224	308	318		272.6	163	80	81			77	-0.034		
70	9.640	11.336	0.14	0.16	0.94	1.10	76	88	1.08	1.2	96	0.041	102	102	10.2	-0.8	242	277	216	306	316		271.4	164	80	80			77	-0.034		
80	11.025	12.963	0.14	0.16	0.94	1.10	75	88	1.08	1.2	96	0.041	102	102	9.5	-0.7	246	278	212	305	318		271.8	163	80	80			78	-0.033		
90	12.411	14.592	0.14	0.16	0.94	1.10	75	89	1.08	1.2	96	0.041	102	102	8.8	-0.7	250	276	209	305	319		271.8	164	80	80			78	-0.033		
100	13.797	16.221	0.14	0.16	0.94	1.10	76	89	1.08	1.2	96	0.041	102	102	8.0	-0.8	259	275	210	308	322		274.8	165	80	80			78	-0.035		
110	15.185	17.849	0.14	0.16	0.94	1.10	76	89	1.08	1.2	95	0.041	102	101	7.3	-0.7	263	272	205	312	325		275.4	159	80	80			78	-0.030		
120	16.570	19.477	0.14	0.16	0.94	1.10	76	89	1.08	1.2	93	0.041	102	101	6.6	-0.7	262	271	188	313	324		271.6	151	80	80			78	-0.028		
130	17.955	21.105	0.14	0.16	0.93	1.10	76	90	1.09	1.2	93	0.041	102	101	6.0	-0.6	263	268	177	314	317		267.8	150	80	80			78	-0.026		
140	19.340	22.731	0.14	0.16	0.94	1.10	76	90	1.1	1.2	92	0.041	101	101	5.3	-0.7	265	265	168	318	309		265.0	146	80	80			78	-0.024		
150	20.720	24.357	0.14	0.16	0.93	1.09	77	90	1.1	1.2	90	0.041	101	101	4.8	-0.5	267	262	160	321	302		262.4	140	80	80			78	-0.020		
160	22.100	25.981	0.14	0.16	0.94	1.08	77	90	1.09	1.2	88	0.041	101	100	4.5	-0.3	254	260	149	318	294		255.0	132	80	80			78	-0.017		
170	23.480	27.605	0.14	0.16	0.93	1.09	77	90	1.1	1.2	87	0.041	100	100	4.2	-0.3	244	258	141	311	286		248.0	130	79	79			78	-0.016		
180	24.861	29.230	0.14	0.16	0.93	1.09	77	90	1.1	1.2	86	0.041	100	100	4.0	-0.2	237	255	135	306	279		242.4	128	79	79			78	-0.014		
190	26.242	30.855	0.14	0.16	0.93	1.09	77	90	1.1	1.2	86	0.041	100	100	3.8	-0.2	230	253	131	302	273		237.8	120	79	79			78	-0.013		
200	27.626	32.482	0.14	0.16	0.93	1.09	78	90	1.1	1.2	85	0.041	100	100	3.5	-0.3	227	249	128	298	267		233.8	124	79	79			78	-0.011		
210	29.006	34.107	0.14	0.16	0.93	1.09	77	90	1.1	1.2	85	0.041	100	100	3.3	-0.2	224	247	125	295	262		230.6	118	79	79			78	-0.010		
220	30.386	35.731	0.14	0.16	0.93	1.09	77	90	1.11	1.2	85	0.041	100	100	3.1	-0.2	222	244	123	293	258		228.0	119	79	79			78	-0.009		
230	31.767	37.355	0.14	0.16	0.93	1.09	77	90	1.1	1.2	84	0.041	100	100	2.9	-0.2	218	242	121	290	253		224.8	119	79	79			79	-0.009		
240	33.147	38.979	0.14	0.16	0.92	1.08	77	90	1.11	1.2	84	0.041	100	100	2.7	-0.2	214	239	119	287	249		221.6	114	79	79			79	-0.008		
250	34.527	40.602	0.14	0.16	0.93	1.09	77	90	1.1	1.2	84	0.041	100	100	2.5	-0.2	207	235	118	283	244		217.4	118	79	79			78	-0.009		
260	35.908	42.225	0.14	0.16	0.92	1.09	77	90	1.1	1.2	84	0.041	100	100	2.4	-0.1	200	231	118	276	239		212.8	119	79	79			78	-0.009		
270	37.287	43.849	0.14	0.16	0.93	1.09	78	90	1.11	1.2	84	0.041	100	100	2.3	-0.1	194	227	118	268	234		208.2	116	79	79			78	-0.008		
280	38.667	45.472	0.14	0.16	0.93	1.09	77	90	1.1	1.2	83	0.041	100	100	2.2	-0.1	189	223	117	261	230		204.0	113	79	79			79	-0.008		
290	40.048	47.095	0.14	0.16	0.93	1.09	78	90	1.1	1.2	83	0.041	100	100	2.1	-0.1	185	220	115	254	226		200.0	119	79	79			78	-0.007		
300	41.429	48.720	0.14	0.16	0.93	1.09	78	90	1.11	1.2	83	0.041	100	100	2.0	-0.1	181	217	114	249	222		196.6	114	79	79			78	-0.006		
310	42.810	50.344	0.14	0.16	0.93	1.09	78	90	1.11	1.2	83	0.041	100	100	1.9	-0.1	178	214	112	244	218		193.2	119	79	79			78	-0.006		
320	44.191	51.968	0.14	0.16	0.92	1.09	78	90	1.1	1.2	82	0.041	100	100	1.8	-0.1	174	211	110	240	214		189.8	116	79	79			78	-0.005		
330	45.573	53.593	0.14	0.16	0.93	1.09	78	90	1.11	1.2	82	0.041	100	100	1.7	-0.1	170	208	109	235	209		186.2	116	79	79			78	-0.004		
340	46.957	55.219	0.14	0.16	0.93	1.09	78	90	1.11	1.2	82	0.041	100	100	1.7	0	167	205	107	230	205		182.8	116	79	78			78	-0.004		
350	48.338	56.842	0.14	0.16	0.92	1.09	78	90	1.1	1.2	82	0.041	100	100	1.6	-0.1	163	202	106	225	204		179.4	117	79	79			78	-0.004		
360	49.718	58.464	0.14	0.16	0.93	1.09	78	90	1.11	1.2	82	0.041	100	100	1.5	-0.1	160	200	105	220	203		176.0	117	79	79			78	-0.004		
370	51.098	60.088	0.14	0.16	0.92	1.08	78	90	1.1	1.2	81	0.041	100	100	1.4	-0.1	157	198	104	215	202		172.6	117	79	79			78	-0.004		
380	52.477	61.709	0.14	0.16	0.93	1.08	78	90	1.11	1.2	81	0.041	100	100	1.3	-0.1	154	196	103	210	200		169.2	117	79	79			79	-0.004		
390	53.856	63.332	0.14	0.16	0.93	1.09	79	90	1.11	1.2	81	0.041	100	100	1.2	-0.1	151	194	102	205	197		165.8	117	79	79			79	-0.004		
Avg/Total	53.856	63.332	0.14	0.16	0.93	1.08	76.75	88.65	/	/	89.50	0.041	100.73	100.71	/	/	/	/	/	/	/	/	94	/	79.40	79.60	#DIV/0!	#DIV/0!	/	-0.020		

PRINT

**Final Laboratory Report - Method 5G Dual Train  
Dilution Tunnel Particulate Calculations**

Client Name: Harman Equipment Numbers: 23, 343, 131, 291 Run #: 2  
 Model: TL 2.6 Train #: A  
 Project No.: 135-8-30-8,3 Date: 06/26/11  
 Tracking No.: 1695

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G127	140.8	120.2	20.6
B. Rear filter catch	Filter	G128	120.8	119.6	1.2
C. Probe catch	Probe	59	122931.6	122931.6	0.0

Total Particulate, mg :	21.8
-------------------------	------

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *Arum* Date: 7/5/11



PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>2</u>
Model: <u>TL 2,6</u>		Train #: <u>B</u>
Project No.: <u>135-S-30-8.3</u>		Date: <u>06/26/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G129	146.9	122.1	24.8
B. Rear filter catch	Filter	G130	121.8	120.5	1.3
C. Probe catch	Probe	6	115338.5	115338.5	0.0

Total Particulate, mg:	26.1
------------------------	------

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *[Signature]*      Date: 7/6/11

# STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Project #: 135-S-30-8.3 Tracking #: 1695  
 Date: 6/26/11 Test Crew: A. Kravitz Run #: 2  
 OMNI Equipment ID #: 185,355,356

Time	Fuel Weight	Delta Weight	Stack Draft	Coal Bed					Actual		
				Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0	11.2	0	-0.048	74	306	256	208	253	283	288	n/a
10	10.1	-1.14	-0.041	74	244	263	235	259	299	262	n/a
20	9.2	-0.864	-0.036	74	233	253	221	262	301	243	n/a
30	8.5	-0.696	-0.033	75	236	248	202	265	297	230	n/a
40	7.6	-0.913	-0.038	75	236	248	213	269	292	257	n/a
50	6.8	-0.818	-0.038	75	239	250	233	278	294	253	n/a
60	6	-0.782	-0.036	75	248	258	236	288	300	250	n/a
70	5.3	-0.717	-0.036	75	257	267	227	298	305	246	n/a
80	4.1	-1.119	-0.043	76	258	275	285	309	316	271	n/a
90	3.5	-0.666	-0.038	76	273	281	280	324	332	252	n/a
91	3.4	-0.079	-0.037	76	274	282	276	326	333	249	n/a

