

Certification Test Report

Harman Home Heating Pellet Stove Insert Model: P35i

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

Prepared by: OMNI-Test Laboratories, Inc.
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Test Period: June 12-13, 2014; August 25, 2014

Report Date: August 2014

Report Number: 135-S-25c-8.3

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Model: P35i
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Section 1

Photographs/Appliance Description/Drawings

Model: P35i
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Harman Home Heating
P35i
Test Dates: June 12-13, 2014



APPLIANCE DESCRIPTION

Appliance Manufacturer: Harman Home Heating

Pellet Stove Model: P35i

Type: Air-circulating type, pellet-fired fireplace insert.

PELLET HEATER DESCRIPTION

Materials of Construction: The unit is constructed of mild steel with the door being constructed of cast iron.

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 4-inch diameter flue outlet is located in the top right-hand side 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.

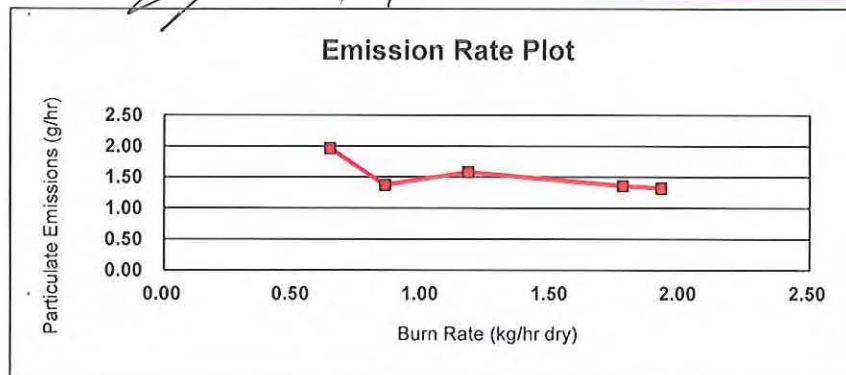
Model: P35i
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Section 4

Test Data by Run

EPA Weighted Average Emissions EPA Method 28

Client: Harman Status: Final
 Stove Model: P35i Stove Type: Pellet Stove
 Test Dates: June 12-13, 2014; August 25, 2014
 Project Number: 135-S-25c-8.3
 Tracking Number: 1979
 Signature/Date: *[Signature]* 8/27/14

**Weighted Average
(g/hr)
1.5**


Run #	5		Run #	4	
Burn Rate (dry kg/hr)	0.64		Burn Rate (dry kg/hr)	1.93	
Category	1		Category	4	
Overall Efficiency (%)	78%		Overall Efficiency (%)	78%	
Emissions (g/hr)	1.96		Emissions (g/hr)	1.32	
Cap (g/hr)	15.00		Cap (g/hr)	18.00	
Weighting Factor	0.254	14.25%	Weighting Factor	0.136	7.62%
Heat Output (BTU/hr)	9605		Heat Output (BTU/hr)	28814	

Run #	1				
Burn Rate (dry kg/hr)	0.86				
Category	2				
Overall Efficiency (%)	78%				
Emissions (g/hr)	1.38				
Cap (g/hr)	15.00				
Weighting Factor	0.397	22.28%			
Heat Output (BTU/hr)	12806				

Run #	2				
Burn Rate (dry kg/hr)	1.18				
Category	2				
Overall Efficiency (%)	78%				
Emissions (g/hr)	1.58				
Cap (g/hr)	15.00				
Weighting Factor	0.610	34.23%			
Heat Output (BTU/hr)	17609				

Run #	3				
Burn Rate (dry kg/hr)	1.78				
Category	3				
Overall Efficiency (%)	78%				
Emissions (g/hr)	1.36				
Cap (g/hr)	18.00				
Weighting Factor	0.385	21.62%			
Heat Output (BTU/hr)	26573				

Model: P35i
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 1

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
 Model: P35i
 Project No.: 135-S-25c-8.3
 Tracking No.: 1979
 Run: 1
 Test Date: 06/12/14

Burn Rate	0.86 kg/hr dry
Average Tunnel Temperature	85 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.5 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8882.9 dscf/hour
Average Delta p	0.040 inches H2O
Average Delta H	1.53 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	15.62 cubic feet	16.03 cubic feet	15.22 cubic feet
Average Gas Meter Temperature	73 degrees Fahrenheit	73 degrees Fahrenheit	73 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	15.6 dscf	16.0 dscf	15.1 dscf
Total Particulates - mn		1.3 mg	1.2 mg
Particulate Concentration (dry-standard)	0.00008 grams/dscf	0.00008 grams/dscf	0.00008 grams/dscf
Particulate Emission Rate	0.71 grams/hour	0.72 grams/hour	0.70 grams/hour
Adjusted Emissions	1.38 grams/hour	1.39 grams/hour	1.36 grams/hour
Difference from Average		0.01 grams/hour	0.01 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: 1

Manufacturer: Harman

Model: P35i

Tracking No.: 1979

Project No.: 135-S-25c-8.3

Test Date: 12-Jun-14

Beginning Clock Time: 11:49

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	0.040	0.044	0.040	0.036	0.036	0.040	0.042	0.042
Initial Temp.	84	84	85	85	85	85	85	85

OMNI Equipment Numbers: See Run Notes.

PM Control Module: N/A

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: -0.390 "H2O

Pitot Tube Cp: 0.99

Meter Box Y Factor: 1.002 (1) 0.999 (2)

Barometric Pressure: Begin Middle End Average

Signature/Date: 6/18/14

Tunnel Velocity: 13.52 ft/sec.

