EPA Certification Test Report

The following models are EPA certified under the following attached test report:	**F2450**
	Model #
Wood Stoves	F2450
Wood Inserts	N/A
Wood Fireplaces	N/A
Pellet Stoves	N/A
Pellet Inserts	N/A

Full US Environmental Protection Agency ("EPA") certification test reports have been reported to the EPA. Test reports may contain sensitive, confidential business information which has been specifically excluded and/or redacted from this publicly posted test report.

Published February 28, 2022
E&OE

Fireplace Products International, Ltd.

Project # 19-460
Model: F2450
Type: Wood-Fired Room Heater
March 7, 2019
Revised: February 28, 2022

ASTM E3053 Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel (EPA ALT-125)

Contact: Mr. Dave Lal
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Revision Summary

Date: 3/7/2019 – Original Issue

Date: 2/28/2022 – The following revisions were made per a request from EPA:

-The “Test Run Narrative” section was edited to clarify that test run 3 was appropriate and valid, see page 9.

-Added a drawing of the Firebox to the main body of the report, see page 12.

-Updated drawing of firebox in Appendix D, the previous version showed overall dimensions without firebrick and baffling.

-The Owner’s Manual in Appendix B was updated to include information on the longest firebox dimensions and information on use of CO monitors, see pages 211 and 235 of the Non-CBI report.

Contents

Affidavit

PFS-TECO was contracted by Fireplace Products International Ltd. (FPI) to provide testing services for the F2450 Wood-Fired Room Heater per ASTM E3053, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel*, which was approved for use under EPA ALT-125. All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory beginning on 2/27/2019 and ending on 2/28/2019. PFS-TECO's Portland Laboratory is located at 11785 SE Highway 212 – Suite 305, Clackamas, Oregon 97015. Testing procedures followed ASTM E3053 with the exception of caveats described in EPA ALT-125. Particulate sampling was performed per ASTM E2515, *Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel,* with the exception of caveats described in EPA ALT-125. A copy of EPA ALT-125 is included in Appendix A for reference, as required by the approval letter.

PFS-TECO is accredited by the U.S. Environmental Protection Agency for the certification and auditing of wood heaters pursuant to subpart AAA of 40 CFR Part 60, New Source Performance Standards for Residential Wood Heaters and subpart QQQQ of 40 CFR Part 60, Standards of Performance for New Hydronic Heaters and Forced Air Furnaces, Methods 28R, 28WHH, 28 WHH-PTS, and all methods listed in Sections 60.534 and 60.5476. PFS-TECO holds EPA Accreditation Certificate Numbers 4 and 4M (mobile). PFS-TECO is accredited by IAS to ISO 17020:2012 "Criteria for Bodies Performing Inspections", and ISO 17025:2005 "Requirements for Testing Laboratories." PFS-TECO is also accredited by Standards Council of Canada to ISO 17065:2012 "Requirements for Bodies Operating Product Certification Systems."

The following people were associated with the testing, analysis and report writing associated with this project.

Sebastian Button, Laboratory Supervisor

Introduction

FPI-Regency Fireplaces Products of Delta, BC, contracted with PFS-TECO to perform EPA certification testing on F2450 Wood-Fired Room Heater. All testing was performed at PFS-TECO's Portland Laboratory. Testing was performed by Mr. Sebastian Button.

Notes

- Prior to start of testing, 50 hours of conditioning was performed per ASTM E3053.
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- Front filters were changed on sample train A at one hour for all 3 test runs.
- A total of 3 test runs were performed in accordance with ASTM E3053, no anomalies occurred, no additional tests performed, see Run Narrative section for further detail on each run.

Wood Heater Identification and Testing

- Appliance Tested: ***F2450***
- Serial Number: ***Un-serialized Prototype – PFS Tracking Number 0022***
- Manufacturer***:*** ***FPI-Regency Fireplace Products***
- Catalyst: ***No***
- Heat exchange blower: ***Optional***
- Type: ***Wood Stove***
- Style: ***Pedestal***
- Date Received: ***Thursday, February 21, 2019***
- Testing Period – Start: ***Wednesday, February 27, 2019*** Finish: ***Thursday, February 28, 2019***
- Test Location: ***PFS-TECO Portland Laboratory, 11785 SE HWY 212 - Suite 305, Clackamas, OR 97015***
- Elevation: ***≈131 Feet above sea level***
- Test Technician(s): ***Sebastian Button***
- Observers: ***Radu Costei and Dave Lal of FPI.***

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Sebastian Button. All procedures used are directly from ASTM E3053 and ASTM E2515. See the list below for equipment used. See Appendix C submitted with this report for calibration data.

Equipment List:

Equipment ID#	Equipment Description
041	Rice Lake 3'x3' floor scale w/digital weight indicator
050	Digiweigh DWP12i Platform Scale
053	APEX XC-60 Digital Emissions Sampling Box A
054	APEX XC-60 Digital Emissions Sampling Box B
055	APEX Ambient sampling box
057	California Analytical ZRE CO2/CO/O2 IR ANALYZER
064	Digital Barometer
109A/B	Troemner 100mg/200mg Audit Weights
107	Sartorius Analytical Balance
051	10 lb audit weight
090	Dewalt Tape Measure
092	Digital Calipers
095	Anemometer
111	Microtector
115	Delmhorst Wood Moisture Meter
CC700832	Gas Analyzer Calibration Span Gas
CC170624	Gas Analyzer Calibration Mid Gas

Results

The weighted average emissions rate for the 3 run test series was measured to be **2.26 g/hr** with a Higher Heating Value efficiency of **73.3%.** The average CO emission rate for the 3 tests was **1.85 g/min.** The FPI F2450 Wood-Fired Room Heater meets the 2020 cordwood PM emission standard of ≤ 2.5 g/hr per CFR 40 part 60, §60.532 (c).

Detailed individual run data can be found in Appendix A submitted with this report.

Summary Table

	High Fire Test	Low Fire Test	Medium Fire Test
Date	2/27/2019	2/27/2019	2/28/2019
Run Number	1	2	3
PM Emission Rate (g/hr)	5.78	1.81	0.96
Burn Rate (kg/hr)	4.38	1.01	1.17
Heat Output (BTU/hr)	53,563	14,179	16,405
HHV Efficiency (%)	71.2	73.9	73.7
LHV Efficiency (%)	76.1	79.1	78.9
CO Emissions (g/MJ output)	3.80	5.90	4.74
CO Emissions (g/kg dry fuel)	54.01	87.10	69.72
CO Emissions (g/min)	3.58	1.47	1.37
First Hour Emission Rate (g/hr)	9.84	2.92	5.65
Weighting Factor (%)	20	40	40
Weighted particulate emission average of 3 test runs: 2.26 grams per hour.			
Weighted average HHV efficiency of 3 test runs: 73.3%.			
Average CO emission rate for 3 test runs: 1.85 grams per minute			

Test Run Narrative

Run 1

Run 1 was performed on 2/27/2019 as a high fire test run per ASTM E3053. Emissions sampling began from a cold start ignition of kindling and start-up fuel. The test fuel load was loaded 27 minutes into the test. Testing was completed when 90% of the test fuel load was consumed. Total test time was 124 minutes, main test fuel load burn time was 97 min. The particulate emissions rate from kindling ignition to test completion was 5.78 g/hr. The burn rate of the test fuel load was 4.38 kg/hr. The main test load portion of the run had an overall HHV efficiency of 71.2%. The train A front filter was changed at 1 hr. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 2

Run 2 was performed on 2/27/2019 as a low fire test run per ASTM E3053. The overall test duration was 573 minutes. The burn rate for the test run was 1.01 kg/hr. The particulate emissions rate for the test run was 1.81 g/hr. The run had an overall HHV efficiency of 73.9%. The train A front filter was changed at 1 hr. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 3

Run 3 was performed on 2/28/2019 as a medium fire test run per ASTM E3053. The overall test duration was 490 minutes. The burn rate for the test run was 1.17 kg/hr, therefore the medium fire category requirements were met, less than the mid-point of the high and low burn rates (2.69 kg/hr). The particulate emissions rate for the test run was 0.96 g/hr. The run had an overall HHV efficiency of 73.7%. The train A front filter was changed at 1 hr. All test results were appropriate and valid. There were no anomalies and all criteria were met.

Test Conditions Summary

Testing conditions for all runs fell within allowable specifications of ASTM E3053 and ASTM E2515. A summary of facility conditions, fuel burned, and run times is listed below.

Runs	Ambient (°F)		Relative Humidity (%)		Average Barometric Pressure (In. Hg.)	Preburn Fuel Weight (lbs)	Test Fuel Weight (lbs)	Test Fuel Moisture (%DB)	Test Run Time (Min)
	Pre	Post	Pre	Post					
1	71	74	8.1	9.1	29.78	7.2[1]	21.4	20.7	124[2]
2	75	76	9.1	8.1	29.77	21.4	26.0	22.0	573
3	74	69	10.1	9.3	29.97	21.6	25.9	22.5	490

[1]This is the weight of the kindling and startup fuel

[2]Total test time was 127 min, high fire test load burn duration was 97 min.

Appliance Operation and Test Settings

The appliance was operated according to procedures as described in the Operations Manual, found in Appendix B submitted with this report. Detailed run information can be found in Appendix A submitted with this report.

Settings & Run Notes

	Pre-Burn Air Setting	Test Run Air and Fan Settings
Run 1	N/A – Cold Start Ignition	Air control set to high fire test setting (1.975 in^2 opening), blower off for first 20 min, then set to high.
Run 2	Air control set to High Fire Setting in accordance with ASTM E3053	Air control set to low fire test setting (0.322 in^2 opening), blower off for first 30 min, then set to low.
Run 3	Air control set to High Fire Setting in accordance with ASTM E3053	Air control set to medium fire test setting (0.447 in^2 opening), blower off for first 20 min, then set to low.

Appliance Description

Model(s): F2450

Appliance Type: Wood-Fired Room Heater

Firebox Volume: 2.24 ft^3

Air Introduction System: Primary Air enters the firebox from the front bottom of the appliance and is channeled up the sides on the appliance and down through the air wash, as well as through a pilot air opening in the front of the firebox. Primary air is controlled via a damper arm located below the ashlip which moves left (open) to right (closed). Secondary air is pulled through a fixed opening in to rear bottom of the appliance and channeled up through 4 secondary air tubes. Dimensions on all these features can be found in Appendix D.

Baffles: A pair of mating 9.437” x 15.0” x 0.984” vermiculite panels mate together to form a baffle which rests on top of the secondary air tubes.

Refractory Insulation: The firebox is lined with 1” thick firebrick.

Flue Outlet: 6-inch exhaust outlet located on the top of the appliance.

Catalytic Combustor: N/A

Fan: The F2450 is optionally offered with a convection fan that attached to the bottom rear of the appliance.

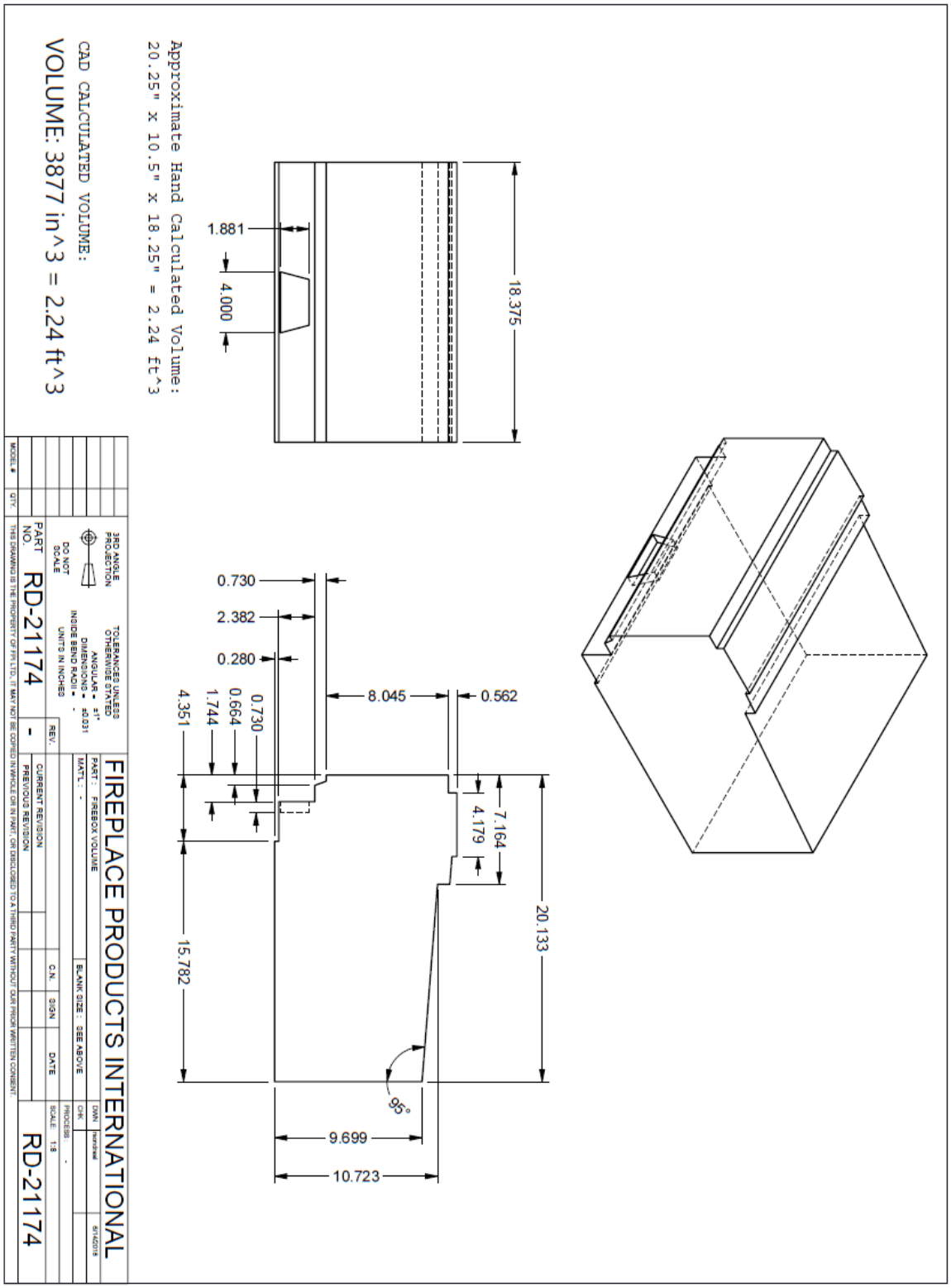
Appliance Dimensions

F2450 Unit Dimensions

Height	Width	Depth	Firebox Volume	Weight
32.125”	24”	24.75”	2.24 ft^3	330 lbs

Appliance design drawings can be found in Appendix D submitted with the CBI copy of this report.

Firebox Volume Dimensions



Appliance Front

Appliance Left

Appliance Right

Appliance Rear

Test Fuel Properties

Test fuel used was Maple cordwood, split and air-dried to the specified moisture content range. Typical fuel loads are pictured below:

Typical Kindling Load

Typical Startup Load

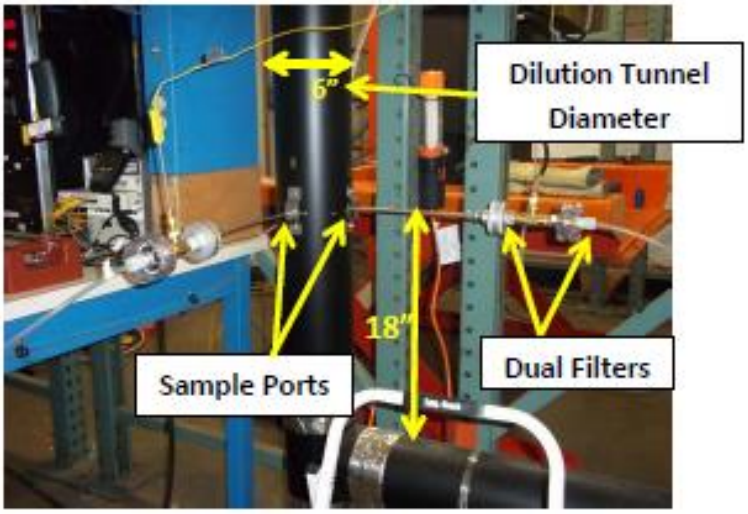
Typical High Fire Load

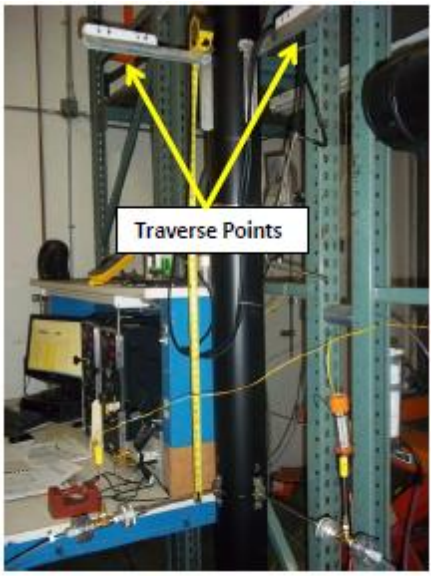
Typical Low Fire Load

Sampling Locations and Descriptions

Sample ports are located 16.5 feet downstream from any disturbances and 1 foot upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 5.5 feet upstream from any disturbances. (See below).

Sample Points





Sampling Methods

ASTM E2515 was used in collecting particulate samples. The dilution tunnel is 6 inches in diameter. All sampling conditions per ASTM E2515 were followed. No alternate procedures were used with the exception of caveats described in ALT-125: Pall TX40 Emfab filters were used, filter temperatures were maintained between 80 and 90°F for all tests, filters were weighed in pairs where applicable, and no sampling intervals fell outside of proportional rates of +/- 10%.

Analytical Methods Description

All sample recovery and analysis procedures followed ASTM E2515 procedures. At the end of each test run, filters, O-Rings and probes were removed from their housings, dessicated for a minimum of 24 hours, and then weighed at 6 hour intervals to a constant weight per ASTM E2515-11 Section 10.

Calibration, Quality Control and Assurances

Calibration procedures and results were conducted per EPA Method 28R, ASTM E2515-11 and ASTM E3053. Test method quality control procedures (leak checks, volume meter checks, stratification checks, proportionality results) followed the procedures outlined.

Appliance Sealing and Storage

Upon completion of testing, the appliance was secured with metal strapping and the seal below was applied, the appliance was then returned to the manufacturer's location at: 6988 Venture St, Delta, BC V4G 1H4, Canada, for archival.

Sealing Label

ATTENTION:

THIS SEAL IS NOT TO BE BROKEN WITHOUT PRIOR AUTHORIZATION FROM THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

THIS APPLIANCE HAS BEEN SEALED INACCORDANCE WITH REQUIREMNTS OF 40CFR PART 60 SUBPART AAA §60.535 (a)(2)(vii)

REPORT #_____ DATE SEALED_____

MANUFACTURER_____ MODEL #_____

Sealed Unit

List of Appendices

The following appendices have been submitted electronically in conjunction with this report:

Appendix A – Test Run Data, Technician Notes, Sample Analysis, and Alternate Test Method Approval

Appendix B – Labels and Manuals

Appendix C –Equipment Calibration Records

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

Conditioning Data

Client:	FPI	Job #:	19-460
Model:	F2450	Tracking #:	0022
Date(s):		Technician:	SJB

		Average:	291.5	71.0	N/A
Elapsed Time (hrs)	**Scale Reading (lbs)**	**Weight Change (lbs)**	**Flue (°F)**	**Ambient (°F)**	**Catalyst Exit (°F)**
0	27.0	-	377	70	N/A
1	16.2	-10.8	397	70	N/A
2	8.5	-7.7	376	73	N/A
3	5.1	-3.4	258	72	N/A
4	3.8	-1.3	192	71	N/A
5	2.8	-1.0	192	70	N/A
6	1.9	-0.9	184	69	N/A
7	1.0	-0.9	186	68	N/A
8	26.3	25.3	407	71	N/A
9	14.8	-11.5	400	70	N/A
10	7.6	-7.2	353	71	N/A
11	4.5	-3.1	252	71	N/A
12	3.3	-1.2	210	70	N/A
13	2.3	-1.0	196	72	N/A
14	1.4	-0.9	184	67	N/A
15	26.7	25.3	418	69	N/A
16	15.4	-11.3	385	70	N/A
17	7.6	-7.8	374	74	N/A
18	4.6	-3.0	263	73	N/A
19	3.4	-1.2	207	69	N/A
20	2.3	-1.1	206	69	N/A
21	1.4	-0.9	194	67	N/A
22	26.8	25.4	364	73	N/A
23	17.4	-9.4	424	74	N/A
24	9.9	-7.5	355	75	N/A
25	5.6	-4.3	286	72	N/A
26	4.0	-1.6	213	71	N/A
27	2.9	-1.1	204	69	N/A
28	2.0	-0.9	184	69	N/A
29	1.0	-1.0	188	68	N/A
30	0.3	-0.7	181	68	N/A
31	26.0	25.7	383	72	N/A
32	17.8	-8.2	318	72	N/A
33	10.2	-7.6	355	73	N/A
34	5.8	-4.4	261	73	N/A
35	4.2	-1.6	191	74	N/A
36	25.9	21.7	402	75	N/A
37	16.7	-9.2	335	74	N/A
38	9.2	-7.5	372	77	N/A
39	5.5	-3.7	244	76	N/A
40	4.3	-1.2	202	74	N/A
41	3.3	-1.0	191	74	N/A
42	2.8	-0.5	181	73	N/A
43	26.4	23.6	403	71	N/A
44	18.9	-7.5	290	69	N/A
45	12.5	-6.4	336	69	N/A
46	7.6	-4.9	270	70	N/A
47	5.1	-2.5	209	70	N/A
48	26.0	20.9	432	65	N/A
49	15.2	-10.8	475	67	N/A
50	7.0	-8.2	405	68	N/A

Signature/Date: 2/27/2019

WOOD HEATER TESTING SUMMARY

SECTION 1 – Model Identification

Model Name(s)/Number(s)	F2450
Manufacturer	FPI - Regency Fireplaces Products
Address 1	6988 Venture St.
Address 2	Delta, BC V4G 1H4
Appliance Category(s) (Free-standing, Insert, etc.)	Free-standing
Usable Firebox Volume - ft^3	2.24
Catalytic/Non-Cat	Non-Cat
Convection Air Fan (No, Standard, Optional)	Optional

SECTION 1B – Laboratory Information

Testing Laboratory	PFS-TECO
Address 1	11785 SE Hwy 212 Ste 305
Address 2	Clackamas, OR 97015
ISO/Accreditation Info	ISO 17025
Dates Tested	2/27/2019 - 2/28/2019
Test Methods/Standards	ASTM E3053 (ALT-125), ASTM E2515
Dilution Tunnel Inside Diameter - in.	6.00
Fliter Diameter - mm	47
Filter Material	Pall Type TX40

Test Configuration Photographs

Stove Front

Stove Left

Stove Right

Typical Kindling Load

Typical Start-up Load

Typical High Fire Load

Typical High Fire Coal Bed

Typical Low/Med Fire Load

Typical Low Fire Coal Bed

SECTION 2 – Test Conditions Summary

Model Name(s)/Number(s)	F2450			
Usable Firebox Volume - ft^3	2.24			
Convection Air Fan (No, Standard, Optional)	Optional			
Test Run #	1	2	3	
Date Tested	2/27/2019	2/27/2019	2/28/2019	
Test Run Category (L, M, H)	H	L	M	
Average Barometric Pressure - in Hg	29.78	29.77	29.97	
Max. Observed Ambient Temp - °F	76	77	74	
Min. Observed Ambient Temp - °F	71	68	69	
Max. Observed Filter Temp - °F	87	87	87	
Test Run Air Settings				
Primary (measured up from minimum)	Maximum	Minimum	0.792"	
Secondary (measured up from minimum)	Fixed	Fixed	Fixed	
Convection Air Fan Setting	High	Low	Low	
Test Fuel Load				
Cordwood Fuel Species	Maple	Maple	Maple	
Specific Gravity (from Table 1)	0.6	0.6	0.6	
Higher Heating Value - Btu/lb (from Annex A1)	8587	8587	8587	
Nom. Test Fuel Load Piece Length - in.	17	17	17	
Number of Test Fuel Pieces	6	5	5	
Test Fuel Weight				
Kindling - As Fired lb	3.02	na	na	
Kindling Wt. - As % of Test Fuel Load	14%	na	na	
Kindling Moisture - % DB	10%	na	na	
Kindling - kg DB	1.25	na	na	
SU Fuel - As Fired lb	4.19	na	na	
SU Fuel Wt. - As % of Test Fuel Load	20%	na	na	
SU Fuel Moisture - % DB	20%	na	na	
SU Fuel - kg DB	1.58	na	na	
Test Fuel Load - As Fired lb	21.37	25.96	25.88	
Ave. Test Fuel Load MC % DB	20.7%	22.0%	22.5%	
Test Fuel Load - kg DB	8.03	9.67	9.58	
Test Fuel Loading Density - lb/ft^3	9.54	11.59	11.55	
Residual SU Fuel Wt. - As Fired lb	2.20	na	na	
Residual SU Fuel Wt. - As % of Test Fuel Load	10%	na	na	
Test Run Duration - minutes	124	573	490	
Test Run Duration - h	2.07	9.55	8.17	
Run Duration of High Fire Load Only - minutes	97	na	na	
Run Duration of High Fire Load Only - h	1.62	na	na	
Test Fuel Load Wt. at End of Test - As Fired lb	2.1	0	0	
Total Total Fuel Burned - kg DB	8.91	9.67	9.58	
% Test Fuel Load Wt. at End of Test	9.8%	0.0%	0.0%	

SECTION 3 – Test Run Results Summary

Model Name(s)/Number(s)	F2450			
Usable Firebox Volume - ft^3	2.24			
Convection Air Fan (No, Standard, Optional)	Optional			
Test Run #	1	2	3	
Date Tested	2/27/19	2/27/19	2/28/19	
Test Run Category	H	L	M	
Burn Rate - kg/h DB	4.38	1.01	1.17	
Burn Rate - As % of Low to High Midpoint	na	na	44%	
Burn Duration - h	2.07	9.55	8.17	
Heat Output - Btu/h	53,563	14,179	16,405	
Average Dilution Tunnel Flow Rate - dscfm	171.08	176.61	178.73	
Average Sample Flow Rates - dscfm				
Train 1	0.151	0.154	0.150	
Train 2	0.147	0.151	0.148	
Total PM Emissions - g				
Train 1	12.23	17.40	7.79	
Train 2	11.65	17.25	7.84	
Average	11.940	17.325	7.815	
PM Emission Train Precision - %	2.4%	0.4%	-0.3%	
PM Emission Train Precision - g/kg	0.07	0.02	-0.01	
PM Emission Rate - g/h	5.78	1.81	0.96	
Total CO Emissions - g	347	843	669	
CO Emissions Rate - g/h	215	88	82	
Overall Efficiency - CSA B415.1-10				
% HHV Basis	71.2	73.9	73.7	
% LHV Basis	76.1	79.1	78.9	

SECTION 4 - Weighted Average Summary

Model Name(s)/Number(s)	F2450		
Usable Firebox Volume - ft_3	2.24		
Convection Air Fan (No, Standard, Optional)	Optional		
Average for Each Test Run Category	L	M	H
Burn Rate - kg/h DB	1.01	1.17	4.38
PM Emission Rate - g/h	1.81	0.96	5.78
CO Emissions Rate - g/h	88.3	81.9	214.6
Overall Efficiency - CSA B415.1-10			
% HHV Basis	73.9	73.7	71.2
% LHV Basis	79.1	78.9	76.1
Heat Output - Btu/h	14200	16400	53600
Category Weighting	40%	40%	20%

ASTM E 3053 Weighted Averages			
PM Emission Rate - g/h	2.26		
CO Emissions Rate - g/h	111.0		
Overall Efficiency - CSA B415.1-10			
% HHV Basis	73.3		
% LHV Basis	78.4		
Heat Output Range - Btu/h	14200	to	53600

Emission testing instructions F2450

Volume: 2.24 cu.ft.

Low and Medium

High before Low and Medium – no sampling. Air set to High Setting

Fan on high at 20 min after loading main fuel load

Kindling – 3.0lb

Startup fuel – 4.0lb

Procedure

Start with a couple pieces of crumbled paper in between and 2 lbs kindling. Adjust the door opening for less smoke and establish a good fire. Keep the door open in that position for 2 – 3 min.

At ~0.8lb load the remainder of the kindling fuel and 1.5lbs of start-up fuel, keep door open slightly ajar for 2 minutes.

At ~1b load remaining SU fuel and keep door open slightly ajar for 2 minutes.

At low end of coal bed range load the high load. Close the door right away.

At 20 min turn on the fan on high.

Around 6 lbs adjust the load. Lift the unburned pieces out from the coals and bring unburned pieces to center front to ensure full charcoalization.

Around 4 lbs, when everything is burned, and almost no flames left rake the coals, zero the scale and follow the standard loading procedure.

Low and Medium test load

Load heavier logs to the sides.

Keep the door open a couple seconds so there is a strong fire going.

Air adjustment

Medium

Set the air to medium air setting within 3-4 min.

Fan on low at 20 min

Low

At 4-5 min, turn air down to medium setting, at 13-14 min set to Low setting.

Fan on low at 30 min.

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 1 Data Summary

Client: FPI
Model: F2450
Job #: 19-460
Tracking #: 0022
Test Date: 2/27/2019

3/4/2019

Techician Signature | Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

Burn Rate (kg/hr):	4.38

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	15.005	18.725	18.214	8.947
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.76			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10264.9			
Average Gas Meter Temperature (°F)	73.9	91.7	91.2	85.5
Total Sample Volume (dscf)	14.747	17.999	17.452	8.697
Average Tunnel Temperature (°F)	134.0			
Total Time of Test (min)	124			
Total Particulate Catch (mg)	0.1	10.5	9.7	8.4
Particulate Concentration, dry-standard (g/dscf)	0.0000068	0.0005834	0.0005558	0.0009659
Total PM Emissions (g)	0.14	12.23	11.65	9.84
Particulate Emission Rate (g/hr)	0.07	5.92	5.64	9.84
Emissions Factor (g/kg)	-	1.37	1.30	-
Difference from Average Total Particulate Emissions (g)	-	0.29	0.29	-
Difference from Average Emissions Factor (g/kg)	-	0.03	0.03	-

Final Average Results	
Total Particulate Emissions (g)	11.94
Particulate Emission Rate (g/hr)	5.78
Emissions Factor (g/kg)	1.34
HHV Efficiency (%)	71.2%
LHV Efficiency (%)	76.1%
CO Emissions (g/min)	3.58

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	>80 °F, <90 °F	Min: 81 / Max: 87	OK
Face Velocity	< 30 ft/min	12.7	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min: 71 / Max: 76	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	CHECK 10 MIN. INTERVAL PRO-RATES

B415.1 Efficiency Results

Manufacturer:	FPI
Model:	F2450
Date:	02/27/19
Run:	1
Control #:	19-460
Test Duration:	97
Output Category:	High

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	71.2%	76.1%
Combustion Efficiency	96.2%	96.2%
Heat Transfer Efficiency	74.0%	79.1%

Output Rate (kJ/h)	56,465	53,563	**(Btu/h)**
Burn Rate (kg/h)	3.98	8.76	**(lb/h)**
Input (kJ/h)	79,352	75,274	**(Btu/h)**

Test Load Weight (dry kg)	6.43	14.17	**dry lb**
MC wet (%)	17.16		
MC dry (%)	20.72		
Particulate (g)	11.94		
CO (g)	347		
Test Duration (h)	1.62		

Emissions	**Particulate**	**CO**
g/MJ Output	0.13	3.80
g/kg Dry Fuel	1.86	54.01
g/h	7.39	214.73
g/min	0.12	3.58
lb/MM Btu Output	0.30	8.84

Air/Fuel Ratio (A/F)	8.78

VERSION: **2.2** **12/14/2009**

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 1
Technician: SJB
Date: 2/27/2019

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.24		
Target Load Weight (lbs):	22.40		
Total Load Weight Range (lbs):	21.30	to	23.50
Core Load Weight Range (lbs):	10.10	to	14.60
Remainder Load Weight Range (lbs):	7.80	to	12.30
Core Load Piece Range (lbs):	3.40	to	5.60
Remainder Load Piece Range (lbs):	2.20	to	12.30
Max Allowable Kindling Weight (lbs):	4.27		
Max Allowable Start-up Fuel Weight (lbs):	6.41		

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	3.44	In Range	23.8	22.4	22.1	22.8	In Range	2.80	1.27
2	17.00	4.32	In Range	22.9	22.1	19.4	21.5	In Range	3.56	1.61
3	17.00	4.61	In Range	18.6	19.4	19.8	19.3	In Range	3.87	1.75
Core Load Wt. (lbs)		12.37	In Range							

REMAINDER LOAD DATA (1 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	3.22	In Range	19.3	19.5	18.7	19.2	In Range	2.70	1.23
2	17.00	2.25	In Range	25.2	23.4	24.6	24.4	In Range	1.81	0.82
3	17.00	3.53	In Range	19.4	18.3	19.1	18.9	In Range	2.97	1.35
Remainder Load (lbs)		9.00	In Range							

Total Load Weight (lbs):	21.37	In Range	
Core Load % of Total Weight:	58%	In Range	45-65%
Remainder % of Total Weight:	42%	In Range	35-55%
Total Load % of Target Weight:	95%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	9.5		
Total Load Average Moisture Conent (%DB):	20.7	In Range	19-25%
Total Load Average Moisture Conent (%WB):	17.2		
Total Test Load Weight (dry basis):	17.70 lbs	8.03 kg	

KINDLING AND START-UP FUEL

		Kindling Moisture Readings (%DB)					Dry Weight	
Kindling Weight (lbs)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
3.02	In Range	10	10	10	10.0	In Range	2.75	1.25

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
4.19	In Range	19.3	22.4	18.7	20.1	In Range	3.49	1.58

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.1	to	4.3	
Actual Residual Start-up Fuel Weight (lb):		2.2		In Range

TEST END POINT

High Fire Test Run End Point Range:	1.9	to	2.4	lb
Actual Fuel Load Ending Weight (lb):		2.1		In Range

Total Weight All Fuel Added: 28.58 lbs, wet basis
23.94 lbs, dry basis
10.86 kg, dry basis

Total Weight All Fuel Burned (dry basis): 19.64 lbs
8.91 kg

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	FPI	Job #:	19-460
Model:	F2450	Tracking #:	0022
Run #:	1	Technician:	SJB
Test Start Time:	9:25	Date:	2/27/2019
Test Type:	High Fire		

Recording Interval (min):	1
Total Sampling Time (min):	124
High Fire Test Load Time (min):	27

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.73	29.82	29.78
Relative Humidity (%)	8.1	9.1	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	

Meter Box γ Factor:	1.004	(A)	
Meter Box γ Factor:	1.000	(B)	
Meter Box γ Factor:	0.999	(Ambient)	
Ambient Sample Volume:	15.005	ft^3	

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	2/25/2019

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-13	in. Hg
(B)	0.000	cfm @	-15	in. Hg
(Ambient)	0.001	cfm @	-14	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.040	85
2	0.064	85
3	0.068	85
4	0.046	85
5	0.046	85
6	0.064	85
7	0.068	85
8	0.048	85
Center	0.070	85

Static Pressure: -0.200 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.07	ft/sec
V_{scent}:	17.88	ft/sec
F_p:	0.899	[ratio]
Initial Tunnel Flow:	176.1	scf/min

TEST FUEL PROPERTIES

ASTM 3053-17 - Table A1.1 Fuel Properties by Fuel Species

Select Fuel Type	Species	%C	%H	%O	%Ash	MJ/kg	BTU/lb
	Ash, White	49.70	6.90	43.00	0.30	20.75	8927
	Beech	48.70	5.80	44.70	0.60	18.80	8088
	Birch, Sweet	49.80	6.50	43.40	0.30	20.12	8656
	Birch, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Interior West/North)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Interioir South)	48.73	6.87	43.90	0.50	19.81	8522
	Elm, Rock	50.40	6.60	42.30	0.70	20.49	8815
	Elm, Soft	50.40	6.60	42.30	0.70	20.49	8815
	Gum, Red	50.88	6.06	41.57	1.28	19.72	8478
	Larch, Western	50.54	6.36	42.40	0.70	17.58	7558
X	Maple, Hard	50.64	6.02	41.74	1.35	19.96	8587
	Maple, Sugar	50.64	6.02	41.74	1.35	19.96	8587
	Oak, Red	49.50	6.62	43.70	0.20	20.20	8690
	Oak, White	50.40	6.59	42.70	0.20	20.50	8819
	Pine, Southern	52.60	7.00	40.10	1.31	22.30	9587
	Pine, Southern Long Leaf	52.60	7.02	40.10	1.30	22.30	9594
	Other						

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

High Fire Test Begins from Cold Start, No Preburn is Performed

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.070	0.00	79	-0.11		1.9		83	76	84	71
1	0.112	0.112	0.070	2.21	79	-1.94	73	1.7	-0.2	92	230	84	71
2	0.350	0.238	0.070	2.30	79	-0.62	159	1.2	-0.5	118	456	85	71
3	0.495	0.145	0.070	2.29	79	-0.03	96	1.1	-0.1	111	419	86	71
4	0.646	0.151	0.070	2.23	79	-0.15	100	1.0	-0.1	107	410	85	71
5	0.791	0.145	0.070	2.24	79	-2.75	96	0.8	-0.2	106	401	84	71
6	0.941	0.150	0.070	2.23	79	-1.82	99	0.7	-0.1	105	380	83	71
7	1.085	0.144	0.070	2.22	79	-1.35	95	0.6	-0.1	104	364	84	71
8	1.237	0.152	0.070	2.27	79	-2.75	100	0.6	0	103	344	85	71
9	1.381	0.144	0.070	2.14	80	-0.49	96	2.7	2.1	120	357	86	71
10	1.521	0.140	0.070	2.25	80	-2.41	95	2.4	-0.3	135	480	85	71
11	1.674	0.153	0.070	2.28	80	-2.16	102	2.2	-0.2	121	451	81	71
12	1.823	0.149	0.070	2.27	80	-0.16	100	2.1	-0.1	119	471	84	71
13	1.968	0.145	0.070	2.25	80	-1.78	97	1.8	-0.3	118	479	86	71
14	2.119	0.151	0.070	2.22	81	-2.59	101	1.7	-0.1	118	488	86	72
15	2.264	0.145	0.070	2.22	81	-1.79	97	1.6	-0.1	120	516	85	72
16	2.416	0.152	0.070	2.31	81	-1.17	102	1.4	-0.2	122	528	83	72
17	2.564	0.148	0.070	2.29	82	-2.16	99	1.2	-0.2	122	509	84	72
18	2.716	0.152	0.070	2.29	82	-2.79	101	1.0	-0.2	122	499	84	72
19	2.863	0.147	0.070	2.27	82	-0.72	98	0.9	-0.1	121	484	86	72
20	3.013	0.150	0.070	2.26	82	-0.21	100	0.8	-0.1	120	469	86	71
21	3.160	0.147	0.070	2.30	83	-2.86	98	0.7	-0.1	120	461	84	72
22	3.308	0.148	0.070	2.23	83	-3.22	101	3.2	2.5	146	521	84	72
23	3.451	0.143	0.070	1.92	83	-4.13	97	3.2	0	144	586	84	72
24	3.549	0.098	0.070	0.91	84	-1.41	66	3.0	-0.2	138	580	84	72
25	3.696	0.147	0.070	2.26	84	-0.65	99	2.6	-0.4	137	593	86	72
26	3.842	0.146	0.070	2.22	84	-0.03	98	2.4	-0.2	137	602	86	72
27	3.991	0.149	0.070	2.22	85	-1.41	100	21.4	19	136	602	85	73
28	4.136	0.145	0.070	2.22	85	-0.7	100	23.8	2.4	168	685	84	73
29	4.285	0.149	0.070	2.21	85	-0.66	102	22.9	-0.9	155	618	84	73
30	4.431	0.146	0.070	2.21	85	-2.74	99	22.6	-0.3	150	652	84	73
31	4.581	0.150	0.070	2.35	86	-0.78	102	22.2	-0.4	150	670	86	73
32	4.730	0.149	0.070	2.25	86	-0.91	101	21.8	-0.4	150	685	86	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	4.879	0.149	0.070	2.16	86	-1.42	101	21.6	-0.2	151	691	85	73
34	5.025	0.146	0.070	2.21	87	-4.5	99	21.2	-0.4	151	697	84	73
35	5.178	0.153	0.070	3.34	87	0	104	20.8	-0.4	152	702	82	73
36	5.347	0.169	0.070	2.31	87	-0.69	115	20.4	-0.4	153	707	83	73
37	5.495	0.148	0.070	2.27	88	-1.52	100	20.1	-0.3	153	705	85	73
38	5.647	0.152	0.070	2.25	88	-1.29	103	19.8	-0.3	153	704	86	74
39	5.794	0.147	0.070	2.22	88	-2.87	100	19.6	-0.2	155	710	86	74
40	5.943	0.149	0.070	2.20	88	-2.78	101	19.1	-0.5	154	710	85	73
41	6.093	0.150	0.070	2.35	89	-0.44	101	18.8	-0.3	154	713	84	73
42	6.246	0.153	0.070	2.34	89	-0.42	104	18.6	-0.2	155	714	84	73
43	6.400	0.154	0.070	2.35	89	-0.33	104	18.1	-0.5	155	719	84	73
44	6.550	0.150	0.070	2.30	89	-2.98	102	17.8	-0.3	155	720	85	73
45	6.703	0.153	0.070	2.32	90	-2.3	103	17.5	-0.3	156	725	86	73
46	6.851	0.148	0.070	2.31	90	-3.07	100	17.1	-0.4	156	724	86	74
47	7.005	0.154	0.070	2.29	90	-0.39	104	16.8	-0.3	156	725	85	74
48	7.156	0.151	0.070	2.27	90	-1.64	102	16.6	-0.2	155	721	84	73
49	7.309	0.153	0.070	2.27	91	-3.01	103	16.1	-0.5	154	715	84	75
50	7.457	0.148	0.070	2.27	91	-2.43	100	15.8	-0.3	154	712	84	74
51	7.608	0.151	0.070	2.26	91	-0.44	102	15.7	-0.1	154	709	85	74
52	7.756	0.148	0.070	2.23	91	-0.44	100	15.4	-0.3	154	707	86	75
53	7.906	0.150	0.070	2.25	92	-2.68	101	15.0	-0.4	154	701	86	75
54	8.054	0.148	0.070	2.24	92	-2.03	100	14.6	-0.4	153	699	85	75
55	8.204	0.150	0.070	2.22	92	-3.19	101	14.4	-0.2	153	695	85	75
56	8.354	0.150	0.070	2.20	92	-1.26	101	14.0	-0.4	153	694	84	74
57	8.501	0.147	0.070	2.21	92	-3.14	99	13.7	-0.3	153	689	84	75
58	8.651	0.150	0.070	2.21	93	-2.31	101	13.4	-0.3	152	684	84	75
59	8.798	0.147	0.070	2.19	93	-2.03	99	13.1	-0.3	152	685	86	75
60	8.947	0.149	0.070	2.19	93	-1.69	100	12.8	-0.3	151	681	86	75
61	9.107	0.160	0.070	2.78	93	0	107	12.6	-0.2	151	678	84	75
62	9.264	0.157	0.070	2.21	93	-2.64	105	12.2	-0.4	150	679	84	75
63	9.411	0.147	0.070	2.17	94	-0.06	98	11.9	-0.3	150	676	84	75
64	9.564	0.153	0.070	2.37	94	-2.63	102	11.8	-0.1	150	676	84	75
65	9.716	0.152	0.070	2.36	94	-0.6	101	11.4	-0.4	149	672	85	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	9.870	0.154	0.070	2.36	94	-0.19	103	11.1	-0.3	149	669	86	75
67	10.026	0.156	0.070	2.35	94	-2.7	104	10.8	-0.3	149	670	86	75
68	10.175	0.149	0.070	2.34	95	-0.22	99	10.6	-0.2	148	669	85	75
69	10.330	0.155	0.070	2.33	95	-0.58	103	10.2	-0.4	148	667	84	75
70	10.481	0.151	0.070	2.33	95	-2.89	101	10.0	-0.2	148	662	84	76
71	10.636	0.155	0.070	2.33	95	-1.34	103	9.8	-0.2	146	653	84	76
72	10.786	0.150	0.070	2.32	95	-3.08	100	9.6	-0.2	145	640	85	75
73	10.938	0.152	0.070	2.31	95	-0.25	101	9.3	-0.3	144	629	87	75
74	11.093	0.155	0.070	2.30	96	-0.34	103	9.2	-0.1	144	618	86	75
75	11.244	0.151	0.070	2.34	96	-0.55	100	9.0	-0.2	143	612	86	76
76	11.397	0.153	0.070	2.32	96	-1.5	101	8.8	-0.2	141	603	85	75
77	11.547	0.150	0.070	2.32	96	-2.74	99	8.6	-0.2	141	596	84	76
78	11.703	0.156	0.070	2.31	96	-2.02	103	8.6	0	139	587	84	75
79	11.854	0.151	0.070	2.30	96	-0.29	100	8.3	-0.3	139	586	85	76
80	12.007	0.153	0.070	2.33	96	-2.68	101	8.1	-0.2	139	587	86	75
81	12.158	0.151	0.070	2.31	97	-1	99	8.0	-0.1	138	582	86	76
82	12.311	0.153	0.070	2.31	97	-0.7	101	7.8	-0.2	137	576	86	76
83	12.466	0.155	0.070	2.31	97	-2.93	102	7.7	-0.1	136	569	86	75
84	12.615	0.149	0.070	2.34	97	-2.97	98	7.5	-0.2	135	564	85	76
85	12.770	0.155	0.070	2.31	97	-2.76	102	7.5	0	135	558	84	76
86	12.920	0.150	0.070	2.31	97	-1.3	98	7.3	-0.2	134	555	84	75
87	13.076	0.156	0.070	2.31	97	-0.7	102	7.1	-0.2	133	552	85	75
88	13.226	0.150	0.070	2.29	97	-2.8	98	7.0	-0.1	133	544	86	75
89	13.379	0.153	0.070	2.31	98	-2.82	100	6.9	-0.1	132	534	86	75
90	13.533	0.154	0.070	2.30	98	-1.63	100	6.8	-0.1	130	524	86	75
91	13.684	0.151	0.070	2.30	98	-2.98	99	6.8	0	130	519	85	76
92	13.839	0.155	0.070	2.31	98	-2.48	101	6.6	-0.2	128	513	84	75
93	13.988	0.149	0.070	2.30	98	-0.25	97	6.5	-0.1	128	505	84	75
94	14.144	0.156	0.070	2.31	98	-0.31	102	6.4	-0.1	127	499	85	75
95	14.294	0.150	0.070	2.29	98	-2.84	98	6.3	-0.1	126	491	86	75
96	14.449	0.155	0.070	2.30	98	-0.46	101	6.2	-0.1	126	488	86	75
97	14.600	0.151	0.070	2.31	99	-2.82	98	6.1	-0.1	125	482	86	75
98	14.753	0.153	0.070	2.31	99	-3.03	99	6.2	0.1	124	480	85	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	14.907	0.154	0.070	2.30	99	-1.14	100	6.0	-0.2	124	477	85	75
100	15.058	0.151	0.070	2.31	99	-3.01	98	5.9	-0.1	123	474	84	75
101	15.212	0.154	0.070	2.31	99	-3.12	100	5.8	-0.1	122	471	85	75
102	15.362	0.150	0.070	2.30	99	-2	97	5.7	-0.1	122	468	86	75
103	15.518	0.156	0.070	2.30	99	-0.34	101	5.6	-0.1	121	461	86	75
104	15.668	0.150	0.070	2.31	99	-2.02	97	5.6	0	121	457	86	75
105	15.822	0.154	0.070	2.30	99	-2.27	99	5.5	-0.1	120	453	85	75
106	15.975	0.153	0.070	2.31	99	-1.65	99	5.4	-0.1	120	451	85	74
107	16.127	0.152	0.070	2.31	99	-3.06	98	5.4	0	119	448	84	75
108	16.281	0.154	0.070	2.31	99	-2.78	99	5.3	-0.1	119	447	85	75
109	16.431	0.150	0.070	2.31	99	-2.43	97	5.2	-0.1	118	443	86	74
110	16.587	0.156	0.070	2.31	100	-1.22	100	5.2	0	118	441	86	74
111	16.737	0.150	0.070	2.30	100	-2.47	97	5.1	-0.1	118	440	86	74
112	16.892	0.155	0.070	2.30	100	-2.23	100	5.0	-0.1	117	438	85	74
113	17.043	0.151	0.070	2.30	100	-2.89	97	4.9	-0.1	117	437	84	74
114	17.196	0.153	0.070	2.31	100	-1.17	98	4.9	0	116	435	84	74
115	17.350	0.154	0.070	2.31	100	-3.07	99	4.8	-0.1	116	434	85	75
116	17.501	0.151	0.070	2.31	100	-2.96	97	4.7	-0.1	116	434	86	75
117	17.656	0.155	0.070	2.29	100	-1.7	100	4.7	0	116	433	86	74
118	17.806	0.150	0.070	2.31	100	-0.81	96	4.6	-0.1	115	430	86	74
119	17.962	0.156	0.070	2.30	100	-2.82	100	4.5	-0.1	115	429	85	74
120	18.112	0.150	0.070	2.31	100	-1.87	96	4.5	0	115	429	84	75
121	18.266	0.154	0.070	2.30	100	-0.26	99	4.4	-0.1	114	424	84	75
122	18.419	0.153	0.070	2.31	100	-3.04	98	4.4	0	114	418	85	75
123	18.571	0.152	0.070	2.30	100	-2.08	97	4.3	-0.1	113	414	86	75
124	18.725	0.154	0.070	2.32	100	-1.47	99	4.3	0	113	410	86	74
Avg/Tot	18.725	0.151	0.070	2.26	92	-1.73	100			134	557	85	73.9

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.00	79	-1		85	0.000	0.08	0.00
1	0.106	0.106	2.30	79	-1.04	71	85	-0.060	0.09	0.00
2	0.251	0.145	2.22	79	-2.06	100	84	-0.090	4.93	0.16
3	0.398	0.147	2.27	79	-2.52	100	84	-0.060	9.24	0.34
4	0.542	0.144	2.25	79	-3.18	98	84	-0.060	11.16	0.17
5	0.690	0.148	2.21	79	-3.27	101	85	-0.060	10.41	0.09
6	0.834	0.144	2.22	79	-3.02	98	85	-0.070	9.77	0.09
7	0.981	0.147	2.20	79	-1.78	100	85	-0.050	7.87	0.16
8	1.124	0.143	2.25	79	-0.89	97	85	-0.070	7.47	0.18
9	1.272	0.148	2.10	79	-3.19	102	85	-0.060	6.17	0.21
10	1.403	0.131	1.49	79	-7.06	91	85	-0.070	4.06	0.23
11	1.554	0.151	2.28	80	-0.03	104	84	-0.070	9.83	0.44
12	1.699	0.145	2.27	80	-0.35	99	83	-0.070	11.38	0.23
13	1.846	0.147	2.27	80	-0.64	101	84	-0.060	12.94	0.30
14	1.991	0.145	2.27	80	-2.3	99	85	-0.070	12.48	0.20
15	2.140	0.149	2.25	81	-0.88	102	85	-0.080	12.86	0.26
16	2.284	0.144	2.24	81	-3.23	99	86	-0.070	14.42	0.46
17	2.433	0.149	2.24	81	-1.51	102	86	-0.070	13.61	0.35
18	2.577	0.144	2.22	81	-0.66	99	85	-0.080	11.61	0.14
19	2.724	0.147	2.22	82	-1.92	101	85	-0.060	10.88	0.11
20	2.869	0.145	2.22	82	-3.15	99	84	-0.060	9.56	0.12
21	3.017	0.148	2.25	82	-0.96	101	84	-0.070	8.86	0.12
22	3.160	0.143	2.15	83	-0.92	100	85	-0.080	8.02	0.12
23	3.308	0.148	2.20	83	-3.58	103	85	-0.080	7.05	0.26
24	3.444	0.136	1.64	83	-4.88	94	86	-0.070	14.52	0.56
25	3.589	0.145	2.65	84	-1.09	100	85	-0.090	15.18	0.76
26	3.742	0.153	2.37	84	-1.18	106	85	-0.090	15.81	1.22
27	3.894	0.152	2.34	84	-2.54	105	86	-0.080	15.79	0.88
28	4.039	0.145	2.26	84	-1.14	103	86	-0.090	14.27	0.46
29	4.188	0.149	2.24	85	-0.9	104	85	-0.090	7.94	0.52
30	4.333	0.145	2.24	85	-0.93	101	85	-0.080	14.24	0.38
31	4.481	0.148	2.15	85	-1.25	103	85	-0.100	16.93	1.11

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.624	0.143	2.19	86	-2.76	100	85	-0.090	17.79	1.69
33	4.771	0.147	2.20	86	-3.16	102	86	-0.090	17.96	1.56
34	4.915	0.144	2.26	86	-3.78	100	86	-0.090	18.02	1.48
35	5.062	0.147	2.21	87	-2	102	86	-0.090	18.10	1.26
36	5.208	0.146	2.31	87	-3.56	102	86	-0.090	17.93	1.12
37	5.358	0.150	2.25	87	-1.74	105	85	-0.100	17.98	0.99
38	5.504	0.146	2.26	87	-1.85	102	85	-0.090	17.81	0.99
39	5.653	0.149	2.24	88	-2.03	104	85	-0.090	17.91	0.98
40	5.798	0.145	2.23	88	-2.62	101	85	-0.090	17.91	1.00
41	5.946	0.148	2.23	88	-2.87	103	86	-0.090	18.03	0.96
42	6.092	0.146	2.21	88	-1.95	102	86	-0.090	18.04	1.02
43	6.239	0.147	2.22	89	-2.95	102	86	-0.090	18.04	1.09
44	6.384	0.145	2.20	89	-1.97	101	85	-0.100	17.94	1.07
45	6.531	0.147	2.17	89	-2.07	102	85	-0.090	18.04	1.09
46	6.675	0.144	2.19	89	-1.94	100	85	-0.090	18.28	1.11
47	6.821	0.146	2.17	90	-4.1	101	86	-0.080	18.09	1.14
48	6.966	0.145	2.16	90	-2.08	101	86	-0.100	18.19	1.14
49	7.112	0.146	2.24	90	-2.11	101	86	-0.090	18.08	1.16
50	7.259	0.147	2.23	90	-3.73	102	86	-0.090	18.22	1.24
51	7.406	0.147	2.22	91	-2.07	102	85	-0.090	18.28	1.27
52	7.553	0.147	2.20	91	-3.55	102	85	-0.090	18.11	1.25
53	7.700	0.147	2.21	91	-2.1	102	86	-0.100	18.19	1.34
54	7.846	0.146	2.20	91	-4.13	101	86	-0.090	18.13	1.33
55	7.993	0.147	2.19	92	-2.11	102	87	-0.090	18.16	1.26
56	8.139	0.146	2.18	92	-3.45	101	86	-0.100	18.01	1.25
57	8.285	0.146	2.18	92	-2.55	101	86	-0.100	17.90	1.31
58	8.431	0.146	2.17	92	-2.62	101	85	-0.090	17.99	1.32
59	8.576	0.145	2.17	92	-2.24	100	85	-0.090	17.88	1.38
60	8.723	0.147	2.24	93	-2.55	101	86	-0.090	17.90	1.24
61	8.871	0.148	2.23	93	-3.1	102	86	-0.090	17.67	1.17
62	9.019	0.148	2.22	93	-2.22	102	87	-0.090	17.62	1.02
63	9.167	0.148	2.22	93	-4.15	102	87	-0.080	17.50	0.92

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.314	0.147	2.22	93	-2.7	101	86	-0.100	17.30	0.85
65	9.462	0.148	2.20	94	-2.88	101	86	-0.100	16.94	0.86
66	9.609	0.147	2.19	94	-3.62	101	85	-0.090	16.88	0.90
67	9.758	0.149	2.22	94	-4.43	102	85	-0.080	16.84	0.87
68	9.903	0.145	2.21	94	-3.02	99	86	-0.080	16.91	0.79
69	10.052	0.149	2.20	94	-2.43	102	87	-0.100	16.93	0.54
70	10.197	0.145	2.21	94	-4.39	99	87	-0.090	16.73	0.44
71	10.346	0.149	2.21	95	-2.36	102	86	-0.090	16.42	0.30
72	10.491	0.145	2.20	95	-2.98	99	86	-0.090	15.86	0.19
73	10.640	0.149	2.19	95	-4.46	102	85	-0.090	15.07	0.17
74	10.786	0.146	2.21	95	-4.49	100	85	-0.090	14.56	0.12
75	10.934	0.148	2.23	95	-2.39	101	86	-0.090	14.12	0.08
76	11.080	0.146	2.20	95	-2.34	99	86	-0.080	13.91	0.11
77	11.229	0.149	2.18	95	-4.33	101	87	-0.070	13.33	0.11
78	11.376	0.147	2.21	96	-2.88	100	87	-0.100	13.18	0.06
79	11.525	0.149	2.20	96	-3.47	101	86	-0.080	12.91	0.11
80	11.670	0.145	2.21	96	-2.31	98	86	-0.080	13.37	0.05
81	11.820	0.150	2.20	96	-2.84	102	85	-0.090	13.55	0.09
82	11.966	0.146	2.21	96	-2.53	99	85	-0.080	13.31	0.09
83	12.116	0.150	2.20	96	-4.25	101	86	-0.080	12.87	0.06
84	12.261	0.145	2.22	96	-4.43	98	87	-0.080	12.31	0.07
85	12.412	0.151	2.21	96	-4.4	102	87	-0.070	12.37	0.04
86	12.558	0.146	2.21	97	-2.23	98	86	-0.090	12.34	0.04
87	12.709	0.151	2.21	97	-4.47	102	86	-0.080	11.96	0.07
88	12.854	0.145	2.21	97	-2.35	98	86	-0.080	11.64	0.06
89	13.005	0.151	2.21	97	-3.26	102	85	-0.090	11.01	0.04
90	13.151	0.146	2.20	97	-4.41	98	86	-0.080	10.32	0.06
91	13.302	0.151	2.23	97	-3.86	101	86	-0.080	10.01	0.05
92	13.447	0.145	2.22	97	-4.34	97	86	-0.080	9.99	0.01
93	13.597	0.150	2.22	97	-2.32	101	86	-0.080	9.75	0.05
94	13.743	0.146	2.20	97	-2.86	98	86	-0.080	9.22	0.07
95	13.894	0.151	2.23	98	-3.65	101	85	-0.080	8.86	0.08

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.041	0.147	2.22	98	-4.44	98	85	-0.070	8.81	0.08
97	14.191	0.150	2.21	98	-2.22	100	86	-0.080	8.94	0.09
98	14.338	0.147	2.22	98	-2.41	98	86	-0.080	8.90	0.07
99	14.488	0.150	2.23	98	-2.22	100	86	-0.070	8.90	0.06
100	14.637	0.149	2.23	98	-4.5	99	86	-0.070	8.89	0.06
101	14.786	0.149	2.22	98	-4.36	99	86	-0.070	8.85	0.06
102	14.935	0.149	2.23	98	-2.47	99	86	-0.080	8.63	0.07
103	15.083	0.148	2.24	98	-3.24	98	85	-0.080	8.66	0.06
104	15.233	0.150	2.23	98	-2.58	100	85	-0.080	8.03	0.10
105	15.380	0.147	2.22	98	-2.18	98	86	-0.070	8.14	0.09
106	15.530	0.150	2.22	99	-2.73	99	86	-0.080	7.86	0.14
107	15.677	0.147	2.23	99	-4.06	97	87	-0.070	7.90	0.13
108	15.828	0.151	2.23	99	-2.77	100	86	-0.070	7.99	0.12
109	15.975	0.147	2.22	99	-2.26	97	86	-0.070	7.96	0.12
110	16.127	0.152	2.23	99	-2.4	101	85	-0.070	8.03	0.12
111	16.274	0.147	2.23	99	-2.63	97	85	-0.070	7.83	0.15
112	16.425	0.151	2.23	99	-2.54	100	85	-0.080	7.93	0.15
113	16.572	0.147	2.21	99	-2.26	97	86	-0.060	7.92	0.15
114	16.724	0.152	2.23	99	-4.09	100	86	-0.070	7.99	0.17
115	16.870	0.146	2.24	99	-2.26	97	86	-0.070	7.85	0.20
116	17.021	0.151	2.24	99	-3.27	100	86	-0.060	8.08	0.16
117	17.168	0.147	2.23	99	-2.85	97	86	-0.070	7.93	0.18
118	17.319	0.151	2.24	99	-2.36	100	85	-0.080	7.86	0.16
119	17.467	0.148	2.23	99	-2.79	98	85	-0.060	7.66	0.22
120	17.618	0.151	2.22	99	-2.22	100	85	-0.050	7.60	0.25
121	17.767	0.149	2.22	99	-4.19	98	86	-0.070	7.76	0.21
122	17.916	0.149	2.24	100	-2.16	98	86	-0.060	7.21	0.26
123	18.067	0.151	2.24	100	-2.19	99	86	-0.070	6.87	0.44
124	18.214	0.147	2.24	100	-4.34	97	86	-0.060	6.91	0.44
Avg/Tot	18.214	0.147	2.20	91	-2.73	100			12.56	0.49

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	74	74	72	75	74	73.8	N/A
1	74	74	74	88	74	76.8	N/A
2	78	78	87	137	74	90.8	N/A
3	87	88	98	189	74	107.2	N/A
4	98	100	106	234	74	122.4	N/A
5	111	113	115	267	74	136.0	N/A
6	125	126	122	292	75	148.0	N/A
7	139	136	132	310	76	158.6	N/A
8	152	145	141	319	78	167.0	N/A
9	164	153	149	324	80	174.0	N/A
10	174	160	160	346	82	184.4	N/A
11	185	168	172	374	85	196.8	N/A
12	196	178	185	407	88	210.8	N/A
13	208	190	198	439	91	225.2	N/A
14	220	203	213	466	95	239.4	N/A
15	233	217	227	497	99	254.6	N/A
16	247	232	243	529	103	270.8	N/A
17	261	247	259	550	107	284.8	N/A
18	275	261	274	562	111	296.6	N/A
19	289	275	286	568	116	306.8	N/A
20	301	287	297	569	120	314.8	N/A
21	313	299	307	567	125	322.2	N/A
22	324	308	318	567	130	329.4	N/A
23	334	317	327	585	134	339.4	N/A
24	342	326	337	618	139	352.4	N/A
25	352	336	347	653	144	366.4	N/A
26	362	345	357	687	149	380.0	N/A
27	373	355	366	712	153	391.8	N/A
28	390	364	376	739	159	405.6	N/A
29	402	372	384	738	164	412.0	N/A
30	411	381	389	762	169	422.4	N/A
31	418	387	394	791	174	432.8	N/A
32	424	393	398	817	178	442.0	N/A
33	429	397	403	841	183	450.6	N/A
34	435	401	409	858	187	458.0	N/A
35	439	406	414	877	191	465.4	N/A
36	444	410	419	888	196	471.4	N/A
37	449	414	425	897	200	477.0	N/A
38	454	417	430	908	204	482.6	N/A
39	459	422	435	916	209	488.2	N/A
40	463	426	439	922	212	492.4	N/A
41	467	430	444	929	216	497.2	N/A
42	471	434	448	935	219	501.4	N/A
43	476	439	452	941	223	506.2	N/A
44	481	443	456	948	226	510.8	N/A
45	485	448	460	953	229	515.0	N/A
46	489	453	464	956	231	518.6	N/A
47	494	458	467	962	234	523.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	498	461	394	948	237	507.6	N/A
49	501	464	361	945	239	502.0	N/A
50	505	469	338	942	241	499.0	N/A
51	509	473	322	940	244	497.6	N/A
52	513	477	313	938	246	497.4	N/A
53	517	481	305	936	248	497.4	N/A
54	521	485	301	936	250	498.6	N/A
55	525	488	296	935	252	499.2	N/A
56	528	490	294	935	254	500.2	N/A
57	531	494	293	935	256	501.8	N/A
58	534	497	290	934	258	502.6	N/A
59	538	499	291	934	259	504.2	N/A
60	541	502	290	934	261	505.6	N/A
61	545	504	289	933	263	506.8	N/A
62	547	507	290	932	264	508.0	N/A
63	550	510	289	931	266	509.2	N/A
64	553	514	289	929	268	510.6	N/A
65	555	515	290	930	270	512.0	N/A
66	558	518	290	929	271	513.2	N/A
67	560	520	290	929	273	514.4	N/A
68	562	523	291	927	275	515.6	N/A
69	565	525	292	926	277	517.0	N/A
70	566	528	291	923	279	517.4	N/A
71	569	531	292	920	280	518.4	N/A
72	570	532	292	915	283	518.4	N/A
73	573	535	294	903	284	517.8	N/A
74	574	538	293	894	286	517.0	N/A
75	575	539	292	882	288	515.2	N/A
76	577	541	292	870	290	514.0	N/A
77	578	542	291	859	292	512.4	N/A
78	580	542	291	848	294	511.0	N/A
79	581	543	291	836	296	509.4	N/A
80	582	543	290	827	298	508.0	N/A
81	582	545	289	818	300	506.8	N/A
82	582	545	289	811	301	505.6	N/A
83	583	545	289	802	304	504.6	N/A
84	583	546	289	794	305	503.4	N/A
85	583	547	288	786	307	502.2	N/A
86	584	547	287	779	309	501.2	N/A
87	585	548	286	775	311	501.0	N/A
88	584	548	286	769	312	499.8	N/A
89	584	548	285	761	314	498.4	N/A
90	584	548	284	752	315	496.6	N/A
91	582	546	283	740	317	493.6	N/A
92	582	544	282	729	318	491.0	N/A
93	580	544	280	715	320	487.8	N/A
94	578	542	277	704	321	484.4	N/A
95	576	541	277	691	322	481.4	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 1

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	574	539	275	679	323	478.0	N/A
97	572	536	274	671	325	475.6	N/A
98	569	535	272	659	326	472.2	N/A
99	567	533	270	652	327	469.8	N/A
100	563	531	269	642	327	466.4	N/A
101	562	530	268	636	328	464.8	N/A
102	560	528	266	626	329	461.8	N/A
103	558	526	265	620	330	459.8	N/A
104	556	525	263	612	330	457.2	N/A
105	554	522	261	603	331	454.2	N/A
106	552	520	259	596	331	451.6	N/A
107	550	518	258	591	332	449.8	N/A
108	547	515	257	585	332	447.2	N/A
109	545	512	255	578	332	444.4	N/A
110	543	510	252	573	332	442.0	N/A
111	541	508	251	566	333	439.8	N/A
112	539	506	250	562	333	438.0	N/A
113	537	504	249	559	333	436.4	N/A
114	534	502	248	555	333	434.4	N/A
115	533	500	247	553	333	433.2	N/A
116	531	498	247	549	334	431.8	N/A
117	529	497	245	546	334	430.2	N/A
118	528	495	246	542	334	429.0	N/A
119	527	493	245	541	334	428.0	N/A
120	525	492	244	539	334	426.8	N/A
121	524	492	243	536	335	426.0	N/A
122	523	490	242	530	335	424.0	N/A
123	521	488	239	522	336	421.2	N/A
124	520	487	239	517	336	419.8	N/A
Average	461	431	288	705	240	425	N/A

LAB SAMPLE DATA - ASTM E2515

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 1
Technician: SJB
Date: 2/27/2019

TRAIN A (1st Hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T103, T104, T110, T112	363.0	354.6	8.4
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. O-Ring catch*	O-Ring				0.0

Sub-Total	Total Particulate, mg:	8.4

TRAIN A (Post 1st hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T113	178.9	88.8	1.8
B. Rear filter catch	Filter	T105		88.3	
C. Probe catch*	Probe	7A	116740.1	116739.9	0.2
D. O-Ring catch*	O-Ring	7A	3569.2	3569.1	0.1

Sub-Total	Total Particulate, mg:	2.1

Train A Aggregate	Total Particulate, mg:	**10.5**

TRAIN B

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T106, T109, T111	364.2	266.8	9.3
B. Rear filter catch	Filter	T107		88.1	
C. Probe catch*	Probe	7B	117288.0	117287.7	0.3
D. O-Ring catch*	O-Ring	7B	3517.9	3517.8	0.1

Total Particulate, mg:	**9.7**

AMBIENT

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Filter catch*	Filter	T108	88.5	88.4	0.1

Total Particulate, mg:	**0.1**

*Particulate catch that results in a negative number, is assumed to be zero for probes and O-rings, negative numbers for filters are assumed to be part of the O-Ring weight.