Technician signature: *[Signature]* Date: 7/5/11

### FUEL DATA

Client: Harman

Model: TL2.6

Project #: 135-S-30-8.3 Tracking #: 1695

Date: 6/26/11 Test Crew: A. Kravitz

Run #: 2

OMNI Equipment ID #: 183, 431, 353

FUEL LOAD PREPARED BY: A. Kravitz

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

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:	Cal Value (1) = 12%	Actual Reading	<u>12.0</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22.0</u>		
Piece	Length	Readings		Type	
1	<u>8</u> ft	<u>24.1</u>	<u>24.9</u>	<u>18.6</u>	<u>2x4</u>
2	<u>8</u> ft	<u>23.6</u>	<u>25.0</u>	<u>24.2</u>	<u>2x4</u>
3	ft				
Length of cut pieces: <u>8</u> inches		Pre-Burn Fuel Average Moisture: <u>234</u>			
Time (clock): <u>0934</u>		Room Temperature (F): <u>73</u>	Initials: <u>AK</u>		

TEST FUEL				
FUEL TYPE AND AMOUNT:	<u>2x4</u>	<u>8-4</u>	<u>4x4</u>	<u>2</u>
CALCULATED LOAD WEIGHT:	<u>16.7 lb</u>	ACTUAL LOAD WEIGHT:		
		<u>8.4</u>	<u>8.4</u>	(2x4)
		<u>6.8</u>		(4x4)
				Total
FUEL PIECE LENGTH:	<u>16.5"</u>			
MOISTURE CONTENT (METER -- DRY BASIS)				
PIECE	READINGS			TYPE
1	<u>23.1</u>	<u>24.1</u>	<u>23.1</u>	<u>4x4</u>
2	<u>23.1</u>	<u>23.1</u>	<u>18.2</u>	<u>4x4</u>
3	<u>23.2</u>	<u>24.7</u>	<u>22.0</u>	<u>2x4</u>
4	<u>20.0</u>	<u>26.0</u>	<u>22.4</u>	<u>2x4</u>
5	<u>24.6</u>	<u>23.0</u>	<u>24.1</u>	<u>2x4</u>
6	<u>23.9</u>	<u>22.5</u>	<u>23.1</u>	<u>2x4</u>
7				
8				
9				
10				
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>22.96</u>				
Time (clock): <u>0915</u>		Room Temperature (F): <u>73</u>	Initials: <u>AK</u>	

Technician signature: [Signature] Date: 6/26/11

### Run Notes

\* Fuel load repositioned  
 @ 5:41:00 - door open  
 15 sec.

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1695

Run #: 2 Date: 6/26/11

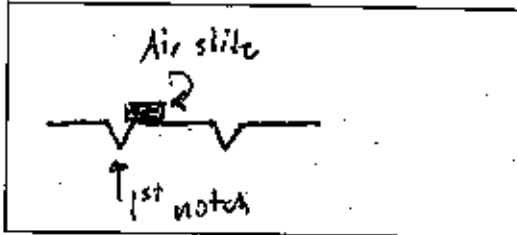
Test Crew: A. Kavit

OMNI Equipment ID #(s): see next page(s) supplemental data

#### PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

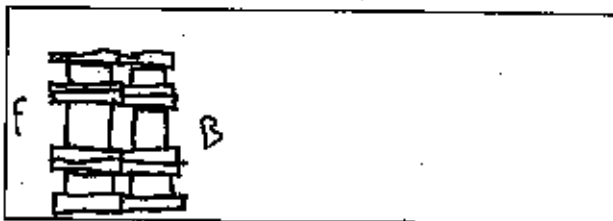
FAN: On high

#### PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
35:00						
1:10:00						stirred coals levels coals

#### TEST

TEST FUEL CONFIGURATION SKETCH  
 (INDICATE VIEW ANGLE)



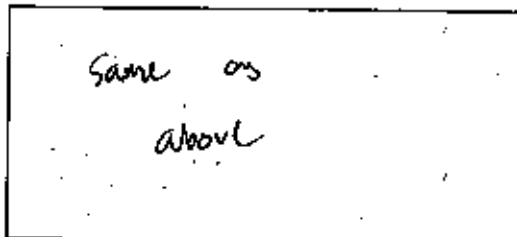
#### START UP PROCEDURES

BYPASS: Closed whole fans  
 FUEL LOADING: Done @ 1:20  
 DOOR: Closed @ 1:30  
 PRIMARY AIR: Set @ 5:00

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: [Signature]

Date: 6/26/11

### Supplemental Data EPA 5G/5H

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1965

Date: 6/26/11

Run #: 2 Booth: 1

Test Crew: A. Vornith

Start Time: 11:39 Stop Time: 18:09

OMNI Equipment #(s): 23, 131, 132, 141, 183, 189, 209, 265, 281, 286, 315, 336, 343, 410, 420, 431, 435, 507

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: ∅

Initial: N/A

Final: ∅

Final: N/A

Calibrations: Span Gas CO<sub>2</sub>: 17.10 O<sub>2</sub>: N/A CO: 4.280 CO<sub>2</sub>(DT): N/A  
 Mid 5.06 N/A 2.600

Time	<u>N<sub>2</sub> Span</u>	<u>N<sub>2</sub> Span</u>	<u>N<sub>2</sub> Span</u>	<u>N<sub>2</sub> Span</u>	<u>N<sub>2</sub> Span</u>	<u>N<sub>2</sub> Span</u>	N <sub>2</sub> Span
	0949	0950	0953	<del>1001</del> 1811	1'	1812	
O <sub>2</sub>	N/A	N/A	N/A	N/A	N/A	N/A	
CO <sub>2</sub>	0.00	17.10	5.24	0.02	4.1699	5.21	
CO	0.000	4.280	2.482	0.000	4.256	2.463	
CO <sub>2</sub> (DT)	N/A	N/A	N/A	N/A	N/A	N/A	

Stack Diameter (inches): 6"

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

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

Induced Draft: ∅ %Smoke Capture: 100

Pitot Tube Leak Test: Pre: ∅ Post: ∅

Flue Pipe Cleaned Prior to First Test in Series: Date: 6/24 Initials: AV

	Initial	Middle	Ending
Pb (in/Hg)	30.01	30.05	30.00
Room Temp (°F)	76	78	79

Technician signature: [Signature] Date: 7/1/11

Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

## Run 3

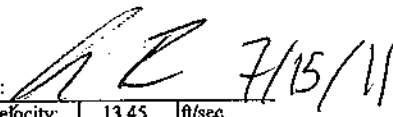
## Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman  
 Model: TL 2.8  
 Project No.: 135-S-30-8.3  
 Tracking No.: 1895  
 Run: 3  
 Test Date: 08/27/11

Burn Rate	1.42 kg/hr dry
Average Tunnel Temperature	102 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.5 feet/second
Average Gas Flow Rate in Dilution Tunnel - Q <sub>gd</sub>	8537.6 dscf/hour
Average Delta p	0.038 inches H <sub>2</sub> O
Average Delta H	0.99 inches H <sub>2</sub> O
Total Time of Test	264 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - V <sub>m</sub>	40.54 cubic feet	38.11 cubic feet	42.97 cubic feet
Average Gas Meter Temperature	88 degrees Fahrenheit	79 degrees Fahrenheit	92 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - V <sub>mstd</sub>	39.8 dscf	37.2 dscf	42.0 dscf
Total Particulates - mn		3.3 mg	4 mg
Particulate Concentration (dry-standard)	0.00008 grams/dscf	0.00009 grams/dscf	0.00010 grams/dscf
Particulate Emission Rate	0.79 grams/hour	0.76 grams/hour	0.81 grams/hour
Adjusted Emissions	1.49 grams/hour	1.44 grams/hour	1.53 grams/hour
Difference from Average		0.04 grams/hour	0.04 grams/hour
7.5% of the average emission rate	0.11		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
<b>Results Are Acceptable</b>			

### Wood Heater Test Data - EPA Method 5G

Signature/Date:  7/15/11

Run: 3  
 Manufacturer: Harman  
 Model: TL 2.6  
 Tracking No.: 1695  
 Project No.: 135-S-30-8.3  
 Test Date: 27-Jun-11  
 Beginning Clock Time: 13:10  
 Recording Interval: 10 min.  
 Total Sampling Time: 264 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.038	0.048	0.042	0.032	0.044	0.036	0.038	0.028
Initial Temp.	114	114	114	114	114	114	114	114

OMNI Equipment Numbers: 23, 131, 132, 141, 183, 185, 209, 265, 291, 296, 335, 336, 343, 410, 420, 431, 455, 507

PM Control Module: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole  
 Dilution Tunnel H2O: 4.00 percent  
 Dilution Tunnel Static: -0.460 "H2O  
 Pitot Tube Cp: 0.99  
 Meter Box Y Factor: 0.999 (1) 1.023 (2)  
 Barometric Pressure: Begin Middle End Average  
 29.84 29.8 29.78 29.81 "Hg

Tunnel Velocity: 13.45 ft/sec.  
 Initial Tunnel Flow: 140.3 scfm  
 Average Tunnel Flow: 142.3 scfm  
 Tunnel Area: 0.1963 ft<sup>2</sup>  
 Post-Test Leak Check (1): 0.002 cfm@"Hg  
 Post-Test Leak Check (2): 0.004 cfm@"Hg  
 Fuel Moisture (dry basis %): 22.19  
 Total Particulate (1): 3.3  
 Total Particulate (2): 4.0