Initial Tunnel Flow: 148.1 scfm

Average Tunnel Flow: 148.0 scfm

Tunnel Area: 0.1963 ft2

Post-Test Leak Check (1): 0.00@6 cfm@"Hg

Post-Test Leak Check (2): 0.00@5 cfm@"Hg

Fuel Moisture (dry basis %): 5.98

Total Particulate (1): 1.3

Total Particulate (2): 1.2

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	
0	0.000	0.000			0.87	0.10	73	73	0.35	0.7	85	0.040			4.0		113	282	97	319	321	N/A	226.4	248	73	74	N/A	N/A	72	-0.060
10	1.321	1.264	0.13	0.13	1.60	1.24	72	73	0.32	0.7	85	0.040	100	100	3.7	-0.3	113	282	97	316	315		224.6	246	74	74			72	-0.059
20	2.651	2.534	0.13	0.13	1.58	1.22	72	72	0.32	0.7	85	0.040	100	101	3.3	-0.4	114	287	98	321	318		227.6	253	74	74			72	-0.060
30	3.985	3.803	0.13	0.13	1.58	1.21	72	72	0.32	0.7	85	0.040	101	101	3.0	-0.3	114	285	98	306	313		223.2	248	74	74			72	-0.060
40	5.319	5.072	0.13	0.13	1.59	1.21	72	73	0.32	0.7	85	0.040	101	101	2.7	-0.3	114	286	98	308	312		223.6	250	75	75			72	-0.060
50	6.656	6.340	0.13	0.13	1.59	1.21	72	73	0.32	0.7	85	0.040	101	101	2.3	-0.4	115	286	98	305	306		222.0	246	75	75			72	-0.059
60	7.994	7.606	0.13	0.13	1.58	1.21	73	73	0.31	0.7	85	0.040	101	101	2.0	-0.3	115	288	99	307	312		224.2	248	75	75			73	-0.060
70	9.334	8.875	0.13	0.13	1.59	1.21	73	74	0.31	0.7	86	0.040	101	101	1.7	-0.3	116	287	99	309	309		224.0	249	75	75			73	-0.060
80	10.671	10.144	0.13	0.13	1.59	1.21	73	74	0.31	0.7	86	0.040	101	101	1.4	-0.3	116	288	99	313	312		225.6	250	75	75			73	-0.060
90	12.011	11.413	0.13	0.13	1.59	1.21	74	74	0.31	0.7	86	0.040	101	101	1.0	-0.4	117	288	99	310	312		225.2	250	75	75			73	-0.060
100	13.350	12.682	0.13	0.13	1.58	1.21	74	74	0.31	0.7	86	0.040	101	101	0.7	-0.3	117	290	100	312	313		226.4	251	76	75			74	-0.060
110	14.689	13.952	0.13	0.13	1.58	1.20	74	75	0.31	0.7	86	0.040	101	101	0.4	-0.3	117	289	100	310	316		226.4	251	76	76			73	-0.060
120	16.027	15.221	0.13	0.13	1.58	1.21	74	74	0.3	0.7	86	0.040	101	101	0.0	-0.4	117	288	100	312	311		225.6	251	76	76			73	-0.060
Avg/Total	16.027	15.221	0.13	0.13	1.53	1.13	72.92	73.38			85.44	0.040	100.77	100.77									1		74.85	74.85				-0.060

Run Notes

Client: Harman
Model: P35i
Project #: 135-S-33-8.3 135-S-25c-8.3
Tracking #: 1979
Run #: 1 Date: 6/12/2014
Test Crew: J. Clark
OMNI Equipment ID #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-T55, 343, 371, 372, 378, 410, 436

PREBURN

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

PRIMARY:

Low Burn - Cat I

Temp knob = 1.00

Feed knob = 1.82

Constant Burn #

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 - pellet

START UP PROCEDURES

BYPASS:

FUEL LOADING:

DOOR:

PRIMARY AIR:

OTHER:

N/A

Auto

N/A

Auto

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

PRIMARY:

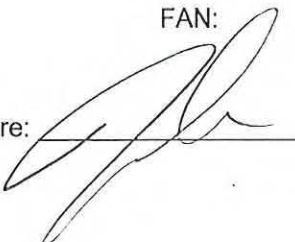
Same as Above

SECONDARY:

Auto

TERTIARY:

FAN:

Technician signature: 

Date: 6/12/14

Supplemental Data EPA 5G/5H

Client: Harman

Model: P35i

Project #: 135-5-25c-8.3
135-6-33-8.3-3c

Tracking #: 1979

Date: 6/12/14 Run #: 1 Booth: E2

Test Crew: J. Clark Start Time: 11:49 Stop Time: 13:49

OMNI Equipment #(s): 132, 436, 288, 123, 128, 131, 209, 283B, 296-755, 343, 371, 372, 378, 410

Stack Gas Leak Check:

Initial: Ø

Final: Ø

Dilution Tunnel Gas Leak Check (5H only):

Initial: N/A

Final: ↓

Calibrations: Span Gas CO₂: 16.83 O₂: 20.95 CO: 4.183 CO₂ (DT): N/A
Mid Gas CO₂: 9.86 O₂: 10.47 CO: 2.493 CO₂ (DT): ↓
9.87

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
	<u>10:53</u>	<u>10:56</u>	<u>10:59</u>	<u>10:53</u>	<u>13:52</u>	<u>13:52</u>
O ₂	<u>0.00</u>	<u>20.95</u>	<u>10.65</u>	<u>0.00</u>	<u>20.93</u>	<u>10.69</u>
CO ₂	<u>0.00</u>	<u>16.83</u>	<u>10.00</u>	<u>0.05</u>	<u>16.85</u>	<u>10.03</u>
CO	<u>0.000</u>	<u>4.183</u>	<u>2.429</u>	<u>0.004</u>	<u>4.178</u>	<u>2.429</u>
CO ₂ (DT)	<u>N/A</u>					<u>→</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): 6"

Induced Draft: Ø

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 6/12/14 Initials: JC

	Initial	Middle	Ending
P _b (in/Hg)	<u>29.96</u>	<u>29.96</u>	<u>29.96</u>
Ambient (°F)	<u>72</u>	<u>72</u>	<u>74</u>

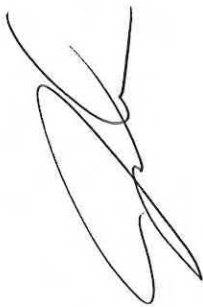
Technician signature: [Signature]

Date: 6/12/14

Tunnel Traverse	
dP (in H ₂ O)	T (°F)
<u>1.050, 0.040</u>	<u>84</u>
<u>.044</u>	<u>84</u>
<u>.040</u>	<u>85</u>
<u>.036</u>	<u>85</u>
<u>.036</u>	<u>85</u>
<u>.040</u>	<u>85</u>
<u>.042</u>	<u>85</u>
<u>.042</u>	<u>85</u>
<u>N/A</u>	<u>N/A</u>
<u>↓</u>	<u>↓</u>
Static P:	<u>- .39</u>

Method 28 Preburn Data

Run Data		Client: Harman		Test Run: 1							
Model: P35i		Date: 6/12/2014									
Project Number: 135-S-25c-8.3		Test Crew: J. Clark									
Tracking Number: 1979		Equipment: 288, 371, 372									
Coal Bed Range (lb):		N/A (pellet)									
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	40.4	-0.006	73	70	73	72	72	72	73	N/A	N/A
10	39.9	-0.038	191	71	82	147	81	271	293		
20	39.5	-0.044	221	71	98	207	91	310	324		
30	39.2	-0.058	234	71	105	244	94	310	318		
40	38.8	-0.059	244	72	109	265	96	321	318		
50	38.4	-0.059	246	72	111	275	97	319	318		
60	38.1	-0.06	247	72	113	282	97	319	321		
Averages:		-0.046	208.00	71.29	98.71	213.14	89.71	274.57	280.71		