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 1 Test Date: 2/27/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: N/A
Air Control Setting: N/A

Time	Notes
N/A	High Fire test begins from cold start

Test Notes
Test Burn Start Time: 9:25
Air Control Setting: Fully Open

Time	Notes
0 min	2.0 lbs of kindling and scrap paper loaded in stove, propane torch for 20 seconds; door cracked open ~3”
1 min	Door closed down to 1” open
2 min	Door closed engaged
8 min	@0.7 lbs, added remaining kindling (1.0 lb) of kindling and 1.2 lbs of start-up fuel, door open 40 seconds, then closed but not engaged
10 min	Door latch engaged, changed front filter on both sample trains due to plugging
21 min	@0.7 lbs, added remaining start-up fuel (3.0 lbs), door open 120 seconds
22 min	Changed front filter on both sample trains due to plugging
27 min	@2.2 lbs, leveled coal bed and loaded high fire fuel load, door open 1 minute
29 min	Changed front filter on both A & B trains due to plugging
35 min	Changed Train A front filter due to plugging
47 min	Fan turned on high (20 minutes after fuel loading) per manufacturer’s instructions
60 min	Changed 1-hour filter on train A
124 min	End of Test

Test Burn End Time: 11:29

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 16.93 CO (%): 4.330
Mid Gas CO_2 (%): 10.00 CO (%): 2.51

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	9:05	9:09	9:07	2/28 – 6:57	2/28 – 6:54	2/28 – 6:59
CO_2	0.00	10.06	16.93	0.02	10.15	17.13
CO	0.000	2.492	4.330	0.000	2.512	4.371

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature:  Date: 2/28/2019

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 1 Test Date: 2/27/2019

Test Photos

Kindling Fuel Load

Start-up Fuel Load

High Fire Fuel Load

Residual Start-up Fuel Coal Bed

Technician Signature: Date: 2/28/2019

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 1 Test Date: 2/27/2019

High Fire Fuel Loaded

Residual High Fire Load Coal Bed

N/A – High Fire Test Only

Low Fire Fuel Load

N/A – High Fire Test Only

Low Fire Fuel Loaded

Technician Signature: Date: 2/28/2019

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 2 Data Summary

Client:	FPI
Model:	F2450
Job #:	19-460
Tracking #:	0022
Test Date:	2/27/2019

Techician Signature

3/4/2019
Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

Burn Rate (kg/hr):	1.01

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	69.305	88.189	86.702	9.133
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.24			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10596.8			
Average Gas Meter Temperature (°F)	74.9	103.1	102.3	99.6
Total Sample Volume (dscf)	67.977	83.051	81.434	8.652
Average Tunnel Temperature (°F)	97.3			
Total Time of Test (min)	573			
Total Particulate Catch (mg)	0.1	14.4	14.0	2.4
Particulate Concentration, dry-standard (g/dscf)	0.0000015	0.0001734	0.0001719	0.0002774
Total PM Emissions (g)	0.15	17.40	17.25	2.92
Particulate Emission Rate (g/hr)	0.02	1.82	1.81	2.92
Emissions Factor (g/kg)	-	1.80	1.78	-
Difference from Average Total Particulate Emissions (g)	-	0.07	0.07	-
Difference from Average Emissions Factor (g/kg)	-	0.01	0.01	-

Final Average Results	
Total Particulate Emissions (g)	17.32
Particulate Emission Rate (g/hr)	1.81
Emissions Factor (g/kg)	1.79
HHV Efficiency (%)	73.9%
LHV Efficiency (%)	79.1%
CO Emissions (g/min)	1.47

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	>80 °F, <90 °F	Min: 80 / Max: 87	OK
Face Velocity	< 30 ft/min	9.5	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min: 68 / Max: 77	OK
Negative Probe Weight Evaluation	<5% of Total Catch	-0.7%	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	CHECK 10 MIN. INTERVAL PRO-RATES

B415.1 Efficiency Results

Manufacturer:	FPI
Model:	F2450
Date:	02/27/19
Run:	2
Control #:	19-460
Test Duration:	573
Output Category:	Low

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	73.9%	79.1%
Combustion Efficiency	94.1%	94.1%
Heat Transfer Efficiency	78.6%	84.0%

Output Rate (kJ/h)	14,947	14,179	**(Btu/h)**
Burn Rate (kg/h)	1.01	2.23	**(lb/h)**
Input (kJ/h)	20,217	19,178	**(Btu/h)**

Test Load Weight (dry kg)	9.67	21.32	**dry lb**
MC wet (%)	18.00		
MC dry (%)	21.96		
Particulate (g)	17.32		
CO (g)	843		
Test Duration (h)	9.55		

Emissions	Particulate	CO
g/MJ Output	0.12	5.90
g/kg Dry Fuel	1.79	87.10
g/h	1.81	88.22
g/min	0.03	1.47
lb/MM Btu Output	0.28	13.72

Air/Fuel Ratio (A/F)	16.40

VERSION: **2.2** **12/14/2009**

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: FPI
Job #: 19-460
Model: F2450
Tracking # 0022
Run #: 2
Technician: SJB
Date: 2/27/2019

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.24		
Target Load Weight (lbs):	22.40		
Total Load Weight Range (lbs):	21.30	to	23.50
Core Load Weight Range (lbs):	10.10	to	14.60
Remainder Load Weight Range (lbs):	7.80	to	12.30
Core Load Piece Range (lbs):	3.40	to	5.60
Remainder Load Piece Range (lbs):	2.20	to	12.30
Max Allowable Kindling Weight (lbs):	4.27		
Max Allowable Start-up Fuel Weight (lbs):	6.41		

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	3.44	In Range	23.8	22.4	22.1	22.8	In Range	2.80	1.27
2	17.00	4.32	In Range	22.9	22.1	19.4	21.5	In Range	3.56	1.61
3	17.00	4.61	In Range	18.6	19.4	19.8	19.3	In Range	3.87	1.75
Core Load Wt. (lbs)		12.37	In Range							

REMAINDER LOAD DATA (1 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	3.22	In Range	19.3	19.5	18.7	19.2	In Range	2.70	1.23
2	17.00	2.25	In Range	25.2	23.4	24.6	24.4	In Range	1.81	0.82
3	17.00	3.53	In Range	19.4	18.3	19.1	18.9	In Range	2.97	1.35
Remainder Load (lbs)		9.00	In Range							

Total Load Weight (lbs):	21.37	In Range	
Core Load % of Total Weight:	58%	In Range	45-65%
Remainder % of Total Weight:	42%	In Range	35-55%
Total Load % of Target Weight:	95%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	9.5		
Total Load Average Moisture Conent (%DB):	20.7	In Range	19-25%
Total Load Average Moisture Conent (%WB):	17.2		
Total Test Load Weight (dry basis):	17.70 lbs	8.03 kg	

KINDLING AND START-UP FUEL

		Kindling Moisture Readings (%DB)					Dry Weight	
Kindling Weight (lbs)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
3.02	In Range	10	10	10	10.0	In Range	2.75	1.25

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
4.19	In Range	19.3	22.4	18.7	20.1	In Range	3.49	1.58

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.1	to	4.3	
Actual Residual Start-up Fuel Weight (lb):	2.2			In Range

LOW & MEDIUM FIRE FUEL LOAD DATA - ASTM E3053

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 2
Technician: SJB
Date: 2/27/2019

Nominal Loading Density (lbs/ft^3, wet basis):	12		
Usable Firebox Volume (ft^3):	2.24		
Target Load Weight (lbs):	26.88		
Total Load Weight Range (lbs):	25.54	to	28.22
Core Load Weight Range (lbs):	12.10	to	17.47
Remainder Load Weight Range (lbs):	9.41	to	14.78
Core Load Piece Range (lbs):	4.03	to	6.72
Remainder Load Piece Range (lbs):	2.69	to	8.06

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	5.53	In Range	20.6	22.0	18.7	20.4	In Range	4.59	2.08
2	17.00	5.18	In Range	24.2	21.7	22.6	22.8	In Range	4.22	1.91
3	17.00	5.07	In Range	22.3	19.0	21.4	20.9	In Range	4.19	1.90
Core Load Wt. (lbs)		15.78	In Range							

REMAINDER LOAD DATA (2 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	3.70	In Range	24.5	21.5	19.7	21.9	In Range	3.04	1.38
2	17.00	6.48	In Range	22.8	24.7	22.9	23.5	In Range	5.25	2.38
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		10.18	In Range							

Remainder Load Small/Large Piece Weight Ratio:	57%	In Range	≤ 67%
Total Load Weight (lbs):	25.96	In Range	
Core Load % of Total Weight:	61%	In Range	45-65%
Remainder % of Total Weight:	39%	In Range	35-55%
Total Load % of Target Weight:	97%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	11.6		
Total Load Average Moisture Conent (%DB):	22.0	In Range	19-25%
Total Load Average Moisture Conent (%WB):	18.0		
Total Test Load Weight (dry basis):	21.29 lbs	9.66 kg	

TEST FUEL LOADING RANGE

Allowable Charcoal Bed Weight Range (lb):	2.6	to	5.1
Actual Charcoal Bed Wt. (lb):	3.9	In Range	

TEST END POINT

Actual Fuel Load Ending Weight (lb): 0.0 Valid Test (≥90%)

Total Fuel Burned During Test Run:
26.0 lbs, wet basis
21.3 lbs, dry basis
9.66 kg, dry basis

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	FPI	Job #:	19-460
Model:	F2450	Tracking #:	0022
Run #:	2	Technician:	SJB
Test Start Time:	11:38	Date:	2/27/2019
Test Type:	Low Fire		

Recording Interval (min):	1
Total Sampling Time (min):	573

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.82	29.72	29.77
Relative Humidity (%)	9.1	8.1	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	

Meter Box γ Factor:	1.004	(A)	
Meter Box γ Factor:	1.000	(B)	
Meter Box γ Factor:	0.999	(Ambient)	
Ambient Sample Volume:	69.305	ft^3	

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	2/25/2019

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-16	in. Hg
(B)	0.000	cfm @	-13	in. Hg
(Ambient)	0.001	cfm @	-13	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.040	85
2	0.064	85
3	0.068	85
4	0.046	85
5	0.046	85
6	0.064	85
7	0.068	85
8	0.048	85
Center	0.070	85

Static Pressure: -0.200 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.04	ft/sec
V_{scent}:	17.85	ft/sec
F_p:	0.899	[ratio]
Initial Tunnel Flow:	176.1	scf/min

TEST FUEL PROPERTIES

ASTM 3053-17 - Table A1.1 Fuel Properties by Fuel Species

Select Fuel Type	Species	%C	%H	%O	%Ash	MJ/kg	BTU/lb
	Ash, White	49.70	6.90	43.00	0.30	20.75	8927
	Beech	48.70	5.80	44.70	0.60	18.80	8088
	Birch, Sweet	49.80	6.50	43.40	0.30	20.12	8656
	Birch, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Interior West/North)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Interioir South)	48.73	6.87	43.90	0.50	19.81	8522
	Elm, Rock	50.40	6.60	42.30	0.70	20.49	8815
	Elm, Soft	50.40	6.60	42.30	0.70	20.49	8815
	Gum, Red	50.88	6.06	41.57	1.28	19.72	8478
	Larch, Western	50.54	6.36	42.40	0.70	17.58	7558
X	Maple, Hard	50.64	6.02	41.74	1.35	19.96	8587
	Maple, Sugar	50.64	6.02	41.74	1.35	19.96	8587
	Oak, Red	49.50	6.62	43.70	0.20	20.20	8690
	Oak, White	50.40	6.59	42.70	0.20	20.50	8819
	Pine, Southern	52.60	7.00	40.10	1.31	22.30	9587
	Pine, Southern Long Leaf	52.60	7.02	40.10	1.30	22.30	9594
	Other						

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

Recording Interval (min): 1
Run Time (min): 124

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
0	1.9	0.000	74	74	72	75	74	73.8	76	71
1	1.7	-0.060	74	74	74	88	74	76.8	230	71
2	1.2	-0.090	78	78	87	137	74	90.8	456	71
3	1.1	-0.060	87	88	98	189	74	107.2	419	71
4	1.0	-0.060	98	100	106	234	74	122.4	410	71
5	0.8	-0.060	111	113	115	267	74	136.0	401	71
6	0.7	-0.070	125	126	122	292	75	148.0	380	71
7	0.6	-0.050	139	136	132	310	76	158.6	364	71
8	0.6	-0.070	152	145	141	319	78	167.0	344	71
9	2.7	-0.060	164	153	149	324	80	174.0	357	71
10	2.4	-0.070	174	160	160	346	82	184.4	480	71
11	2.2	-0.070	185	168	172	374	85	196.8	451	71
12	2.1	-0.070	196	178	185	407	88	210.8	471	71
13	1.8	-0.060	208	190	198	439	91	225.2	479	71
14	1.7	-0.070	220	203	213	466	95	239.4	488	72
15	1.6	-0.080	233	217	227	497	99	254.6	516	72
16	1.4	-0.070	247	232	243	529	103	270.8	528	72
17	1.2	-0.070	261	247	259	550	107	284.8	509	72
18	1.0	-0.080	275	261	274	562	111	296.6	499	72
19	0.9	-0.060	289	275	286	568	116	306.8	484	72
20	0.8	-0.060	301	287	297	569	120	314.8	469	71
21	0.7	-0.070	313	299	307	567	125	322.2	461	72
22	3.2	-0.080	324	308	318	567	130	329.4	521	72
23	3.2	-0.080	334	317	327	585	134	339.4	586	72
24	3.0	-0.070	342	326	337	618	139	352.4	580	72
25	2.6	-0.090	352	336	347	653	144	366.4	593	72
26	2.4	-0.090	362	345	357	687	149	380.0	602	72
27	2.2	-0.080	373	355	366	712	153	391.8	602	73
28	23.8	-0.090	390	364	376	739	159	405.6	685	73
29	22.9	-0.090	402	372	384	738	164	412.0	618	73
30	22.6	-0.080	411	381	389	762	169	422.4	652	73
31	22.2	-0.100	418	387	394	791	174	432.8	670	73
32	21.8	-0.090	424	393	398	817	178	442.0	685	73
33	21.6	-0.090	429	397	403	841	183	450.6	691	73
34	21.2	-0.090	435	401	409	858	187	458.0	697	73
35	20.8	-0.090	439	406	414	877	191	465.4	702	73
36	20.4	-0.090	444	410	419	888	196	471.4	707	73
37	20.1	-0.100	449	414	425	897	200	477.0	705	73
38	19.8	-0.090	454	417	430	908	204	482.6	704	74
39	19.6	-0.090	459	422	435	916	209	488.2	710	74
40	19.1	-0.090	463	426	439	922	212	492.4	710	73
41	18.8	-0.090	467	430	444	929	216	497.2	713	73
42	18.6	-0.090	471	434	448	935	219	501.4	714	73
43	18.1	-0.090	476	439	452	941	223	506.2	719	73

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

Recording Interval (min): 1
Run Time (min): 124

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
44	17.8	-0.100	481	443	456	948	226	510.8	720	73
45	17.5	-0.090	485	448	460	953	229	515.0	725	73
46	17.1	-0.090	489	453	464	956	231	518.6	724	74
47	16.8	-0.080	494	458	467	962	234	523.0	725	74
48	16.6	-0.100	498	461	394	948	237	507.6	721	73
49	16.1	-0.090	501	464	361	945	239	502.0	715	75
50	15.8	-0.090	505	469	338	942	241	499.0	712	74
51	15.7	-0.090	509	473	322	940	244	497.6	709	74
52	15.4	-0.090	513	477	313	938	246	497.4	707	75
53	15.0	-0.100	517	481	305	936	248	497.4	701	75
54	14.6	-0.090	521	485	301	936	250	498.6	699	75
55	14.4	-0.090	525	488	296	935	252	499.2	695	75
56	14.0	-0.100	528	490	294	935	254	500.2	694	74
57	13.7	-0.100	531	494	293	935	256	501.8	689	75
58	13.4	-0.090	534	497	290	934	258	502.6	684	75
59	13.1	-0.090	538	499	291	934	259	504.2	685	75
60	12.8	-0.090	541	502	290	934	261	505.6	681	75
61	12.6	-0.090	545	504	289	933	263	506.8	678	75
62	12.2	-0.090	547	507	290	932	264	508.0	679	75
63	11.9	-0.080	550	510	289	931	266	509.2	676	75
64	11.8	-0.100	553	514	289	929	268	510.6	676	75
65	11.4	-0.100	555	515	290	930	270	512.0	672	75
66	11.1	-0.090	558	518	290	929	271	513.2	669	75
67	10.8	-0.080	560	520	290	929	273	514.4	670	75
68	10.6	-0.080	562	523	291	927	275	515.6	669	75
69	10.2	-0.100	565	525	292	926	277	517.0	667	75
70	10.0	-0.090	566	528	291	923	279	517.4	662	76
71	9.8	-0.090	569	531	292	920	280	518.4	653	76
72	9.6	-0.090	570	532	292	915	283	518.4	640	75
73	9.3	-0.090	573	535	294	903	284	517.8	629	75
74	9.2	-0.090	574	538	293	894	286	517.0	618	75
75	9.0	-0.090	575	539	292	882	288	515.2	612	76
76	8.8	-0.080	577	541	292	870	290	514.0	603	75
77	8.6	-0.070	578	542	291	859	292	512.4	596	76
78	8.6	-0.100	580	542	291	848	294	511.0	587	75
79	8.3	-0.080	581	543	291	836	296	509.4	586	76
80	8.1	-0.080	582	543	290	827	298	508.0	587	75
81	8.0	-0.090	582	545	289	818	300	506.8	582	76
82	7.8	-0.080	582	545	289	811	301	505.6	576	76
83	7.7	-0.080	583	545	289	802	304	504.6	569	75
84	7.5	-0.080	583	546	289	794	305	503.4	564	76
85	7.5	-0.070	583	547	288	786	307	502.2	558	76
86	7.3	-0.090	584	547	287	779	309	501.2	555	75
87	7.1	-0.080	585	548	286	775	311	501.0	552	75

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

Recording Interval (min): 1
Run Time (min): 124

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
88	7.0	-0.080	584	548	286	769	312	499.8	544	75
89	6.9	-0.090	584	548	285	761	314	498.4	534	75
90	6.8	-0.080	584	548	284	752	315	496.6	524	75
91	6.8	-0.080	582	546	283	740	317	493.6	519	76
92	6.6	-0.080	582	544	282	729	318	491.0	513	75
93	6.5	-0.080	580	544	280	715	320	487.8	505	75
94	6.4	-0.080	578	542	277	704	321	484.4	499	75
95	6.3	-0.080	576	541	277	691	322	481.4	491	75
96	6.2	-0.070	574	539	275	679	323	478.0	488	75
97	6.1	-0.080	572	536	274	671	325	475.6	482	75
98	6.2	-0.080	569	535	272	659	326	472.2	480	75
99	6.0	-0.070	567	533	270	652	327	469.8	477	75
100	5.9	-0.070	563	531	269	642	327	466.4	474	75
101	5.8	-0.070	562	530	268	636	328	464.8	471	75
102	5.7	-0.080	560	528	266	626	329	461.8	468	75
103	5.6	-0.080	558	526	265	620	330	459.8	461	75
104	5.6	-0.080	556	525	263	612	330	457.2	457	75
105	5.5	-0.070	554	522	261	603	331	454.2	453	75
106	5.4	-0.080	552	520	259	596	331	451.6	451	74
107	5.4	-0.070	550	518	258	591	332	449.8	448	75
108	5.3	-0.070	547	515	257	585	332	447.2	447	75
109	5.2	-0.070	545	512	255	578	332	444.4	443	74
110	5.2	-0.070	543	510	252	573	332	442.0	441	74
111	5.1	-0.070	541	508	251	566	333	439.8	440	74
112	5.0	-0.080	539	506	250	562	333	438.0	438	74
113	4.9	-0.060	537	504	249	559	333	436.4	437	74
114	4.9	-0.070	534	502	248	555	333	434.4	435	74
115	4.8	-0.070	533	500	247	553	333	433.2	434	75
116	4.7	-0.060	531	498	247	549	334	431.8	434	75
117	4.7	-0.070	529	497	245	546	334	430.2	433	74
118	4.6	-0.080	528	495	246	542	334	429.0	430	74
119	4.5	-0.060	527	493	245	541	334	428.0	429	74
120	4.5	-0.050	525	492	244	539	334	426.8	429	75
121	4.4	-0.070	524	492	243	536	335	426.0	424	75
122	4.4	-0.060	523	490	242	530	335	424.0	418	75
123	4.3	-0.070	521	488	239	522	336	421.2	414	75
124	4.3	-0.060	520	487	239	517	336	419.8	410	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.070	0.01	100	-0.11		26.0		118	414	85	75
1	0.150	0.150	0.070	2.36	100	-1.67	101	25.7	-0.3	130	388	86	75
2	0.300	0.150	0.070	2.36	99	-0.29	101	25.5	-0.2	128	494	85	74
3	0.456	0.156	0.070	2.29	99	-1.16	105	25.2	-0.3	132	568	84	75
4	0.605	0.149	0.070	2.26	99	-1.93	101	24.8	-0.4	135	608	84	75
5	0.758	0.153	0.070	2.27	99	-2.42	104	24.5	-0.3	137	632	85	75
6	0.905	0.147	0.070	2.25	99	-1.46	99	24.2	-0.3	132	565	86	74
7	1.057	0.152	0.070	2.22	99	-2.81	102	24.0	-0.2	129	535	86	74
8	1.205	0.148	0.070	2.23	99	-0.25	99	23.8	-0.2	128	529	85	74
9	1.355	0.150	0.070	2.21	99	-0.59	101	23.6	-0.2	127	525	84	74
10	1.506	0.151	0.070	2.20	99	-0.41	101	23.4	-0.2	126	519	84	74
11	1.656	0.150	0.070	2.30	99	-0.47	101	23.2	-0.2	126	521	85	74
12	1.810	0.154	0.070	2.31	99	-1.48	103	22.9	-0.3	126	520	86	74
13	1.959	0.149	0.070	2.32	99	-1.1	100	22.7	-0.2	125	519	85	74
14	2.115	0.156	0.070	2.31	99	-1.26	105	22.6	-0.1	125	517	84	74
15	2.265	0.150	0.070	2.31	99	-1.03	100	22.3	-0.3	124	491	83	74
16	2.420	0.155	0.070	2.31	99	-1.49	104	22.1	-0.2	122	479	84	74
17	2.570	0.150	0.070	2.32	99	-2.86	100	22.0	-0.1	121	470	85	74
18	2.723	0.153	0.070	2.30	99	-2.89	102	21.8	-0.2	120	459	86	74
19	2.878	0.155	0.070	2.29	99	-2.06	103	21.7	-0.1	119	451	85	74
20	3.029	0.151	0.070	2.31	99	-0.39	101	21.5	-0.2	118	443	84	75
21	3.183	0.154	0.070	2.29	99	-1.17	103	21.4	-0.1	118	437	84	74
22	3.332	0.149	0.070	2.31	99	-0.38	99	21.3	-0.1	117	432	84	74
23	3.489	0.157	0.070	2.30	99	-2.11	105	21.1	-0.2	117	430	85	74
24	3.639	0.150	0.070	2.31	99	-0.23	100	21.0	-0.1	117	428	86	74
25	3.792	0.153	0.070	2.28	99	-0.34	102	20.9	-0.1	116	424	85	74
26	3.943	0.151	0.070	2.29	99	-1.78	100	20.8	-0.1	116	421	84	74
27	4.097	0.154	0.070	2.30	99	-1.38	102	20.6	-0.2	115	420	84	74
28	4.252	0.155	0.070	2.28	99	-2.79	103	20.5	-0.1	115	417	85	74
29	4.400	0.148	0.070	2.29	99	-2.74	98	20.4	-0.1	115	416	86	74
30	4.555	0.155	0.070	2.29	99	-2.64	103	20.3	-0.1	114	415	86	74
31	4.706	0.151	0.070	2.29	100	-1.13	100	20.0	-0.3	112	413	85	74
32	4.862	0.156	0.070	2.29	100	-2.69	103	20.0	0	110	411	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	5.011	0.149	0.070	2.30	100	-2.34	98	19.9	-0.1	108	409	84	74
34	5.164	0.153	0.070	2.31	100	-2.4	101	19.7	-0.2	107	405	85	75
35	5.318	0.154	0.070	2.30	100	-2.08	101	19.7	0	107	401	86	75
36	5.470	0.152	0.070	2.29	100	-2.88	100	19.5	-0.2	107	399	86	74
37	5.624	0.154	0.070	2.32	100	-2.84	101	19.4	-0.1	106	396	85	74
38	5.773	0.149	0.070	2.29	100	-0.23	98	19.3	-0.1	106	395	84	74
39	5.930	0.157	0.070	2.29	100	-2.94	103	19.1	-0.2	106	394	84	74
40	6.080	0.150	0.070	2.30	100	-2.94	99	18.9	-0.2	106	392	84	74
41	6.234	0.154	0.070	2.32	100	-0.23	101	19.0	0.1	106	393	86	74
42	6.385	0.151	0.070	2.29	100	-1.41	99	18.8	-0.2	106	394	86	74
43	6.538	0.153	0.070	2.30	100	-2.65	101	18.6	-0.2	106	395	85	73
44	6.692	0.154	0.070	2.29	100	-0.65	101	18.5	-0.1	106	395	84	74
45	6.842	0.150	0.070	2.29	100	-0.22	99	18.4	-0.1	105	393	84	73
46	6.997	0.155	0.070	2.31	100	-0.28	102	18.3	-0.1	105	393	85	73
47	7.147	0.150	0.070	2.29	100	-2.94	99	18.1	-0.2	105	392	86	73
48	7.303	0.156	0.070	2.30	100	-2.07	103	18.0	-0.1	105	392	86	74
49	7.453	0.150	0.070	2.29	100	-0.29	99	17.8	-0.2	104	391	85	73
50	7.606	0.153	0.070	2.29	100	-2.41	101	17.8	0	104	391	84	74
51	7.760	0.154	0.070	2.31	100	-2.49	101	17.7	-0.1	104	392	84	73
52	7.912	0.152	0.070	2.30	100	-2.52	100	17.5	-0.2	104	394	85	74
53	8.066	0.154	0.070	2.30	100	-0.24	101	17.4	-0.1	104	394	86	74
54	8.215	0.149	0.070	2.29	100	-0.48	98	17.3	-0.1	104	395	86	74
55	8.371	0.156	0.070	2.28	101	-2.77	102	17.1	-0.2	105	395	85	73
56	8.521	0.150	0.070	2.28	101	-0.69	98	17.0	-0.1	105	394	84	74
57	8.675	0.154	0.070	2.28	101	-1.34	101	16.9	-0.1	105	393	84	74
58	8.826	0.151	0.070	2.29	101	-0.17	99	16.8	-0.1	105	393	85	74
59	8.979	0.153	0.070	2.28	101	-2.48	100	16.7	-0.1	104	392	86	74
60	9.133	0.154	0.070	2.29	101	-0.87	101	16.4	-0.3	104	390	86	74
61	9.294	0.161	0.070	2.52	101	-1.52	106	16.4	0	104	390	85	73
62	9.453	0.159	0.070	2.25	101	0	104	16.3	-0.1	104	389	84	74
63	9.602	0.149	0.070	2.26	101	-1.33	98	16.3	0	103	387	85	74
64	9.754	0.152	0.070	2.26	101	-2.26	100	16.1	-0.2	103	386	86	73
65	9.904	0.150	0.070	2.24	101	-1.68	98	16.0	-0.1	103	384	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	10.056	0.152	0.070	2.26	101	-0.97	100	15.9	-0.1	103	383	84	73
67	10.208	0.152	0.070	2.27	101	-2.55	100	15.7	-0.2	102	381	84	73
68	10.358	0.150	0.070	2.25	101	-2.64	98	15.6	-0.1	102	381	85	73
69	10.510	0.152	0.070	2.24	101	-2.41	100	15.5	-0.1	102	380	86	73
70	10.658	0.148	0.070	2.25	101	0	97	15.4	-0.1	102	379	86	73
71	10.812	0.154	0.070	2.23	101	-2.4	101	15.3	-0.1	102	378	85	74
72	10.961	0.149	0.070	2.24	101	-2.58	98	15.3	0	102	375	84	73
73	11.115	0.154	0.070	2.22	101	-0.49	101	15.1	-0.2	102	375	84	73
74	11.263	0.148	0.070	2.26	101	-2.7	97	15.0	-0.1	102	374	85	74
75	11.415	0.152	0.070	2.22	101	-2.75	100	14.9	-0.1	102	375	86	73
76	11.565	0.150	0.070	2.23	101	-0.41	98	14.8	-0.1	102	375	86	74
77	11.717	0.152	0.070	2.25	101	-2.62	100	14.6	-0.2	102	375	85	73
78	11.869	0.152	0.070	2.24	101	-1.44	100	14.4	-0.2	102	376	84	73
79	12.019	0.150	0.070	2.21	101	0	98	14.4	0	102	376	84	74
80	12.171	0.152	0.070	2.26	101	0	100	14.3	-0.1	102	375	85	73
81	12.319	0.148	0.070	2.25	101	-0.75	97	14.2	-0.1	102	376	86	73
82	12.473	0.154	0.070	2.22	101	-1.23	101	14.1	-0.1	102	376	86	73
83	12.621	0.148	0.070	2.23	101	0	97	14.0	-0.1	101	377	85	73
84	12.775	0.154	0.070	2.24	101	0	101	13.9	-0.1	101	375	84	73
85	12.924	0.149	0.070	2.22	101	-2.4	97	13.8	-0.1	101	373	84	73
86	13.076	0.152	0.070	2.25	101	-2.67	99	13.7	-0.1	101	372	85	73
87	13.225	0.149	0.070	2.23	101	0	97	13.5	-0.2	101	371	86	73
88	13.377	0.152	0.070	2.26	101	-2.56	99	13.4	-0.1	101	369	86	73
89	13.530	0.153	0.070	2.23	101	0	100	13.3	-0.1	101	368	85	74
90	13.679	0.149	0.070	2.23	101	-2.57	97	13.1	-0.2	101	368	84	73
91	13.832	0.153	0.070	2.23	101	-0.66	100	13.1	0	102	369	85	73
92	13.979	0.147	0.070	2.24	101	-2.47	96	13.0	-0.1	102	370	85	74
93	14.132	0.153	0.070	2.23	101	0	100	12.9	-0.1	102	372	86	73
94	14.281	0.149	0.070	2.23	101	0	98	12.8	-0.1	102	374	85	73
95	14.435	0.154	0.070	2.24	101	-0.1	101	12.7	-0.1	102	374	84	73
96	14.583	0.148	0.070	2.22	101	-2.68	97	12.6	-0.1	102	379	84	73
97	14.735	0.152	0.070	2.24	101	0	100	12.4	-0.2	102	385	85	73
98	14.884	0.149	0.070	2.21	101	-1.2	98	12.3	-0.1	102	384	86	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	15.035	0.151	0.070	2.22	101	-1.24	99	12.2	-0.1	102	383	86	73
100	15.185	0.150	0.070	2.22	101	-1.73	98	12.1	-0.1	101	380	85	74
101	15.336	0.151	0.070	2.21	101	-1.43	99	12.0	-0.1	101	377	84	74
102	15.487	0.151	0.070	2.20	101	0	99	11.9	-0.1	101	374	84	73
103	15.636	0.149	0.070	2.20	101	-2.63	98	11.8	-0.1	102	368	85	73
104	15.787	0.151	0.070	2.22	101	-1.94	99	11.7	-0.1	102	363	86	74
105	15.935	0.148	0.070	2.20	101	-2.55	97	11.6	-0.1	102	359	85	73
106	16.087	0.152	0.070	2.20	101	-2.65	100	11.5	-0.1	102	355	84	73
107	16.235	0.148	0.070	2.22	101	0	97	11.4	-0.1	103	352	84	73
108	16.389	0.154	0.070	2.21	101	-2.74	101	11.3	-0.1	103	349	84	73
109	16.536	0.147	0.070	2.22	101	-2.09	96	11.3	0	103	345	86	74
110	16.689	0.153	0.070	2.27	101	-0.14	100	11.2	-0.1	104	343	86	74
111	16.839	0.150	0.070	2.29	101	-0.07	98	11.1	-0.1	104	340	86	74
112	16.991	0.152	0.070	2.26	101	-0.57	100	11.1	0	104	337	84	74
113	17.145	0.154	0.070	2.27	101	-2.67	101	10.9	-0.2	104	335	84	73
114	17.296	0.151	0.070	2.26	101	-0.47	99	10.9	0	104	333	85	74
115	17.449	0.153	0.070	2.27	101	-2.28	100	10.8	-0.1	104	330	86	74
116	17.597	0.148	0.070	2.27	101	-0.57	97	10.8	0	104	328	86	74
117	17.753	0.156	0.070	2.27	101	-2.71	102	10.7	-0.1	104	327	85	73
118	17.902	0.149	0.070	2.26	101	-1.09	98	10.6	-0.1	104	325	84	74
119	18.056	0.154	0.070	2.25	101	-2.33	101	10.5	-0.1	104	324	84	74
120	18.205	0.149	0.070	2.25	101	-0.72	98	10.5	0	104	321	85	74
121	18.358	0.153	0.070	2.26	101	-2.19	100	10.4	-0.1	104	320	86	74
122	18.511	0.153	0.070	2.25	101	-1.62	100	10.3	-0.1	104	320	86	74
123	18.662	0.151	0.070	2.27	101	-2.2	99	10.2	-0.1	104	319	85	74
124	18.815	0.153	0.070	2.25	101	-2.65	100	10.2	0	104	318	84	74
125	18.964	0.149	0.070	2.26	101	-1.27	98	10.1	-0.1	105	316	84	74
126	19.118	0.154	0.070	2.26	102	-0.43	101	10.0	-0.1	105	315	85	74
127	19.267	0.149	0.070	2.22	102	-2.23	98	10.0	0	104	314	86	74
128	19.422	0.155	0.070	2.25	102	-1.47	102	9.9	-0.1	105	313	85	74
129	19.571	0.149	0.070	2.26	102	-0.22	98	9.8	-0.1	105	312	84	74
130	19.723	0.152	0.070	2.27	102	-0.01	100	9.7	-0.1	105	311	84	74
131	19.873	0.150	0.070	2.24	102	-2.47	98	9.7	0	105	310	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	20.026	0.153	0.070	2.25	102	-0.33	100	9.6	-0.1	104	310	86	74
133	20.179	0.153	0.070	2.23	102	-1.27	100	9.5	-0.1	105	308	86	74
134	20.328	0.149	0.070	2.24	102	-1.4	98	9.4	-0.1	105	306	85	74
135	20.481	0.153	0.070	2.25	102	0	100	9.4	0	105	302	84	74
136	20.629	0.148	0.070	2.24	102	-1.3	97	9.4	0	104	300	84	74
137	20.784	0.155	0.070	2.23	102	-0.45	102	9.3	-0.1	104	297	85	74
138	20.933	0.149	0.070	2.24	102	-0.43	98	9.2	-0.1	104	295	86	73
139	21.087	0.154	0.070	2.24	102	-2.72	101	9.2	0	104	293	86	74
140	21.236	0.149	0.070	2.26	102	-0.2	98	9.2	0	104	291	85	74
141	21.388	0.152	0.070	2.26	102	-2.82	100	9.1	-0.1	104	289	84	74
142	21.541	0.153	0.070	2.24	102	-0.9	100	9.0	-0.1	104	287	84	74
143	21.692	0.151	0.070	2.26	102	-2.75	99	9.0	0	104	287	85	74
144	21.845	0.153	0.070	2.25	102	-0.08	100	8.9	-0.1	104	285	86	74
145	21.994	0.149	0.070	2.27	102	-1.54	98	8.8	-0.1	104	284	86	74
146	22.147	0.153	0.070	2.26	102	-2.35	100	8.8	0	104	283	85	73
147	22.297	0.150	0.070	2.24	102	-1.14	98	8.7	-0.1	104	283	84	74
148	22.451	0.154	0.070	2.25	102	-1.48	101	8.7	0	104	282	84	74
149	22.601	0.150	0.070	2.25	102	-2.73	98	8.6	-0.1	104	282	86	74
150	22.753	0.152	0.070	2.25	102	-0.17	100	8.6	0	104	282	86	74
151	22.904	0.151	0.070	2.24	102	-2.61	99	8.5	-0.1	104	281	86	74
152	23.057	0.153	0.070	2.24	102	-1.85	100	8.5	0	104	281	85	74
153	23.210	0.153	0.070	2.24	102	-2.74	100	8.3	-0.2	104	280	84	75
154	23.358	0.148	0.070	2.25	102	-0.22	97	8.4	0.1	104	280	84	74
155	23.512	0.154	0.070	2.28	102	-0.18	101	8.3	-0.1	104	279	85	74
156	23.661	0.149	0.070	2.25	102	-0.15	98	8.3	0	104	278	86	74
157	23.817	0.156	0.070	2.24	102	-2.17	102	8.2	-0.1	103	278	86	74
158	23.966	0.149	0.070	2.25	102	-0.34	97	8.1	-0.1	103	277	85	74
159	24.119	0.153	0.070	2.25	102	-1.49	100	8.1	0	103	278	84	74
160	24.269	0.150	0.070	2.24	102	-2.12	98	8.0	-0.1	102	277	84	74
161	24.422	0.153	0.070	2.26	102	-2.25	100	8.1	0.1	102	277	85	74
162	24.574	0.152	0.070	2.26	102	-1.88	99	8.0	-0.1	102	276	86	74
163	24.724	0.150	0.070	2.26	102	-2.28	98	7.9	-0.1	102	276	86	74
164	24.877	0.153	0.070	2.25	102	-0.01	100	7.8	-0.1	103	276	85	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	25.026	0.149	0.070	2.26	102	-0.8	97	7.8	0	103	275	84	74
166	25.181	0.155	0.070	2.25	102	-2.39	101	7.7	-0.1	103	274	84	74
167	25.330	0.149	0.070	2.24	102	-2.46	97	7.7	0	103	273	85	74
168	25.484	0.154	0.070	2.24	102	-1.91	101	7.6	-0.1	102	271	86	74
169	25.633	0.149	0.070	2.25	102	-2.74	97	7.6	0	102	270	86	74
170	25.785	0.152	0.070	2.24	102	-2.59	99	7.5	-0.1	101	268	85	74
171	25.938	0.153	0.070	2.25	102	-1.61	100	7.6	0.1	101	267	84	74
172	26.089	0.151	0.070	2.25	102	-1.6	99	7.5	-0.1	101	262	84	74
173	26.242	0.153	0.070	2.24	102	0	100	7.4	-0.1	101	256	85	74
174	26.390	0.148	0.070	2.22	102	-2.62	97	7.4	0	101	252	86	74
175	26.543	0.153	0.070	2.20	102	-0.01	100	7.3	-0.1	101	250	86	74
176	26.690	0.147	0.070	2.20	102	-2.16	96	7.3	0	102	249	86	74
177	26.844	0.154	0.070	2.18	102	-0.24	101	7.2	-0.1	102	246	85	74
178	26.990	0.146	0.070	2.14	102	-2.84	95	7.2	0	102	244	84	74
179	27.140	0.150	0.070	2.11	102	-1.94	98	7.2	0	101	241	85	74
180	27.285	0.145	0.070	2.08	102	-0.25	95	7.1	-0.1	101	240	86	74
181	27.433	0.148	0.070	2.04	103	-1.71	96	7.0	-0.1	100	238	86	74
182	27.575	0.142	0.070	1.99	103	-2.98	92	7.0	0	100	235	86	74
183	27.720	0.145	0.070	1.97	103	-1.61	94	6.9	-0.1	100	233	85	74
184	27.859	0.139	0.070	1.98	103	-1.99	91	7.0	0.1	100	232	84	74
185	28.003	0.144	0.070	1.94	103	-0.51	94	6.8	-0.2	100	230	84	74
186	28.143	0.140	0.070	1.91	103	-0.66	91	6.8	0	100	227	85	74
187	28.284	0.141	0.070	1.90	103	-3.19	92	6.8	0	100	226	86	74
188	28.423	0.139	0.070	1.88	103	-3.07	91	6.8	0	100	224	86	74
189	28.562	0.139	0.070	1.88	103	-0.95	91	6.7	-0.1	100	223	85	74
190	28.703	0.141	0.070	1.87	103	-0.63	92	6.6	-0.1	100	224	84	74
191	28.838	0.135	0.070	1.86	103	-0.71	88	6.7	0.1	100	225	85	74
192	28.980	0.142	0.070	1.84	103	-2.83	92	6.6	-0.1	99	225	86	74
193	29.116	0.136	0.070	1.84	103	-0.7	89	6.6	0	99	228	86	74
194	29.253	0.137	0.070	1.83	103	-0.77	89	6.4	-0.2	99	229	86	74
195	29.394	0.141	0.070	1.85	103	-1.77	92	6.4	0	99	230	85	74
196	29.529	0.135	0.070	1.83	103	-3.34	88	6.4	0	99	231	84	74
197	29.669	0.140	0.070	1.84	103	-0.88	91	6.3	-0.1	99	231	84	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	29.805	0.136	0.070	1.83	103	-1.43	89	6.3	0	99	231	85	74
199	29.943	0.138	0.070	1.84	103	-1.18	90	6.2	-0.1	100	233	86	74
200	30.080	0.137	0.070	1.82	103	-1.12	89	6.2	0	100	233	86	74
201	30.217	0.137	0.070	1.83	103	-1.41	89	6.2	0	100	234	85	74
202	30.356	0.139	0.070	1.83	103	-0.65	91	6.2	0	100	234	84	74
203	30.491	0.135	0.070	1.82	103	-1.32	88	6.1	-0.1	99	230	84	74
204	30.629	0.138	0.070	1.79	103	-2.45	90	6.0	-0.1	99	229	85	74
205	30.765	0.136	0.070	1.76	103	-2.26	88	5.9	-0.1	98	228	86	74
206	30.900	0.135	0.070	1.80	103	-0.8	88	5.9	0	98	227	86	74
207	31.037	0.137	0.070	1.79	103	-1.47	89	5.9	0	98	226	85	74
208	31.172	0.135	0.070	1.77	103	-1.04	88	5.9	0	98	225	84	74
209	31.306	0.134	0.070	1.77	103	-3.01	87	5.7	-0.2	99	224	85	74
210	31.445	0.139	0.070	1.78	103	-3.38	90	5.8	0.1	99	223	86	74
211	31.576	0.131	0.070	1.77	103	-3.32	85	5.8	0	99	221	87	74
212	31.715	0.139	0.070	1.76	103	-1.06	90	5.7	-0.1	99	220	86	74
213	31.849	0.134	0.070	1.78	103	-2.55	87	5.7	0	99	219	85	74
214	31.998	0.149	0.070	2.25	103	-2.83	97	5.7	0	99	218	84	74
215	32.149	0.151	0.070	2.25	103	-1.32	98	5.7	0	98	217	85	74
216	32.302	0.153	0.070	2.24	103	-2.58	99	5.7	0	98	217	86	74
217	32.451	0.149	0.070	2.24	103	-2.89	97	5.6	-0.1	98	215	86	74
218	32.604	0.153	0.070	2.22	103	-3.22	99	5.6	0	98	214	85	74
219	32.754	0.150	0.070	2.24	103	-3.79	98	5.6	0	98	213	84	74
220	32.908	0.154	0.070	2.23	103	-2.22	100	5.5	-0.1	98	213	84	74
221	33.057	0.149	0.070	2.22	103	-3.77	97	5.5	0	98	212	85	74
222	33.208	0.151	0.070	2.22	103	-3.83	98	5.5	0	98	211	86	74
223	33.358	0.150	0.070	2.22	103	-1.77	98	5.5	0	99	210	86	74
224	33.510	0.152	0.070	2.22	103	-1.37	99	5.4	-0.1	98	209	86	74
225	33.662	0.152	0.070	2.21	103	-3.84	99	5.4	0	98	209	84	74
226	33.811	0.149	0.070	2.19	103	-1.28	97	5.4	0	97	209	84	74
227	33.963	0.152	0.070	2.21	103	-3.82	99	5.4	0	97	209	85	74
228	34.110	0.147	0.070	2.18	103	-2.12	95	5.4	0	97	208	86	74
229	34.263	0.153	0.070	2.20	103	-3.77	99	5.3	-0.1	97	207	86	74
230	34.410	0.147	0.070	2.19	103	-3.59	96	5.4	0.1	98	207	86	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	34.564	0.154	0.070	2.17	103	-2.81	100	5.3	-0.1	98	207	85	74
232	34.711	0.147	0.070	2.18	103	-1.61	96	5.2	-0.1	98	206	84	74
233	34.863	0.152	0.070	2.17	103	-3.99	99	5.2	0	98	206	84	74
234	35.010	0.147	0.070	2.17	103	-2.31	96	5.3	0.1	98	205	85	74
235	35.160	0.150	0.070	2.15	103	-2.41	98	5.2	-0.1	98	204	86	74
236	35.307	0.147	0.070	2.15	103	-1.93	96	5.1	-0.1	98	204	86	74
237	35.457	0.150	0.070	2.16	103	-3.88	98	5.1	0	99	203	84	74
238	35.604	0.147	0.070	2.15	103	-2.17	96	5.1	0	99	203	84	74
239	35.753	0.149	0.070	2.14	103	-3.96	97	5.1	0	99	203	84	75
240	35.901	0.148	0.070	2.11	103	-4	96	5.1	0	99	202	85	74
241	36.051	0.150	0.070	2.28	103	-1.71	98	5.0	-0.1	99	202	86	74
242	36.205	0.154	0.070	2.24	103	-1.87	100	5.0	0	98	203	86	74
243	36.355	0.150	0.070	2.25	103	-1.79	97	5.0	0	97	202	85	74
244	36.508	0.153	0.070	2.26	103	-3.96	99	5.0	0	97	202	84	74
245	36.657	0.149	0.070	2.24	103	-3.06	97	4.9	-0.1	97	201	84	74
246	36.813	0.156	0.070	2.25	103	-1.67	101	4.9	0	97	201	85	74
247	36.961	0.148	0.070	2.25	103	-4.1	96	4.9	0	97	202	86	74
248	37.115	0.154	0.070	2.24	103	-1.77	100	4.9	0	98	202	86	74
249	37.264	0.149	0.070	2.25	103	-1.63	97	4.8	-0.1	98	203	85	74
250	37.415	0.151	0.070	2.23	103	-4.05	98	4.8	0	98	203	84	74
251	37.568	0.153	0.070	2.23	103	-4.2	99	4.8	0	98	205	84	74
252	37.718	0.150	0.070	2.24	103	-1.8	98	4.7	-0.1	98	205	85	74
253	37.871	0.153	0.070	2.22	103	-2.49	99	4.7	0	98	205	86	74
254	38.019	0.148	0.070	2.21	103	-2.9	96	4.7	0	97	205	86	74
255	38.173	0.154	0.070	2.21	103	-3.79	100	4.7	0	97	206	86	74
256	38.321	0.148	0.070	2.23	103	-1.69	96	4.7	0	97	207	85	74
257	38.476	0.155	0.070	2.22	103	-4.23	101	4.7	0	97	207	84	74
258	38.625	0.149	0.070	2.21	103	-3.1	97	4.6	-0.1	97	208	85	74
259	38.777	0.152	0.070	2.23	103	-3.54	99	4.6	0	97	208	86	74
260	38.926	0.149	0.070	2.23	103	-3.81	97	4.6	0	97	208	86	74
261	39.078	0.152	0.070	2.24	103	-3.93	99	4.6	0	98	209	85	75
262	39.231	0.153	0.070	2.23	103	-4.17	99	4.6	0	98	210	84	74
263	39.381	0.150	0.070	2.22	103	-3.92	98	4.6	0	98	211	84	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	39.534	0.153	0.070	2.25	103	-1.74	99	4.5	-0.1	98	212	84	74
265	39.683	0.149	0.070	2.26	103	-1.75	97	4.5	0	98	212	86	74
266	39.837	0.154	0.070	2.23	103	-2.01	100	4.5	0	97	213	86	74
267	39.987	0.150	0.070	2.25	103	-1.74	97	4.4	-0.1	97	214	86	74
268	40.142	0.155	0.070	2.25	103	-1.74	101	4.4	0	97	214	85	74
269	40.290	0.148	0.070	2.23	103	-4.01	96	4.4	0	97	214	84	74
270	40.443	0.153	0.070	2.25	103	-1.68	99	4.4	0	97	215	84	74
271	40.595	0.152	0.070	2.25	103	-2.99	99	4.4	0	97	215	85	74
272	40.747	0.152	0.070	2.24	103	-4.18	99	4.3	-0.1	97	214	86	74
273	40.901	0.154	0.070	2.24	103	-4.02	100	4.3	0	98	214	86	74
274	41.049	0.148	0.070	2.23	103	-1.6	96	4.3	0	98	213	85	74
275	41.203	0.154	0.070	2.25	103	-3.16	100	4.3	0	98	213	84	74
276	41.353	0.150	0.070	2.24	103	-4.2	98	4.3	0	98	213	85	74
277	41.508	0.155	0.070	2.25	103	-4.13	101	4.3	0	98	212	86	74
278	41.657	0.149	0.070	2.25	103	-2.25	97	4.2	-0.1	98	212	86	74
279	41.810	0.153	0.070	2.26	103	-4.1	99	4.2	0	97	211	86	74
280	41.962	0.152	0.070	2.26	103	-3.75	99	4.2	0	97	210	85	74
281	42.114	0.152	0.070	2.24	103	-1.64	99	4.2	0	97	209	84	74
282	42.269	0.155	0.070	2.27	103	-3.98	101	4.2	0	97	209	85	74
283	42.418	0.149	0.070	2.27	103	-3.96	97	4.2	0	97	208	86	74
284	42.573	0.155	0.070	2.26	103	-1.8	101	4.1	-0.1	98	208	86	74
285	42.724	0.151	0.070	2.26	103	-2.57	98	4.1	0	98	207	85	74
286	42.879	0.155	0.070	2.26	103	-2.69	101	4.1	0	98	206	84	74
287	43.029	0.150	0.070	2.26	103	-2.92	98	4.1	0	98	206	84	74
288	43.182	0.153	0.070	2.27	103	-3.54	99	4.2	0.1	97	205	85	74
289	43.337	0.155	0.070	2.29	103	-2.11	101	4.1	-0.1	97	205	86	74
290	43.489	0.152	0.070	2.28	103	-1.46	99	4.1	0	97	205	86	74
291	43.643	0.154	0.070	2.29	103	-1.7	100	4.0	-0.1	97	204	85	74
292	43.794	0.151	0.070	2.29	103	-1.77	98	4.0	0	97	204	84	74
293	43.950	0.156	0.070	2.29	103	-1.7	101	4.0	0	97	203	84	75
294	44.101	0.151	0.070	2.31	103	-2.82	98	4.0	0	97	202	85	74
295	44.255	0.154	0.070	2.31	103	-2.17	100	4.0	0	97	201	86	74
296	44.409	0.154	0.070	2.28	103	-3.53	100	4.1	0.1	97	201	86	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	44.563	0.154	0.070	2.31	103	-2.91	100	4.0	-0.1	97	200	85	74
298	44.718	0.155	0.070	2.32	103	-2.19	101	3.9	-0.1	97	200	84	74
299	44.869	0.151	0.070	2.32	104	-4.03	98	3.9	0	96	199	85	74
300	45.026	0.157	0.070	2.30	104	-1.51	102	3.9	0	96	199	86	74
301	45.177	0.151	0.070	2.33	104	-1.45	98	3.9	0	96	199	86	74
302	45.332	0.155	0.070	2.32	104	-3.13	100	3.9	0	96	199	86	72
303	45.488	0.156	0.070	2.30	104	-4	101	4.0	0.1	96	199	85	70
304	45.640	0.152	0.070	2.33	104	-3.93	99	3.8	-0.2	97	198	84	69
305	45.796	0.156	0.070	2.33	104	-2.54	101	3.8	0	97	198	84	68
306	45.949	0.153	0.070	2.33	104	-1.45	99	3.8	0	97	197	85	69
307	46.106	0.157	0.070	2.34	104	-1.82	102	3.8	0	97	196	86	69
308	46.258	0.152	0.070	2.36	104	-3.62	99	3.8	0	98	196	86	68
309	46.414	0.156	0.070	2.34	104	-1.72	101	3.8	0	97	195	85	69
310	46.570	0.156	0.070	2.36	104	-1.36	101	3.7	-0.1	97	195	84	70
311	46.722	0.152	0.070	2.34	103	-1.33	99	3.7	0	97	194	84	71
312	46.881	0.159	0.070	2.37	103	-1.24	103	3.7	0	97	193	85	72
313	47.033	0.152	0.070	2.37	103	-2.55	99	3.7	0	97	193	86	72
314	47.189	0.156	0.070	2.36	103	-3.91	101	3.8	0.1	96	193	86	73
315	47.346	0.157	0.070	2.37	103	-1.32	102	3.7	-0.1	96	193	85	73
316	47.499	0.153	0.070	2.35	103	-1.86	99	3.7	0	96	193	84	73
317	47.658	0.159	0.070	2.37	103	-1.26	103	3.8	0.1	96	193	83	73
318	47.812	0.154	0.070	2.38	103	-1.9	100	3.8	0	96	193	84	74
319	47.968	0.156	0.070	2.36	103	-1.47	101	3.6	-0.2	96	193	85	74
320	48.124	0.156	0.070	2.39	103	-1.35	101	3.7	0.1	96	193	86	74
321	48.278	0.154	0.070	2.39	103	-1.76	100	3.6	-0.1	96	193	85	74
322	48.436	0.158	0.070	2.38	103	-1.29	103	3.6	0	96	193	84	75
323	48.591	0.155	0.070	2.39	103	-2.88	101	3.6	0	96	193	84	75
324	48.748	0.157	0.070	2.42	103	-1.38	102	3.6	0	95	192	85	75
325	48.905	0.157	0.070	2.39	103	-1.46	102	3.6	0	95	192	85	75
326	49.060	0.155	0.070	2.40	103	-3.15	101	3.6	0	95	192	86	75
327	49.218	0.158	0.070	2.39	103	-2.07	102	3.6	0	95	192	85	75
328	49.373	0.155	0.070	2.39	103	-3.06	100	3.5	-0.1	94	192	84	75
329	49.531	0.158	0.070	2.41	103	-3.1	102	3.5	0	93	192	84	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
330	49.688	0.157	0.070	2.40	103	-1.62	102	3.5	0	93	191	85	76
331	49.843	0.155	0.070	2.40	103	-2.09	100	3.5	0	94	191	86	76
332	50.002	0.159	0.070	2.40	103	-1.09	103	3.5	0	94	191	86	76
333	50.157	0.155	0.070	2.43	103	-2.09	100	3.4	-0.1	94	190	85	76
334	50.314	0.157	0.070	2.42	103	-3.83	102	3.4	0	94	191	84	76
335	50.473	0.159	0.070	2.40	103	-2.94	103	3.4	0	94	191	84	76
336	50.628	0.155	0.070	2.43	103	-1.52	100	3.4	0	93	191	84	76
337	50.789	0.161	0.070	2.41	103	-2.7	104	3.4	0	93	191	85	76
338	50.943	0.154	0.070	2.42	103	-1.43	100	3.4	0	92	192	86	76
339	51.102	0.159	0.070	2.43	103	-1.88	103	3.4	0	92	191	86	76
340	51.261	0.159	0.070	2.43	103	-2.54	103	3.4	0	92	191	85	76
341	51.415	0.154	0.070	2.43	103	-3.75	100	3.3	-0.1	93	190	84	76
342	51.576	0.161	0.070	2.43	103	-1.73	104	3.3	0	93	189	84	76
343	51.731	0.155	0.070	2.44	103	-1.97	100	3.3	0	93	190	84	76
344	51.890	0.159	0.070	2.42	103	-1.35	103	3.3	0	93	190	84	76
345	52.049	0.159	0.070	2.45	103	-2.64	103	3.3	0	92	191	86	76
346	52.205	0.156	0.070	2.44	103	-3.37	101	3.3	0	92	190	86	76
347	52.365	0.160	0.070	2.45	103	-1.21	103	3.3	0	91	191	85	76
348	52.524	0.159	0.070	2.44	104	-1.31	103	3.4	0.1	91	190	84	76
349	52.679	0.155	0.070	2.46	104	-3.53	100	3.2	-0.2	92	190	84	77
350	52.841	0.162	0.070	2.44	104	-2.57	105	3.2	0	92	190	84	77
351	52.996	0.155	0.070	2.43	104	-2.43	100	3.2	0	92	189	85	76
352	53.156	0.160	0.070	2.46	104	-3.71	103	3.2	0	92	189	86	76
353	53.316	0.160	0.070	2.46	104	-3.66	103	3.2	0	91	190	86	76
354	53.473	0.157	0.070	2.46	104	-3.08	101	3.3	0.1	91	190	85	76
355	53.633	0.160	0.070	2.44	104	-0.98	103	3.2	-0.1	90	191	84	77
356	53.792	0.159	0.070	2.45	104	-3.62	103	3.1	-0.1	91	190	84	76
357	53.948	0.156	0.070	2.45	104	-1.19	101	3.1	0	91	190	85	77
358	54.111	0.163	0.070	2.47	104	-3.35	105	3.1	0	91	190	86	77
359	54.267	0.156	0.070	2.44	104	-2.57	101	3.1	0	91	189	86	77
360	54.428	0.161	0.070	2.47	104	-1.77	104	3.1	0	92	189	85	77
361	54.588	0.160	0.070	2.48	104	-1.47	103	3.1	0	91	189	84	77
362	54.745	0.157	0.070	2.49	104	-1.14	101	3.1	0	91	189	84	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
363	54.906	0.161	0.070	2.48	104	-3.57	104	3.0	-0.1	90	189	83	76
364	55.066	0.160	0.070	2.47	104	-3.1	103	3.0	0	90	189	85	77
365	55.222	0.156	0.070	2.47	104	-1.67	101	3.0	0	91	189	86	77
366	55.386	0.164	0.070	2.48	104	-3.51	106	3.0	0	91	189	86	76
367	55.542	0.156	0.070	2.49	104	-1.2	101	3.0	0	91	189	85	77
368	55.703	0.161	0.070	2.46	104	-3.42	104	3.0	0	91	188	84	76
369	55.863	0.160	0.070	2.49	104	-3.21	103	2.9	-0.1	91	188	84	77
370	56.022	0.159	0.070	2.48	104	-2.08	102	2.9	0	90	189	83	76
371	56.182	0.160	0.070	2.49	104	-1.22	103	2.9	0	90	189	84	76
372	56.343	0.161	0.070	2.50	104	-3.66	104	3.0	0.1	90	189	85	77
373	56.500	0.157	0.070	2.48	104	-0.93	101	2.9	-0.1	90	188	86	77
374	56.662	0.162	0.070	2.48	104	-2.34	104	3.0	0.1	90	188	86	77
375	56.823	0.161	0.070	2.49	104	-2.01	104	2.9	-0.1	91	187	85	77
376	56.980	0.157	0.070	2.51	104	-1.32	101	2.9	0	91	188	84	76
377	57.144	0.164	0.070	2.50	104	-2.23	106	3.0	0.1	91	188	84	77
378	57.301	0.157	0.070	2.51	104	-2.84	101	2.8	-0.2	90	188	84	76
379	57.463	0.162	0.070	2.51	104	-0.99	104	2.9	0.1	90	189	85	76
380	57.624	0.161	0.070	2.50	104	-3.49	104	2.8	-0.1	89	189	86	77
381	57.782	0.158	0.070	2.52	104	-2.21	102	2.8	0	90	189	86	77
382	57.943	0.161	0.070	2.51	104	-0.97	104	2.7	-0.1	90	189	85	77
383	58.104	0.161	0.070	2.50	104	-1.6	104	2.8	0.1	90	189	84	76
384	58.263	0.159	0.070	2.50	104	-2.18	102	2.7	-0.1	90	189	84	77
385	58.424	0.161	0.070	2.51	104	-1.33	104	2.7	0	91	188	84	76
386	58.586	0.162	0.070	2.52	104	-1.94	104	2.7	0	90	189	85	77
387	58.743	0.157	0.070	2.51	104	-1.94	101	2.7	0	90	189	86	76
388	58.907	0.164	0.070	2.52	105	-1.42	105	2.7	0	89	189	86	77
389	59.066	0.159	0.070	2.51	105	-3.43	102	2.7	0	89	189	85	77
390	59.225	0.159	0.070	2.52	105	-1.08	102	2.7	0	90	189	84	77
391	59.389	0.164	0.070	2.50	105	-3.62	105	2.6	-0.1	90	188	84	77
392	59.546	0.157	0.070	2.50	105	-2.04	101	2.6	0	90	189	83	77
393	59.708	0.162	0.070	2.51	105	-0.97	104	2.6	0	90	188	84	77
394	59.869	0.161	0.070	2.52	105	-3.01	104	2.6	0	90	188	86	77
395	60.028	0.159	0.070	2.51	105	-3.6	102	2.6	0	90	188	86	77

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
396	60.189	0.161	0.070	2.50	105	-3.64	103	2.6	0	89	189	85	76
397	60.351	0.162	0.070	2.52	105	-1.04	104	2.6	0	89	189	84	77
398	60.510	0.159	0.070	2.51	105	-1.77	102	2.6	0	89	189	84	77
399	60.672	0.162	0.070	2.52	105	-0.9	104	2.6	0	90	188	84	77
400	60.834	0.162	0.070	2.50	105	-3.44	104	2.5	-0.1	90	188	85	77
401	60.991	0.157	0.070	2.52	105	-1.23	101	2.5	0	90	188	86	77
402	61.155	0.164	0.070	2.52	105	-3.65	105	2.5	0	90	188	86	76
403	61.315	0.160	0.070	2.54	105	-3.55	103	2.6	0.1	90	188	85	76
404	61.474	0.159	0.070	2.51	105	-2.18	102	2.5	-0.1	89	189	84	76
405	61.638	0.164	0.070	2.55	105	-3.47	105	2.5	0	89	189	83	76
406	61.796	0.158	0.070	2.54	105	-1.47	102	2.4	-0.1	89	189	84	76
407	61.958	0.162	0.070	2.54	105	-0.92	104	2.4	0	90	188	85	77
408	62.121	0.163	0.070	2.50	105	-3.47	105	2.4	0	90	188	86	77
409	62.279	0.158	0.070	2.52	105	-3.26	102	2.4	0	90	188	86	76
410	62.441	0.162	0.070	2.52	105	-3.43	104	2.4	0	90	188	85	76
411	62.603	0.162	0.070	2.53	105	-3.41	104	2.4	0	89	188	84	76
412	62.762	0.159	0.070	2.51	105	-2.88	102	2.4	0	89	189	84	76
413	62.923	0.161	0.070	2.52	105	-1.52	103	2.4	0	89	189	84	76
414	63.086	0.163	0.070	2.53	105	-3.43	105	2.3	-0.1	89	189	85	77
415	63.244	0.158	0.070	2.52	105	-1.72	102	2.3	0	89	189	86	76
416	63.407	0.163	0.070	2.53	105	-1.03	105	2.3	0	90	188	86	76
417	63.568	0.161	0.070	2.52	105	-2.7	104	2.3	0	90	188	85	76
418	63.726	0.158	0.070	2.52	105	-3.48	102	2.3	0	90	188	84	77
419	63.891	0.165	0.070	2.53	105	-1.77	106	2.3	0	89	189	84	76
420	64.049	0.158	0.070	2.51	105	-1.71	102	2.2	-0.1	89	190	83	76
421	64.208	0.159	0.070	2.50	105	-3.43	102	2.2	0	89	190	84	76
422	64.371	0.163	0.070	2.47	105	-1.78	105	2.2	0	89	190	86	76
423	64.528	0.157	0.070	2.50	105	-0.97	101	2.2	0	89	190	87	76
424	64.689	0.161	0.070	2.49	105	-2.06	103	2.2	0	89	190	86	76
425	64.850	0.161	0.070	2.48	105	-2.67	104	2.2	0	90	191	85	77
426	65.007	0.157	0.070	2.48	105	-3.53	101	2.1	-0.1	90	190	84	76
427	65.168	0.161	0.070	2.46	105	-3.53	104	2.1	0	90	191	83	76
428	65.328	0.160	0.070	2.46	105	-2.34	103	2.1	0	89	192	84	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
429	65.484	0.156	0.070	2.47	105	-1.08	100	2.1	0	89	193	85	76
430	65.647	0.163	0.070	2.45	105	-2.68	105	2.1	0	89	193	86	76
431	65.803	0.156	0.070	2.47	105	-3.2	100	2.2	0.1	89	192	86	77
432	65.962	0.159	0.070	2.46	105	-1.07	102	2.1	-0.1	89	193	85	77
433	66.122	0.160	0.070	2.45	105	-2.03	103	2.0	-0.1	90	193	84	77
434	66.279	0.157	0.070	2.45	105	-1.37	101	2.1	0.1	90	193	84	77
435	66.438	0.159	0.070	2.45	105	-2.93	102	2.0	-0.1	90	194	84	76
436	66.598	0.160	0.070	2.45	105	-2.19	103	2.0	0	90	195	85	76
437	66.753	0.155	0.070	2.45	105	-1.68	100	2.0	0	89	196	86	76
438	66.915	0.162	0.070	2.45	105	-3.32	104	2.0	0	89	196	86	76
439	67.071	0.156	0.070	2.43	105	-1.99	100	1.9	-0.1	89	196	85	76
440	67.230	0.159	0.070	2.43	105	-3.37	102	1.9	0	90	196	84	76
441	67.389	0.159	0.070	2.42	105	-2.29	102	1.9	0	90	196	84	76
442	67.544	0.155	0.070	2.41	105	-3.14	100	1.9	0	90	196	84	76
443	67.704	0.160	0.070	2.42	105	-1.29	103	1.9	0	90	196	85	76
444	67.862	0.158	0.070	2.43	105	-1.76	102	1.9	0	90	196	86	76
445	68.019	0.157	0.070	2.44	105	-3.68	101	2.0	0.1	90	197	86	76
446	68.179	0.160	0.070	2.42	105	-1.69	103	1.8	-0.2	89	197	85	77
447	68.335	0.156	0.070	2.43	105	-1.21	100	1.8	0	89	197	84	77
448	68.493	0.158	0.070	2.43	105	-1.26	102	1.8	0	90	196	84	77
449	68.653	0.160	0.070	2.42	105	-3.31	103	1.8	0	90	196	85	77
450	68.807	0.154	0.070	2.45	105	-3.64	99	1.8	0	90	197	86	77
451	68.969	0.162	0.070	2.42	105	-1.26	104	1.8	0	90	196	86	77
452	69.124	0.155	0.070	2.42	105	-1.09	100	1.7	-0.1	90	196	85	77
453	69.283	0.159	0.070	2.42	105	-1.18	102	1.7	0	90	197	84	76
454	69.443	0.160	0.070	2.45	105	-1.57	103	1.7	0	90	197	84	76
455	69.599	0.156	0.070	2.43	105	-1.11	100	1.7	0	89	197	84	77
456	69.758	0.159	0.070	2.42	105	-1.15	102	1.8	0.1	89	196	85	77
457	69.917	0.159	0.070	2.43	105	-1.13	102	1.7	-0.1	90	196	86	77
458	70.073	0.156	0.070	2.45	105	-3.64	100	1.7	0	90	196	86	77
459	70.234	0.161	0.070	2.41	105	-3.77	104	1.6	-0.1	90	196	86	77
460	70.389	0.155	0.070	2.44	105	-3.61	100	1.6	0	90	196	85	77
461	70.549	0.160	0.070	2.44	105	-3.52	103	1.6	0	90	196	84	77

