



Certification Test Report

Harman Home Heating Freestanding Pellet Stove Model: P43

Report Number: 135-S-23-8.3



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Certification Test Report

Harman Home Heating Freestanding Pellet Stove Model: P43

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

Prepared by: OMNI-Test Laboratories, Inc.
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Portland, OR 97230
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Test Period: March 3-4, 2014

Report Date: April 2014

Report Number: 135-S-23-8.3

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AUTHORIZED SIGNATORIES

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



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OMNI-Test Laboratories, Inc.



Jeremy Clark, Emissions Testing Specialist
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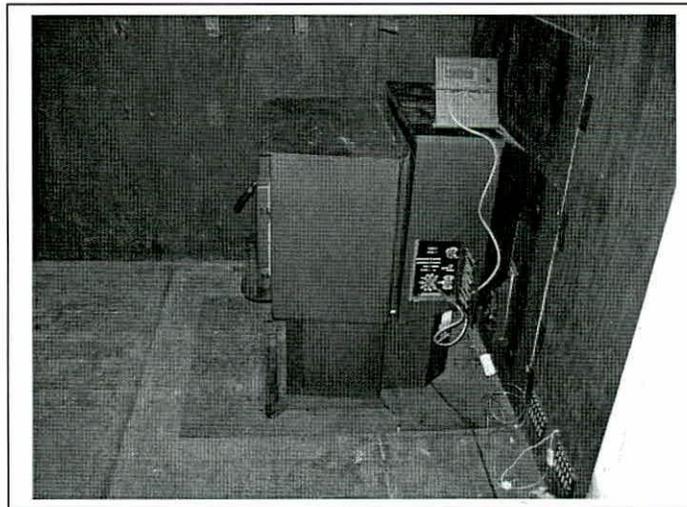
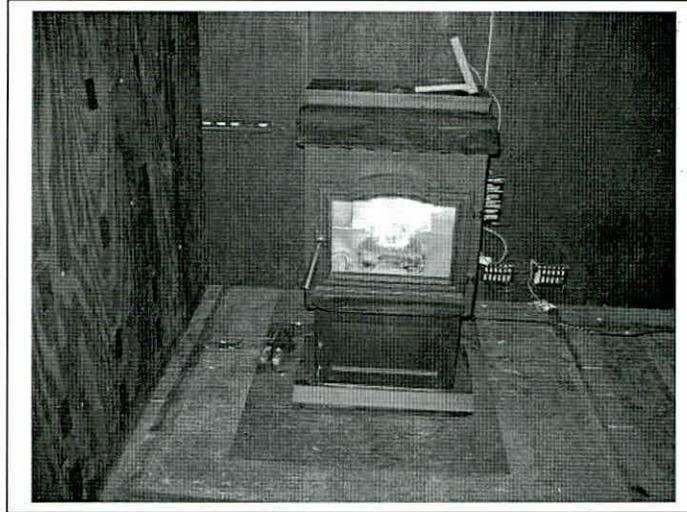
Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Section 1

Photographs/Appliance Description/Drawings

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Harman Home Heating
P43
Test Dates: March 3-4, 2014



APPLIANCE DESCRIPTION

Appliance Manufacturer: Harman Home Heating

Pellet Stove Model: P43

Type: Freestanding, Air-Circulating Type, Pellet-Fired Room Heater

PELLET HEATER DESCRIPTION

Materials of Construction: The firebox is constructed of mild steel with the exterior being constructed entirely of steel.

Air Introduction System: Air enters the firepot through holes in the firepot. Air is drawn through the pot via a combustion fan.

Combustion Control Mechanisms: Electronically controlled via user selectable control knob.

Combustor: N/A.

Internal Baffles: N/A.

Other Features: Large capacity ash drawer.

Flue Outlet: The 3-inch diameter flue outlet is located in the bottom/rear of the unit.

PELLET 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: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Section 4

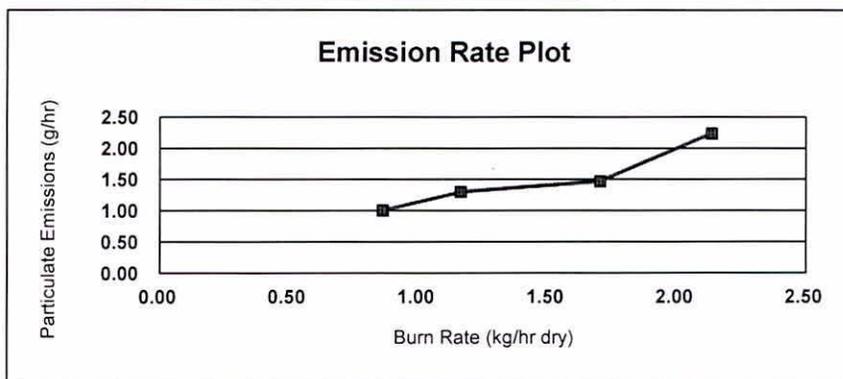
Test Data by Run

EPA Weighted Average Emissions EPA Method 28

Client: Harman
 Stove Model: P43
 Test Dates: 3/3/14 to 3/4/14
 Project Number: 135-S-23-8.3
 Tracking Number: 1945
 Signature/Date: _____

Status: Final
 Stove Type: Pellet Stove

**Weighted Average
(g/hr)
1.3**



Run #	2	
Burn Rate (dry kg/hr)	0.86	
Category	2	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.01	
Cap (g/hr)	15.00	
Weighting Factor	0.502	30.13%
Heat Output (BTU/hr)	12631	

Run #	3	
Burn Rate (dry kg/hr)	1.16	
Category	2	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.30	
Cap (g/hr)	15.00	
Weighting Factor	0.577	34.62%
Heat Output (BTU/hr)	17052	

Run #	4	
Burn Rate (dry kg/hr)	1.70	
Category	3	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.47	
Cap (g/hr)	18.00	
Weighting Factor	0.427	25.64%
Heat Output (BTU/hr)	24947	