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, °F														Stack Draft In. H2O
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient		
0	0.000	0.000			0.70	0.70	77	84	0.83	1.2	114	0.038			16.8		310	350	397	396	420		374.6	228	80	81			81	-0.049	
10	1.425	1.599	0.14	0.16	1.01	1.07	78	85	1.12	1.2	114	0.038	101	101	15.3	-1.5	278	347	383	406	427		368.2	224	83	86			81	-0.047	
20	2.851	3.201	0.14	0.16	0.99	1.07	79	86	1.11	1.2	112	0.038	101	101	14.1	-1.2	252	338	345	394	417		349.2	216	85	87			82	-0.046	
30	4.276	4.806	0.14	0.16	0.99	1.07	79	88	1.11	1.2	111	0.038	100	101	12.9	-1.2	245	329	335	380	405		338.8	217	85	87			82	-0.046	
40	5.704	6.413	0.14	0.16	0.99	1.07	79	90	1.11	1.2	111	0.038	101	101	11.7	-1.2	252	324	339	373	401		337.8	218	85	88			82	-0.044	
50	7.133	8.021	0.14	0.16	1.00	1.07	79	91	1.11	1.2	111	0.038	101	101	10.5	-1.2	268	321	324	368	407		337.6	216	86	88			82	-0.045	
60	8.564	9.632	0.14	0.16	0.99	1.06	79	92	1.11	1.2	110	0.038	101	101	9.4	-1.1	281	319	308	366	414		337.6	209	86	88			82	-0.043	
70	9.998	11.245	0.14	0.16	0.99	1.07	79	93	1.11	1.2	109	0.038	101	100	8.4	-1	295	320	290	365	419		337.8	206	86	88			82	-0.042	
80	11.431	12.858	0.14	0.16	0.99	1.07	79	93	1.12	1.2	108	0.038	101	100	7.4	-1	308	318	283	365	423		339.4	204	86	88			82	-0.041	
90	12.866	14.473	0.14	0.16	0.99	1.07	79	94	1.12	1.2	109	0.038	101	100	6.4	-1	320	317	274	366	425		340.4	204	86	88			83	-0.040	
100	14.301	16.090	0.14	0.16	1.00	1.07	79	94	1.12	1.2	107	0.038	101	100	5.6	-0.8	334	316	260	368	427		341.0	195	86	88			83	-0.037	
110	15.739	17.705	0.14	0.16	0.99	1.07	79	94	1.11	1.2	105	0.038	101	100	5.0	-0.6	325	315	239	367	423		333.8	187	86	87			82	-0.035	
120	17.176	19.323	0.14	0.16	0.99	1.07	79	94	1.12	1.2	104	0.038	101	100	4.4	-0.6	315	313	227	364	419		327.6	187	85	87			83	-0.034	
130	18.615	20.941	0.14	0.16	0.99	1.07	79	94	1.11	1.2	103	0.038	101	100	3.9	-0.5	311	311	221	362	414		323.8	181	85	87			84	-0.032	
140	20.053	22.559	0.14	0.16	0.99	1.07	80	94	1.12	1.2	100	0.038	100	100	3.5	-0.4	311	311	206	362	403		318.6	172	85	87			83	-0.029	
150	21.493	24.179	0.14	0.16	1.00	1.07	80	94	1.12	1.2	98	0.038	100	100	3.2	-0.3	310	313	190	365	388		313.2	164	85	86			83	-0.025	
160	22.935	25.800	0.14	0.16	1.00	1.07	80	94	1.11	1.2	96	0.038	100	100	2.9	-0.3	303	314	177	362	373		305.8	159	84	86			82	-0.024	
170	24.376	27.422	0.14	0.16	1.00	1.07	80	94	1.11	1.2	96	0.038	100	100	2.5	-0.4	295	314	172	356	361		299.6	157	84	85			83	-0.024	
180	25.818	29.044	0.14	0.16	1.00	1.07	80	94	1.12	1.2	95	0.038	100	100	2.2	-0.3	283	311	168	350	351		292.6	155	84	85			82	-0.023	
190	27.261	30.663	0.14	0.16	1.00	1.07	80	94	1.11	1.2	96	0.038	100	99	1.7	-0.5	277	308	168	348	343		288.8	162	84	85			83	-0.025	
200	28.702	32.282	0.14	0.16	1.00	1.07	80	94	1.12	1.2	95	0.038	100	99	1.4	-0.3	271	303	171	345	336		285.2	157	84	85			83	-0.022	
210	30.144	33.902	0.14	0.16	1.00	1.07	79	94	1.12	1.2	94	0.038	100	99	1.1	-0.3	261	301	161	339	328		278.0	149	84	85			82	-0.020	
220	31.586	35.522	0.14	0.16	1.00	1.08	80	94	1.11	1.2	92	0.038	100	99	0.9	-0.2	254	298	153	330	320		271.0	144	84	84			81	-0.018	
230	33.030	37.143	0.14	0.16	1.00	1.07	80	94	1.12	1.2	92	0.038	100	99	0.8	-0.1	247	293	148	322	312		264.4	142	84	84			82	-0.017	
240	34.474	38.764	0.14	0.16	1.00	1.08	80	94	1.11	1.2	91	0.038	100	99	0.6	-0.2	244	290	145	313	306		259.6	141	84	84			82	-0.016	
250	35.918	40.386	0.14	0.16	1.00	1.07	80	93	1.12	1.2	91	0.038	100	99	0.3	-0.3	245	287	144	305	301		256.4	142	83	84			82	-0.017	
260	37.363	42.006	0.14	0.16	1.00	1.07	79	93	1.12	1.2	91	0.038	100	99	0.1	-0.2	237	283	144	298	298		252.0	144	83	84			82	-0.018	
264	38.112	42.973	0.07	0.10	1.00	1.07	80	93	1.12	1.2	91	0.038	52	59	0.0	-0.1	234	283	144	295	296		250.4	234	83	84			82	-0.017	
Avg/Total	38.112	42.973	0.14	0.16	0.99	1.06	79.32	92.32			101.64	0.038	98.49	98.45									124		84.46	85.93	#DIV/0!	#DIV/0!		-0.031	



PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>3</u>
Model: <u>TL 2.6</u>		Train #: <u>A</u>
Project No.: <u>135-S-30-8.3</u>		Date: <u>06/27/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G131	122.4	119.1	3.3
B. Rear filter catch	Filter	G132	119.8	119.8	0.0
C. Probe catch	Probe	54	122820.7	122820.7	0.0

Total Particulate, mg :	3.3
-------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *Sharon M...*      Date: 1/5/11

PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>3</u>
Model: <u>TL 2.6</u>		Train #: <u>B</u>
Project No.: <u>135-S-30-8.3</u>		Date: <u>06/27/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G133	123.8	119.8	4.0
B. Rear filter catch	Filter	G134	120.3	120.3	0.0
C. Probe catch	Probe	68	122434.9	122434.9	0.0

Total Particulate, mg:	4.0
------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *[Signature]*

Date: 7/5/11

# STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Project #: 135-S-30-8.3 Tracking #: 1695  
 Date: 6/27/11 Test Crew: A. Kravitz Run #: 3  
 OMNI Equipment ID #: 185,355,356

Preburn [x] Test [.]	Coal Bed										Actual		
	Fuel Weight	Delta Weight	Stack Draft	Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst	Coal Bed:	3.5
Time	TEMPERATURES (oF)												
0	11.3	0	-0.054	77	329	335	269	273	285	206	n/a		
10	9.8	-1.494	-0.051	77	255	327	207	305	304	228	n/a		
20	8.3	-1.451	-0.046	78	227	315	254	298	303	228	n/a		
30	6.9	-1.432	-0.047	78	232	309	300	303	313	234	n/a		
40	5.6	-1.303	-0.046	78	251	310	315	317	330	241	n/a		
50	3.9	-1.72	-0.049	78	274	311	369	335	351	244	n/a		
60	9.9	5.973	-0.054	79	280	321	363	355	373	250	n/a		
70	8.7	-1.172	-0.046	78	259	333	340	364	383	219	n/a		
80	7.6	-1.119	-0.046	80	256	341	326	363	384	212	n/a		
90	6.4	-1.172	-0.045	79	270	346	333	364	390	218	n/a		
100	5	-1.411	-0.053	80	293	357	330	370	401	244	n/a		
110	3.5	-1.442	-0.049	80	297	351	395	387	414	234	n/a		

Technician signature: *[Signature]* Date: 7/5/11

FUEL DATA

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3 Tracking #: 1695

Date: 6/27/11 Test Crew: A. Kravitz

Run #: 3

OMNI Equipment ID #: 183, 431, 252

FUEL LOAD PREPARED BY: A. Kravitz

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

**PRE-BURN FUEL**  
**MOISTURE CONTENT (METER -- DRY BASIS)**

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

Piece	Length	Readings	Type
1	<u>12</u> ft	<u>19.7</u> <u>20.2</u>	<u>2x4</u>
2	_____ ft	_____	_____
3	_____ ft	_____	_____

Length of cut pieces: 8 inches      Pre-Burn Fuel Average Moisture: 19.67

Time (clock): 0945 Room Temperature (F): 74 Initials: AK

**TEST FUEL**

FUEL TYPE AND AMOUNT: 2x4 4      4x4 2

CALCULATED LOAD WEIGHT: 16.8      ACTUAL LOAD WEIGHT: 8.1 (2x4)  
8.7 (4x4)  
16.8 Total

FUEL PIECE LENGTH: 16.5"

**MOISTURE CONTENT (METER -- DRY BASIS)**

PIECE	READINGS	TYPE
1	<u>18.8</u> <u>21.9</u> <u>20.2</u>	<u>2x4</u>
2	<u>21.1</u> <u>21.1</u> <u>22.9</u>	<u>2x4</u>
3	<u>24.2</u> <u>23.6</u> <u>22.7</u>	<u>2x4</u>
4	<u>24.5</u> <u>21.0</u> <u>21.2</u>	<u>2x4</u>
5	<u>21.1</u> <u>23.1</u> <u>24.1</u>	<u>4x4</u>
6	<u>18.9</u> <u>24.2</u> <u>25.3</u>	<u>4x4</u>
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 22.19