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
462	70.709	0.160	0.070	2.45	105	-1.08	103	1.6	0	90	196	84	76
463	70.863	0.154	0.070	2.44	105	-1.93	99	1.7	0.1	90	197	84	77
464	71.025	0.162	0.070	2.44	105	-1.66	104	1.6	-0.1	89	196	86	77
465	71.181	0.156	0.070	2.44	105	-3.48	100	1.6	0	90	196	87	77
466	71.340	0.159	0.070	2.45	105	-3.38	102	1.5	-0.1	90	196	86	77
467	71.499	0.159	0.070	2.44	105	-3.65	102	1.5	0	90	196	85	77
468	71.656	0.157	0.070	2.43	105	-3.61	101	1.5	0	90	196	85	77
469	71.814	0.158	0.070	2.45	105	-3.64	102	1.5	0	90	195	84	77
470	71.974	0.160	0.070	2.44	105	-1.26	103	1.5	0	90	196	84	76
471	72.129	0.155	0.070	2.44	105	-1.77	100	1.5	0	89	196	84	76
472	72.291	0.162	0.070	2.43	105	-3.23	104	1.5	0	89	197	86	77
473	72.446	0.155	0.070	2.45	105	-3.7	100	1.5	0	89	196	87	77
474	72.604	0.158	0.070	2.43	105	-3.3	102	1.5	0	89	196	86	77
475	72.763	0.159	0.070	2.43	105	-1.2	102	1.4	-0.1	90	196	85	77
476	72.918	0.155	0.070	2.44	105	-1.16	100	1.4	0	90	195	84	77
477	73.079	0.161	0.070	2.43	105	-1.13	104	1.4	0	90	196	84	77
478	73.235	0.156	0.070	2.41	105	-3.12	100	1.3	-0.1	90	196	83	76
479	73.393	0.158	0.070	2.42	105	-3.5	102	1.5	0.2	89	196	84	76
480	73.551	0.158	0.070	2.42	105	-1.58	102	1.3	-0.2	89	197	86	76
481	73.707	0.156	0.070	2.41	105	-1.62	100	1.4	0.1	89	197	86	77
482	73.866	0.159	0.070	2.43	105	-1.48	102	1.3	-0.1	89	196	86	77
483	74.024	0.158	0.070	2.41	105	-2.96	102	1.3	0	89	197	85	77
484	74.179	0.155	0.070	2.39	105	-1.56	100	1.3	0	90	196	84	77
485	74.339	0.160	0.070	2.44	105	-2.02	103	1.4	0.1	90	197	83	77
486	74.494	0.155	0.070	2.42	105	-3.8	100	1.3	-0.1	90	196	84	76
487	74.652	0.158	0.070	2.42	105	-2.23	102	1.2	-0.1	90	197	85	76
488	74.812	0.160	0.070	2.40	105	-3.8	103	1.2	0	89	197	86	76
489	74.965	0.153	0.070	2.40	105	-2.4	98	1.2	0	89	198	85	76
490	75.126	0.161	0.070	2.40	105	-3.77	103	1.2	0	89	197	85	77
491	75.280	0.154	0.070	2.40	105	-1.24	99	1.3	0.1	89	197	84	77
492	75.439	0.159	0.070	2.41	105	-1.48	102	1.1	-0.2	89	197	83	77
493	75.597	0.158	0.070	2.42	105	-1.41	102	1.2	0.1	90	197	83	76
494	75.752	0.155	0.070	2.39	105	-3.69	100	1.1	-0.1	90	199	85	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
495	75.912	0.160	0.070	2.39	105	-1.1	103	1.1	0	90	197	86	77
496	76.067	0.155	0.070	2.40	105	-3.66	100	1.1	0	90	198	85	76
497	76.225	0.158	0.070	2.39	105	-1.99	102	1.1	0	90	198	84	76
498	76.383	0.158	0.070	2.40	105	-1.23	102	1.1	0	89	198	84	76
499	76.539	0.156	0.070	2.41	105	-3.41	100	1.1	0	89	198	83	76
500	76.697	0.158	0.070	2.39	105	-2.64	102	1.0	-0.1	90	198	84	77
501	76.855	0.158	0.070	2.42	105	-1.98	102	1.0	0	90	198	85	76
502	77.011	0.156	0.070	2.41	105	-1.63	100	1.0	0	90	199	85	76
503	77.171	0.160	0.070	2.41	105	-3.18	103	1.0	0	90	198	85	77
504	77.326	0.155	0.070	2.40	105	-1.84	100	1.0	0	90	198	84	77
505	77.484	0.158	0.070	2.41	105	-1.39	102	1.1	0.1	90	198	83	77
506	77.644	0.160	0.070	2.41	105	-3.51	103	1.0	-0.1	91	199	83	76
507	77.797	0.153	0.070	2.42	105	-1.43	98	1.0	0	90	199	84	77
508	77.959	0.162	0.070	2.44	105	-1.87	104	0.9	-0.1	90	198	85	77
509	78.113	0.154	0.070	2.43	105	-1.05	99	0.9	0	90	199	86	77
510	78.272	0.159	0.070	2.41	105	-3.84	102	0.9	0	90	199	85	76
511	78.431	0.159	0.070	2.42	105	-3.05	102	0.9	0	90	198	84	76
512	78.586	0.155	0.070	2.42	105	-3.68	100	0.9	0	90	198	83	76
513	78.746	0.160	0.070	2.42	105	-2.3	103	0.8	-0.1	90	198	84	76
514	78.901	0.155	0.070	2.41	105	-1.45	100	0.9	0.1	91	198	85	76
515	79.059	0.158	0.070	2.39	105	-3.57	102	0.8	-0.1	91	198	86	76
516	79.218	0.159	0.070	2.41	105	-1.91	102	0.8	0	90	198	85	76
517	79.374	0.156	0.070	2.40	105	-1.26	100	0.8	0	90	199	84	76
518	79.532	0.158	0.070	2.43	105	-3.38	102	0.8	0	90	198	84	77
519	79.690	0.158	0.070	2.39	105	-1.37	102	0.8	0	90	198	84	76
520	79.845	0.155	0.070	2.43	105	-1.89	100	0.7	-0.1	90	198	85	76
521	80.006	0.161	0.070	2.41	105	-3.33	104	0.8	0.1	90	198	86	76
522	80.161	0.155	0.070	2.43	105	-1.22	100	0.7	-0.1	90	198	85	76
523	80.319	0.158	0.070	2.41	105	-3.43	102	0.8	0.1	90	197	84	76
524	80.479	0.160	0.070	2.41	105	-3.72	103	0.7	-0.1	90	198	83	76
525	80.632	0.153	0.070	2.42	105	-1.35	98	0.7	0	90	198	84	76
526	80.794	0.162	0.070	2.40	105	-1.61	104	0.7	0	90	199	85	77
527	80.949	0.155	0.070	2.41	105	-1.57	100	0.6	-0.1	89	198	86	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
528	81.107	0.158	0.070	2.42	105	-1.33	102	0.6	0	90	198	86	76
529	81.265	0.158	0.070	2.42	105	-3.51	102	0.7	0.1	90	197	85	76
530	81.420	0.155	0.070	2.42	105	-2.91	100	0.7	0	90	197	84	76
531	81.580	0.160	0.070	2.40	105	-3.59	103	0.6	-0.1	90	197	83	76
532	81.736	0.156	0.070	2.40	105	-1.63	100	0.6	0	90	197	83	76
533	81.894	0.158	0.070	2.41	105	-1.35	102	0.6	0	90	198	85	76
534	82.052	0.158	0.070	2.42	105	-1.27	102	0.4	-0.2	89	198	86	76
535	82.207	0.155	0.070	2.40	105	-1.26	100	0.5	0.1	89	198	86	76
536	82.366	0.159	0.070	2.43	105	-1.27	102	0.6	0.1	89	198	85	76
537	82.524	0.158	0.070	2.42	105	-1.7	102	0.5	-0.1	89	197	84	76
538	82.679	0.155	0.070	2.42	105	-2.17	100	0.5	0	90	198	84	76
539	82.840	0.161	0.070	2.42	105	-2.22	104	0.6	0.1	90	198	83	76
540	82.995	0.155	0.070	2.40	105	-3.29	100	0.6	0	90	198	84	76
541	83.152	0.157	0.070	2.40	105	-1.19	101	0.5	-0.1	90	197	86	76
542	83.312	0.160	0.070	2.41	105	-1.03	103	0.4	-0.1	90	198	86	76
543	83.466	0.154	0.070	2.40	105	-1.28	99	0.4	0	89	199	85	76
544	83.627	0.161	0.070	2.41	105	-3.03	103	0.4	0	89	198	84	76
545	83.781	0.154	0.070	2.41	105	-2.42	99	0.4	0	90	198	84	76
546	83.940	0.159	0.070	2.39	105	-1.31	102	0.4	0	90	197	84	76
547	84.098	0.158	0.070	2.44	105	-3.47	102	0.4	0	90	197	85	76
548	84.253	0.155	0.070	2.41	105	-3.77	100	0.4	0	90	198	86	76
549	84.414	0.161	0.070	2.42	105	-1.18	104	0.3	-0.1	90	197	85	76
550	84.568	0.154	0.070	2.40	105	-1.96	99	0.3	0	90	197	84	76
551	84.726	0.158	0.070	2.40	105	-2.99	102	0.3	0	89	198	84	76
552	84.885	0.159	0.070	2.40	105	-1.33	102	0.3	0	89	198	84	76
553	85.040	0.155	0.070	2.41	105	-3.73	100	0.3	0	89	198	86	76
554	85.199	0.159	0.070	2.41	105	-1.23	102	0.3	0	89	197	86	77
555	85.356	0.157	0.070	2.42	105	-3.22	101	0.3	0	89	196	85	76
556	85.512	0.156	0.070	2.40	105	-3.71	100	0.3	0	89	196	84	77
557	85.672	0.160	0.070	2.40	105	-1.59	103	0.2	-0.1	90	196	84	76
558	85.828	0.156	0.070	2.41	105	-2.48	100	0.2	0	90	195	83	76
559	85.985	0.157	0.070	2.40	105	-2.94	101	0.2	0	90	195	84	76
560	86.144	0.159	0.070	2.41	105	-1.18	102	0.2	0	89	195	85	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
561	86.298	0.154	0.070	2.41	105	-1.22	99	0.3	0.1	89	196	86	76
562	86.459	0.161	0.070	2.42	105	-3.76	103	0.3	0	89	196	85	76
563	86.613	0.154	0.070	2.42	105	-1.96	99	0.2	-0.1	89	195	84	76
564	86.772	0.159	0.070	2.43	105	-2.12	102	0.1	-0.1	89	195	84	76
565	86.931	0.159	0.070	2.42	105	-3.73	102	0.1	0	89	194	84	76
566	87.085	0.154	0.070	2.41	105	-3.6	99	0.2	0.1	89	194	85	76
567	87.246	0.161	0.070	2.39	105	-1.35	104	0.1	-0.1	90	194	85	76
568	87.400	0.154	0.070	2.41	105	-3.41	99	0.1	0	89	194	86	76
569	87.559	0.159	0.070	2.42	105	-1.24	102	0.3	0.2	89	195	85	76
570	87.718	0.159	0.070	2.45	105	-1.33	102	0.1	-0.2	89	194	84	76
571	87.873	0.155	0.070	2.41	105	-2.84	100	0.1	0	89	193	84	76
572	88.032	0.159	0.070	2.43	105	-1.78	102	0.1	0	89	192	85	76
573	88.189	0.157	0.070	2.41	105	-2.93	101	0.0	-0.1	89	192	86	76
Avg/Tot	88.189	0.154	0.070	2.31	103	-2.08	100			97	251	85	74.9

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.00	99	-1		85	0.000	6.67	0.44
1	0.143	0.143	2.31	99	-0.69	98	85	-0.080	5.19	0.40
2	0.295	0.152	2.28	99	-2.51	104	86	-0.080	4.23	0.51
3	0.442	0.147	2.24	99	-2.58	101	85	-0.090	13.26	0.47
4	0.592	0.150	2.24	98	-1.19	103	85	-0.080	15.75	1.27
5	0.739	0.147	2.22	98	-3.16	101	85	-0.090	16.19	1.52
6	0.889	0.150	2.20	98	-1.11	103	85	-0.080	16.43	1.53
7	1.035	0.146	2.22	98	-2.25	100	85	-0.090	15.71	1.18
8	1.186	0.151	2.21	98	-2.73	103	85	-0.080	14.40	0.33
9	1.332	0.146	2.20	98	-3.03	100	86	-0.080	15.12	0.62
10	1.482	0.150	2.21	98	-0.87	102	86	-0.090	14.95	0.48
11	1.627	0.145	2.17	98	-3.27	99	86	-0.080	14.44	0.24
12	1.780	0.153	2.26	98	-1.29	104	85	-0.080	15.01	0.62
13	1.927	0.147	2.27	98	-1.13	100	85	-0.080	14.77	0.50
14	2.078	0.151	2.26	98	-0.86	103	85	-0.090	14.42	0.42
15	2.226	0.148	2.27	98	-3.02	101	85	-0.080	14.30	0.36
16	2.377	0.151	2.26	98	-2.59	103	85	-0.080	14.36	0.52
17	2.527	0.150	2.27	98	-3.29	102	86	-0.080	13.89	0.42
18	2.677	0.150	2.27	98	-0.83	102	86	-0.080	13.16	0.36
19	2.828	0.151	2.26	98	-1	102	86	-0.080	12.27	0.25
20	2.977	0.149	2.26	98	-0.83	101	86	-0.070	11.58	0.28
21	3.127	0.150	2.27	98	-3.26	102	86	-0.080	11.25	0.26
22	3.276	0.149	2.28	98	-2.42	101	85	-0.070	10.86	0.32
23	3.427	0.151	2.26	98	-3.21	102	85	-0.070	10.64	0.29
24	3.575	0.148	2.24	99	-1.9	100	85	-0.070	10.34	0.28
25	3.728	0.153	2.25	99	-2.32	103	85	-0.080	10.33	0.29
26	3.875	0.147	2.25	99	-3.03	99	86	-0.070	10.12	0.29
27	4.028	0.153	2.24	99	-1.26	103	86	-0.070	9.99	0.30
28	4.175	0.147	2.26	99	-2.81	99	86	-0.070	9.96	0.30
29	4.327	0.152	2.24	99	-2.93	103	86	-0.070	9.93	0.30
30	4.475	0.148	2.26	99	-0.86	100	85	-0.060	10.03	0.31
31	4.626	0.151	2.26	99	-2.28	102	85	-0.080	10.17	0.25

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.776	0.150	2.26	99	-1.54	101	85	-0.070	10.07	0.31
33	4.927	0.151	2.25	99	-0.95	101	85	-0.070	10.00	0.32
34	5.077	0.150	2.26	99	-3.05	101	86	-0.070	10.02	0.29
35	5.226	0.149	2.26	99	-3.27	100	86	-0.060	9.86	0.33
36	5.377	0.151	2.26	99	-2.86	101	86	-0.060	9.93	0.32
37	5.525	0.148	2.27	99	-3.33	99	86	-0.070	9.77	0.35
38	5.677	0.152	2.26	99	-1.01	102	86	-0.070	9.86	0.32
39	5.825	0.148	2.26	99	-3.16	99	85	-0.060	9.99	0.30
40	5.977	0.152	2.27	99	-3.26	102	84	-0.070	9.96	0.35
41	6.125	0.148	2.25	99	-1.07	99	84	-0.080	10.23	0.32
42	6.278	0.153	2.26	99	-0.89	102	85	-0.070	10.23	0.28
43	6.425	0.147	2.25	99	-3.17	98	85	-0.050	10.24	0.29
44	6.576	0.151	2.26	100	-3.27	101	86	-0.070	10.38	0.25
45	6.724	0.148	2.26	100	-3.19	99	86	-0.080	10.38	0.24
46	6.876	0.152	2.25	100	-2.9	102	86	-0.060	10.36	0.25
47	7.026	0.150	2.26	100	-1.02	100	86	-0.070	10.37	0.25
48	7.176	0.150	2.25	100	-3.05	100	85	-0.070	10.37	0.26
49	7.327	0.151	2.26	100	-1.41	101	84	-0.070	10.34	0.27
50	7.475	0.148	2.26	100	-3.15	99	84	-0.080	10.46	0.25
51	7.626	0.151	2.24	100	-2.78	101	85	-0.060	10.52	0.23
52	7.774	0.148	2.25	100	-1.31	99	85	-0.070	10.56	0.26
53	7.926	0.152	2.24	100	-2.04	101	86	-0.070	10.84	0.25
54	8.075	0.149	2.24	100	-2.84	99	86	-0.070	10.63	0.29
55	8.227	0.152	2.23	100	-2.56	102	86	-0.070	10.79	0.25
56	8.375	0.148	2.24	100	-1.25	99	85	-0.070	10.79	0.29
57	8.527	0.152	2.26	100	-0.82	102	85	-0.070	10.64	0.32
58	8.674	0.147	2.23	100	-3.18	98	84	-0.070	10.65	0.31
59	8.826	0.152	2.25	100	-0.86	101	85	-0.070	10.65	0.34
60	8.974	0.148	2.24	100	-2.12	99	85	-0.080	10.39	0.37
61	9.125	0.151	2.26	100	-3.19	101	86	-0.070	10.47	0.36
62	9.275	0.150	2.25	100	-1.33	100	86	-0.060	10.46	0.34
63	9.425	0.150	2.24	100	-0.95	100	86	-0.070	10.48	0.37

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.576	0.151	2.25	100	-0.93	101	86	-0.060	10.39	0.37
65	9.724	0.148	2.25	100	-2.56	99	85	-0.070	10.47	0.33
66	9.874	0.150	2.24	100	-2.04	100	85	-0.080	10.21	0.30
67	10.022	0.148	2.25	100	-3.31	99	84	-0.070	10.20	0.28
68	10.173	0.151	2.25	100	-1.2	101	85	-0.060	10.17	0.27
69	10.321	0.148	2.25	100	-1.17	99	85	-0.070	10.12	0.25
70	10.474	0.153	2.25	100	-2.63	102	86	-0.070	10.13	0.26
71	10.621	0.147	2.24	100	-2.53	98	86	-0.060	10.09	0.22
72	10.773	0.152	2.24	100	-2.48	101	86	-0.070	10.04	0.27
73	10.920	0.147	2.24	100	-3.28	98	86	-0.070	10.03	0.26
74	11.071	0.151	2.23	100	-2.36	101	85	-0.070	10.27	0.22
75	11.219	0.148	2.24	100	-1.75	99	85	-0.060	10.19	0.26
76	11.369	0.150	2.24	101	-0.88	100	85	-0.060	10.18	0.23
77	11.518	0.149	2.24	100	-2.01	99	85	-0.060	10.23	0.25
78	11.669	0.151	2.23	100	-0.91	101	85	-0.060	10.39	0.21
79	11.818	0.149	2.25	100	-1.41	99	86	-0.080	10.43	0.20
80	11.967	0.149	2.24	101	-3.23	99	86	-0.070	10.27	0.25
81	12.118	0.151	2.24	101	-2.17	100	86	-0.060	10.39	0.25
82	12.266	0.148	2.24	101	-2.65	98	85	-0.060	10.63	0.21
83	12.417	0.151	2.23	101	-1.08	100	85	-0.070	10.52	0.21
84	12.564	0.147	2.24	101	-2.67	98	85	-0.060	10.58	0.20
85	12.715	0.151	2.23	101	-2.25	100	85	-0.070	10.33	0.22
86	12.863	0.148	2.25	101	-2.87	98	85	-0.060	10.19	0.23
87	13.015	0.152	2.22	101	-3.21	101	85	-0.050	10.19	0.22
88	13.162	0.147	2.20	101	-2.7	98	86	-0.070	9.94	0.25
89	13.313	0.151	2.22	101	-1.08	100	86	-0.060	10.13	0.22
90	13.460	0.147	2.23	101	-0.9	98	86	-0.080	10.19	0.24
91	13.611	0.151	2.23	101	-0.94	100	85	-0.060	10.21	0.20
92	13.758	0.147	2.23	101	-2.16	98	85	-0.070	10.35	0.25
93	13.909	0.151	2.23	101	-3.3	100	84	-0.060	10.36	0.25
94	14.056	0.147	2.23	101	-2.13	98	84	-0.070	10.64	0.24
95	14.207	0.151	2.23	101	-0.9	100	85	-0.060	10.67	0.21

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.356	0.149	2.22	101	-0.92	99	85	-0.070	11.05	0.29
97	14.505	0.149	2.23	101	-2.85	99	86	-0.060	11.57	0.44
98	14.654	0.149	2.22	101	-1.98	99	86	-0.070	12.18	0.54
99	14.803	0.149	2.20	101	-0.95	99	85	-0.050	11.54	0.34
100	14.952	0.149	2.22	101	-2.06	99	85	-0.060	11.17	0.23
101	15.100	0.148	2.22	101	-1.42	98	84	-0.070	10.84	0.23
102	15.249	0.149	2.22	101	-1.63	99	84	-0.070	10.50	0.24
103	15.396	0.147	2.21	101	-0.93	98	84	-0.060	10.22	0.18
104	15.547	0.151	2.21	101	-2.31	100	85	-0.060	9.68	0.18
105	15.693	0.146	2.22	101	-3.43	97	85	-0.060	9.32	0.19
106	15.844	0.151	2.20	101	-2.52	100	86	-0.060	8.96	0.27
107	15.991	0.147	2.23	101	-2.8	98	85	-0.060	8.92	0.23
108	16.143	0.152	2.21	101	-2.03	101	85	-0.060	8.75	0.26
109	16.289	0.146	2.21	101	-1.5	97	85	-0.060	8.60	0.27
110	16.440	0.151	2.23	101	-3.31	101	84	-0.040	8.47	0.30
111	16.587	0.147	2.26	101	-1.06	98	84	-0.070	8.33	0.33
112	16.739	0.152	2.23	101	-1.07	101	84	-0.060	8.09	0.31
113	16.885	0.146	2.22	101	-1.17	97	85	-0.060	8.12	0.33
114	17.037	0.152	2.24	101	-0.94	101	86	-0.050	8.09	0.38
115	17.184	0.147	2.24	101	-2.41	98	86	-0.060	8.03	0.32
116	17.335	0.151	2.23	101	-2.87	101	86	-0.060	7.92	0.33
117	17.484	0.149	2.23	101	-1.11	99	86	-0.060	7.75	0.36
118	17.634	0.150	2.24	101	-3.27	100	85	-0.060	7.97	0.35
119	17.783	0.149	2.22	101	-2.97	99	85	-0.060	7.92	0.34
120	17.932	0.149	2.24	101	-3.35	99	84	-0.070	7.86	0.35
121	18.082	0.150	2.23	101	-1.72	100	84	-0.050	7.72	0.36
122	18.229	0.147	2.23	101	-2.08	98	85	-0.050	7.76	0.35
123	18.380	0.151	2.21	101	-3.04	101	86	-0.060	7.68	0.37
124	18.527	0.147	2.22	101	-1.27	98	86	-0.050	7.93	0.32
125	18.678	0.151	2.21	101	-3.35	101	86	-0.060	7.99	0.33
126	18.825	0.147	2.23	101	-0.97	98	86	-0.060	7.97	0.34
127	18.977	0.152	2.21	101	-1.35	101	86	-0.060	7.92	0.37

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.124	0.147	2.21	101	-1.22	98	85	-0.050	7.90	0.37
129	19.275	0.151	2.21	101	-2.23	101	85	-0.060	7.98	0.38
130	19.422	0.147	2.22	101	-3.27	98	85	-0.050	7.96	0.34
131	19.573	0.151	2.22	101	-3.19	101	85	-0.070	7.78	0.40
132	19.719	0.146	2.22	101	-1.75	97	85	-0.060	8.02	0.37
133	19.869	0.150	2.20	101	-1.42	100	86	-0.050	7.82	0.41
134	20.016	0.147	2.21	101	-1.03	98	86	-0.060	7.63	0.47
135	20.166	0.150	2.22	101	-1.53	100	86	-0.050	7.62	0.43
136	20.314	0.148	2.20	101	-1.62	99	85	-0.050	7.25	0.42
137	20.464	0.150	2.20	101	-2.68	100	85	-0.040	7.11	0.42
138	20.611	0.147	2.20	101	-3.2	98	84	-0.060	6.88	0.48
139	20.761	0.150	2.19	101	-0.98	100	85	-0.050	6.97	0.48
140	20.908	0.147	2.17	101	-1.51	98	85	-0.050	6.97	0.49
141	21.055	0.147	2.17	101	-1.22	98	86	-0.050	6.77	0.54
142	21.203	0.148	2.14	101	-1.1	99	86	-0.050	7.02	0.48
143	21.349	0.146	2.12	101	-3.33	97	86	-0.050	7.00	0.53
144	21.494	0.145	2.09	101	-3.28	97	86	-0.060	6.90	0.55
145	21.638	0.144	2.05	101	-1.39	96	85	-0.050	6.87	0.55
146	21.779	0.141	2.01	101	-3.08	94	85	-0.060	7.00	0.52
147	21.922	0.143	1.94	101	-3.92	95	84	-0.060	6.87	0.55
148	22.059	0.137	1.88	101	-2.32	91	85	-0.040	7.18	0.50
149	22.196	0.137	1.82	101	-1.91	91	85	-0.050	7.08	0.50
150	22.330	0.134	1.74	101	-3.92	89	86	-0.050	7.27	0.46
151	22.459	0.129	1.67	101	-3.53	86	86	-0.040	7.20	0.48
152	22.588	0.129	1.57	101	-4.61	86	86	-0.050	7.25	0.45
153	22.712	0.124	1.49	101	-4.52	83	86	-0.050	7.23	0.45
154	22.830	0.118	1.39	101	-3.1	79	85	-0.040	7.18	0.50
155	22.946	0.116	1.28	101	-3.21	77	85	-0.050	7.21	0.46
156	23.060	0.114	1.20	101	-5.51	76	85	-0.050	7.24	0.46
157	23.214	0.154	3.28	101	-0.38	103	80	-0.060	7.20	0.47
158	23.391	0.177	3.09	101	-0.82	118	84	-0.040	7.19	0.43
159	23.545	0.154	2.39	101	-2.79	103	85	-0.030	7.15	0.45

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	23.699	0.154	2.28	102	-1.26	102	86	-0.050	7.19	0.43
161	23.850	0.151	2.26	102	-2.88	100	86	-0.050	7.14	0.45
162	23.999	0.149	2.27	102	-0.57	99	86	-0.050	7.14	0.48
163	24.152	0.153	2.27	102	-1.26	102	85	-0.060	7.18	0.46
164	24.300	0.148	2.26	102	-2.88	98	85	-0.050	7.23	0.42
165	24.454	0.154	2.26	102	-2.15	102	84	-0.050	7.22	0.44
166	24.602	0.148	2.28	102	-1.18	98	84	-0.050	7.27	0.43
167	24.754	0.152	2.26	102	-2.69	101	84	-0.050	7.11	0.44
168	24.903	0.149	2.27	102	-1.84	99	85	-0.050	6.89	0.47
169	25.055	0.152	2.27	102	-2.14	101	86	-0.040	6.82	0.49
170	25.206	0.151	2.27	102	-2.22	100	86	-0.040	6.89	0.51
171	25.357	0.151	2.27	102	-2.92	100	86	-0.030	6.23	0.58
172	25.508	0.151	2.28	102	-2.98	100	86	-0.050	6.31	0.56
173	25.657	0.149	2.27	102	-2.78	99	85	-0.040	5.65	1.13
174	25.809	0.152	2.28	102	-2.89	101	85	-0.050	5.46	1.30
175	25.957	0.148	2.25	102	-1.49	98	84	-0.050	5.52	1.28
176	26.111	0.154	2.26	102	-1.43	102	84	-0.040	5.64	1.31
177	26.258	0.147	2.26	102	-1.13	98	85	-0.040	6.10	1.11
178	26.411	0.153	2.23	102	-1.75	102	85	-0.040	5.63	1.30
179	26.559	0.148	2.24	102	-0.52	98	86	-0.040	5.67	1.31
180	26.710	0.151	2.25	102	-0.68	100	86	-0.050	5.50	1.27
181	26.858	0.148	2.23	102	-2.2	98	86	-0.040	5.62	1.26
182	27.009	0.151	2.21	102	-2.79	100	85	-0.040	5.56	1.29
183	27.157	0.148	2.21	102	-2.76	98	85	-0.040	5.48	1.30
184	27.307	0.150	2.20	102	-1.03	99	84	-0.040	5.46	1.27
185	27.455	0.148	2.19	102	-1.57	98	84	-0.040	5.69	1.28
186	27.604	0.149	2.17	102	-3.13	99	85	-0.030	5.65	1.36
187	27.751	0.147	2.16	102	-2.5	97	85	-0.040	5.40	1.45
188	27.898	0.147	2.16	102	-0.96	97	86	-0.040	5.49	1.46
189	28.046	0.148	2.15	102	-0.83	98	86	-0.040	5.73	1.45
190	28.192	0.146	2.14	102	-2.37	97	86	-0.050	5.66	1.45
191	28.339	0.147	2.15	102	-2.06	97	85	-0.040	6.20	1.27

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	28.485	0.146	2.14	102	-3.12	97	85	-0.040	6.19	1.19
193	28.632	0.147	2.13	102	-2.88	97	85	-0.030	6.16	1.22
194	28.778	0.146	2.14	102	-2.15	97	84	-0.050	6.63	0.87
195	28.925	0.147	2.13	102	-0.81	97	85	-0.040	6.55	0.79
196	29.071	0.146	2.13	102	-0.89	97	85	-0.040	6.90	0.73
197	29.217	0.146	2.14	102	-0.97	97	86	-0.050	6.92	0.70
198	29.363	0.146	2.13	102	-1.18	97	86	-0.030	6.99	0.65
199	29.510	0.147	2.13	102	-3.35	97	86	-0.050	6.91	0.62
200	29.656	0.146	2.13	102	-1.84	97	85	-0.050	6.82	0.64
201	29.802	0.146	2.13	102	-1.73	97	85	-0.040	6.87	0.63
202	29.948	0.146	2.12	102	-1.29	97	85	-0.030	6.96	0.57
203	30.094	0.146	2.11	102	-3.28	97	85	-0.040	6.65	0.79
204	30.240	0.146	2.11	102	-1.13	97	85	-0.050	6.00	1.49
205	30.385	0.145	2.10	102	-1.04	96	85	-0.040	5.93	1.45
206	30.530	0.145	2.10	102	-1.29	96	86	-0.040	5.90	1.46
207	30.674	0.144	2.09	102	-1.93	95	86	-0.050	5.84	1.36
208	30.821	0.147	2.10	102	-1.83	97	86	-0.040	5.78	1.31
209	30.965	0.144	2.09	102	-0.89	95	85	-0.040	5.81	1.28
210	31.112	0.147	2.10	102	-1.44	97	85	-0.040	5.70	1.28
211	31.255	0.143	2.08	102	-3.02	95	84	-0.040	5.81	1.26
212	31.402	0.147	2.09	102	-3.31	97	85	-0.030	5.70	1.28
213	31.545	0.143	2.09	102	-3.38	95	85	-0.030	5.76	1.27
214	31.693	0.148	2.22	102	-0.95	98	86	-0.030	5.77	1.23
215	31.840	0.147	2.22	103	-1.65	97	86	-0.040	5.65	1.22
216	31.991	0.151	2.22	103	-1.45	100	86	-0.020	5.62	1.23
217	32.138	0.147	2.21	103	-0.97	97	86	-0.030	5.98	1.17
218	32.289	0.151	2.21	103	-1.75	100	85	-0.030	5.79	1.13
219	32.438	0.149	2.22	103	-1.48	98	85	-0.050	5.64	1.15
220	32.587	0.149	2.21	103	-3.31	98	85	-0.040	5.89	1.09
221	32.736	0.149	2.20	103	-2.12	98	85	-0.040	5.91	1.09
222	32.885	0.149	2.19	103	-2.96	98	85	-0.030	5.88	1.12
223	33.035	0.150	2.22	103	-2.38	99	86	-0.030	5.91	1.16

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	33.182	0.147	2.21	103	-0.92	97	86	-0.030	5.78	1.19
225	33.332	0.150	2.20	103	-3.01	99	86	-0.030	6.03	1.17
226	33.479	0.147	2.20	103	-2.32	97	85	-0.050	5.77	1.31
227	33.630	0.151	2.21	103	-1.02	100	85	-0.020	5.87	1.22
228	33.776	0.146	2.21	103	-2.31	96	84	-0.040	5.84	1.24
229	33.927	0.151	2.19	103	-1.7	100	85	-0.020	5.99	1.22
230	34.074	0.147	2.20	103	-1.41	97	85	-0.050	5.94	1.20
231	34.225	0.151	2.20	103	-1.38	100	85	-0.030	6.05	1.23
232	34.371	0.146	2.19	103	-1.09	96	86	-0.030	6.17	1.19
233	34.522	0.151	2.19	103	-3.35	100	86	-0.020	6.09	1.22
234	34.667	0.145	2.19	103	-1.63	96	85	-0.040	5.82	1.33
235	34.818	0.151	2.17	103	-1.84	100	85	-0.030	5.71	1.26
236	34.964	0.146	2.19	103	-2.84	96	84	-0.030	5.85	1.21
237	35.114	0.150	2.18	103	-1.48	99	84	-0.030	5.74	1.22
238	35.260	0.146	2.18	103	-1.4	97	85	-0.030	5.76	1.20
239	35.409	0.149	2.18	103	-3.42	98	85	-0.030	5.93	1.15
240	35.555	0.146	2.17	103	-2.35	97	86	-0.030	5.86	1.12
241	35.706	0.151	2.29	103	-3.48	100	86	-0.040	5.88	1.14
242	35.856	0.150	2.28	103	-2.77	99	86	-0.040	5.77	1.17
243	36.008	0.152	2.27	103	-3.56	100	86	-0.030	6.03	1.18
244	36.160	0.152	2.28	103	-1.49	100	85	-0.030	5.76	1.18
245	36.310	0.150	2.28	103	-1.34	99	85	-0.030	6.05	1.20
246	36.462	0.152	2.28	103	-1.34	100	84	-0.030	5.93	1.24
247	36.611	0.149	2.27	103	-2.81	98	84	-0.030	5.82	1.31
248	36.765	0.154	2.27	103	-1.26	102	85	-0.040	5.91	1.36
249	36.914	0.149	2.27	103	-3.05	98	85	-0.040	6.00	1.39
250	37.068	0.154	2.27	103	-1.33	102	86	-0.040	5.97	1.35
251	37.215	0.147	2.27	103	-1.07	97	86	-0.030	6.28	1.17
252	37.368	0.153	2.28	103	-1.92	101	86	-0.030	6.24	1.22
253	37.517	0.149	2.26	103	-2.48	98	85	-0.030	6.35	0.99
254	37.670	0.153	2.27	103	-1.2	101	85	-0.040	6.31	0.96
255	37.821	0.151	2.28	103	-3.1	100	85	-0.030	6.41	0.91

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	37.971	0.150	2.28	103	-1.31	99	84	-0.030	6.50	0.84
257	38.122	0.151	2.26	103	-2.22	100	85	-0.040	6.30	0.85
258	38.272	0.150	2.27	103	-1.26	99	85	-0.040	6.37	0.84
259	38.426	0.154	2.28	103	-1.15	102	86	-0.030	6.60	0.80
260	38.574	0.148	2.28	103	-1.85	98	86	-0.030	6.53	0.75
261	38.728	0.154	2.26	103	-1.19	102	85	-0.040	6.45	0.76
262	38.876	0.148	2.27	103	-1.53	98	85	-0.040	6.62	0.73
263	39.029	0.153	2.30	103	-2.11	101	84	-0.040	6.56	0.71
264	39.178	0.149	2.28	103	-1.36	98	85	-0.030	6.58	0.72
265	39.331	0.153	2.27	103	-1.1	101	85	-0.040	6.73	0.70
266	39.482	0.151	2.28	103	-3.24	100	86	-0.040	6.59	0.73
267	39.633	0.151	2.27	103	-2.35	100	86	-0.050	6.42	0.71
268	39.784	0.151	2.27	103	-1.56	100	86	-0.040	6.48	0.74
269	39.933	0.149	2.29	103	-3.47	98	85	-0.040	6.30	0.77
270	40.088	0.155	2.29	103	-1.28	102	85	-0.040	6.46	0.71
271	40.236	0.148	2.27	103	-2.29	98	85	-0.050	6.42	0.70
272	40.391	0.155	2.28	103	-1.55	102	85	-0.040	6.17	0.76
273	40.538	0.147	2.28	103	-3.52	97	85	-0.030	5.58	0.70
274	40.692	0.154	2.29	103	-2.43	102	85	-0.030	5.51	0.74
275	40.841	0.149	2.28	103	-1.11	98	86	-0.040	5.24	0.89
276	40.994	0.153	2.28	103	-1.09	101	86	-0.030	5.42	1.05
277	41.146	0.152	2.27	103	-1.04	100	86	-0.040	5.34	1.04
278	41.296	0.150	2.28	103	-3.22	99	85	-0.030	5.18	1.06
279	41.449	0.153	2.29	103	-1.25	101	85	-0.040	5.23	0.99
280	41.597	0.148	2.28	103	-1.13	98	84	-0.040	5.20	0.95
281	41.752	0.155	2.28	103	-1.31	102	85	-0.040	5.28	0.93
282	41.901	0.149	2.28	103	-3.47	98	85	-0.030	5.18	0.94
283	42.055	0.154	2.29	103	-3.41	102	86	-0.050	5.19	0.91
284	42.204	0.149	2.29	103	-2.02	98	86	-0.030	5.35	0.89
285	42.356	0.152	2.28	103	-1.64	100	86	-0.030	5.36	0.91
286	42.507	0.151	2.28	103	-1.13	100	86	-0.030	5.29	0.90
287	42.659	0.152	2.28	103	-1.91	100	85	-0.040	5.36	0.89

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
288	42.812	0.153	2.29	103	-1.19	101	85	-0.030	5.37	0.91
289	42.961	0.149	2.29	103	-3.38	98	84	-0.040	5.38	0.89
290	43.114	0.153	2.29	103	-1.41	101	85	-0.040	5.25	0.91
291	43.264	0.150	2.29	103	-2.52	99	85	-0.020	5.35	0.88
292	43.418	0.154	2.29	103	-2.46	102	86	-0.030	5.25	0.90
293	43.567	0.149	2.30	103	-1.53	98	86	-0.030	5.31	0.92
294	43.721	0.154	2.31	103	-1.84	102	86	-0.050	5.20	0.92
295	43.870	0.149	2.29	103	-1.15	98	85	-0.030	5.39	0.90
296	44.024	0.154	2.29	103	-1.02	102	85	-0.030	5.12	0.91
297	44.176	0.152	2.29	103	-2.84	100	85	-0.030	5.29	0.85
298	44.326	0.150	2.30	103	-1.18	99	84	-0.040	5.24	0.88
299	44.479	0.153	2.29	103	-2.4	101	85	-0.030	5.20	0.91
300	44.629	0.150	2.30	103	-3.15	99	85	-0.050	5.21	0.91
301	44.784	0.155	2.30	103	-1.59	102	86	-0.040	5.09	0.87
302	44.934	0.150	2.32	103	-2.76	99	86	-0.030	5.30	0.87
303	45.087	0.153	2.30	103	-1.84	101	86	-0.040	5.10	0.85
304	45.237	0.150	2.31	104	-1.03	99	85	-0.010	5.32	0.85
305	45.391	0.154	2.32	104	-3.23	101	85	-0.040	5.12	0.87
306	45.543	0.152	2.31	104	-0.99	100	84	-0.030	5.20	0.85
307	45.694	0.151	2.31	104	-3.36	99	85	-0.030	5.17	0.89
308	45.848	0.154	2.31	104	-1.1	102	85	-0.030	5.20	0.87
309	45.998	0.150	2.31	104	-2.04	99	85	-0.020	5.25	0.85
310	46.153	0.155	2.32	103	-1	102	86	-0.030	5.12	0.89
311	46.303	0.150	2.31	103	-2.71	99	86	-0.030	5.23	0.88
312	46.457	0.154	2.32	103	-3.28	102	86	-0.030	5.23	0.89
313	46.607	0.150	2.32	103	-2.88	99	85	-0.030	5.39	0.88
314	46.761	0.154	2.32	103	-2.38	102	84	-0.040	5.32	0.86
315	46.915	0.154	2.32	103	-1.34	102	85	-0.030	5.43	0.86
316	47.065	0.150	2.32	103	-2.46	99	85	-0.030	5.41	0.86
317	47.219	0.154	2.32	102	-1.44	102	85	-0.040	5.29	0.85
318	47.370	0.151	2.32	102	-1.99	100	86	-0.030	5.26	0.89
319	47.525	0.155	2.30	102	-1.78	102	86	-0.030	5.30	0.90

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
320	47.674	0.149	2.32	102	-1.94	98	86	-0.030	5.30	0.90
321	47.828	0.154	2.33	102	-1.61	102	85	-0.030	5.31	0.90
322	47.981	0.153	2.33	102	-2	101	85	-0.040	5.29	0.90
323	48.134	0.153	2.31	102	-2.87	101	84	-0.030	5.46	0.86
324	48.287	0.153	2.34	102	-0.94	101	85	-0.030	5.34	0.91
325	48.437	0.150	2.33	102	-1.88	99	85	-0.040	5.30	0.88
326	48.593	0.156	2.33	102	-0.97	103	86	-0.040	5.32	0.86
327	48.743	0.150	2.33	102	-2.84	99	86	-0.040	5.31	0.90
328	48.898	0.155	2.33	102	-3.09	102	86	-0.040	5.28	0.87
329	49.048	0.150	2.33	102	-3.42	99	86	-0.030	5.26	0.86
330	49.203	0.155	2.33	102	-3.33	102	85	-0.030	5.41	0.87
331	49.356	0.153	2.34	102	-2.89	101	85	-0.030	5.32	0.84
332	49.507	0.151	2.33	102	-3.43	100	85	-0.030	5.26	0.86
333	49.661	0.154	2.33	102	-3.22	102	85	-0.040	5.30	0.87
334	49.813	0.152	2.33	102	-1.55	100	86	-0.030	5.40	0.84
335	49.968	0.155	2.32	102	-3.43	102	86	-0.040	5.35	0.87
336	50.118	0.150	2.34	102	-2.27	99	86	-0.030	5.39	0.86
337	50.272	0.154	2.34	103	-2.59	101	86	-0.040	5.28	0.89
338	50.425	0.153	2.33	103	-1.04	101	85	-0.040	5.33	0.87
339	50.579	0.154	2.34	103	-2.42	101	85	-0.010	5.20	0.85
340	50.732	0.153	2.33	103	-1.01	101	85	-0.040	5.40	0.86
341	50.883	0.151	2.34	103	-1.75	99	85	-0.030	5.32	0.86
342	51.039	0.156	2.34	103	-2.9	103	86	-0.030	5.31	0.85
343	51.190	0.151	2.36	103	-1.5	99	86	-0.040	5.30	0.84
344	51.345	0.155	2.34	103	-3.4	102	86	-0.030	5.33	0.87
345	51.496	0.151	2.34	103	-1.02	99	86	-0.030	5.20	0.85
346	51.650	0.154	2.33	103	-1.41	101	86	-0.030	5.25	0.85
347	51.805	0.155	2.34	103	-1.03	102	85	-0.040	5.20	0.83
348	51.955	0.150	2.34	103	-2.26	98	85	-0.030	5.16	0.85
349	52.111	0.156	2.35	103	-1.26	102	85	-0.030	5.29	0.83
350	52.262	0.151	2.34	103	-2.69	99	85	-0.030	5.34	0.84
351	52.417	0.155	2.34	103	-1.28	102	86	-0.030	5.30	0.87

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
352	52.568	0.151	2.37	103	-3.38	99	86	-0.040	5.24	0.87
353	52.724	0.156	2.35	103	-3.14	102	86	-0.030	5.30	0.85
354	52.878	0.154	2.35	103	-3.33	101	86	-0.040	5.27	0.85
355	53.029	0.151	2.35	103	-1.84	99	85	-0.030	5.30	0.85
356	53.184	0.155	2.35	103	-1.25	102	85	-0.020	5.22	0.83
357	53.336	0.152	2.35	103	-1.35	100	85	-0.040	5.20	0.89
358	53.491	0.155	2.36	103	-3.29	102	85	-0.030	5.17	0.91
359	53.643	0.152	2.35	103	-1.9	100	85	-0.030	5.24	0.88
360	53.798	0.155	2.35	103	-1.48	102	86	-0.030	5.38	0.86
361	53.952	0.154	2.37	103	-2.62	101	86	-0.040	5.19	0.88
362	54.104	0.152	2.36	103	-2.88	100	86	-0.040	5.28	0.87
363	54.259	0.155	2.35	103	-2.06	102	86	-0.040	5.26	0.84
364	54.411	0.152	2.34	103	-1.12	100	85	-0.030	5.17	0.85
365	54.567	0.156	2.37	103	-1.04	102	84	-0.040	5.06	0.89
366	54.718	0.151	2.36	103	-1.09	99	85	-0.040	5.30	0.83
367	54.873	0.155	2.35	103	-3.29	102	85	-0.030	5.10	0.86
368	55.028	0.155	2.36	103	-1.31	102	85	-0.030	5.31	0.83
369	55.179	0.151	2.37	103	-1.02	99	86	-0.040	5.28	0.85
370	55.335	0.156	2.35	103	-2.65	102	86	-0.040	5.25	0.86
371	55.487	0.152	2.34	103	-3.34	100	86	-0.020	5.31	0.83
372	55.643	0.156	2.37	103	-1.81	102	86	-0.030	5.12	0.89
373	55.794	0.151	2.36	103	-1.29	99	85	-0.030	5.14	0.87
374	55.950	0.156	2.36	103	-1.64	102	85	-0.040	5.23	0.87
375	56.105	0.155	2.35	103	-1.13	102	85	-0.040	5.18	0.87
376	56.256	0.151	2.37	103	-3.33	99	85	-0.040	5.16	0.89
377	56.413	0.157	2.36	103	-1.47	103	86	-0.030	5.38	0.90
378	56.565	0.152	2.35	103	-2.74	100	86	-0.020	5.28	0.87
379	56.720	0.155	2.37	104	-1.05	101	86	-0.040	5.12	0.93
380	56.872	0.152	2.36	104	-3.31	99	86	-0.040	5.23	0.92
381	57.027	0.155	2.36	104	-1.02	101	85	-0.030	5.34	0.89
382	57.182	0.155	2.36	104	-2.93	101	84	-0.040	5.26	0.91
383	57.333	0.151	2.37	104	-1.73	99	85	-0.040	5.11	0.86

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
384	57.491	0.158	2.37	104	-2.61	103	85	-0.030	5.16	0.90
385	57.642	0.151	2.37	104	-3.19	99	85	-0.040	5.39	0.87
386	57.798	0.156	2.37	104	-3.35	102	86	-0.030	5.17	0.92
387	57.951	0.153	2.35	104	-3.22	100	86	-0.050	5.23	0.89
388	58.106	0.155	2.39	104	-1.1	101	86	-0.030	5.24	0.85
389	58.261	0.155	2.39	104	-3.27	101	86	-0.030	5.19	0.86
390	58.413	0.152	2.38	104	-0.92	99	85	-0.020	5.31	0.90
391	58.570	0.157	2.37	104	-2.25	103	85	-0.030	5.22	0.86
392	58.721	0.151	2.35	104	-0.87	99	85	-0.030	5.16	0.87
393	58.876	0.155	2.38	104	-2.53	101	85	-0.030	5.28	0.84
394	59.031	0.155	2.37	104	-1.31	101	86	-0.030	4.82	0.85
395	59.184	0.153	2.38	104	-1.34	100	86	-0.030	5.06	0.84
396	59.340	0.156	2.39	104	-2.56	102	86	-0.040	4.92	0.82
397	59.493	0.153	2.37	104	-1.24	100	86	-0.030	4.90	0.83
398	59.649	0.156	2.38	104	-2.89	102	85	-0.020	5.00	0.80
399	59.801	0.152	2.37	104	-1.5	99	84	-0.030	4.95	0.84
400	59.957	0.156	2.37	104	-1.35	102	85	-0.030	5.02	0.79
401	60.112	0.155	2.37	104	-3.17	101	85	-0.030	5.11	0.80
402	60.264	0.152	2.38	104	-0.91	99	86	-0.030	4.87	0.85
403	60.421	0.157	2.37	104	-1.03	103	86	-0.030	5.06	0.80
404	60.573	0.152	2.40	104	-1.41	99	86	-0.030	5.01	0.80
405	60.729	0.156	2.39	104	-0.92	102	86	-0.030	5.14	0.80
406	60.882	0.153	2.39	104	-2.54	100	85	-0.030	5.20	0.85
407	61.037	0.155	2.37	104	-3.13	101	85	-0.040	5.16	0.85
408	61.192	0.155	2.38	104	-0.92	101	85	-0.040	5.15	0.86
409	61.345	0.153	2.38	104	-0.95	100	85	-0.030	5.13	0.88
410	61.502	0.157	2.38	104	-0.91	103	85	-0.010	5.14	0.89
411	61.653	0.151	2.38	104	-0.95	99	86	-0.030	5.15	0.89
412	61.809	0.156	2.38	104	-0.91	102	86	-0.010	5.18	0.87
413	61.964	0.155	2.38	104	-3.22	101	86	-0.040	5.19	0.85
414	62.117	0.153	2.41	104	-1.88	100	85	-0.030	5.13	0.89
415	62.273	0.156	2.38	104	-3.38	102	85	-0.040	5.20	0.86

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
416	62.426	0.153	2.38	104	-1.95	100	84	-0.020	5.03	0.86
417	62.582	0.156	2.40	104	-0.9	102	85	-0.030	5.19	0.88
418	62.734	0.152	2.38	104	-1.04	99	85	-0.030	5.39	0.87
419	62.891	0.157	2.38	104	-0.87	103	86	-0.040	5.27	0.87
420	63.046	0.155	2.39	104	-0.93	101	86	-0.030	5.34	0.89
421	63.198	0.152	2.38	104	-3.2	99	86	-0.040	5.34	0.86
422	63.356	0.158	2.38	104	-0.86	103	85	-0.030	5.37	0.83
423	63.507	0.151	2.40	104	-3.44	99	85	-0.020	5.38	0.87
424	63.663	0.156	2.39	104	-3.21	102	84	-0.040	5.35	0.86
425	63.818	0.155	2.38	104	-1.78	101	85	-0.040	5.39	0.86
426	63.972	0.154	2.37	104	-2.25	101	85	-0.030	5.31	0.90
427	64.127	0.155	2.38	104	-0.98	101	85	-0.030	5.37	0.88
428	64.280	0.153	2.37	104	-3.3	100	86	-0.030	5.41	0.90
429	64.437	0.157	2.38	104	-0.92	103	86	-0.040	5.39	0.90
430	64.589	0.152	2.39	104	-1.07	99	86	-0.040	5.40	0.88
431	64.744	0.155	2.38	104	-1.47	101	85	-0.030	5.44	0.89
432	64.900	0.156	2.40	104	-1.9	102	84	-0.040	5.29	0.88
433	65.052	0.152	2.39	104	-1.27	99	84	-0.030	5.52	0.89
434	65.209	0.157	2.39	104	-3.32	103	85	-0.040	5.52	0.88
435	65.361	0.152	2.36	104	-2.94	99	85	-0.020	5.44	0.91
436	65.517	0.156	2.40	104	-1.5	102	86	-0.030	5.59	0.89
437	65.671	0.154	2.38	104	-2.78	101	86	-0.020	5.54	0.91
438	65.826	0.155	2.40	104	-1.48	101	86	-0.040	5.51	0.91
439	65.980	0.154	2.37	104	-0.85	101	85	-0.030	5.38	0.90
440	66.133	0.153	2.38	104	-1.16	100	85	-0.040	5.61	0.88
441	66.290	0.157	2.38	104	-2.59	103	85	-0.040	5.42	0.87
442	66.442	0.152	2.39	104	-2.35	99	85	-0.040	5.59	0.85
443	66.598	0.156	2.37	104	-2.43	102	85	-0.040	5.45	0.89
444	66.753	0.155	2.38	104	-0.86	101	86	-0.020	5.29	0.97
445	66.906	0.153	2.38	104	-0.94	100	86	-0.030	5.37	0.95
446	67.061	0.155	2.39	104	-1.2	101	86	-0.020	5.36	0.94
447	67.215	0.154	2.37	104	-3.02	101	86	-0.040	5.34	0.92

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
448	67.371	0.156	2.38	104	-0.93	102	85	-0.030	5.48	0.91
449	67.523	0.152	2.39	104	-0.93	99	85	-0.040	5.37	0.87
450	67.679	0.156	2.38	104	-1.06	102	85	-0.030	5.47	0.86
451	67.834	0.155	2.39	104	-0.95	101	85	-0.040	5.28	0.89
452	67.986	0.152	2.39	104	-3.32	99	85	-0.040	5.43	0.86
453	68.144	0.158	2.38	104	-1.52	103	86	-0.040	5.37	0.86
454	68.296	0.152	2.38	104	-1.19	99	86	-0.040	5.27	0.88
455	68.452	0.156	2.38	104	-1.9	102	86	-0.030	5.42	0.86
456	68.605	0.153	2.38	104	-1.36	100	86	-0.030	5.42	0.82
457	68.761	0.156	2.41	104	-2.28	102	85	-0.030	5.21	0.85
458	68.916	0.155	2.39	104	-3.39	101	85	-0.030	5.25	0.81
459	69.068	0.152	2.38	104	-0.9	99	85	-0.020	5.32	0.80
460	69.226	0.158	2.37	103	-3.13	104	85	-0.030	5.44	0.80
461	69.377	0.151	2.40	103	-0.95	99	86	-0.030	5.36	0.82
462	69.533	0.156	2.39	103	-0.88	102	86	-0.030	5.32	0.80
463	69.688	0.155	2.38	103	-1.66	102	86	-0.040	5.23	0.85
464	69.841	0.153	2.37	103	-1.36	100	86	-0.040	5.31	0.83
465	69.997	0.156	2.39	103	-0.97	102	85	-0.030	5.26	0.83
466	70.150	0.153	2.37	103	-2.88	100	85	-0.030	5.32	0.83
467	70.306	0.156	2.39	103	-1.07	102	85	-0.030	5.35	0.79
468	70.459	0.153	2.39	103	-3.28	100	85	-0.040	5.34	0.79
469	70.614	0.155	2.39	103	-1.02	102	85	-0.030	5.37	0.78
470	70.769	0.155	2.40	103	-1.01	102	86	-0.030	5.33	0.83
471	70.922	0.153	2.38	103	-3.09	100	86	-0.030	5.23	0.81
472	71.079	0.157	2.38	103	-1.95	103	86	-0.030	5.42	0.80
473	71.231	0.152	2.40	103	-1.67	100	86	-0.030	5.40	0.83
474	71.387	0.156	2.39	103	-3.26	102	85	-0.020	5.31	0.83
475	71.542	0.155	2.38	103	-1.75	102	85	-0.050	5.27	0.79
476	71.695	0.153	2.40	103	-2.19	100	85	-0.050	5.37	0.82
477	71.851	0.156	2.40	103	-1.34	102	85	-0.030	5.34	0.82
478	72.004	0.153	2.39	103	-1.08	100	86	-0.030	5.50	0.82
479	72.161	0.157	2.39	103	-2.45	103	86	-0.030	5.38	0.77

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
480	72.313	0.152	2.39	103	-1.2	100	86	-0.020	5.47	0.81
481	72.469	0.156	2.38	103	-1.86	102	86	-0.030	5.56	0.76
482	72.624	0.155	2.39	103	-1.17	102	86	-0.030	5.39	0.76
483	72.776	0.152	2.39	103	-0.9	100	85	-0.030	5.53	0.78
484	72.934	0.158	2.38	103	-3.23	104	85	-0.040	5.40	0.78
485	73.086	0.152	2.40	103	-2.37	100	85	-0.040	5.42	0.83
486	73.241	0.155	2.39	103	-2.11	102	85	-0.030	5.34	0.79
487	73.396	0.155	2.39	103	-1.52	102	86	-0.040	5.48	0.76
488	73.550	0.154	2.39	103	-2.2	101	86	-0.030	5.44	0.79
489	73.706	0.156	2.39	103	-1.31	102	86	-0.030	5.46	0.75
490	73.858	0.152	2.39	103	-0.93	100	86	-0.030	5.58	0.76
491	74.016	0.158	2.40	103	-3.24	104	85	-0.040	5.30	0.78
492	74.167	0.151	2.40	103	-0.92	99	85	-0.040	5.47	0.77
493	74.323	0.156	2.40	103	-1.51	102	85	-0.030	5.51	0.75
494	74.479	0.156	2.38	103	-1.44	102	84	-0.030	5.56	0.76
495	74.631	0.152	2.39	103	-1.34	100	85	-0.050	5.45	0.78
496	74.788	0.157	2.39	103	-1.01	103	86	-0.040	5.45	0.75
497	74.940	0.152	2.38	103	-2.59	100	86	-0.040	5.43	0.79
498	75.096	0.156	2.39	103	-2.17	102	86	-0.040	5.38	0.75
499	75.250	0.154	2.37	103	-1.86	101	86	-0.040	5.49	0.76
500	75.405	0.155	2.39	103	-2.06	102	85	-0.030	5.38	0.79
501	75.560	0.155	2.38	103	-3.28	102	85	-0.020	5.43	0.79
502	75.712	0.152	2.39	103	-2.86	100	84	-0.030	5.32	0.81
503	75.870	0.158	2.39	103	-3.37	104	85	-0.030	5.34	0.76
504	76.021	0.151	2.41	103	-2.27	99	85	-0.030	5.39	0.81
505	76.178	0.157	2.39	103	-3.25	103	86	-0.030	5.51	0.80
506	76.333	0.155	2.39	103	-2.15	102	86	-0.030	5.54	0.79
507	76.486	0.153	2.41	103	-1.39	100	86	-0.030	5.53	0.80
508	76.642	0.156	2.38	103	-1.21	102	86	-0.040	5.43	0.79
509	76.795	0.153	2.40	103	-2.63	100	85	-0.030	5.47	0.79
510	76.951	0.156	2.40	103	-3.23	102	84	-0.030	5.49	0.82
511	77.104	0.153	2.39	103	-3.02	100	85	-0.040	5.43	0.81

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
512	77.260	0.156	2.38	103	-0.92	102	85	-0.040	5.25	0.82
513	77.415	0.155	2.39	103	-1.14	102	85	-0.030	5.32	0.83
514	77.567	0.152	2.39	103	-0.9	100	86	-0.030	5.40	0.86
515	77.725	0.158	2.40	103	-0.94	104	86	-0.030	5.47	0.83
516	77.877	0.152	2.40	103	-0.95	100	86	-0.050	5.27	0.88
517	78.033	0.156	2.39	103	-0.99	102	86	-0.030	5.28	0.85
518	78.188	0.155	2.39	103	-1	102	85	-0.030	5.43	0.82
519	78.342	0.154	2.39	103	-2.95	101	85	-0.030	5.28	0.89
520	78.498	0.156	2.39	103	-0.84	102	85	-0.030	5.44	0.83
521	78.651	0.153	2.40	103	-2.6	100	85	-0.030	5.30	0.83
522	78.808	0.157	2.39	103	-2.13	103	85	-0.040	5.21	0.85
523	78.960	0.152	2.41	103	-0.81	100	86	-0.040	5.30	0.83
524	79.116	0.156	2.39	103	-3.26	102	86	-0.020	5.14	0.83
525	79.272	0.156	2.40	103	-1.02	102	86	-0.030	5.23	0.76
526	79.424	0.152	2.40	103	-3.08	100	85	-0.030	5.24	0.73
527	79.582	0.158	2.40	103	-3.24	104	85	-0.040	5.05	0.75
528	79.734	0.152	2.39	103	-0.96	100	84	-0.040	5.18	0.73
529	79.889	0.155	2.39	103	-3.1	102	85	-0.030	5.19	0.74
530	80.045	0.156	2.39	103	-2.51	102	85	-0.040	5.21	0.70
531	80.199	0.154	2.40	103	-1.51	101	85	-0.030	5.05	0.71
532	80.354	0.155	2.41	103	-0.86	102	86	-0.030	5.40	0.68
533	80.508	0.154	2.39	103	-1.58	101	86	-0.030	5.12	0.69
534	80.664	0.156	2.40	103	-3.13	102	86	-0.040	5.13	0.69
535	80.816	0.152	2.40	103	-3.14	100	86	-0.030	5.21	0.66
536	80.973	0.157	2.41	103	-0.96	103	85	-0.040	5.28	0.69
537	81.128	0.155	2.40	103	-1.76	102	85	-0.030	5.17	0.69
538	81.280	0.152	2.40	103	-0.91	100	85	-0.030	4.97	0.70
539	81.439	0.159	2.39	103	-1.03	104	85	-0.030	5.26	0.70
540	81.591	0.152	2.39	103	-1.21	100	86	-0.030	5.16	0.68
541	81.746	0.155	2.40	104	-2.14	101	86	-0.030	5.08	0.72
542	81.902	0.156	2.39	104	-0.89	102	86	-0.040	5.13	0.74
543	82.056	0.154	2.40	104	-1.39	101	86	-0.030	5.13	0.70

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
544	82.212	0.156	2.41	104	-0.92	102	85	-0.040	5.07	0.69
545	82.365	0.153	2.40	104	-3.13	100	85	-0.040	5.08	0.71
546	82.522	0.157	2.39	104	-1.65	103	84	-0.040	5.06	0.71
547	82.674	0.152	2.40	104	-1.29	99	85	-0.040	5.14	0.69
548	82.831	0.157	2.39	104	-1.97	103	85	-0.030	5.20	0.69
549	82.986	0.155	2.40	104	-0.84	101	86	-0.030	5.17	0.69
550	83.138	0.152	2.40	104	-3.14	99	86	-0.030	5.01	0.72
551	83.296	0.158	2.40	104	-1.21	103	86	-0.050	5.12	0.71
552	83.448	0.152	2.40	104	-2.39	99	86	-0.020	5.07	0.81
553	83.604	0.156	2.39	104	-2.62	102	85	-0.040	5.12	0.78
554	83.759	0.155	2.40	104	-1.58	101	84	-0.030	5.09	0.77
555	83.913	0.154	2.38	104	-0.84	101	84	-0.030	4.94	0.81
556	84.069	0.156	2.40	104	-1.16	102	85	-0.030	4.87	0.75
557	84.223	0.154	2.40	104	-2.18	101	85	-0.020	4.76	0.76
558	84.379	0.156	2.41	104	-3.23	102	86	-0.020	4.75	0.76
559	84.532	0.153	2.41	104	-0.97	100	86	-0.030	4.80	0.77
560	84.688	0.156	2.40	104	-0.9	102	86	-0.010	4.81	0.77
561	84.844	0.156	2.41	104	-1.49	102	86	-0.040	4.86	0.76
562	84.996	0.152	2.39	104	-1.09	99	85	-0.030	4.84	0.75
563	85.154	0.158	2.38	104	-2.71	103	85	-0.040	4.72	0.79
564	85.306	0.152	2.42	104	-3.24	99	84	-0.030	4.91	0.75
565	85.462	0.156	2.40	104	-1.05	102	85	-0.030	4.83	0.76
566	85.618	0.156	2.39	104	-3.41	102	85	-0.030	4.89	0.75
567	85.771	0.153	2.41	104	-2.47	100	86	-0.040	4.73	0.79
568	85.928	0.157	2.40	104	-2.15	103	86	-0.040	4.91	0.76
569	86.081	0.153	2.40	104	-3.31	100	86	-0.030	4.81	0.76
570	86.238	0.157	2.40	104	-1.29	103	86	-0.030	4.83	0.74
571	86.391	0.153	2.40	104	-2.99	100	85	-0.040	4.83	0.76
572	86.547	0.156	2.40	104	-3.38	102	85	-0.040	4.79	0.72
573	86.702	0.155	2.40	104	-2.67	101	84	-0.040	4.70	0.73
Avg/Tot	86.702	0.151	2.29	102	-2.01	100			6.70	0.74