 6/18/14

Run 2

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
Model: P35i
Project No.: 135-S-25c-8.3
Tracking No.: 1979
Run: 2
Test Date: 06/12/14

Burn Rate	1.18 kg/hr dry
Average Tunnel Temperature	96 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.6 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8800.3 dscf/hour
Average Delta p	0.040 inches H2O
Average Delta H	1.56 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	15.65 cubic feet	16.05 cubic feet	15.25 cubic feet
Average Gas Meter Temperature	74 degrees Fahrenheit	74 degrees Fahrenheit	74 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	15.6 dscf	16.0 dscf	15.1 dscf
Total Particulates - mn		1.7 mg	1.3 mg
Particulate Concentration (dry-standard)	0.00010 grams/dscf	0.00011 grams/dscf	0.00009 grams/dscf
Particulate Emission Rate	0.85 grams/hour	0.94 grams/hour	0.76 grams/hour
Adjusted Emissions	1.58 grams/hour	1.72 grams/hour	1.44 grams/hour
Difference from Average		0.14 grams/hour	0.14 grams/hour
7.5% of the average emission rate	0.12		
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: P35i

Tracking No.: 1979

Project No.: 135-S-25e-8.3

Test Date: 12-Jun-14

Beginning Clock Time: 14:56

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	0.038	0.044	0.040	0.036	0.034	0.042	0.044	0.042
Initial Temp.	96	96	96	96	96	96	96	96

OMNI Equipment Numbers: See Run Notes

PM Control Module: N/A

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: -0.430 "H2O

Pitot Tube Cp: 0.99

Meter Box Y Factor: 1.002 (1) 0.999 (2)

Barometric Pressure: Begin Middle End Average

29.96 29.97 29.99 29.97 "Hg

Signature/Date: 6/18/14

Tunnel Velocity: 13.65 ft/sec.

Initial Tunnel Flow: 146.5 scfm

Average Tunnel Flow: 146.7 scfm

Tunnel Area: 0.1963 ft2

Post-Test Leak Check (1): 0@5.5 cfm@"Hg

Post-Test Leak Check (2): 0@5 cfm@"Hg

Fuel Moisture (dry basis %): 5.98

Total Particulate (1): 1.7

Total Particulate (2): 1.3

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			1.23	0.72	74	74	0.32	0.7	96	0.040			5.5		125	354	105	321	337	N/A	248.4	306	74	74	N/A	N/A	72	-0.070			
10	1.337	1.275	0.13	0.13	1.61	1.22	74	74	0.32	0.7	95	0.040	101	101	5.0	-0.5	125	352	105	324	346		250.4	308	76	76			72	-0.070			
20	2.673	2.548	0.13	0.13	1.60	1.22	73	74	0.32	0.7	95	0.040	101	101	4.6	-0.4	124	352	104	323	341		248.8	307	76	76			72	-0.070			
30	4.010	3.819	0.13	0.13	1.59	1.22	73	73	0.31	0.7	95	0.040	101	101	4.1	-0.5	124	353	105	329	352		252.6	312	77	77			72	-0.070			
40	5.347	5.089	0.13	0.13	1.59	1.21	73	74	0.32	0.7	96	0.040	101	101	3.7	-0.4	125	352	105	323	347		250.4	310	77	77			73	-0.070			
50	6.681	6.358	0.13	0.13	1.58	1.21	73	74	0.31	0.7	95	0.040	101	101	3.2	-0.5	126	357	105	328	347		252.6	313	77	77			72	-0.071			
60	8.020	7.628	0.13	0.13	1.58	1.22	74	74	0.32	0.7	96	0.040	101	101	2.8	-0.4	126	359	105	333	357		256.0	314	77	77			73	-0.071			
70	9.363	8.898	0.13	0.13	1.57	1.21	74	74	0.31	0.7	96	0.040	101	101	2.3	-0.5	127	356	106	327	352		253.6	312	78	77			74	-0.070			
80	10.701	10.168	0.13	0.13	1.58	1.21	74	74	0.31	0.7	96	0.040	101	101	1.8	-0.5	128	359	107	335	361		258.0	318	78	77			74	-0.070			
90	12.038	11.438	0.13	0.13	1.58	1.20	74	74	0.32	0.7	96	0.040	101	101	1.4	-0.4	128	359	108	331	360		257.2	316	78	78			74	-0.071			
100	13.375	12.707	0.13	0.13	1.58	1.21	74	75	0.31	0.7	96	0.040	101	100	0.9	-0.5	129	361	108	327	357		256.4	313	78	78			74	-0.070			
110	14.713	13.977	0.13	0.13	1.58	1.21	74	75	0.31	0.7	97	0.040	101	101	0.5	-0.4	128	357	107	333	362		257.4	319	78	78			74	-0.071			
120	16.052	15.246	0.13	0.13	1.58	1.20	75	75	0.31	0.7	98	0.040	101	101	0.0	-0.5	130	363	109	339	359		260.0	321	79	78			75	-0.072			
Avg/Total	16.052	15.246	0.13	0.13	1.56	1.17	73.77	74.15			95.92	0.040	100.77	100.76									12		77.15	76.92				-0.070			

Run Notes

Client: Harman
Model: P35i
Project #: 135-S-33-8.3.2c 135-S-25c-8.3
Tracking #: 1979
Run #: 2 Date: 6/12/14
Test Crew: J. Clark
OMNI Equipment ID #(s): 1,13,128,131,132,209,2828,288,296-755,343,371,372,378,410,436

PREBURN

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

PRIMARY:

Med-Low - Cat II

Temp knob = 4.53

Feed knob = 2.60

Constant Burn H

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 - pellet

START UP PROCEDURES

BYPASS:

FUEL LOADING:

DOOR:

PRIMARY AIR:

OTHER:

N/A

Auto

N/A

Auto

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

PRIMARY:

SECONDARY:

TERTIARY:

FAN:

Same as above

Auto

Technician signature: 

Date: 6/12/14
4-12 of 4-32

Supplemental Data EPA 5G/5H

Client: Harman 135-3-25c-8.3
Model: P35i Project #: 135-S-33-8.3-8c Tracking #: 1979
Date: 6/12/14 Run #: 2 Booth: E2
Test Crew: J. Clark Start Time: 14:56 Stop Time: 16:56
OMNI Equipment #(s): 209, 132, 436, 288, 1, 23, 128, 131, 283B, 296-135, 343, 371, 372, 378, 410