Time (clock): 1000 Room Temperature (F): 74 Initials: AK

Technician signature: [Signature] Date: 6/27/11

### Run Notes

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1695

Run #: 3

Date: 6/27/11

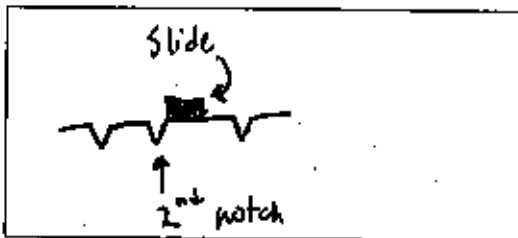
Test Crew: A. Krawitz

OMNI Equipment ID #(s): 455, 335, 336, 410

#### PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

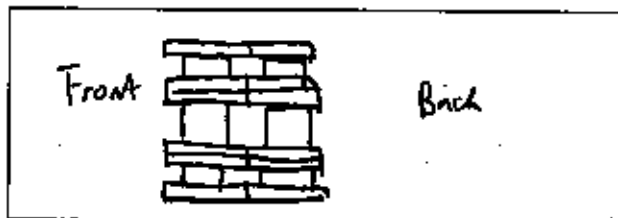
FAN: On high

#### PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0:49:30						
0:49:00						repositioned fuel
0:59:00			16.8 lb			leveled coals
1:36:00						leveled coals

#### TEST

TEST FUEL CONFIGURATION SKETCH  
(INDICATE VIEW ANGLE)



#### START UP PROCEDURES

BYPASS: Closed the whole time

FUEL LOADING DOOR: Open @ 30 sec.

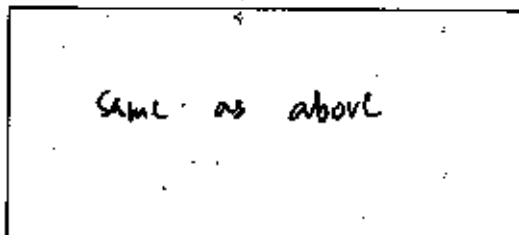
PRIMARY AIR: Closed @ 45 sec

OTHER: Set @ 5 min

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: [Signature]

Date: 6/27/11

### Supplemental Data EPA 5G/5H

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1985

Date: 6/27/11

Run #: 3 Booth: E1

Test Crew: A. Kravitz

Start Time: 1:10 PM Stop Time: 5:35 PM

OMNI Equipment #(s): 23, 31, 132, 141, 183, 185, 209, 215, 241, 242, 335, 336, 348, 410, 420, 431, 455, 507

**Gas Analyzer Train Leak Check:**

Stack:

Dilution Tunnel (Method 5G Only):

Initial: φ

Initial: N/A

Final: φ

Final: N/A

Calibrations: Span Gas Mid CO<sub>2</sub>: 17.10 O<sub>2</sub>: N/A CO: 4.280 CO<sub>2</sub>(DT): N/A  
5.06 N/A 2.600

Time	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span
	1112	1114	1115	543	546	544	
O <sub>2</sub>	N/A	N/A	N/A	N/A	N/A	N/A	
CO <sub>2</sub>	0.00	17.18	5.24	1.01	17.06	5.21	
CO	0.000	4.280	2.487	<del>N/A</del> -0.003	<del>N/A</del> 4.265	<del>N/A</del> 2.472	
CO <sub>2</sub> (DT)	N/A	N/A	N/A	N/A	N/A	N/A	

Stack Diameter (inches): 6

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

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

Induced Draft: φ %Smoke Capture: 100

Pitot Tube Leak Test: Pre: φ Post: φ

Flue Pipe Cleaned Prior to First Test in Series: Date: 6/24 Initials: A

	Initial	Middle	Ending
Pb (in/Hg)	21.84	21.80	21.78
Room Temp (°F)	<del>75</del> 81	82	82

Technician signature: [Signature] Date: 6/27/11

Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

## Run 4

## Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman  
 Model: TL 2.6  
 Project No.: 135-S-30-8.3  
 Tracking No.: 1695  
 Run: 4  
 Test Date: 06/28/11

Burn Rate	0.97 kg/hr dry
Average Tunnel Temperature	91 degrees Fahrenheit
Average Gas Velocity In Dilution Tunnel - vs	13.4 feet/second
Average Gas Flow Rate In Dilution Tunnel - Qgd	8675.0 dscf/hour
Average Delta p	0.039 inches H2O
Average Delta H	1.00 inches H2O
Total Time of Test	380 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	57.97 cubic feet	54.82 cubic feet	61.12 cubic feet
Average Gas Meter Temperature	83 degrees Fahrenheit	77 degrees Fahrenheit	88 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	56.9 dscf	53.8 dscf	60.1 dscf
Total Particulates - mn		38 mg	42.6 mg
Particulate Concentration (dry-standard)	0.00071 grams/dscf	0.00071 grams/dscf	0.00071 grams/dscf
Particulate Emission Rate	6.14 grams/hour	6.13 grams/hour	6.15 grams/hour
Adjusted Emissions	8.21 grams/hour	8.20 grams/hour	8.22 grams/hour
Difference from Average		0.01 grams/hour	0.01 grams/hour
7.5% of the average emission rate	0.62		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
<b>Results Are Acceptable</b>			



### Wood Heater Test Data - EPA Method 5G

Run: 4  
 Manufacturer: Harman  
 Model: TL 2.6  
 Tracking No.: 1695  
 Project No.: 135-S-30-8.3  
 Test Date: 28-Jun-11  
 Beginning Clock Time: 11:09  
 Recording Interval: 10 min.  
 Total Sampling Time: 380 min.

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.032	0.046	0.048	0.038	0.044	0.034	0.038	0.030
Initial Temp.	108	108	108	108	108	108	108	108

OMNI Equipment Numbers: 23, 131, 132, 141, 183, 185, 209, 265, 291, 296, 335, 336, 343, 410, 420, 431, 455, 507

PM Control Module: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole  
 Dilution Tunnel H2O: 4.00 percent  
 Dilution Tunnel Static: -0.560 "H2O  
 Pitot Tube Cp: 0.99  
 Meter Box Y Factor: 0.999 (1) 1.023 (2)  
 Barometric Pressure: Begin Middle End Average  
 29.80 29.84 29.86 29.83 "Hg

Signature/Date: *[Signature]* 7/1/11  
 Tunnel Velocity: 13.41 ft/sec  
 Initial Tunnel Flow: 142.0 scfm  
 Average Tunnel Flow: 144.6 scfm  
 Tunnel Area: 0.1963 ft<sup>2</sup>  
 Post-Test Leak Check (1): 0 cfm@"Hg  
 Post-Test Leak Check (2): 0.001 cfm@"Hg  
 Fuel Moisture (dry basis %): 22.58  
 Total Particulate (1): 38.0  
 Total Particulate (2): 42.6