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	515	472	255	521	341	420.8	N/A
1	514	470	275	513	343	423.0	N/A
2	512	467	288	546	343	431.2	N/A
3	508	465	298	605	344	444.0	N/A
4	503	460	308	666	345	456.4	N/A
5	499	456	317	719	345	467.2	N/A
6	494	455	327	754	347	475.4	N/A
7	492	453	338	768	347	479.6	N/A
8	489	452	346	781	348	483.2	N/A
9	487	451	355	794	348	487.0	N/A
10	484	449	363	798	348	488.4	N/A
11	483	449	370	805	349	491.2	N/A
12	481	449	379	813	349	494.2	N/A
13	479	449	386	815	349	495.6	N/A
14	478	448	392	817	349	496.8	N/A
15	478	448	399	814	349	497.6	N/A
16	477	448	404	814	349	498.4	N/A
17	476	448	409	810	348	498.2	N/A
18	476	447	412	806	348	497.8	N/A
19	475	446	415	796	347	495.8	N/A
20	474	443	417	787	347	493.6	N/A
21	473	441	417	777	346	490.8	N/A
22	472	439	418	767	345	488.2	N/A
23	471	436	417	761	344	485.8	N/A
24	469	433	415	752	343	482.4	N/A
25	467	430	413	744	342	479.2	N/A
26	465	426	410	739	341	476.2	N/A
27	463	423	408	733	340	473.4	N/A
28	460	419	405	727	339	470.0	N/A
29	457	416	402	723	337	467.0	N/A
30	454	413	400	718	335	464.0	N/A
31	451	409	356	714	334	452.8	N/A
32	447	407	337	710	333	446.8	N/A
33	444	405	322	705	331	441.4	N/A
34	441	403	306	701	330	436.2	N/A
35	438	401	296	695	328	431.6	N/A
36	435	400	287	690	327	427.8	N/A
37	432	399	281	685	325	424.4	N/A
38	429	397	276	684	323	421.8	N/A
39	426	395	270	680	322	418.6	N/A
40	423	395	266	677	320	416.2	N/A
41	421	394	263	678	319	415.0	N/A
42	418	392	260	678	317	413.0	N/A
43	415	391	257	676	315	410.8	N/A
44	413	391	255	676	314	409.8	N/A
45	411	390	254	676	312	408.6	N/A
46	409	389	253	674	310	407.0	N/A
47	408	388	251	676	309	406.4	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	406	387	251	675	307	405.2	N/A
49	405	386	249	673	306	403.8	N/A
50	404	385	248	673	304	402.8	N/A
51	403	384	247	673	303	402.0	N/A
52	402	383	246	675	301	401.4	N/A
53	401	383	245	677	300	401.2	N/A
54	401	382	247	681	299	402.0	N/A
55	400	382	246	679	297	400.8	N/A
56	400	381	247	680	296	400.8	N/A
57	400	380	247	679	295	400.2	N/A
58	400	380	247	680	294	400.2	N/A
59	401	379	245	677	292	398.8	N/A
60	402	378	247	677	291	399.0	N/A
61	403	378	245	675	290	398.2	N/A
62	404	377	246	675	289	398.2	N/A
63	404	376	247	673	288	397.6	N/A
64	405	376	248	672	286	397.4	N/A
65	405	376	247	670	286	396.8	N/A
66	406	375	248	668	284	396.2	N/A
67	406	375	248	668	283	396.0	N/A
68	406	375	247	664	282	394.8	N/A
69	407	375	248	661	281	394.4	N/A
70	407	375	247	659	281	393.8	N/A
71	407	375	248	655	280	393.0	N/A
72	406	376	248	653	279	392.4	N/A
73	406	375	248	651	278	391.6	N/A
74	406	375	248	650	277	391.2	N/A
75	406	377	247	646	276	390.4	N/A
76	405	377	247	645	276	390.0	N/A
77	405	377	247	644	275	389.6	N/A
78	405	377	249	643	274	389.6	N/A
79	405	378	249	641	274	389.4	N/A
80	405	379	249	642	273	389.6	N/A
81	405	379	249	639	273	389.0	N/A
82	405	380	249	636	272	388.4	N/A
83	405	381	251	636	272	389.0	N/A
84	405	382	250	635	271	388.6	N/A
85	406	382	253	634	271	389.2	N/A
86	406	383	254	631	270	388.8	N/A
87	406	384	253	631	270	388.8	N/A
88	406	385	251	628	270	388.0	N/A
89	406	387	250	627	269	387.8	N/A
90	406	387	251	625	269	387.6	N/A
91	406	387	251	624	269	387.4	N/A
92	406	388	249	626	268	387.4	N/A
93	406	389	253	626	268	388.4	N/A
94	406	389	255	626	268	388.8	N/A
95	406	390	254	628	268	389.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	407	391	255	629	267	389.8	N/A
97	407	393	258	636	267	392.2	N/A
98	408	393	260	643	267	394.2	N/A
99	409	395	262	643	267	395.2	N/A
100	409	397	266	642	266	396.0	N/A
101	410	399	265	642	266	396.4	N/A
102	410	400	267	636	266	395.8	N/A
103	411	403	268	636	266	396.8	N/A
104	410	403	268	628	265	394.8	N/A
105	410	405	269	621	265	394.0	N/A
106	410	405	270	618	265	393.6	N/A
107	410	406	268	611	265	392.0	N/A
108	409	406	267	605	264	390.2	N/A
109	409	405	270	598	264	389.2	N/A
110	408	405	267	592	264	387.2	N/A
111	408	405	266	586	264	385.8	N/A
112	407	402	266	578	263	383.2	N/A
113	406	402	266	574	263	382.2	N/A
114	405	402	263	567	263	380.0	N/A
115	404	399	262	562	263	378.0	N/A
116	404	398	260	556	262	376.0	N/A
117	402	397	262	551	262	374.8	N/A
118	401	395	261	547	262	373.2	N/A
119	401	395	258	541	262	371.4	N/A
120	399	393	260	537	262	370.2	N/A
121	398	391	259	534	261	368.6	N/A
122	397	390	258	528	261	366.8	N/A
123	396	388	260	528	261	366.6	N/A
124	395	387	259	523	261	365.0	N/A
125	394	387	259	519	261	364.0	N/A
126	393	385	259	516	261	362.8	N/A
127	392	385	258	515	261	362.2	N/A
128	392	384	259	512	260	361.4	N/A
129	391	384	258	511	260	360.8	N/A
130	391	383	259	508	260	360.2	N/A
131	390	381	260	507	260	359.6	N/A
132	390	381	259	504	260	358.8	N/A
133	390	380	259	503	260	358.4	N/A
134	389	378	259	502	260	357.6	N/A
135	389	377	260	499	260	357.0	N/A
136	389	376	259	496	260	356.0	N/A
137	388	376	259	491	260	354.8	N/A
138	387	373	255	487	260	352.4	N/A
139	386	372	256	483	260	351.4	N/A
140	385	370	254	480	260	349.8	N/A
141	384	368	255	477	259	348.6	N/A
142	383	367	251	473	259	346.6	N/A
143	381	365	252	469	259	345.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	380	364	250	467	259	344.0	N/A
145	378	362	248	463	259	342.0	N/A
146	377	360	245	460	259	340.2	N/A
147	376	359	245	458	259	339.4	N/A
148	375	358	244	455	259	338.2	N/A
149	374	357	243	452	259	337.0	N/A
150	373	355	243	452	259	336.4	N/A
151	372	355	242	451	259	335.8	N/A
152	372	354	243	447	259	335.0	N/A
153	371	353	241	447	259	334.2	N/A
154	370	352	241	445	259	333.4	N/A
155	370	352	240	443	259	332.8	N/A
156	369	351	241	442	259	332.4	N/A
157	369	351	240	441	259	332.0	N/A
158	368	350	240	442	259	331.8	N/A
159	368	349	239	440	259	331.0	N/A
160	367	348	239	438	259	330.2	N/A
161	367	348	238	436	260	329.8	N/A
162	366	348	240	439	260	330.6	N/A
163	366	346	238	435	260	329.0	N/A
164	365	346	239	435	260	329.0	N/A
165	365	346	239	434	261	329.0	N/A
166	364	345	239	435	261	328.8	N/A
167	364	345	237	433	261	328.0	N/A
168	364	345	237	430	261	327.4	N/A
169	363	344	235	430	262	326.8	N/A
170	363	343	234	428	262	326.0	N/A
171	362	343	233	424	262	324.8	N/A
172	360	342	230	421	262	323.0	N/A
173	359	341	227	414	263	320.8	N/A
174	357	340	223	410	263	318.6	N/A
175	356	338	220	405	263	316.4	N/A
176	354	337	216	398	263	313.6	N/A
177	351	335	215	395	263	311.8	N/A
178	349	333	211	389	263	309.0	N/A
179	347	332	209	385	264	307.4	N/A
180	346	330	206	380	264	305.2	N/A
181	344	328	204	376	264	303.2	N/A
182	342	327	202	372	264	301.4	N/A
183	340	325	200	367	264	299.2	N/A
184	339	324	198	362	265	297.6	N/A
185	337	322	196	360	265	296.0	N/A
186	336	320	195	356	265	294.4	N/A
187	335	318	194	352	265	292.8	N/A
188	333	317	191	348	265	290.8	N/A
189	332	315	191	345	265	289.6	N/A
190	330	314	189	343	266	288.4	N/A
191	329	313	189	341	266	287.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	328	312	189	340	266	287.0	N/A
193	327	311	189	339	266	286.4	N/A
194	326	310	190	340	267	286.6	N/A
195	326	310	192	340	267	287.0	N/A
196	325	310	193	340	267	287.0	N/A
197	325	311	195	342	268	288.2	N/A
198	325	311	197	343	268	288.8	N/A
199	325	311	199	344	268	289.4	N/A
200	325	313	199	343	269	289.8	N/A
201	325	313	201	346	269	290.8	N/A
202	326	314	203	347	269	291.8	N/A
203	326	315	203	348	270	292.4	N/A
204	326	315	200	346	270	291.4	N/A
205	325	315	199	347	270	291.2	N/A
206	325	315	197	347	270	290.8	N/A
207	324	315	197	345	271	290.4	N/A
208	324	314	194	345	271	289.6	N/A
209	323	314	193	343	271	288.8	N/A
210	322	313	193	343	271	288.4	N/A
211	322	313	190	340	271	287.2	N/A
212	321	313	189	339	271	286.6	N/A
213	320	312	187	337	271	285.4	N/A
214	320	311	187	335	272	285.0	N/A
215	320	310	186	335	272	284.6	N/A
216	319	310	186	334	272	284.2	N/A
217	319	309	185	332	272	283.4	N/A
218	318	309	184	330	272	282.6	N/A
219	318	308	183	328	272	281.8	N/A
220	318	308	183	328	272	281.8	N/A
221	318	307	182	326	272	281.0	N/A
222	318	306	181	326	273	280.8	N/A
223	317	306	180	323	273	279.8	N/A
224	317	305	180	321	273	279.2	N/A
225	317	304	180	321	273	279.0	N/A
226	317	305	178	319	273	278.4	N/A
227	317	304	178	319	274	278.4	N/A
228	317	304	178	317	274	278.0	N/A
229	316	303	178	317	274	277.6	N/A
230	317	303	178	315	274	277.4	N/A
231	317	303	177	315	275	277.4	N/A
232	316	303	177	314	275	277.0	N/A
233	317	302	177	313	275	276.8	N/A
234	317	302	176	311	276	276.4	N/A
235	316	303	177	311	276	276.6	N/A
236	316	302	176	311	276	276.2	N/A
237	316	302	176	311	277	276.4	N/A
238	316	303	176	309	277	276.2	N/A
239	316	302	176	309	278	276.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	317	302	176	308	278	276.2	N/A
241	317	302	176	306	278	275.8	N/A
242	317	302	176	307	279	276.2	N/A
243	317	302	176	306	279	276.0	N/A
244	317	302	176	306	280	276.2	N/A
245	317	302	176	305	280	276.0	N/A
246	317	302	177	305	281	276.4	N/A
247	317	302	176	304	281	276.0	N/A
248	318	301	177	304	282	276.4	N/A
249	317	301	176	304	282	276.0	N/A
250	318	302	177	305	283	277.0	N/A
251	318	301	178	305	283	277.0	N/A
252	318	302	178	306	284	277.6	N/A
253	318	302	178	307	285	278.0	N/A
254	319	302	179	308	285	278.6	N/A
255	320	302	180	308	286	279.2	N/A
256	320	303	181	309	286	279.8	N/A
257	320	304	182	309	287	280.4	N/A
258	321	304	183	309	288	281.0	N/A
259	322	305	184	311	288	282.0	N/A
260	322	306	186	311	289	282.8	N/A
261	323	306	188	312	290	283.8	N/A
262	323	307	189	313	291	284.6	N/A
263	324	308	192	314	291	285.8	N/A
264	324	309	193	315	292	286.6	N/A
265	325	310	194	316	293	287.6	N/A
266	325	311	197	317	293	288.6	N/A
267	326	311	198	318	294	289.4	N/A
268	327	312	199	321	295	290.8	N/A
269	327	312	201	319	296	291.0	N/A
270	327	313	201	321	296	291.6	N/A
271	327	314	202	322	297	292.4	N/A
272	328	314	202	322	298	292.8	N/A
273	328	315	202	322	299	293.2	N/A
274	328	314	202	322	300	293.2	N/A
275	328	315	202	321	300	293.2	N/A
276	329	315	202	320	301	293.4	N/A
277	328	315	201	320	302	293.2	N/A
278	328	314	200	320	302	292.8	N/A
279	328	314	201	319	303	293.0	N/A
280	328	314	199	317	303	292.2	N/A
281	328	313	199	316	304	292.0	N/A
282	328	313	199	315	304	291.8	N/A
283	327	313	198	315	304	291.4	N/A
284	328	312	196	313	305	290.8	N/A
285	327	312	197	311	305	290.4	N/A
286	327	312	196	311	305	290.2	N/A
287	327	311	196	310	305	289.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
288	327	310	195	309	305	289.2	N/A
289	327	311	196	308	305	289.4	N/A
290	327	310	193	308	305	288.6	N/A
291	327	310	193	307	305	288.4	N/A
292	326	309	193	306	305	287.8	N/A
293	326	309	192	306	305	287.6	N/A
294	327	309	193	304	305	287.6	N/A
295	326	308	192	302	304	286.4	N/A
296	326	308	192	302	304	286.4	N/A
297	326	308	191	300	304	285.8	N/A
298	325	307	191	301	304	285.6	N/A
299	325	307	189	298	304	284.6	N/A
300	325	307	189	299	303	284.6	N/A
301	325	307	188	298	303	284.2	N/A
302	325	306	187	298	303	283.8	N/A
303	324	306	186	297	302	283.0	N/A
304	324	305	185	297	302	282.6	N/A
305	324	305	185	296	302	282.4	N/A
306	323	305	184	295	302	281.8	N/A
307	323	304	183	294	302	281.2	N/A
308	322	303	183	293	301	280.4	N/A
309	322	304	182	292	301	280.2	N/A
310	322	303	183	290	301	279.8	N/A
311	322	303	182	291	300	279.6	N/A
312	322	303	182	290	300	279.4	N/A
313	321	302	183	290	300	279.2	N/A
314	321	303	184	290	299	279.4	N/A
315	321	302	185	291	299	279.6	N/A
316	321	302	183	289	299	278.8	N/A
317	321	302	184	288	298	278.6	N/A
318	320	302	184	289	298	278.6	N/A
319	320	302	184	289	298	278.6	N/A
320	320	302	185	289	298	278.8	N/A
321	319	302	184	290	297	278.4	N/A
322	320	301	184	288	297	278.0	N/A
323	319	300	185	289	297	278.0	N/A
324	319	301	185	288	297	278.0	N/A
325	319	301	185	288	297	278.0	N/A
326	319	301	186	288	297	278.2	N/A
327	318	300	185	287	297	277.4	N/A
328	318	301	185	287	297	277.6	N/A
329	318	300	185	286	297	277.2	N/A
330	318	300	185	287	297	277.4	N/A
331	318	300	185	287	297	277.4	N/A
332	318	300	185	288	296	277.4	N/A
333	317	300	186	287	296	277.2	N/A
334	317	299	186	286	296	276.8	N/A
335	318	299	186	286	296	277.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
336	317	299	185	285	297	276.6	N/A
337	318	298	185	285	297	276.6	N/A
338	317	299	185	286	296	276.6	N/A
339	317	298	186	285	297	276.6	N/A
340	317	299	187	285	297	277.0	N/A
341	317	298	186	285	297	276.6	N/A
342	316	298	186	284	297	276.2	N/A
343	316	298	186	284	297	276.2	N/A
344	317	297	186	284	297	276.2	N/A
345	316	298	186	283	297	276.0	N/A
346	317	297	187	284	297	276.4	N/A
347	316	297	187	284	297	276.2	N/A
348	316	297	187	282	297	275.8	N/A
349	316	297	187	283	297	276.0	N/A
350	317	297	187	283	297	276.2	N/A
351	316	296	187	282	298	275.8	N/A
352	316	297	186	282	298	275.8	N/A
353	316	297	187	282	298	276.0	N/A
354	316	296	186	281	298	275.4	N/A
355	316	296	187	283	298	276.0	N/A
356	316	296	188	282	298	276.0	N/A
357	316	295	187	282	298	275.6	N/A
358	316	296	188	281	298	275.8	N/A
359	316	296	188	281	298	275.8	N/A
360	316	296	188	281	298	275.8	N/A
361	316	296	188	281	298	275.8	N/A
362	316	295	187	282	299	275.8	N/A
363	316	295	188	280	299	275.6	N/A
364	316	294	188	281	299	275.6	N/A
365	317	296	188	280	299	276.0	N/A
366	316	295	189	280	299	275.8	N/A
367	317	295	188	280	299	275.8	N/A
368	317	296	188	280	299	276.0	N/A
369	316	295	188	280	299	275.6	N/A
370	316	295	188	279	299	275.4	N/A
371	316	295	188	279	299	275.4	N/A
372	316	295	188	280	300	275.8	N/A
373	316	295	188	278	300	275.4	N/A
374	316	295	189	279	300	275.8	N/A
375	316	295	189	278	300	275.6	N/A
376	316	295	189	278	300	275.6	N/A
377	316	296	189	277	300	275.6	N/A
378	316	295	189	278	300	275.6	N/A
379	316	295	189	278	301	275.8	N/A
380	316	295	189	279	301	276.0	N/A
381	316	295	190	278	301	276.0	N/A
382	315	295	190	278	301	275.8	N/A
383	315	295	191	278	301	276.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
384	315	296	190	278	301	276.0	N/A
385	314	295	190	277	302	275.6	N/A
386	314	295	190	277	302	275.6	N/A
387	313	296	190	278	302	275.8	N/A
388	313	295	190	278	302	275.6	N/A
389	312	295	191	278	303	275.8	N/A
390	312	295	191	277	303	275.6	N/A
391	311	296	191	277	303	275.6	N/A
392	311	296	190	278	303	275.6	N/A
393	310	295	191	278	304	275.6	N/A
394	310	296	191	277	304	275.6	N/A
395	309	295	191	277	304	275.2	N/A
396	308	296	191	277	304	275.2	N/A
397	308	296	191	277	305	275.4	N/A
398	308	296	192	277	305	275.6	N/A
399	308	296	192	278	305	275.8	N/A
400	307	296	192	277	305	275.4	N/A
401	307	296	192	277	305	275.4	N/A
402	306	296	191	277	306	275.2	N/A
403	306	295	193	276	306	275.2	N/A
404	306	295	193	276	306	275.2	N/A
405	305	296	192	277	306	275.2	N/A
406	305	296	192	277	306	275.2	N/A
407	305	297	193	277	306	275.6	N/A
408	305	296	193	277	306	275.4	N/A
409	304	296	193	277	306	275.2	N/A
410	304	296	193	276	306	275.0	N/A
411	304	295	192	277	306	274.8	N/A
412	304	295	192	276	306	274.6	N/A
413	304	296	192	277	306	275.0	N/A
414	304	296	192	277	306	275.0	N/A
415	304	296	193	276	306	275.0	N/A
416	304	296	193	276	306	275.0	N/A
417	303	296	194	277	306	275.2	N/A
418	303	296	193	277	306	275.0	N/A
419	303	296	194	276	306	275.0	N/A
420	303	296	194	277	306	275.2	N/A
421	303	296	195	278	306	275.6	N/A
422	303	296	196	278	307	276.0	N/A
423	303	297	196	279	307	276.4	N/A
424	303	297	196	279	307	276.4	N/A
425	303	298	198	279	307	277.0	N/A
426	303	297	198	279	307	276.8	N/A
427	303	298	198	279	307	277.0	N/A
428	303	298	199	279	307	277.2	N/A
429	302	299	199	280	307	277.4	N/A
430	302	298	201	281	307	277.8	N/A
431	302	300	201	281	307	278.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
432	303	300	201	282	307	278.6	N/A
433	303	300	202	282	307	278.8	N/A
434	303	301	203	284	307	279.6	N/A
435	303	302	204	283	307	279.8	N/A
436	303	301	203	283	307	279.4	N/A
437	303	303	204	285	307	280.4	N/A
438	303	304	204	287	307	281.0	N/A
439	303	304	205	287	308	281.4	N/A
440	304	305	206	287	308	282.0	N/A
441	303	305	207	288	308	282.2	N/A
442	304	306	206	289	308	282.6	N/A
443	304	307	206	290	308	283.0	N/A
444	305	307	207	289	308	283.2	N/A
445	304	307	208	289	308	283.2	N/A
446	305	308	208	291	308	284.0	N/A
447	305	309	208	291	308	284.2	N/A
448	305	309	208	291	308	284.2	N/A
449	305	309	208	291	309	284.4	N/A
450	305	309	208	291	309	284.4	N/A
451	306	310	208	291	309	284.8	N/A
452	306	310	208	291	309	284.8	N/A
453	306	310	208	290	309	284.6	N/A
454	306	311	207	293	309	285.2	N/A
455	306	310	208	291	309	284.8	N/A
456	307	310	207	292	310	285.2	N/A
457	307	311	208	291	310	285.4	N/A
458	307	311	208	290	310	285.2	N/A
459	307	311	208	291	310	285.4	N/A
460	307	311	208	291	310	285.4	N/A
461	308	311	208	290	310	285.4	N/A
462	308	310	207	289	310	284.8	N/A
463	308	311	208	290	310	285.4	N/A
464	308	311	207	291	311	285.6	N/A
465	308	311	209	290	311	285.8	N/A
466	308	311	208	289	311	285.4	N/A
467	308	311	209	290	311	285.8	N/A
468	308	311	209	291	311	286.0	N/A
469	309	311	208	290	311	285.8	N/A
470	309	311	208	290	311	285.8	N/A
471	309	310	208	289	311	285.4	N/A
472	309	311	207	290	311	285.6	N/A
473	309	310	208	290	312	285.8	N/A
474	309	310	208	290	312	285.8	N/A
475	309	308	208	291	311	285.4	N/A
476	310	310	208	291	311	286.0	N/A
477	310	309	208	290	311	285.6	N/A
478	310	311	208	290	312	286.2	N/A
479	310	310	208	290	311	285.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
480	310	310	208	291	312	286.2	N/A
481	310	308	209	290	311	285.6	N/A
482	310	309	210	290	311	286.0	N/A
483	311	309	210	290	311	286.2	N/A
484	311	308	211	290	311	286.2	N/A
485	311	309	211	291	311	286.6	N/A
486	312	309	212	290	311	286.8	N/A
487	312	309	211	290	311	286.6	N/A
488	312	309	212	291	311	287.0	N/A
489	312	309	212	291	311	287.0	N/A
490	312	309	214	291	311	287.4	N/A
491	313	310	213	292	311	287.8	N/A
492	313	310	214	292	311	288.0	N/A
493	314	310	214	291	311	288.0	N/A
494	314	310	214	291	311	288.0	N/A
495	314	310	215	290	311	288.0	N/A
496	315	311	214	291	311	288.4	N/A
497	314	311	215	290	311	288.2	N/A
498	315	310	213	292	311	288.2	N/A
499	315	311	215	291	311	288.6	N/A
500	315	310	215	291	311	288.4	N/A
501	316	311	215	290	310	288.4	N/A
502	316	312	215	290	310	288.6	N/A
503	316	312	214	291	310	288.6	N/A
504	316	313	215	290	310	288.8	N/A
505	317	313	214	291	310	289.0	N/A
506	317	312	216	291	310	289.2	N/A
507	317	313	214	291	310	289.0	N/A
508	317	314	213	291	310	289.0	N/A
509	317	313	214	291	310	289.0	N/A
510	318	314	215	291	310	289.6	N/A
511	318	314	215	292	309	289.6	N/A
512	318	314	214	292	309	289.4	N/A
513	318	315	213	292	309	289.4	N/A
514	319	315	214	293	309	290.0	N/A
515	319	316	214	291	309	289.8	N/A
516	319	316	214	293	309	290.2	N/A
517	319	316	214	291	308	289.6	N/A
518	319	316	215	292	308	290.0	N/A
519	320	317	215	291	308	290.2	N/A
520	320	317	215	291	308	290.2	N/A
521	319	316	215	291	307	289.6	N/A
522	320	317	214	291	307	289.8	N/A
523	320	317	215	291	307	290.0	N/A
524	320	317	214	291	307	289.8	N/A
525	320	318	215	290	307	290.0	N/A
526	320	318	214	290	307	289.8	N/A
527	320	317	213	291	307	289.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 2

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/27/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
528	320	316	214	290	306	289.2	N/A
529	320	316	214	289	306	289.0	N/A
530	320	318	215	290	306	289.8	N/A
531	320	317	214	291	306	289.6	N/A
532	320	317	216	290	305	289.6	N/A
533	319	318	215	289	305	289.2	N/A
534	320	318	215	289	306	289.6	N/A
535	320	317	215	290	305	289.4	N/A
536	320	317	216	289	305	289.4	N/A
537	319	317	217	289	305	289.4	N/A
538	320	315	216	290	305	289.2	N/A
539	319	317	216	290	305	289.4	N/A
540	319	317	217	289	304	289.2	N/A
541	319	317	216	289	304	289.0	N/A
542	319	317	217	288	304	289.0	N/A
543	319	317	216	289	304	289.0	N/A
544	318	316	217	290	304	289.0	N/A
545	318	315	218	289	304	288.8	N/A
546	318	316	218	288	304	288.8	N/A
547	317	315	217	289	303	288.2	N/A
548	317	315	216	289	303	288.0	N/A
549	317	316	218	289	303	288.6	N/A
550	317	314	216	289	303	287.8	N/A
551	317	316	217	288	303	288.2	N/A
552	317	315	215	288	303	287.6	N/A
553	317	315	216	288	303	287.8	N/A
554	317	315	215	287	303	287.4	N/A
555	317	314	215	288	303	287.4	N/A
556	317	314	215	287	302	287.0	N/A
557	316	314	213	288	302	286.6	N/A
558	316	314	213	288	302	286.6	N/A
559	316	314	211	287	302	286.0	N/A
560	316	315	210	285	302	285.6	N/A
561	316	313	209	285	302	285.0	N/A
562	316	313	209	285	302	285.0	N/A
563	316	310	209	285	302	284.4	N/A
564	315	311	208	284	302	284.0	N/A
565	315	312	207	285	301	284.0	N/A
566	316	311	206	284	301	283.6	N/A
567	315	311	206	284	301	283.4	N/A
568	315	311	206	282	301	283.0	N/A
569	315	311	206	283	301	283.2	N/A
570	315	311	204	283	301	282.8	N/A
571	315	308	205	283	301	282.4	N/A
572	314	309	204	282	301	282.0	N/A
573	314	309	205	282	300	282.0	N/A
Average	346	332	221	393	294	317	N/A

LAB SAMPLE DATA - ASTM E2515

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 2
Technician: SJB
Date: 2/27/2019

TRAIN A (1st Hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T114	90.7	88.3	2.4
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. O-Ring catch*	O-Ring				0.0

Sub-Total	Total Particulate, mg:	2.4

TRAIN A (Post 1st hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T115	190.3	89.3	11.7
B. Rear filter catch	Filter	T116		89.3	
C. Probe catch*	Probe	8A	116824.2	116824.1	0.1
D. O-Ring catch*	O-Ring	8A	3547.2	3547.0	0.2

Sub-Total	Total Particulate, mg:	12.0
Train A Aggregate	Total Particulate, mg:	**14.4**

TRAIN B

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T117, T120	275.5	180.1	13.2
B. Rear filter catch	Filter	T118		82.2	
C. Probe catch*	Probe	8B	116826.0	116826.1	0.0
D. O-Ring catch*	O-Ring	8B	3581.1	3580.3	0.8

Total Particulate, mg:	**14.0**

AMBIENT

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Filter catch*	Filter	T119	92.0	91.9	0.1

Total Particulate, mg:	**0.1**

*Particulate catch that results in a negative number, is assumed to be zero for probes and O-rings, negative numbers for filters are assumed to be part of the O-Ring weight.

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 2 Test Date: 2/27/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: 9:25
Air Control Setting: Fully Open

Time	Notes
N/A	Low fire test done as a continuation of the Run 1 High Fire Test, See Run 1 notes for more detail

Test Notes
Test Burn Start Time: 11:38
Air Control Setting: Fully Closed

Time	Notes
0 min	@3.9 lbs, leveled coal bed, turned off fan, zeroed scale and loaded low fire fuel load, door open 1 minute
5 min	Set air to medium test setting
14 min	Set air to low fire test setting
30 min	Fan turned on low (30 minutes after fuel loading) per manufacturer's instructions
60 min	Changed 1-hour filter on Train A
157 min	Changed front filter on Trian B due to plugging
573 min	End of Test

Test Burn End Time: 21:11

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 16.93 CO (%): 4.330
Mid Gas CO_2 (%): 10.00 CO (%): 2.51

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	9:05	9:09	9:07	2/28 – 6:57	2/28 – 6:54	2/28 – 6:59
CO_2	0.00	10.06	16.93	0.02	10.15	17.13
CO	0.000	2.492	4.330	0.000	2.512	4.371

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature: Date: 2/28/2019

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 2 Test Date: 2/27/2019

Test Photos

Kindling Fuel Load

Start-up Fuel Load

High Fire Fuel Load

Residual Start-up Fuel Coal Bed

Technician Signature: Date: 2/28/2019

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 2 Test Date: 2/27/2019

High Fire Fuel Loaded

Residual High Fire Load Coal Bed

Low Fire Fuel Load

Low Fire Fuel Loaded

Technician Signature: Date: 2/28/2019

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 3 Data Summary

Client:	FPI
Model:	F2450
Job #:	19-460
Tracking #:	0022
Test Date:	2/28/2019

3/5/2019

Techician Signature — Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

Burn Rate (kg/hr):	1.17

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	59.776	73.736	72.329	8.861
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.12			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10723.6			
Average Gas Meter Temperature (°F)	71.7	97.5	96.6	82.9
Total Sample Volume (dscf)	59.381	70.595	69.068	8.711
Average Tunnel Temperature (°F)	90.4			
Total Time of Test (min)	490			
Total Particulate Catch (mg)	0.1	6.4	6.3	4.6
Particulate Concentration, dry-standard (g/dscf)	0.0000017	0.0000907	0.0000912	0.0005281
Total PM Emissions (g)	0.15	7.79	7.84	5.65
Particulate Emission Rate (g/hr)	0.02	0.95	0.96	5.65
Emissions Factor (g/kg)	-	0.81	0.82	-
Difference from Average Total Particulate Emissions (g)	-	0.02	0.02	-
Difference from Average Emissions Factor (g/kg)	-	0.00	0.00	-

Final Average Results	
Total Particulate Emissions (g)	7.82
Particulate Emission Rate (g/hr)	0.96
Emissions Factor (g/kg)	0.81
HHV Efficiency (%)	73.7%
LHV Efficiency (%)	78.9%
CO Emissions (g/min)	1.37

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	>80 °F, <90 °F	Min: 81 / Max: 87	OK
Face Velocity	< 30 ft/min	8.6	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min: 69 / Max: 74	OK
Negative Probe Weight Evaluation	<5% of Total Catch	-3.2%	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	FPI
Model:	F2450
Date:	02/28/19
Run:	3
Control #:	19-460
Test Duration:	490
Output Category:	Medium

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	73.7%	78.9%
Combustion Efficiency	95.3%	95.3%
Heat Transfer Efficiency	77.4%	82.7%

Output Rate (kJ/h)	17,294	16,405	**(Btu/h)**
Burn Rate (kg/h)	1.17	2.59	**(lb/h)**
Input (kJ/h)	23,450	22,244	**(Btu/h)**

Test Load Weight (dry kg)	9.59	21.15	**dry lb**
MC wet (%)	18.35		
MC dry (%)	22.48		
Particulate (g)	7.82		
CO (g)	669		
Test Duration (h)	8.17		

Emissions	**Particulate**	**CO**
g/MJ Output	0.06	4.74
g/kg Dry Fuel	0.81	69.72
g/h	0.96	81.91
g/min	0.02	1.37
lb/MM Btu Output	0.13	11.01

Air/Fuel Ratio (A/F)	17.02

VERSION: **2.2** **12/14/2009**

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 3
Technician: SJB
Date: 2/28/2019

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.24		
Target Load Weight (lbs):	22.40		
Total Load Weight Range (lbs):	21.30	to	23.50
Core Load Weight Range (lbs):	10.10	to	14.60
Remainder Load Weight Range (lbs):	7.80	to	12.30
Core Load Piece Range (lbs):	3.40	to	5.60
Remainder Load Piece Range (lbs):	2.20	to	12.30
Max Allowable Kindling Weight (lbs):	4.33		
Max Allowable Start-up Fuel Weight (lbs):	6.49		

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	4.56	In Range	25.9	27.8	27.8	27.2	In Range	3.59	1.63
2	17.00	4.08	In Range	23.6	26.1	20.8	23.5	In Range	3.30	1.50
3	17.00	4.54	In Range	26.1	25.0	24.1	25.1	In Range	3.63	1.65
Core Load Wt. (lbs)		13.18	In Range							

REMAINDER LOAD DATA (1 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	3.40	In Range	25.0	27.4	25.0	25.8	In Range	2.70	1.23
2	17.00	2.71	In Range	21.0	21.3	20.8	21.0	In Range	2.24	1.02
3	17.00	2.34	In Range	24.2	22.4	20.9	22.5	In Range	1.91	0.87
Remainder Load (lbs)		8.45	In Range							

Total Load Weight (lbs):	21.63	In Range	
Core Load % of Total Weight:	61%	In Range	45-65%
Remainder % of Total Weight:	39%	In Range	35-55%
Total Load % of Target Weight:	97%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	9.7		
Total Load Average Moisture Conent (%DB):	24.5	In Range	19-25%
Total Load Average Moisture Conent (%WB):	19.7		
Total Test Load Weight (dry basis):	17.37 lbs	7.88 kg	

KINDLING AND START-UP FUEL

		Kindling Moisture Readings (%DB)					Dry Weight	
Kindling Weight (lbs)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
3.04	In Range	10	10	10	10.0	In Range	2.76	1.25

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
4.28	In Range	18.7	19.4	20.6	19.6	In Range	3.58	1.62

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.2	to	4.3	
Actual Residual Start-up Fuel Weight (lb):	2.3			In Range

LOW & MEDIUM FIRE FUEL LOAD DATA - ASTM E3053

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 3
Technician: SJB
Date: 2/28/2019

Nominal Loading Density (lbs/ft^3, wet basis):	12		
Usable Firebox Volume (ft^3):	2.24		
Target Load Weight (lbs):	26.88		
Total Load Weight Range (lbs):	25.54	to	28.22
Core Load Weight Range (lbs):	12.10	to	17.47
Remainder Load Weight Range (lbs):	9.41	to	14.78
Core Load Piece Range (lbs):	4.03	to	6.72
Remainder Load Piece Range (lbs):	2.69	to	8.06

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	5.16	In Range	22.8	18.3	23.1	21.4	In Range	4.25	1.93
2	17.00	4.61	In Range	23.5	24.7	24.9	24.4	In Range	3.71	1.68
3	17.00	6.06	In Range	22.3	22.7	22.3	22.4	In Range	4.95	2.25
Core Load Wt. (lbs)		15.83	In Range							

REMAINDER LOAD DATA (2 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	17.00	6.46	In Range	24.2	23.4	23.1	23.6	In Range	5.23	2.37
2	17.00	3.59	In Range	22.3	18.7	18.6	19.9	In Range	2.99	1.36
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		10.05	In Range							

Remainder Load Small/Large Piece Weight Ratio:	56%	In Range	≤ 67%
Total Load Weight (lbs):	25.88	In Range	
Core Load % of Total Weight:	61%	In Range	45-65%
Remainder % of Total Weight:	39%	In Range	35-55%
Total Load % of Target Weight:	96%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	11.6		
Total Load Average Moisture Conent (%DB):	22.5	In Range	19-25%
Total Load Average Moisture Conent (%WB):	18.4		
Total Test Load Weight (dry basis):	21.13 lbs	9.58 kg	

TEST FUEL LOADING RANGE

Allowable Charcoal Bed Weight Range (lb):	2.6	to	5.1
Actual Charcoal Bed Wt. (lb):	4.1	In Range	

TEST END POINT

Actual Fuel Load Ending Weight (lb):	0.0	Valid Test (≥90%)

Total Fuel Burned During Test Run:	25.9 lbs, wet basis
	21.1 lbs, dry basis
	9.58 kg, dry basis

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	FPI	Job #:	19-460
Model:	F2450	Tracking #:	0022
Run #:	3	Technician:	SJB
Test Start Time:	9:32	Date:	2/28/2019
Test Type:	Medium Fire		

Recording Interval (min):	1
Total Sampling Time (min):	490

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.96	29.98	29.97
Relative Humidity (%)	10.1	9.3	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	

Meter Box γ Factor:	1.004	(A)	
Meter Box γ Factor:	1.000	(B)	
Meter Box γ Factor:	0.999	(Ambient)	
Ambient Sample Volume:	59.776	ft^3	

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	2/25/2019

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-13	in. Hg
(B)	0.000	cfm @	-12	in. Hg
(Ambient)	0.001	cfm @	-14	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.042	77
2	0.066	77
3	0.066	77
4	0.048	77
5	0.046	77
6	0.064	77
7	0.068	77
8	0.046	77
Center	0.070	77

Static Pressure: -0.200 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	15.92	ft/sec
V_{scent}:	17.68	ft/sec
F_p:	0.901	[ratio]
Initial Tunnel Flow:	178.5	scf/min

TEST FUEL PROPERTIES

ASTM 3053-17 - Table A1.1 Fuel Properties by Fuel Species

Select Fuel Type	Species	%C	%H	%O	%Ash	MJ/kg	BTU/lb
	Ash, White	49.70	6.90	43.00	0.30	20.75	8927
	Beech	48.70	5.80	44.70	0.60	18.80	8088
	Birch, Sweet	49.80	6.50	43.40	0.30	20.12	8656
	Birch, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Interior West/North)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Interioir South)	48.73	6.87	43.90	0.50	19.81	8522
	Elm, Rock	50.40	6.60	42.30	0.70	20.49	8815
	Elm, Soft	50.40	6.60	42.30	0.70	20.49	8815
	Gum, Red	50.88	6.06	41.57	1.28	19.72	8478
	Larch, Western	50.54	6.36	42.40	0.70	17.58	7558
X	Maple, Hard	50.64	6.02	41.74	1.35	19.96	8587
	Maple, Sugar	50.64	6.02	41.74	1.35	19.96	8587
	Oak, Red	49.50	6.62	43.70	0.20	20.20	8690
	Oak, White	50.40	6.59	42.70	0.20	20.50	8819
	Pine, Southern	52.60	7.00	40.10	1.31	22.30	9587
	Pine, Southern Long Leaf	52.60	7.02	40.10	1.30	22.30	9594
	Other						

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

Recording Interval (min): 1
Run Time (min): 98

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
0	1.9	-0.007	78	77	78	76	81	78.0	74	66
1	1.5	-0.082	78	77	82	100	81	83.6	288	66
2	0.5	-0.098	83	83	101	153	80	100.0	490	66
3	0.7	-0.079	93	95	117	230	80	123.0	501	66
4	0.6	-0.073	105	109	129	296	80	143.8	473	65
5	0.4	-0.069	118	124	146	330	80	159.6	432	65
6	2.7	-0.062	133	138	157	350	80	171.6	428	65
7	2.5	-0.084	147	150	168	366	81	182.4	441	65
8	2.2	-0.091	161	162	179	409	83	198.8	500	65
9	1.8	-0.095	174	176	192	466	85	218.6	547	65
10	1.8	-0.080	189	191	206	520	87	238.6	562	65
11	1.5	-0.092	206	207	223	562	90	257.6	574	65
12	1.2	-0.085	224	222	239	597	93	275.0	568	65
13	1.1	-0.091	242	237	256	623	97	291.0	560	65
14	0.9	-0.079	259	253	271	644	101	305.6	557	65
15	0.8	-0.079	276	269	286	661	105	319.4	554	64
16	3.5	-0.093	292	283	302	669	109	331.0	599	64
17	3.2	-0.089	307	296	315	688	114	344.0	617	64
18	2.9	-0.093	321	311	329	723	118	360.4	631	64
19	2.6	-0.092	333	325	342	755	123	375.6	635	64
20	2.2	-0.085	346	340	357	779	128	390.0	640	64
21	16.6	-0.101	359	354	372	815	133	406.6	768	64
22	23.0	-0.086	372	369	381	808	138	413.6	666	64
23	22.8	-0.096	384	380	387	836	144	426.2	686	64
24	22.3	-0.089	394	388	391	861	149	436.6	685	64
25	22.0	-0.077	402	395	396	883	154	446.0	691	64
26	21.8	-0.087	410	400	401	900	159	454.0	696	64
27	22.1	-0.109	417	406	405	917	163	461.6	702	64
28	22.0	-0.102	423	410	409	928	168	467.6	709	64
29	21.6	-0.091	429	414	413	935	173	472.8	712	64
30	21.4	-0.102	435	418	417	946	177	478.6	712	64
31	20.8	-0.089	440	421	420	954	181	483.2	719	64
32	20.5	-0.096	446	425	423	963	185	488.4	727	64
33	19.9	-0.092	451	428	425	972	190	493.2	728	64
34	19.2	-0.097	456	431	427	976	194	496.8	726	64
35	18.1	-0.099	460	435	430	981	197	500.6	728	64
36	17.7	-0.101	466	438	432	982	201	503.8	721	64
37	17.3	-0.091	470	441	434	985	205	507.0	721	64
38	17.0	-0.098	474	444	437	985	208	509.6	734	64
39	16.6	-0.095	478	447	439	987	212	512.6	735	64
40	16.3	-0.102	481	449	441	987	215	514.6	723	64
41	15.9	-0.097	485	452	366	968	218	497.8	718	64
42	15.6	-0.104	489	454	335	957	221	491.2	713	64
43	15.2	-0.104	492	457	313	952	224	487.6	713	64

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

Recording Interval (min): 1
Run Time (min): 98

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
44	14.9	-0.103	496	459	297	951	227	486.0	703	64
45	14.6	-0.089	499	462	287	947	230	485.0	704	64
46	14.2	-0.089	502	465	280	946	233	485.2	707	64
47	13.9	-0.100	506	467	275	943	236	485.4	706	64
48	13.6	-0.099	510	470	271	937	238	485.2	704	64
49	13.4	-0.100	513	472	267	936	241	485.8	704	64
50	13.0	-0.089	516	475	265	934	244	486.8	698	64
51	12.7	-0.087	520	476	264	931	246	487.4	699	65
52	12.3	-0.104	522	479	265	935	249	490.0	697	65
53	12.1	-0.102	526	481	264	938	251	492.0	696	65
54	11.8	-0.096	529	483	264	941	254	494.2	691	65
55	11.5	-0.086	532	485	264	934	257	494.4	688	65
56	11.2	-0.087	536	488	264	931	260	495.8	673	65
57	11.0	-0.098	539	489	265	927	263	496.6	663	65
58	10.7	-0.101	542	492	265	921	265	497.0	657	65
59	10.5	-0.092	544	494	266	915	268	497.4	655	65
60	10.2	-0.087	547	496	267	911	271	498.4	649	65
61	10.0	-0.092	549	498	267	907	273	498.8	646	65
62	9.7	-0.099	551	500	268	905	276	500.0	646	65
63	9.5	-0.099	552	502	270	900	278	500.4	643	65
64	9.2	-0.094	553	503	271	898	281	501.2	641	65
65	9.0	-0.096	554	507	272	895	284	502.4	639	65
66	8.8	-0.086	556	508	273	892	287	503.2	637	65
67	8.5	-0.086	556	510	275	884	289	502.8	633	65
68	8.3	-0.087	557	512	276	878	292	503.0	630	65
69	8.1	-0.094	560	515	277	873	295	504.0	625	65
70	7.9	-0.096	562	517	277	869	297	504.4	620	65
71	7.7	-0.083	563	519	279	859	300	504.0	615	66
72	7.5	-0.090	564	521	281	855	303	504.8	613	65
73	7.3	-0.098	566	523	282	849	305	505.0	611	66
74	7.1	-0.084	568	526	283	850	308	507.0	609	66
75	6.9	-0.091	569	528	283	844	311	507.0	605	66
76	6.7	-0.078	571	530	284	842	314	508.2	602	66
77	6.5	-0.088	573	531	285	839	316	508.8	600	66
78	6.3	-0.088	573	534	286	839	319	510.2	600	66
79	6.1	-0.088	575	535	286	837	321	510.8	597	66
80	6.0	-0.080	577	537	288	837	324	512.6	599	66
81	5.7	-0.085	582	538	293	842	328	516.6	651	66
82	5.5	-0.098	585	540	296	858	332	522.2	631	66
83	5.3	-0.096	587	543	300	864	336	526.0	618	66
84	5.2	-0.083	591	544	299	862	339	527.0	602	66
85	5.0	-0.082	593	546	300	857	341	527.4	586	66
86	4.9	-0.096	596	547	300	843	344	526.0	574	66
87	4.8	-0.078	597	549	302	824	346	523.6	557	66

WOODSTOVE PREBURN DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

Recording Interval (min): 1
Run Time (min): 98

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
88	4.6	-0.077	599	549	302	806	348	520.8	541	66
89	4.6	-0.074	599	549	301	787	350	517.2	527	66
90	4.5	-0.074	600	550	301	765	352	513.6	513	66
91	4.4	-0.073	598	549	299	743	353	508.4	497	66
92	4.2	-0.081	596	547	297	721	354	503.0	488	66
93	4.3	-0.086	594	545	294	699	355	497.4	479	66
94	4.3	-0.075	590	543	292	680	355	492.0	470	66
95	4.3	-0.071	586	541	288	663	356	486.8	462	66
96	4.2	-0.078	583	539	283	647	356	481.6	455	66
97	4.2	-0.073	579	536	278	632	357	476.4	449	66
98	4.1	-0.074	575	533	275	617	357	471.4	445	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.070	0.01	75	-0.13		25.9		124	444	85	74
1	0.134	0.134	0.070	2.27	75	-0.63	97	25.6	-0.3	140	430	86	74
2	0.277	0.143	0.070	2.25	75	-2.39	103	25.3	-0.3	134	508	86	73
3	0.424	0.147	0.070	2.13	75	-1.19	106	24.9	-0.4	136	559	85	73
4	0.562	0.138	0.070	2.12	75	-2.44	99	24.5	-0.4	131	524	83	73
5	0.709	0.147	0.070	2.27	75	0	105	24.3	-0.2	128	516	83	73
6	0.851	0.142	0.070	2.20	75	-2.5	101	24.1	-0.2	126	517	83	73
7	1.002	0.151	0.070	2.34	75	-2.66	108	23.8	-0.3	125	519	85	73
8	1.148	0.146	0.070	2.28	76	-2.11	104	23.5	-0.3	124	521	87	72
9	1.299	0.151	0.070	2.30	76	0	107	23.3	-0.2	123	523	86	73
10	1.443	0.144	0.070	2.27	76	0	103	23.1	-0.2	124	524	84	73
11	1.593	0.150	0.070	2.26	76	-0.46	107	22.8	-0.3	123	521	83	72
12	1.737	0.144	0.070	2.23	77	-2.43	102	22.4	-0.4	123	520	84	73
13	1.886	0.149	0.070	2.23	77	0	106	22.3	-0.1	123	520	85	73
14	2.029	0.143	0.070	2.22	77	-0.94	102	22.1	-0.2	123	521	86	73
15	2.179	0.150	0.070	2.22	78	-1.15	106	21.8	-0.3	122	518	85	73
16	2.322	0.143	0.070	2.22	78	-1.08	101	21.7	-0.1	122	514	84	73
17	2.471	0.149	0.070	2.22	78	-0.65	106	21.3	-0.4	122	513	84	73
18	2.614	0.143	0.070	2.21	79	-1.24	101	21.1	-0.2	122	508	85	73
19	2.763	0.149	0.070	2.18	79	0	105	21.0	-0.1	122	507	85	73
20	2.906	0.143	0.070	2.19	79	0	101	20.7	-0.3	122	505	84	73
21	3.055	0.149	0.070	2.21	80	-2.8	105	20.5	-0.2	120	504	83	73
22	3.198	0.143	0.070	2.21	80	-2.56	101	20.3	-0.2	118	500	84	73
23	3.347	0.149	0.070	2.20	80	-2.27	105	20.2	-0.1	117	497	85	73
24	3.490	0.143	0.070	2.19	81	-2.13	100	19.9	-0.3	116	490	86	73
25	3.639	0.149	0.070	2.20	81	0	104	19.7	-0.2	116	485	85	73
26	3.782	0.143	0.070	2.19	81	-2.2	100	19.5	-0.2	115	481	84	73
27	3.931	0.149	0.070	2.18	82	-0.41	104	19.3	-0.2	115	477	84	73
28	4.076	0.145	0.070	2.27	82	-1.16	101	19.2	-0.1	114	473	85	73
29	4.228	0.152	0.070	2.27	83	-0.16	106	19.0	-0.2	114	469	86	73
30	4.374	0.146	0.070	2.28	83	0	102	18.8	-0.2	113	464	85	73
31	4.525	0.151	0.070	2.27	83	-0.74	105	18.8	0	113	458	84	74
32	4.671	0.146	0.070	2.27	84	-2.36	101	18.5	-0.3	112	455	84	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	4.824	0.153	0.070	2.28	84	-1.8	106	18.3	-0.2	112	451	85	73
34	4.970	0.146	0.070	2.27	84	-0.37	101	18.2	-0.1	111	448	85	73
35	5.122	0.152	0.070	2.27	85	-2.7	105	18.1	-0.1	111	444	86	73
36	5.269	0.147	0.070	2.27	85	-1.61	102	17.8	-0.3	111	441	85	73
37	5.421	0.152	0.070	2.28	85	-0.05	105	17.7	-0.1	110	440	84	73
38	5.567	0.146	0.070	2.28	86	-0.61	101	17.5	-0.2	110	437	84	73
39	5.717	0.150	0.070	2.27	86	0	104	17.5	0	110	436	85	73
40	5.866	0.149	0.070	2.26	86	-0.08	103	17.2	-0.3	109	432	86	73
41	6.015	0.149	0.070	2.28	87	-1.13	103	17.1	-0.1	109	432	85	73
42	6.165	0.150	0.070	2.26	87	-0.04	103	16.9	-0.2	109	430	84	73
43	6.315	0.150	0.070	2.26	87	-0.28	103	16.8	-0.1	108	428	83	73
44	6.466	0.151	0.070	2.26	88	-2.22	104	16.6	-0.2	108	427	84	73
45	6.614	0.148	0.070	2.27	88	-1.52	102	16.4	-0.2	108	426	85	73
46	6.766	0.152	0.070	2.27	88	-2.79	104	16.3	-0.1	108	423	86	73
47	6.912	0.146	0.070	2.26	89	-0.65	100	16.2	-0.1	107	422	86	73
48	7.064	0.152	0.070	2.28	89	-0.98	104	16.1	-0.1	107	418	85	73
49	7.210	0.146	0.070	2.28	89	-2.84	100	15.9	-0.2	107	417	84	73
50	7.363	0.153	0.070	2.27	89	-0.75	105	15.8	-0.1	107	414	83	74
51	7.511	0.148	0.070	2.25	90	-0.3	101	15.6	-0.2	106	413	84	73
52	7.663	0.152	0.070	2.27	90	-0.16	104	15.5	-0.1	106	414	85	73
53	7.811	0.148	0.070	2.25	90	-0.28	101	15.4	-0.1	106	415	86	73
54	7.963	0.152	0.070	2.26	90	-1.23	104	15.2	-0.2	106	414	84	74
55	8.110	0.147	0.070	2.28	91	-0.25	100	15.1	-0.1	106	413	83	72
56	8.261	0.151	0.070	2.26	91	-2.68	103	14.9	-0.2	106	414	84	73
57	8.410	0.149	0.070	2.28	91	-0.67	102	14.8	-0.1	106	414	85	73
58	8.561	0.151	0.070	2.27	91	-1.34	103	14.7	-0.1	105	411	86	73
59	8.712	0.151	0.070	2.27	92	-2.64	103	14.5	-0.2	105	411	85	73
60	8.861	0.149	0.070	2.28	92	-1.2	101	14.4	-0.1	105	411	84	73
61	9.021	0.160	0.070	2.39	92	-1.18	109	14.3	-0.1	105	410	83	73
62	9.168	0.147	0.070	2.24	92	-0.56	100	14.1	-0.2	105	413	84	73
63	9.321	0.153	0.070	2.25	92	-2.01	104	14.0	-0.1	105	413	86	73
64	9.468	0.147	0.070	2.25	93	-2.59	100	13.9	-0.1	105	412	86	73
65	9.620	0.152	0.070	2.24	93	-1.92	103	13.8	-0.1	105	414	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	9.768	0.148	0.070	2.26	93	-2.61	100	13.6	-0.2	105	413	84	73
67	9.918	0.150	0.070	2.26	93	-1.89	102	13.5	-0.1	105	413	84	73
68	10.065	0.147	0.070	2.22	93	0	100	13.4	-0.1	105	411	85	73
69	10.216	0.151	0.070	2.26	94	0	102	13.2	-0.2	105	413	86	73
70	10.364	0.148	0.070	2.24	94	-2.59	100	13.1	-0.1	105	415	86	73
71	10.514	0.150	0.070	2.24	94	-2.6	102	12.9	-0.2	105	413	84	73
72	10.664	0.150	0.070	2.23	94	0	102	12.8	-0.1	105	413	83	73
73	10.813	0.149	0.070	2.23	94	0	101	12.7	-0.1	105	410	84	73
74	10.964	0.151	0.070	2.25	95	0	102	12.6	-0.1	105	411	85	74
75	11.111	0.147	0.070	2.25	95	-1.1	99	12.5	-0.1	104	408	86	73
76	11.262	0.151	0.070	2.25	95	-0.68	102	12.3	-0.2	104	407	85	73
77	11.408	0.146	0.070	2.22	95	-2.15	99	12.2	-0.1	104	407	84	74
78	11.561	0.153	0.070	2.24	95	0	103	12.1	-0.1	104	407	83	73
79	11.706	0.145	0.070	2.23	95	-0.07	98	12.0	-0.1	104	406	84	73
80	11.858	0.152	0.070	2.21	95	0	103	11.8	-0.2	104	407	85	74
81	12.005	0.147	0.070	2.22	96	-0.5	99	11.7	-0.1	104	406	86	74
82	12.157	0.152	0.070	2.22	96	0	103	11.6	-0.1	104	408	85	74
83	12.303	0.146	0.070	2.22	96	0	98	11.5	-0.1	104	412	84	74
84	12.455	0.152	0.070	2.21	96	0	103	11.2	-0.3	104	416	83	74
85	12.601	0.146	0.070	2.21	96	0	98	11.2	0	104	419	84	73
86	12.752	0.151	0.070	2.22	96	-2.25	102	11.0	-0.2	105	421	86	73
87	12.898	0.146	0.070	2.36	96	-2.66	99	10.9	-0.1	105	426	86	74
88	13.051	0.153	0.070	2.34	96	0	103	10.8	-0.1	105	430	85	74
89	13.205	0.154	0.070	2.33	97	0	104	10.6	-0.2	105	428	84	74
90	13.357	0.152	0.070	2.32	97	-1.79	102	10.5	-0.1	105	421	84	73
91	13.511	0.154	0.070	2.34	97	-1.09	104	10.4	-0.1	104	414	85	73
92	13.660	0.149	0.070	2.32	97	-0.35	100	10.3	-0.1	104	410	86	73
93	13.817	0.157	0.070	2.33	97	0	106	10.2	-0.1	104	407	86	74
94	13.967	0.150	0.070	2.32	97	-1.76	101	10.1	-0.1	104	403	84	74
95	14.121	0.154	0.070	2.34	97	0	104	10.1	0	104	403	83	73
96	14.272	0.151	0.070	2.32	97	-2.66	102	9.9	-0.2	104	403	84	74
97	14.425	0.153	0.070	2.31	97	-1.08	103	9.7	-0.2	104	402	85	74
98	14.579	0.154	0.070	2.32	98	0	103	9.7	0	103	402	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	14.729	0.150	0.070	2.32	98	0	101	9.6	-0.1	103	400	85	74
100	14.884	0.155	0.070	2.32	98	0	104	9.4	-0.2	103	400	84	74
101	15.033	0.149	0.070	2.32	98	-1.82	100	9.4	0	103	398	83	73
102	15.189	0.156	0.070	2.30	98	-0.07	105	9.2	-0.2	103	396	84	73
103	15.339	0.150	0.070	2.31	98	-2	101	9.2	0	103	393	85	74
104	15.492	0.153	0.070	2.33	98	-2.37	103	9.1	-0.1	103	389	86	73
105	15.644	0.152	0.070	2.31	98	-2.36	102	9.0	-0.1	102	386	85	73
106	15.797	0.153	0.070	2.32	98	-2.5	103	8.9	-0.1	102	384	83	73
107	15.951	0.154	0.070	2.32	98	0	103	8.8	-0.1	102	382	84	73
108	16.100	0.149	0.070	2.30	98	0	100	8.7	-0.1	102	379	85	74
109	16.254	0.154	0.070	2.30	98	-2.65	103	8.6	-0.1	101	378	86	74
110	16.405	0.151	0.070	2.30	99	0	101	8.6	0	101	375	85	74
111	16.560	0.155	0.070	2.29	99	0	104	8.6	0	101	373	84	74
112	16.710	0.150	0.070	2.29	99	-0.07	100	8.4	-0.2	101	371	83	74
113	16.863	0.153	0.070	2.28	99	-0.43	102	8.3	-0.1	101	370	84	74
114	17.016	0.153	0.070	2.30	99	-2.07	102	8.2	-0.1	100	368	85	74
115	17.168	0.152	0.070	2.30	99	-0.46	102	8.1	-0.1	100	366	86	73
116	17.322	0.154	0.070	2.32	99	-0.53	103	8.1	0	100	364	85	74
117	17.471	0.149	0.070	2.30	99	-0.11	100	8.0	-0.1	100	364	84	74
118	17.626	0.155	0.070	2.29	99	-2.51	104	7.9	-0.1	100	362	83	73
119	17.776	0.150	0.070	2.31	99	-0.02	100	7.8	-0.1	99	361	84	74
120	17.931	0.155	0.070	2.28	99	-2.43	104	7.7	-0.1	99	360	85	74
121	18.081	0.150	0.070	2.33	99	-1.74	100	7.7	0	99	359	86	74
122	18.233	0.152	0.070	2.30	99	0	102	7.6	-0.1	99	357	85	73
123	18.387	0.154	0.070	2.29	99	-0.16	103	7.5	-0.1	98	356	84	74
124	18.538	0.151	0.070	2.28	99	-1.56	101	7.5	0	98	352	83	73
125	18.691	0.153	0.070	2.31	99	-1.59	102	7.5	0	98	349	84	73
126	18.840	0.149	0.070	2.31	100	-0.57	99	7.3	-0.2	98	345	85	73
127	18.996	0.156	0.070	2.28	100	-1.05	104	7.2	-0.1	98	343	85	73
128	19.145	0.149	0.070	2.31	100	-0.96	99	7.2	0	98	342	84	73
129	19.300	0.155	0.070	2.30	100	-2.73	103	7.1	-0.1	98	340	83	74
130	19.449	0.149	0.070	2.29	100	-1.91	99	7.0	-0.1	97	340	84	73
131	19.602	0.153	0.070	2.29	100	0	102	7.0	0	97	339	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	19.756	0.154	0.070	2.29	100	-2.66	102	6.9	-0.1	97	336	85	73
133	19.907	0.151	0.070	2.30	100	-0.65	100	6.9	0	97	333	84	73
134	20.060	0.153	0.070	2.30	100	-0.45	102	6.8	-0.1	97	331	83	73
135	20.209	0.149	0.070	2.29	100	-1.2	99	6.8	0	96	328	83	73
136	20.364	0.155	0.070	2.31	100	-1.37	103	6.7	-0.1	96	326	85	73
137	20.514	0.150	0.070	2.28	100	-0.2	100	6.6	-0.1	96	325	85	73
138	20.668	0.154	0.070	2.30	100	-2.64	102	6.6	0	96	323	85	73
139	20.818	0.150	0.070	2.31	100	-1.76	100	6.5	-0.1	96	322	83	74
140	20.971	0.153	0.070	2.30	100	-0.78	102	6.5	0	96	321	83	73
141	21.125	0.154	0.070	2.29	100	-1.46	102	6.4	-0.1	96	321	84	73
142	21.276	0.151	0.070	2.30	100	-0.62	100	6.4	0	95	319	85	73
143	21.429	0.153	0.070	2.27	100	-0.97	102	6.3	-0.1	95	317	85	73
144	21.578	0.149	0.070	2.30	100	-0.05	99	6.3	0	95	315	84	73
145	21.734	0.156	0.070	2.30	100	-2.83	104	6.2	-0.1	95	313	83	73
146	21.884	0.150	0.070	2.30	100	-2.64	100	6.2	0	94	312	84	73
147	22.037	0.153	0.070	2.30	100	-0.73	102	6.1	-0.1	94	312	85	73
148	22.188	0.151	0.070	2.30	100	-2.42	100	6.1	0	94	311	85	73
149	22.341	0.153	0.070	2.29	100	-0.66	102	6.0	-0.1	94	310	84	73
150	22.494	0.153	0.070	2.30	100	-0.84	102	6.1	0.1	94	311	83	73
151	22.645	0.151	0.070	2.30	100	-2.77	100	5.9	-0.2	94	312	84	73
152	22.798	0.153	0.070	2.29	100	-0.03	102	5.9	0	94	310	85	73
153	22.947	0.149	0.070	2.29	100	-0.38	99	6.0	0.1	94	308	85	73
154	23.103	0.156	0.070	2.30	100	-2.39	103	5.8	-0.2	93	306	85	73
155	23.253	0.150	0.070	2.30	101	-0.72	99	5.8	0	93	303	83	73
156	23.406	0.153	0.070	2.31	101	-0.05	101	5.8	0	93	301	83	73
157	23.557	0.151	0.070	2.30	101	-2.77	100	5.7	-0.1	93	300	84	73
158	23.710	0.153	0.070	2.29	101	-0.44	101	5.6	-0.1	93	297	85	73
159	23.864	0.154	0.070	2.29	101	-0.07	102	5.6	0	93	296	85	73
160	24.013	0.149	0.070	2.30	101	-2.7	99	5.7	0.1	93	295	84	73
161	24.168	0.155	0.070	2.29	101	-2.1	103	5.5	-0.2	93	296	83	73
162	24.316	0.148	0.070	2.29	101	-2.69	98	5.5	0	92	294	84	73
163	24.472	0.156	0.070	2.29	101	-2.67	103	5.4	-0.1	92	293	85	73
164	24.622	0.150	0.070	2.29	101	-1.35	99	5.4	0	92	292	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	24.775	0.153	0.070	2.29	101	-2.71	101	5.3	-0.1	92	292	85	73
166	24.926	0.151	0.070	2.31	101	-1.76	100	5.3	0	92	290	83	73
167	25.079	0.153	0.070	2.30	101	-1.24	101	5.3	0	92	290	83	73
168	25.233	0.154	0.070	2.30	101	-0.96	102	5.2	-0.1	92	290	84	73
169	25.382	0.149	0.070	2.30	101	-0.12	99	5.2	0	92	289	85	73
170	25.536	0.154	0.070	2.30	101	-1.46	102	5.1	-0.1	91	289	85	73
171	25.686	0.150	0.070	2.28	101	-0.02	99	5.0	-0.1	91	288	84	73
172	25.841	0.155	0.070	2.29	101	-0.5	102	5.0	0	91	287	83	73
173	25.991	0.150	0.070	2.28	101	-1.06	99	5.0	0	91	286	84	73
174	26.143	0.152	0.070	2.25	101	-2.77	100	5.0	0	91	285	85	73
175	26.294	0.151	0.070	2.29	101	-1.57	100	5.0	0	91	282	85	73
176	26.447	0.153	0.070	2.27	101	-0.18	101	4.9	-0.1	91	280	84	73
177	26.601	0.154	0.070	2.29	101	0	102	4.9	0	90	274	83	73
178	26.750	0.149	0.070	2.29	101	-2.18	98	4.9	0	90	271	83	73
179	26.904	0.154	0.070	2.29	101	-0.69	102	4.8	-0.1	90	268	84	73
180	27.053	0.149	0.070	2.26	101	-2.49	98	4.9	0.1	90	266	85	73
181	27.208	0.155	0.070	2.27	101	0	102	4.8	-0.1	90	264	85	73
182	27.358	0.150	0.070	2.30	101	-0.29	99	4.8	0	90	263	84	73
183	27.510	0.152	0.070	2.29	101	-2.53	100	4.7	-0.1	89	260	83	73
184	27.661	0.151	0.070	2.27	101	0	100	4.7	0	89	260	84	73
185	27.813	0.152	0.070	2.29	101	-2.17	100	4.7	0	89	259	85	73
186	27.966	0.153	0.070	2.28	101	-2.52	101	4.7	0	89	257	85	73
187	28.116	0.150	0.070	2.29	101	0	99	4.7	0	89	256	85	73
188	28.269	0.153	0.070	2.27	101	-2.55	101	4.5	-0.2	89	255	83	73
189	28.417	0.148	0.070	2.28	101	-1.08	98	4.6	0.1	89	254	83	73
190	28.573	0.156	0.070	2.26	101	-2.55	103	4.6	0	89	253	84	73
191	28.722	0.149	0.070	2.27	101	-2.71	98	4.5	-0.1	88	251	85	73
192	28.876	0.154	0.070	2.26	101	-2.75	101	4.5	0	88	250	85	73
193	29.025	0.149	0.070	2.27	101	-1.05	98	4.4	-0.1	88	249	84	73
194	29.177	0.152	0.070	2.27	101	-2.25	100	4.5	0.1	88	248	83	73
195	29.330	0.153	0.070	2.28	101	-2.61	101	4.5	0	88	247	83	73
196	29.481	0.151	0.070	2.27	101	-0.84	99	4.3	-0.2	88	246	84	73
197	29.634	0.153	0.070	2.25	101	0	101	4.4	0.1	88	245	85	73

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	29.782	0.148	0.070	2.25	101	-2.17	97	4.4	0	87	244	85	73
199	29.936	0.154	0.070	2.28	101	-2.83	101	4.4	0	87	243	84	73
200	30.086	0.150	0.070	2.27	101	-2.82	99	4.3	-0.1	87	243	83	73
201	30.240	0.154	0.070	2.27	101	-2.87	101	4.2	-0.1	87	242	84	73
202	30.390	0.150	0.070	2.27	101	-0.07	99	4.4	0.2	87	241	85	73
203	30.542	0.152	0.070	2.28	101	-0.84	100	4.3	-0.1	87	240	85	73
204	30.692	0.150	0.070	2.27	101	-2.7	99	4.2	-0.1	87	239	84	73
205	30.845	0.153	0.070	2.26	101	-1.81	101	4.3	0.1	87	239	83	73
206	30.998	0.153	0.070	2.26	101	-0.13	101	4.2	-0.1	87	238	83	72
207	31.147	0.149	0.070	2.28	101	-2.45	98	4.2	0	87	238	84	72
208	31.300	0.153	0.070	2.28	101	-2.34	101	4.3	0.1	87	238	85	72
209	31.448	0.148	0.070	2.28	101	-0.04	97	4.2	-0.1	87	237	85	72
210	31.603	0.155	0.070	2.26	101	-0.09	102	4.1	-0.1	86	237	84	72
211	31.752	0.149	0.070	2.27	101	-2.68	98	4.2	0.1	86	236	83	72
212	31.906	0.154	0.070	2.25	101	-2.59	101	4.1	-0.1	86	235	84	72
213	32.054	0.148	0.070	2.25	101	-2.12	97	4.1	0	86	235	85	72
214	32.206	0.152	0.070	2.27	101	-1.49	100	4.0	-0.1	86	235	86	72
215	32.358	0.152	0.070	2.27	101	-1.29	100	4.0	0	86	234	85	72
216	32.509	0.151	0.070	2.28	101	-2.57	99	4.0	0	86	234	84	72
217	32.662	0.153	0.070	2.27	101	-0.64	101	4.0	0	86	234	83	72
218	32.810	0.148	0.070	2.28	101	-0.02	97	4.0	0	86	234	84	72
219	32.964	0.154	0.070	2.28	101	-0.62	101	4.1	0.1	86	233	85	72
220	33.112	0.148	0.070	2.25	101	-1.1	97	3.9	-0.2	86	233	86	72
221	33.267	0.155	0.070	2.28	101	-2.21	102	3.9	0	86	232	85	72
222	33.415	0.148	0.070	2.26	101	-1.04	97	3.9	0	86	231	84	72
223	33.568	0.153	0.070	2.27	101	-2.37	101	3.9	0	86	232	84	72
224	33.718	0.150	0.070	2.27	101	-0.21	99	3.9	0	86	231	84	72
225	33.869	0.151	0.070	2.25	101	-2.51	99	3.8	-0.1	85	231	85	72
226	34.021	0.152	0.070	2.26	101	-1.95	100	3.8	0	85	230	86	72
227	34.171	0.150	0.070	2.24	101	-0.2	99	3.8	0	85	230	85	72
228	34.325	0.154	0.070	2.25	101	-2.1	101	3.8	0	85	230	83	72
229	34.472	0.147	0.070	2.25	101	0	97	3.8	0	85	229	84	72
230	34.626	0.154	0.070	2.26	101	-0.03	101	3.8	0	85	230	85	72