Run #	1	
Burn Rate (dry kg/hr)	2.13	
Category	4	
Overall Efficiency (%)	78%	
Emissions (g/hr)	2.24	
Cap (g/hr)	18.00	
Weighting Factor	0.160	9.60%
Heat Output (BTU/hr)	31263	

Moisture Content Worksheet

Client: Harman

Model: P43

Project #: 135-S-23-8.3 Tracking #: 1945

Sample description: 100% softwood pellets

Weight record:

Prior to Oven-Drying

Balance ID #: OMNI - 00128

Audit ID #: 00283

Date/Time in: 3/3/14 11:30

Audit weight: 200.0 g

Container: ID#: 908

Tare weight: 106.1 g

Total weight: 244.0 g

Material weight (total weight - container tare weight): 137.9 g

Post Oven-Drying

Balance ID #: OMNI - 00128

Date/Time out: 3/6/14 11:30

Audit ID #: OMNI - 00283 B

Total weight: 237.2

Audit weight (if necessary): 200.0 g

Material weight (total weight - container tare weight): 131.1 g

Calculations:

$$\text{Dry basis (\%)} = \frac{137.9 - 131.1}{131.1} \times 100 = 5.19 \%$$

$$\text{Wet basis (\%)} = \frac{137.9 - 131.1}{137.9} \times 100 = 4.93 \%$$

Method: ASTM D4442-92 Method A—Oven-Drying Method

Technician signature: [Signature] Date: 3/6/14

Reviewed by: [Signature] Date: 4/9/14

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 1

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
 Model: P43
 Project No.: 135-S23-8.3
 Tracking No.: 1945
 Run: 1
 Test Date: 03/03/14

Burn Rate	2.13 kg/hr dry
Average Tunnel Temperature	113 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	12.9 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8050.7 dscf/hour
Average Delta p	0.035 inches H2O
Average Delta H	1.82 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	17.55 cubic feet	17.42 cubic feet	17.67 cubic feet
Average Gas Meter Temperature	69 degrees Fahrenheit	68 degrees Fahrenheit	69 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	17.6 dscf	17.5 dscf	17.7 dscf
Total Particulates - mn		2.7 mg	2.9 mg
Particulate Concentration (dry-standard)	0.00016 grams/dscf	0.00015 grams/dscf	0.00016 grams/dscf
Particulate Emission Rate	1.28 grams/hour	1.25 grams/hour	1.32 grams/hour
Adjusted Emissions	2.24 grams/hour	2.18 grams/hour	2.29 grams/hour
Difference from Average		0.05 grams/hour	0.05 grams/hour
7.5% of the average emission rate	0.17		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 1

Manufacturer: Harman
 Model: P43
 Tracking No.: 1945
 Project No.: 135-S23-8.3
 Test Date: 03-Mar-14
 Beginning Clock Time: 11:22
 Recording Interval: 10 min.
 Total Sampling Time: 120 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.029	0.032	0.038	0.038	0.026	0.036	0.040	0.038
Initial Temp.	118	118	118	118	118	118	118	118

OMNI Equipment Numbers: 132, 288, 296-T59, 371, 372, 410, 419

PM Control Module: 371/372
 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: -0.420 "H2O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.999 (1) 1.001 (2)
 Barometric Pressure: Begin Middle End Average
29.87 29.88 29.89 29.88 "Hg

Signature/Date: [Signature] 4/9/14
 Tunnel Velocity: 12.91 ft/sec.
 Initial Tunnel Flow: 133.3 scfm
 Average Tunnel Flow: 134.2 scfm
 Tunnel Area: 0.1963 ft²
 Post-Test Leak Check (1): 0.0@7.5 cfm@"Hg
 Post-Test Leak Check (2): 0.0@5 cfm@"Hg
 Fuel Moisture (dry basis %): 5.19
 Total Particulate (1): 2.7
 Total Particulate (2): 2.9

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF														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			1.53	1.16	67	67	0.25	0.8	118	0.035			9.9		385	567	522	558	577	N/A	521.8	405	67	68	N/A	N/A	69	-0.086		
10	1.446	1.470	0.14	0.15	1.87	1.63	66	67	0.15	0.7	136	0.035	103	103	9.1	-0.8	384	571	530	576	586		529.4	410	81	82			70	-0.086		
20	2.883	2.929	0.14	0.15	1.85	1.60	67	67	0.17	0.7	110	0.035	100	100	8.2	-0.9	391	579	546	577	590		536.6	411	75	77			70	-0.086		
30	4.326	4.393	0.14	0.15	1.85	1.61	67	67	0.18	0.7	109	0.035	100	100	7.3	-0.9	395	584	542	581	595		539.4	414	75	74			70	-0.086		
40	5.781	5.868	0.15	0.15	1.85	1.59	67	68	0.17	0.7	109	0.035	101	101	6.7	-0.6	388	579	532	569	581		529.8	410	75	75			70	-0.086		
50	7.233	7.341	0.15	0.15	1.84	1.61	68	68	0.16	0.7	110	0.035	101	101	5.8	-0.9	383	587	550	576	617		542.6	412	76	76			71	-0.086		
60	8.687	8.814	0.15	0.15	1.85	1.61	68	69	0.18	0.7	111	0.035	101	101	5.1	-0.7	397	578	544	587	590		539.2	411	77	77			72	-0.086		
70	10.142	10.289	0.15	0.15	1.85	1.60	69	69	0.17	0.6	111	0.035	101	101	4.2	-0.9	389	571	537	596	590		536.6	412	77	78			71	-0.086		
80	11.597	11.765	0.15	0.15	1.85	1.60	69	70	0.16	0.6	111	0.035	101	101	3.4	-0.8	387	565	529	589	583		530.6	411	78	79			72	-0.085		
90	13.052	13.241	0.15	0.15	1.85	1.60	70	70	0.16	0.6	111	0.035	100	101	2.6	-0.8	384	565	528	583	582		528.4	409	78	79			71	-0.084		
100	14.509	14.717	0.15	0.15	1.85	1.60	70	71	0.17	0.6	112	0.035	101	100	1.7	-0.9	396	579	541	603	600		543.8	416	78	79			72	-0.087		
110	15.965	16.194	0.15	0.15	1.82	1.61	70	71	0.17	0.6	112	0.035	101	101	0.8	-0.9	404	575	534	583	598		538.8	412	78	79			72	-0.085		
120	17.423	17.671	0.15	0.15	1.85	1.59	70	71	0.16	0.6	112	0.035	101	101	0.0	-0.8	393	572	534	583	583		533.0	411	79	79			72	-0.086		
Avg/Total	17.423	17.671	0.15	0.15	1.82	1.57	68.31	68.85			113.23	0.035	100.71	100.70									11		76.46	77.08	#DIV/0!	#DIV/0!		-0.086		