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF														Stack Draft In. H2O
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient		
0	0.000	0.000			0.70	0.70	74	80	0.07	-0.3	108	0.039			16.6		250	249	315	308	302		284.8	215	78	80			77	-0.043	
10	1.426	1.582	0.14	0.16	1.04	0.16	75	81	1.07	1.2	109	0.039	102	102	15.4	-1.2	230	263	311	322	316		288.4	210	81	83			78	-0.043	
20	2.871	3.185	0.14	0.16	1.03	0.16	76	83	1.07	1.2	105	0.039	102	103	14.4	-1	214	272	286	318	313		280.6	201	82	84			78	-0.041	
30	4.316	4.790	0.14	0.16	1.03	0.16	77	85	1.07	1.2	103	0.039	102	102	13.3	-1.1	214	278	273	313	307		277.0	200	83	84			78	-0.041	
40	5.763	6.399	0.14	0.16	1.03	0.16	77	87	1.08	1.2	103	0.039	102	102	12.3	-1	220	283	271	312	305		278.2	201	83	84			79	-0.040	
50	7.214	8.010	0.15	0.16	1.03	0.16	77	88	1.07	1.2	101	0.039	102	102	11.3	-1	227	285	258	316	304		278.0	193	83	83			78	-0.038	
60	8.667	9.625	0.15	0.16	1.03	0.16	76	89	1.08	1.2	99	0.039	102	102	10.5	-0.8	232	285	236	321	304		275.6	185	82	83			79	-0.035	
70	10.123	11.242	0.15	0.16	1.03	0.16	76	89	1.08	1.2	98	0.039	103	102	9.8	-0.7	239	285	220	324	303		274.2	184	82	82			78	-0.034	
80	11.578	12.861	0.15	0.16	1.03	0.16	76	90	1.09	1.2	98	0.039	103	102	9.0	-0.8	242	286	216	324	302		274.0	185	82	82			79	-0.033	
90	13.036	14.480	0.15	0.16	1.03	0.16	77	90	1.08	1.2	97	0.039	102	102	8.3	-0.7	244	286	205	323	302		272.0	179	82	82			79	-0.033	
100	14.490	16.099	0.15	0.16	1.03	0.16	77	90	1.09	1.2	96	0.039	102	102	7.5	-0.8	246	285	195	323	301		270.0	172	82	82			79	-0.031	
110	15.944	17.717	0.15	0.16	1.03	0.16	77	91	1.09	1.2	96	0.039	102	101	6.8	-0.7	248	283	191	322	299		268.6	173	82	82			79	-0.030	
120	17.397	19.335	0.15	0.16	1.02	0.16	77	91	1.1	1.2	93	0.039	102	101	6.2	-0.6	243	282	177	319	295		263.2	158	81	82			79	-0.031	
130	18.847	20.950	0.15	0.16	1.02	0.16	77	91	1.1	1.2	91	0.039	101	101	5.7	-0.5	235	281	159	310	288		254.6	152	81	81			79	-0.024	
140	20.292	22.562	0.14	0.16	1.01	0.16	77	91	1.12	1.2	90	0.039	101	101	5.3	-0.4	226	278	149	300	280		246.6	144	80	81			78	-0.018	
150	21.733	24.169	0.14	0.16	1.01	0.16	77	90	1.12	1.2	88	0.039	100	100	5.0	-0.3	220	274	141	293	272		240.0	137	80	80			79	-0.016	
160	23.173	25.777	0.14	0.16	1.00	0.16	77	90	1.13	1.3	87	0.039	100	100	4.8	-0.2	214	269	135	286	264		233.6	128	80	80			78	-0.014	
170	24.614	27.385	0.14	0.16	1.00	0.16	77	90	1.12	1.3	86	0.039	100	100	4.6	-0.2	209	263	129	279	257		227.4	131	80	80			78	-0.012	
180	26.054	28.994	0.14	0.16	1.01	0.16	77	90	1.12	1.3	86	0.039	100	100	4.4	-0.2	204	257	126	273	250		222.0	131	79	79			78	-0.012	
190	27.497	30.603	0.14	0.16	1.00	0.16	77	90	1.13	1.2	86	0.039	100	100	4.3	-0.1	200	250	125	268	244		217.4	132	79	79			78	-0.013	
200	28.941	32.215	0.14	0.16	1.01	0.16	77	90	1.12	1.2	85	0.039	100	100	4.1	-0.2	199	247	125	264	240		215.0	132	79	79			78	-0.012	
210	30.382	33.825	0.14	0.16	1.00	0.16	77	90	1.13	1.2	85	0.039	100	100	3.9	-0.2	197	245	124	260	236		212.4	202	79	79			78	-0.012	
220	31.823	35.433	0.14	0.16	1.01	0.16	77	90	1.11	1.2	85	0.039	100	100	3.7	-0.2	198	243	122	258	234		211.0	201	79	79			78	-0.011	
230	33.264	37.040	0.14	0.16	1.01	0.16	77	90	1.12	1.2	85	0.039	100	100	3.5	-0.2	203	241	122	257	234		211.0	201	79	79			78	-0.010	
240	34.702	38.647	0.14	0.16	1.00	0.16	78	90	1.12	1.2	85	0.039	100	100	3.3	-0.2	205	239	121	255	234		210.8	195	80	80			79	-0.009	
250	36.140	40.253	0.14	0.16	1.00	0.16	78	90	1.12	1.3	86	0.039	100	100	3.1	-0.2	201	238	119	251	233		208.4	191	79	79			79	-0.009	
260	37.578	41.859	0.14	0.16	1.00	0.16	77	90	1.12	1.3	86	0.039	100	100	2.9	-0.2	198	238	117	247	231		206.2	189	79	79			78	-0.008	
270	39.015	43.466	0.14	0.16	1.00	0.16	78	90	1.12	1.2	86	0.039	100	100	2.7	-0.2	197	238	116	242	228		204.2	183	80	80			79	-0.006	
280	40.453	45.070	0.14	0.16	1.00	0.16	78	90	1.12	1.2	86	0.039	100	100	2.6	-0.1	196	236	115	240	226		202.6	179	80	80			80	-0.006	
290	41.888	46.674	0.14	0.16	1.00	0.16	79	91	1.13	1.2	86	0.039	99	100	2.4	-0.2	192	235	114	236	223		200.0	176	80	80			80	-0.005	
300	43.326	48.280	0.14	0.16	1.00	0.16	78	91	1.13	1.2	86	0.039	100	100	2.3	-0.1	187	232	111	232	220		196.4	173	80	80			80	-0.005	
310	44.762	49.885	0.14	0.16	1.00	0.16	79	91	1.13	1.3	85	0.039	99	100	2.2	-0.1	187	230	111	227	217		194.4	167	80	80			80	-0.004	
320	46.199	51.490	0.14	0.16	1.00	0.16	80	91	1.12	1.3	85	0.039	99	100	2.0	-0.2	186	229	109	223	215		192.4	163	80	80			80	-0.003	
330	47.636	53.096	0.14	0.16	1.00	0.16	80	91	1.13	1.3	84	0.039	99	100	1.9	-0.1	183	227	108	219	213		190.0	159	81	80			80	-0.003	
340	49.074	54.703	0.14	0.16	1.00	0.16	79	91	1.12	1.3	83	0.039	99	100	1.9	0	178	222	106	214	211		186.2	154	80	80			79	-0.002	
350	50.513	56.310	0.14	0.16	1.00	0.16	79	91	1.13	1.3	87	0.039	100	100	1.6	-0.3	168	218	110	208	207		182.2	138	80	80			79	-0.018	
360	51.948	57.914	0.14	0.16	1.00	0.16	79	91	1.14	1.3	94	0.039	100	100	0.9	-0.7	174	218	166	213	210		196.2	174	81	81			79	-0.031	
370	53.383	59.517	0.14	0.16	0.99	0.16	79	91	1.13	1.3	95	0.039	100	100	0.3	-0.6	189	223	184	229	222		209.4	171	81	82			78	-0.029	
380	54.817	61.121	0.14	0.16	1.00		79	91	1.13	1.3	93	0.039	100	100	0.0	-0.3	199	231	174	239	232		215.0	162	81	82			79	-0.026	
Avg/Total	54.817	61.121	0.14	0.16	1.00	0.18	77.41	89.38			91.46	0.039	100.71	100.68									70		80.51	80.82	#DIV/0!	#DIV/0!		-0.020	

PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>4</u>
Model: <u>TL 2.6</u>		Train #: <u>A</u>
Project No.: <u>135-S-30-8.3</u>		Date: <u>06/28/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G135	157.5	122.1	35.4
B. Rear filter catch	Filter	G136	122.0	120.2	1.8
C. Probe catch	Probe	69	123077.1	123076.3	0.8

Total Particulate, mg:	38.0
------------------------	------

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *[Signature]*      Date: 7/6/11



### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>4</u>
Model: <u>TL 2.6</u>		Train #: <u>B</u>
Project No.: <u>135-S-30-8,3</u>		Date: <u>06/28/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G137	159.7	119.7	40.0
B. Rear filter catch	Filter	G138	124.3	122.7	1.6
C. Probe catch	Probe	63	121599.5	121598.5	1.0

Total Particulate, mg :	42.6
-------------------------	------

Component	Equations:
A. Front filter catch	$Final\ (mg) - Tare\ (mg) = Particulate,\ mg$
B. Rear filter catch	$Final\ (mg) - Tare\ (mg) = Particulate,\ mg$
C. Probe catch	$Final\ (mg) - Tare\ (mg) = Particulate,\ mg$

Analyst: *Ann [Signature]*      Date: 7/5/11

# STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Project #: 135-S-30-8.3 Tracking #: 1695  
 Date: 6/28/11 Test Crew: A. Kravitz Run #: 4  
 OMNI Equipment ID #: 185,355,356

Preburn Test	Coal Bed										Actual Coal Bed: 3.4
	Fuel Weight	Delta Weight	Stack Draft	Ambient	Top	Bottom	Back	Left	Right	Flue	
0	10.9	0	-0.061	76	388	208	247	198	214	247	n/a
10	9.9	-0.966	-0.028	76	260	238	164	234	252	292	n/a
20	9.2	-0.727	-0.025	75	213	233	149	234	248	273	n/a
30	8.4	-0.737	-0.026	75	205	227	162	231	245	160	n/a
40	7.8	-0.652	-0.019	75	193	231	148	228	242	144	n/a
50	6.6	-1.179	-0.038	76	191	231	207	231	244	197	n/a
60	5.6	-0.992	-0.039	76	196	235	254	247	254	204	n/a
70	4.2	-1.362	-0.045	76	219	244	318	273	273	221	n/a
79	3.4	-0.839	-0.041	76	242	246	320	303	298	210	n/a

Data: T=0 @: 9:45 Range: 3.34 to 4.17

Technician signature: [Signature] Date: 7/5/11

### FUEL DATA

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3 Tracking #: 1695

Date: 6/29/11 Test Crew: A. Kravitz

Run #: 4

OMNI Equipment ID #: 183, 383, 431

FUEL LOAD PREPARED BY: A. Kravitz

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

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:		Cal Value (1) = 12%	Actual Reading	<u>12.0</u>	
		Cal Value (2) = 22%	Actual Reading	<u>22.0</u>	
Piece	Length	Readings		Type	
1	<u>8</u> ft	<u>23.7</u>	<u>24.9</u>	<u>24.9</u>	<u>2x4</u>
2	<u>8</u> ft	<u>19.5</u>	<u>18.3</u>	<u>19.0</u>	<u>2x4</u>
3	ft				
Length of cut pieces: <u>8</u> inches			Pre-Burn Fuel Average Moisture: <u>21.57</u>		
Time (clock): <u>0900</u>		Room Temperature (F): <u>74</u>		Initials: <u>AK</u>	