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	34.775	0.149	0.070	2.25	101	0	98	3.8	0	85	229	86	72
232	34.929	0.154	0.070	2.25	101	0	101	3.7	-0.1	85	229	86	72
233	35.077	0.148	0.070	2.25	101	-0.27	97	3.7	0	85	228	84	72
234	35.230	0.153	0.070	2.27	101	-0.6	101	3.7	0	85	228	83	72
235	35.379	0.149	0.070	2.27	101	-0.04	98	3.7	0	85	228	84	72
236	35.530	0.151	0.070	2.25	101	-2.28	99	3.7	0	85	227	85	72
237	35.683	0.153	0.070	2.23	101	-1.26	101	3.6	-0.1	85	228	86	72
238	35.833	0.150	0.070	2.25	101	-2.55	99	3.6	0	85	227	86	72
239	35.986	0.153	0.070	2.25	101	-0.99	101	3.6	0	85	227	84	72
240	36.134	0.148	0.070	2.24	101	-1.95	97	3.6	0	85	226	84	72
241	36.287	0.153	0.070	2.26	101	-0.06	101	3.5	-0.1	85	226	84	72
242	36.436	0.149	0.070	2.25	101	-1.1	98	3.5	0	85	226	85	72
243	36.590	0.154	0.070	2.25	101	-2.68	101	3.5	0	85	225	86	72
244	36.739	0.149	0.070	2.24	101	-0.02	98	3.5	0	85	224	86	72
245	36.891	0.152	0.070	2.27	101	-0.66	100	3.5	0	85	225	84	72
246	37.040	0.149	0.070	2.28	101	-0.9	98	3.5	0	85	225	84	72
247	37.191	0.151	0.070	2.27	101	-0.2	99	3.5	0	85	224	84	72
248	37.344	0.153	0.070	2.26	101	-0.19	101	3.4	-0.1	85	224	85	72
249	37.494	0.150	0.070	2.24	101	-1.47	98	3.5	0.1	84	224	86	72
250	37.647	0.153	0.070	2.27	101	-0.6	100	3.4	-0.1	84	223	85	72
251	37.794	0.147	0.070	2.25	101	-2.38	97	3.5	0.1	84	223	84	72
252	37.948	0.154	0.070	2.25	101	-2.88	101	3.4	-0.1	84	223	84	72
253	38.095	0.147	0.070	2.25	101	-0.5	97	3.3	-0.1	84	222	84	72
254	38.250	0.155	0.070	2.25	101	-1.81	102	3.3	0	84	222	85	72
255	38.398	0.148	0.070	2.26	101	-0.41	97	3.3	0	84	222	86	72
256	38.552	0.154	0.070	2.25	101	-1.27	101	3.3	0	84	222	85	72
257	38.700	0.148	0.070	2.23	101	-1.15	97	3.3	0	84	222	84	72
258	38.851	0.151	0.070	2.27	101	-0.65	99	3.3	0	84	221	84	72
259	39.003	0.152	0.070	2.24	101	-2.5	100	3.2	-0.1	84	221	84	72
260	39.153	0.150	0.070	2.23	101	-2.22	98	3.2	0	84	221	86	72
261	39.306	0.153	0.070	2.24	101	-2.51	100	3.2	0	84	220	86	72
262	39.454	0.148	0.070	2.26	101	-2.78	97	3.2	0	84	221	85	72
263	39.607	0.153	0.070	2.26	101	-1.17	100	3.2	0	84	220	84	72

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	39.754	0.147	0.070	2.26	101	-2.82	97	3.2	0	84	220	84	72
265	39.909	0.155	0.070	2.25	101	-0.01	102	3.1	-0.1	84	219	84	72
266	40.057	0.148	0.070	2.26	101	-0.24	97	3.1	0	84	219	86	72
267	40.211	0.154	0.070	2.24	101	-1.86	101	3.1	0	84	219	86	72
268	40.358	0.147	0.070	2.26	101	-0.12	97	3.0	-0.1	84	218	85	72
269	40.511	0.153	0.070	2.25	101	-0.24	100	3.1	0.1	84	218	84	72
270	40.660	0.149	0.070	2.25	101	-2.36	98	3.0	-0.1	84	218	84	72
271	40.812	0.152	0.070	2.25	101	-0.6	100	3.0	0	84	218	84	72
272	40.964	0.152	0.070	2.25	101	-0.15	100	3.0	0	84	218	86	72
273	41.114	0.150	0.070	2.25	101	-1.71	98	3.0	0	84	219	86	72
274	41.266	0.152	0.070	2.25	101	-1.36	100	3.0	0	84	219	85	72
275	41.414	0.148	0.070	2.26	101	-0.35	97	3.0	0	84	220	83	72
276	41.567	0.153	0.070	2.23	101	-0.57	100	2.9	-0.1	84	219	84	72
277	41.715	0.148	0.070	2.26	101	-2.7	97	2.9	0	84	219	85	72
278	41.869	0.154	0.070	2.23	101	0	101	2.9	0	84	219	86	71
279	42.018	0.149	0.070	2.24	101	-2.78	98	2.9	0	83	219	86	72
280	42.169	0.151	0.070	2.25	101	-0.65	99	2.9	0	83	219	85	71
281	42.318	0.149	0.070	2.24	101	-2.65	98	2.9	0	83	219	84	71
282	42.469	0.151	0.070	2.26	101	-2.34	99	2.9	0	83	218	84	71
283	42.621	0.152	0.070	2.25	101	-0.03	100	2.8	-0.1	83	218	85	72
284	42.771	0.150	0.070	2.24	101	-0.16	98	2.8	0	83	218	86	72
285	42.924	0.153	0.070	2.24	101	-2.81	100	2.8	0	83	218	85	72
286	43.071	0.147	0.070	2.24	101	-0.17	96	2.8	0	83	218	84	71
287	43.225	0.154	0.070	2.25	101	-2.55	101	2.8	0	83	216	84	71
288	43.372	0.147	0.070	2.23	101	-1.28	96	2.8	0	83	216	84	71
289	43.526	0.154	0.070	2.23	101	-1.7	101	2.7	-0.1	83	216	85	72
290	43.674	0.148	0.070	2.24	101	-0.94	97	2.7	0	83	216	86	72
291	43.828	0.154	0.070	2.24	101	-1.94	101	2.7	0	83	216	85	71
292	43.975	0.147	0.070	2.26	101	-0.25	96	2.6	-0.1	83	216	84	71
293	44.127	0.152	0.070	2.24	100	-0.19	100	2.7	0.1	83	215	84	72
294	44.278	0.151	0.070	2.24	100	-2.83	99	2.7	0	83	215	84	72
295	44.429	0.151	0.070	2.23	100	-2.39	99	2.7	0	83	215	86	71
296	44.581	0.152	0.070	2.24	100	-0.72	100	2.6	-0.1	83	214	86	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	44.730	0.149	0.070	2.24	100	-0.58	98	2.6	0	83	213	85	71
298	44.882	0.152	0.070	2.25	100	-0.62	100	2.6	0	83	212	83	71
299	45.030	0.148	0.070	2.25	100	-2.34	97	2.6	0	83	213	84	72
300	45.183	0.153	0.070	2.24	100	-1.99	101	2.6	0	83	213	85	71
301	45.332	0.149	0.070	2.24	100	-0.03	98	2.6	0	83	212	86	72
302	45.485	0.153	0.070	2.25	100	-0.95	101	2.6	0	83	211	85	72
303	45.634	0.149	0.070	2.24	100	-0.07	98	2.5	-0.1	83	211	84	71
304	45.785	0.151	0.070	2.25	100	-0.27	99	2.5	0	83	210	84	71
305	45.935	0.150	0.070	2.25	100	-0.06	99	2.5	0	83	210	84	71
306	46.086	0.151	0.070	2.25	100	-0.9	99	2.5	0	83	209	85	71
307	46.238	0.152	0.070	2.24	100	-1.71	100	2.6	0.1	83	209	86	71
308	46.388	0.150	0.070	2.22	100	-0.05	98	2.5	-0.1	82	208	85	71
309	46.540	0.152	0.070	2.26	100	-2.84	100	2.5	0	82	209	84	71
310	46.687	0.147	0.070	2.25	100	-1.36	96	2.4	-0.1	82	209	84	71
311	46.841	0.154	0.070	2.25	100	-2.69	101	2.4	0	82	208	84	71
312	46.988	0.147	0.070	2.24	100	-0.71	96	2.4	0	82	208	86	71
313	47.143	0.155	0.070	2.23	100	-1.74	102	2.4	0	82	208	86	71
314	47.291	0.148	0.070	2.24	100	-0.04	97	2.4	0	82	207	85	72
315	47.444	0.153	0.070	2.25	100	-0.28	100	2.4	0	82	207	83	72
316	47.592	0.148	0.070	2.25	100	-0.24	97	2.4	0	82	207	84	71
317	47.744	0.152	0.070	2.24	100	-0.78	100	2.5	0.1	82	206	85	71
318	47.894	0.150	0.070	2.24	100	-0.83	98	2.3	-0.2	82	206	86	71
319	48.045	0.151	0.070	2.24	100	-0.4	99	2.3	0	82	206	85	71
320	48.197	0.152	0.070	2.23	100	-0.03	100	2.3	0	82	205	84	71
321	48.346	0.149	0.070	2.24	100	-0.23	98	2.3	0	82	205	84	71
322	48.498	0.152	0.070	2.25	100	-1.28	100	2.3	0	82	205	84	71
323	48.646	0.148	0.070	2.26	100	-0.08	97	2.3	0	82	204	85	71
324	48.800	0.154	0.070	2.24	100	-0.09	101	2.3	0	82	204	86	71
325	48.948	0.148	0.070	2.23	100	-2.04	97	2.2	-0.1	82	204	85	71
326	49.101	0.153	0.070	2.24	100	-1.41	100	2.2	0	82	204	84	71
327	49.250	0.149	0.070	2.26	100	-2.73	98	2.2	0	82	204	84	71
328	49.401	0.151	0.070	2.26	100	-0.11	99	2.2	0	82	203	85	71
329	49.550	0.149	0.070	2.25	100	-2.83	98	2.2	0	82	204	86	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
330	49.702	0.152	0.070	2.23	100	-2.72	100	2.3	0.1	82	204	86	71
331	49.853	0.151	0.070	2.22	100	-0.1	99	2.2	-0.1	82	203	85	71
332	50.003	0.150	0.070	2.24	100	-1.27	98	2.1	-0.1	82	203	83	71
333	50.156	0.153	0.070	2.27	100	-2.81	100	2.1	0	82	203	84	71
334	50.303	0.147	0.070	2.27	100	-0.31	96	2.1	0	81	203	85	71
335	50.456	0.153	0.070	2.26	100	-0.07	100	2.1	0	82	203	86	71
336	50.603	0.147	0.070	2.25	100	-2.4	96	2.2	0.1	81	203	85	71
337	50.758	0.155	0.070	2.24	100	-1.72	102	2.1	-0.1	81	203	84	71
338	50.906	0.148	0.070	2.23	100	-2.02	97	2.1	0	81	203	84	71
339	51.059	0.153	0.070	2.25	100	-0.07	100	2.1	0	82	203	84	71
340	51.207	0.148	0.070	2.24	100	-0.89	97	2.0	-0.1	82	203	85	71
341	51.359	0.152	0.070	2.25	100	-0.01	100	2.0	0	82	203	86	71
342	51.508	0.149	0.070	2.27	100	-2.24	98	2.0	0	81	203	85	71
343	51.660	0.152	0.070	2.25	100	-1.58	100	2.0	0	82	203	83	71
344	51.811	0.151	0.070	2.24	100	-0.14	99	2.0	0	81	203	84	71
345	51.961	0.150	0.070	2.25	100	-0.13	98	2.1	0.1	81	203	84	71
346	52.113	0.152	0.070	2.24	100	-2.49	100	1.9	-0.2	81	203	86	71
347	52.260	0.147	0.070	2.27	100	-2.81	96	1.9	0	81	202	86	70
348	52.413	0.153	0.070	2.26	100	-2.02	100	2.0	0.1	81	202	85	71
349	52.561	0.148	0.070	2.24	100	0	97	1.9	-0.1	81	202	84	71
350	52.715	0.154	0.070	2.24	100	-0.47	101	1.9	0	81	201	84	71
351	52.863	0.148	0.070	2.24	100	0	97	1.9	0	81	201	85	71
352	53.015	0.152	0.070	2.25	100	-1.82	100	1.9	0	81	201	86	70
353	53.164	0.149	0.070	2.22	100	-0.72	98	1.9	0	81	201	85	70
354	53.315	0.151	0.070	2.25	100	-2.86	99	1.9	0	81	201	84	71
355	53.466	0.151	0.070	2.24	100	-2.51	99	1.9	0	81	201	84	70
356	53.616	0.150	0.070	2.24	100	-1.05	98	1.8	-0.1	81	200	84	70
357	53.768	0.152	0.070	2.25	100	-0.06	100	1.9	0.1	81	200	86	70
358	53.917	0.149	0.070	2.23	100	-1.27	98	1.8	-0.1	81	200	86	70
359	54.069	0.152	0.070	2.26	100	-2.71	100	1.8	0	81	200	85	70
360	54.217	0.148	0.070	2.25	100	0	97	1.9	0.1	81	200	83	70
361	54.370	0.153	0.070	2.24	100	-1.49	100	1.8	-0.1	81	200	83	70
362	54.518	0.148	0.070	2.24	100	-2.68	97	1.7	-0.1	81	200	84	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
363	54.672	0.154	0.070	2.24	100	-0.69	101	1.8	0.1	81	200	86	70
364	54.820	0.148	0.070	2.26	100	-1.3	97	1.7	-0.1	81	199	86	70
365	54.972	0.152	0.070	2.25	100	-0.12	100	1.7	0	81	199	84	70
366	55.121	0.149	0.070	2.27	100	-0.14	98	1.7	0	81	199	83	70
367	55.271	0.150	0.070	2.27	100	-0.65	98	1.7	0	81	199	84	70
368	55.423	0.152	0.070	2.25	100	-2.85	100	1.7	0	81	199	85	70
369	55.573	0.150	0.070	2.24	100	-2.52	98	1.7	0	81	199	86	70
370	55.726	0.153	0.070	2.26	100	-2.81	100	1.6	-0.1	81	198	86	70
371	55.873	0.147	0.070	2.26	100	-0.07	96	1.6	0	81	199	84	70
372	56.026	0.153	0.070	2.25	100	-0.64	100	1.6	0	81	199	83	70
373	56.173	0.147	0.070	2.24	100	-0.1	96	1.6	0	81	198	84	70
374	56.327	0.154	0.070	2.25	100	-2.5	101	1.6	0	81	198	85	70
375	56.475	0.148	0.070	2.25	100	-2.46	97	1.6	0	80	198	86	70
376	56.628	0.153	0.070	2.24	100	-2.61	100	1.5	-0.1	80	198	85	70
377	56.776	0.148	0.070	2.25	100	-1.05	97	1.5	0	80	198	84	70
378	56.927	0.151	0.070	2.23	100	-0.02	99	1.6	0.1	80	198	84	70
379	57.076	0.149	0.070	2.25	100	-2.38	98	1.5	-0.1	80	198	84	70
380	57.227	0.151	0.070	2.25	100	-0.1	99	1.5	0	80	198	86	70
381	57.379	0.152	0.070	2.24	100	-1.15	100	1.6	0.1	80	198	86	70
382	57.528	0.149	0.070	2.23	100	-2.82	98	1.4	-0.2	80	198	85	70
383	57.681	0.153	0.070	2.24	100	-1.1	100	1.5	0.1	80	198	83	70
384	57.828	0.147	0.070	2.24	100	-2.86	96	1.5	0	80	198	84	70
385	57.981	0.153	0.070	2.25	100	-0.5	100	1.4	-0.1	80	198	85	70
386	58.128	0.147	0.070	2.26	100	-2.88	96	1.4	0	80	198	86	70
387	58.282	0.154	0.070	2.23	100	-0.74	101	1.4	0	80	198	85	70
388	58.430	0.148	0.070	2.25	99	-0.2	97	1.4	0	80	198	84	70
389	58.583	0.153	0.070	2.23	100	-1.51	100	1.4	0	80	198	83	70
390	58.731	0.148	0.070	2.25	99	-2.86	97	1.4	0	80	198	84	70
391	58.882	0.151	0.070	2.24	99	-0.05	99	1.4	0	80	198	85	70
392	59.031	0.149	0.070	2.24	99	-2.74	98	1.3	-0.1	80	197	86	70
393	59.182	0.151	0.070	2.23	99	-1.51	99	1.3	0	80	197	85	70
394	59.334	0.152	0.070	2.23	99	-2.74	100	1.3	0	80	197	83	70
395	59.483	0.149	0.070	2.23	99	-2.83	98	1.5	0.2	80	198	83	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
396	59.635	0.152	0.070	2.24	99	-2.54	100	1.3	-0.2	80	197	84	70
397	59.782	0.147	0.070	2.25	99	-2.9	96	1.3	0	80	197	86	70
398	59.935	0.153	0.070	2.25	99	-2.61	100	1.2	-0.1	80	197	86	70
399	60.082	0.147	0.070	2.23	99	-2.89	96	1.2	0	80	198	84	70
400	60.236	0.154	0.070	2.23	99	-2.87	101	1.2	0	80	198	83	70
401	60.384	0.148	0.070	2.23	99	-2.83	97	1.2	0	80	197	84	69
402	60.537	0.153	0.070	2.23	99	-0.25	100	1.2	0	80	197	85	70
403	60.685	0.148	0.070	2.23	99	-0.23	97	1.2	0	80	198	86	70
404	60.836	0.151	0.070	2.24	99	-0.32	99	1.2	0	80	198	85	70
405	60.985	0.149	0.070	2.23	99	-0.43	98	1.1	-0.1	80	198	84	70
406	61.135	0.150	0.070	2.23	99	-2.88	98	1.1	0	80	199	83	70
407	61.287	0.152	0.070	2.23	99	-0.31	100	1.1	0	80	199	84	70
408	61.436	0.149	0.070	2.23	99	-1.15	98	1.1	0	80	199	85	70
409	61.589	0.153	0.070	2.22	99	-1.25	100	1.1	0	80	199	86	70
410	61.736	0.147	0.070	2.25	99	-0.3	96	1.1	0	80	199	85	70
411	61.888	0.152	0.070	2.22	99	-2.8	100	1.0	-0.1	80	199	83	69
412	62.035	0.147	0.070	2.23	99	-2.44	96	1.0	0	80	199	84	70
413	62.188	0.153	0.070	2.23	99	0	100	1.0	0	80	199	85	70
414	62.336	0.148	0.070	2.21	99	-0.15	97	1.1	0.1	80	200	86	70
415	62.489	0.153	0.070	2.23	99	-1.83	100	0.9	-0.2	80	200	86	69
416	62.637	0.148	0.070	2.23	99	-1.37	97	1.1	0.2	80	201	84	69
417	62.789	0.152	0.070	2.24	99	-2.91	100	1.1	0	80	201	84	69
418	62.937	0.148	0.070	2.25	99	-0.15	97	0.9	-0.2	80	201	84	69
419	63.088	0.151	0.070	2.24	99	-2.75	99	0.9	0	80	201	85	69
420	63.238	0.150	0.070	2.23	99	-0.21	98	0.9	0	80	201	86	69
421	63.388	0.150	0.070	2.22	99	-2.17	98	1.0	0.1	80	202	85	70
422	63.540	0.152	0.070	2.22	99	-2.41	100	0.9	-0.1	80	202	84	70
423	63.689	0.149	0.070	2.25	99	-2.83	98	0.9	0	80	202	84	69
424	63.840	0.151	0.070	2.25	99	-0.36	99	0.9	0	80	202	84	70
425	63.987	0.147	0.070	2.24	99	-0.41	96	0.9	0	80	202	85	69
426	64.140	0.153	0.070	2.24	99	-0.03	100	0.8	-0.1	80	201	86	69
427	64.287	0.147	0.070	2.21	99	-2.66	96	0.8	0	80	201	85	70
428	64.441	0.154	0.070	2.22	99	-0.75	101	0.8	0	80	202	83	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
429	64.588	0.147	0.070	2.25	99	-0.13	96	0.8	0	80	202	84	70
430	64.741	0.153	0.070	2.22	99	-0.24	100	0.8	0	80	202	85	69
431	64.888	0.147	0.070	2.25	99	-2.32	96	0.8	0	80	202	86	70
432	65.039	0.151	0.070	2.22	99	-2.7	99	0.7	-0.1	80	202	86	70
433	65.188	0.149	0.070	2.25	99	-1.2	98	0.8	0.1	80	201	84	70
434	65.339	0.151	0.070	2.21	99	-0.4	99	0.7	-0.1	80	201	83	69
435	65.490	0.151	0.070	2.21	99	-2.92	99	0.7	0	80	201	84	69
436	65.639	0.149	0.070	2.24	99	-0.2	98	0.8	0.1	80	200	85	69
437	65.791	0.152	0.070	2.23	99	-0.06	100	0.7	-0.1	80	200	86	69
438	65.938	0.147	0.070	2.23	99	-1.49	96	0.7	0	80	200	85	69
439	66.090	0.152	0.070	2.22	99	-0.26	100	0.7	0	80	199	84	69
440	66.237	0.147	0.070	2.23	99	-0.09	96	0.7	0	80	199	84	69
441	66.390	0.153	0.070	2.22	99	-0.79	100	0.8	0.1	80	199	84	69
442	66.537	0.147	0.070	2.23	99	-1.03	96	0.6	-0.2	80	199	86	69
443	66.690	0.153	0.070	2.22	99	-2.84	100	0.7	0.1	80	199	86	69
444	66.838	0.148	0.070	2.23	99	-0.51	97	0.7	0	80	198	84	69
445	66.990	0.152	0.070	2.22	99	-0.45	100	0.6	-0.1	79	198	83	69
446	67.137	0.147	0.070	2.23	99	-0.04	96	0.6	0	79	198	84	69
447	67.289	0.152	0.070	2.25	99	-2.83	100	0.6	0	79	197	85	69
448	67.438	0.149	0.070	2.23	99	-2.74	98	0.6	0	79	197	86	69
449	67.589	0.151	0.070	2.23	99	-1.19	99	0.5	-0.1	79	197	85	69
450	67.740	0.151	0.070	2.24	99	-0.13	99	0.5	0	79	197	84	69
451	67.888	0.148	0.070	2.23	99	-1.7	97	0.5	0	79	197	83	69
452	68.040	0.152	0.070	2.23	99	-0.21	100	0.5	0	79	197	84	69
453	68.187	0.147	0.070	2.24	99	-2.46	96	0.5	0	79	196	85	69
454	68.340	0.153	0.070	2.23	99	-2.78	100	0.5	0	79	196	86	69
455	68.486	0.146	0.070	2.22	99	-0.66	96	0.5	0	79	197	85	69
456	68.640	0.154	0.070	2.22	99	-1.03	101	0.4	-0.1	79	196	83	69
457	68.787	0.147	0.070	2.23	99	-2.41	96	0.5	0.1	79	195	84	69
458	68.940	0.153	0.070	2.21	99	-2.88	100	0.4	-0.1	79	195	84	69
459	69.088	0.148	0.070	2.22	99	-0.91	97	0.5	0.1	79	195	86	69
460	69.239	0.151	0.070	2.22	99	-0.98	99	0.5	0	79	195	86	69
461	69.387	0.148	0.070	2.22	99	-1.09	97	0.5	0	79	195	84	69

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
462	69.538	0.151	0.070	2.23	99	-2.81	99	0.5	0	79	195	84	69
463	69.687	0.149	0.070	2.24	99	-2.86	98	0.4	-0.1	79	195	84	69
464	69.838	0.151	0.070	2.22	99	-1.9	99	0.5	0.1	79	195	85	69
465	69.989	0.151	0.070	2.23	99	-1.71	99	0.3	-0.2	79	194	86	69
466	70.138	0.149	0.070	2.19	99	-0.24	98	0.4	0.1	79	194	85	69
467	70.289	0.151	0.070	2.23	99	-0.16	99	0.3	-0.1	79	193	84	69
468	70.436	0.147	0.070	2.22	99	-0.06	96	0.3	0	79	193	83	69
469	70.588	0.152	0.070	2.22	99	-0.09	100	0.3	0	79	194	84	69
470	70.735	0.147	0.070	2.22	99	-2.8	96	0.3	0	79	193	85	69
471	70.889	0.154	0.070	2.23	99	-2.19	101	0.4	0.1	79	193	86	69
472	71.036	0.147	0.070	2.23	99	-2.2	96	0.3	-0.1	79	193	85	69
473	71.189	0.153	0.070	2.21	99	-2.71	100	0.2	-0.1	79	193	83	69
474	71.336	0.147	0.070	2.22	99	-2.12	96	0.2	0	79	193	84	69
475	71.487	0.151	0.070	2.23	99	-0.5	99	0.2	0	79	193	85	69
476	71.636	0.149	0.070	2.25	98	-0.06	98	0.2	0	79	193	86	69
477	71.786	0.150	0.070	2.23	98	-0.11	99	0.2	0	79	192	86	69
478	71.936	0.150	0.070	2.22	98	-0.53	99	0.2	0	79	192	84	69
479	72.086	0.150	0.070	2.24	98	-1.77	99	0.2	0	79	192	83	69
480	72.238	0.152	0.070	2.23	98	-0.1	100	0.2	0	79	192	84	69
481	72.386	0.148	0.070	2.24	98	-1.03	97	0.2	0	79	191	85	69
482	72.538	0.152	0.070	2.23	98	-2.56	100	0.1	-0.1	79	191	86	69
483	72.684	0.146	0.070	2.21	98	-2.56	96	0.1	0	79	191	85	69
484	72.837	0.153	0.070	2.22	98	-1.25	100	0.2	0.1	78	191	84	69
485	72.984	0.147	0.070	2.22	98	-0.18	97	0.1	-0.1	79	191	83	69
486	73.137	0.153	0.070	2.23	98	-0.16	101	0.1	0	79	191	84	69
487	73.285	0.148	0.070	2.23	98	-2.6	97	0.1	0	78	190	85	69
488	73.437	0.152	0.070	2.21	98	-0.01	100	0.1	0	78	189	86	69
489	73.585	0.148	0.070	2.22	98	-0.48	97	0.1	0	78	190	85	69
490	73.736	0.151	0.070	2.23	98	-1.16	99	0.0	-0.1	78	189	83	69
Avg/Tot	73.736	0.150	0.070	2.25	97	-1.26	100			90	278	85	71.7

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.00	74	-1		85	0.000	7.11	0.29
1	0.109	0.109	2.22	74	-2.31	80	86	-0.070	5.20	0.25
2	0.255	0.146	2.19	74	-3.15	107	86	-0.090	5.79	0.79
3	0.397	0.142	2.19	74	-2.36	104	86	-0.080	14.36	1.87
4	0.538	0.141	2.17	74	-3.45	103	85	-0.090	15.26	3.79
5	0.680	0.142	2.49	74	-1.92	104	84	-0.080	15.34	2.13
6	0.835	0.155	2.48	75	-1.3	113	84	-0.070	15.26	1.37
7	0.983	0.148	2.33	75	-2.75	108	81	-0.090	15.43	1.05
8	1.133	0.150	2.29	75	-0.74	109	85	-0.080	15.50	0.98
9	1.276	0.143	2.28	75	-0.87	104	86	-0.080	15.60	1.14
10	1.424	0.148	2.24	75	-2.74	107	86	-0.080	15.72	1.46
11	1.566	0.142	2.24	76	-2.92	103	86	-0.080	15.68	1.57
12	1.713	0.147	2.21	76	-1.37	106	86	-0.090	15.52	1.60
13	1.854	0.141	2.21	76	-2.12	102	85	-0.080	15.55	1.41
14	2.001	0.147	2.21	76	-0.89	106	85	-0.080	15.51	1.24
15	2.141	0.140	2.21	77	-0.94	101	85	-0.090	15.24	1.14
16	2.288	0.147	2.20	77	-0.72	106	85	-0.080	15.01	1.06
17	2.430	0.142	2.17	77	-3.13	103	85	-0.070	14.74	0.89
18	2.576	0.146	2.20	78	-2.53	105	86	-0.080	14.52	0.81
19	2.719	0.143	2.20	78	-1.41	103	86	-0.090	14.36	0.72
20	2.863	0.144	2.19	79	-3.06	104	86	-0.080	14.36	0.60
21	3.006	0.143	2.19	79	-1.78	103	86	-0.080	14.21	0.54
22	3.149	0.143	2.19	79	-3.19	103	85	-0.080	14.11	0.51
23	3.292	0.143	2.16	80	-3.22	102	85	-0.070	14.11	0.47
24	3.435	0.143	2.17	80	-2.18	102	85	-0.080	13.91	0.41
25	3.581	0.146	2.17	80	-0.85	104	85	-0.070	13.54	0.40
26	3.723	0.142	2.17	81	-2.01	101	86	-0.080	13.43	0.28
27	3.869	0.146	2.18	81	-2.56	104	86	-0.070	13.20	0.20
28	4.012	0.143	2.25	81	-0.81	102	86	-0.080	12.85	0.19
29	4.161	0.149	2.25	82	-3.3	106	86	-0.080	12.62	0.18
30	4.305	0.144	2.26	82	-2.32	102	85	-0.080	12.50	0.11
31	4.454	0.149	2.24	82	-2.5	106	85	-0.070	12.15	0.17

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.598	0.144	2.25	83	-3.2	102	85	-0.070	12.20	0.10
33	4.747	0.149	2.26	83	-0.78	105	85	-0.070	11.92	0.15
34	4.892	0.145	2.27	84	-2.55	102	86	-0.080	11.89	0.14
35	5.041	0.149	2.26	84	-1.87	105	86	-0.070	11.66	0.13
36	5.186	0.145	2.27	84	-2.73	102	86	-0.070	11.71	0.14
37	5.335	0.149	2.27	85	-1.02	105	85	-0.080	11.39	0.16
38	5.480	0.145	2.26	85	-1.33	102	85	-0.080	11.61	0.15
39	5.629	0.149	2.25	85	-1.02	105	85	-0.070	11.46	0.12
40	5.774	0.145	2.25	86	-2.74	102	85	-0.080	11.46	0.13
41	5.923	0.149	2.26	86	-3.26	105	85	-0.070	11.28	0.11
42	6.067	0.144	2.26	86	-0.84	101	86	-0.080	11.27	0.14
43	6.217	0.150	2.26	86	-3.27	105	86	-0.070	11.12	0.15
44	6.361	0.144	2.25	87	-3.22	101	86	-0.080	11.10	0.10
45	6.511	0.150	2.25	87	-1.23	105	86	-0.080	11.05	0.15
46	6.656	0.145	2.26	87	-0.77	102	85	-0.080	11.08	0.14
47	6.805	0.149	2.26	88	-1	104	85	-0.070	11.08	0.14
48	6.951	0.146	2.23	88	-1.27	102	85	-0.080	10.81	0.14
49	7.100	0.149	2.26	88	-2.45	104	85	-0.080	10.75	0.19
50	7.246	0.146	2.25	88	-3.2	102	86	-0.060	10.84	0.12
51	7.395	0.149	2.25	89	-3.21	104	86	-0.070	10.79	0.12
52	7.541	0.146	2.25	89	-3.27	102	86	-0.080	10.69	0.17
53	7.689	0.148	2.25	89	-1.47	103	86	-0.070	11.01	0.15
54	7.835	0.146	2.25	89	-3.25	102	85	-0.080	10.86	0.16
55	7.984	0.149	2.23	90	-2.52	104	85	-0.070	10.91	0.14
56	8.131	0.147	2.24	90	-2.38	102	85	-0.070	10.98	0.13
57	8.280	0.149	2.24	90	-0.93	104	85	-0.070	10.94	0.13
58	8.427	0.147	2.25	90	-1.23	102	86	-0.080	10.88	0.13
59	8.575	0.148	2.24	91	-1.88	103	86	-0.070	10.84	0.13
60	8.723	0.148	2.25	91	-3.18	103	86	-0.080	10.93	0.13
61	8.871	0.148	2.24	91	-3.06	103	86	-0.070	11.00	0.11
62	9.019	0.148	2.25	91	-1.43	103	85	-0.070	10.90	0.11
63	9.166	0.147	2.25	92	-3.25	102	85	-0.070	11.23	0.09

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.315	0.149	2.25	92	-0.85	103	85	-0.070	10.95	0.14
65	9.462	0.147	2.23	92	-0.91	102	85	-0.070	11.15	0.13
66	9.611	0.149	2.26	92	-2.31	103	86	-0.080	11.15	0.12
67	9.758	0.147	2.24	92	-3.05	102	86	-0.060	11.23	0.12
68	9.907	0.149	2.25	92	-2.98	103	86	-0.080	11.21	0.11
69	10.052	0.145	2.24	93	-3.18	100	85	-0.070	11.15	0.13
70	10.202	0.150	2.24	93	-2.46	104	85	-0.070	11.31	0.10
71	10.348	0.146	2.24	93	-3.1	101	85	-0.070	11.32	0.07
72	10.498	0.150	2.24	93	-3.09	104	85	-0.060	11.09	0.11
73	10.644	0.146	2.24	93	-1.56	101	85	-0.050	10.94	0.11
74	10.794	0.150	2.25	94	-0.8	103	86	-0.070	10.74	0.09
75	10.939	0.145	2.24	94	-2.3	100	86	-0.070	10.79	0.14
76	11.090	0.151	2.23	94	-3.27	104	86	-0.070	10.76	0.12
77	11.236	0.146	2.24	94	-1.53	101	86	-0.070	10.81	0.10
78	11.387	0.151	2.24	94	-3.05	104	85	-0.070	10.95	0.11
79	11.532	0.145	2.24	94	-0.82	100	85	-0.070	10.80	0.13
80	11.683	0.151	2.24	94	-3.17	104	85	-0.080	10.90	0.13
81	11.828	0.145	2.24	95	-1.7	100	85	-0.070	10.96	0.12
82	11.979	0.151	2.23	95	-0.97	104	86	-0.070	11.00	0.10
83	12.125	0.146	2.22	95	-3.1	100	86	-0.070	11.21	0.12
84	12.275	0.150	2.24	95	-3.04	103	86	-0.070	11.41	0.15
85	12.421	0.146	2.23	95	-0.85	100	86	-0.070	11.68	0.14
86	12.570	0.149	2.23	95	-0.85	103	85	-0.070	11.89	0.18
87	12.716	0.146	2.24	95	-0.85	101	85	-0.080	12.31	0.20
88	12.866	0.150	2.22	96	-1.63	103	85	-0.080	12.44	0.23
89	13.012	0.146	2.23	96	-2.01	100	85	-0.080	12.44	0.22
90	13.162	0.150	2.24	96	-0.84	103	86	-0.080	12.00	0.17
91	13.308	0.146	2.22	96	-1.02	100	86	-0.070	10.87	0.16
92	13.457	0.149	2.22	96	-1.19	102	86	-0.060	10.24	0.12
93	13.603	0.146	2.22	96	-1.73	100	86	-0.070	10.16	0.11
94	13.752	0.149	2.22	96	-3.13	102	85	-0.070	10.08	0.15
95	13.900	0.148	2.22	96	-0.9	102	85	-0.070	10.13	0.15

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.049	0.149	2.22	96	-2.08	102	85	-0.070	10.32	0.11
97	14.196	0.147	2.22	97	-3.34	101	85	-0.060	10.25	0.13
98	14.345	0.149	2.22	97	-3.23	102	85	-0.070	10.31	0.13
99	14.493	0.148	2.21	97	-2.28	101	86	-0.070	10.39	0.12
100	14.641	0.148	2.22	97	-0.87	101	86	-0.070	10.23	0.16
101	14.789	0.148	2.22	97	-3.21	101	86	-0.060	10.09	0.16
102	14.936	0.147	2.23	97	-2.41	101	85	-0.060	10.01	0.16
103	15.086	0.150	2.22	97	-1.75	103	85	-0.070	9.82	0.18
104	15.232	0.146	2.22	97	-1.04	100	85	-0.070	9.57	0.17
105	15.381	0.149	2.23	97	-2.64	102	85	-0.060	9.61	0.15
106	15.527	0.146	2.23	97	-1.42	100	85	-0.070	9.38	0.17
107	15.677	0.150	2.22	97	-3.25	103	86	-0.060	9.23	0.16
108	15.823	0.146	2.23	97	-1.48	100	86	-0.070	9.05	0.19
109	15.973	0.150	2.21	98	-3.24	102	86	-0.070	9.16	0.14
110	16.119	0.146	2.22	98	-2.33	100	85	-0.060	9.08	0.14
111	16.269	0.150	2.22	98	-3.17	102	85	-0.060	8.95	0.17
112	16.415	0.146	2.22	98	-1.27	100	85	-0.060	8.95	0.16
113	16.566	0.151	2.23	98	-3.24	103	85	-0.070	8.70	0.21
114	16.711	0.145	2.22	98	-2.48	99	85	-0.070	8.71	0.22
115	16.862	0.151	2.22	98	-1.51	103	86	-0.070	8.77	0.24
116	17.008	0.146	2.22	98	-1.05	100	86	-0.070	8.67	0.26
117	17.158	0.150	2.22	98	-3.24	102	86	-0.080	8.77	0.23
118	17.304	0.146	2.22	98	-2.46	100	86	-0.060	8.93	0.20
119	17.455	0.151	2.20	98	-3.08	103	85	-0.060	8.60	0.24
120	17.600	0.145	2.22	98	-3.31	99	85	-0.050	8.77	0.22
121	17.750	0.150	2.20	98	-1	102	85	-0.070	8.74	0.27
122	17.896	0.146	2.21	98	-3.21	99	85	-0.070	8.63	0.29
123	18.045	0.149	2.22	98	-0.89	101	86	-0.060	8.64	0.26
124	18.192	0.147	2.21	99	-0.81	100	86	-0.070	8.35	0.24
125	18.342	0.150	2.22	99	-3.28	102	86	-0.060	8.19	0.21
126	18.488	0.146	2.23	99	-0.8	99	85	-0.060	8.02	0.22
127	18.637	0.149	2.22	99	-1.53	101	85	-0.060	7.95	0.25

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	18.784	0.147	2.23	99	-1.76	100	84	-0.060	7.95	0.26
129	18.933	0.149	2.21	99	-1.54	101	85	-0.060	7.95	0.24
130	19.081	0.148	2.20	99	-0.88	100	85	-0.070	8.05	0.25
131	19.229	0.148	2.21	99	-1.63	100	86	-0.060	7.97	0.26
132	19.378	0.149	2.22	99	-0.94	101	86	-0.060	8.17	0.21
133	19.526	0.148	2.23	99	-0.9	100	86	-0.060	7.84	0.29
134	19.674	0.148	2.21	99	-0.87	100	86	-0.060	7.69	0.31
135	19.822	0.148	2.21	99	-2.78	100	85	-0.050	7.52	0.32
136	19.971	0.149	2.22	99	-2	101	85	-0.060	7.35	0.38
137	20.118	0.147	2.21	99	-2.21	100	85	-0.050	7.40	0.34
138	20.267	0.149	2.23	99	-0.92	101	85	-0.070	7.35	0.37
139	20.414	0.147	2.22	99	-1.66	100	85	-0.060	7.32	0.29
140	20.563	0.149	2.22	99	-1.88	101	86	-0.060	7.46	0.31
141	20.709	0.146	2.21	99	-0.97	99	86	-0.060	7.46	0.30
142	20.860	0.151	2.21	99	-3.22	102	85	-0.050	7.41	0.24
143	21.005	0.145	2.21	99	-3.25	98	85	-0.060	7.33	0.28
144	21.156	0.151	2.21	99	-0.95	102	84	-0.050	6.94	0.32
145	21.302	0.146	2.20	99	-1.01	99	85	-0.060	7.00	0.37
146	21.453	0.151	2.22	99	-2.63	102	85	-0.050	6.76	0.39
147	21.598	0.145	2.22	99	-0.93	98	86	-0.060	6.79	0.36
148	21.750	0.152	2.22	99	-2.69	103	86	-0.050	6.85	0.37
149	21.895	0.145	2.21	100	-1.09	98	86	-0.050	6.99	0.33
150	22.046	0.151	2.21	100	-2.2	102	85	-0.050	7.00	0.34
151	22.191	0.145	2.21	100	-2.67	98	85	-0.060	7.15	0.33
152	22.343	0.152	2.23	100	-2.97	103	84	-0.060	7.00	0.37
153	22.488	0.145	2.21	100	-3.31	98	84	-0.060	6.94	0.43
154	22.638	0.150	2.21	100	-3.03	101	85	-0.060	6.83	0.45
155	22.784	0.146	2.23	100	-1.3	99	85	-0.070	6.81	0.44
156	22.934	0.150	2.21	100	-1.4	101	86	-0.070	6.62	0.54
157	23.081	0.147	2.23	100	-3.04	99	86	-0.060	6.50	0.57
158	23.230	0.149	2.21	100	-3.05	101	86	-0.050	6.63	0.55
159	23.377	0.147	2.21	100	-1	99	85	-0.040	6.63	0.54

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	23.526	0.149	2.21	100	-1.7	101	85	-0.060	6.53	0.56
161	23.674	0.148	2.20	100	-2.34	100	84	-0.050	6.58	0.55
162	23.823	0.149	2.22	100	-3.04	100	85	-0.050	6.73	0.51
163	23.971	0.148	2.22	100	-1.08	100	85	-0.060	6.64	0.49
164	24.120	0.149	2.21	100	-3.23	100	86	-0.060	6.83	0.48
165	24.268	0.148	2.22	100	-1.47	100	86	-0.050	6.58	0.49
166	24.416	0.148	2.21	100	-0.84	100	86	-0.060	6.54	0.48
167	24.566	0.150	2.22	100	-1.24	101	85	-0.050	6.61	0.50
168	24.712	0.146	2.22	100	-2.12	98	85	-0.050	6.67	0.45
169	24.862	0.150	2.21	100	-1.43	101	85	-0.050	6.62	0.44
170	25.008	0.146	2.23	100	-2.39	98	85	-0.070	6.45	0.48
171	25.158	0.150	2.20	100	-1.62	101	85	-0.050	6.57	0.44
172	25.305	0.147	2.21	100	-2.65	99	86	-0.040	6.46	0.47
173	25.455	0.150	2.21	100	-3.18	101	86	-0.050	6.62	0.44
174	25.600	0.145	2.21	100	-3.32	98	86	-0.060	6.65	0.43
175	25.751	0.151	2.21	100	-1.14	102	85	-0.050	6.36	0.49
176	25.897	0.146	2.20	100	-3.31	98	85	-0.050	6.09	0.54
177	26.048	0.151	2.20	100	-2.19	102	84	-0.050	5.80	0.66
178	26.194	0.146	2.21	100	-2.59	98	85	-0.050	5.65	0.91
179	26.345	0.151	2.21	100	-0.84	102	85	-0.050	5.51	1.02
180	26.490	0.145	2.21	100	-1.11	98	86	-0.050	5.53	1.05
181	26.641	0.151	2.20	100	-0.91	102	86	-0.040	5.66	1.02
182	26.787	0.146	2.19	100	-3	98	86	-0.040	5.79	1.00
183	26.938	0.151	2.20	100	-0.93	102	85	-0.040	5.73	0.99
184	27.083	0.145	2.21	100	-2.84	98	85	-0.050	5.54	1.02
185	27.233	0.150	2.21	100	-2.29	101	84	-0.050	5.72	1.00
186	27.378	0.145	2.21	100	-3.23	98	85	-0.050	5.68	0.99
187	27.529	0.151	2.21	100	-3.24	102	85	-0.050	5.70	1.02
188	27.675	0.146	2.20	100	-0.92	98	86	-0.040	5.66	0.99
189	27.824	0.149	2.20	100	-2.21	100	86	-0.050	5.74	0.97
190	27.970	0.146	2.20	100	-1.59	98	86	-0.030	5.72	1.00
191	28.120	0.150	2.20	100	-0.89	101	85	-0.040	5.54	1.02

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	28.267	0.147	2.20	100	-0.91	99	85	-0.040	5.64	1.06
193	28.417	0.150	2.20	100	-3.27	101	84	-0.040	5.70	1.04
194	28.564	0.147	2.19	100	-2.46	99	85	-0.040	5.48	1.06
195	28.713	0.149	2.20	100	-1.56	100	85	-0.050	5.52	1.04
196	28.861	0.148	2.20	100	-2.13	99	86	-0.040	5.47	1.14
197	29.009	0.148	2.19	100	-2.36	99	86	-0.050	5.35	1.16
198	29.157	0.148	2.21	100	-3.26	99	86	-0.050	5.35	1.14
199	29.305	0.148	2.21	100	-2.28	99	85	-0.040	5.39	1.10
200	29.454	0.149	2.21	100	-0.93	100	85	-0.050	5.45	1.09
201	29.601	0.147	2.20	100	-1.14	99	84	-0.040	5.58	1.07
202	29.749	0.148	2.21	100	-1.6	99	85	-0.050	5.52	1.07
203	29.896	0.147	2.22	100	-2.6	99	85	-0.040	5.59	1.06
204	30.046	0.150	2.20	100	-0.86	101	86	-0.050	5.54	1.05
205	30.192	0.146	2.20	100	-3.08	98	86	-0.040	5.54	1.06
206	30.342	0.150	2.20	100	-1.2	101	86	-0.040	5.50	1.10
207	30.487	0.145	2.20	100	-3.28	97	85	-0.040	5.48	1.08
208	30.638	0.151	2.20	100	-1.81	101	85	-0.040	5.42	1.12
209	30.783	0.145	2.18	100	-2.11	97	84	-0.030	5.42	1.11
210	30.935	0.152	2.21	100	-1.64	102	85	-0.050	5.46	1.02
211	31.080	0.145	2.20	100	-3.17	97	85	-0.040	5.33	0.99
212	31.231	0.151	2.20	100	-1.25	101	86	-0.050	5.43	0.97
213	31.376	0.145	2.20	100	-0.97	97	86	-0.040	5.36	0.95
214	31.526	0.150	2.19	100	-0.98	101	86	-0.040	5.38	0.92
215	31.672	0.146	2.20	100	-2.89	98	85	-0.040	5.40	0.94
216	31.823	0.151	2.18	100	-3.33	101	85	-0.040	5.27	0.93
217	31.969	0.146	2.21	100	-0.95	98	84	-0.050	5.28	0.91
218	32.119	0.150	2.21	100	-3.35	101	85	-0.040	5.28	0.88
219	32.264	0.145	2.21	100	-0.98	97	85	-0.040	5.40	0.88
220	32.414	0.150	2.21	100	-1.68	101	85	-0.050	5.25	0.89
221	32.560	0.146	2.19	100	-0.82	98	86	-0.040	5.31	0.86
222	32.710	0.150	2.20	100	-2.75	101	86	-0.040	5.55	0.82
223	32.856	0.146	2.20	100	-3.37	98	85	-0.040	5.52	0.78

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	33.005	0.149	2.20	100	-1.38	100	85	-0.040	5.38	0.83
225	33.152	0.147	2.21	100	-2.09	99	84	-0.040	5.48	0.81
226	33.301	0.149	2.19	100	-2.91	100	85	-0.040	5.36	0.80
227	33.449	0.148	2.21	100	-2.71	99	85	-0.050	5.57	0.79
228	33.598	0.149	2.20	100	-0.88	100	86	-0.040	5.31	0.81
229	33.746	0.148	2.20	100	-0.9	99	86	-0.040	5.30	0.78
230	33.894	0.148	2.20	100	-3.29	99	86	-0.040	5.46	0.76
231	34.042	0.148	2.19	100	-1.39	99	85	-0.050	5.51	0.76
232	34.190	0.148	2.21	100	-0.87	99	85	-0.050	5.44	0.74
233	34.339	0.149	2.20	100	-3.28	100	84	-0.050	5.47	0.76
234	34.486	0.147	2.21	100	-3.27	99	85	-0.050	5.37	0.76
235	34.635	0.149	2.20	100	-0.96	100	85	-0.050	5.63	0.74
236	34.781	0.146	2.21	100	-1.38	98	85	-0.040	5.49	0.79
237	34.930	0.149	2.20	100	-2.24	100	86	-0.040	5.38	0.76
238	35.076	0.146	2.20	100	-2.71	98	86	-0.040	5.27	0.79
239	35.226	0.150	2.20	100	-1.86	101	85	-0.040	5.26	0.79
240	35.373	0.147	2.20	100	-1.57	99	85	-0.040	5.21	0.79
241	35.522	0.149	2.21	100	-2.66	100	84	-0.040	5.27	0.75
242	35.668	0.146	2.21	100	-2.74	98	84	-0.050	5.31	0.70
243	35.818	0.150	2.19	100	-1.7	101	85	-0.030	5.20	0.73
244	35.964	0.146	2.19	100	-0.87	98	85	-0.040	5.29	0.72
245	36.115	0.151	2.20	100	-3.11	101	86	-0.040	5.18	0.73
246	36.260	0.145	2.20	100	-2.33	97	86	-0.040	5.42	0.71
247	36.411	0.151	2.19	100	-1.26	101	85	-0.050	5.28	0.70
248	36.556	0.145	2.20	100	-0.8	97	85	-0.040	5.24	0.71
249	36.707	0.151	2.21	100	-0.89	101	84	-0.040	5.19	0.74
250	36.852	0.145	2.21	100	-2.33	97	84	-0.040	5.26	0.73
251	37.003	0.151	2.19	100	-0.93	101	84	-0.040	5.14	0.76
252	37.149	0.146	2.22	100	-3.43	98	85	-0.030	5.28	0.72
253	37.299	0.150	2.20	100	-3.28	100	85	-0.050	5.23	0.71
254	37.444	0.145	2.21	100	-1.88	97	85	-0.050	5.17	0.74
255	37.594	0.150	2.21	100	-3.34	100	85	-0.030	5.29	0.73

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	37.739	0.145	2.21	100	-3.21	97	85	-0.030	5.02	0.81
257	37.889	0.150	2.19	100	-3.28	100	84	-0.040	5.02	0.77
258	38.036	0.147	2.21	100	-0.91	98	84	-0.040	5.08	0.74
259	38.185	0.149	2.22	100	-3.37	100	85	-0.050	5.04	0.74
260	38.331	0.146	2.21	100	-2.72	98	85	-0.040	4.99	0.74
261	38.480	0.149	2.20	100	-3.31	100	85	-0.050	5.14	0.71
262	38.627	0.147	2.19	100	-1.72	98	85	-0.020	5.07	0.69
263	38.776	0.149	2.20	100	-1.83	100	85	-0.040	5.12	0.69
264	38.924	0.148	2.20	100	-0.97	99	85	-0.050	5.08	0.67
265	39.072	0.148	2.20	100	-1.3	99	84	-0.040	5.14	0.68
266	39.221	0.149	2.20	100	-2.06	100	84	-0.040	5.04	0.72
267	39.368	0.147	2.20	100	-1.04	98	85	-0.040	4.92	0.71
268	39.517	0.149	2.21	100	-1.63	100	85	-0.040	4.92	0.70
269	39.664	0.147	2.19	100	-0.91	98	85	-0.040	5.04	0.66
270	39.813	0.149	2.19	100	-1.19	100	86	-0.040	5.05	0.68
271	39.960	0.147	2.20	100	-2.78	98	85	-0.050	5.04	0.69
272	40.109	0.149	2.20	100	-1.17	100	85	-0.040	5.09	0.66
273	40.255	0.146	2.20	100	-1.98	98	84	-0.040	5.20	0.69
274	40.405	0.150	2.20	100	-3.35	100	84	-0.040	5.17	0.70
275	40.551	0.146	2.19	100	-2.81	98	84	-0.040	5.09	0.69
276	40.701	0.150	2.23	100	-3.35	100	85	-0.050	5.23	0.69
277	40.847	0.146	2.19	100	-2.49	98	85	-0.030	5.22	0.69
278	40.996	0.149	2.20	100	-0.97	100	85	-0.040	4.85	0.82
279	41.142	0.146	2.20	100	-1.37	98	85	-0.040	4.72	0.79
280	41.292	0.150	2.20	100	-2.9	100	85	-0.040	4.79	0.76
281	41.438	0.146	2.20	100	-1.77	98	84	-0.050	4.77	0.74
282	41.589	0.151	2.21	100	-3.24	101	84	-0.040	4.83	0.71
283	41.734	0.145	2.21	100	-2.68	97	85	-0.040	4.83	0.69
284	41.885	0.151	2.18	100	-1.77	101	85	-0.040	4.86	0.68
285	42.030	0.145	2.19	100	-3.37	97	85	-0.040	4.69	0.71
286	42.180	0.150	2.19	100	-3.2	100	85	-0.040	4.77	0.66
287	42.326	0.146	2.21	100	-1.56	98	85	-0.060	4.68	0.70

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
288	42.476	0.150	2.19	100	-3.23	100	85	-0.050	4.87	0.67
289	42.622	0.146	2.22	100	-1.53	98	84	-0.050	4.73	0.68
290	42.772	0.150	2.21	100	-1.42	100	84	-0.050	4.69	0.69
291	42.917	0.145	2.20	100	-1.01	97	84	-0.020	4.73	0.65
292	43.067	0.150	2.20	100	-2.06	100	85	-0.050	4.73	0.67
293	43.213	0.146	2.20	100	-1.82	98	85	-0.040	4.63	0.68
294	43.363	0.150	2.19	100	-1.28	100	86	-0.050	4.66	0.66
295	43.509	0.146	2.21	100	-2.21	98	85	-0.040	4.51	0.65
296	43.658	0.149	2.21	100	-0.94	100	85	-0.040	4.63	0.64
297	43.805	0.147	2.22	100	-2.15	98	85	-0.040	4.48	0.66
298	43.954	0.149	2.21	100	-3.36	100	84	-0.050	4.69	0.61
299	44.100	0.146	2.20	100	-1.08	98	84	-0.040	4.54	0.59
300	44.250	0.150	2.19	100	-0.97	100	85	-0.040	4.49	0.61
301	44.398	0.148	2.21	100	-0.87	99	85	-0.030	4.39	0.64
302	44.546	0.148	2.21	100	-3.27	99	86	-0.040	4.41	0.63
303	44.694	0.148	2.20	100	-3.18	99	85	-0.030	4.57	0.59
304	44.842	0.148	2.21	100	-0.84	99	85	-0.030	4.51	0.62
305	44.990	0.148	2.20	100	-0.84	99	84	-0.040	4.41	0.63
306	45.138	0.148	2.20	100	-1.92	99	84	-0.060	4.50	0.59
307	45.286	0.148	2.18	100	-3.25	99	85	-0.050	4.39	0.61
308	45.434	0.148	2.21	100	-1	99	85	-0.040	4.47	0.60
309	45.583	0.149	2.20	100	-1.56	100	85	-0.030	4.48	0.63
310	45.729	0.146	2.21	100	-1.46	98	86	-0.040	4.57	0.60
311	45.878	0.149	2.21	100	-2.61	100	85	-0.040	4.40	0.63
312	46.024	0.146	2.20	100	-2.99	98	85	-0.040	4.62	0.61
313	46.174	0.150	2.21	100	-1.56	100	84	-0.030	4.43	0.63
314	46.320	0.146	2.21	100	-1.38	98	84	-0.040	4.36	0.62
315	46.470	0.150	2.20	100	-0.94	100	85	-0.040	4.50	0.59
316	46.616	0.146	2.20	100	-2.46	98	85	-0.040	4.42	0.60
317	46.766	0.150	2.19	100	-3.51	100	86	-0.040	4.44	0.56
318	46.911	0.145	2.20	100	-1.03	97	86	-0.040	4.51	0.60
319	47.063	0.152	2.21	100	-0.87	102	85	-0.040	4.45	0.59

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
320	47.208	0.145	2.19	99	-3.3	97	85	-0.040	4.36	0.61
321	47.359	0.151	2.20	99	-0.96	101	85	-0.020	4.46	0.60
322	47.504	0.145	2.21	99	-1.09	97	84	-0.050	4.38	0.63
323	47.654	0.150	2.20	99	-3.29	100	84	-0.030	4.44	0.60
324	47.800	0.146	2.20	99	-1.5	98	85	-0.040	4.56	0.59
325	47.951	0.151	2.19	99	-2.53	101	85	-0.020	4.57	0.56
326	48.096	0.145	2.22	99	-0.85	97	86	-0.030	4.43	0.63
327	48.247	0.151	2.21	99	-0.84	101	86	-0.040	4.51	0.58
328	48.392	0.145	2.21	99	-1.97	97	85	-0.040	4.59	0.57
329	48.541	0.149	2.21	99	-3.33	100	85	-0.040	4.42	0.60
330	48.687	0.146	2.21	99	-1.36	98	85	-0.030	4.60	0.56
331	48.837	0.150	2.20	99	-1.06	100	84	-0.040	4.53	0.56
332	48.983	0.146	2.21	99	-1.39	98	84	-0.030	4.54	0.60
333	49.133	0.150	2.21	99	-1.46	100	85	-0.050	4.65	0.58
334	49.279	0.146	2.22	99	-3.42	98	85	-0.030	4.55	0.61
335	49.428	0.149	2.20	99	-0.95	100	85	-0.040	4.56	0.57
336	49.575	0.147	2.19	99	-2.75	98	86	-0.040	4.61	0.58
337	49.724	0.149	2.20	99	-2.87	100	85	-0.040	4.69	0.58
338	49.872	0.148	2.21	99	-2.43	99	85	-0.050	4.46	0.62
339	50.020	0.148	2.20	99	-3.27	99	84	-0.030	4.43	0.64
340	50.168	0.148	2.21	99	-0.93	99	84	-0.040	4.49	0.64
341	50.316	0.148	2.21	99	-0.84	99	85	-0.030	4.34	0.68
342	50.464	0.148	2.20	99	-1.89	99	85	-0.040	4.29	0.67
343	50.611	0.147	2.20	99	-0.9	98	85	-0.040	4.21	0.67
344	50.760	0.149	2.20	99	-0.81	100	86	-0.040	4.33	0.63
345	50.907	0.147	2.21	99	-2.42	98	86	-0.040	4.33	0.62
346	51.056	0.149	2.21	99	-0.85	100	85	-0.050	4.09	0.64
347	51.203	0.147	2.22	99	-3.32	98	85	-0.040	4.18	0.65
348	51.351	0.148	2.21	99	-2.39	99	84	-0.050	4.21	0.62
349	51.497	0.146	2.21	99	-1.57	98	84	-0.040	4.23	0.62
350	51.647	0.150	2.21	99	-3.24	100	84	-0.040	4.35	0.61
351	51.793	0.146	2.21	99	-2.6	98	85	-0.040	4.32	0.61

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
352	51.943	0.150	2.21	99	-2.99	100	85	-0.040	4.38	0.60
353	52.088	0.145	2.21	99	-2.89	97	86	-0.040	4.32	0.58
354	52.238	0.150	2.21	99	-2.83	100	85	-0.040	4.24	0.61
355	52.384	0.146	2.21	99	-0.9	98	85	-0.020	4.30	0.60
356	52.534	0.150	2.18	99	-0.89	100	85	-0.040	4.18	0.61
357	52.680	0.146	2.21	99	-1.58	98	84	-0.030	4.40	0.60
358	52.831	0.151	2.21	99	-3.03	101	84	-0.030	4.37	0.61
359	52.976	0.145	2.20	99	-2.26	97	84	-0.050	4.21	0.64
360	53.127	0.151	2.21	99	-3.31	101	85	-0.030	4.24	0.61
361	53.272	0.145	2.20	99	-1.38	97	85	-0.030	4.31	0.66
362	53.422	0.150	2.21	99	-1.04	100	85	-0.040	4.38	0.63
363	53.567	0.145	2.21	99	-1.03	97	85	-0.040	4.38	0.63
364	53.718	0.151	2.20	99	-1.62	101	85	-0.030	4.30	0.63
365	53.864	0.146	2.21	99	-3.41	98	84	-0.030	4.39	0.65
366	54.014	0.150	2.20	99	-1.1	100	84	-0.040	4.31	0.65
367	54.159	0.145	2.22	99	-0.96	97	85	-0.050	4.24	0.69
368	54.308	0.149	2.21	99	-0.98	100	85	-0.040	4.44	0.65
369	54.454	0.146	2.22	99	-3.14	98	85	-0.030	4.37	0.66
370	54.604	0.150	2.20	99	-1.74	100	86	-0.040	4.38	0.65
371	54.750	0.146	2.21	99	-1.81	98	85	-0.030	4.35	0.68
372	54.900	0.150	2.19	99	-1.09	100	85	-0.050	4.28	0.68
373	55.046	0.146	2.20	99	-3.4	98	84	-0.040	4.29	0.68
374	55.195	0.149	2.20	99	-1.71	100	84	-0.040	4.34	0.68
375	55.341	0.146	2.20	99	-1.04	98	84	-0.040	4.46	0.68
376	55.490	0.149	2.21	99	-1.9	100	85	-0.040	4.31	0.68
377	55.638	0.148	2.22	99	-2.21	99	85	-0.030	4.28	0.66
378	55.786	0.148	2.20	99	-3.08	99	85	-0.040	4.30	0.67
379	55.934	0.148	2.20	99	-1.82	99	85	-0.040	4.11	0.68
380	56.082	0.148	2.21	99	-2.89	99	85	-0.050	4.26	0.65
381	56.230	0.148	2.19	99	-1.32	99	84	-0.030	4.36	0.66
382	56.377	0.147	2.20	99	-3.22	98	84	-0.040	4.31	0.64
383	56.526	0.149	2.20	99	-3.33	100	84	-0.040	4.28	0.64

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
384	56.673	0.147	2.18	99	-0.91	98	85	-0.030	4.12	0.71
385	56.822	0.149	2.21	99	-2.58	100	85	-0.030	4.33	0.68
386	56.969	0.147	2.21	99	-2.34	98	85	-0.040	4.33	0.66
387	57.118	0.149	2.22	99	-2.4	100	85	-0.040	4.14	0.70
388	57.264	0.146	2.22	99	-1.28	98	85	-0.040	4.37	0.67
389	57.413	0.149	2.21	99	-2.8	100	84	-0.040	4.38	0.65
390	57.559	0.146	2.19	99	-0.91	98	84	-0.040	4.16	0.71
391	57.709	0.150	2.21	99	-1.5	100	84	-0.040	4.18	0.69
392	57.854	0.145	2.22	99	-3.02	97	84	-0.040	4.15	0.69
393	58.004	0.150	2.20	99	-2.19	100	85	-0.040	4.20	0.67
394	58.150	0.146	2.20	99	-3.05	98	85	-0.040	4.22	0.64
395	58.300	0.150	2.20	99	-1.6	100	85	-0.040	4.26	0.64
396	58.445	0.145	2.20	99	-0.94	97	85	-0.030	4.32	0.63
397	58.596	0.151	2.19	99	-2.86	101	85	-0.040	4.25	0.65
398	58.742	0.146	2.21	99	-0.89	98	84	-0.040	4.23	0.64
399	58.892	0.150	2.20	99	-3.28	100	84	-0.030	4.25	0.64
400	59.037	0.145	2.21	99	-0.89	97	84	-0.040	4.33	0.65
401	59.188	0.151	2.21	99	-3.12	101	85	-0.040	4.32	0.66
402	59.333	0.145	2.20	99	-3.31	97	85	-0.030	4.30	0.68
403	59.483	0.150	2.20	99	-2.94	100	85	-0.050	4.34	0.63
404	59.628	0.145	2.20	99	-2.93	97	85	-0.040	4.28	0.63
405	59.779	0.151	2.19	99	-1.67	101	85	-0.050	4.26	0.65
406	59.924	0.145	2.21	99	-3.28	97	84	-0.050	4.22	0.67
407	60.074	0.150	2.20	99	-3.27	100	84	-0.050	4.41	0.66
408	60.219	0.145	2.21	99	-2.81	97	84	-0.030	4.38	0.63
409	60.369	0.150	2.22	99	-1.04	100	85	-0.040	4.43	0.65
410	60.514	0.145	2.22	98	-1.82	97	85	-0.040	4.34	0.62
411	60.664	0.150	2.19	98	-1.67	100	85	-0.040	4.39	0.63
412	60.810	0.146	2.21	98	-2.8	98	85	-0.030	4.37	0.63
413	60.960	0.150	2.20	98	-0.89	100	85	-0.040	4.41	0.65
414	61.106	0.146	2.19	98	-3.2	98	84	-0.040	4.49	0.62
415	61.254	0.148	2.21	98	-2.8	99	84	-0.040	4.45	0.65

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
416	61.401	0.147	2.21	98	-0.93	98	84	-0.050	4.36	0.65
417	61.550	0.149	2.19	98	-2.48	100	85	-0.040	4.48	0.62
418	61.697	0.147	2.21	98	-1.16	98	85	-0.040	4.49	0.61
419	61.846	0.149	2.21	98	-0.9	100	85	-0.030	4.57	0.60
420	61.993	0.147	2.20	98	-0.86	98	85	-0.040	4.43	0.62
421	62.141	0.148	2.20	98	-0.91	99	85	-0.040	4.57	0.59
422	62.289	0.148	2.21	98	-3.43	99	84	-0.040	4.53	0.61
423	62.437	0.148	2.19	98	-2.33	99	84	-0.040	4.41	0.63
424	62.585	0.148	2.19	98	-1.84	99	85	-0.040	4.57	0.60
425	62.732	0.147	2.19	98	-1.28	98	85	-0.030	4.53	0.60
426	62.880	0.148	2.19	98	-3.37	99	85	-0.050	4.28	0.62
427	63.027	0.147	2.20	98	-2.86	98	85	-0.030	4.46	0.60
428	63.176	0.149	2.21	98	-3.31	100	85	-0.040	4.32	0.61
429	63.323	0.147	2.20	98	-1.63	98	85	-0.030	4.46	0.60
430	63.471	0.148	2.21	98	-0.86	99	84	-0.040	4.34	0.61
431	63.617	0.146	2.21	98	-0.98	98	84	-0.040	4.16	0.64
432	63.766	0.149	2.20	98	-3.15	100	85	-0.040	4.07	0.64
433	63.912	0.146	2.19	98	-1.85	98	85	-0.040	3.96	0.64
434	64.062	0.150	2.21	98	-1.33	100	86	-0.030	4.22	0.60
435	64.207	0.145	2.20	98	-1.05	97	86	-0.040	4.05	0.60
436	64.357	0.150	2.19	98	-0.94	100	85	-0.040	4.03	0.62
437	64.502	0.145	2.21	98	-1.96	97	85	-0.050	4.10	0.61
438	64.652	0.150	2.21	98	-3.42	100	84	-0.030	4.01	0.65
439	64.797	0.145	2.20	98	-0.92	97	84	-0.050	4.06	0.62
440	64.948	0.151	2.20	98	-3.35	101	84	-0.040	4.13	0.62
441	65.093	0.145	2.19	98	-2.31	97	85	-0.030	4.02	0.63
442	65.244	0.151	2.20	98	-1.63	101	85	-0.030	3.96	0.66
443	65.389	0.145	2.20	98	-3.33	97	85	-0.050	3.91	0.66
444	65.539	0.150	2.20	98	-3.15	100	85	-0.040	4.02	0.63
445	65.684	0.145	2.21	98	-1.86	97	85	-0.040	4.04	0.59
446	65.834	0.150	2.20	98	-2.83	100	85	-0.040	3.84	0.63
447	65.979	0.145	2.21	98	-2.25	97	84	-0.040	3.88	0.65

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
448	66.130	0.151	2.21	98	-1.64	101	84	-0.040	3.97	0.62
449	66.275	0.145	2.19	98	-1.4	97	85	-0.040	3.95	0.63
450	66.425	0.150	2.19	98	-0.85	100	85	-0.030	4.07	0.61
451	66.571	0.146	2.22	98	-1.91	98	85	-0.030	3.97	0.60
452	66.721	0.150	2.19	98	-1.47	100	85	-0.040	4.03	0.60
453	66.866	0.145	2.20	98	-1.85	97	85	-0.040	3.84	0.62
454	67.015	0.149	2.20	98	-2.44	100	85	-0.040	4.01	0.60
455	67.161	0.146	2.21	98	-3.27	98	84	-0.030	3.92	0.59
456	67.310	0.149	2.21	98	-3.28	100	84	-0.050	4.06	0.60
457	67.456	0.146	2.20	98	-3.12	98	85	-0.040	3.93	0.62
458	67.606	0.150	2.21	98	-2.53	100	85	-0.030	3.86	0.62
459	67.752	0.146	2.21	98	-1.03	98	85	-0.040	3.80	0.60
460	67.901	0.149	2.20	98	-1.64	100	85	-0.050	3.83	0.61
461	68.047	0.146	2.20	98	-1.68	98	85	-0.030	3.86	0.58
462	68.195	0.148	2.19	98	-1.04	99	85	-0.030	3.86	0.59
463	68.342	0.147	2.21	98	-3.22	98	84	-0.040	3.90	0.60
464	68.491	0.149	2.19	98	-2.81	100	85	-0.030	3.85	0.60
465	68.639	0.148	2.20	98	-3.33	99	85	-0.030	3.93	0.61
466	68.787	0.148	2.20	98	-2.31	99	85	-0.040	3.86	0.60
467	68.934	0.147	2.19	98	-1.27	98	86	-0.030	3.83	0.61
468	69.082	0.148	2.19	98	-3.07	99	85	-0.040	3.89	0.62
469	69.230	0.148	2.19	98	-0.91	99	85	-0.040	3.86	0.60
470	69.377	0.147	2.20	98	-0.9	98	84	-0.040	3.71	0.62
471	69.525	0.148	2.20	98	-3.18	99	84	-0.040	3.85	0.60
472	69.673	0.148	2.20	98	-0.92	99	84	-0.030	3.88	0.61
473	69.821	0.148	2.19	98	-2.5	99	85	-0.040	3.86	0.59
474	69.968	0.147	2.23	98	-3.34	98	85	-0.040	3.81	0.61
475	70.117	0.149	2.19	98	-3.2	100	86	-0.040	3.81	0.61
476	70.263	0.146	2.20	98	-0.86	98	86	-0.040	3.76	0.62
477	70.412	0.149	2.21	98	-2.38	100	85	-0.040	3.82	0.59
478	70.557	0.145	2.20	98	-3.28	97	85	-0.020	3.90	0.60
479	70.706	0.149	2.19	98	-1.25	100	84	-0.040	3.73	0.62