Stack Gas Leak Check: Dilution Tunnel Gas Leak Check (5H only):
Initial: Ø Initial: N/A
Final: Ø Final: ↓
Calibrations: Span Gas CO₂: 16.83 O₂: 20.95 CO: 4.183 CO₂(DT): N/A
Mid Gas CO₂: 9.87 O₂: 10.47 CO: 2.493 CO₂(DT): ↓

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
	14:00	14:02	14:05	17:07	16:59	17:05
O ₂	0.00	20.95	10.72	0.03	20.89	10.69
CO ₂	0.00	16.83	9.99	0.03	16.85	10.00
CO	0.000	4.183	2.432	0.001	4.157	2.417
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): 6"
Induced Draft: Ø
% Smoke Capture: 100%
Flue Pipe Cleaned Prior to First Test in Series:
Date: 6/12/14 Initials: sc

	Initial	Middle	Ending
P _b (in/Hg)	29.96	29.97	29.99
Ambient (°F)	74	73	75

Technician signature: [Signature]
Date: 6/12/14

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
.038	96
.044	96
.040	96
.036	96
.034	96
.042	96
.044	96
.042	96
N/A	N/A
↓	↓
Static P:	<u>-1.43</u>

Method 28 Preburn Data

Run Data											
Client:		Harman		Test Run:		2					
Model:		P35i		Date:		6/12/2014					
Project Number:		135-S-25c-8.3		Test Crew:		J. Clark					
Tracking Number:		1979		Equipment:		288, 371, 372					
		Coal Bed Range (lb):		N/A (pellet)							
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	33.8	-0.064	273	74	117	297	101	318	321	N/A	N/A
10	33.3	-0.07	303	74	119	328	103	325	345		
20	32.8	-0.071	312	73	122	343	105	331	357		
30	32.4	-0.07	311	73	124	351	106	326	345		
40	32.2	-0.071	311	73	124	352	106	325	346		
50	31.7	-0.071	313	73	125	355	105	332	348		
60	31.3	-0.069	307	73	125	354	105	322	340		
	Averages:	-0.069	304.29	73.29	122.29	340.00	104.43	325.57	343.14		

 6/18/14

Model: P35i
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 3

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
Model: P35i
Project No.: 135-S-25c-8.3
Tracking No.: 1979
Run: 3
Test Date: 06/13/14

Burn Rate	1.78 kg/hr dry
Average Tunnel Temperature	100 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.2 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8501.7 dscf/hour
Average Delta p	0.038 inches H2O
Average Delta H	1.55 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	15.67 cubic feet	16.03 cubic feet	15.31 cubic feet
Average Gas Meter Temperature	71 degrees Fahrenheit	71 degrees Fahrenheit	71 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	15.7 dscf	16.1 dscf	15.3 dscf
Total Particulates - mn		1.2 mg	1.4 mg
Particulate Concentration (dry-standard)	0.00008 grams/dscf	0.00007 grams/dscf	0.00009 grams/dscf
Particulate Emission Rate	0.70 grams/hour	0.63 grams/hour	0.78 grams/hour
Adjusted Emissions	1.36 grams/hour	1.24 grams/hour	1.47 grams/hour
Difference from Average		0.12 grams/hour	0.12 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: P35i

Tracking No.: 1979

Project No.: 135-S-25c-8.3

Test Date: 13-Jun-14

Beginning Clock Time: 08:51

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	0.034	0.044	0.040	0.036	0.034	0.040	0.036	0.036
Initial Temp.	100	100	101	101	101	101	101	101

OMNI Equipment Numbers: See Run Notes

PM Control Module: N/A

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: 1.002 (1) 0.999 (2)

Barometric Pressure: Begin Middle End Average

30.06 30.08 30.09 30.08 "Hg

Signature/Date: 6/18/14

Tunnel Velocity: 13.24 ft/sec.

Initial Tunnel Flow: 141.5 scfm

Average Tunnel Flow: 141.7 scfm

Tunnel Area: 0.1963 ft2

Post-Test Leak Check (1): 0@5.5 cfm@"Hg

Post-Test Leak Check (2): 0@5 cfm@"Hg

Fuel Moisture (dry basis %): 5.98

Total Particulate (1): 1.2

Total Particulate (2): 1.4

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			1.07	0.88	71	71	0.35	0.8	101	0.038			8.3		98	467	121	453	469	N/A	321.6	396	74	74	N/A	N/A	72	-0.081
10	1.328	1.276	0.13	0.13	1.61	1.24	70	71	0.3	0.7	100	0.038	100	101	7.6	-0.7	91	472	122	451	487		324.6	396	75	75			71	-0.082
20	2.662	2.553	0.13	0.13	1.60	1.23	70	71	0.31	0.7	100	0.038	101	101	6.9	-0.7	92	472	122	453	491		326.0	397	76	75			72	-0.082
30	3.994	3.827	0.13	0.13	1.59	1.24	70	70	0.31	0.7	100	0.038	101	101	6.2	-0.7	92	482	124	467	501		333.2	402	76	76			72	-0.083
40	5.327	5.102	0.13	0.13	1.59	1.23	70	71	0.32	0.7	100	0.038	101	101	5.5	-0.7	93	486	125	465	485		330.8	403	76	76			72	-0.083
50	6.662	6.377	0.13	0.13	1.59	1.24	70	71	0.31	0.7	100	0.038	101	101	4.8	-0.7	92	484	125	456	490		329.4	401	76	76			72	-0.083
60	7.998	7.653	0.13	0.13	1.59	1.24	71	71	0.31	0.7	100	0.038	101	101	4.2	-0.6	90	477	125	445	473		322.0	395	76	76			72	-0.081
70	9.339	8.930	0.13	0.13	1.60	1.24	71	72	0.31	0.7	101	0.038	101	101	3.5	-0.7	90	474	123	445	472		320.8	392	76	76			72	-0.081
80	10.678	10.208	0.13	0.13	1.60	1.24	71	72	0.32	0.7	100	0.038	101	101	2.8	-0.7	90	476	125	454	484		325.8	396	76	76			72	-0.082
90	12.017	11.486	0.13	0.13	1.59	1.23	71	72	0.31	0.7	101	0.038	101	101	2.1	-0.7	90	481	125	468	491		331.0	402	77	76			72	-0.083
100	13.353	12.762	0.13	0.13	1.59	1.23	71	72	0.31	0.7	101	0.038	101	101	1.4	-0.7	92	484	127	463	505		334.2	403	77	76			72	-0.082
110	14.692	14.036	0.13	0.13	1.59	1.23	71	72	0.3	0.7	101	0.038	101	101	0.7	-0.7	94	485	127	465	492		332.6	404	77	76			73	-0.082
120	16.033	15.310	0.13	0.13	1.58	1.23	71	72	0.3	0.7	101	0.038	101	101	0.0	-0.7	95	484	127	464	501		334.2	402	77	76			73	-0.083
Avg/Total	16.033	15.310	0.13	0.13	1.55	1.21	70.62	71.38			100.44	0.038	100.77	100.76									13		76.08	75.69				-0.082