TEST FUEL					
FUEL TYPE AND AMOUNT:		<u>2x4</u>	<u>4</u>	<u>4x4</u>	<u>2</u>
CALCULATED LOAD WEIGHT:		<u>18.5</u>	<u>16.7</u>	ACTUAL LOAD WEIGHT: <u>8.6</u> (2x4)	
FUEL PIECE LENGTH: <u>14.5"</u>				<u>81.47 lb</u> (4x4)	
				<u>16.7</u> <del>18.5</del>	Total
MOISTURE CONTENT (METER -- DRY BASIS)					
PIECE	READINGS			TYPE	
1	<u>23.8</u>	<u>24.4</u>	<u>23.4</u>	<u>2x4</u>	
2	<u>23.4</u>	<u>23.7</u>	<u>20.7</u>	<u>2x4</u>	
3	<u>24.0</u>	<u>19.6</u>	<u>24.4</u>	<u>2x4</u>	
4	<u>24.1</u>	<u>22.3</u>	<u>18.0</u>	<u>2x4</u>	
5	<u>21.0</u>	<u>21.6</u>	<u>23.6</u>	<u>4x4</u>	
6	<u>22.2</u>	<u>23.9</u>	<u>18.6</u>	<u>4x4</u>	
7					
8					
9					
10					
OVERALL TEST FUEL LOAD MOISTURE AVERAGE:				<u>22.58</u>	
Time (clock): <u>0910</u>		Room Temperature (F): <u>74</u>		Initials: <u>AK</u>	

Technician signature: [Signature] Date: 6/28/11

# Run Notes

\* Stirred coals @

5:44:00

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1695

Run #: 4

Date: 6/28/11

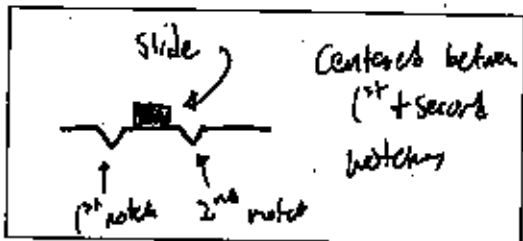
Test Crew: A. Kavita

OMNI Equipment ID #(s): See next page (supplemental data)

## PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

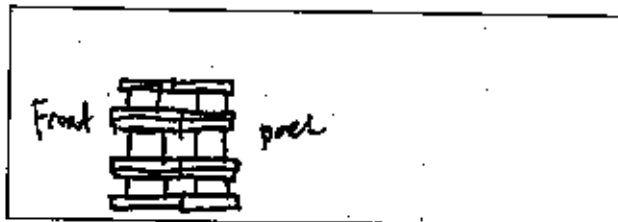
FAN: On high

## PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
40:00						
1:01:00						stirred coals stirred coals

## TEST

TEST FUEL CONFIGURATION SKETCH  
(INDICATE VIEW ANGLE)



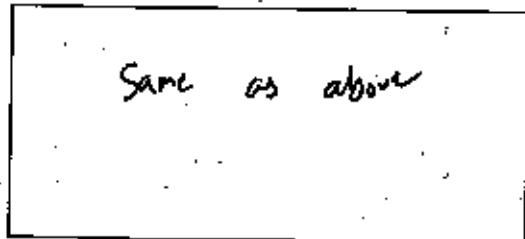
### START UP PROCEDURES

BYPASS: closed whole time  
 FUEL LOADING: Done @ 45 sec  
 DOOR: closed @ 60 sec  
 PRIMARY AIR: set @ 5 min

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: A. Kavita

Date: 6/28/11

### Supplemental Data EPA 5G/5H

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: <sup>1645</sup>1965

Date: 6/28/11

Run #: 4 Booth: #1

Test Crew: A. Kravitz

Start Time: 1106 Stop Time: 11:26

OMNI Equipment #(s): 131, 132, 141, 183, 185, 201, 215, 211, 216, 335, 336, 343, 410, 420, 431, 455, 507

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: 0

Initial: N/A

Final: 0

Final: N/A

Calibrations: Span Gas CO<sub>2</sub>: 17.10 O<sub>2</sub>: N/A CO: 4.280 CO<sub>2</sub>(DT): N/A  
Mid 5.06 N/A 2.500

Time	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span
	1001	1003	1004	1729	1731	1730	
O <sub>2</sub>	N/A	N/A	N/A	N/A	N/A	N/A	
CO <sub>2</sub>	0.00	17.10	5.23	0.00	17.14	9.22	
CO	0.000	4.280	5.252	-0.006	4.292	2.481	
CO <sub>2</sub> (DT)	N/A	N/A	N/A	N/A	N/A	N/A	

Stack Diameter (inches): 6

Air Velocity (ft/min): Initial: 650 Final: 650

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

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: 0 Post: 0

Flue Pipe Cleaned Prior to First Test in Series: Date: 6/24/11 Initials: AK

	Initial	Middle	Ending
Pb (in/Hg)	29.80	29.84	29.86
Room Temp (°F)	76.71	78	79

Technician signature: A. Kravitz Date: 6/28/11

Model: TL2.6  
Harmon Home Heating  
352 Mountain House Road  
Halifax, PA 17032

## Run 5



## Wood Heater Test Data - EPA Method 5G

**Manufacturer:** Harman  
**Model:** TL 2.6  
**Project No.:** 135-S-30-8.3  
**Tracking No.:** 1695  
**Run:** 5  
**Test Date:** 06/29/11

<b>Burn Rate</b>	<b>1.23 kg/hr dry</b>
<b>Average Tunnel Temperature</b>	102 degrees Fahrenheit
<b>Average Gas Velocity in Diffusion Tunnel - v<sub>g</sub></b>	13.6 feet/second
<b>Average Gas Flow Rate in Diffusion Tunnel - Q<sub>sd</sub></b>	8870.9 dscf/hour
<b>Average Delta p</b>	0.039 Inches H <sub>2</sub> O
<b>Average Delta H</b>	1.03 Inches H <sub>2</sub> O
<b>Total Time of Test</b>	350 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
<b>Total Sample Volume - V<sub>m</sub></b>	53.75 cubic feet	50.91 cubic feet	56.59 cubic feet
<b>Average Gas Meter Temperature</b>	83 degrees Fahrenheit	76 degrees Fahrenheit	89 degrees Fahrenheit
<b>Total Sample Volume (Standard Conditions) - V<sub>mstd</sub></b>	53.1 dscf	50.3 dscf	55.8 dscf
<b>Total Particulates - m<sub>t</sub></b>		13.6 mg	15.1 mg
<b>Particulate Concentration (dry-standard)</b>	0.00027 grams/dscf	0.00027 grams/dscf	0.00027 grams/dscf
<b>Particulate Emission Rate</b>	2.34 grams/hour	2.35 grams/hour	2.34 grams/hour
<b>Adjusted Emissions</b>	3.69 grams/hour	3.69 grams/hour	3.89 grams/hour
<b>Difference from Average</b>		0.00 grams/hour	0.00 grams/hour
<b>7.5% of the average emission rate</b>	0.28		
<b>Weighted Average Emission Rate Limit</b>	4.10 grams/hour		
<b>7.5% of the weighted average emission rate limit</b>	0.31		
Results Are Acceptable			

### Wood Heater Test Data - EPA Method 5G

Run: 5  
 Manufacturer: Harman  
 Model: TL 2.6  
 Tracking No.: 1695  
 Project No.: 135-S-30-8.3  
 Test Date: 29-Jun-11  
 Beginning Clock Time: 11:40  
 Recording Interval: 10 min.  
 Total Sampling Time: 350 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.034	0.044	0.050	0.036	0.042	0.038	0.040	0.030
Initial Temp.	114	114	114	114	114	114	114	114

OMNI Equipment Numbers: 23, 131, 132, 141, 183, 185, 209, 265, 291, 296, 335, 336, 343, 410, 420, 431, 455, 507

PM Control Module: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole  
 Dilution Tunnel H2O: 4.00 percent  
 Dilution Tunnel Static: -0.550 "H2O  
 Pitot Tube Cp: 0.99  
 Meter Box Y Factor: 0.999 (1) 1.023 (2)  
 Barometric Pressure: Begin Middle End Average

Signature/Date: Ames 7/14/11  
 Tunnel Velocity: 13.59 ft/sec  
 Initial Tunnel Flow: 142.6 scfm  
 Average Tunnel Flow: 144.5 scfm  
 Tunnel Area: 0.1963 ft<sup>2</sup>  
 Post-Test Leak Check (1): 0.007 cfm@\*Hg  
 Post-Test Leak Check (2): 0.002 cfm@\*Hg  
 Fuel Moisture (dry basis %): 20.74  
 Total Particulate (1): 13.6  
 Total Particulate (2): 15.1