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
480	70.853	0.147	2.19	98	-3.29	98	84	-0.030	3.72	0.64
481	71.002	0.149	2.21	98	-1.28	100	85	-0.040	3.81	0.60
482	71.148	0.146	2.21	98	-0.88	98	85	-0.030	3.90	0.58
483	71.297	0.149	2.19	98	-1.58	100	86	-0.040	3.77	0.59
484	71.443	0.146	2.21	98	-3.31	98	86	-0.040	3.71	0.62
485	71.592	0.149	2.21	98	-1.05	100	85	-0.030	3.84	0.57
486	71.738	0.146	2.19	98	-1.1	98	85	-0.040	3.81	0.60
487	71.888	0.150	2.20	98	-0.88	100	84	-0.040	3.78	0.59
488	72.033	0.145	2.20	98	-0.96	97	84	-0.050	3.69	0.60
489	72.184	0.151	2.20	98	-3.08	101	85	-0.040	3.63	0.60
490	72.329	0.145	2.21	98	-1.32	97	85	-0.040	3.63	0.60
Avg/Tot	72.329	0.148	2.21	97	-2.04	100			6.60	0.58

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	569	527	304	616	358	474.8	N/A
1	564	524	326	598	359	474.2	N/A
2	560	521	340	626	360	481.4	N/A
3	555	515	351	674	361	491.2	N/A
4	552	509	363	721	363	501.6	N/A
5	548	501	372	756	364	508.2	N/A
6	544	494	380	786	365	513.8	N/A
7	541	487	389	807	365	517.8	N/A
8	538	482	395	831	365	522.2	N/A
9	535	477	402	848	366	525.6	N/A
10	534	473	408	860	367	528.4	N/A
11	531	470	413	867	367	529.6	N/A
12	529	468	418	875	367	531.4	N/A
13	528	465	423	880	367	532.6	N/A
14	526	463	427	883	367	533.2	N/A
15	524	462	431	881	367	533.0	N/A
16	523	460	435	880	366	532.8	N/A
17	522	457	439	875	366	531.8	N/A
18	520	456	441	873	365	531.0	N/A
19	518	455	444	870	364	530.2	N/A
20	517	454	446	869	363	529.8	N/A
21	515	453	400	862	361	518.2	N/A
22	514	452	384	861	360	514.2	N/A
23	512	452	367	855	358	508.8	N/A
24	511	451	356	849	357	504.8	N/A
25	509	449	348	844	356	501.2	N/A
26	508	449	338	839	354	497.6	N/A
27	507	449	332	832	352	494.4	N/A
28	504	447	328	827	350	491.2	N/A
29	503	447	323	817	348	487.6	N/A
30	502	446	320	807	346	484.2	N/A
31	500	444	321	797	345	481.4	N/A
32	498	443	314	790	342	477.4	N/A
33	496	442	310	785	340	474.6	N/A
34	495	441	308	775	338	471.4	N/A
35	492	438	305	767	336	467.6	N/A
36	491	438	302	763	334	465.6	N/A
37	488	436	301	757	332	462.8	N/A
38	486	435	297	753	330	460.2	N/A
39	484	434	297	750	328	458.6	N/A
40	482	432	295	743	326	455.6	N/A
41	480	430	293	739	324	453.2	N/A
42	477	428	291	736	322	450.8	N/A
43	475	427	290	727	320	447.8	N/A
44	473	426	290	726	318	446.6	N/A
45	472	424	288	725	316	445.0	N/A
46	470	423	286	721	314	442.8	N/A
47	468	422	286	717	313	441.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	466	422	287	714	311	440.0	N/A
49	464	420	284	707	309	436.8	N/A
50	462	419	283	706	307	435.4	N/A
51	461	419	284	704	305	434.6	N/A
52	459	418	283	703	304	433.4	N/A
53	458	417	282	699	302	431.6	N/A
54	456	416	281	700	300	430.6	N/A
55	454	416	282	697	299	429.6	N/A
56	453	415	280	695	298	428.2	N/A
57	452	415	281	696	296	428.0	N/A
58	451	416	282	690	294	426.6	N/A
59	450	414	279	690	293	425.2	N/A
60	449	415	280	693	291	425.6	N/A
61	448	414	280	691	290	424.6	N/A
62	447	415	279	693	288	424.4	N/A
63	446	415	279	692	287	423.8	N/A
64	446	414	279	692	286	423.4	N/A
65	446	414	282	694	285	424.2	N/A
66	446	414	280	691	283	422.8	N/A
67	445	415	280	694	282	423.2	N/A
68	446	415	281	692	281	423.0	N/A
69	445	415	283	696	280	423.8	N/A
70	445	416	282	697	278	423.6	N/A
71	446	416	283	697	277	423.8	N/A
72	445	417	284	698	276	424.0	N/A
73	445	417	284	699	275	424.0	N/A
74	445	416	284	698	274	423.4	N/A
75	445	416	285	699	273	423.6	N/A
76	445	416	285	697	272	423.0	N/A
77	445	418	285	693	271	422.4	N/A
78	445	417	286	694	270	422.4	N/A
79	445	417	288	695	270	423.0	N/A
80	445	417	288	692	269	422.2	N/A
81	444	417	289	696	268	422.8	N/A
82	444	418	289	693	267	422.2	N/A
83	444	417	288	697	266	422.4	N/A
84	445	418	291	700	266	424.0	N/A
85	444	419	291	700	265	423.8	N/A
86	444	420	292	707	264	425.4	N/A
87	445	421	293	718	263	428.0	N/A
88	446	421	295	724	263	429.8	N/A
89	446	422	296	730	262	431.2	N/A
90	446	422	297	733	262	432.0	N/A
91	446	424	299	727	261	431.4	N/A
92	446	424	297	718	261	429.2	N/A
93	445	424	298	711	260	427.6	N/A
94	445	424	297	710	260	427.2	N/A
95	445	424	297	701	259	425.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	444	423	296	699	259	424.2	N/A
97	444	423	297	696	259	423.8	N/A
98	444	422	297	690	258	422.2	N/A
99	442	422	296	688	258	421.2	N/A
100	442	421	296	684	257	420.0	N/A
101	442	421	297	683	257	420.0	N/A
102	442	420	295	679	257	418.6	N/A
103	442	420	295	677	257	418.2	N/A
104	441	419	295	673	256	416.8	N/A
105	441	418	295	666	256	415.2	N/A
106	440	418	294	661	255	413.6	N/A
107	440	417	293	656	256	412.4	N/A
108	439	417	293	655	255	411.8	N/A
109	438	416	291	646	255	409.2	N/A
110	437	415	291	643	255	408.2	N/A
111	437	414	290	640	255	407.2	N/A
112	435	414	289	634	255	405.4	N/A
113	435	413	288	629	255	404.0	N/A
114	434	413	288	628	255	403.6	N/A
115	433	412	287	623	254	401.8	N/A
116	433	412	286	623	255	401.8	N/A
117	432	411	287	618	254	400.4	N/A
118	431	411	285	614	254	399.0	N/A
119	430	410	285	609	254	397.6	N/A
120	429	410	284	610	254	397.4	N/A
121	428	410	283	606	254	396.2	N/A
122	428	409	284	607	254	396.4	N/A
123	427	409	283	602	254	395.0	N/A
124	427	408	282	600	254	394.2	N/A
125	426	408	282	594	254	392.8	N/A
126	425	407	281	589	254	391.2	N/A
127	424	408	280	583	254	389.8	N/A
128	424	407	279	579	254	388.6	N/A
129	422	407	278	577	253	387.4	N/A
130	422	407	277	573	253	386.4	N/A
131	421	407	277	568	253	385.2	N/A
132	420	407	276	565	254	384.4	N/A
133	419	407	276	561	253	383.2	N/A
134	418	408	275	557	253	382.2	N/A
135	417	407	274	553	253	380.8	N/A
136	416	407	273	548	253	379.4	N/A
137	415	407	272	545	254	378.6	N/A
138	414	407	272	539	254	377.2	N/A
139	412	406	271	536	254	375.8	N/A
140	412	405	270	531	254	374.4	N/A
141	411	404	269	530	254	373.6	N/A
142	410	404	269	526	254	372.6	N/A
143	410	403	269	524	254	372.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	409	402	267	519	254	370.2	N/A
145	408	401	266	518	254	369.4	N/A
146	407	400	263	511	254	367.0	N/A
147	406	398	263	508	255	366.0	N/A
148	406	397	261	504	255	364.6	N/A
149	406	396	261	501	255	363.8	N/A
150	405	394	258	498	255	362.0	N/A
151	405	393	256	496	255	361.0	N/A
152	405	392	254	494	255	360.0	N/A
153	406	390	253	492	256	359.4	N/A
154	406	390	252	488	256	358.4	N/A
155	406	388	250	487	256	357.4	N/A
156	405	387	249	484	256	356.2	N/A
157	406	386	248	481	256	355.4	N/A
158	404	386	246	480	257	354.6	N/A
159	404	384	246	476	257	353.4	N/A
160	403	384	245	473	257	352.4	N/A
161	402	383	245	472	257	351.8	N/A
162	402	381	245	469	257	350.8	N/A
163	401	381	244	469	258	350.6	N/A
164	400	381	244	466	258	349.8	N/A
165	399	380	244	462	259	348.8	N/A
166	398	380	244	462	259	348.6	N/A
167	398	379	244	460	259	348.0	N/A
168	397	379	244	458	260	347.6	N/A
169	396	379	243	457	260	347.0	N/A
170	396	378	244	456	260	346.8	N/A
171	394	378	243	454	261	346.0	N/A
172	394	378	242	452	261	345.4	N/A
173	394	377	243	452	261	345.4	N/A
174	393	378	242	450	262	345.0	N/A
175	392	378	241	448	262	344.2	N/A
176	391	378	240	445	262	343.2	N/A
177	390	378	237	440	263	341.6	N/A
178	389	376	235	434	263	339.4	N/A
179	387	377	232	429	263	337.6	N/A
180	385	376	230	425	263	335.8	N/A
181	382	376	226	421	264	333.8	N/A
182	380	375	224	417	264	332.0	N/A
183	378	375	222	413	265	330.6	N/A
184	377	374	219	409	265	328.8	N/A
185	375	374	218	407	265	327.8	N/A
186	374	374	215	402	265	326.0	N/A
187	372	374	214	400	265	325.0	N/A
188	371	374	212	397	266	324.0	N/A
189	370	374	210	394	266	322.8	N/A
190	369	374	209	392	266	322.0	N/A
191	368	374	207	392	266	321.4	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	367	374	206	387	267	320.2	N/A
193	367	374	204	385	267	319.4	N/A
194	366	374	203	383	267	318.6	N/A
195	366	374	202	382	268	318.4	N/A
196	365	374	201	378	268	317.2	N/A
197	364	373	200	377	268	316.4	N/A
198	364	372	200	375	269	316.0	N/A
199	364	371	199	373	269	315.2	N/A
200	363	370	198	371	269	314.2	N/A
201	363	369	198	371	270	314.2	N/A
202	362	368	197	368	270	313.0	N/A
203	362	367	196	366	271	312.4	N/A
204	361	366	195	364	271	311.4	N/A
205	361	364	195	362	272	310.8	N/A
206	361	363	194	361	272	310.2	N/A
207	361	361	194	360	272	309.6	N/A
208	361	361	193	360	273	309.6	N/A
209	361	359	194	358	273	309.0	N/A
210	361	359	192	357	273	308.4	N/A
211	361	357	192	356	274	308.0	N/A
212	361	356	192	356	275	308.0	N/A
213	361	355	191	356	275	307.6	N/A
214	362	354	191	354	275	307.2	N/A
215	361	353	191	353	276	306.8	N/A
216	362	352	190	352	276	306.4	N/A
217	362	350	190	351	277	306.0	N/A
218	361	350	190	351	277	305.8	N/A
219	361	349	189	350	277	305.2	N/A
220	361	348	190	350	278	305.4	N/A
221	361	347	189	348	278	304.6	N/A
222	360	347	189	347	279	304.4	N/A
223	360	346	189	346	279	304.0	N/A
224	360	344	189	347	279	303.8	N/A
225	359	344	189	346	279	303.4	N/A
226	359	343	189	345	280	303.2	N/A
227	358	343	189	345	280	303.0	N/A
228	358	342	188	344	280	302.4	N/A
229	357	341	189	345	280	302.4	N/A
230	357	341	188	344	281	302.2	N/A
231	357	340	188	343	281	301.8	N/A
232	356	340	188	344	281	301.8	N/A
233	356	339	188	342	281	301.2	N/A
234	355	339	188	343	282	301.4	N/A
235	355	339	188	341	282	301.0	N/A
236	355	337	188	342	282	300.8	N/A
237	355	338	188	342	282	301.0	N/A
238	355	337	188	341	282	300.6	N/A
239	354	337	187	340	283	300.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	354	337	187	339	283	300.0	N/A
241	353	336	187	338	283	299.4	N/A
242	353	336	187	339	283	299.6	N/A
243	353	336	187	337	283	299.2	N/A
244	353	335	187	337	283	299.0	N/A
245	352	335	186	335	283	298.2	N/A
246	352	335	186	335	283	298.2	N/A
247	352	334	186	334	283	297.8	N/A
248	352	334	186	333	283	297.6	N/A
249	352	334	186	333	283	297.6	N/A
250	351	334	186	332	283	297.2	N/A
251	351	334	186	331	283	297.0	N/A
252	350	333	186	331	283	296.6	N/A
253	351	333	185	330	283	296.4	N/A
254	350	333	186	330	283	296.4	N/A
255	350	333	185	329	283	296.0	N/A
256	350	332	185	329	283	295.8	N/A
257	350	332	185	328	283	295.6	N/A
258	350	331	184	327	283	295.0	N/A
259	349	331	185	327	283	295.0	N/A
260	349	331	185	325	283	294.6	N/A
261	349	330	185	326	283	294.6	N/A
262	349	329	184	325	283	294.0	N/A
263	349	329	184	325	283	294.0	N/A
264	349	329	184	323	282	293.4	N/A
265	349	329	183	324	282	293.4	N/A
266	349	328	184	323	282	293.2	N/A
267	349	328	183	321	282	292.6	N/A
268	349	327	183	321	282	292.4	N/A
269	349	327	183	320	282	292.2	N/A
270	349	326	183	320	282	292.0	N/A
271	349	326	183	320	282	292.0	N/A
272	349	325	183	319	282	291.6	N/A
273	349	325	183	319	282	291.6	N/A
274	349	323	183	318	282	291.0	N/A
275	349	324	183	318	282	291.2	N/A
276	348	323	184	318	282	291.0	N/A
277	348	323	184	319	282	291.2	N/A
278	348	322	183	318	282	290.6	N/A
279	348	322	183	319	282	290.8	N/A
280	347	322	183	318	282	290.4	N/A
281	347	322	183	319	282	290.6	N/A
282	347	321	183	318	282	290.2	N/A
283	346	321	184	317	282	290.0	N/A
284	346	321	183	317	282	289.8	N/A
285	345	321	183	316	282	289.4	N/A
286	345	320	183	316	282	289.2	N/A
287	344	320	183	316	282	289.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
288	344	320	182	316	282	288.8	N/A
289	343	320	182	316	282	288.6	N/A
290	343	319	182	315	282	288.2	N/A
291	342	319	182	315	282	288.0	N/A
292	342	319	182	314	282	287.8	N/A
293	341	319	182	313	282	287.4	N/A
294	341	319	182	313	282	287.4	N/A
295	340	319	182	312	281	286.8	N/A
296	340	318	181	312	281	286.4	N/A
297	339	317	181	311	281	285.8	N/A
298	339	317	181	311	281	285.8	N/A
299	338	317	182	309	281	285.4	N/A
300	337	316	181	308	281	284.6	N/A
301	337	316	181	308	281	284.6	N/A
302	337	316	180	307	281	284.2	N/A
303	336	316	180	307	280	283.8	N/A
304	336	315	180	305	280	283.2	N/A
305	335	315	179	305	280	282.8	N/A
306	334	315	179	304	280	282.4	N/A
307	335	315	179	302	280	282.2	N/A
308	333	314	179	302	280	281.6	N/A
309	334	314	178	302	279	281.4	N/A
310	333	314	178	300	279	280.8	N/A
311	332	314	178	301	279	280.8	N/A
312	332	313	178	300	279	280.4	N/A
313	331	313	178	299	278	279.8	N/A
314	331	312	177	299	278	279.4	N/A
315	331	312	177	299	278	279.4	N/A
316	330	311	177	297	278	278.6	N/A
317	329	311	176	297	278	278.2	N/A
318	329	311	176	296	277	277.8	N/A
319	329	311	176	295	277	277.6	N/A
320	329	311	176	295	277	277.6	N/A
321	328	310	176	295	277	277.2	N/A
322	328	310	176	293	277	276.8	N/A
323	327	310	175	294	276	276.4	N/A
324	327	310	175	293	276	276.2	N/A
325	327	309	175	292	276	275.8	N/A
326	326	309	175	291	276	275.4	N/A
327	325	308	175	291	275	274.8	N/A
328	325	308	175	292	275	275.0	N/A
329	325	308	175	291	275	274.8	N/A
330	324	307	175	290	275	274.2	N/A
331	324	308	174	291	274	274.2	N/A
332	324	308	174	289	274	273.8	N/A
333	323	307	174	290	274	273.6	N/A
334	324	308	174	289	274	273.8	N/A
335	323	307	174	289	273	273.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
336	322	308	174	289	273	273.2	N/A
337	322	307	174	289	273	273.0	N/A
338	322	307	175	288	273	273.0	N/A
339	322	307	175	289	273	273.2	N/A
340	321	307	174	288	273	272.6	N/A
341	322	307	174	288	272	272.6	N/A
342	322	307	175	288	272	272.8	N/A
343	321	307	174	287	272	272.2	N/A
344	321	307	174	286	272	272.0	N/A
345	321	307	174	287	272	272.2	N/A
346	321	307	175	287	272	272.4	N/A
347	321	307	175	287	271	272.2	N/A
348	321	307	174	286	271	271.8	N/A
349	321	307	174	285	271	271.6	N/A
350	320	306	174	285	271	271.2	N/A
351	320	307	174	285	271	271.4	N/A
352	321	307	174	285	271	271.6	N/A
353	320	307	174	283	271	271.0	N/A
354	320	307	174	283	271	271.0	N/A
355	320	307	174	283	271	271.0	N/A
356	320	306	174	282	271	270.6	N/A
357	320	306	174	283	270	270.6	N/A
358	320	306	173	283	270	270.4	N/A
359	320	307	174	282	270	270.6	N/A
360	319	305	174	282	270	270.0	N/A
361	320	305	174	282	270	270.2	N/A
362	319	305	175	281	270	270.0	N/A
363	319	305	174	281	270	269.8	N/A
364	319	305	174	281	270	269.8	N/A
365	319	305	174	281	270	269.8	N/A
366	318	305	175	280	270	269.6	N/A
367	318	305	175	279	270	269.4	N/A
368	318	305	175	280	270	269.6	N/A
369	318	304	175	280	269	269.2	N/A
370	317	304	175	279	269	268.8	N/A
371	317	305	175	278	270	269.0	N/A
372	317	304	175	279	270	269.0	N/A
373	317	304	176	279	269	269.0	N/A
374	316	304	175	278	269	268.4	N/A
375	316	304	176	278	269	268.6	N/A
376	316	304	176	277	269	268.4	N/A
377	316	304	176	278	269	268.6	N/A
378	315	303	176	278	269	268.2	N/A
379	315	303	177	278	270	268.6	N/A
380	314	303	178	277	270	268.4	N/A
381	314	303	178	278	270	268.6	N/A
382	314	303	178	277	270	268.4	N/A
383	314	303	178	278	270	268.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
384	314	302	178	277	270	268.2	N/A
385	313	302	179	277	270	268.2	N/A
386	313	302	179	277	270	268.2	N/A
387	313	302	179	276	270	268.0	N/A
388	312	302	179	276	270	267.8	N/A
389	312	301	180	277	270	268.0	N/A
390	312	301	180	277	270	268.0	N/A
391	312	301	179	277	270	267.8	N/A
392	312	301	180	276	270	267.8	N/A
393	311	300	180	275	270	267.2	N/A
394	312	300	180	277	270	267.8	N/A
395	312	300	180	276	271	267.8	N/A
396	312	299	180	276	271	267.6	N/A
397	312	299	181	276	271	267.8	N/A
398	312	299	181	276	271	267.8	N/A
399	312	298	181	276	271	267.6	N/A
400	312	298	182	275	271	267.6	N/A
401	312	298	182	276	271	267.8	N/A
402	312	297	182	276	271	267.6	N/A
403	312	297	182	276	271	267.6	N/A
404	313	296	183	276	271	267.8	N/A
405	313	297	184	277	271	268.4	N/A
406	313	296	184	276	271	268.0	N/A
407	313	296	185	276	271	268.2	N/A
408	314	296	186	276	271	268.6	N/A
409	314	295	185	277	271	268.4	N/A
410	314	296	186	277	271	268.8	N/A
411	314	295	187	277	271	268.8	N/A
412	314	295	187	278	271	269.0	N/A
413	315	295	187	278	271	269.2	N/A
414	315	295	187	278	271	269.2	N/A
415	315	295	189	279	271	269.8	N/A
416	315	295	190	279	271	270.0	N/A
417	316	294	190	279	271	270.0	N/A
418	316	295	190	280	271	270.4	N/A
419	317	294	192	279	271	270.6	N/A
420	317	294	192	280	271	270.8	N/A
421	317	295	192	280	271	271.0	N/A
422	317	294	193	280	271	271.0	N/A
423	318	294	193	280	271	271.2	N/A
424	318	294	193	281	271	271.4	N/A
425	318	294	194	281	271	271.6	N/A
426	318	294	194	281	271	271.6	N/A
427	318	294	195	280	271	271.6	N/A
428	318	294	195	281	271	271.8	N/A
429	318	294	195	282	271	272.0	N/A
430	319	294	195	280	271	271.8	N/A
431	319	295	195	280	271	272.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
432	318	294	194	281	271	271.6	N/A
433	319	294	194	280	272	271.8	N/A
434	318	294	193	280	271	271.2	N/A
435	318	294	193	280	271	271.2	N/A
436	317	293	193	280	271	270.8	N/A
437	317	293	193	280	271	270.8	N/A
438	317	294	193	279	271	270.8	N/A
439	317	294	192	279	271	270.6	N/A
440	316	293	192	279	271	270.2	N/A
441	316	293	192	278	271	270.0	N/A
442	315	292	192	278	271	269.6	N/A
443	315	293	192	278	271	269.8	N/A
444	315	292	191	277	271	269.2	N/A
445	315	293	192	276	271	269.4	N/A
446	314	293	191	276	271	269.0	N/A
447	314	292	191	275	271	268.6	N/A
448	314	292	190	276	271	268.6	N/A
449	314	292	191	275	271	268.6	N/A
450	313	292	189	274	271	267.8	N/A
451	314	292	190	274	271	268.2	N/A
452	313	291	189	273	271	267.4	N/A
453	312	291	189	273	270	267.0	N/A
454	313	291	188	273	270	267.0	N/A
455	312	291	188	272	270	266.6	N/A
456	313	291	188	272	270	266.8	N/A
457	312	290	187	270	270	265.8	N/A
458	312	290	187	271	269	265.8	N/A
459	311	290	187	270	269	265.4	N/A
460	311	290	188	270	269	265.6	N/A
461	311	289	186	269	269	264.8	N/A
462	311	290	187	269	269	265.2	N/A
463	310	290	186	269	269	264.8	N/A
464	310	289	186	268	268	264.2	N/A
465	310	289	186	268	268	264.2	N/A
466	311	289	186	268	268	264.4	N/A
467	310	289	185	267	268	263.8	N/A
468	310	288	185	267	267	263.4	N/A
469	309	288	185	266	267	263.0	N/A
470	309	287	185	266	267	262.8	N/A
471	310	288	185	267	267	263.4	N/A
472	309	287	185	265	267	262.6	N/A
473	309	287	185	266	267	262.8	N/A
474	309	286	184	265	267	262.2	N/A
475	308	287	184	265	266	262.0	N/A
476	308	286	184	265	266	261.8	N/A
477	307	286	184	264	266	261.4	N/A
478	307	286	184	265	266	261.6	N/A
479	306	285	183	264	266	260.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: FPI
Model: F2450
Run #: 3

Job #: 19-460
Tracking #: 0022
Technician: SJB
Date: 2/28/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
480	307	285	183	264	266	261.0	N/A
481	306	285	184	263	265	260.6	N/A
482	306	285	184	263	265	260.6	N/A
483	305	285	183	262	265	260.0	N/A
484	305	284	184	262	265	260.0	N/A
485	305	284	183	261	265	259.6	N/A
486	305	284	183	262	265	259.8	N/A
487	304	283	183	261	264	259.0	N/A
488	304	283	183	260	264	258.8	N/A
489	304	284	182	260	264	258.8	N/A
490	304	283	182	260	264	258.6	N/A
Average	376	354	226	434	279	334	N/A

LAB SAMPLE DATA - ASTM E2515

Client: FPI
Job #: 19-460
Model: F2450
Tracking #: 0022
Run #: 3
Technician: SJB
Date: 2/28/2019

TRAIN A (1st Hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T121, T122	180.7	176.1	4.6
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. O-Ring catch*	O-Ring				0.0

Sub-Total	Total Particulate, mg:	4.6

TRAIN A (Post 1st hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T128	177.9	88.8	1.7
B. Rear filter catch	Filter	T123		87.4	
C. Probe catch*	Probe	9A	116713.5	116713.6	0.0
D. O-Ring catch*	O-Ring	9A	3577.2	3577.1	0.1

Sub-Total	Total Particulate, mg:	1.8
Train A Aggregate	Total Particulate, mg:	**6.4**

TRAIN B

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T124, T127	269.3	176.1	6.1
B. Rear filter catch	Filter	T125		87.1	
C. Probe catch*	Probe	9B	117135.2	117135.4	0.0
D. O-Ring catch*	O-Ring	9B	3520.1	3519.9	0.2

Total Particulate, mg:	**6.3**

AMBIENT

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Filter catch*	Filter	T126	88.0	87.9	0.1

Total Particulate, mg:	**0.1**

*Particulate catch that results in a negative number, is assumed to be zero for probes and O-rings, negative numbers for filters are assumed to be part of the O-Ring weight.

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 3 Test Date: 2/28/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: 7:53
Air Control Setting: Fully Open

Time	Notes
0 min	2.0 lbs of kindling and scrap paper loaded in stove, propane torch for 20 seconds; door cracked open ~3"
1 min	Door closed down to 1" open
2 min	Door closed
5 min	@0.5 lbs, added remaining kindling (1.0 lb) of kindling and 1.3 lbs of start-up fuel, door open 40 seconds, then closed but not engaged
6.5 min	Door latch engaged
15 min	@0.8 lbs, added remaining start-up fuel (3.0 lbs), door open 40 seconds
20 min	@2.3 lbs, leveled coal bed and loaded high fire fuel load, door open 1 minute
40 min	Fan turned on high (20 minutes after fuel loading) per manufacturer's instructions
80 min	@6.0 lbs, brought unburnt pieces forward for more uniform charcoalization
98 min	@4.1 lbs, leveled coal bed, turned off fan, zeroed scale in preparation of medium fire fuel loading

Test Notes
Test Burn Start Time: 9:32
Air Control Setting: Medium Test Setting (See pictures/drawings is test file)

Time	Notes
0 min	Loaded Medium fire test fuel, door closed @ 60 seconds.
3 min	Set air to medium test setting
6 min	Changed both front filters due to plugging
20 min	Fan turned on low (20 minutes after fuel loading) per manufacturer's instructions
60 min	Changed 1-hour filter on Train A
490 min	End of Test

Test Burn End Time: 17:42

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 16.93 CO (%): 4.330
Mid Gas CO_2 (%): 10.00 CO (%): 2.51

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	7:04	7:09	7:06	3/1 – 11:17	3/1 – 11:15	3/1 – 11:20
CO_2	0.00	10.07	16.93	0.00	10.09	16.96
CO	0.000	2.500	4.330	-0.025	2.472	4.300

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature:  Date: 3/1/2019

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 3 Test Date: 2/28/2019

Test Photos

Kindling Fuel Load

Start-up Fuel Load

High Fire Fuel Load

Residual Start-up Fuel Coal Bed

Technician Signature: Date: 3/1/2019

ASTM E3053 Wood Heater Run Sheets

Client: FPI Job Number: 19-460 Tracking #: 0022
Model: F2450 Run Number: 3 Test Date: 2/28/2019

High Fire Fuel Loaded

Residual High Fire Load Coal Bed

Medium Fire Fuel Load

Medium Fire Fuel Loaded

Technician Signature: Date: 3/1/2019

Sample Pre-Test Tare Sheet: ☐ Probes ☒ TX40 Filters ☐ O-Rings

Date/Time In Desiccator: 1/17/2019 - 16:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109A-100mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
T091	1/20 - 17:00	88.8	1/22 - 15:30	88.4	1/25 - 8:00	88.5	-	-	SB	19-460 #1 ~~#SS.1~~
T092	↓	89.2	↓	89.0	-	-	-	-	SB	19-460 #1 ~~#SS.1~~
T093	↓	87.4	↓	87.4	-	-	-	-	SB	19-460 #1 ~~#SS.1~~
T094	↓	87.4	↓	87.5	-	-	-	-	SB	19-460 #1 ~~#SS.1~~
T095	↓	87.3	↓	87.2	-	-	-	-	SB	↓
T096	↓	87.8	↓	87.8	-	-	-	-	SB	↓
T097	↓	87.3	↓	87.5	-	-	-	-	SB	↓
T098	↓	86.4	↓	86.5	-	-	-	-	SB	↓
T099	↓	87.7	↓	87.6	-	-	-	-	SB	↓
T100	↓	88.0	↓	88.0	-	-	-	-	SB	↓
T101	↓	87.3	↓	87.4	-	-	-	-	SB	↓
T102	↓	88.0	↓	87.9	-	-	-	-	SB	↓
T103	↓	87.9	↓	87.8	-	-	-	-	SB	19-460 #1
T104	1/25 - 12:30	~~87.5~~ 88.7	1/26 - 9:00	88.7	-	-	-	-	SB	↓
T105	↓	88.5	↓	88.3	-	-	-	-	SB	↓
T106	↓	88.6	↓	88.5	-	-	-	-	SB	↓
T107	↓	88.2	↓	88.1	-	-	-	-	SB	↓
T108	↓	88.4	↓	88.4	-	-	-	-	SB	↓
T109	↓	89.1	↓	89.2	-	-	-	-	SB	↓
T110	↓	88.8	↓	88.9	-	-	-	-	SB	↓
T111	↓	89.1	1/27 - 9:00	89.1	-	-	-	-	SB	↓
T112	↓	89.3	↓	89.2	-	-	-	-	SB	↓
T113	↓	88.8	↓	88.8	-	-	-	-	SB	~~19-460 #2 #1~~
T114	↓	88.2	↓	88.3	-	-	-	-	SB	19-460 #2
T115	↓	89.3	↓	89.3	-	-	-	-	SB	↓
T116	↓	89.3	↓	89.3	-	-	-	-	SB	↓
T117	↓	88.9	↓	89.0	-	-	-	-	SB	↓
T118	↓	82.3	↓	82.2	-	-	-	-	SB	↓
T119	↓	91.9	↓	91.9	-	-	-	-	SB	↓
T120	↓	91.2	↓	91.1	-	-	-	-	SB	↓

Sample Post-Test Analysis Sheet: ☐ Probes ☒ TX40 Filters ☐ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109A-100mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
T091	88.5	2/25- 14:00	2/27- 13:30	88.7	2/28- 6:30	88.7	-	-	-	-	JB
T092	89.0	↓	↓	* weighed as	set with	T089+T090*					JB
T093	87.4	↓	↓	* weighed as	pair with	T088*					JB
T094	87.5	2/27/19-7:30	3/1-10:00	>	3/4-8:00	>	-	-	-	-	JB
T095	87.2	↓	↓	190.6	↓	190.5	-	-	-	-	JB
T096	87.8	↓	↓	185.5	↓	185.5	-	-	-	-	JB
T097	87.5	↓	↓	>	↓	>	-	-	-	-	JB
T098	86.5	↓	↓	376.9	↓	377.0	-	-	-	-	JB
T099	87.6	↓	↓	87.8	↓	87.8	-	-	-	-	JB
T100	88.0	↓	↓	* weighed as set with	T097, T102, T098*						JB
T101	87.4	↓	↓	* weighed as	a pair	w.th T096*					JB
T102	87.9	↓	↓	* weighed as	set with	T097, T098, T100*					JB
T103	87.8	2/27/19-12:00	↓	>	3/4-8:00	>	-	-	-	-	JB
T104	88.7	↓	↓	363.1	↓	363.0	-	-	-	-	JB
T105	88.3	↓	↓	178.9	↓	178.9	-	-	-	-	JB
T106	88.5	↓	↓	>	↓	>	-	-	-	-	JB
T107	88.1	↓	↓	364.4	↓	364.2	-	-	-	-	JB
T108	88.4	↓	↓	88.5	↓	88.5	-	-	-	-	JB
T109	89.2	↓	↓	* weighed as a set with	T106, 107, and T111*						JB
T110	88.9	↓	↓	* weighed as a set with	T103, T104, and T112*						JB
T111	89.1	↓	↓	* weighed as a set with	T106, T107, and T109*						JB
T112	89.2	↓	↓	* weighed as a set with	T103, T104, and T110*						JB
T113	88.8	↓	↓	* weighed as a pair with	T105*						JB
T114	88.3	2/28-7:00	↓	90.7	3/4-8:00	90.7	-	-	-	-	JB
T115	89.3	↓	↓	>	↓	>	-	-	-	-	JB
T116	89.3	↓	↓	190.3	↓	190.3	-	-	-	-	JB
T117	89.0	↓	↓	>	↓	>	-	-	-	-	JB
T118	82.2	↓	↓	275.5	↓	275.5	-	-	-	-	JB
T119	91.9	↓	↓	92.0	↓	92.0	-	-	-	-	JB
T120	91.1	↓	↓	* weighed as	a set	with T117+T118*					JB

Sample Pre-Test Tare Sheet: ☐ Probes ☒ TX40 Filters ☐ O-Rings

Date/Time In Desiccator: 2/22 - 16:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109A-100mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
T121	2/27 - 16:00	87.6	2/28 - 8:30	87.6	–	–	–	–	SB	19.460 #3
T122		88.4		88.5	–	–	–	–	SB	
T123		87.3		87.4	–	–	–	–	SB	
T124		87.5		87.3	–	–	–	–	SB	
T125		87.1		87.1	–	–	–	–	SB	
T126		87.8		87.9	–	–	–	–	SB	
T127		88.9		88.8	–	–	–	–	SB	
T128		88.9		88.8	–	–	–	–	SB	
T129		88.5		88.6	–	–	–	–	SB	
T130		89.7		89.6	–	–	–	–	SB	
T131		88.8		88.9	–	–	–	–	SB	
T132		88.2		88.3	–	–	–	–	SB	
T133		87.5		87.6	–	–	–	–	SB	
T134		86.7		86.7	–	–	–	–	SB	
T135										
T136										
T137										
T138										
T139										
T140										
T141										
T142										
T143										
T144										
T145										
T146										
T147										
T148										
T149										
T150										

Sample Post-Test Analysis Sheet: ☐ Probes ☒ TX40 Filters ☐ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109A-100mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
T121	87.6	3/1 - 10:30	3/4 - 8:00	> 180.8	3/5-8:00	> 180.7	-	-	-	-	SB
T122	88.3	↓	↓	180.0	↓	177.9	-	-	-	-	SB
T123	87.4						-	-	-	-	SB
T124	87.3			> 269.2		> 269.3	-	-	-	-	SB
T125	87.1			88.0	↓	88.0	-	-	-	-	SB
T126	87.9										
T127	88.8			* weighed as a pair with T127*							SB
T128	88.8			* weighed as a pair with T123*							SB
T129											
T130											
T131											
T132											
T133											
T134											
T135											
T136											
T137											
T138											
T139											
T140											
T141											
T142											
T143											
T144											
T145											
T146											
T147											
T148											
T149											
T150											

Sample Pre-Test Tare Sheet: ☒ Probes ☐ Filters ☐ O-Rings

Date/Time In Desiccator: 1/17/19 - 8:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109A/B – 100/200mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
1A	1/24 - 10:00	115627.8	1/24 - 8:00	115627.7	–	–	–	–	JD	18-447 #1
1B		115902.3		115902.3	–	–	–	–	SD	18-447 #1
2A		116239.5		116239.6	–	–	–	–	SB	18-447 #2
2B		116329.5		116329.4	–	–	–	–	SB	18-447 #2
3A		116072.9		116072.9	–	–	–	–	SB	18-447 #3
3B		116339.8		116339.7	–	–	–	–	SB	18-447 #3
4A		116182.2	2/1/19-8:45	116182.3	–	–	–	–	SB	18-439 #1
4B		116365.2	2/1 - 8:45	116365.3	–	–	–	–	SB	18-439 #1
5A	2/20 - 17:00	116768.2	2/21 - 13:00	116768.1	–	–	–	–	SB	19-460 #Ass.1
5B		116876.5		116876.2	2/22 - 15:30	116876.1	–	–	SB	19-460 #Ass.1
6A		116543.9		116543.8	–	–	–	–	SB	19-460 #Ass.2
6B		116117.0		116116.9	–	–	–	–	SB	19-460 #Ass.2
7A		116739.9		116739.9	–	–	–	–	SB	19-460 #1
7B		117287.7		117287.7	–	–	–	–	SB	19-460 #1
8A	2/26 - 15:00	116824.0	2/27 - 7:00	116824.1	–	–	–	–	SB	19-460 #2
8B	2/26 - 15:00	116826.3	2/27 - 7:00	116826.1	–	–	–	–	SB	19-460 #2
9A	2/26 - 15:00	116713.8	2/27 - 7:00	116713.6	–	–	–	–	SB	19-460 #3
9B	2/26 - 15:00	117135.5	2/27 - 7:00	117135.4	–	–	–	–	SB	19-460 #3
10A										
10B										
11A										
11B										
12A										
12B										
13A										
13B										
14A										
14B										
15A										
15B										

Sample Post-Test Analysis Sheet: ☒ Probes ☐ Filters ☐ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109A/B – 100/200mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
1A	115627.7	1/28 - 15:10	1/30 - 7:30	115628.7	1/31 - 8:00	115628.5	-	-	-	-	SB
1B	115902.3	1/28 - 15:10	1/30 - 7:30	115963.0	1/31 - 8:00	115902.8	-	-	-	-	SB
2A	116239.6	1/30 - 8:00	1/31 - 8:00	116239.8	2/1 - 8:45	116239.9	-	-	-	-	SB
116329.4	1/30 - 8:00	1/31 - 8:00	116329.9	2/1 - 8:45	116330.0	-	-	-	-	SB
3A	116072.9	1/31 - 8:30	2/1 - 8:45	116073.4	2/2 - 7:30	116073.5	-	-	-	-	SB
3B	116339.7	1/31 - 8:30	2/1 - 8:45	116340.1	2/2 - 7:30	116340.1	-	-	-	-	SB
4A	116182.3	2/4 - 15:45	2/6 - 8:30	116182.4	2/7 - 8:00	116182.3	-	-	-	-	SB
4B	116365.3	2/4 - 15:45	2/6 - 8:30	116365.1	2/7 - 8:00	116365.2	-	-	-	-	SB
5A	116768.1	2/25 - 14:00	2/27 - 13:30	116768.7	2/28 - 6:30	116768.5	-	-	-	-	SB
5B	116876.1	2/25 - 14:00	2/27 - 13:30	116876.2	2/28 - 6:30	116876.2	-	-	-	-	SB
6A	116543.2	2/27 - 7:30	3/1 - 10:00	116544.4	3/4 - 8:00	116544.2	-	-	-	-	SB
6B	116116.9	2/27 - 7:30	3/1 - 10:00	116117.6	3/4 - 8:00	116117.5	-	-	-	-	SB
7A	116739.9	2/27 - 12:00	3/1 - 10:00	116740.2	3/4 - 8:00	116740.1	-	-	-	-	SB
7B	117287.7	2/27 - 12:00	3/1 - 10:00	117287.9	3/4 - 8:00	117288.0	-	-	-	-	SB
8A	116824.1	2/28 - 7:00	3/1 - 10:00	116824.3	3/4 - 8:00	116824.2	-	-	-	-	SB
8B	116826.1	2/28 - 7:00	3/1 - 10:00	116826.1	3/4 - 8:00	116826.0	-	-	-	-	SB
9A	116713.6	3/1 - 10:30	3/4 - 8:00	116713.6	3/5 - 8:00	116713.5	-	-	-	-	SB
9B	117135.4	3/1 - 10:30	3/4 - 8:00	117135.4	3/5 - 8:00	117135.2	-	-	-	-	SB
10A											
10B											
11A											
11B											
12A											
12B											
13A											
13B											
14A											
14B											
15A											
15B											

Sample Pre-Test Tare Sheet: ☐ Probes ☐ Filters ☒ O-Rings

Date/Time In Desiccator: 1/17/2019 - 8:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109B-200mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
1A	1/24 - 10:00	3562.0	1/24 - 16:30	3562.0	–	–	–	–	SB	18-447 #1
1B		3550.9		3550.8	–	–	–	–	SB	18- 447 #1
2A		3548.0		3547.9	–	–	–	–	SB	18- 447 #2
2B		3566.4		3566.5	–	–	–	–	SB	18- 447 #2
3A		3575.4		3575.2	–	–	–	–	SB	18- 447 #3
3B		3563.8		3563.8	–	–	–	–	SB	18- 447 #3
4A		3588.8	2/1 - 8:45	3588.4	2/2 - 7:30	3588.3	–	–	SB	18-459 #1
4B	↓	3576.4	2/1 - 8:45	3575.7	2/2 - 7:30	3575.7	–	–	SB	18- 439 #1
5A	2/20 - 17:00	3529.7	2/21 - 13:00	3529.7	–	–	–	–	SB	19- 461 #1 ~~ASS.~~
5B		3526.4		3526.3	–	–	–	–	SB	19- 460 #1 ~~ASS.~~
6A		3610.3		3610.2	–	–	–	–	SB	19- 460 #~~ASS~~2
6B		3379.9		3380.0	–	–	–	–	SB	19 460 #~~ASS~~2
7A		3569.0		3569.1	–	–	–	–	SB	19-460 #1
7B	↓	3517.8	↓	3517.8	–	–	–	–	SB	19-460 #1
8A	2/26 - 15:00	3547.0	2/27 - 7:00	3547.0	–	–	–	–	SB	19- 460 #2
8B		3580.2		3580.3	–	–	–	–	SB	19- 460 #2
9A		3577.1		3577.1	–	–	–	–	SB	19- 460 #3
9B	↓	3520.0	↓	3519.9	–	–	–	–	SB	19- 460 #3
10A										
10B										
11A										
11B										
12A										
12B										
13A										
13B										
14A										
14B										
15A										
15B										

Sample Post-Test Analysis Sheet: ☐ Probes ☐ Filters ☒ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109B-200mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
1A	3562.0	1/28 - 15:10	1/30 - 7:30	3562.3	1/31 - 8:00	3562.0	2/1 - 8:45	3562.0	–	–	SB
1B	3550.8	1/28 - 15:10	1/30 - 7:30	3551.1	1/31 - 8:00	3550.9	–	–	–	–	SB
2A	3547.9	1/30 - 8:00	1/31 - 8:00	3548.5	2/1 - 8:45	3548.2	2/2 - 7:30	3548.2	–	–	SB
2B	3566.5	1/30 - 8:00	1/31 - 8:00	3566.8	2/1 - 8:45	3566.6	–	–	–	–	SB
3A	3575.2	1/31 - 8:30	2/1 - 8:45	3575.9	2/2 - 7:30	3575.8	–	–	–	–	SB
3B	3563.8	1/31 - 8:30	2/1 - 8:45	3564.0	2/2 - 7:30	3563.8	–	–	–	–	SB
4A	3588.3	2/4 - 15:45	2/6 - 8:30	3588.4	2/7 - 8:00	3588.4	–	–	–	–	SB
4B	3575.7	2/4 - 15:45	2/6 - 8:30	3576.1	2/7 - 8:00	3576.0	–	–	–	–	SB
5A	3529.7	2/25 - 14:00	2/27 - 13:30	3529.9	2/28 - 6:30	3530.0	–	–	–	–	SB
5B	3526.3	2/25 - 14:00	2/27 - 13:30	3527.0	2/28 - 6:30	3526.8	–	–	–	–	SB
6A	3610.2	2/27 - 7:30	3/1 - 10:00	3611.0	3/4 - 8:00	3610.9	–	–	–	–	SB
6B	3380.0	2/27 - 7:30	↓	3381.5	3/4 - 8:00	3380.5	–	–	–	–	SB
7A	3569.1	2/27 - 12:00		3569.2	3/4 - 8:00	3569.2	–	–	–	–	SB
7B	3517.8	2/27 - 12:00		3517.9	3/4 - 8:00	3517.9	–	–	–	–	SB
8A	3547.0	2/28 - 7:00		3547.2	3/4 - 8:00	3547.2	–	–	–	–	SB
8B	3580.3	2/28 - 7:00	↓	3581.0	3/4 - 8:00	3581.1	–	–	–	–	SB
9A	3577.1	3/1 - 10:30	3/4 - 8:00	3577.2	3/5 - 8:00	~~3520.1~~ 3577.2	–	–	–	–	SB
9B	3519.9	3/1 - 10:30	3/4 - 8:00	3520.0	3/5 - 8:00	3520.1	–	–	–	–	SB
10A											
10B											
11A											
11B											
12A											
12B											
13A											
13B											
14A											
14B											
15A											
15B											

Sample Calculations – ASTM E3053 & E2515

Client: FPI
Model: F2450
Run: 2

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)

M_{Kdb} - Weight of kindling, dry basis, lb (kg)

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)

V_s – Average gas velocity in the dilution tunnel, ft/sec

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

$V_{m(std)}$ – Volume of gas sampled, corrected to dry standard conditions, dscf

m_n – Total particulate matter collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_{RH} - Particulate emission rate for high fire test run, g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned

PM_R – Particulate emission rate for low or medium fire test run, g/hr

PM_F – Particulate emission factor for low or medium fire test run, g/dry kg of fuel burned

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)
ASTM E3053 equation (1)

$$M_{Fldb} = \Sigma((M_{FLnwb})(100/(100 + MC_{FLn})))$$

Where,

M_{FLnwb} = Weight of each test fuel piece, n, in test fuel load per 8.4.1, wet basis, lb (kg)
MC_{FLn} = Average fuel moisture of test fuel piece, n, in test fuel load, % dry basis
n = individual test fuel pieces that comprise the test fuel load, as applicable.

Sample Calculation:

n	M_{FLnwb}	MC_{FLn}	$(M_{FLnwb})(100/(100 + MC_{FLn}))$		
1	5.53	20.4	5.53 (100) / (100+ 20.4)) =	4.59	
2	5.18	22.8	5.18 (100) / (100+ 22.8)) =	4.22	
3	5.07	20.9	5.07 (100) / (100+ 20.9)) =	4.19	
4	3.70	21.9	3.7 (100) / (100+ 21.9)) =	3.04	
5	6.48	23.5	6.48 (100) / (100+ 23.5)) =	5.25	
6	0.00	NA	N/A	-	
7	0.00		N/A	-	
			SUM	21.29	lbs

M_{Fldb} = **21.29** lbs
M_{Fldb} = **9.66** kg

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)
ASTM E3053 equation (2)

$$M_{SUdb} = (M_{SUwb})(100/(100 + MC_{SU}))$$

Where,

M_{SUwb} = Total weight of start-up fuel pieces, wet basis, lb (kg)

MC_{SU} = Average fuel moisture of the piece(s) from which start-up fuel was split, % dry basis

Sample Calculation:

M_{SUwb} = N/A - Applicable to High Fire Tests Only

MC_{SU} = N/A - Applicable to High Fire Tests Only

M_{SUdb} = N/A (100/(100+ N/A)

M_{SUdb} = **N/A** lbs

= **N/A** kg

M_{Kdb} - Weight of kindling, dry basis, lb (kg)
ASTM E3053 equation (3)

$$M_{Kdb} = (M_{Kwb})(100/(100 + MC_K))$$

Where,

M_{Kwb} = Weight of kindling per 8.5.6, wet basis, lb (kg);

MC_K = Average moisture of kindling (may be assumed 10%), % dry basis.

Sample calculation:

M_{Kwb} = N/A - Applicable to High Fire Tests Only

MC_K = N/A - Applicable to High Fire Tests Only

M_{Kdb} = N/A (100/(100+ N/A)

M_{Kdb} = **N/A** lbs

= **N/A** kgs

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)
ASTM E3053 equation (4)

$$M_{FREHdb} = M_{RSUBdb} + M_{FLEHdb}$$

Where,

M_{RSUBdb} = Weight of residual start-up fuel bed when high fire test load added, lb (kg)

M_{FLEHdb} = Weight of unburned portion of test fuel load at the end of the high fire test run, lb (kg)

Sample calculation:

M_{RSUBdb} = N/A - Applicable to High Fire Tests Only

M_{FLEHdb} = N/A - Applicable to High Fire Tests Only

M_{FREHdb} = N/A + N/A

M_{FREHdb} = **N/A** lbs

= **N/A** kg

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

ASTM E3053 equation (5)

$$M_{TFBHdb} = M_{Kdb} + M_{SUdb} + M_{FLdb} - M_{FREHdb}$$

Sample Calculation:

M_{Kdb} = N/A

M_{SUdb} = N/A

M_{FLdb} = N/A

M_{FREHdb} = N/A

M_{TFBHdb} = N/A + N/A + N/A - N/A

= **N/A** lbs

= **N/A** kg

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

ASTM E3053 equation (6)

$$BR_H = 60 (M_{FLdb} - M_{FLEHdb})/\theta_{H1}$$

Where,

θ_{H1} = Total duration of high fire test run, from time when test fuel load is added to end of test run, min.

Sample calculation:

M_{FLdb} = N/A - Applicable to High Fire Tests Only

M_{FLEHdb} = N/A - Applicable to High Fire Tests Only

θ_{H1} = N/A - Applicable to High Fire Tests Only

$$BR_H = \frac{60 (\text{N/A} - \text{N/A})}{\text{N/A}}$$

BR_H = **N/A** lb/hr

= **N/A** kg/hr

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis
ASTM E3053 equation (7)

$$M_{TFBdb} = M_{FLdb} - M_{FREdb}$$

Where,

M_{FLdb} = Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

M_{FREdb} = Weight of remaining fuel at end of low or medium fire test run, lb (kg)

Sample Calculation:

M_{FLdb} = 21.29

M_{FREdb} = 0.00

M_{TFBdb} = 21.29 - 0.00

= **21.29** lbs

= **9.66** kg

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)
ASTM E3053 equation (8)

$$BR = \frac{60\ M_{TFBdb}}{\theta}$$

Where,

θ = Total test run duration for low or medium fire test run, min.

Sample Calculation:

M_{TFBdb} = 21.29

θ = 573

$$BR = \frac{60 \times 21.29}{573}$$

BR = **2.23** lb/hr

= **1.01** kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec
ASTM E2515 equation (9)

$$v_s = F_P \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

Where:

F_p = Adjustment factor for pitot tube center point reading = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)

v_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec

v_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec

k_p = Pitot tube constant, 85.49

C_p = Pitot tube coefficient: 0.99, unitless

ΔP* = Velocity pressure in the dilution tunnel, in H_2O

T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)

P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg

P_{bar} = Barometric pressure at test site, in. Hg

P_g = Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)

M_s = **The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$Fp = \frac{16.04}{17.85} = 0.899$$

$$V_s = 0.899 \times 85.49 \times 0.99 \times 0.265 \times \left(\frac{97.3 + 460}{\left(29.77 + \frac{-0.20}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **16.24** ft/s

*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

**The ASTM test standard mistakenly identifies Ms as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

3600	=	Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
B_{ws}	=	Water vapor in gas stream, proportion by volume; assume 2%
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 528 °R
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
$T_{s(avg)}$	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 16.24 \times 0.1963 \times \frac{528}{97.3 + 460} \times \frac{29.77 + \frac{-0.20}{13.6}}{29.92}$$

Q_{sd} = **10596.8** dscf/hr

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
ASTM E2515 equation (6)

$$V_{m(std)} = K_1 V_m Y \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

Where:

K_1	=	17.64 °R/in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_{bar}	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 88.189 \times 1.004 \times \frac{\left(29.77 + \frac{2.31}{13.6}\right)}{(103.1 + 460)}$$

$V_{m(std)}$ = **83.051** dscf

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 86.702 \times 1 \times \frac{\left(29.77 + \frac{2.29}{13.6}\right)}{(\#\#\#\#\# + 460)}$$

$V_{m(std)}$ = **81.434** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 69.31 \times 0.999 \times \frac{\left(\underline{29.77} + \frac{0.00}{13.6}\right)}{(74.9 + 460)}$$

$V_{m(std)}$ = **67.977** dscf

m_n – Total Particulate Matter Collected, mg
ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A (first hour):

m_n = 0.0 + 2.4 + 0.0

m_n = 2.4 mg

Using equation for Train A (post-first hour):

m_n = 0.1 + 11.7 + 0.2

m_n = 12.0 mg

Train A aggregate:

m_n = 2.4 + 12.0

m_n = **14.4** mg

Using equation for Train B:

m_n = 0 + 13.2 + 0.8

m_n = **14.0** mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf
ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K_2	=	Constant, 0.001 g/mg
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{14.4}{83.05}$$

$C_s =$ **0.00017** g/dscf

For Train 2

$$C_s = 0.001 \times \frac{14.0}{81.43}$$

$C_s =$ **0.00017** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.1}{67.98}$$

$C_r =$ **0.000001** g/dscf

E_T – Total Particulate Emissions, g
ASTM E2515 equation (15)

$$E_T = (c_s - c_r) \times Q_{std} \times \theta$$

Where:

C_s	=	Concentration of particulate matter in tunnel gas, g/dscf
C_r	=	Concentration particulate matter room air, g/dscf
Q_{std}	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

E_T = (0.000173 - 0.000001) x 10596.8 x 573 /60

E_T = **17.40** g

For Train 2

E_T = (0.000172 - 0.000001) x 10596.8 x 573 /60

E_T = **17.25** g

Average

E = **17.32** g

Total emission values shall not differ by more than 7.5% from the total average emissions

7.5% of the average =	1.30
Train 1 difference =	0.07
Train 2 difference =	0.07

PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[\frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_{mi} \times T_s} \right] \times 100$$

Where:

θ = Total sampling time, min

θ_i = Length of recording interval, min

V_{mi} = Volume of gas sample measured by the dry gas meter during the “ith” time interval, dcf

V_m = Volume of gas sample as measured by dry gas meter, dcf

V_{si} = Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec

V_s = Average gas velocity in the dilution tunnel, ft/sec

T_{mi} = Absolute average dry gas meter temperature during the "ith" time interval, ^oR

T_m = Absolute average dry gas meter temperature, ^oR

T_{si} = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, ^oR

T_s = Absolute average gas temperature in the dilution tunnel, ^oR

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left(\frac{573 \times 0.15 \times 16.24 \times (130.0 + 460) \times (\#\#\#\# + 460)}{1 \times 88.189 \times 16.70 \times (97.3 + 460) \times (\#\#\#\# + 460)} \right) \times 100$$

PR = **101** %

PM_{RH} - Particulate emission rate for high fire test run, g/hr;
ASTM E3053 equation (9)

$$PM_{RH} = 60(E_{TH}/\theta_{H2})$$

Where,

E_{TH} = Total particulate emissions for high fire test run including kindling and start-up, g

θ_{H2} = Total duration of high fire test run, from ignition of kindling to end of test run, min.

Sample Calculation:

E_{TH} = N/A - Applicable to High Fire Tests Only

θ_{H2} = N/A - Applicable to High Fire Tests Only

PM_{RH} = 60(N/A / N/A)

PM_{RH} = **N/A** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.

ASTM E3053 equation (10)

$$PM_{FH} = E_{TH}/M_{TFBHdb}$$

Sample Calculation:

E_{TH} = N/A - Applicable to High Fire Tests Only

M_{TFBHdb} = N/A - Applicable to High Fire Tests Only

PM_{FH} = N/A / N/A

= **N/A** g/kg

PM_R - Particulate emission rate for low or medium fire test runs, g/hr
ASTM E3053 equation (12)

$$PM_R = 60(E_T/\theta)$$

Where,

E_T = Total particulate emissions for low or medium fire test runs from Test Method E2515, g

Sample Calculation:

E_T = 17.32
θ = 573

PM_R = 60(17.32 / 573)

PM_{RH} = **1.81** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.
ASTM E3053 equation (13)

$$PM_F = E_T/M_{TFBdb}$$

Sample Calculation:

E_T = 17.32
M_{TFBdb} = 9.66

PM_{FH} = 17.32 / 9.66
= **1.79** g/kg

Sample Calculations – ASTM E3053 & E2515

Client: FPI
Model: F2450
Run: 1

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)

M_{Kdb} - Weight of kindling, dry basis, lb (kg)

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)

V_s – Average gas velocity in the dilution tunnel, ft/sec

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

$V_{m(std)}$ – Volume of gas sampled, corrected to dry standard conditions, dscf

m_n – Total particulate matter collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_{RH} - Particulate emission rate for high fire test run, g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned

PM_R – Particulate emission rate for low or medium fire test run, g/hr

PM_F – Particulate emission factor for low or medium fire test run, g/dry kg of fuel burned

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)
ASTM E3053 equation (1)

$$M_{Fldb} = \Sigma((M_{FLnwb})(100/(100 + MC_{FLn})))$$

Where,

M_{FLnwb} = Weight of each test fuel piece, n, in test fuel load per 8.4.1, wet basis, lb (kg)
MC_{FLn} = Average fuel moisture of test fuel piece, n, in test fuel load, % dry basis
n = individual test fuel pieces that comprise the test fuel load, as applicable.

Sample Calculation:

n	M_{FLnwb}	MC_{FLn}	$(M_{FLnwb})(100/(100 + MC_{FLn}))$		
1	3.44	22.8	3.44 (100) / (100+ 22.8)) =	2.80	
2	4.32	21.5	4.32 (100) / (100+ 21.5)) =	3.56	
3	4.61	19.3	4.61 (100) / (100+ 19.3)) =	3.87	
4	3.22	19.2	3.22 (100) / (100+ 19.2)) =	2.70	
5	2.25	24.4	2.25 (100) / (100+ 24.4)) =	1.81	
6	3.53	18.9	3.53 (100) / (100+ 18.9)) =	2.97	
7	N/A	N/A	N/A	-	
			SUM	17.70	lbs

M_{Fldb} = **17.70** lbs
M_{Fldb} = **8.03** kg

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)
ASTM E3053 equation (2)

$$M_{SUdb} = (M_{SUwb})(100/(100 + MC_{SU}))$$

Where,

M_{SUwb} = Total weight of start-up fuel pieces, wet basis, lb (kg)

MC_{SU} = Average fuel moisture of the piece(s) from which start-up fuel was split, % dry basis

Sample Calculation:

M_{SUwb} = 4.19

MC_{SU} = 20.1

M_{SUdb} = 4.2 (100/(100+ 20.1)

M_{SUdb} = **3.49** lbs

= **1.58** kg

M_{Kdb} - Weight of kindling, dry basis, lb (kg)
ASTM E3053 equation (3)

$$M_{Kdb} = (M_{Kwb})(100/(100 + MC_K))$$

Where,

M_{Kwb} = Weight of kindling per 8.5.6, wet basis, lb (kg);

MC_K = Average moisture of kindling (may be assumed 10%), % dry basis.

Sample calculation:

M_{Kwb} = 3.02

MC_K = 10.0

M_{Kdb} = 3.02 (100/(100+ 10.0)

M_{Kdb} = **2.75** lbs

= **1.25** kgs

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)
ASTM E3053 equation (4)

$$M_{FREHdb} = M_{RSUBdb} + M_{FLEHdb}$$

Where,

M_{RSUBdb} = Weight of residual start-up fuel bed when high fire test load added, lb (kg)

M_{FLEHdb} = Weight of unburned portion of test fuel load at the end of the high fire test run, lb (kg)

Sample calculation:

M_{RSUBdb} = 2.2

M_{FLEHdb} = 2.1

M_{FREHdb} = 2.20 + 2.1

M_{FREHdb} = **4.30** lbs

= **1.95** kg

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

ASTM E3053 equation (5)

$$M_{TFBHdb} = M_{Kdb} + M_{SUdb} + M_{FLdb} - M_{FREHdb}$$

Sample Calculation:

M_{Kdb} = 2.75

M_{SUdb} = 3.49

M_{FLdb} = 17.70

M_{FREHdb} = 4.30

M_{TFBHdb} = 2.75 + 3.49 + 17.70 - 4.30

= **19.64** lbs

= **8.91** kg

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

ASTM E3053 equation (6)

$$BR_H = 60 (M_{FLdb} - M_{FLEHdb})/\theta_{H1}$$

Where,

θ_{H1} = Total duration of high fire test run, from time when test fuel load is added to end of test run, min.

Sample calculation:

M_{FLdb} = 17.70

M_{FLEHdb} = 2.10

θ_{H1} = 97

$$BR_H = \frac{60 (17.70 - 2.10)}{97}$$

BR_H = **9.65** lb/hr

= **4.38** kg/hr

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis
ASTM E3053 equation (7)

$$M_{TFBdb} = M_{FLdb} - M_{FREdb}$$

Where,

M_{FLdb} = Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

M_{FREdb} = Weight of remaining fuel at end of low or medium fire test run, lb (kg)

Sample Calculation:

M_{FLdb} = N/A - Applicable to Low/Medium Fire Tests Only

M_{FREdb} = N/A - Applicable to Low/Medium Fire Tests Only

M_{TFBdb} = N/A - N/A

= **N/A** lbs

= **N/A** kg

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)
ASTM E3053 equation (8)

$$BR = \frac{60\ M_{TFBdb}}{\theta}$$

Where,

θ = Total test run duration for low or medium fire test run, min.

Sample Calculation:

M_{TFBdb} = N/A - Applicable to Low/Medium Fire Tests Only

θ = N/A - Applicable to Low/Medium Fire Tests Only

$$BR = \frac{60 \times \text{N/A}}{\text{N/A}}$$

BR = **N/A** lb/hr

= **N/A** kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec
ASTM E2515 equation (9)

$$v_s = F_P \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

Where:

F_p = Adjustment factor for pitot tube center point reading = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)

v_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec

v_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec

k_p = Pitot tube constant, 85.49

C_p = Pitot tube coefficient: 0.99, unitless

ΔP* = Velocity pressure in the dilution tunnel, in H_2O

T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)

P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg

P_{bar} = Barometric pressure at test site, in. Hg

P_g = Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)

M_s = **The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$Fp = \frac{16.07}{17.88} = 0.899$$

$$V_s = 0.899 \times 85.49 \times 0.99 \times 0.265 \times \left(\frac{134.0 + 460}{\left(29.78 + \frac{-0.20}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **16.76** ft/s

*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

**The ASTM test standard mistakenly identifies Ms as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr
ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

3600	=	Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
B_{ws}	=	Water vapor in gas stream, proportion by volume; assume 2%
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 528 °R
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
$T_{s(avg)}$	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 16.76 \times 0.1963 \times \frac{528}{134.0 + 460} \times \frac{29.78 + \frac{-0.20}{13.6}}{29.92}$$

Q_{sd} = **10264.9** dscf/hr

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
ASTM E2515 equation (6)

$$V_{m(std)} = K_1 V_m Y \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

Where:

K_1	=	17.64 °R/in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_{bar}	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 18.725 \times 1.004 \times \frac{\left(29.78 + \frac{2.26}{13.6}\right)}{(91.7 + 460)}$$

$V_{m(std)}$ = **17.999** dscf

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 18.214 \times 1 \times \frac{\left(29.78 + \frac{2.20}{13.6}\right)}{(91.2 + 460)}$$

$V_{m(std)}$ = **17.452** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 15.01 \times 0.999 \times \frac{\left(\underline{29.78} + \frac{0.00}{13.6}\right)}{(73.9 + 460)}$$

$V_{m(std)}$ = **14.747** dscf

m_n – Total Particulate Matter Collected, mg
ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A (first hour):

m_n = 0.0 + 8.4 + 0.0

m_n = 8.4 mg

Using equation for Train A (post-first hour):

m_n = 0.2 + 1.8 + 0.1

m_n = 2.1 mg

Train A aggregate:

m_n = 8.4 + 2.1

m_n = **10.5** mg

Using equation for Train B:

m_n = 0.3 + 9.3 + 0.1

m_n = **9.7** mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf
ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K_2	=	Constant, 0.001 g/mg
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{10.5}{18.00}$$

C_s = **0.00058** g/dscf

For Train 2

$$C_s = 0.001 \times \frac{9.7}{17.45}$$

C_s = **0.00056** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.1}{14.75}$$

C_r = **0.000007** g/dscf

E_T – Total Particulate Emissions, g
ASTM E2515 equation (15)

$$E_T = (c_s - c_r) \times Q_{std} \times \theta$$

Where:

C_s	=	Concentration of particulate matter in tunnel gas, g/dscf
C_r	=	Concentration particulate matter room air, g/dscf
Q_{std}	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

E_T = (0.000583 - 0.000007) x 10264.9 x 124 /60

E_T = **12.23** g

For Train 2

E_T = (0.000556 - 0.000007) x 10264.9 x 124 /60

E_T = **11.65** g

Average

E = **11.94** g

Total emission values shall not differ by more than 7.5% from the total average emissions

7.5% of the average =	0.90
Train 1 difference =	0.29
Train 2 difference =	0.29

PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[\frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_{mi} \times T_s} \right] \times 100$$

Where:

θ	=	Total sampling time, min
θ_i	=	Length of recording interval, min
V_{mi}	=	Volume of gas sample measured by the dry gas meter during the “ith” time interval, dcf
V_m	=	Volume of gas sample as measured by dry gas meter, dcf
V_{si}	=	Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec
V_s	=	Average gas velocity in the dilution tunnel, ft/sec
T_{mi}	=	Absolute average dry gas meter temperature during the "ith" time interval, ^oR
T_m	=	Absolute average dry gas meter temperature, ^oR
T_{si}	=	Absolute average gas temperature in the dilution tunnel during the "ith" time interval, ^oR
T_s	=	Absolute average gas temperature in the dilution tunnel, ^oR

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left(\frac{124 \times 0.112 \times 16.76 \times (92.0 + 460) \times (91.7 + 460)}{1 \times 18.725 \times 16.16 \times (134.0 + 460) \times (79.0 + 460)} \right) \times 100$$

PR = **73** %

PM_{RH} - Particulate emission rate for high fire test run, g/hr;
ASTM E3053 equation (9)

$$PM_{RH} = 60(E_{TH}/\theta_{H2})$$

Where,

E_{TH} = Total particulate emissions for high fire test run including kindling and start-up, g

θ_{H2} = Total duration of high fire test run, from ignition of kindling to end of test run, min.

Sample Calculation:

E_{TH} = 11.94

θ_{H2} = 124

PM_{RH} = 60(11.94 / 124)

PM_{RH} = **5.78** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.