Method 28 Preburn Data

Run Data

Client:	Harman	Test Run:	1
Model:	P43	Date:	3/3/2014
Project Number:	135-S-23-8.3	Test Crew:	J. Clark
Tracking Number:	1945	Equipment:	288, 371, 372
Coal Bed Range (lb):		N/A (pellet)	

Logged Data

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Stack	Temperatures (F)							
				Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	37.8	-0.085	80	66	68	87	111	78	74		
10	31.3	-0.086	410	70	384	571	530	576	586		
20	30.4	-0.085	411	70	391	579	546	577	590		
30	29.5	-0.085	414	70	395	584	542	581	595		
40	28.9	-0.085	410	70	388	579	532	569	581		
50	28	-0.086	412	71	383	587	550	576	617		
60	27.3	-0.085	411	72	397	578	544	587	590		
Averages:			364.00	69.86	343.71	509.29	479.29	506.29	519.00		

[Signature]
4/1/14

Run Notes

Client: Harman
 Model: P43
 Project #: 135-S-23-8.3
 Tracking #: 1945
 Run #: 1 Date: 3/3/2014
 Test Crew: J. Clark
 OMNI Equipment ID #(s): N/A

PREBURN

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

PRIMARY:

Feed = 4.5
 Stove Temp = H
 Setting = 6.5

SECONDARY: N/A

TERTIARY: _____

FAN: Auto

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
	<u>N/A</u>					

TEST

TEST FUEL CONFIGURATION SKETCH
 (INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES

BYPASS: N/A

FUEL LOADING: _____

DOOR: _____

PRIMARY AIR: _____

OTHER: _____

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

PRIMARY:

Same as above

SECONDARY: N/A

TERTIARY: _____

FAN: Auto

Technician signature: [Signature] Date: 3/5/14

Supplemental Data EPA 5G/5H

Client: Harman

Model: P43 Project #: 135-S-23-8.3 Tracking #: 1945

Date: 3/3/2014 Run #: 1 Booth: E2

Test Crew: J. Clark Start Time: 11:22 Stop Time: 13:22

OMNI Equipment #(s): 132, 296-T59, 371, 372, 410, 419, 288

Stack Gas Leak Check:

Initial: 0

Final: 0

Dilution Tunnel Gas Leak Check (5H only):

Initial: N/A

Final: N/A

Calibrations: Span Gas CO₂: 16.80 O₂: 20.95 CO: 4.183 CO₂ (DT): N/A

Mid Gas CO₂: 10.02 O₂: 10.51 CO: 2.533 CO₂ (DT): N/A

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
	11:15	11:10	11:18	13:38	13:42	13:40
O ₂	0.00	20.95	10.56	0.06	20.86	10.60
CO ₂	0.00	16.80	9.99	0.11	16.59	9.86
CO	0.000	4.183	2.522	-0.005	4.187	2.530
CO ₂ (DT)	N/A			N/A		

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

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: 0 Final: 0

Stack Diameter (inches): 3" / 6"

Induced Draft: 0

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 2/17 Initials: AK

	Initial	Middle	Ending
P _b (in/Hg)	29.87	29.88	29.89
Ambient (°F)	69	72	72

Technician signature: [Signature]

Date: 3/5/14

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
0.029	118
0.032	118
0.038	118
0.038	118
0.020	118
0.036	118
0.040	118
0.038	118
N/A	N/A
↓	↓
Static P:	-0.42

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 2

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
 Model: P43
 Project No.: 135-S23-8.3
 Tracking No.: 1945
 Run: 2
 Test Date: 03/03/14

Burn Rate	0.86 kg/hr dry
Average Tunnel Temperature	87 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	12.6 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8242.3 dscf/hour
Average Delta p	0.035 inches H2O
Average Delta H	1.87 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	17.66 cubic feet	17.55 cubic feet	17.77 cubic feet
Average Gas Meter Temperature	71 degrees Fahrenheit	70 degrees Fahrenheit	71 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	17.6 dscf	17.5 dscf	17.7 dscf
Total Particulates - mn		1.2 mg	0.9 mg
Particulate Concentration (dry-standard)	0.00006 grams/dscf	0.00007 grams/dscf	0.00005 grams/dscf
Particulate Emission Rate	0.49 grams/hour	0.56 grams/hour	0.42 grams/hour
Adjusted Emissions	1.01 grams/hour	1.13 grams/hour	0.88 grams/hour
Difference from Average		0.12 grams/hour	0.12 grams/hour
7.5% of the average emission rate	0.08		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 2

Manufacturer: Harman

Model: P43

Tracking No.: 1945

Project No.: 135-S23-8.3

Test Date: 03-Mar-14

Beginning Clock Time: 14:36

Recording Interval: 10 min.

Total Sampling Time: 120 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.029	0.032	0.038	0.038	0.026	0.036	0.040	0.038
Initial Temp.	118	118	118	118	118	118	118	118

OMNI Equipment Numbers: 132, 288, 296-T59, 371, 372, 410, 419

PM Control Module: 371/372

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: -0.420 "H2O

Pitot Tube Cp: 0.99

Meter Box Y Factor: 0.999 (1) 1.001 (2)

Barometric Pressure: Begin Middle End Average

29.89 29.9 29.93 29.91 "Hg

Signature/Date: *[Signature]* 4/9/14

Tunnel Velocity: 12.61 ft/sec.