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, °F														Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter of (1)	Meter of (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O	
0	0.000	0.000			0.70	0.70	74	80	1.02	-0.3	114	0.039			19.1		326	248	597	293	325		357.8	542	77	79			75	-0.050	
10	1.443	1.597	0.14	0.16	1.05	1.08	74	81	1.08	1.2	117	0.039	102	102	17.5	-1.6	305	253	654	304	333		369.8	517	80	83			75	-0.051	
20	2.890	3.203	0.14	0.16	1.04	1.08	74	83	1.08	1.2	114	0.039	102	102	16.4	-1.1	284	252	615	303	333		357.4	499	81	83			76	-0.049	
30	4.337	4.811	0.14	0.16	1.04	1.09	74	84	1.08	1.2	113	0.039	102	102	15.2	-1.2	283	253	599	300	331		353.2	507	81	83			76	-0.050	
40	5.786	6.421	0.14	0.16	1.04	1.09	74	86	1.09	1.2	113	0.039	102	102	13.9	-1.3	294	254	611	300	332		358.2	497	82	83			76	-0.049	
50	7.238	8.036	0.15	0.16	1.04	1.09	73	87	1.09	1.2	111	0.039	102	102	12.8	-1.1	308	256	584	304	335		357.4	482	81	82			76	-0.046	
60	8.692	9.652	0.15	0.16	1.04	1.09	73	87	1.08	1.2	111	0.039	102	102	11.7	-1.1	329	261	563	309	339		360.2	474	81	82			77	-0.046	
70	10.148	11.268	0.15	0.16	1.04	1.09	74	88	1.08	1.2	111	0.039	102	102	10.6	-1.1	344	265	554	315	347		365.0	477	81	82			77	-0.046	
80	11.603	12.886	0.15	0.16	1.04	1.08	74	88	1.09	1.2	112	0.039	102	102	9.5	-1.1	360	270	557	321	355		372.6	485	81	82			77	-0.046	
90	13.059	14.503	0.15	0.16	1.04	1.09	74	89	1.09	1.2	113	0.039	102	102	8.3	-1.2	375	273	568	329	362		381.4	489	82	83			78	-0.046	
100	14.515	16.120	0.15	0.16	1.04	1.08	75	89	1.1	1.2	114	0.039	102	102	7.2	-1.1	385	277	567	339	368		387.2	493	82	83			78	-0.047	
110	15.970	17.737	0.15	0.16	1.04	1.09	76	90	1.09	1.2	113	0.039	102	102	6.2	-1	392	282	569	347	373		392.6	482	83	84			78	-0.045	
120	17.428	19.356	0.15	0.16	1.04	1.08	76	90	1.1	1.2	110	0.039	102	101	5.5	-0.7	398	287	547	353	380		393.0	447	83	83			78	-0.042	
130	18.887	20.976	0.15	0.16	1.04	1.09	75	90	1.1	1.2	106	0.039	102	101	4.9	-0.6	397	291	511	355	386		388.0	425	82	83			78	-0.041	
140	20.346	22.597	0.15	0.16	1.04	1.08	75	90	1.09	1.2	106	0.039	102	101	4.3	-0.6	391	294	484	356	387		382.4	411	82	83			78	-0.038	
150	21.806	24.217	0.15	0.16	1.04	1.09	76	90	1.09	1.2	104	0.039	101	101	4.0	-0.3	383	297	450	355	386		374.2	364	81	82			77	-0.033	
160	23.266	25.840	0.15	0.16	1.04	1.08	76	90	1.1	1.2	101	0.039	101	101	3.6	-0.4	373	296	410	351	382		362.4	339	81	82			77	-0.030	
170	24.725	27.460	0.15	0.16	1.03	1.08	76	90	1.09	1.2	100	0.039	101	101	3.3	-0.3	361	296	378	345	375		351.0	321	81	82			78	-0.028	
180	26.181	29.080	0.15	0.16	1.04	1.09	76	90	1.11	1.2	98	0.039	101	100	2.9	-0.4	349	293	355	339	369		341.0	307	81	81			78	-0.027	
190	27.638	30.698	0.15	0.16	1.03	1.08	76	90	1.11	1.2	96	0.039	100	100	2.6	-0.3	337	290	337	332	362		331.6	296	80	81			77	-0.025	
200	29.092	32.316	0.15	0.16	1.03	1.08	77	90	1.11	1.2	95	0.039	100	100	2.3	-0.3	327	288	322	326	354		323.4	284	80	81			77	-0.023	
210	30.546	33.934	0.15	0.16	1.03	1.08	77	90	1.11	1.2	94	0.039	100	100	2.2	-0.1	318	285	309	320	345		315.4	275	80	81			77	-0.022	
220	32.001	35.553	0.15	0.16	1.03	1.09	77	90	1.11	1.2	93	0.039	100	100	2.0	-0.2	311	282	298	315	338		308.8	265	80	80			78	-0.020	
230	33.457	37.171	0.15	0.16	1.03	1.08	76	90	1.11	1.2	92	0.039	100	100	1.8	-0.2	307	277	288	310	330		302.4	261	80	80			78	-0.020	
240	34.911	38.790	0.15	0.16	1.04	1.08	77	90	1.1	1.2	92	0.039	100	100	1.7	-0.1	302	270	280	306	324		296.4	254	79	80			78	-0.018	
250	36.368	40.409	0.15	0.16	1.03	1.08	77	90	1.11	1.2	92	0.039	100	100	1.6	-0.1	296	264	273	301	318		290.4	248	80	80			77	-0.018	
260	37.824	42.029	0.15	0.16	1.04	1.09	77	90	1.1	1.2	91	0.039	100	100	1.5	-0.1	291	258	267	296	312		284.8	243	79	80			78	-0.017	
270	39.279	43.647	0.15	0.16	1.04	1.08	77	90	1.11	1.2	92	0.039	100	100	1.3	-0.2	287	252	262	292	307		280.0	244	79	80			79	-0.016	
280	40.733	45.266	0.15	0.16	1.03	1.08	78	90	1.11	1.2	92	0.039	100	100	1.2	-0.1	286	247	260	289	303		277.0	243	80	81			79	-0.016	
290	42.187	46.882	0.15	0.16	1.02	1.08	79	90	1.11	1.2	92	0.039	99	100	1.0	-0.2	284	242	259	286	299		274.0	246	81	81			80	-0.016	
300	43.639	48.499	0.15	0.16	1.03	1.08	79	91	1.11	1.2	92	0.039	99	100	0.9	-0.1	282	238	259	284	294		271.4	246	81	82			80	-0.017	
310	45.091	50.116	0.15	0.16	1.03	1.08	79	91	1.1	1.2	92	0.039	99	100	0.7	-0.2	281	236	259	284	290		270.0	246	82	82			81	-0.017	
320	46.544	51.733	0.15	0.16	1.03	1.08	79	92	1.11	1.2	93	0.039	99	99	0.6	-0.1	283	235	261	286	286		270.2	252	82	82			80	-0.017	
330	47.997	53.352	0.15	0.16	1.03	1.08	79	92	1.1	1.2	93	0.039	99	100	0.3	-0.3	288	237	264	287	284		272.0	258	82	82			80	-0.018	
340	49.452	54.971	0.15	0.16	1.02	1.08	79	92	1.11	1.2	93	0.039	99	100	0.1	-0.2	298	247	269	288	287		277.8	259	82	82			81	-0.018	
350	50.906	56.591	0.15	0.16	1.03	1.08	79	92	1.11	1.2	93	0.039	99	100	0.0	-0.1	303	258	271	287	291		282.0	257	82	82			81	-0.018	
Avg/Total	50.906	56.591	0.15	0.16	1.03	1.07	76.14	88.94			101.61	0.039	100.72	100.69									76		80.89	81.72	#DIV/0!	#DIV/0!		-0.031	



PRINT

### Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>Harman</u>	Equipment Numbers: <u>23, 343, 131, 291</u>	Run #: <u>5</u>
Model: <u>TL 2.6</u>		Train #: <u>B</u>
Project No.: <u>135-S-30-8.3</u>		Date: <u>06/29/11</u>
Tracking No.: <u>1695</u>		

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G141	134.7	121.1	13.6
B. Rear filter catch	Filter	G142	120.6	119.8	0.8
C. Probe catch	Probe	16	114261.6	114260.9	0.7

Total Particulate, mg :	15.1
-------------------------	------

Component	Equations:
A. Front filter catch	$Final (mg) - Tare (mg) = Particulate, mg$
B. Rear filter catch	$Final (mg) - Tare (mg) = Particulate, mg$
C. Probe catch	$Final (mg) - Tare (mg) = Particulate, mg$

Analyst: *Ann/MS*      Date: 7/5/11

### STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: Harman Project #: 135-S-30-8.3 Tracking #: 1695  
 Date: 6/29/11 Test Crew: A. Kravitz Run #: 5  
 OMNI Equipment ID #: 185,355,356

Preburn [x] Test [ ]	Coal Bed										Actual		
	Fuel Weight	Delta Weight	Stack Draft	Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst	Coal Bed:	3.8
Time	TEMPERATURES (oF)												
0	11.5	0	-0.037	76	345	214	176	229	225	184	n/a		
10	10	-1.535	-0.033	75	323	230	266	248	255	224	n/a		
20	9.1	-0.897	-0.033	75	304	228	315	249	259	226	n/a		
30	8.3	-0.765	-0.027	75	300	224	330	250	266	210	n/a		
40	7.4	-0.924	-0.041	75	296	223	360	251	274	253	n/a		
50	6.1	-1.274	-0.039	75	300	225	429	258	280	87	n/a		
60	6.4	0.285	-0.037	75	310	232	442	267	292	401	n/a		
70	5.8	-0.61	-0.034	75	320	238	423	274	303	373	n/a		
80	4.4	-1.399	-0.049	75	324	246	494	281	314	538	n/a		
86	3.9	-0.509	-0.049	75	320	247	575	289	321	531	n/a		
86	3.9	-0.027	-0.049	75	320	247	578	290	322	528	n/a		
87	3.8	-0.061	-0.049	75	320	247	583	290	322	524	n/a		
87	3.8	-0.026	-0.048	75	321	247	587	291	323	521	n/a		

Technician signature:  Date: 7/5/11

### FUEL DATA

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3 Tracking #: 1695

Date: 6/29/11 Test Crew: A. Kravitz

Run #: 5

OMNI Equipment ID #: 431, 183, 383

FUEL LOAD PREPARED BY: A. Kravitz

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

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:	Cal Value (1) = 12%	Actual Reading	<u>12.0</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22.0</u>		
Piece	Length	Readings		Type	
1	<u>12</u> ft	<u>19.6</u>	<u>20.2</u>	<u>18.7</u>	<u>2x4</u>
2	<u>6</u> ft	<u>16.0</u>	<u>20.1</u>	<u>20.2</u>	<u>2x4</u>
3	ft				
Length of cut pieces: <u>8</u> inches		Pre-Burn Fuel Average Moisture: <u>19.47</u>			
Time (clock): <u>0932</u>		Room Temperature (F): <u>76</u>	Initials: <u>AK</u>		