ASTM E3053 equation (10)

$$PM_{FH} = E_{TH}/M_{TFBHdb}$$

Sample Calculation:

E_{TH} = 11.94

M_{TFBHdb} = 8.91

PM_{FH} = 11.94 / 8.91

= **1.34** g/kg

PM_R - Particulate emission rate for low or medium fire test runs, g/hr
ASTM E3053 equation (12)

$$PM_R = 60(E_T/\theta)$$

Where,

E_T = Total particulate emissions for low or medium fire test runs from Test Method E2515, g

Sample Calculation:

E_T = N/A - Applicable to Low/Medium Fire Tests Only
θ = N/A - Applicable to Low/Medium Fire Tests Only

PM_R = 60(N/A / N/A)

PM_{RH} = **N/A** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.
ASTM E3053 equation (13)

$$PM_F = E_T/M_{TFBdb}$$

Sample Calculation:

E_T = N/A - Applicable to Low/Medium Fire Tests Only
M_{TFBdb} = N/A - Applicable to Low/Medium Fire Tests Only

PM_{FH} = N/A / N/A
= **N/A** g/kg

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

FEB 2 8 2018

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Justin White
Hearthstone QHPP, Inc.
#17 Stafford Ave.
Morrisville, VT 05661

Dear Mr. White,

I am writing in response to your letter dated January 12, 2018, regarding wood heaters manufactured by Hearthstone QHPP, Inc. (Hearthstone). This response, dated February 28, 2018, supercedes our previous response (dated February 26, 2018) to correct an inaccuracy regarding required changes to ASTM E3053-17.

You are requesting to use an alternative test method, using cord wood, as referenced in section 60.532(c) of 40 CFR part 60, Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA) to meet the 2020 cord wood alternative compliance option. The 2020 cord wood alternative compliance option states that each affected wood heater manufactured or sold at retail for use in the United States on or after May 15, 2020, must not discharge into the atmosphere any gases that contain particulate matter in excess of 2.5 g/hr. Compliance must be determined by a cord wood test method approved by the Administrator along with the procedures in 40 CFR 60.534. You have requested approval to use the procedures and specifications found in ASTM Method E3053-17, a cord wood test method titled, "Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel," in conjunction with ASTM E2515-11 and Canadian Standards Administration (CSA) Method CSA-B415.1-10, which are specified in 40 CFR 60.534.

We understand that Hearthstone is also requesting that the alternative method proposed above be approved to apply broadly to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA, from the approval date of this request until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, providing all requirements of section 60.533 of Subpart AAA are met.

With the caveats set forth below, we approve your alternative test method request for certifying wood heaters using ASTM E3053-17 in conjunction with section 60.534 of Subpart AAA to meet the 2020 cord wood compliance option until such time that Subpart AAA is revised or replaced to require a different cord wood certification method. We also approve application of this alternative method to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA.

As required in Subpart AAA, section 60.354(d), you or your approved test laboratory must also measure the first hour of particulate matter emissions for each test run using a separate filter in one of the two parallel sampling trains. These results must be reported separately and also included in the total particulate matter emissions per run. Also, as required by Subpart AAA, section 60.534(e), you must have your approved laboratory measure the efficiency, heat output, and carbon monoxide emissions of the tested wood heater using CSA-B415.1-10. For measurement of particulate matter emission concentrations, ASTM 2515-11 must be used.

The following change to ASTM E3053-17 must be followed:

1. Coal bed conditions prior to loading test fuel. The coal bed shall be a level plane without valleys or ridges for all test runs in the high, low, and medium burn rate categories.

The following changes to ASTM E2515-11 must be followed:

1. The filter temperature must be maintained between 80 and 90 degrees F during testing.

2. Filters must be weighed in pairs to reduce weighing error propagation; see ASTM 2515-11, Section 10.2.1 Analytical Procedure.

3. Sample filters must be Pall TX-40 or equivalent Teflon-coated glass fiber, and of 47 mm, 90 mm, 100 mm, or 110 mm in diameter.

4. Only one point is allowed outside the +/- 10 percent proportionality range per test run.

A copy of this letter must be included in each certification test report where this alternative test method is utilized.

It is reasonable that this alternative test method approval be broadly applicable to all wood heaters subject to the requirements of 40 CFR part 60, Subpart AAA. For this reason, we will post this letter as ALT-125 on our website at *http://www3.epa.gov/ttn/emc/approalt.html* for use by other interested parties. As noted earlier in this letter, this alternative method approval is valid until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, and at such time, this alternative will be reconsidered and possibly withdrawn.

If you have additional questions regarding this approval, please contact Michael Toney of my staff at 919-541-5247 or toney.mike@epa.gov.

Sincerely,

Steffan M. Johnson, Group Leader
Measurement Technology Group

cc: Amanda Aldridge, EPA/OAQPS/OID
Adam Baumgart-Getz, EPA/OAQPS/OID
Rafael Sanchez, EPA/OECA
Michael Toney, EPA/OAQPS/AQAD

duplicate serial number | 512

0219WS026S

LISTED SPACE HEATER, SOLID FUEL TYPE, ALSO SUITABLE FOR MOBILE HOME INSTALLATION / APPAREIL DE CHAUFFAGE AMBIANT HOMOLOGUÉ À COMBUSTIBLE SOLIDE, CONVENANT AUSSI POUR INSTALLATION DANS UNE MAISON MOBILE

DO NOT REMOVE THIS LABEL/
NE RETIREZ PAS CETTE ÉTIQUETTE

512

MODEL: REGENCY MEDIUM FREESTANDING STOVE - F2450

TESTED TO: ULC S627-00 / UL 1482-2011 (R2015) / UL 737-2011 (R2015)

This appliance is not approved for mobile home installations in Canada (USA only)

Cet appareil n'est pas homologué pour être installé dans une maison mobile au Canada (États-Unis seulement)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cord wood." Tested to ASTM E3053. Model Regency F2450 – 2.3g /hr. This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

Certifié conforme aux normes 2020 du U.S. ENVIRONMENTAL PROTECTION AGENCY en matière d'émission de particules de bois avec du bois de corde". Approuvé ASTM E3053. Modèle Regency F2450 – 2,3 g /h. Cet appareil de chauffage au bois doit être inspecté périodiquement et réparé pour fonctionner correctement. Consulter le manuel d'installation pour plus d'information. La réglementation fédérale interdit de faire fonctionner un tel appareil si les consignes d'utilisation contenues dans le présent manuel ne sont pas respectées.

INSTALL AND USE ONLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS. CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. USE 150 MM (6 IN.) DIAMETER MINIMUM 24 MSG BLACK OR 26 MSG BLUED STEEL CONNECTOR WITH LISTED UL103 HT FACTORY-BUILT CHIMNEY SUITABLE FOR USE WITH SOLID FUELS OR MASONRY CHIMNEY.

SEE LOCAL BUILDING CODE AND MANUFACTURER'S INSTRUCTIONS FOR PRECAUTIONS REQUIRED FOR PASSING A CHIMNEY THROUGH A COMBUSTIBLE WALL OR CEILING. DO NOT PASS CHIMNEY CONNECTOR THROUGH COMBUSTIBLE WALL OR CEILING. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

INSTALLER ET UTILISER SEULEMENT SELON LES CONSIGNES D'INSTALLATION ET D'UTILISATION DU FABRICANT. CONTACTER LES RESPONSABLES DU BÂTIMENT OU DU SERVICE-INCENDIE DE VOTRE RÉGION POUR CONNAÎTRE LES RESTRICTIONS ET EXIGENCES D'INSPECTION DANS VOTRE RÉGION. UTILISER UN CONNECTEUR D'UN DIAMÈTRE MINIMAL DE 150 MM (6 PO) 24 MSG EN ACIER NOIR OU 26 MSG EN ACIER BRONZÉ AVEC CHEMINÉE PRÉFABRIQUÉE HOMOLOGUÉE UL103 HT CONÇUE POUR ÊTRE UTILISÉE AVEC DES COMBUSTIBLES SOLIDES OU UNE CHEMINÉE EN MAÇONNERIE.

VOIR LE CODE DU BÂTIMENT LOCAL ET LES INSTRUCTIONS DU FABRICANT CONCERNANT LES PRÉCAUTIONS D'INSTALLATION D'UNE CHEMINÉE TRAVERSANT UN MUR OU UN PLAFOND EN MATÉRIAUX COMBUSTIBLES. NE PAS FAIRE TRAVERSER LE CONNECTEUR DE CHEMINÉE DANS UN MUR OU PLAFOND EN MATÉRIAUX COMBUSTIBLES. NE PAS RACCORDER CE POÊLE À BOIS À UN CONDUIT DE CHEMINÉE DESSERVANT UN AUTRE APPAREIL.

MINIMUM ALCOVE CEILING HEIGHT: 2109 MM / 83" MAXIMUM ALCOVE DEPTH 1219 MM / 48".
MINIMUM CLEARANCES FOR HORIZONTAL CONNECTOR TO CEILING: 405 MM / 16"
THE SPACE BENEATH THE HEATER MUST NOT BE OBSTRUCTED. OPERATE ONLY WITH FIREBRICKS IN PLACE.

FOR USE WITH SOLID WOOD FUEL ONLY. USE OF OTHER FUELS MAY DAMAGE HEATER AND CREATE A HAZARDOUS CONDITION. DO NOT OBSTRUCT COMBUSTION AIR OPENINGS. OPERATE ONLY WITH FIREBRICKS IN PLACE. RISK OF SMOKE AND FLAME SPILLAGE, OPERATE ONLY WITH DOORS FULLY CLOSED. IF INSTALLED IN A MOBILE HOME OPERATE ONLY WITH DOORS FULLY CLOSED - OPEN FEED DOOR TO FEED FIRE ONLY. DO NOT USE GRATE OR ELEVATE FIRE. BUILD WOOD FIRE DIRECTLY ON HEARTH. DO NOT OVERFIRE - IF HEATER OR CHIMNEY CONNECTOR GLOWS YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE CREOSOTE BUILDUP MAY OCCUR RAPIDLY. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIAL AWAY FROM HEATER. REPLACE GLASS ONLY WITH NEOCERAM GLASS. COMBUSTIBLE FLOOR MUST BE PROTECTED BY NON-COMBUSTIBLE MATERIAL EXTENDING BENEATH THE HEATER AND TO THE FRONT AND SIDES AS INDICATED OR TO THE NEAREST PERMITTED COMBUSTIBLE MATERIAL.
OPTIONAL COMPONENT: FAN PART #075-917, ELECTRICAL RATING: VOLTS 115, 60 HZ, 2 AMPS / SCREEN
DANGER: RISK OF ELECTRIC SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. DO NOT ROUTE POWER CORD UNDER OR IN FRONT OF APPLIANCE.
COMPONENTS REQUIRED FOR MOBILE HOME INSTALLATION: OUTSIDE AIR KIT
IN CANADA: LISTED ULCS 629 CHIMNEY. USE CHIMNEY COMPONENTS AS SPECIFIED IN INSTALLATION/INSTRUCTIONS
IN USA: LISTED UL 103 HT CHIMNEY

WARNING: ONLY USE LISTED REGENCY OPTIONS SUCH AS LEGS, AIRMATE, FAN AS SHOWN IN THE INSTALLATION MANUAL.
CAUTION: MOVING PARTS MAY CAUSE INJURY.

HAUTEUR MINIMALE DU PLAFOND DE L'ALCÔVE : 2109 MM / 83 PO PROFONDEUR MAXIMALE DE L'ALCÔVE : 1219 MM / 48 PO
DÉGAGEMENT MINIMAL DU PLAFOND POUR UN CONNECTEUR HORIZONTAL : 405 MM / 16 PO.
L'ESPACE SOUS LE POÊLE NE DOIT PAS ÊTRE OBSTRUÉ. UTILISER SEULEMENT AVEC LES BRIQUES RÉFRACTAIRES EN PLACE.
À UTILISER AVEC DU BOIS SOLIDE SEULEMENT. L'UTILISATION D'AUTRES COMBUSTIBLES PEUT ENDOMMAGER LE POÊLE ET CRÉER UNE CONDITION DANGEREUSE. NE PAS OBSTRUER LES OUVERTURES D'AIR DE COMBUSTION. UTILISER SEULEMENT AVEC LA PORTE FERMÉE – OUVRIR SEULEMENT LA PORTE DE CHARGEMENT POUR ALIMENTER LE FEU. NE PAS UTILISER DE GRILLE À BÛCHES NI SURÉLEVER LE FEU. MONTER LE FEU DE BOIS DIRECTEMENT SUR L'ÂTRE. NE PAS SURCHAUFFER – SI LE POÊLE OU LE CONNECTEUR DE CHEMINÉE SE MET À ROUGIR, RISQUE DE SURCHAUFFAGE. INSPECTER ET NETTOYER FRÉQUEMMENT LA CHEMINÉE ET LE CONNECTEUR. DANS CERTAINES CONDITIONS D'UTILISATION, UN DÉPÔT DE CRÉOSOTE PEUT SE FORMER RAPIDEMENT. GARDER LES MEUBLES ET AUTRES MATÉRIAUX COMBUSTIBLES ÉLOIGNÉS DU POÊLE. REMPLACER LA VITRE SEULEMENT PAR DU VERRE EN NEOCERAM. LE PLANCHER COMBUSTIBLE DOIT ÊTRE PROTÉGÉ PAR DES MATÉRIAUX NON COMBUSTIBLES DÉPASSANT SUR LE DESSOUS, LE DEVANT ET LES CÔTÉS DU POÊLE, TEL QU'INDIQUÉ, OU JUSQU'AU MATÉRIAU COMBUSTIBLE LE PLUS PRÈS PERMIS.
COMPOSANTS EN OPTION : VENTILATEUR PIÈCE N°075-917, ALIMENTATION ÉLECTRIQUE : 115 VOLTS, 60 HZ, 2 AMP.
DANGER : RISQUE D'ÉLECTROCUTION. DÉCONNECTER L'ALIMENTATION ÉLECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN DU POÊLE. NE PAS INSTALLER LE CORDON ÉLECTRIQUE SOUS OU DEVANT L'APPAREIL.
COMPOSANTS EXIGÉS POUR INSTALLATION DANS UNE MAISON MOBILE : KIT DE PRISE D'AIR EXTÉRIEUR.
AU CANADA : CHEMINÉE HOMOLOGUÉE ULCS 629. UTILISER LES PIÈCES DE LA CHEMINÉE TEL QUE SPÉCIFIÉ DANS LES CONSIGNES D'INSTALLATION.
AUX ÉTATS-UNIS : CHEMINÉE HOMOLOGUÉE UL103HT.

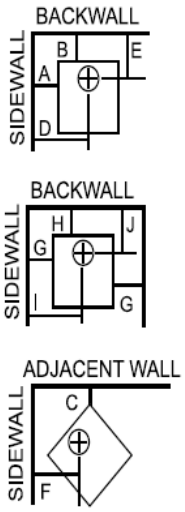
AVERTISSEMENT : UTILISER SEULEMENT LES OPTIONS HOMOLOGUÉES PAR REGENCY COMME LES PATTES, LE DIFFUSEUR AIRMATE, LE VENTILATEUR COMME ILLUTRÉ DANE LE MANUEL D'INSTALLATION.
ATTENTION : LE DÉPLACEMENT DES PIÈCES PEUT ENTRAÎNER DES BLESSURES.

MANUFACTURED BY/ FABRIQUÉ PAR :
FPI FIREPLACE PRODUCTS INTERNATIONAL LTD.
6988 VENTURE ST.
DELTA, BC V4G 1H4

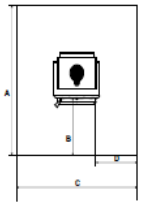
REGENCY® FIREPLACE PRODUCTS

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS
DÉGAGEMENTS MINIMAUX PAR RAPPORT AUX MATÉRIAUX COMBUSTIBLES

F2500M WITH AIRMATE SHIELD			F2500M WITH REAR DEFLECTOR		
MEASURE FROM	HEATER	FLUE CENTER-LINE	MEASURE FROM	HEATER	FLUE CENTER-LINE
RESIDENTIAL INSTALLATION USING SINGLE WALL CONNECTOR			**RESIDENTIAL INSTALLATION USING SINGLE WALL CONNECTOR**		
SIDEWALL	A 406 mm / 16 in	D 711 mm / 28 in	SIDEWALL	A 406 mm / 16 in	D 711 mm / 28 in
BACKWALL	B 267 mm / 10.5 in	E 432 mm / 17 in	BACKWALL	B 317 mm / 12.5 in	E 483 mm / 19 in
CORNER	C 229 mm / 9 in	F 533 mm / 21 in	CORNER	C 229 mm / 9 in	F 533 mm / 21 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - MOBILE HOME			**INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - MOBILE HOME**		
SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in	SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in
BACKWALL	B 229 mm / 9 in	E 394 mm / 15.5 in	BACKWALL	B 279 mm / 11 in	E 444 mm / 17.5 in
CORNER	C 178 mm / 7 in	F 483 mm / 19 in	CORNER	C 178 mm / 7 in	F 483 mm / 19 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - RESIDENTIAL CLOSE CLEARANCE			**INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - RESIDENTIAL CLOSE CLEARANCE**		
SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in	SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in
BACKWALL	B 229 mm / 9 in	E 394 mm / 15.5 in	BACKWALL	B 279 mm / 11 in	E 444 mm / 17.5 in
CORNER	C 178 mm / 7 in	F 483 mm / 19 in	CORNER	C 178 mm / 7 in	F 483 mm / 19 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - ALCOVE			**INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - ALCOVE**		
SIDEWALL	G 380 mm / 15 in	I 686 mm / 27 in	SIDEWALL	G 380 mm / 15 in	I 686 mm / 27 in
BACKWALL	H 229 mm / 9 in	J 394 mm / 15.5 in	BACKWALL	H 279 mm / 11 in	J 444 mm / 17.5 in



FLOOR PROTECTION*
PROTECTION DE PLANCHER*



A 1245 mm / 49 in (Canada)
A 1194mm / 47 in (USA)
B 457 mm / 18 in*
C 855 mm / 33-11/16 in
D 200 mm / 8 in

* In Canada, floor protection must extend 18" (457mm) to the front (16" for USA) and 8" (200mm) to each side and back of the stove.

* Au Canada, la protection de plancher doit dépasser de 18 po (457 mm) à l'avant (16 po aux États-Unis) et de 8 po (200 mm) de chaque côté du poêle et derrière le poêle.

CAUTION

HOT WHILE IN OPERATION DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. READ NAMEPLATE AND INSTRUCTIONS.

ATTENTION

CHAUD DURANT LE FONCTIONNEMENT. NE TOUCHEZ PAS. ÉLOIGNEZ LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES. LE CONTACT PEUT CAUSER DES BRÛLURES. LISEZ LA PLAQUE SIGNALÉTIQUE ET LES INSTRUCTIONS

MADE IN CANADA / FABRIQUÉ AU CANADA

920-037

DATE OF MANUFACTURE
JAN FEB MAR APR MAY JUN JUL AUG SEPT OCT NOV DEC
2018 2019 2020 2021 2022

REGENCY
FIREPLACE PRODUCTS

Classic™ Freestanding Woodstove F2450M

Owners & Installation Manual

French Manual Download: https://bit.ly/3rAsDW7
Manuel en Français : https://bit.ly/3rAsDW7

www.regency-fire.com

MODEL: F2450M

Tested by:
0219WS026S

Installer: **Please complete the details on the back cover and leave this manual with the homeowner.**
Homeowner: **Please keep these instructions for future reference.**

FPI FIREPLACE PRODUCTS INTERNATIONAL LTD. 6988 Venture St., Delta, BC Canada, V4G 1H4

Thank-you for purchasing a
REGENCY FIREPLACE PRODUCT.

The pride of workmanship that goes into each of our products will give you years of trouble-free enjoyment. Should you have any questions about your product that are not covered in this manual, please contact the **REGENCY DEALER** in your area.

"**This wood heater has a manufacturer set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual." Failure to follow the manual details can lead to smoke and CO emissions spilling into the home. It is recommended to have monitors in areas that are expected to generate CO such as heater fueling areas.**

"**U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cord wood." Tested to ASTM E3053. Model Regency F2450M – 2.3g/hr.**

"This manual describes the installation and operation of the Regency F2450M wood heater. This heater meets the 2020 U.S. Environmental Protection Agency's cord wood emission limits for wood heaters. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 14,200 BTU/hr to 53,600 BTU/hr." Efficiency is determined using the B415 method resulting in lower and higher heat values. This heater generates the best efficiency when operated using well-seasoned wood and installed in the main living areas where the majority of the chimney is within the building envelope. "This wood heater needs periodic inspection and repair for proper operation.

It is against federal regulation to operate this wood heater in a manner inconsistent with operating instructions in this manual."

CAUTION: BURN UNTREATED WOOD ONLY. OTHER MATERIALS SUCH AS WOOD PRESERVATIVES, METAL FOILS, COAL, PLASTIC, GARBAGE, SULPHUR OR OIL MAY DAMAGE THE STOVE.

"This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods."

DO NOT BURN:

- Treated wood
- Coal
- Garbage
- Cardboard
- Solvents
- Colored Paper
- Trash
- **Lawn clippings or yard waste**
- **Materials containing rubber including tires**
- **Materials containing plastic**
- **Waste petroleum products , paints or paint thinners or asphalt products**
- **Materials containing asbestos**
- **Construction or demolition debris**
- **Railroad ties**
- **Manure or animal remains**
- **Saltwater driftwood or other previously salt water saturated materials**
- **Unseasoned wood**
- **Paper products, cardboard, plywood or particle board. The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in a wood heater.**

Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke.

The authority having jurisdiction (such as Municipal Building Department, Fire Department, Fire Prevention Bureau, etc.) should be consulted before installation to determine the need to obtain a permit.

This unit must be connected to either a listed factory built chimney suitable for use with solid fuels and conforming to, ULC629 in Canada or UL-103HT in the United States of America. or code approved masonry chimney with flue liner.

F2450M is tested and certified to ULC-S627-00 and UL1482-2011 (R2015).

SAVE THESE INSTRUCTIONS

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED www.nficertified.org
We recommend that our products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) or in Canada by Wood Energy Technical Training (WETT).
Wood Energy Technical Training

WARNING: Cancer and Reproductive Harm
www.P65Warnings.ca.gov
919-874

table of contents

CAUTION: To avoid burns or wood splinters, when opening/closing the fuel door or adding wood to the fire, You should always wear appropriate protective gloves to protect your hands from the heat being emitted from this fireplace.

safety decal

This is a copy of the label that accompanies each Regency Freestanding Woodstove (F2450M). We have printed a copy of the contents here for your review.

NOTE: Regency units are constantly being improved. Check the label on the unit and if there is a difference, the label on the unit is the correct one.

duplicate serial number **512**

0219WS026S

LISTED SPACE HEATER, SOLID FUEL TYPE, ALSO SUITABLE FOR MOBILE HOME INSTALLATION / APPAREIL DE CHAUFFAGE AMBIANT HOMOLOGUÉ À COMBUSTIBLE SOLIDE, CONVENANT AUSSI POUR INSTALLATION DANS UNE MAISON MOBILE

DO NOT REMOVE THIS LABEL/
NE RETIREZ PAS CETTE ÉTIQUETTE

512

MODEL: REGENCY MEDIUM FREESTANDING STOVE - F2450M

TESTED TO: ULC S627-00 / UL 1482-2011 (R2015)

This appliance is approved for mobile home installations in Canada and the USA.
Cet appareil est homologué pour être installé dans une maison mobile au Canada et aux États-Unis.

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cord wood." Tested to ASTM E3053. Model Regency F2450M – 2.3g /hr. This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certifié conforme aux normes 2020 du U.S. ENVIRONMENTAL PROTECTION AGENCY en matière d'émission de particules de bois en utilisant le bois de corde. Approuvé ASTM E3053. Modèle Regency F2450M – 2,3 g /h. Cet appareil de chauffage au bois doit être inspecté périodiquement et réparé pour fonctionner correctement. Consulter le manuel d'installation pour plus d'information. La réglementation fédérale interdit de faire fonctionner un tel appareil si les consignes d'utilisation contenues dans le présent manuel ne sont pas respectées.

INSTALL AND USE ONLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS. CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. USE 150 MM (6 IN.) DIAMETER MINIMUM 24 MSG BLACK OR 26 MSG BLUED STEEL CONNECTOR WITH LISTED UL103 HT FACTORY-BUILT CHIMNEY SUITABLE FOR USE WITH SOLID FUELS OR MASONRY CHIMNEY.
SEE LOCAL BUILDING CODE AND MANUFACTURER'S INSTRUCTIONS FOR PRECAUTIONS REQUIRED FOR PASSING A CHIMNEY THROUGH A COMBUSTIBLE WALL OR CEILING. DO NOT PASS CHIMNEY CONNECTOR THROUGH COMBUSTIBLE WALL OR CEILING. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
INSTALLER ET UTILISER SEULEMENT SELON LES CONSIGNES D'INSTALLATION ET D'UTILISATION DU FABRICANT. CONTACTER LES RESPONSABLES DU BÂTIMENT OU DU SERVICE-INCENDIE DE VOTRE RÉGION POUR CONNAÎTRE LES RESTRICTIONS ET EXIGENCES D'INSPECTION DANS VOTRE RÉGION. UTILISER UN CONNECTEUR D'UN DIAMÈTRE MINIMAL DE 150 MM (6 PO) 24 MSG EN ACIER NOIR OU 26 MSG EN ACIER BRONZÉ AVEC CHEMINÉE PRÉFA-BRIQUÉE HOMOLOGUÉE UL103 HT CONÇUE POUR ÊTRE UTILISÉE AVEC DES COMBUSTIBLES SOLIDES OU UNE CHEMINÉE EN MAÇONNERIE.
VOIR LE CODE DU BÂTIMENT LOCAL ET LES INSTRUCTIONS DU FABRICANT CONCERNANT LES PRÉCAUTIONS D'INSTALLATION D'UNE CHEMINÉE TRAVERSANT UN MUR OU UN PLAFOND EN MATÉRIAUX COMBUSTIBLES. NE PAS FAIRE TRAVERSER LE CONNECTEUR DE CHEMINÉE DANS UN MUR OU PLAFOND EN MATÉRIAUX COMBUSTIBLES. NE PAS RACCORDER CE POÊLE À BOIS À UN CONDUIT DE CHEMINÉE DESSERVANT UN AUTRE APPAREIL.

MINIMUM ALCOVE CEILING HEIGHT: 2109 MM / 83" MAXIMUM ALCOVE DEPTH 1219 MM / 48".
MINIMUM CLEARANCES FOR HORIZONTAL CONNECTOR TO CEILING: 405 MM / 16".
THE SPACE BENEATH THE HEATER MUST NOT BE OBSTRUCTED. OPERATE ONLY WITH FIREBRICKS IN PLACE.

FOR USE WITH SOLID WOOD FUEL ONLY. USE OF OTHER FUELS MAY DAMAGE HEATER AND CREATE A HAZARDOUS CONDITION. DO NOT OBSTRUCT COMBUSTION AIR OPENINGS. OPERATE ONLY WITH FIREBRICKS IN PLACE. RISK OF SMOKE AND FLAME SPILLAGE, OPERATE ONLY WITH DOORS FULLY CLOSED. IF INSTALLED IN A MOBILE HOME OPERATE ONLY WITH DOORS FULLY CLOSED - OPEN FEED DOOR TO FEED FIRE ONLY, DO NOT USE GRATE OR ELEVATE FIRE. BUILD WOOD FIRE DIRECTLY ON HEARTH. DO NOT OVERFIRE - IF HEATER OR CHIMNEY CONNECTOR GLOWS YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE CREOSOTE BUILDUP MAY OCCUR RAPIDLY. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIAL AWAY FROM HEATER. REPLACE GLASS ONLY WITH NEOCERAM GLASS. COMBUSTIBLE FLOOR MUST BE PROTECTED BY NON-COMBUSTIBLE MATERIAL EXTENDING BENEATH THE HEATER AND TO THE FRONT AND SIDES AS INDICATED OR TO THE NEAREST PERMITTED COMBUSTIBLE MATERIAL.
OPTIONAL COMPONENT: FAN PART #075-917, ELECTRICAL RATING: VOLTS 115, 60 HZ, 2 AMPS
DANGER: RISK OF ELECTRIC SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. DO NOT ROUTE POWER CORD UNDER OR IN FRONT OF APPLIANCE.
COMPONENTS REQUIRED FOR MOBILE HOME INSTALLATION: OUTSIDE AIR KIT
IN CANADA: LISTED ULCS 629 CHIMNEY, USE CHIMNEY COMPONENTS AS SPECIFIED IN INSTALLATION/INSTRUCTIONS
IN USA: LISTED UL 103 HT CHIMNEY

WARNING: ONLY USE LISTED REGENCY OPTIONS SUCH AS LEGS, AIRMATE, FAN AS SHOWN IN THE INSTALLATION MANUAL.
CAUTION: BURNING OF MATERIALS OTHER THAN SPECIFIED MAY CAUSE DAMAGE TO THE UNIT.
CAUTION: MOVING PARTS MAY CAUSE INJURY.
HAUTEUR MINIMALE DU PLAFOND DE L'ALCÔVE : 2109 MM / 83 PO PROFONDEUR MAXIMALE DE L'ALCÔVE : 1219 MM / 48 PO
DÉGAGEMENT MINIMAL DU PLAFOND POUR UN CONNECTEUR HORIZONTAL : 405 MM / 16 PO.
L'ESPACE SOUS LE POÊLE NE DOIT PAS ÊTRE OBSTRUÉ. UTILISER SEULEMENT AVEC LES BRIQUES RÉFRACTAIRES EN PLACE.
À UTILISER AVEC OU BOIS SOLIDE SEULEMENT. L'UTILISATION D'AUTRES COMBUSTIBLES PEUT ENDOMMAGER LE POÊLE ET CRÉER UNE CONDITION DANGEREUSE. NE PAS OBSTRUER LES OUVERTURES D'AIR DE COMBUSTION. UTILISER SEULEMENT AVEC LA PORTE FERMÉE – OUVRIR SEULEMENT LA PORTE DE CHARGEMENT POUR ALIMENTER LE FEU. NE PAS UTILISER DE GRILLE À BÛCHES NI SURÉLEVER LE FEU. MONTER LE FEU DE BOIS DIRECTEMENT SUR L'ÂTRE. NE PAS SURCHAUFFER – SI LE POÊLE OU LE CONNECTEUR DE CHEMINÉE SE MET À ROUGIR, RISQUE DE SURCHAUFFAGE. INSPECTER ET NETTOYER FRÉQUEMMENT LA CHEMINÉE ET LE CONNECTEUR. DANS CERTAINES CONDITIONS D'UTILISATION, UN DÉPÔT DE CRÉOSOTE PEUT SE FORMER RAPIDEMENT. GARDER LES MEUBLES ET AUTRES MATÉRIAUX COMBUSTIBLES ÉLOIGNÉS DU POÊLE. REMPLACER LA VITRE SEULEMENT PAR DU VERRE EN NEOCERAM. LE PLANCHER COMBUSTIBLE DOIT ÊTRE PROTÉGÉ PAR DES MATÉRIAUX NON COMBUSTIBLES DÉPASSANT SUR LE DESSOUS, LE DEVANT ET LES CÔTÉS DU POÊLE, TEL QU'INDIQUÉ, OU JUSQU'AU MATÉRIAU COMBUSTIBLE LE PLUS PRÈS PERMIS.
COMPOSANTS EN OPTION : VENTILATEUR PIÈCE N°075-917, ALIMENTATION ÉLECTRIQUE : 115 VOLTS, 60 HZ, 2 AMP.
DANGER : RISQUE D'ÉLECTROCUTION. DÉCONNECTER L'ALIMENTATION ÉLECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN DU POÊLE. NE PAS INSTALLER LE CORDON ÉLECTRIQUE SOUS OU DEVANT L'APPAREIL.
COMPOSANTS EXIGÉS POUR INSTALLATION DANS UNE MAISON MOBILE : KIT DE PRISE D'AIR EXTÉRIEUR.
AU CANADA : CHEMINÉE HOMOLOGUÉE ULCS 629. UTILISER LES PIÈCES DE LA CHEMINÉE TEL QUE SPÉCIFIÉ DANS LES CONSIGNES D'INSTALLATION.
AUX ÉTATS-UNIS : CHEMINÉE HOMOLOGUÉE UL103HT.

AVERTISSEMENT : UTILISER SEULEMENT LES OPTIONS HOMOLOGUÉES PAR REGENCY COMME LES PATTES, LE DIFFUSEUR AIRMATE, LE VENTILATEUR COMME ILLUTRÉ DANE LE MANUEL D'INSTALLATION.
ATTENTION : COMBUSTION DE TOUT MATÉRIAU NON SPÉCIFIÉ PEUT ENDOMMAGER L'APPAREIL.
ATTENTION : LE DÉPLACEMENT DES PIÈCES PEUT ENTRAÎNER DES BLESSURES.

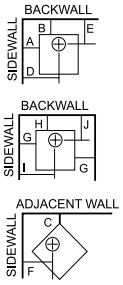
MANUFACTURED BY/ FABRIQUÉ PAR :
FPI FIREPLACE PRODUCTS INTERNATIONAL LTD.
6988 VENTURE ST.
DELTA, BC V4G 1H4

REGENCY FIREPLACE PRODUCTS

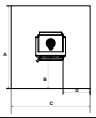
MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS
DÉGAGEMENTS MINIMAUX PAR RAPPORT AUX MATÉRIAUX COMBUSTIBLES

F2450M WITH AIRMATE SHIELD	MEASURE FROM HEATER	FLUE CENTER-LINE
RESIDENTIAL INSTALLATION USING SINGLE WALL CONNECTOR		
SIDEWALL	A 406 mm / 16 in	D 711 mm / 28 in
BACKWALL	B 241 mm / 9.5 in	E 406 mm / 16 in
CORNER	C 203 mm / 8 in	F 508 mm / 20 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - MOBILE HOME		
SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in
BACKWALL	B 203 mm / 8 in	E 368 mm / 14.5 in
CORNER	C 152 mm / 6 in	F 457 mm / 18 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - RESIDENTIAL CLOSE CLEARANCE		
SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in
BACKWALL	B 203 mm / 8 in	E 368 mm / 14.5 in
CORNER	C 152 mm / 6 in	F 457 mm / 18 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - ALCOVE		
SIDEWALL	G 380 mm / 15 in	I 686 mm / 27 in
BACKWALL	H 203 mm / 8 in	J 368 mm / 14.5 in

F2450M WITH REAR DEFLECTOR	MEASURE FROM HEATER	FLUE CENTER-LINE
RESIDENTIAL INSTALLATION USING SINGLE WALL CONNECTOR		
SIDEWALL	A 406 mm / 16 in	D 711 mm / 28 in
BACKWALL	B 292 mm / 11.5 in	E 457 mm / 18 in
CORNER	C 203 mm / 8 in	F 508 mm / 20 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - MOBILE HOME		
SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in
BACKWALL	B 254 mm / 10 in	E 419 mm / 16.5 in
CORNER	C 152 mm / 6 in	F 457 mm / 18 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - RESIDENTIAL CLOSE CLEARANCE		
SIDEWALL	A 381 mm / 15 in	D 686 mm / 27 in
BACKWALL	B 254 mm / 10 in	E 419 mm / 16.5 in
CORNER	C 152 mm / 6 in	F 457 mm / 18 in
INSTALLATION USING LISTED DOUBLE WALL CONNECTOR - ALCOVE		
SIDEWALL	G 380 mm / 15 in	I 686 mm / 27 in
BACKWALL	H 254 mm / 10 in	J 419 mm / 16.5 in



FLOOR PROTECTION*
PROTECTION DE PLANCHER*



A 1245 mm / 49 in (Canada)
A 1194mm / 47 in (USA)
B 457 mm / 18 in
B 406 mm / 16 in
C 856 mm / 33-11/16 in
D 203 mm / 8 in

* In Canada, floor protection must extend 18" (457mm) to the front (16" for USA) and 8" (203mm) to each side and back of the stove.

* Au Canada, la protection de plancher doit dépasser de 18 po (457 mm) à l'avant (16 po aux États-Unis) et de 8 po (200 mm) de chaque côté du poêle et derrière le poêle.

CAUTION

HOT WHILE IN OPERATION DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. READ NAMEPLATE AND INSTRUCTIONS.

ATTENTION

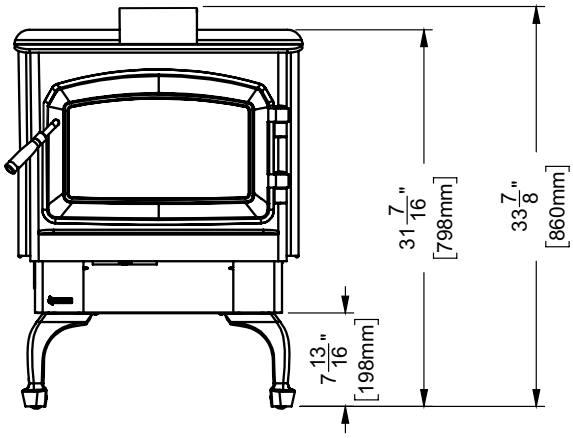
CHAUD DURANT LE FONCTIONNEMENT. NE TOUCHEZ PAS. ÉLOIGNEZ LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES. LE CONTACT PEUT CAUSER DES BRÛLURES. LISEZ LA PLAQUE SIGNALÉTIQUE ET LES INSTRUCTIONS

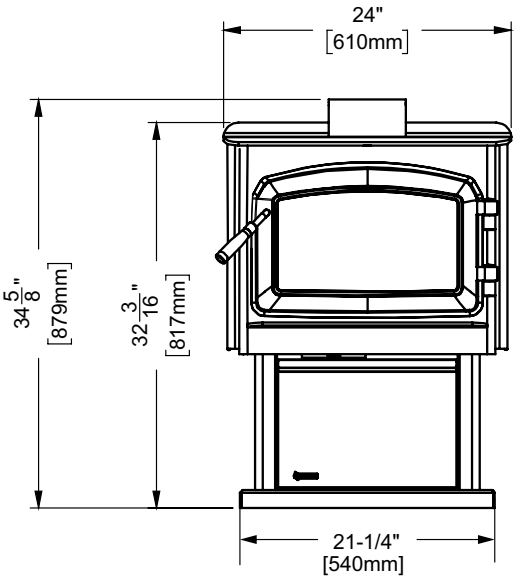
MADE IN CANADA / FABRIQUÉ AU CANADA

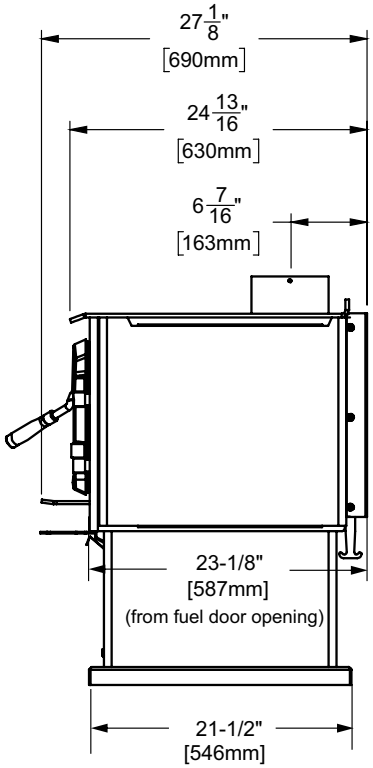
920-037a

DATE OF MANUFACTURE
JAN FEB MAR APR MAY JUN JUL AUG SEPT OCT NOV DEC
2021 2022 2023 2024 2025

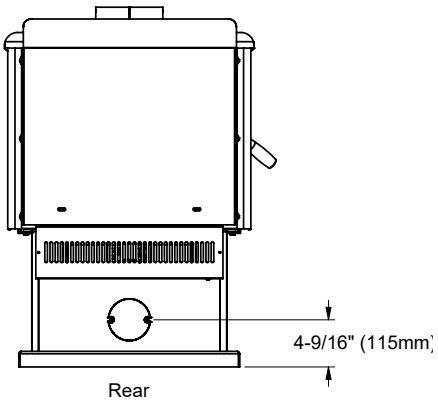
Unit Dimensions

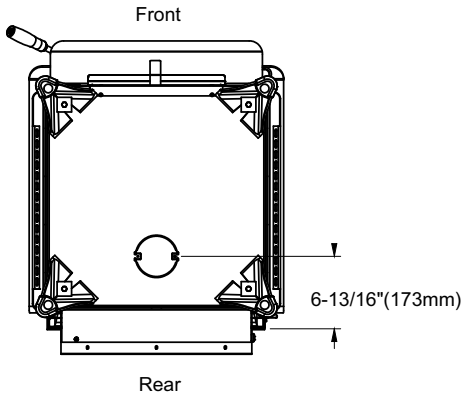






Outside Air Dimensions





installation

1. Please read this entire manual before you install and use your new woodstove. Failure to follow instructions may result in property damage, bodily injury or even death. Be aware that local Codes and Regulations may override some items in this manual. Check with your local inspector.

2. Select a position for your Regency Stove. Consult the minimum clearance chart for your model and set the stove in place. For installation use listed double wall connector systems only.

3. To insure vertical alignment, suspend a plumb bob from the ceiling over the exact center of your stove flue and mark a spot on the ceiling to indicate the center of the chimney.

4. Check that the area above the ceiling is clear for cutting. Re-confirm the clearance from the stove to combustibles to ensure that they are within the prescribed limits.

5. This woodstove must be connected to a UL 103 HT (ULC S629) listed chimney or a code approved masonry chimney with a flue liner.

   Space heater is to be connected to a factory built chimney conforming to CAN/ULC-5629 standard for 650C factory built chimneys. The chimney requirement is 6", refer to appropriate sections in this manual for specifics.

6. Install chimney according to chimney manufacturers instructions. The performance of your woodstove is governed to a very large part by the chimney system. Too short a chimney can cause difficult start-up, dirty glass, back smoking when door is open, and even reduced heat output.

WHEN THIS ROOM HEATER IS NOT PROPERLY INSTALLED, A HOUSE FIRE MAY RESULT. TO REDUCE THE RISK OF FIRE, FOLLOW THE INSTALLATION INSTRUCTIONS. CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.

Too tall a chimney may prompt excessive draft which can result in very short burn times and excessive heat output. The use of an inexpensive flue pipe damper may be helpful in reducing excessive draft.

CAUTION: The chimney should be the same size as the 6" flue outlet on the stove. The chimney must be listed as suitable for use with solid fuels. For other types of chimneys check with your local building code officials. Do not confuse a chimney with a type "B" Venting System used for gas appliances as suitable for a wood burning appliance. For Mobile Home installations refer to that section within this manual.

7. Mark the location of the pedestal base or legs on the floor, then move the stove aside and mark the position of the floor protector.

8. The floor protector must be of non-combustible material and must extend 16" (406mm) (USA)in front of the door opening and 8" (203mm) to the sides and rear of the unit. Some areas may require a larger size floor protector. See your local inspector. For outside air installation refer to Mobile Home installation instructions within this manual.

NOTE: In Canada, floor protection must extend 18" (450mm) to the front and 8" (203mm) to each side and back of the stove.

9. When the floor protection is complete, position the stove with the flue collar centered under the installed chimney.

10. In areas with frequent seismic activity, Regency recommends that your unit is secured to the floor by using the bolt down holes inside the pedestal (the same ones used in Mobile Home installations).

11. For residential installations 6" (single wall OK) double wall chimney, the chimney connector must be at least 24 gauge steel. Do not use galvanized pipe. For Mobile Home installation refer to the Mobile Home installation instructions within this manual.

12. **DO NOT CONNECT THIS UNIT TO A CHIMNEY SERVING ANOTHER APPLIANCE.**

13. A chimney connector cannot pass through an attic or roof space, closet or similar concealed space, or a floor, ceiling, wall or partition of combustible construction. In Canada, if passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment.

14. Your Regency Woodstove is not to be connected to any air distribution duct.

CAUTION:
Do not alter or makeshift chimney or install. Install as per Manual.

IMPORTANT:
During the first few fires, a white film may develop on the glass front as part of the curing process. **The glass should be cleaned** or the film will bake on and become very difficult to remove. Use a non-abrasive cleaner and **NEVER** clean the glass while it is hot.

IMPORTANT:
Smoke and CO Detectors:
Make sure your home has a working smoke and CO detector, especially near any bedrooms. We recommend having a smoke and CO detector in the same room as the wood appliance for additional safety. Location of both detectors should be chosen wisely to avoid false alarms when reloading the appliance.

Fire Extinguisher:
A fire extinguisher should be installed in the home. The location of the fire extinguisher should be known by all family members.

Modular Installation Options

WARNING: ONLY USE SPECIFIED COMPONENTS.
The following items are required when assembling your Regency Stove. F2450M unit - the Rear Heat Deflector is supplied with the stove, but if you choose not to use it you must use the Airmate instead

Modular Part	See the Minimum Clearance to Combustible Materials chart in the Installation section of this manual
F2450M Airmate OR Rear Heat Deflector	Convection heat with Airmate vs. Radiant Heat with Rear Heat Deflector. The Airmate pushes heat forward out into the room, the Rear Heat Deflector deflects the heat upward. Refer to the Installation sections within this manual.
OPTIONS :	
Blower/ Fan	Adding the blower will increase the area heated by the stove, it can move warm air beyond the room where the stove
Ash Drawer Kit	Adding the Ash Drawer Kit makes cleaning ashes out of the stove easier and cleaner (refer to Bottom Shield Ash Drawer Kit, Installation section)
Outside Air Kit	Allows outside combustion air to enter firebox
Bottom heat shield + legs	Used instead of pedestal
Pedestal	Used instead of heat shield and legs

Stove Assembly Prior to Installation

The F2450M unit requires the pedestal (or heat shield and legs) to be attached to the base. The F2450M stove requires either the Airmate or Rear Heat Deflector on top of the stove. Clearances to combustible materials vary depending on whether the Airmate or rear heat deflector is installed, so be sure to check the Minimum Clearances, Installation section.

Airmate Assembly for F2450M

1. The Airmate sits on top of the stove with the slots in the sides fitting over the curved deflector on the rear stove top. See diagram 1. Discard the Rear Heat Deflector that is supplied with the unit, it is not required if the Airmate is installed.

2. Center the Airmate and push it forward to the front of the stove. The back of the Airmate should be level with the back and sides of the rear heat shield. See Diagrams 2 & 3.

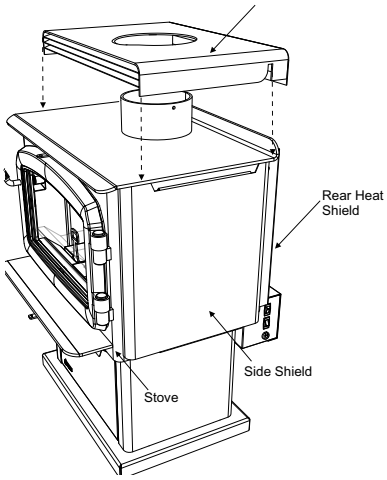


Diagram 1

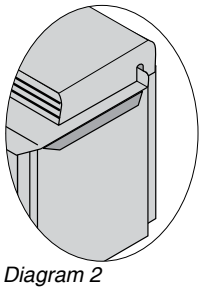


Diagram 2

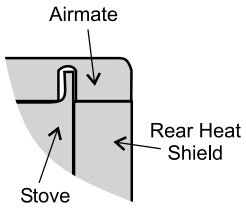


Diagram 3

Rear Heat Deflector Assembly for F2450M

The rear heat deflector is supplied with the stove and must be installed unless the optional Airmate has been selected. It stops the heat radiated from the flue collar from overheating the rear wall. The rear heat deflector is installed on top of the rear heat shield, as shown in Diagram 4.

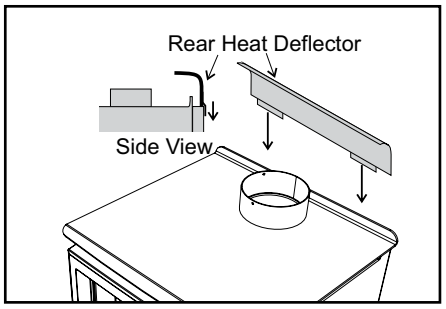


Diagram 4

Side Shield Adjustment

The left and right side shields are lowered for shipping and handling. It allows for a handhold on the top of the stove. Before placing the stove in its final position, the side shields must be raised.

Loosen the screws on the rear on the stove (3 per side), slide the side panel up as far as possible and then secure by tightening the screws.

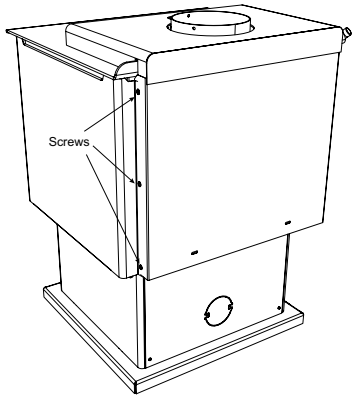


Diagram 5

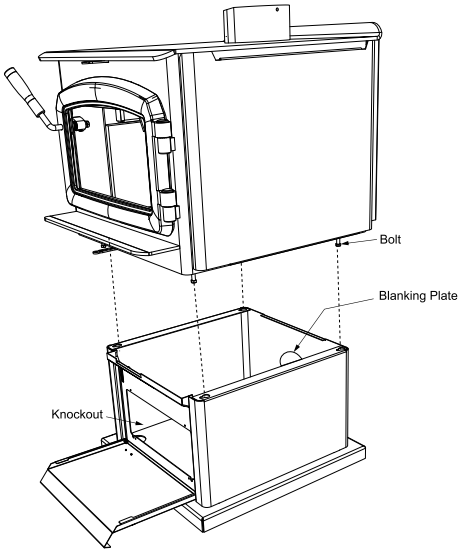
Pedestal Assembly Installation

1. For easier assembly, tip the stove on its back (onto a soft surface to prevent scratching) and remove the front cover.

   Hint: If you have chosen the Ash Drawer option, remove the ash dump cover plates before attaching the pedestal (refer to the Ash drawer Kit Installation section).

2. Important: Remove the blanking plate if:
   a) you are not installing outside combustion air or
   b) outside air is to be brought in from the rear of the stove (see below).

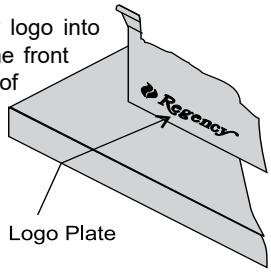
3. Using the 4 supplied 5/16" bolts in the under-side of the stove, insert the bolts loosely onto the threads located at all 4 corners at the base of the unit. Align the holes in the corners of the pedestal top with the corresponding bolts in the base of the stove. Tighten each bolt from inside the pedestal.



Shown with Classic door

Logo Installation

1. Push the Regency logo into the two holes in the front bottom left corner of the pedestal cover plate.



Note: Any paint touch up should be done prior to placing logo on pedestal.

2. If not using ash drawer, then the front cover must remain in place. If using ash drawer, then remove the front cover.

Bottom Heat Shield and Legs Installation

The instructions below apply to the painted cast leg. It will be easier to attach the legs to the stove if the stove is tipped on its back (preferably on a soft surface to prevent scratching). Ensure to be extremely careful when tipping stove.

Important: Prior to installing the bottom heat shield, remove the 4 inch blanking plate. See below.
This must be removed for combustion air to enter the appliance.

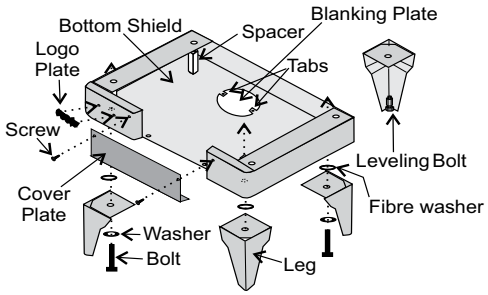
1. Remove the 4 bolts from underside of the base of the pedestal and discard. Also remove cover plate and put to the side.

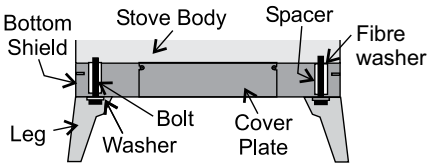
2. Line up the heat shield with the bottom of the unit.

3. Add fibre washers and washers.

4. Start threading the bolt and washer (supplied with the bottom shield) for about 1/4 of the way through the leg with the washers being underneath the legs. Ensure that the legs are properly aligned with heat shield and tighten the bolts.

5. Level the stove by adjusting the levelling bolts in the bottom of each leg.





6. Reinstall cover plate if not using ash drawer option.

7. Install logo plate onto heat shield by placing in 2 holes as shown in diagram.

If you are installing outside combustion air, bend the tabs out 90 degrees. Pipe fresh air into the bottom shield by using a minimum 4" duct pipe with a mesh grill at the outside termination. Attach the pipe to the 2 tabs with screws.

Room Air - Important

For installation using room air for combustion, remove knockout from the pedestal, and/or from the bottom if using a heat shield.

Mobile home installations require the use of outside air.

On pedestal units there are two locations where outside air may be adapted to the unit. If using the bottom of the pedestal, do not remove knock-out from the rear of the pedestal. Only remove rear knockout if outside air will be brought in from the rear.

On leg units outside air can only be brought in from the bottom of the heat shield.

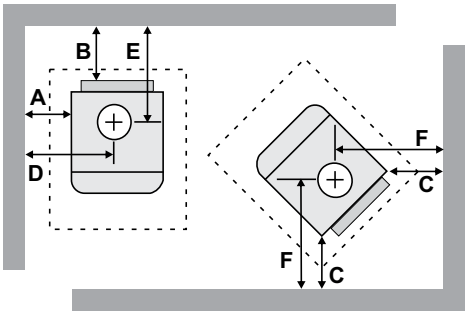
Note: Once the knockout is removed there are two tabs remaining. Bend both tabs out for ease of installation when attaching outside air.

Minimum Clearance To Combustible Materials

Please read the section below carefully as clearances depend on whether the airmate or the rear heat deflector is installed on the stove.

Measurements "From Unit" are from the top plate of the stove to a side wall or to a corner, and from the rear heat shield to a back wall.

Clearances may only be reduced by means approved by the regulatory authority.
Minimum ceiling height - 83" (2108mm)

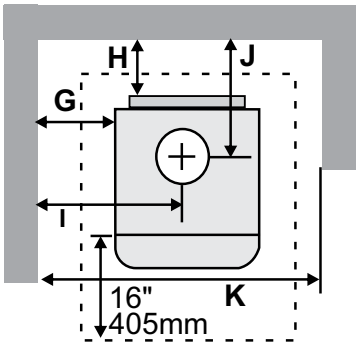


NOTE: This clearance is also required for air space between the appliance and wall/ceiling.

NOTE: Be aware that local Codes and Regulations may override some clearances listed in this manual. Check with your local inspector.

Residential Installation "C" Vent (Single Wall)						
Unit	**From Unit**		**From Corner**		**From Flue Center-Line**	
	A	**B**	**C**	**D**	**E**	**F**
Medium F2450M with Airmate	16" (406mm)	9.5" (241mm)	8" (203mm)	28" (711mm)	16" (406mm)	20" (508mm)
with Rear Deflector	16" (406mm)	11.5" (292mm)	8" (203mm)	28" (711mm)	18" (457mm)	20" (508mm)
Residential Close Clearance (To be installed with required pipe components) When the stove is installed as a close clearance residential unit, a listed double wall connector is required from the stove collar to the ceiling level.						
Unit	**From Unit**		**From Corner**		**From Flue Center-Line**	
	A	**B**	**C**	**D**	**E**	**F**
Medium F2450M with Airmate	15" (381mm)	8" (203mm)	6" (152mm)	27" (686mm)	14.5" (368mm)	18" (457mm)
with Rear Deflector	15" (381mm)	10" (254mm)	6" (152mm)	27" (686mm)	16.5" (419mm)	18" (457mm)
Mobile Home Close Clearance (To be installed with required pipe components) "C" Vent single wall pipe is not approved for Mobile Home installations. (Refer to Mobile Home Instructions.)						
Unit	**From Unit**		**From Corner**		**From Flue Center-Line**	
	A	B	C	D	E	F
Medium F2450M with Airmate	15" (381mm)	8" (203mm)	6" (152mm)	27" (686mm)	14.5" (368mm)	18" (457mm)
with Rear Deflector	15" (381mm)	10" (254mm)	6" (152mm)	27" (686mm)	16.5" (419mm)	18" (457mm)

Minimum Alcove Clearance and Clearance to Combustible Materials



The Regency Freestanding models have been alcove approved and must be installed with a listed double wall connector to the ceiling level.

Note: Minimum alcove ceiling height - 83"
Maximum depth of alcove - 48"

NOTE: This clearance is also required for air space between the appliance and wall/ceiling. Where the appliance is installed less than 8" from a rear wall, the ember pad only needs to extend to the base of the wall based on the clearances noted in this manual.

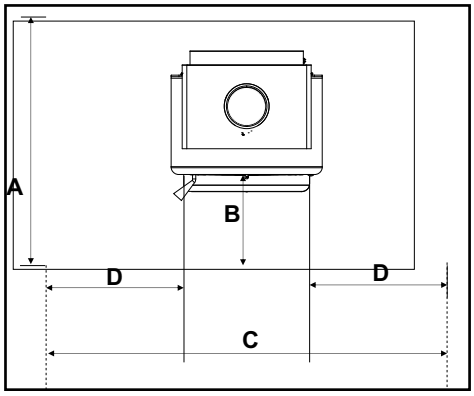
Unit	From Unit		From Flue Center-Line		From Wall
	G	H	I	J	K
Medium F2450M with Airmate	15" (381mm)	8" (203mm)	27" (686mm)	14.5"(368mm)	54" (1372mm)
with Rear Deflector	15" (381mm)	10" (254mm)	27" (686mm)	16.5"(419mm)	54" (1372mm)

Floor Protection
(Ember Protection only required)

A combustible floor must be protected by a non-combustible material (like tile, concrete board, or certified to UL-1618 Type 1, or as defined by local codes).

Canada: Beneath the heater and extending to at least 18" on the fuel loading side and at least 8" on the sides and back.

USA: Beneath the heater and extending to at least 16" beyond the fuel loading side and ash removal opening and at least 8" on the sides and back and under the chimney connector extending 2" beyond each side for horizontal applications.



Minimum Overall Depth (Y) of Floor Protector					
		Edge of Fuel door opening to edge of hearth		Edge of Fuel Door Opening (Both Sides)	
Unit		A	B	C	D
F2450M	Canada	49" (1245mm)	18" (457mm)	33 11/16" (856 mm)	8" (203mm)
	USA	47" (1194mm)	16" (406mm)	33 11/16" (856 mm)	8" (203mm)

Minimum Overall Depth (Y) of Floor Protector					
Reference only when hearth pad is installed to rear wall at minimum pipe clearances.		Hearth Depth	Edge of Fuel door opening to edge of hearth	Hearth Width	Edge of Fuel Door Opening (Both Sides)
Residential Installation "C" Vent (Single Wall)					
Unit		A	B	C	D
F2450M with Airmate	Canada	50-1/2" (1283mm)	18" (457mm)	33-11/16" (856mm)	8" (203mm)
	USA	48-1/2" (1232mm)	16" (406mm)	33-11/16" (856mm)	8" (203mm)
F2450M with Rear Deflector	Canada	52-1/2" (1334mm)	18" (457mm)	33-11/16" (856mm)	8" (203mm)
	USA	50-1/2" (1283mm)	16" (406mm)	33-11/16" (856mm)	8" (203mm)
Residential Close Clearance (To be installed with required pipe components)					
Unit		A	B	C	D
F2450M with Airmate	Canada	48" (1219mm)	18" (457mm)	33-11/16" (856mm)	8" (203mm)
	USA	46" (1168mm)	16" (406mm)	33-11/16" (856mm)	8" (203mm)
F2450M with Rear Deflector	Canada	50" (1270mm)	18" (457mm)	33-11/16" (856mm)	8" (203mm)
	USA	48" (1219mm)	16" (406mm)	33-11/16" (856mm)	8" (203mm)

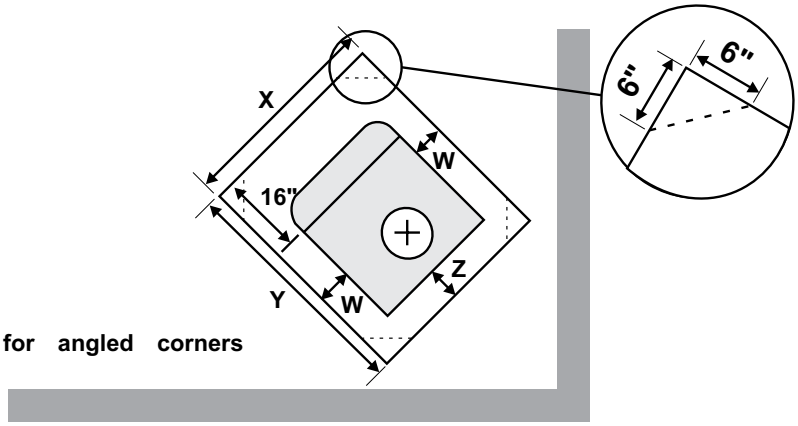
Floor Protection (Corner Installation)

A combustible floor must be protected by non-combustible material (like tile, concrete board, or certified to UL-1618 or as defined by local codes) extending beneath the heater and a minimum of 8" (203mm) from each side and minimum 16" (406mm)** from the front face of the stove and minimum 6" (152mm)** (or the rear clearance to combustibles whichever is smaller) from the rear of the stove.

When installed with horizontal venting, non-combustible floor protection must beneath the flue pipe and extend 2" (51mm) beyond each side.

Minimum Overall Width (X) of Floor Protector for all installations:

Stove	F2450M	33-11/16"(856mm)

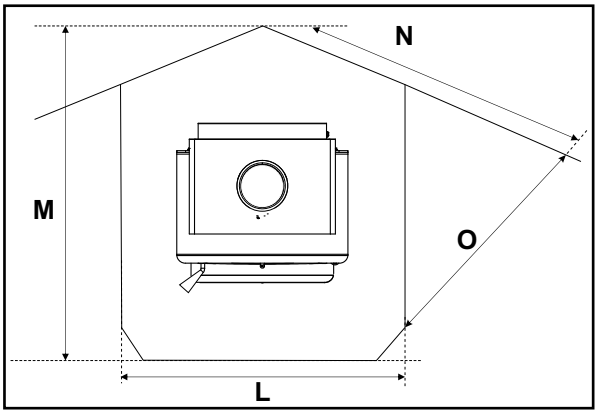


for angled corners

****NOTE: In Canada, floor protection must extend 18" (450mm) to the front and 8" (203mm) to back of the stove.**

Minimum Overall Depth (Y) of Floor Protector			
Unit	**Residential "C" Vent**		**From Edge of Fuel Door Opening**
	Y	**Z**	**W**
Medium F2450M	Canada - 49" (1245mm) USA - 47" (1194mm)	**6" (152mm)	8" (203mm)

Minimum Overall Depth (Y) of Floor Protector - Corner Hearth Reference only when hearth pad is installed to rear wall at minimum pipe clearances.				
	Hearth Depth			
F2450M	**L**	**M**	**N**	**O**
Residential Installation "C" Vent (Single Wall)				
Canada	33-11/16" (856mm)	62-7/8" (1596mm)	52-1/8" (1324mm)	28-5/16" (727mm)
USA	33-11/16" (856mm)	60-7/8" (1545mm)	50-3/4" (1289mm)	26-7/8" (681mm)
Residential Close Clearance (To be installed with required pipe components)				
Canada	33-11/16" (856mm)	60-1/16" (1527mm)	50-1/8" (1273mm)	26-5/16" (676mm)
USA	33-11/16" (856mm)	58-1/16" (1475mm)	48-3/4" (1238mm)	24-7/8" (610mm)



This stove may be connected to a lined masonry chimney or a listed factory built chimney suitable for use with solid fuels and conforming to ULC629 in Canada or UL-103HT in the USA. Do not connect it to a chimney serving another appliance. To do so will affect the safe operation of both appliances, and will void the stove warranty. You must comply with the local authority having jurisdiction and/or in Canada, CSA installation standard B365-M87.

The chimney connector must be 6" diameter, 24 MSG Black/Blue steel. Do not use aluminum or galvanized steel, they cannot properly withstand the extreme temperatures of a wood fire. The chimney connector between the stove and the chimney should be as short and direct as possible.

The chimney connector must be attached to either an approved masonry chimney or one of the listed factory built chimneys suitable for use with solid wood fuel. All joints must be tight and fastened with sheet metal screws.

⚠ WARNING

THE CHIMNEY CONNECTOR IS TO BE USED ONLY WITHIN THE ROOM, BETWEEN THE STOVE AND CEILING/ WALL. NEVER USE A CHIMNEY CONNECTOR TO PASS THROUGH AN ATTIC OR ROOF SPACE, CLOSET OR SIMILAR CONCEALED SPACE, OR A FLOOR, OR CEILING. AN EFFECTIVE VAPOR BARRIER MUST BE MAINTAINED AT THE LOCATION WHERE THE CHIMNEY OR COMPONENT PENETRATES TO THE EXTERIOR OF THE STRUCTURE. ALWAYS MAINTAIN THE MINIMUM CLEARANCES TO COMBUSTIBLES AS REQUIRED BY THE APPLICABLE BUILDING CODES.

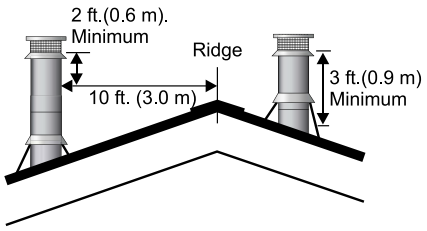
Step-By-Step Chimney And Connector Installation

Note: These are a generic set of chimney installation instructions. Always follow the manufacturers own instructions explicitly. Check the Minimum Recommended Flue Heights section (Table 1).

1. With your location already established, cut and frame the roof hole. It is recommended that no ceiling support member be cut for chimney and support box installation. If it is necessary to cut them, the members must be made structurally sound.

2. Install radiant shield and support from above.

3. Stack the insulated pipe onto your finish support to a minimum height of 3 feet above the roof penetration, or 2 feet above any point within 10 feet measured horizontally. There must be at least 3 feet of chimney above the roof level.



Note: Increasing the chimney height above this minimum level will sometimes help your unit to "breathe" better by allowing a greater draft to be created. This greater draft can decrease problems such as, difficult start-ups, back-smoking when door is open, and dirty glass. It might be sufficient to initially try with the minimum required height, and then if problems do arise add additional height at a later date.

4. Slide the roof flashing over your chimney and seal the flashing to the roof with roofing compound. Secure the flashing to your roof with nails or screws.

5. Place the storm collar over the flashing, sealing the joints with a silicone caulking.

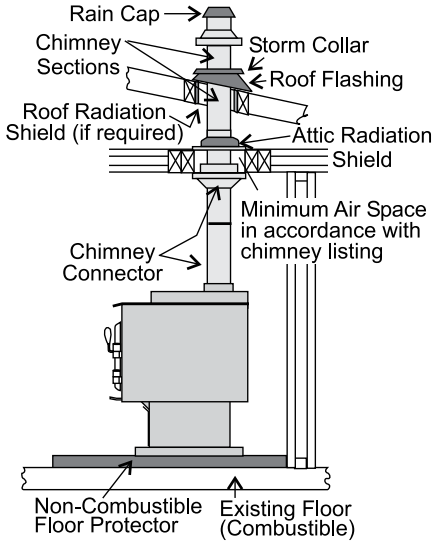
6. Fasten the raincap with spark screens (if required) to the top of your chimney.

7. To complete your chimney installation, install the double wall connector pipe from the stove's flue collar to the chimney support device.

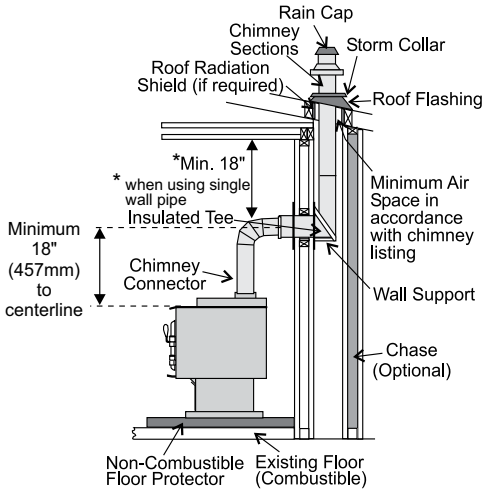
8. If you are using a horizontal connector, the chimney connector should be as high as possible while still maintaining the 18" (457mm) minimum distance from the horizontal connector to the ceiling.