Run Notes

Client: Harman
Model: P35i
Project #: 135-5-33-8.3-2c 135-5-252-8.3
Tracking #: 1979
Run #: 3 Date: 6/13/2014
Test Crew: J. Clark
OMNI Equipment ID #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-TSS, 343, 371, 372, 378, 410, 436

PREBURN

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

PRIMARY:

SECONDARY: Auto

TERTIARY:

FAN:

Temp Knob = 6.53
Feel Knob = 4.75
Constant Burn H

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 - pellets

START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Auto
DOOR: N/A
PRIMARY AIR: Auto

OTHER:

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

PRIMARY:

SECONDARY: Auto

TERTIARY:

FAN:

Same as above

Technician signature: [Signature] Date: 6/13/14 4-18 of 4-32

Supplemental Data EPA 5G/5H

Client: Harman

Model: P35i

Project #:

135-5-250-8.3
135-5-33-8.3

Tracking #:

1979

Date: 6/13/14

Run #:

3

Booth:

E2

Test Crew:

J. Clark

Start Time:

8:51

Stop Time:

10:51

OMNI Equipment #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-T55, 343, 371, 372, 378, 410, 436

Stack Gas Leak Check:

Initial:

Ø

Final:

Ø

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: 9.87

O₂:

10.47

CO:

2.493

CO₂ (DT):

N/A

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
	<u>7:43</u>	<u>7:45</u>	<u>7:49</u>	<u>11:05</u>	<u>10:54</u>	<u>11:04</u>
O ₂	<u>0.00</u>	<u>20.95</u>	<u>10.69</u>	<u>0.03</u>	<u>20.88</u>	<u>10.62</u>
CO ₂	<u>0.00</u>	<u>16.83</u>	<u>10.02</u>	<u>0.13</u>	<u>16.84</u>	<u>10.09</u>
CO	<u>0.000</u>	<u>4.183</u>	<u>2.428</u>	<u>0.004</u>	<u>4.139</u>	<u>2.409</u>
CO ₂ (DT)	<u>N/A</u>					<u>→</u>

Air Velocity (ft/min):

Initial:

450

Final:

450

Scale Audit (lbs):

Initial:

10.0

Final:

10.0

Pitot Tube Leak Test: Initial:

Ø

Final:

Ø

Stack Diameter (inches):

6"

Induced Draft:

Ø

% Smoke Capture:

100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 6/12/14

Initials:

JC

	Initial	Middle	Ending
P _b (in/Hg)	<u>30.06</u>	<u>30.08</u>	<u>30.09</u>
Ambient (°F)	<u>71</u>	<u>72</u>	<u>73</u>

Technician signature:

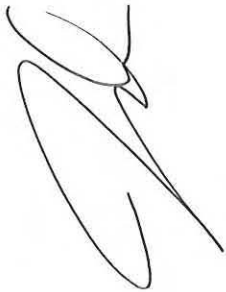
[Signature]

Date: 6/13/14

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
<u>.034</u>	<u>100</u>
<u>.044</u>	<u>100</u>
<u>.040</u>	<u>101</u>
<u>.036</u>	<u>101</u>
<u>.034</u>	<u>101</u>
<u>.040</u>	<u>101</u>
<u>.036</u>	<u>101</u>
<u>.036</u>	<u>101</u>
<u>N/A</u>	<u>N/A</u>
<u>↓</u>	<u>↓</u>
<u>↓</u>	<u>↓</u>
Static P:	<u>-1.37</u>

Method 28 Preburn Data

Run Data											
Client:		Harman		Test Run:		3					
Model:		P35i		Date:		6/13/2014					
Project Number:		135-S-25c-8.3		Test Crew:		J. Clark					
Tracking Number:		1979		Equipment:		288, 371, 372					
				Coal Bed Range (lb):		N/A (pellet)					
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	25.3	-0.027	92	71	72	75	72	85	85	N/A	N/A
10	24.7	-0.067	274	70	83	195	83	302	323		
20	24	-0.075	339	70	104	314	98	381	412		
30	23.3	-0.08	373	70	124	384	109	427	457		
40	22.6	-0.082	387	71	138	425	116	439	468		
50	21.9	-0.081	393	72	146	447	118	453	471		
60	21.2	-0.082	396	72	136	466	121	456	475		
	Averages:	-0.071	322.00	70.86	114.71	329.43	102.43	363.29	384.43		

 6/18/14

Run 4

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
Model: P35i
Project No.: 135-S-25c-8.3
Tracking No.: 1979
Run: 4
Test Date: 06/13/14

Burn Rate	1.93 kg/hr dry
Average Tunnel Temperature	103 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.9 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8904.1 dscf/hour
Average Delta p	0.041 inches H2O
Average Delta H	1.52 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	15.67 cubic feet	16.06 cubic feet	15.28 cubic feet
Average Gas Meter Temperature	72 degrees Fahrenheit	72 degrees Fahrenheit	73 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	15.7 dscf	16.1 dscf	15.3 dscf
Total Particulates - mn		1.2 mg	1.2 mg
Particulate Concentration (dry-standard)	0.00008 grams/dscf	0.00007 grams/dscf	0.00008 grams/dscf
Particulate Emission Rate	0.68 grams/hour	0.66 grams/hour	0.70 grams/hour
Adjusted Emissions	1.32 grams/hour	1.29 grams/hour	1.35 grams/hour
Difference from Average		0.03 grams/hour	0.03 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: 4

Manufacturer: Harman

Model: P35i

Tracking No.: 1979

Project No.: 135-S-25c-8.3

Test Date: 13-Jun-14

Beginning Clock Time: 12:01

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	0.040	0.046	0.042	0.038	0.040	0.044	0.044	0.036
Initial Temp.	102	102	102	102	103	103	103	103

OMNI Equipment Numbers: See Run Notes

PM Control Module: N/A

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: -0.357 "H2O

Pitot Tube Cp: 0.99

Meter Box Y Factor: 1.002 (1) 0.999 (2)

Barometric Pressure: Begin Middle End Average

30.10 30.11 30.13 30.11 "Hg

Signature/Date: 6/18/14

Tunnel Velocity: 13.91 ft/sec.