Initial Tunnel Flow: 133.4 scfm

Average Tunnel Flow: 137.4 scfm

Tunnel Area: 0.1963 ft²

Post-Test Leak Check (1): 0.0@7.5 cfm@"Hg

Post-Test Leak Check (2): 0.0@5 cfm@"Hg

Fuel Moisture (dry basis %): 5.19

Total Particulate (1): 1.2

Total Particulate (2): 0.9

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			1.84	1.57	70	70	0.17	0.7	118	0.035			4.0		253	320	367	362	336	N/A	327.6	228	72	72	N/A	N/A	70	-0.062	
10	1.460	1.476	0.15	0.15	1.89	1.64	70	71	0.18	0.7	85	0.035	100	100	3.6	-0.4	263	330	364	374	342		334.6	231	73	73			71	-0.063	
20	2.920	2.958	0.15	0.15	1.88	1.63	69	70	0.18	0.7	85	0.035	101	101	3.3	-0.3	258	323	356	367	333		327.4	229	73	73			71	-0.063	
30	4.379	4.437	0.15	0.15	1.87	1.61	69	70	0.18	0.7	85	0.035	100	101	3.0	-0.3	262	329	366	376	345		335.6	234	73	73			71	-0.063	
40	5.841	5.916	0.15	0.15	1.86	1.62	70	71	0.18	0.7	85	0.035	100	100	2.6	-0.4	245	318	350	352	329		318.8	229	73	73			71	-0.063	
50	7.303	7.395	0.15	0.15	1.88	1.61	70	71	0.18	0.7	85	0.035	100	100	2.3	-0.3	262	333	378	386	360		343.8	238	73	73			71	-0.064	
60	8.767	8.875	0.15	0.15	1.87	1.62	70	71	0.19	0.6	85	0.035	101	101	2.0	-0.3	239	319	351	354	333		319.2	230	73	73			71	-0.062	
70	10.231	10.356	0.15	0.15	1.87	1.62	70	71	0.18	0.6	85	0.035	101	101	1.7	-0.3	240	322	362	368	344		327.2	232	73	73			71	-0.063	
80	11.696	11.837	0.15	0.15	1.88	1.61	70	71	0.18	0.6	84	0.035	101	100	1.3	-0.4	238	322	381	364	349		330.8	230	73	73			70	-0.063	
90	13.160	13.319	0.15	0.15	1.88	1.62	70	72	0.19	0.6	85	0.035	101	100	1.0	-0.3	246	322	356	360	334		323.6	230	73	73			70	-0.062	
100	14.624	14.802	0.15	0.15	1.87	1.61	70	72	0.18	0.6	84	0.035	101	100	0.6	-0.4	251	331	370	390	354		339.2	233	73	73			71	-0.063	
110	16.089	16.284	0.15	0.15	1.87	1.61	71	72	0.17	0.6	85	0.035	101	100	0.3	-0.3	250	322	359	365	334		326.0	230	73	73			71	-0.063	
120	17.553	17.767	0.15	0.15	1.88	1.62	71	72	0.18	0.6	85	0.035	100	101	0.0	-0.3	239	321	352	363	335		322.0	234	73	73			71	-0.063	
Avg/Total	17.553	17.767	0.15	0.15	1.87	1.61	70.00	71.08			87.38	0.035	100.53	100.52									6		72.92	72.92	#DIV/0!	#DIV/0!		-0.063	

Method 28 Preburn Data

Run Data	
Client: Harman	Test Run: 2
Model: P43	Date: 3/3/2014
Project Number: 135-S-23-8.3	Test Crew: J. Clark
Tracking Number: 1945	Equipment: 288, 371, 372
Coal Bed Range (lb): N/A (pellet)	

Logged Data

Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Stack	Temperatures (F)							
				Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	22.1	-0.065	240	72	227	333	335	316	305		
10	21.8	-0.061	225	71	221	312	353	334	307		
20	21.6	-0.064	234	70	264	327	357	356	331		
30	21.3	-0.063	229	71	242	319	357	356	321		
40	21	-0.063	233	71	265	329	370	374	342		
50	20.7	-0.062	230	71	257	325	360	361	332		
60	20.3	-0.062	227	71	252	320	369	360	335		
Averages:		-0.063	231.14	71.00	246.86	323.57	357.29	351.00	324.71		

[Signature]
4/1/14

Run Notes

Client: Harman
 Model: P43
 Project #: 135-S-23-8.3
 Tracking #: 1945
 Run #: 2 Date: 3/3/14
 Test Crew: J. Clark
 OMNI Equipment ID #(s): 132, 296-759, 371, 372, 419, 410, 288

PREBURN

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

PRIMARY:
Low Burn
 Feed = 1
 Stove Temp = L
 Setting = 1
 SECONDARY: Auto
 TERTIARY: _____
 FAN: _____

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
<u>N/A</u>						

TEST

TEST FUEL CONFIGURATION SKETCH
 (INDICATE VIEW ANGLE)

N/A - pellet

START UP PROCEDURES

BYPASS: N/A
 FUEL LOADING: _____
 DOOR: _____
 PRIMARY AIR: _____
 OTHER: _____

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

PRIMARY:
Same as above
 SECONDARY: Auto
 TERTIARY: _____
 FAN: _____

Technician signature: [Signature] Date: 3/5/14

Supplemental Data EPA 5G/5H

Client: Harman

Model: P43 Project #: 135-S-23-8.3 Tracking #: 1945

Date: 3/3/14 Run #: 2 Booth: E2

Test Crew: J. Clark Start Time: 14:36 Stop Time: 16:36

OMNI Equipment #(s): 132, 288, 296-759, 371, 372, 419

Stack Gas Leak Check:

Dilution Tunnel Gas Leak Check (5H only):