TEST FUEL				
FUEL TYPE AND AMOUNT:	<u>2x4</u>	<u>4</u>	<u>4x4</u>	<u>2</u>
CALCULATED LOAD WEIGHT:	<u>19.2</u>	ACTUAL LOAD WEIGHT:		<u>9.2</u> (2x4)
				<u>10.0</u> (4x4)
FUEL PIECE LENGTH:	<u>16.5"</u>			<u>19.2</u> Total
MOISTURE CONTENT (METER -- DRY BASIS)				
PIECE	READINGS			TYPE
1	<u>21.1</u>	<u>19.7</u>	<u>21.5</u>	<u>2x4</u>
2	<u>20.0</u>	<u>19.7</u>	<u>19.9</u>	<u>2x4</u>
3	<u>20.5</u>	<u>19.8</u>	<u>21.1</u>	<u>2x4</u>
4	<u>19.8</u>	<u>20.1</u>	<u>18.8</u>	<u>2x4</u>
5	<u>21.3</u>	<u>21.1</u>	<u>18.1</u>	<u>4x4</u>
6	<u>21.3</u>	<u>22.4</u>	<u>21.2</u>	<u>4x4</u>
7				
8				
9				
10				
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>20.74</u>				
Time (clock): <u>0948</u>		Room Temperature (F): <u>76</u>		Initials: <u>AK</u>

Technician signature: A. Kravitz

Date: 6/29/11

### Run Notes

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1695

Run #: 5

Date: 6/24/11

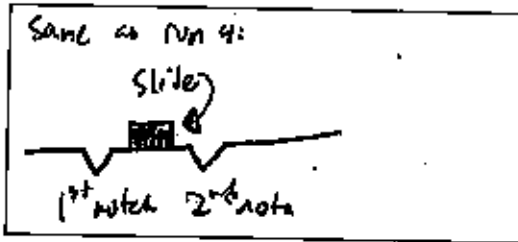
Test Crew: A. [Signature]

OMNI Equipment ID #(s): See next page (supplemental data)

#### PREBURN

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

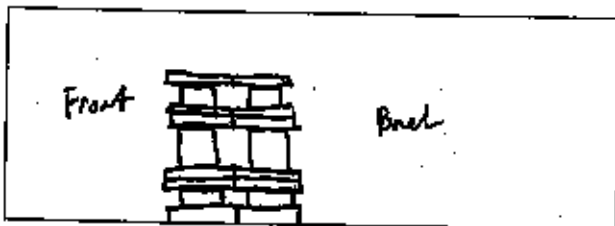
FAN: OFF

#### PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
37:00 12:00						stirred coals stirred coals

#### TEST

TEST FUEL CONFIGURATION SKETCH  
(INDICATE VIEW ANGLE)



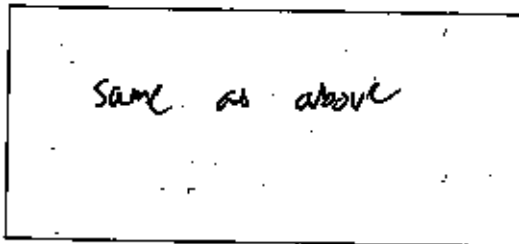
#### START UP PROCEDURES

BYPASS: Closed whole time  
 FUEL LOADING DOOR: Open @ 30 sec  
 PRIMARY AIR: Closed @ 1 min  
Set @ 5 min

OTHER: N/A

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

PRIMARY:



SECONDARY: Fixed

TERTIARY: N/A

FAN: OFF

Technician signature: [Signature]

Date: 7/5/11

### Supplemental Data EPA 5G/5H

Client: Harman

Model: TL 2.6

Project #: 135-S-30-8.3

Tracking #: 1965

Date: 6/29/11

Run #: 5 Booth: E1

Test Crew: A. Kravitz Start Time: 11:24 Stop Time: 11:44

OMNI Equipment #(s): 23, 31, 132, 141, 153, 185, 209, 215, 241, 246, 255, 261, 343, 410, 470, 471, 455, 507

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: 0

Initial: N/A

Final: 0

Final: N/A

Calibrations: Span Gas MIL CO<sub>2</sub>: 17.10 O<sub>2</sub>: N/A CO: 4.280 CO<sub>2</sub>(DT): N/A  
5.06 N/A 2.500

Time	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span
	0921	0924	0931	1716	1719	1720	
O <sub>2</sub>	N/A	N/A	N/A	N/A	N/A	N/A	
CO <sub>2</sub>	0.00	17.10	5.22	0.00	17.09	5.20	
CO	0.000	4.291	2.471	-0.006	4.264	2.477	
CO <sub>2</sub> (DT)	N/A	N/A	N/A	N/A	N/A	N/A	

Stack Diameter (inches): 6

Air Velocity (ft/min): Initial: 450 ft/min Final: 450 ft/min

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

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: 0 Post: 0

Flue Pipe Cleaned Prior to First Test in Series: Date: 6/24 Initials: AK

	Initial	Middle	Ending
Pb (in/Hg)	29.95	29.97	29.98
Room Temp (°F)	76	80	80

Technician signature: [Signature] Date: 7/5/11



Model: TL2.6  
Harman Home Heating  
352 Mountain House Road  
Halifax, PA 17032

## 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 TL2.6 wood stove. The TL2.6 wood stove is a non-catalytic, freestanding, radiant-type room heater. The firebox is constructed of mild steel and cast iron. Usable firebox volume was measured to be 2.6 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 June 21, 2011, then assigned and labeled with *OMNI* ID #1695. *OMNI* representative Aaron Kravitz conducted the certification testing and completed all testing by June 28, 2011. The EPA was notified of the testing dates in a letter dated June 20, 2011. 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 TL2.6 wood stove was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA -- Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the four test runs included in the results indicate a particulate emission rate of 3.7 grams per hour. Run #5, a fan confirmation test run, was performed and was not used in the weighted average emission results. 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 TL2.6 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 5G Emissions (g/hr)
1	2.75	0.49
2	0.95	5.38
3	1.42	1.49
4	0.97	8.21

Weighted particulate emission average of four test runs: 3.7 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	77	79	30.16	30.14	<50	<50
2	76	79	30.09	30.00	<50	<50
3	81	82	29.84	29.78	<50	<50
4	77	79	29.80	29.86	<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	15.7	22.1	3.3
2	11.2	23.4	3.4
3	11.3	19.7	3.5
4	10.9	21.9	3.4

**Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST**

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft <sup>3</sup> )	Fuel Loading Density Wet Basis (lbs/ft <sup>3</sup> )	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	16.2	2.6	6.23	23.1	16.5	4	2
2	16.8	2.6	6.46	23.0	16.5	4	2
3	16.8	2.6	6.46	22.2	16.5	4	2
4	16.6	2.6	6.38	22.6	14.5	4	2

**Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary**

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	130	14.51	150.0	121.4
2	390	13.68	149.1	89.5
3	264	13.45	142.3	101.6
4	380	13.41	144.6	91.5

**Table 1.5 - Heater Operation Data (Average Temperature Data)**

Run	Beginning Surface Temperature Average <sup>a</sup>	Ending Surface Temperature Average <sup>a</sup>	Surface Delta T <sup>b</sup>
1	372.2	382.4	10
2	298.8	205.0	94
3	374.6	250.4	123
4	284.8	215.0	70

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 Open	15.7 lbs at start; no addition; coal bed 3.3 lbs	0.0	60
2	Air Slide at First Notch	11.2 lbs at start; no addition; coal bed 3.4 lbs	0.0	91
3	Air Slide at Second Notch	11.3 lbs at start; 6.8 lbs added; coal bed 3.5 lbs	0.0	110
4	Air Slide Centered Between First and Second Notches	10.9 lbs at start; no addition; coal bed 3.4 lbs	0.0	79

**Table 1.7 – Run Data**

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (H <sub>2</sub> O)	Primary Air Setting (in)	Run Time (min)	Average Draft (H <sub>2</sub> O)
1	2.75	0	Fully Open	130	-0.049
2	0.95	0	Air Slide at First Notch	390	-0.020
3	1.42	0	Air Slide at Second Notch	264	-0.031
4	0.97	0	Air Slide Centered Between First and Second Notches	380	-0.020

Table 1.8 – Test Configurations

Run	Five-Minute Startup	Combustion Air
1	<u>Bypass</u> : N/A. <u>Fuel Loading</u> : Completed by 1 minute. <u>Door</u> : Closed at 1 minute. <u>Primary Air</u> : Fully open for duration of test. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Fully Open.
2	<u>Bypass</u> : Closed for duration of test. <u>Fuel Loading</u> : Completed by 1 minute 20 seconds. <u>Door</u> : Closed at 1 minute 30 seconds. <u>Primary Air</u> : Set to test setting at 5 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Air Slide at First Notch
3	<u>Bypass</u> : Closed for duration of test. <u>Fuel Loading</u> : Completed by 30 seconds. <u>Door</u> : Closed at 45 seconds. <u>Primary Air</u> : Set to test setting at 5 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Air Slide at Second Notch
4	<u>Bypass</u> : Closed for duration of test. <u>Fuel Loading</u> : Completed by 45 seconds. <u>Door</u> : Closed at 60 seconds. <u>Primary Air</u> : Set to test setting at 5 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Air Slide Centered Between First and Second Notches

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## TEST RESULTS AND DISCUSSION

A total of five test runs were performed on the TL2.6 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 rate was measured to be 3.7 g/hr.

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