Initial Tunnel Flow: 148.3 scfm

Average Tunnel Flow: 148.4 scfm

Tunnel Area: 0.1963 ft2

Post-Test Leak Check (1): 0@5.5 cfm@"Hg

Post-Test Leak Check (2): 0@5 cfm@"Hg

Fuel Moisture (dry basis %): 5.98

Total Particulate (1): 1.2

Total Particulate (2): 1.2

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			0.53	0.90	72	72	0.32	0.7	103	0.041			9.0		103	497	131	485	517	N/A	346.6	412	72	73	N/A	N/A	73	-0.084
10	1.331	1.274	0.13	0.13	1.61	1.25	72	72	0.3	0.7	103	0.041	100	101	8.2	-0.8	103	504	133	496	531		353.4	419	75	75			73	-0.084
20	2.666	2.549	0.13	0.13	1.59	1.24	71	72	0.31	0.7	103	0.041	101	101	7.5	-0.7	103	502	132	493	519		349.8	417	76	76			73	-0.083
30	4.000	3.822	0.13	0.13	1.60	1.22	71	72	0.31	0.7	102	0.041	101	101	6.8	-0.7	108	501	132	490	512		348.6	415	77	77			74	-0.084
40	5.335	5.093	0.13	0.13	1.60	1.22	72	72	0.31	0.7	103	0.041	101	101	6.0	-0.8	102	501	132	495	518		349.6	414	77	77			73	-0.084
50	6.674	6.365	0.13	0.13	1.60	1.23	72	73	0.3	0.7	103	0.041	101	101	5.2	-0.8	106	506	133	499	531		355.0	419	77	77			74	-0.084
60	8.018	7.638	0.13	0.13	1.59	1.23	72	73	0.31	0.7	103	0.041	101	101	4.5	-0.7	102	506	134	496	525		352.6	419	78	77			74	-0.084
70	9.358	8.911	0.13	0.13	1.60	1.23	72	73	0.31	0.7	102	0.041	101	101	3.7	-0.8	102	502	133	482	516		347.0	416	78	77			73	-0.084
80	10.698	10.185	0.13	0.13	1.60	1.23	72	73	0.3	0.7	102	0.041	101	101	3.0	-0.7	101	503	134	496	528		352.4	421	78	77			73	-0.085
90	12.039	11.459	0.13	0.13	1.60	1.22	72	73	0.29	0.7	103	0.041	101	101	2.3	-0.7	103	501	133	488	508		346.6	416	78	77			73	-0.084
100	13.381	12.733	0.13	0.13	1.60	1.22	72	74	0.3	0.7	103	0.041	101	101	1.5	-0.8	104	501	133	501	509		349.6	420	78	77			73	-0.084
110	14.722	14.006	0.13	0.13	1.60	1.21	72	73	0.29	0.7	103	0.041	101	101	0.7	-0.8	105	500	134	496	506		348.2	418	78	77			74	-0.084
120	16.061	15.280	0.13	0.13	1.60	1.22	72	74	0.3	0.7	103	0.041	101	101	0.0	-0.7	106	504	134	504	527		355.0	422	78	77			74	-0.084
Avg/Total	16.061	15.280	0.13	0.13	1.52	1.20	71.85	72.77			102.73	0.041	100.77	100.76									8		76.92	76.46				-0.084

Run Notes

Client: Harman
Model: P35i ²⁵⁰
Project #: 135-S-23-8.3
Tracking #: 1979
Run #: 4 Date: 6/13/2014
Test Crew: J. Clark
OMNI Equipment ID #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-T55, 343, 371, 372, 378, 410, 436

PREBURN

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

PRIMARY:

Temp Knob = 7.00
Feed Knob = 5.22
Constant Burn H

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 - pellets

START UP PROCEDURES

BYPASS:

FUEL LOADING:

DOOR:

PRIMARY AIR:

OTHER:

N/A

Auto

N/A

Auto

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

PRIMARY:

Same as above

SECONDARY:

Auto

TERTIARY:

FAN:

Technician signature: 

Date: 6/13/14

Supplemental Data EPA 5G/5H

Client: Harman 135-5-250-8.3
Model: P35i Project #: 135-5-33-8.3-SC Tracking #: 1979
Date: 6/13/14 Run #: 4 Booth: E2
Test Crew: J. Clark Start Time: 12:01 Stop Time: 14:01
OMNI Equipment #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-T55, 343, 371, 372, 378, 410, 436

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: 16.83 O₂: 20.95 CO: 4.183 CO₂(DT): N/A
Mid Gas CO₂: 9.87 O₂: 10.47 CO: 2.493 CO₂(DT): N/A

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
O ₂	<u>11:06</u>	<u>11:08</u>	<u>11:10</u>	<u>14:14</u>	<u>14:10</u>	<u>14:15</u>
CO ₂	<u>0.00</u>	<u>20.95</u>	<u>10.71</u>	<u>0.01</u>	<u>20.90</u>	<u>10.65</u>
CO	<u>0.00</u>	<u>16.83</u>	<u>9.97</u>	<u>0.01</u>	<u>16.81</u>	<u>9.97</u>
CO ₂ (DT)	<u>0.000</u>	<u>4.183</u>	<u>2.432</u>	<u>0.000</u>	<u>4.152</u>	<u>2.416</u>
	<u>N/A</u>					<u>→</u>

Air Velocity (ft/min): Initial: 250 Final: 250
Scale Audit (lbs): Initial: 10.0 Final: 10.1
Pitot Tube Leak Test: Initial: Ø Final: Ø
Stack Diameter (inches): 6"
Induced Draft: Ø
% Smoke Capture: 100%
Flue Pipe Cleaned Prior to First Test in Series:
Date: 6/12/14 Initials: SC

	Initial	Middle	Ending
P _b (in/Hg)	<u>30.10</u>	<u>30.11</u>	<u>30.13</u>
Ambient (°F)	<u>73</u>	<u>74</u>	<u>74</u>

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
<u>0.040</u>	<u>102</u>
<u>0.046</u>	<u>102</u>
<u>0.042</u>	<u>102</u>
<u>0.038</u>	<u>102</u>
<u>0.040</u>	<u>103</u>
<u>0.044</u>	<u>103</u>
<u>0.044</u>	<u>103</u>
<u>0.036</u>	<u>103</u>
<u>N/A</u>	<u>N/A</u>
↓	↓
↓	↓
Static P:	<u>-0.357</u>