Initial: Ø

Initial: N/A

Final: Ø

Final: N/A

Calibrations: Span Gas CO₂: 16.80 O₂: 20.95 CO: 4.183 CO₂(DT): N/A

Mid Gas CO₂: 10.02 O₂: 10.51 CO: 2.533 CO₂(DT): N/A

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
O ₂	0.00	20.95	10.57	-0.02	20.97	10.56
CO ₂	6.00	16.80	9.95	-0.02	16.82	9.92
CO	6.000	4.183	2.523	0.000	4.186	2.509
CO ₂ (DT)	N/A					

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

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: Ø Final: Ø

Stack Diameter (inches): 3" / 6"

Induced Draft: Ø

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 2/17 Initials: AK

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
0.029	118
0.032	
0.038	
0.038	
0.026	
0.036	
0.040	
0.038	
N/A	N/A
Static P:	-0.42

	Initial	Middle	Ending
P _b (in/Hg)	29.89	29.90	29.93
Ambient (°F)	72	71	71

Technician signature: [Signature]

Date: 3/5/14

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 3

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
 Model: P43
 Project No.: 135-S23-8.3
 Tracking No.: 1945
 Run: 3
 Test Date: 03/04/14

Burn Rate	1.16 kg/hr dry
Average Tunnel Temperature	100 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	11.9 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7670.7 dscf/hour
Average Delta p	0.031 inches H2O
Average Delta H	1.84 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	17.63 cubic feet	17.53 cubic feet	17.73 cubic feet
Average Gas Meter Temperature	69 degrees Fahrenheit	68 degrees Fahrenheit	69 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	17.8 dscf	17.7 dscf	17.9 dscf
Total Particulates - mn		1.6 mg	1.5 mg
Particulate Concentration (dry-standard)	0.00009 grams/dscf	0.00009 grams/dscf	0.00008 grams/dscf
Particulate Emission Rate	0.67 grams/hour	0.69 grams/hour	0.64 grams/hour
Adjusted Emissions	1.30 grams/hour	1.34 grams/hour	1.26 grams/hour
Difference from Average		0.04 grams/hour	0.04 grams/hour
7.5% of the average emission rate	0.10		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: **3**
 Manufacturer: Harman
 Model: P43
 Tracking No.: 1945
 Project No.: 135-S23-8.3
 Test Date: 04-Mar-14
 Beginning Clock Time: 09:20
 Recording Interval: 10 min.
 Total Sampling Time: 120 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.024	0.032	0.034	0.034	0.020	0.032	0.036	0.032
Initial Temp.	99	99	99	99	100	100	100	100

OMNI Equipment Numbers: 132, 288, 296-T59, 371, 372, 410, 419

PM Control Module: 371/372
 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: -0.370 "H₂O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.999 (1) 1.001 (2)
 Barometric Pressure: Begin Middle End Average
 30.10 30.09 30.08 30.09 "Hg

Signature/Date: *[Signature]* 4/4/14
 Tunnel Velocity: 11.94 ft/sec.
 Initial Tunnel Flow: 127.4 scfm
 Average Tunnel Flow: 127.8 scfm
 Tunnel Area: 0.1963 ft²
 Post-Test Leak Check (1): 0.0@8 cfm@"Hg
 Post-Test Leak Check (2): 0.0@5 cfm@"Hg
 Fuel Moisture (dry basis %): 5.19
 Total Particulate (1): 1.6
 Total Particulate (2): 1.5

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF														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. H ₂ O	
0	0.000	0.000			1.30	0.23	67	68	0.21	0.7	100	0.031			5.4		197	330	320	332	339	N/A	303.6	290	69	69	N/A	N/A	69	-0.068	
10	1.452	1.466	0.15	0.15	1.89	1.66	67	68	0.17	0.7	98	0.031	100	100	4.9	-0.5	200	330	304	329	332		299.0	287	72	72			69	-0.068	
20	2.910	2.943	0.15	0.15	1.90	1.63	67	67	0.18	0.7	98	0.031	101	101	4.5	-0.4	199	330	319	331	336		303.0	291	73	73			69	-0.068	
30	4.372	4.418	0.15	0.15	1.90	1.63	67	67	0.17	0.7	99	0.031	101	101	4.1	-0.4	199	338	318	332	341		305.6	294	74	74			69	-0.067	
40	5.833	5.894	0.15	0.15	1.89	1.63	67	68	0.17	0.7	100	0.031	101	101	3.6	-0.5	200	336	317	335	341		305.8	293	74	74			69	-0.067	
50	7.293	7.371	0.15	0.15	1.89	1.62	68	68	0.18	0.7	100	0.031	101	101	3.1	-0.5	205	341	330	345	353		314.8	300	75	75			69	-0.068	
60	8.757	8.849	0.15	0.15	1.89	1.63	68	69	0.18	0.6	100	0.031	101	101	2.7	-0.4	198	330	314	330	333		301.0	289	75	75			69	-0.066	
70	10.220	10.329	0.15	0.15	1.87	1.63	69	69	0.17	0.6	100	0.031	101	101	2.2	-0.5	196	327	318	329	334		300.8	289	75	75			70	-0.067	
80	11.683	11.809	0.15	0.15	1.89	1.63	69	70	0.17	0.6	101	0.031	101	101	1.8	-0.4	201	333	316	332	344		305.2	294	75	75			70	-0.066	
90	13.146	13.289	0.15	0.15	1.88	1.64	69	70	0.16	0.6	102	0.031	101	101	1.3	-0.5	202	335	318	340	343		307.6	296	76	76			70	-0.068	
100	14.608	14.770	0.15	0.15	1.86	1.62	70	70	0.16	0.6	102	0.031	101	101	0.9	-0.4	203	337	326	343	347		311.2	299	76	76			70	-0.068	
110	16.070	16.251	0.15	0.15	1.88	1.63	70	71	0.16	0.6	102	0.031	101	101	0.4	-0.5	205	337	326	342	343		310.6	297	76	76			71	-0.068	
120	17.532	17.732	0.15	0.15	1.88	1.63	70	71	0.16	0.6	101	0.031	101	101	0.0	-0.4	200	333	323	338	342		307.2	295	76	76			70	-0.066	
Avg/Total	17.532	17.732	0.15	0.15	1.84	1.52	68.31	68.92			100.19	0.031	100.75	100.76									4		74.31	74.31	#DIV/0!	#DIV/0!		-0.067	