Technician signature: [Signature]
Date: 6/13/14

Method 28 Preburn Data

Run Data											
Client:	Harman										
Model:	P35i										
Project Number:	135-S-25c-8.3										
Tracking Number:	1979										
Test Run:	4										
Date:	6/13/2014										
Test Crew:	J. Clark										
Equipment:	288, 371, 372										
Coal Bed Range (lb): N/A (pellet)											
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	22.7	-0.083	406	73	107	487	126	472	497	N/A	N/A
10	22	-0.083	406	73	104	492	128	469	507		
20	21.3	-0.083	404	73	105	489	127	470	491		
30	20.6	-0.083	409	73	104	494	129	485	501		
40	19.8	-0.083	409	73	101	493	128	485	504		
50	19.1	-0.083	411	73	103	494	129	487	517		
60	18.3	-0.084	413	73	102	497	131	492	514		
Averages:		-0.083	408.29	73.00	103.71	492.29	128.29	480.00	504.43		


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6/18/14

Model: P35i
Harman Home Heating
352 Mountain House Road
Halifax, PA 17032

Run 5

Wood Heater Test Data - EPA Method 5G

Manufacturer: Harman
Model: P35i
Project No.: 135-S-25c-8.3
Tracking No.: 1979
Run: 5
Test Date: 08/25/14

Burn Rate	0.64 kg/hr dry
Average Tunnel Temperature	96 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.8 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8915.3 dscf/hour
Average Delta p	0.041 inches H2O
Average Delta H	1.62 inches H2O
Total Time of Test	120 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	16.93 cubic feet	16.47 cubic feet	17.39 cubic feet
Average Gas Meter Temperature	90 degrees Fahrenheit	91 degrees Fahrenheit	90 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	16.7 dscf	16.3 dscf	17.1 dscf
Total Particulates - mn		2.1 mg	2 mg
Particulate Concentration (dry-standard)	0.00012 grams/dscf	0.00013 grams/dscf	0.00012 grams/dscf
Particulate Emission Rate	1.10 grams/hour	1.15 grams/hour	1.04 grams/hour
Adjusted Emissions	1.96 grams/hour	2.05 grams/hour	1.88 grams/hour
Difference from Average		0.08 grams/hour	0.08 grams/hour
7.5% of the average emission rate	0.15		
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: 5

Manufacturer: Harman
Model: P35i
Tracking No.: 1979
Project No.: 135-S-25c-8.3
Test Date: 25-Aug-14
Beginning Clock Time: 13:11
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	0.034	0.046	0.046	0.038	0.038	0.046	0.044	0.036
Initial Temp.	92	92	92	92	92	92	92	92

OMNI Equipment Numbers: OMNI-00001, OMNI-00023, OMNI-00128, OMNI-00131, OMNI-00132, OMNI-00209, OMNI-283B, OMNI-00288, OMNI-00296-T55, OMNI-00343, OMNI-00371, OMNI-00372, OMNI-00410, OMNI-00417

PM Control Module: N/A
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: -0.385 "H2O
Pitot Tube Cp: 0.99
Meter Box Y Factor: 1.024 (1) 1.017 (2)
Barometric Pressure: Begin Middle End Average
30.02 30 29.98 30.00 "Hg

Signature/Date: 8/27/14
Tunnel Velocity: 13.81 ft/sec.
Initial Tunnel Flow: 148.8 scfm
Average Tunnel Flow: 148.6 scfm
Tunnel Area: 0.1963 ft2
Post-Test Leak Check (1): 0.001@8 cfm@"Hg
Post-Test Leak Check (2): 0.000@7 cfm@"Hg
Fuel Moisture (dry basis %): 5.98
Total Particulate (1): 2.1
Total Particulate (2): 2.0

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			1.26	0.94	81	82	0.3	0.6	92	0.041			3.0		116	230	102	257	261	N/A	193.2	223	79	79	N/A	N/A	80	-0.056			
10	1.368	1.436	0.14	0.14	1.65	1.54	83	83	0.3	0.6	95	0.041	102	101	2.8	-0.2	117	234	103	260	262		195.2	225	81	81			80	-0.056			
20	2.735	2.881	0.14	0.14	1.66	1.53	86	85	0.29	0.6	95	0.041	101	101	2.5	-0.3	118	237	103	254	256		193.6	220	82	82			81	-0.044			
30	4.102	4.327	0.14	0.14	1.66	1.53	89	87	0.29	0.5	95	0.041	101	101	2.2	-0.3	118	238	104	260	262		196.4	220	83	83			81	-0.044			
40	5.472	5.774	0.14	0.14	1.66	1.52	90	89	0.29	0.5	95	0.041	101	101	2.0	-0.2	118	238	104	271	268		199.8	226	83	83			81	-0.045			
50	6.845	7.222	0.14	0.14	1.66	1.51	92	90	0.27	0.5	95	0.041	101	101	1.8	-0.2	119	242	105	266	269		200.2	224	83	84			81	-0.044			
60	8.219	8.674	0.14	0.15	1.64	1.52	93	91	0.28	0.5	95	0.041	100	101	1.5	-0.3	120	244	105	273	274		203.2	228	84	84			82	-0.045			
70	9.593	10.124	0.14	0.15	1.65	1.52	94	92	0.27	0.5	96	0.041	100	100	1.2	-0.3	120	245	106	269	270		202.0	229	84	84			82	-0.045			
80	10.966	11.577	0.14	0.15	1.65	1.52	94	92	0.28	0.5	97	0.041	100	101	1.0	-0.2	121	245	106	265	264		200.2	225	85	85			82	-0.044			
90	12.342	13.030	0.14	0.15	1.65	1.52	95	93	0.29	0.5	97	0.041	100	100	0.7	-0.3	121	246	106	270	269		202.4	228	85	85			83	-0.044			
100	13.720	14.484	0.14	0.15	1.64	1.52	95	93	0.28	0.5	97	0.041	101	101	0.5	-0.2	121	246	107	263	264		200.2	224	85	86			83	-0.043			
110	15.096	15.939	0.14	0.15	1.64	1.52	96	94	0.28	0.5	98	0.041	100	101	0.2	-0.3	121	247	107	266	265		201.2	227	86	86			83	-0.044			
120	16.471	17.395	0.14	0.15	1.64	1.51	96	94	0.27	0.5	98	0.041	100	101	0.0	-0.2	122	249	107	268	268		202.8	229	86	86			84	-0.044			
Avg/Total	16.471	17.395	0.14	0.14	1.62	1.48	91.08	89.62			95.77	0.041	100.65	100.68									10		83.54	83.69	#DIV/0!	#DIV/0!		-0.046			

Run Notes

Client: Harman
Model: P35j
Project #: 135-S-25c-8.3
Tracking #: 1979
Run #: 5 Date: 8/25/2014
Test Crew: J. Clark
OMNI Equipment ID #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-T55, 343, 371, 372, 410, 417

PREBURN

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

PRIMARY:

Low Burn - Cat 1 Attempt #2
Temperature = 1.00
Feed knob = 1.26
Constant Burn H

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 (pellets)

START UP PROCEDURES
BYPASS: N/A
FUEL LOADING: Auto
DOOR: N/A
PRIMARY AIR: Auto
OTHER: N/A

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

PRIMARY:

Same as above

SECONDARY: Auto
TERTIARY:
FAN:

Technician signature: [Signature] Date: 8/25/14

Supplemental Data EPA 5G/5H

Client: Harman

Model: P35i Project #: 135-S-25c-8.3 Tracking #: 1979

Date: 8/25/2014 Run #: 5 Booth: E2

Test Crew: J. Clark Start Time: 13:11 Stop Time: 15:11

OMNI Equipment #(s): 1, 23, 128, 131, 132, 209, 283B, 288, 296-T55, 343, 371, 372, 410, 417

Stack Gas Leak Check:

Dilution Tunnel Gas Leak Check (5H only):

Initial: N/A

Initial: N/A

Final: N/A

Final: N/A

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

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

Time	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
	N/A					→
O ₂	N/A					→
CO ₂	N/A					→
CO	N/A					→
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): 6"

Induced Draft: Ø

% Smoke Capture: 100%

Flue Pipe Cleaned Prior to First Test in Series:

Date: 8/25/14 Initials: SC

	Initial	Middle	Ending
P _b (in/Hg)	30.02	30.00	29.98
Ambient (°F)	80	82	83

Tunnel Traverse	
dP (in H ₂ O)	T(°F)
0.034	92
0.046	92
0.046	92
0.038	92
0.038	92
0.046	92
0.044	92
0.036	92
N/A	N/A
↓	↓
↓	↓
Static P:	-0.385

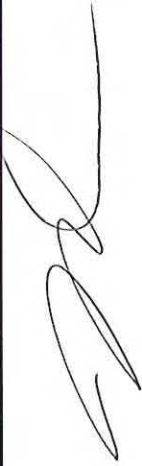
Technician signature: [Signature]

Date: 8/25/14

Method 28 Preburn Data

Run Data	
Client:	Harman
Model:	P35i
Project Number:	135-S-25c-8.3
Tracking Number:	1979
Coal Bed Range (lb):	
N/A (pellet)	
Test Run:	
Date:	
Test Crew:	
Equipment:	
5	
8/25/2014	
J. Clark	
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	12.3	-0.036	88	77	78	79	78	85	84	N/A	N/A
10	11.8	-0.048	186	78	87	130	84	218	229		
20	11.6	-0.052	203	78	100	170	93	240	248		
30	11.3	-0.054	211	79	107	194	97	247	249		
40	11.1	-0.056	218	79	112	212	99	256	258		
50	10.8	-0.056	219	80	114	223	101	255	255		
60	10.5	-0.057	224	80	115	230	102	258	262		
Averages:		-0.051	192.71	78.71	101.86	176.86	93.43	222.71	226.43		

 8/27/14

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 P35i. The P35i is a pellet-fired fireplace insert room heater.

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 at the *OMNI*'s testing facility on June 10, 2014. It was assigned and labeled with *OMNI* ID #1979. *OMNI* representative Jeremy Clark conducted the certification testing and completed the first round of testing by June 13, 2014. Upon review of the data it was discovered that during the Category 1 burn rate attempt (Run 1) the stove had not been set at the lowest possible combustion air setting. The test specimen was returned to *OMNI* and an additional test run (Run 5) was completed on August 25, 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*.

The P35i 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 five test runs indicate a particulate emission rate of 1.5 g/hr. Test runs were conducted in each of four burn rate categories (<0.80 kg/hr; 0.80-1.25 kg/hr; 1.25-1.90 kg/hr; and maximum). Two runs were conducted at Category 2 burn rates because the burn rate for the first (Run 1) had been expected to fall below 0.80 kg/hr. As mentioned previously the fifth test run was conducted later in order to meet the Category 1 burn rate requirement. Emissions for each of the individual test runs did not exceed the cap. The P35i 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 items submitted.

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.86	1.38
2	1.18	1.58
3	1.78	1.36
4	1.93	1.32
5	0.64	1.96
Weighted particulate emission average of five test runs: 1.5 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	72	73	29.96	29.96	<50	<50
2	74	75	29.96	29.99	<50	<50
3	71	73	30.06	30.09	<50	<50
4	73	74	30.10	30.13	<50	<50
5	80	84	30.02	29.98	<50	<50

Table 1.3.1 – Fuel Measurement Summary – PRETEST

Run	Beginning Fuel Weight (lbs)	Ending Fuel Weight (lbs)
1	40.4	38.1
2	33.8	31.3
3	25.3	21.2
4	22.7	18.3
5	12.3	10.5

Table 1.3.2 – Fuel Measurement Summary – TEST

Run	Beginning Fuel Weight (lbs)	Fuel Moisture Content (Dry basis - %)	Ending Fuel Weight (lbs)
1	4.0	5.98	0.0
2	5.5	5.98	0.0
3	8.3	5.98	0.0
4	9.0	5.98	0.0
5	3.0	5.98	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	13.52	148.0	85
2	120	13.65	146.7	96
3	120	13.24	141.7	100
4	120	13.91	148.4	103
5	120	13.81	148.6	96

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	226.4	225.6	0.8
2	248.4	260.0	11.6
3	321.6	334.2	12.6
4	346.6	355.0	8.4
5	193.2	202.8	9.6
a. All temperatures are in °F.			
b. Represents the difference between beginning and ending average surface temperature.			

Table 1.6 – Pretest Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Constant Burn H	1.82	1.00	60
2	Constant Burn H	2.60	4.53	60
3	Constant Burn H	4.75	6.53	60
4	Constant Burn H	5.22	7.00	60
5	Constant Burn H	1.26	1.00	60

Table 1.7 – Test Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Constant Burn H	1.82	1.00	120
2	Constant Burn H	2.60	4.53	120
3	Constant Burn H	4.75	6.53	120
4	Constant Burn H	5.22	7.00	120
5	Constant Burn H	1.26	1.00	120

Table 1.8 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (in H ₂ O)	Average Draft (in H ₂ O)	Run Time (min)
1	0.86	0	-0.060	120
2	1.18	0	-0.070	120
3	1.78	0	-0.082	120
4	1.93	0	-0.084	120
5	0.64	0	-0.046	120

TEST RESULTS AND DISCUSSION

A total of five test runs were conducted in the following categories: one in the <0.80 kg/hr dry category, 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 1.5 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.