Method 28 Preburn Data

Run Data	
Client: Harman	Test Run: 3
Model: P43	Date: 3/4/2014
Project Number: 135-S-23-8.3	Test Crew: J. Clark
Tracking Number: 1945	Equipment: 288, 371, 372
Coal Bed Range (lb): N/A (pellet)	

Logged Data		Temperatures (F)									
		Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out	
Elapsed Time (min)	Scale (lb)	Stack Draft (in H ₂ O)	Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	37.8	-0.039	140	66	73	117	154	116	119		
10	37.3	-0.059	238	66	133	240	237	258	260		
20	36.7	-0.064	270	67	175	297	286	312	312		
30	36.3	-0.064	277	68	185	313	288	319	322		
40	35.7	-0.065	280	68	188	320	297	321	324		
50	35.3	-0.066	281	69	187	318	304	321	322		
60	34.8	-0.067	291	69	197	330	317	333	340		
Averages:		-0.061	253.86	67.57	162.57	276.43	269.00	282.86	285.57		

JRC

4/1/14

Run Notes

Client: Harman

Model: P43

Project #: 135-S-23-8.3

Tracking #: 1945

Run #: 3/3/2014 3 Date: 3/4/2014

Test Crew: J. Clark

OMNI Equipment ID #(s): N/A

PREBURN

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

PRIMARY:

Category II
 Feed = 2
 Store Temp = H
 Setptg = 3.5

SECONDARY: Auto

TERTIARY: _____

FAN: _____

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
	N/A					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES

BYPASS: N/A

FUEL LOADING: _____

DOOR: _____

PRIMARY AIR: _____

OTHER: _____

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

PRIMARY:

Same as above

SECONDARY: Auto

TERTIARY: _____

FAN: _____

Technician signature:  Date: 3/5/14

Supplemental Data EPA 5G/5H

Client: Harman

Model: P43 Project #: 135-S-23-8.3 Tracking #: 1945

Date: 3/4/14 Run #: 3 Booth: E2

Test Crew: J. Clark Start Time: 9:20 Stop Time: 11:20

OMNI Equipment #(s): 132, 288, 296-T59, 371, 372, 410, 419

Stack Gas Leak Check:

Dilution Tunnel Gas Leak Check (5H only):

Initial: Ø

Initial: N/A

Final: Ø

Final: N/A

Calibrations: Span Gas CO₂: 16.80 O₂: 20.95 CO: 4.183 CO₂ (DT): N/A

Mid Gas CO₂: 10.02 O₂: 10.51 CO: 2.533 CO₂ (DT): N/A

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
	<u>8:05</u>	<u>8:08</u>	<u>8:13</u>	<u>11:30</u>	<u>11:33</u>	<u>11:34</u>
O ₂	<u>0.00</u>	<u>20.94</u>	<u>10.55</u>	<u>0.03</u>	<u>20.98</u>	<u>10.62</u>
CO ₂	<u>0.00</u>	<u>16.80</u>	<u>10.03</u>	<u>0.06</u>	<u>16.81</u>	<u>10.08</u>
CO	<u>0.000</u>	<u>4.183</u>	<u>2.519</u>	<u>0.000</u>	<u>4.175</u>	<u>2.528</u>
CO ₂ (DT)	<u>N/A</u>					

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

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: Ø Final: Ø

Stack Diameter (inches): 3" / 6"

Induced Draft: Ø

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 2/17 Initials: AK

	Initial	Middle	Ending
P _b (in/Hg)	<u>30.10</u>	<u>30.09</u>	<u>30.08</u>
Ambient (°F)	<u>66</u>	<u>69</u>	<u>70</u>

Technician signature: [Signature]

Date: 3/5/14

Tunnel Traverse	
dP (in H ₂ O)	T (°F)
<u>0.024</u>	<u>99</u>
<u>0.032</u>	<u>99</u>
<u>0.034</u>	<u>99</u>
<u>0.034</u>	<u>99</u>
<u>0.020</u>	<u>100</u>
<u>0.032</u>	<u>100</u>
<u>0.036</u>	<u>100</u>
<u>0.032</u>	<u>100</u>
<u>N/A</u>	<u>N/A</u>
<u>↓</u>	<u>↓</u>
<u>↓</u>	<u>↓</u>
Static P:	<u>-0.37</u>

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 4

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
 Model: P43
 Project No.: 135-S23-8.3
 Tracking No.: 1945
 Run: 4
 Test Date: 03/04/14

Burn Rate	1.70 kg/hr dry
Average Tunnel Temperature	108 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	12.0 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7612.7 dscf/hour
Average Delta p	0.031 inches H2O
Average Delta H	1.83 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	17.63 cubic feet	17.53 cubic feet	17.73 cubic feet
Average Gas Meter Temperature	71 degrees Fahrenheit	70 degrees Fahrenheit	71 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	17.7 dscf	17.6 dscf	17.8 dscf
Total Particulates - mn		1.8 mg	1.8 mg
Particulate Concentration (dry-standard)	0.00010 grams/dscf	0.00010 grams/dscf	0.00010 grams/dscf
Particulate Emission Rate	0.77 grams/hour	0.78 grams/hour	0.77 grams/hour
Adjusted Emissions	1.47 grams/hour	1.48 grams/hour	1.47 grams/hour
Difference from Average		0.01 grams/hour	0.01 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		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 4
 Manufacturer: Harman
 Model: P43
 Tracking No.: 1945
 Project No.: 135-S23-8.3
 Test Date: 04-Mar-14
 Beginning Clock Time: 12:30
 Recording Interval: 10 min.
 Total Sampling Time: 120 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.024	0.032	0.034	0.034	0.020	0.032	0.036	0.032
Initial Temp.	99	99	99	99	100	100	100	100

OMNI Equipment Numbers: 132, 288, 296-T59, 371, 372, 410, 419

PM Control Module: 371/372
 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: -0.370 "H2O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.999 (1) 1.001 (2)
 Barometric Pressure: 30.08 30.06 30.04 Average

Signature/Date: [Signature] 4/9/14
 Tunnel Velocity: 12.03 ft/sec
 Initial Tunnel Flow: 127.3 scfm
 Average Tunnel Flow: 126.9 scfm
 Tunnel Area: 0.1963 ft²
 Post-Test Leak Check (1): 0.0@8 cfm@"Hg
 Post-Test Leak Check (2): 0.0@5 cfm@"Hg
 Fuel Moisture (dry basis %): 5.19
 Total Particulate (1): 1.8
 Total Particulate (2): 1.8

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF														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			1.29	1.35	70	70	0.18	0.7	100	0.031			7.9		300	454	431	459	472	N/A	423.2	366	72	72	N/A	N/A	71	-0.078		
10	1.463	1.476	0.15	0.15	1.90	1.63	70	71	0.17	0.6	108	0.031	101	101	7.3	-0.6	298	454	429	455	467		420.6	366	76	75			72	-0.078		
20	2.922	2.954	0.15	0.15	1.88	1.62	70	71	0.16	0.6	109	0.031	101	101	6.6	-0.7	303	460	436	472	474		429.0	371	77	76			72	-0.079		
30	4.380	4.431	0.15	0.15	1.88	1.61	70	71	0.16	0.6	109	0.031	101	101	5.9	-0.7	300	462	429	471	475		427.4	373	78	77			72	-0.079		
40	5.838	5.907	0.15	0.15	1.88	1.62	70	71	0.16	0.6	109	0.031	101	101	5.2	-0.7	305	460	435	463	486		429.8	370	79	78			71	-0.080		
50	7.299	7.384	0.15	0.15	1.85	1.62	70	71	0.17	0.6	109	0.031	101	101	4.6	-0.6	295	454	424	460	472		421.0	368	79	78			71	-0.079		
60	8.760	8.862	0.15	0.15	1.88	1.62	70	71	0.16	0.6	109	0.031	101	101	3.9	-0.7	295	459	431	467	477		425.8	371	79	78			71	-0.080		
70	10.222	10.340	0.15	0.15	1.88	1.61	71	72	0.15	0.6	109	0.031	101	101	3.3	-0.6	281	449	423	458	463		414.8	365	79	78			71	-0.078		
80	11.685	11.818	0.15	0.15	1.87	1.62	71	72	0.17	0.6	109	0.031	101	101	2.6	-0.7	287	459	432	464	477		423.8	372	79	79			72	-0.079		
90	13.146	13.297	0.15	0.15	1.86	1.61	71	72	0.16	0.6	109	0.031	101	101	2.0	-0.6	288	451	425	451	474		417.8	367	79	79			71	-0.079		
100	14.607	14.775	0.15	0.15	1.88	1.62	71	72	0.16	0.6	109	0.031	101	101	1.3	-0.7	299	463	429	472	481		428.8	374	79	79			71	-0.079		
110	16.070	16.253	0.15	0.15	1.86	1.61	71	72	0.15	0.6	109	0.031	101	101	0.6	-0.7	288	452	420	455	468		416.6	367	79	79			72	-0.078		
120	17.531	17.731	0.15	0.15	1.88	1.62	71	72	0.16	0.6	109	0.031	101	101	0.0	-0.6	290	452	423	457	464		417.2	367	79	79			72	-0.079		
Avg/Total	17.531	17.731	0.15	0.15	1.83	1.60	70.46	71.38			108.19	0.031	100.82	100.81									6		78.00	77.46	#DIV/0!	#DIV/0!		-0.079		

Method 28 Preburn Data

Run Data	
Client:	Harman
Model:	P43
Project Number:	135-S-23-8.3
Tracking Number:	1945
Coal Bed Range (lb):	N/A (pellet)
Test Run:	4
Date:	3/4/2014
Test Crew:	J. Clark
Equipment:	288, 371, 372

Logged Data			Temperatures (F)									
Elapsed Time (min)	Scale (lb)	Stack Draft (in H2O)	Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out	
0	29	-0.066	281	71	191	321	323	324	321			
10	28.4	-0.073	333	71	241	387	380	408	415			
20	27.7	-0.076	351	71	277	426	411	435	449			
30	27	-0.078	361	71	299	447	434	453	468			
40	26.3	-0.079	367	71	307	460	430	465	471			
50	25.6	-0.078	365	71	299	453	434	455	474			
60	25	-0.079	366	71	301	454	436	459	470			
Averages:		-0.076	346.29	71.00	273.57	421.14	406.86	428.43	438.29			

J. Clark

4/1/14

4-25 of 4-26

Run Notes

Client: Harman

Model: P43

Project #: 135-S-23-8.3

Tracking #: 1945

Run #: 4 Date: 3/4/14

Test Crew: J. Clark

OMNI Equipment ID #(s): N/A

PREBURN

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

PRIMARY:

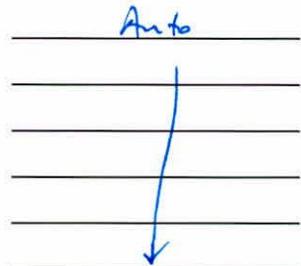
Category III

Feed Rate = 3
Stove Temp = H
Setting = 5.5

SECONDARY: Auto

TERTIARY: _____

FAN: _____



PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
_____	N/A					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES

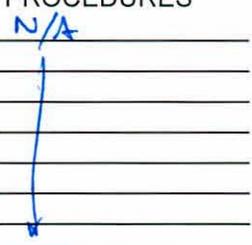
BYPASS: N/A

FUEL LOADING: _____

DOOR: _____

PRIMARY AIR: _____

OTHER: _____



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

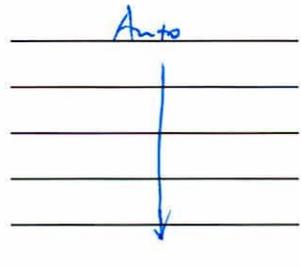
PRIMARY:

Same
as
Above

SECONDARY: Auto

TERTIARY: _____

FAN: _____



Technician signature: _____ Date: 3/5/14

Supplemental Data EPA 5G/5H

Client: Harman

Model: P43

Project #: 135-S-23-8.3

Tracking #: 1945

Date: 3/4/14 Run #: 4 Booth: E2

Test Crew: J. Clark Start Time: 12:30 Stop Time: 14:30

OMNI Equipment #(s): 132, 296-T59, 371, 372, 410, 419, 288

Stack Gas Leak Check:

Initial: ∅

Final: ∅

Dilution Tunnel Gas Leak Check (5H only):

Initial: N/A

Final: N/A

Calibrations: Span Gas CO₂: 16.83 O₂: 20.95 CO: 4.183 CO₂(DT): N/A
Mid Gas CO₂: 10.02 O₂: 10.51 CO: 2.533 CO₂(DT): N/A

Time	Pre Test			Post Test			Span
	Zero	Span	Mid	Zero	Span	Mid	
Time	<u>11:40</u>	<u>11:42</u>	<u>11:44</u>	<u>14:40</u>	<u>14:42</u>	<u>14:42</u>	<u>14:44</u>
O ₂	<u>0.00</u>	<u>20.95</u>	<u>10.56</u>	<u>0.01</u>	<u>10.60</u>	<u>10.60</u>	<u>20.94</u>
CO ₂	<u>0.00</u>	<u>16.83</u>	<u>10.56^{10.02}</u>	<u>0.01</u>	<u>9.99</u>	<u>9.99</u>	<u>16.81</u>
CO	<u>0.000</u>	<u>4.183</u>	<u>2.454</u>	<u>-0.005</u>	<u>2.446</u>	<u>2.446</u>	<u>4.172</u>
CO ₂ (DT)	<u>N/A</u>						

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

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: ∅ Final: ∅

Stack Diameter (inches): 6"

Induced Draft: ∅

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 2/17 Initials: AK

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
<u>0.024</u>	<u>99</u>
<u>0.032</u>	<u>99</u>
<u>0.034</u>	<u>99</u>
<u>0.034</u>	<u>99</u>
<u>0.020</u>	<u>100</u>
<u>0.032</u>	<u>100</u>
<u>0.036</u>	<u>100</u>
<u>0.032</u>	<u>100</u>
<u>N/A</u>	<u>N/A</u>
↓	↓
↓	↓
Static P:	<u>-0.37</u>

	Initial	Middle	Ending
P _b (in/Hg)	<u>30.08</u>	<u>30.06</u>	<u>30.04</u>
Ambient (°F)	<u>71</u>	<u>72</u>	<u>72</u>

Technician signature: [Signature]

Date: 3/4/14

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Section 5

Sampling Procedures and Test Results

INTRODUCTION

Harman Home Heating retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the P43 pellet stove. The P43 is a non-catalytic, freestanding, convective-type room heater. The firebox is constructed of mild steel and the stove is vented through a three-inch diameter flue collar located at the rear of the unit.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in on February 27, 2014. It was assigned and labeled with *OMNI* ID #1945. *OMNI* representative Jeremy Clark conducted the certification testing and completed all testing by March 4, 2014. The EPA was notified of the testing dates in a letter dated February 3, 2014. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Matthew Troutman of Harman Home Heating and is on file at *OMNI*'s testing facility.

The P43 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 two Method 5G sampling trains consisting of two filters each (front and back). The weighted average emissions of the four test runs indicate a particulate emission rate of 1.3 g/hr. 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 the individual test runs did not exceed the cap. The P43 results are within the emission limit of 7.5 g/hr 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.
- “DO NOT TAMPER” labels were placed on 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	2.13	2.24
2	0.86	1.01
3	1.16	1.30
4	1.70	1.47
Weighted particulate emission average of four test runs: 1.3 g/hr		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	69	72	29.87	29.89	<50	<50
2	70	71	29.89	29.93	<50	<50
3	69	70	30.10	30.08	<50	<50
4	71	72	30.08	30.04	<50	<50

Table 1.3.1 – Fuel Measurement Summary – PRETEST

Run	Beginning Fuel Weight (lbs)	Ending Fuel Weight (lbs)
1	37.8	27.3
2	22.1	20.3
3	37.8	34.8
4	29.0	25.0

Table 1.3.2 – Fuel Measurement Summary – TEST

Run	Beginning Fuel Weight (lbs)	Fuel Moisture Content (Dry basis - %)	Ending Fuel Weight (lbs)
1	9.9	5.19	0.0
2	4.0	5.19	0.0
3	5.4	5.19	0.0
4	7.9	5.19	0.0

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	120	12.91	134.2	113
2	120	12.61	137.4	87
3	120	11.94	127.8	100
4	120	12.03	126.9	108

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	529.4	533.0	3.6
2	334.6	322.0	12.6
3	299.0	307.2	8.2
4	420.6	417.2	3.4

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

Table 1.6 – Pretest Configurations

Run	Stove Control Setting	Feed Adjuster	Stove Temperature Setting	Time (min)
1	6.5	Level 4.5	High	60
2	1	Level 1	Low	60
3	3.5	Level 2	High	60
4	5.5	Level 3	High	60

Table 1.7 – Test Configurations and Run Data

Run	Stove Control Setting	Feed Adjuster	Temperature Setting	Burn Rate (dry kg/hr)	Initial (Induced) Draft (in H ₂ O)	Average Draft (in H ₂ O)	Run Time (min)
1	6.5	Level 4.5	High	2.13	0	-0.086	120
2	1	Level 1	Low	0.86	0	-0.063	120
3	3.5	Level 2	High	1.16	0	-0.067	120
4	5.5	Level 3	High	1.70	0	-0.079	120

Model: P43
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

TEST RESULTS AND DISCUSSION

A total of four test runs were conducted in the following categories: 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 **1.3 g/hr**.

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