NOTE: Residential Close Clearance and Alcove installations require a listed double wall connector from the stove collar to the ceiling level.

The diagrams below illustrate one way to install your unit into a standard ceiling or with a horizontal connector. Check with your dealer or installer for information on other options available to you.



Standard Ceiling Installation



Horizontal Installation

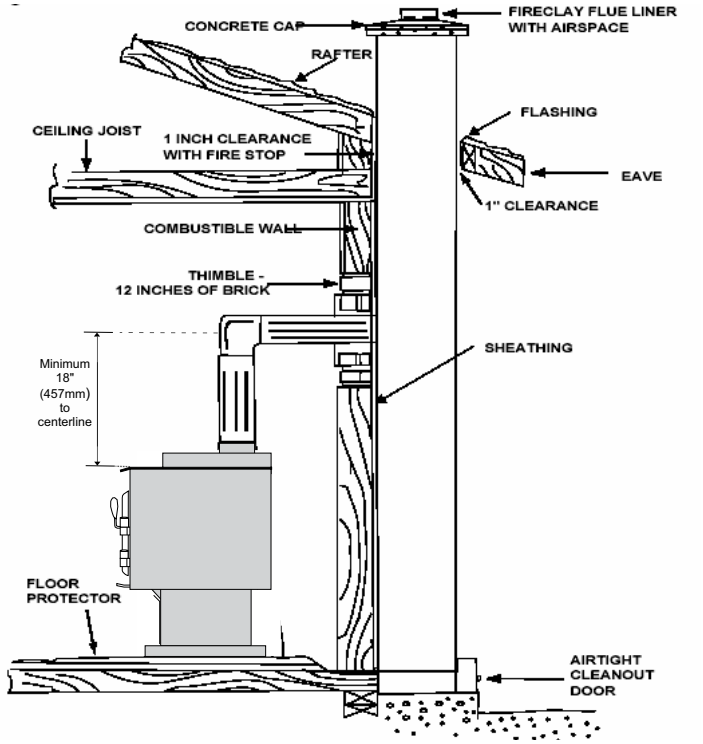
Masonry Chimney

Ensure that a masonry chimney meets the minimum standards of the National Fire Protection Association (NFPA) by having it inspected by a professional. Make sure there are no cracks, loose mortar or other signs of deterioration and blockage. Have the chimney cleaned before the stove is installed and operated. When connecting the stove through a combustible wall to a masonry chimney, special methods are needed.

Ensure that an effective vapour barrier at the location where the chimney or other component penetrates to the exterior of the structure.

When referencing installation or connection to masonry fireplaces or chimneys, the masonry construction must or shall be code complying.

This unit is designed to use either a 5.5" (140mm) or 6" (152mm) flue liner only in the confines of the masonry chimney.



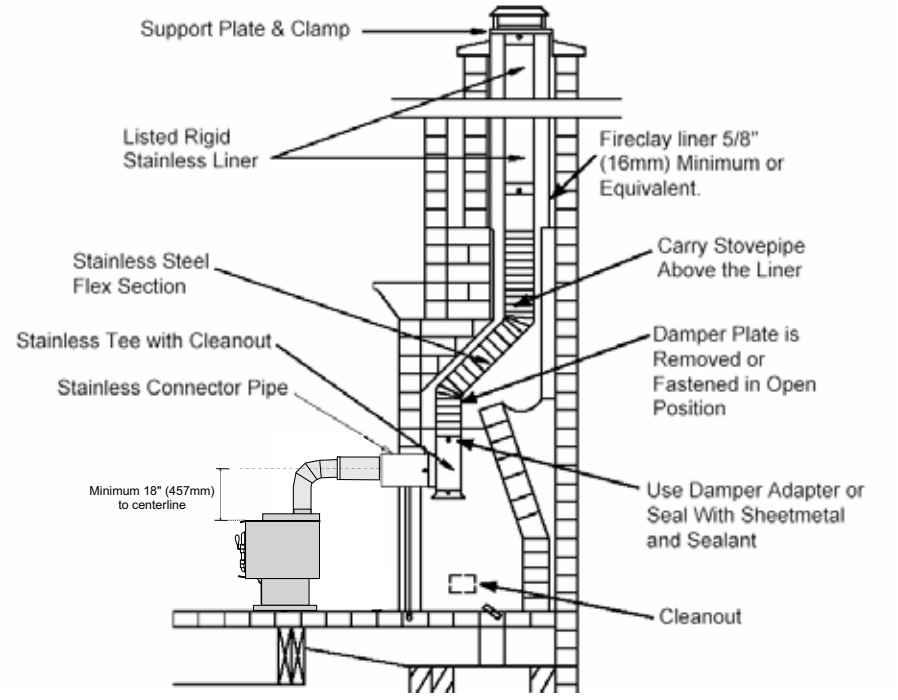
Masonry Fireplace

There are listed kits available to connect a stove to a masonry fireplace. The kit is an adapter that is installed at the location of the fireplace damper. The existing damper may have to be removed to allow installation.

Ensure that an effective vapour barrier at the location where the chimney or other component penetrates to the exterior of the structure.

This unit is designed to use either a 5.5" (140mm) or 6" (152mm) flue liner only in the confines of the masonry chimney as shown.

When referencing installation or connection to masonry fireplaces or chimneys, the masonry construction must or shall be code complying.



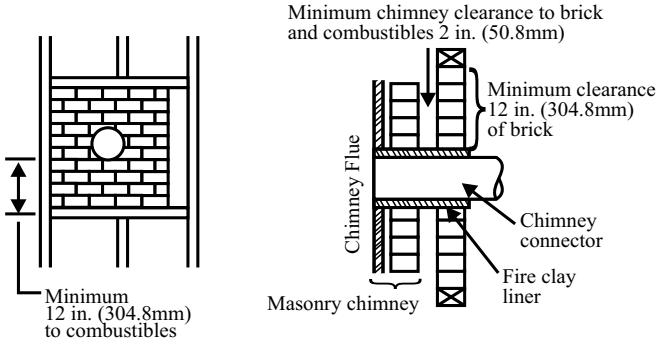
Factory Built Chimney

When a metal prefabricated chimney is used, the manufacturer's installation instructions must be followed. You must also purchase and install the ceiling support package or wall pass-through and "T" section package, firestops (where needed), insulation shield, roof flashing, chimney cap, etc. Maintain proper clearance to the structure as recommended by the manufacturer. The chimney must be the required height above the roof or other obstructions for safety and proper draft operation. The space heater is to be connected to a factory-built chimney conforming to CAN/ULC-S629, Standard for 650^{0}C Factory-Built Chimneys.

Combustible Wall Chimney Connector Pass-throughs

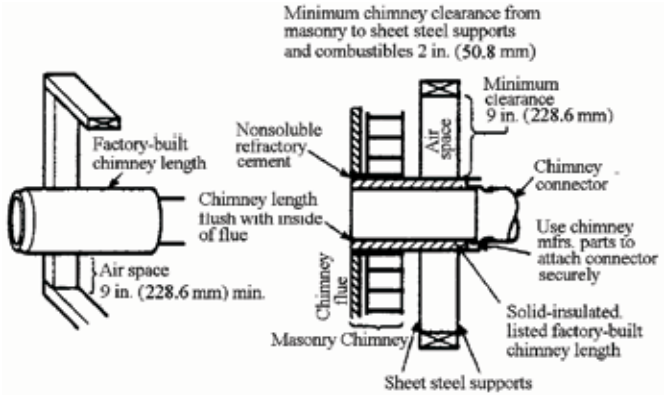
Method A: 12" (304.8 mm) Clearance to Combustible Wall Member:

Using a minimum thickness 3.5" (89 mm) brick and a 5/8" (15.9 mm) minimum wall thickness clay liner, construct a wall pass-through. The clay liner must conform to ASTM C315 (Standard Specification for Clay Fire Linings) or its equivalent. Keep a minimum of 12" (304.8 mm) of brick masonry between the clay liner and wall combustibles. The clay liner shall run from the brick masonry outer surface to the inner surface of the chimney flue liner but not past the inner surface. Firmly grout or cement the clay liner in place to the chimney flue liner.



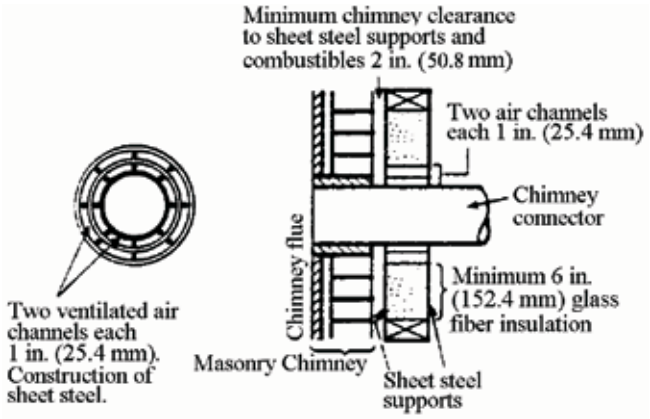
Method B: 9" (228.6 mm) Clearance to Combustible Wall Member:

Using a 6" (152.4 mm) inside diameter, listed, factory-built Solid-Pak chimney section with insulation of 1" (25.4 mm) or more, build a wall pass-through with a minimum 9" (228.6 mm) air space between the outer wall of the chimney length and wall combustibles. Use sheet metal supports fastened securely to wall surfaces on all sides, to maintain the 9" (228.6 mm) air space. When fastening supports to chimney length, do not penetrate the chimney liner (the inside wall of the Solid-Pak chimney). The inner end of the Solid-Pak chimney section shall be flush with the inside of the masonry chimney flue, and sealed with a non-water soluble refractory cement. Use this cement to also seal to the brick masonry penetration.



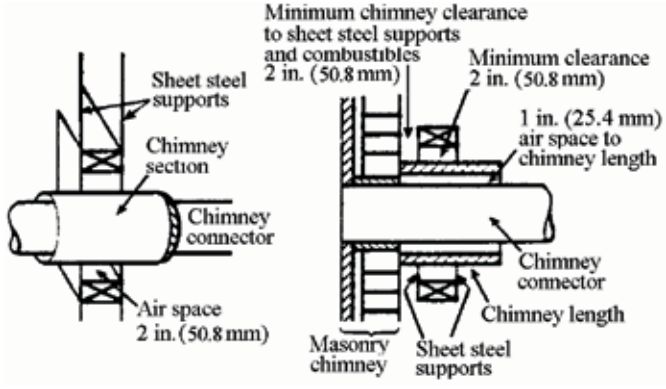
Method C: 6" (152.4 mm) Clearance to Combustible Wall Member:

Starting with a minimum 24 gage (.024" [.61 mm]) 6" (152.4 mm) metal chimney connector, and a minimum 24 gage ventilated wall thimble which has two air channels of 1" (25.4 mm) each, construct a wall pass-through. There shall be a minimum 6" (152.4 mm) separation area containing fiberglass insulation, from the outer surface of the wall thimble to wall combustibles. Support the wall thimble, and cover its opening with a 24-gage minimum sheet metal support. Maintain the 6" (152.4 mm) space. There should also be a support sized to fit and hold the metal chimney connector. See that the supports are fastened securely to wall surfaces on all sides. Make sure fasteners used to secure the metal chimney connector do not penetrate chimney flue liner.



Method D: 2" (50.8 mm) Clearance to Combustible Wall Member:

Start with a solid-pak listed factory built chimney section at least 12" (304 mm) long, with insulation of 1" (25.4 mm) or more, and an inside diameter of 6" (2 inches [51 mm] larger than the 6" [152.4 mm] chimney connector). Use this as a pass-through for a minimum 24-gage single wall steel chimney connector. Keep solid-pak section concentric with and spaced 1" (25.4 mm) off the chimney connector by way of sheet metal support plates at both ends of chimney section. Cover opening with and support chimney section on both sides with 24 gage minimum sheet metal supports. See that the supports are fastened securely to wall surfaces on all sides. Make sure fasteners used to secure the metal chimney connector do not penetrate chimney flue liner.



Mobile Home Installation

For Canadian Installations : see Outside Air Kit - Part # 846-502.

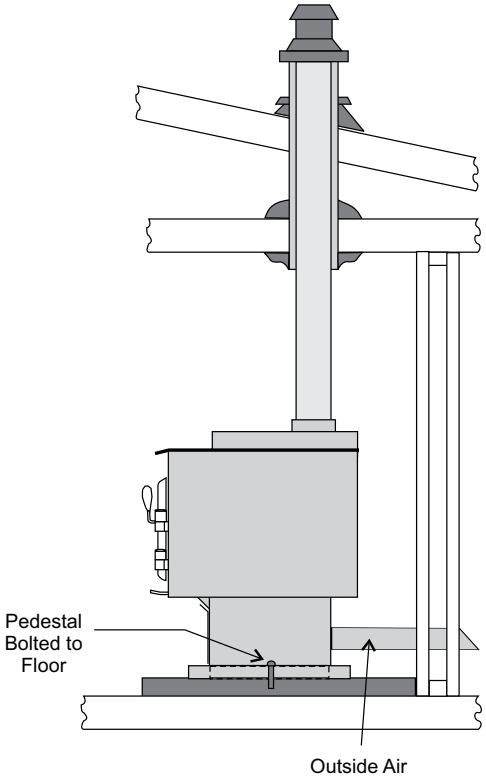
There are further requirements when installing this unit into a mobile home in Canada only.

Once you have properly marked the position of your unit and the floor protection as outlined in the Residential Installation items #1 through #8, a supply of fresh air has to be supplied to your unit.

See Optional Outside Air Kit instructions in this manual.

Place your unit in position and secure it to the floor using two lag bolts 3/8" (10mm) x 3-1/2" (89mm) through the two holes inside the pedestal base. It is important to maintain the structural integrity of the Mobile Home floor, walls and roof when installing your unit.

For Mobile Home units installed in the U.S. the unit must be grounded using a #8 ground wire with approved termination and star washer.



CAUTION: At no time use unlabelled parts, or substitute parts made for another chimney system.

Install as per chimney manufacturer's installation instructions.

WARNING: Operate only with door fully closed - open feed door to feed fire only.

1. Identify the position of the outside air damper by the orientation of the metal handle that rests outside the galvanized pipe. The metal handle and the damper disc are in line with each other. This means that if the metal handle is in a horizontal position, the damper is flat and fully open.

2. Open the damper fully whenever you start a fire. This will allow the outside air to be drawn in the pedestal base eliminating any potential smoke escaping the stove and entering the room. (Negative air pressure)

In addition to standard installation instructions the following requirements are mandatory for installation in a mobile home.

1. **The stove must be permanently bolted to the floor of the Mobile Home using the floor screws provided.**

2. The stove must have a permanent outside air source for combustion.

3. The stove must be electrically grounded to the steel chassis of the Mobile Home.

4. A listed double-wall connector chimney system, roof thimble, spark arrestor and roof flashing kit suitable for use in Mobile Homes must be used.

5. If the chimney exits the Mobile Home at a location other than through the roof, and exits at a point 7ft. (2130mm) or less above the ground level on which the Mobile Home is positioned a guard or method of enclosing the chimney shall be fitted at the point of exit for a height up to 7ft. (2130mm).

6. The chimney shall be attached directly to the room heater and shall extend at least 3 ft. (914mm) above the part of the roof through which it passes. The top of the chimney should project at least 2ft. (610mm) above the highest elevation of any part of the Mobile Home within 10 ft. (3048mm) of the chimney.

7. The chimney system shall comply with Local Requirements.

8. Any openings in a chimney guard where required must not permit the entrance of 3/4" (19mm) diameter rod.

9. **CAUTION: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME ROOF, FLOOR, WALLS AND CEILING MUST BE MAINTAINED.**

10. Check any other local building code as other local codes may apply.

11. **WARNING: DO NOT INSTALL IN A SLEEPING ROOM OF A MOBILE HOME.**

12. Use silicone to create an effective vapour barrier at the location where the chimney or other component penetrates to the exterior of the structure.

Mobile Home Kit - for Canada

Note: The optional ashdrawer cannot be used when using the Mobile Home Kit.

The Mobile Home kit contains:

1 Bottom metal cover - only used when air is drawn from the floor.
1 Flex
1 Collar
1 Mobile home box
1 Square transition box (used when installing bottom heat shield/ legs)
Screws

1. Lay unit on its back. Remove two front 7/16 bolts. Loosen rear two 7/16" bolts. See diagram 1.

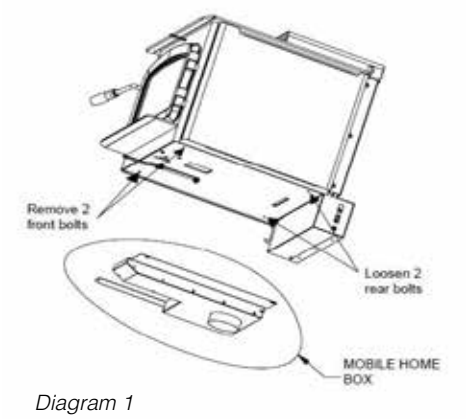


Diagram 1

2. If using outside air from the rear of the pedestal, follow instructions noted below. If using outside air from the pedestal base, follow instructions from step 10 to 16. For bottom heat shield/ legs, follow instructions from step 17 to 22. The Mobile Home Box is always mounted in between the firebox and pedestal or bottom heat shield.

3. Remove the 4" knock out from the rear pedestal.

4. Install rear collar to the rear pedestal using 4 screws.

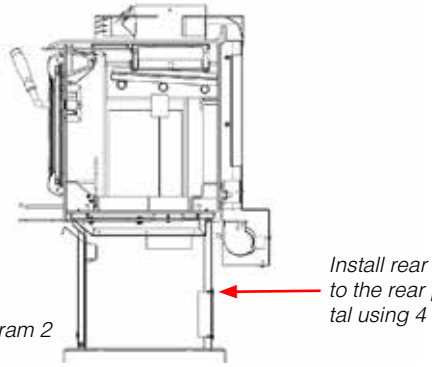


Diagram 2

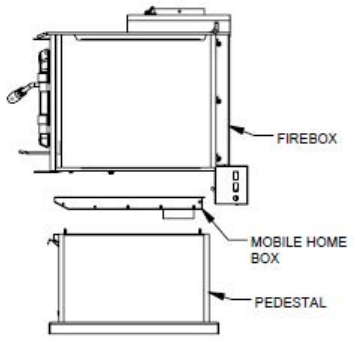


Diagram 3

5. Attach flex to rear pedestal using supplied screws or the 4" clamp.

6. Bring pedestal base near the base of the firebox and secure flex to the Mobile Home box.

7. Secure pedestal base and Mobile Home Box to firebox as shown in diagram 3 using the screws that were previously removed/ loosened in step 1. See pedestal instructions.The Mobile Home Box and firebox use the same screws.

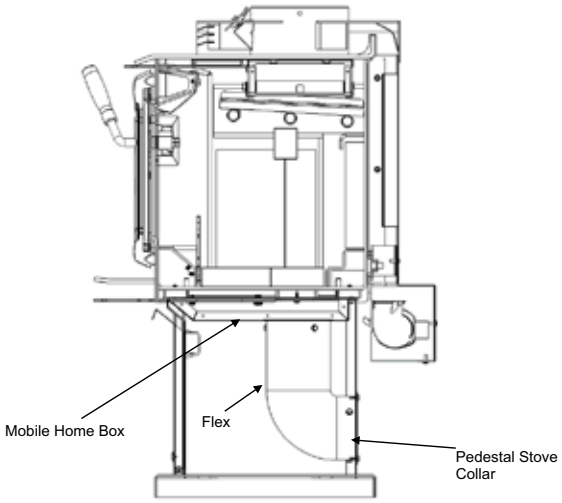


Diagram 4

8. Install blanking plate to the front of the pedestal with 4 screws.

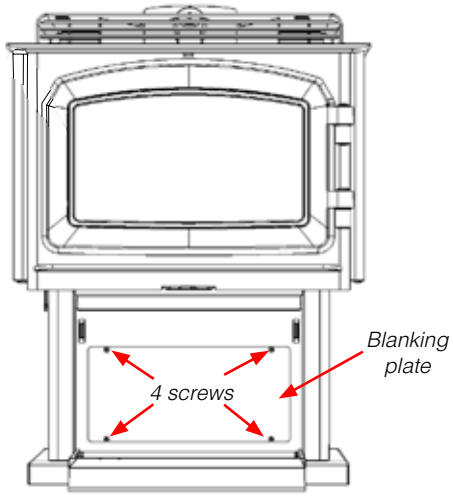
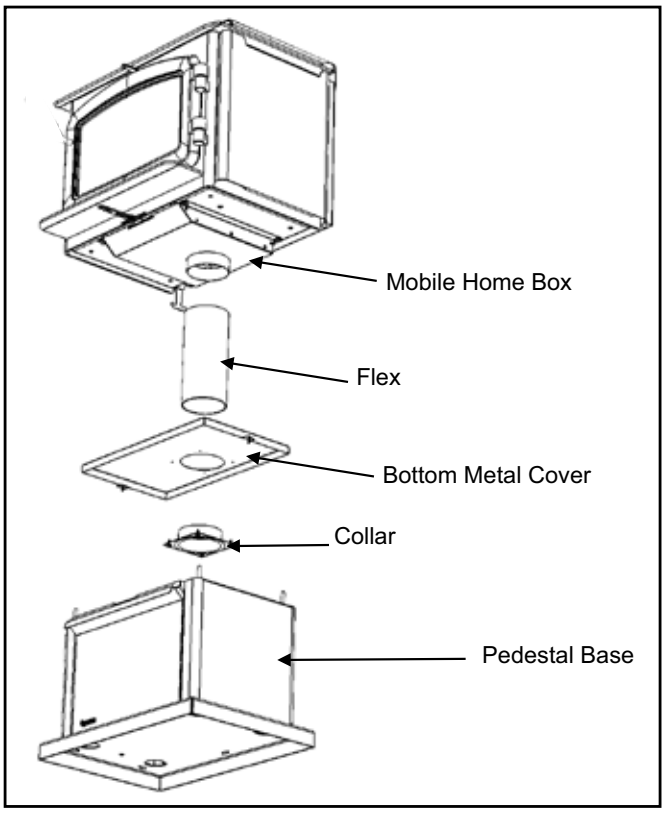


Diagram 5

9. Place unit into position and install the mandatory outside air kit. See «Mobile Home installation» section in this manual.

Installing Outside Air from Pedestal Base

If installing outside air from pedestal base, do not remove knock out from rear of pedestal. This must remain in place.



10. Secure collar to base of unit with 4 screws.

11. Install bottom metal cover over collar installed in step 10 and rest cover on pedestal base.

12. Secure flex to collar with supplied screws or the 4" clamp.

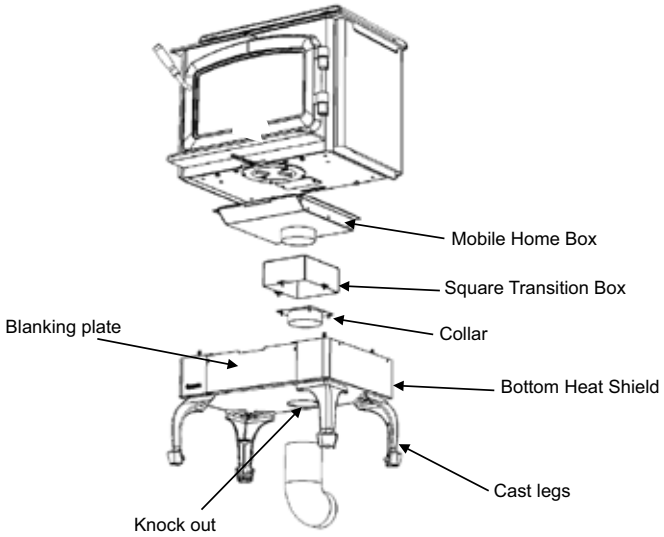
13. Bring pedestal base near the base of the firebox and secure flex to mobile home box with supplied screws.

14. Secure Mobile Home Box and pedestal to the firebox base using the screws that were previously removed in step 1. See pedestal instructions.

15. Install blanking plate to the front of the pedestal with 4 screws. Use picture from step 8.

16. Install the mandatory outside air kit. See «Mobile Home Installation» section in this manual. Place unit into its final position to complete install.

Installing Outside Air Using Bottom Heat Shield/Legs



17. Remove knock out from the bottom heat shield and bend tabs left over when the knock out was removed to the side.

18. Secure collar to base of bottom heat shield as shown with 4 screws.

19. Secure transition box on top of round collar installed in step 18 and secure with 3 screws.

20. Install blanking plate if not already installed.

21. Secure Mobile Home Box and bottom heat shield. See bottom heat shield/leg instructions.

22. Install the mandatory outside air kit. See «Mobile Home Installation» section in this manual. Place unit into its final position to complete install.

TABLE 1

MINIMUM RECOMMENDED FLUE HEIGHTS IN FEET
(Measured from the top of the unit)

ELEVATION (FT) ABOVE SEA LEVEL	# OF ELBOWS						
	0	2 x 15°	4 x 15°	2 x 30°	4 x 30°	2 x 45°	4 x 45°
0-1000	12.0	13.0	14.0	15.0	18.0	16.0	20.0
1000-2000	12.5	13.5	14.5	15.5	19.0	16.5	21.0
2000-3000	13.0	14.0	15.0	16.0	19.5	17.0	21.5
3000-4000	13.5	14.5	15.5	17.0	20.0	18.0	22.5
4000-5000	14.0	15.0	16.0	17.5	21.0	18.5	23.0
5000-6000	14.5	15.5	17.0	18.0	21.5	19.0	24.0
6000-7000	15.0	16.0	17.5	18.5	22.5	20.0	25.0
7000-8000	15.5	16.5	18.0	19.0	23.0	20.5	25.5
8000-9000	16.0	17.0	18.5	20.0	24.0	21.0	26.5
9000-10000	16.5	17.5	19.0	20.5	24.5	22.0	27.0

NOTE: No more than two offsets (four elbows) allowed. Two 45° elbows equal one 90° elbow.

Recommended Heights For Woodstove Flue

Simple rules on draft. See Table 1.

1) At sea level minimum height is 12' straight.

2) Add the following vertical height to compensate for:
45 deg. elbow = 1 ft.
90 deg. elbow = 2 ft.
"T" = 3 ft.
Each foot of horizontal run = 2 ft.

3) Add 4% overall for each 1000' above sea level.

Example: a)
1-1/2 ft. of horizontal run = 3 ft.
one "T" = 3 ft.
Total Addition (at sea level) = 6 ft.

Example: b)
One 90 deg. elbow = 2 ft.
2 ft. of horizontal run = 4 ft.
one "T" = 3 ft.
Total Addition (at sea level) = 9 ft.

	Recommended Flue Height	
Elevation	**Example a)**	**Example b)**
0'	18'	21'
1000'	18.72'	21.84'
2000'	19.44'	22.68'
5000'	21.60'	25.20'
8000'	23.76'	27.72'

Draft is the force which moves air from the appliance up through the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance and may cause damage. An uncontrollable burn or excessive temperature indicates excessive draft. Inadequate draft may cause back puffing into the room and plugging of the chimney. Inadequate draft will cause the appliance to leak smoke into the room through appliance and chimney connector joints. Ensure the heater is installed in areas that are not too close to neighbors or in valleys that would cause unhealthy air quality or nuisance conditions.

WARNING:
DO NOT INSTALL IN SLEEPING ROOM

CAUTION: The structural integrity of the mobile home floor, wall and ceiling/roof must be maintained.

Optional Outside Air Kit

The Outside Air Kit is an option for Freestanding Stoves. Outside air for combustion can be brought in either through the bottom of the pedestal or through the rear plate of the pedestal.

For both bottom and rear outside air the Pedestal Cover Plate must be installed. Loosen the 4 screws on the rear of the pedestal and slide the cover plate over them. Slide the plate to the left to center it and tighten down the 4 screws.

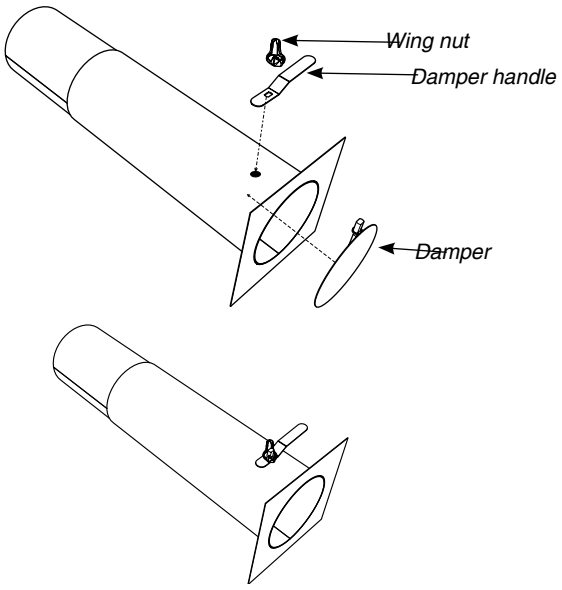
Damper Installation

NOTE: The damper cannot be installed if attaching outside air to the bottom of the appliance.

Supplied damper allows the combustion air to be closed off when unit is not in operation.

Install the damper within the round pipe in an easily accessible location.

1. Drill a 5/16" hole in the desired location.
2. Insert damper with threaded section out.
3. Install damper handle and secure with wing nut.

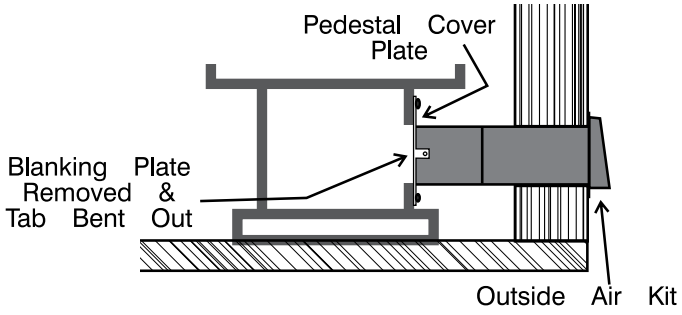


Completed Install

Outside Air Through Pedestal Rear

Remove the blanking plate from the rear of the pedestal and bend the two tabs out 90 degrees. Pipe fresh air into the pedestal area by using a minimum 4" metallic duct pipe with a mesh grill at the outside termination.

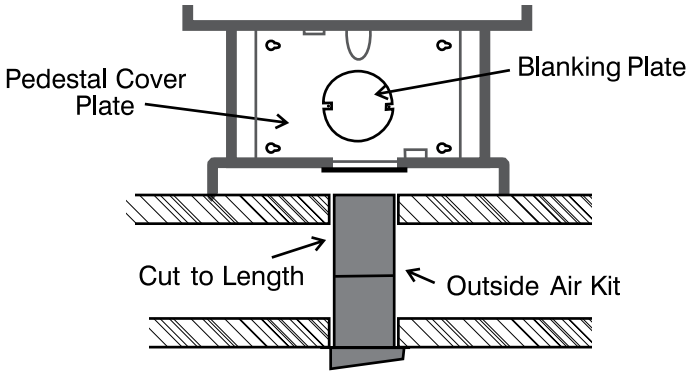
Fasten the pipe to the cover plate using the tabs and 2 screws.



Side View

Outside Air Through Pedestal Bottom

Mark the position of your unit as outlined in the "General Information" and "Clearances to Combustibles" section of the manual. Pipe fresh air into the pedestal area by using a minimum 4" duct pipe with a mesh grill at the outside termination.

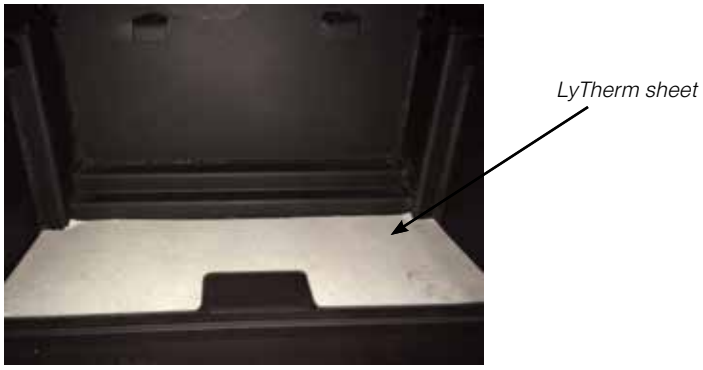


Rear View

Brick Installation

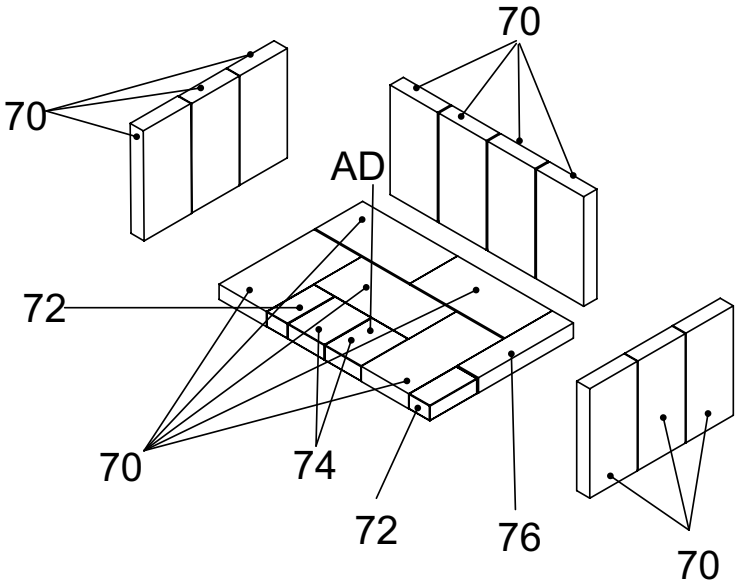
Firebrick is included to extend the life of your stove and radiate heat more evenly. Check to see that all firebricks are in their correct positions and have not become misaligned during shipping. Install all firebricks (if bricks were removed at install) per the diagram below and place in their correct positions.

Do not use a grate.



Order of firebrick install:

a) Rear Firebrick
b) Firebox floor - install brick over LyTherm Sheet
c) Right and left side Firebricks



70)	Brick - Regular Full Size: 1-1/4" x 4-1/2" x 9"
72)	Brick Partial: 1-1/4" x 2" x 4-1/2"
74)	Brick Partial: 1-1/4" x 4-1/2" x 3-1/2"
76)	Brick Partial: 1-1/4" x 2" x 9"

NOTE: The "AD" brick in the drawings above is the brick covering the Ash Dump hole that is used when the Ash Drawer Kit is installed (refer to the Listed Components for Mobile Home Installation section).

Wood Handle & Door Assembly

1. In preparation of installing the door handle, the nuts, cam, washers and spacer must be removed as shown in Diagram 1.

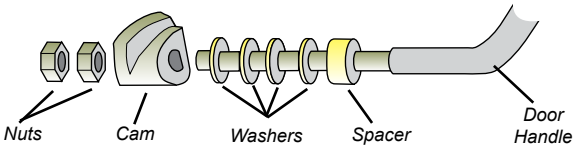


Diagram 1

LATCH ADJUSTMENT

The door latch may require adjustment as the door gasket material compresses over time. Removal of 1 or 2 washers will allow the latch to move closer to the door frame, causing a tighter seal. (Refer to Diagram 1)

2. Place the door onto the hinges and then place the door handle through the opening on the door, as shown in Diagram 2.

   Re-assemble and secure the door handle components in reverse order as removed in step 1, refer to Diagram 1.

3. Put the hinge cover caps on top of hinges to complete the door installation.

Note: The bottom of the door may scrape the ashlip. In this case place the spacers provided on the door hinges of the unit before placing the door.

4. Close door and ensure there is a tight seal. If door is too tight, a washer can be added. If the door is not creating a tight seal, a washer can be removed. Recheck door to ensure there is still a tight seal. Repeat steps if door seal is still not tight until a tight seal has been achieved. The handle should be approximately in the 8 o'clock position when door is fully closed.(Diagram 3)

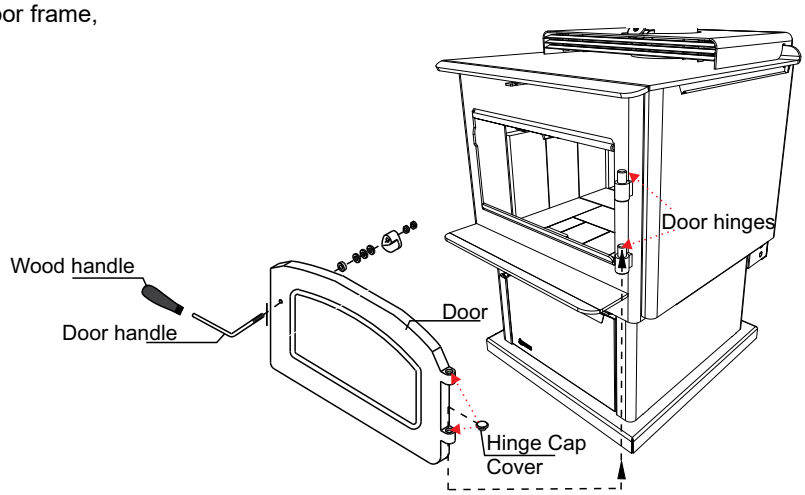


Diagram 2

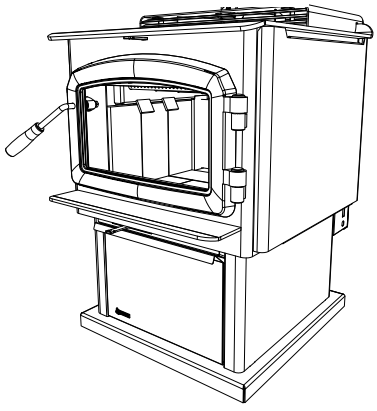


Diagram 3

Flue Baffle & Secondary Air Tube Installation

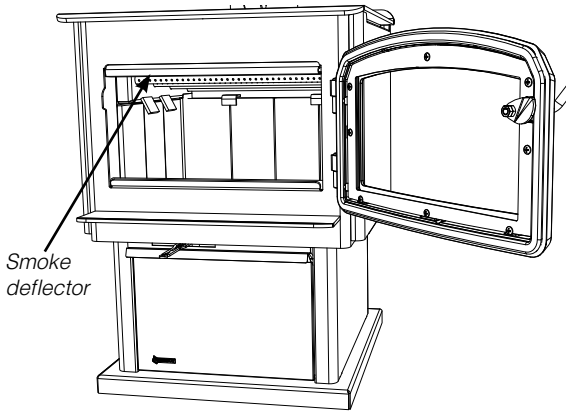
The flue baffle system located in the upper area of the firebox is removable to make cleaning your chimney system easier. The baffles must be installed prior to your first fire. **Smoke spillage and draft problems may occur if the baffles are improperly positioned.** Check the position of the baffles on a regular basis as they can be dislodged if too much fuel is forced into the firebox.

Freestanding Stove F2450M

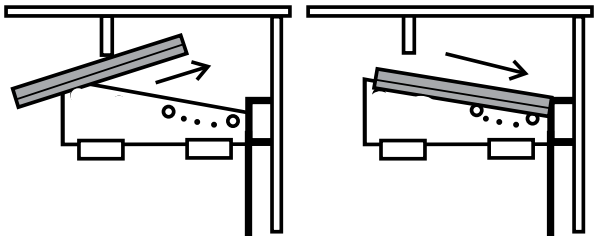
The unit arrives with the 2 baffles and 2 air tubes on the floor of the firebox.

1. Open the door and remove stainless steel smoke deflector - See smoke deflector instructions in this manual.

2. Remove the front secondary air tube with pliers as shown below.

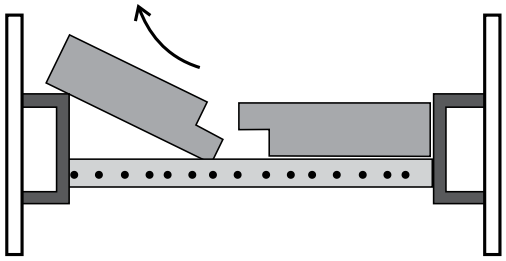


2. Slide the left baffle over the 2 remaining air tubes from the front and then push it to the back.



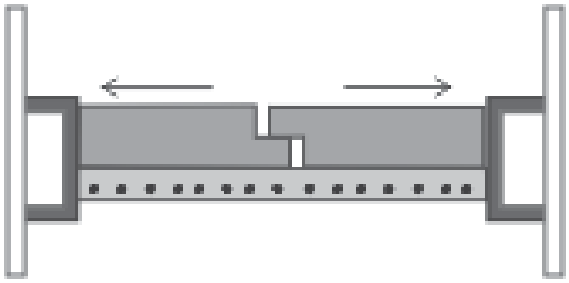
Side View

3. Tilt the left baffle up on top of the side channel and it will leave enough room to position the right baffle in the same manner as Step 1 above. Then reposition the left baffle flat on the air tubes.



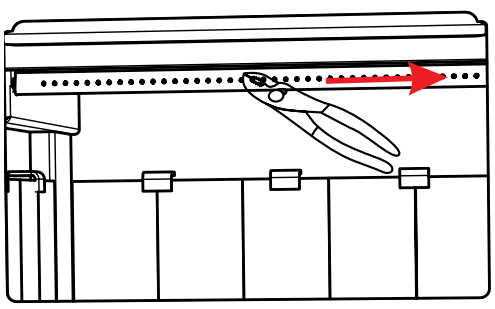
Front View

Important: push both baffles so they are tight against the side walls.



Front View

4 . Install the 2 front secondary air tubes with pliers and hammer to lock them into place, as shown below.



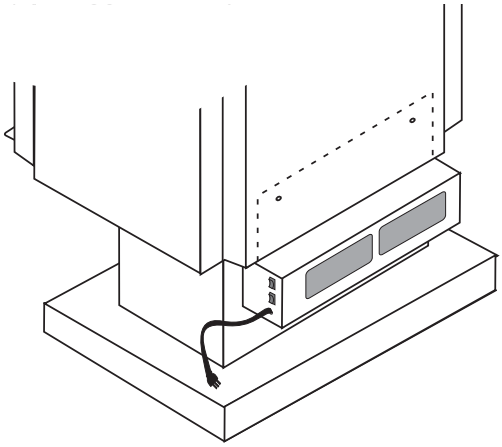
5. Reverse Step 1.

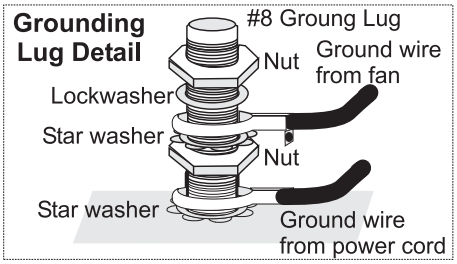
Fan Installation

1. Remove the two screws from the top of the fan housing.
2. Slide the fan up into the rear heat shield.
3. After aligning holes, secure the fan to the rear heat shield using the two screws removed earlier.

Note: The connection cord should not be in contact with any hot surfaces.

WARNING: FAN ASSEMBLY MUST BE DISCONNECTED FROM THE SOURCE OF ELECTRICAL SUPPLY BEFORE ATTEMPTING THE INSTALLATION.





AUTOMATIC

To operate the fan automatically, push the bottom switch on the side of the fan housing to "AUTO" and the top switch to either "HIGH" or "LOW" for fan speed.

This will allow the fan to turn on as the stove has come up to operating temperature. It will also shut the fan system off after the fire has gone out and the unit cooled to below a useful heat output range.

If the fan cycles on and off continuously the thermo switch sensor is not making contact with the stove body. Remove the fan, bend the bracket closer to the stove and re-install the fan.

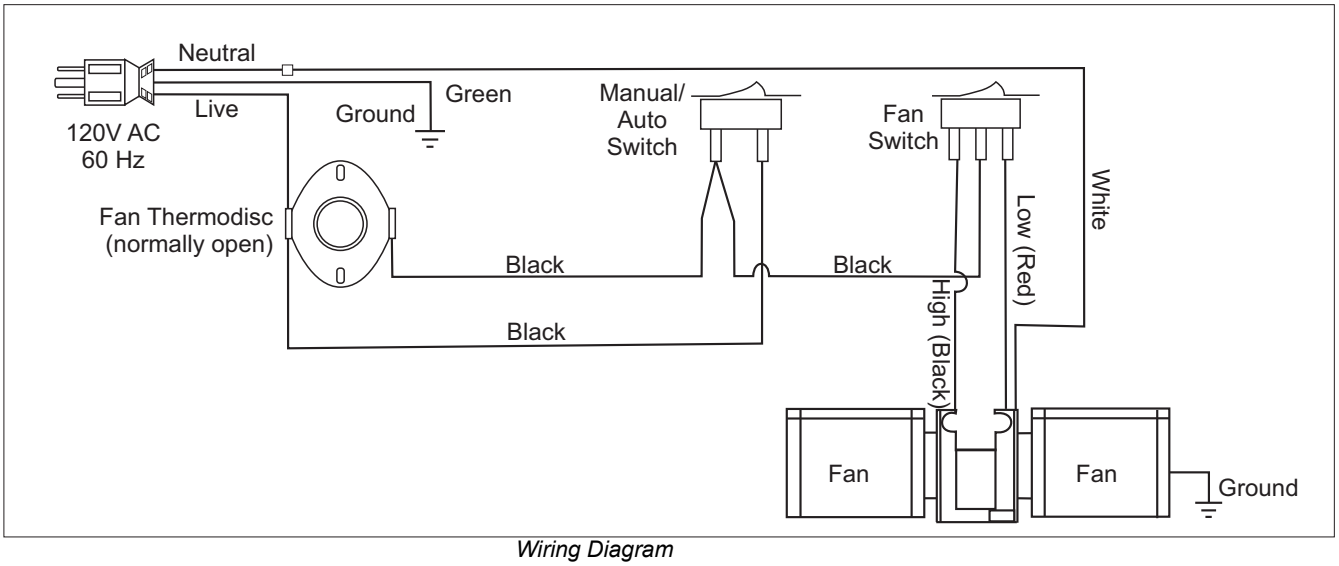
MANUAL

To manually operate the fan system push the bottom switch to "MAN" and the top switch to either "HIGH" or "LOW". This will bypass the sensing device and allow full control of the fan.

Switching from "AUTO" to "MAN" or "HIGH" to "LOW" may be done anytime.

WARNING: Electrical Grounding Instructions
This appliance is equipped with a three pronged (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.

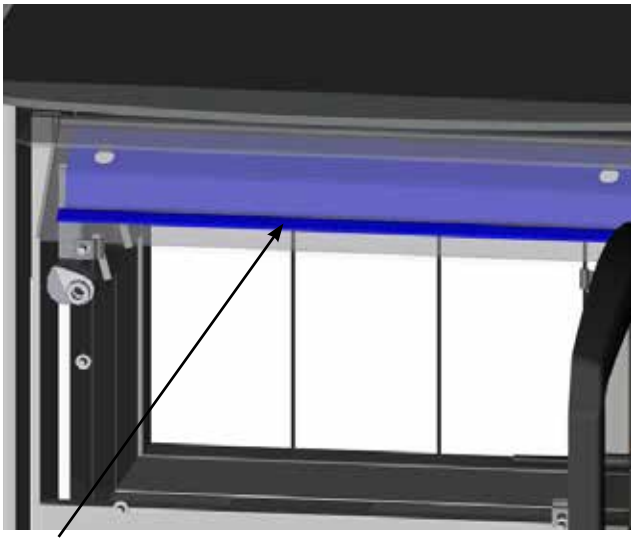
CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.



Wiring Diagram

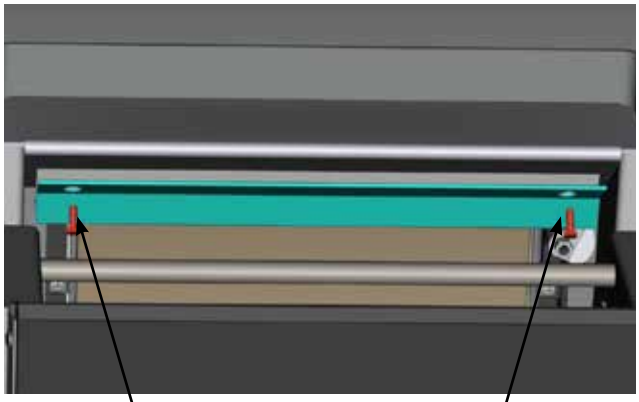
Stainless Steel Smoke Deflector Installation

The stainless smoke deflector is located in the upper front area of the firebox. The deflector is held in place with 2 bolts
Prior to the first fire, ensure deflector is seated properly and secured with 2 hand tightened bolts.



Smoke deflector

Smoke deflector is installed through the door opening in location shown in diagram



Smoke deflector installed with 2 bolts.

Note: *This is a view from the back of the unit through the top.*

To replace the deflector, loosen off both bolts and slide defector upward and out. Install new deflector and hand tighten bolts. Ensure positive location of the defector prior to hand tightening.

WARNING: Operation of the unit with out proper installation of smoke deflector will void warranty.

Ensure deflector is seated so bolts are situated at the top of the keyhole before tightening.

Seasoned Firewood

Whether you burn wood in a fireplace, stove or insert, good quality firewood is the key to convenience, efficiency and safety. Wet wood and pieces that are not the right size and shape for your wood burner can be frustrating, burn inefficiently and deposit creosote that can fuel a dangerous chimney fire. Good planning, seasoning and storage of the firewood supply are essential to successful wood burning.

- Stack the wood in separate rows in an open location where the summer sun can warm it and breezes can carry away the moisture. Do not stack unseasoned wood tightly in an unvented storage area.
- Do not allow firewood to lie on the ground for more than a couple of days before stacking. Mould and rot can set in quickly.
- Stack the wood up off the ground on poles, lumber rails or pallets.
- The top of the pile can be covered to keep off rain, but do not cover the sides.

Softer woods like pine, spruce and poplar/aspen that is cut, split and stacked properly in the early spring maybe be ready for burning in the fall. Extremely hard woods like oak and maple, and large pieces of firewood, may take a minimum of a full year to dry enough. Drying may also take longer in damp climates.

There are a few ways to tell if wood is dry enough to burn efficiently. Use as many indicators as possible to judge the dryness of the firewood your are considering. Here are ways to judge firewood moisture.

- Using a moisture meter, select the species of fuel and then penetrate the pins into a split piece. Ideal moisture and seasoned firewood should be less than 20% moisture content.
- Checks or cracks in the end grain can be an indication of dryness, but may not be a reliable indicator. Some wet wood has checks and some dry wood has no checks.
- The wood tends to darken from white or cream colour to grey or yellow as it dries.
- Two dry pieces banged together sound hollow; wet pieces sound solid and dull.
- Dry wood weighs much less than wet wood.
- Split a piece of wood. If the exposed surface feels damp, the wood is too wet to burn.

Operating Instructions

With your unit now correctly installed and safety inspected by your local authority, you are now ready to start a fire. Before establishing your first fire, it is important that you fully understand the operation of your draft control.

WARNING

Fireplace Stoves equipped with doors should be operated only with doors fully closed. If doors are left partly open, gas and flame may be drawn out of the fireplace stove opening, creating risks from both fire and smoke.

Draft Control

Both the primary and air wash drafts are controlled by the control slide located on the front left side of the unit, below the ashlip (when facing the unit). To increase your draft - slide to the left to open, and to decrease - slide to the right to close. The F2450M unit has a secondary draft system that continually allows combustion air to the induction ports at the top of the firebox.

Draft is the force which moves air from the appliance up through the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance. Inadequate draft may cause back puffing into the room and plugging of the chimney.

Primary Air Damper

Left - Open **Right - Closed**

WARNING: To build a fire in ignorance or to disregard the information contained in this section can cause serious permanent damage to the unit and void your warranty!!

First Fire

When your installation is completed and inspected you are ready for your first fire.

THIS UNIT IS DESIGNED TO BURN SEASONED CORDWOOD ONLY. COAL, BRIQUETTES AND ALL OTHERS LISTED ON PAGE 2 ARE NOT APPROVED.
SEASONED CORDWOOD SHOULD BE LESS THAN 20% MOISTURE CONTENT.

START UP AND OPERATING PROCEDURES:

1. For the first few days, the wood stove will give off an odour from the paint. This is to be expected as the high temperature paint becomes seasoned. Windows and/or doors should be left open to provide adequate ventilation while this temporary condition exists. Burning the wood stove at a very high temperature the first few times may damage the paint. During the first few fires, keep the combustion rate at a moderate level and avoid a large fire. Only after 5 or 6 such fires can you operate the wood stove at its maximum setting, and only after the metal has been warmed.
2. Do not place anything on the wood stove top during the curing process. This may result in damage to your paint finish.
3. When starting the fire, ensure the air control is in the fully open position (far left). To start a good and clean fire you will need approx. 3 lb kindling and 4 lb start up fuel, wood split slightly larger than kindling, approx. 2 inches thick.
4. Load few pieces of crumpled paper on the bottom and 2 lb of the kindling on top, stacked in a manner that allows air flow on the firebrick hearth (Tee pee style or other). DO NOT USE A GRATE TO ELEVATE THE FIRE.
5. Light the paper and adjust the door to establish fire and for less smoke roll out. Wait 2 - 3 minutes for a good updraft in the flue to establish the fire, then close the door. (Leaving the door slightly open will help your fire start more rapidly.)
6. Once most of the kindling has burned down but there are still good flames add the remainder of the kindling and 4-5 pieces of start up wood. Keep the door slightly open until flames are reestablished.(approx. 2 min).
   When a good fire is established, add the remainder of the startup wood (5 - 6 more pieces) and keep the door ajar for 1 - 2 minutes.

NOTE: These steps are crucial to ensure proper charcoaling and coal bed prior to loading High, Med and Low fire loads.

7. Once a nice coal bed is established and there are still good sized flames, the main load of larger logs can be loaded into the firebox. Rake the coals to create a uniform charcoal bed. Load 5 - 6 pieces of 17" long logs cord wood front to back, North/South orientation, parallel with the longest firebox dimension, which is the depth of the firebox 20 1/8 inches. Once loaded, keep the door ajar until the flames are established then close the door. Burn on high setting (air control to the far left when facing the unit) for 15 - 30 minutes. After the 15 - 30 minutes,adjust the air control to your desired position.
   After 20 minutes the fan can be set on high setting.
   High Fire: Air control to far left.
   Low Fire: Air control to far right.
   Med Fire: Air control slightly left of low fire setting.
   For low and medium fire, adjust the air gradually from high to the desired position.

   WARNING: Never build a roaring fire in a cold wood stove. Always warm your wood stove up slowly!

   From the start up of a cold stove, a medium to high firing rate must be maintained for 30 min. This ensures that the stove, and fuel are all stabilized at proper operating temperatures. Even though it is possible to have high temperatures within minutes after a fire has been started, if the fire is allowed to die down immediately it may go out. During re-fueling and rekindling of the cool fire, or a fire that has burned down to the charcoal phase, operate the stove at a medium to high firing rate for about 15 - 30 minutes to ensure to reach operating temperatures.
8. During the first few days it may be more difficult to start the fire. As you dry out your firebrick and your masonry flue, your draft will increase.
9. For those units installed at higher elevations or into sub-standard masonry fireplaces, drafting problems may occur. Consult an experienced dealer or mason on methods of increasing your draft.
10. Some cracking and popping noises may be experienced during the heating up process. These noises will be minimal when your unit reaches temperature.
11. All fuel burning appliances consume oxygen during operation. It is important that you supply a source of fresh air to your unit while burning. A slightly opened window is sufficient for the purpose. If you also have another fireplace in your home, a downdraft may be created by your Regency Stove causing a draft down your chimney. If this occurs, slightly open a window near your unit.

WARNING: If the body of your unit, or any part of the chimney connector starts to glow, you are over firing. Stop loading fuel immediately and close the draft control until the glow has completely subsided.

12. Green or wet wood is not recommended for your unit. If you must add wet or green fuel, open the draft control fully until all moisture has been dispersed by the intense fire. Once all moisture has been removed, the draft control may be adjusted to maintain the fire.
13. If you have been burning your stove on a low draft, use caution when opening the door. Open the door a crack, and allow the fire to adjust before fully opening the door.
14. The controls of your unit or the air supply passages should not be altered to increase firing for any reason.
15. If you burn the unit too slowly or at too low a setting your unit will not be operating as efficiently as it can. An easy rule of thumb says that if your glass is clean, then your flue is clean and your exhaust is clean. Burn the stove hot enough to keep your glass clean and you won't need to clean your flue as often.

    HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

    NOTE: Always stir the coal approximately half way through a burn cycle to ensure proper charcoaling.

How to Light and Maintain a Wood Stove Fire

Fan Operation

Automatic
To operate the fan - turn on the rheostat.

This will allow the fan to turn on as the stove has come up to operating temperature. It will also shut the fan system off after the fire has gone out and the unit cooled to below a useful heat output range.

Operate the fan in the low speed position when burning in the LOW-MED LOW heat output ranges and operate in the high setting for MED-HIGH to HIGH heat outputs.

Route power cord to either left or right behind unit.

Ash Disposal

During constant use, ashes should be removed every few days. The Ash Drawer option features a convenient ash dump for easy removal of ash, refer to Modular Installation Options section.

Safety Precautions

1. Do not allow ashes to build up to the loading doors! Only remove ashes when the fire has died down. Even then, expect to find a few hot embers.

2. Please take care to prevent the build-up of ash around the start-up air housing located inside the stove box, under the loading door lip.

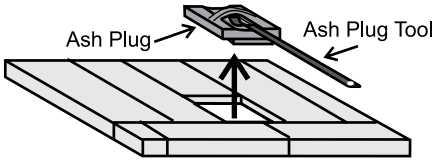
3. Never start a fire if the ash plug and ash drawer are not in place. This will cause over firing which can cause excessive warping of the stove. Evidence of over firing can void the warranty on your stove.

4. The firebricks are brittle and can be damaged if the plug is replaced carelessly or pieces that are too large are forced through the hole.

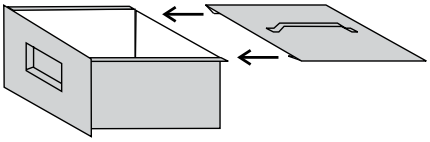
Ash Drawer Operating Guidelines

1. Only clean ashes out of the stove when the unit has cooled down. Remove the plug by lifting on the handle using the tool provided. The plug may still be warm, use caution. Push the ashes down the hole into the ash drawer, the large pieces can be left in the firebox and burned during the next fire or removed through the door opening.

2. Always leave 1/2 to 1 inch of ash in the bottom of the firebox. This helps in easier starting and a more uniform burn of your fire. Replace ash plug when ashes have been removed.



3. **Pedestal Units:**
   To remove the drawer, lift slightly and slide it out. When the drawer is completely out, slide the cover plate over the ash drawer and carry away.



CAUTION: HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

4. When emptying the ash drawer, make sure the ashes are cold. Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled. Other waste should not be placed in the ash container.

5. Before putting the ash drawer back into place, make sure the ash plug is back in place.

   Pedestal Units: make sure the cover lid is off.

Safety Guidelines and Warnings

CAUTION: do not use chemicals or fluids to start fire.

1. **CAUTION:** Never use gasoline, gasoline type lantern fuels, kerosene, charcoal lighter fuel, or similar liquids to start or 'freshen up' a fire in your heater. Keep all such liquids well away from the heater while it is in use.

2. Keep the door closed during operation and maintain all seals in good condition.

3. Do not burn any quantities of paper, garbage, and never burn flammable fluids such as gasoline, naptha or engine oil in your stove.

4. Do not store solid fuels by the appliance.

5. If you have smoke detectors, prevent smoke spillage as this may set off a false alarm.

6. Do not overfire heater. If the chimney connector, flue baffle or the stove top begin to glow, you are over firing. Stop adding fuel and close the draft control. Over firing can cause extensive damage to your stove including warping and premature steel corrosion. Over firing will void your warranty.

7. Do not permit creosote or soot build-up in the chimney system. Check and clean chimney at regular intervals. Failure to do so can result in a serious chimney fire.

8. Your Regency stove can be very hot. You may be seriously burned if you touch the stove while it is operating, keep children, clothing and furniture away. Warn children of the burn hazard.

9. The stove consumes air while operating, provide adequate ventilation with an air duct or open a window while the stove is in use.

10. Do not connect this unit to a chimney flue serving another appliance.

11. Do not use grates or andirons or other methods for supporting fuel. Burn directly on the bricks.

12. Open the draft control fully for 10 to 15 seconds prior to slowly opening the door when refuelling the fire.

13. Do not connect your unit to any air distribution duct.

14. This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods.

15. Do not store any fuel closer than 2 feet from your unit. Do not place wood, paper, furniture, drapes or other combustibles near the appliance.

16. **WARNING: Do not operate without either the Ash Plug properly seated or the Ash Dump Plates screwed in place, excessive temperatures will result.**

17. **CAUTION: Do not operate with broken glazing.**

18. **WARNING: Do not use abrasive cleaners to clean the glass window.**

19. **WARNING: Avoid impact on glass doors such as striking or slamming shut.**

DO NOT BURN:

- Treated wood
- Coal
- Garbage
- Cardboard
- Solvents
- Colored Paper
- Trash
- Salt drift wood
- Cut lumber, plywood, mill ends
- Kiln dried wood

CAUTION: DO NOT BURN GARBAGE OR FLAMMABLE LIQUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL. SOME FUELS COULD GENERATE CARBON MONOXIDE AND ARE VERY DANGEROUS.

CAUTION: DO NOT CONNECT TO, OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCT WORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATION.

Classic Door Handle Replacement

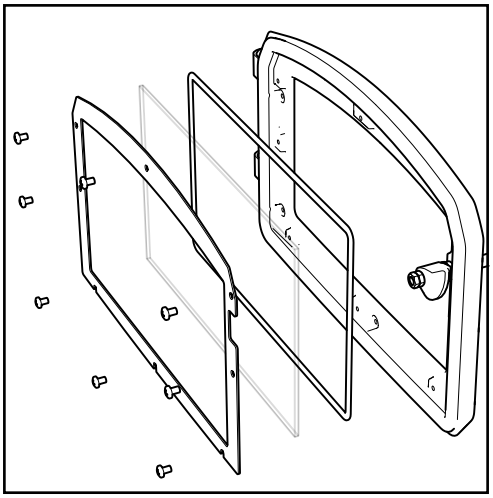
1. To remove the wooden door handle from unit—locate the 7/64" Allen key hole at the bottom of wooden handle.

2. Turn the 7/64" Allen key counter-clockwise to loosen the screw. When screw is completely loosened, drop handle down off door shaft and replace with new handle.

Glass Replacement

Your Regency stove is supplied with 5 mm Neoceram ceramic glass that will withstand the highest heat that your unit will produce. In the event that you break your glass by impact, purchase your replacement from an authorized Regency dealer only.

Remove the door from the stove and remove the screws securing the glass retainer. Position the glass in the door, make sure that the glass gasketing will properly seal your unit, and replace the retainer, it should rest on the gasket not the glass. Tighten securely, but do not wrench down on the glass as this may cause the glass to break.



Maintenance

It is very important to carefully maintain your fireplace stove, including burning seasoned wood and maintaining a clean stove and chimney system. Have the chimney cleaned before the burning season and as necessary during the season, as creosote deposits may build up rapidly. Moving parts of your stove require no lubrication.

Creosote

When wood is burned slowly, it produces tar and other organic vapours combine with moisture to form creosote. The creosote vapours condense in the relatively cool chimney flue of a slow burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote can result in an extremely hot fire.

The chimney connector and chimney should be inspected at least once every two months during the heating season to determine if creosote build up has occurred. If creosote has accumulated it should be removed to reduce the risk of chimney fire.

CAUTION: Things to remember in case of a chimney fire:

1. Close all draft and damper controls.

2. CALL THE FIRE DEPARTMENT.

Ways to Prevent and Keep Unit Free of Creosote

1. Burn stove with the draft control wide open for about 10-15 minutes every morning during burning season.

2. Burn stove with draft control wide open for about 10 - 15 minutes every time you apply fresh wood. This allows the wood to achieve the charcoal stage faster and burns up any unburned gas vapours which might otherwise be deposited within the system.

3. Only burn seasoned wood! Avoid burning wet or green wood. Seasoned wood has been dried at least one year.

4. A small hot fire is preferable to a large smouldering one that can deposit creosote within the system.

5. Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote buildup.

6. The chimney and chimney connector should be inspected at least once every two months during the heating season to determine is a creosote buildup has occurred.

7. **Have chimney system and unit cleaned by competent chimney sweeps twice a year during the first year of use and at least once a year thereafter or when a significant layer of creosote has accumulated (3 mm/1/8" or more) it should be removed to reduce the risk of a chimney fire.**

Door Gasket

If the door gasket requires replacement 7/8" diameter material must be used. Regency uses a 7/8" gasket rope (Part #846-570). A proper high temperature gasket adhesive is required. See your Regency Dealer.

The door catch may require adjustment as the door gasket compresses after a few fires. The door latch compression may require adjustment to renew seal. Removal of a shim, (see section in this manual), will allow the latch to be moved closer to the door frame, causing a tighter seal.

Glass Maintenance

Your Regency stove is supplied with 5mm Neoceram ceramic glass (Part #846-306) that will withstand the highest heat that your unit will produce. In the event that you break your glass by impact, purchase your replacement from an authorized Regency dealer only, and follow our step-by-step instructions for replacement (refer to Glass Replacement section).

Allow the stove to cool down before cleaning the glass. Cleaning the glass will prevent build up of carbon and allow full view of the fire.

WARNING: Do not clean the glass when it is hot.
WARNING: Do not use abrasive cleaners, a damp cloth and glass cleaner is effective.
WARNING: Do not use substitute materials.
WARNING: Do not abuse the glass door, such as striking of slamming shut.
WARNING: Do not operate with broken glass.

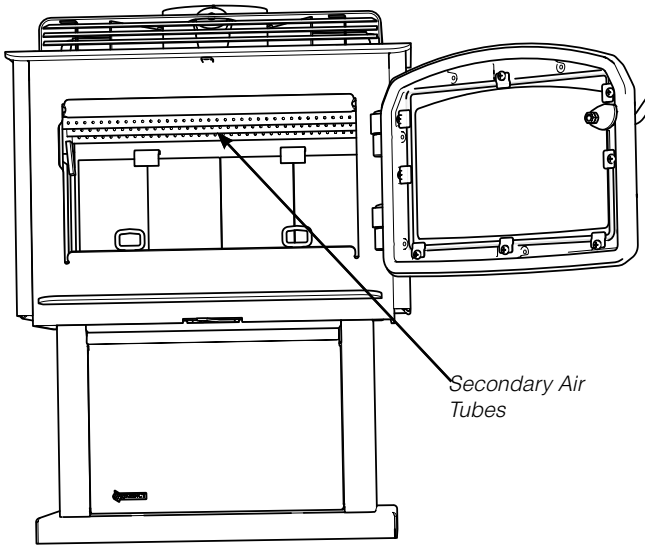
Wood Storage

Store wood under cover, such as in a shed, or covered with a tarp, plastic, tar paper, sheets of scrap plywood, etc., as uncovered wood can absorb water from rain or snow, delaying the seasoning process.

Secondary Air Tube Removal/Installation

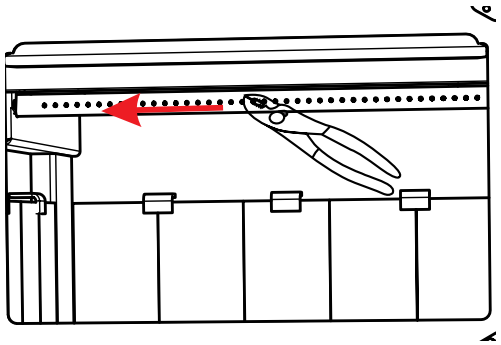
1. Allow the stove to burn out and cool down, until cool to touch.

2. Open stove door to access secondary air tubes.



3. Grasp front secondary air tube firmly with vise grips, using a hammer tap vise grips from right to left until air tube is released from grip. Remove. Repeat step to remove second airtube from front.

4. Remove the fragile two piece Baffles, then remove the remaining 2 tubes.

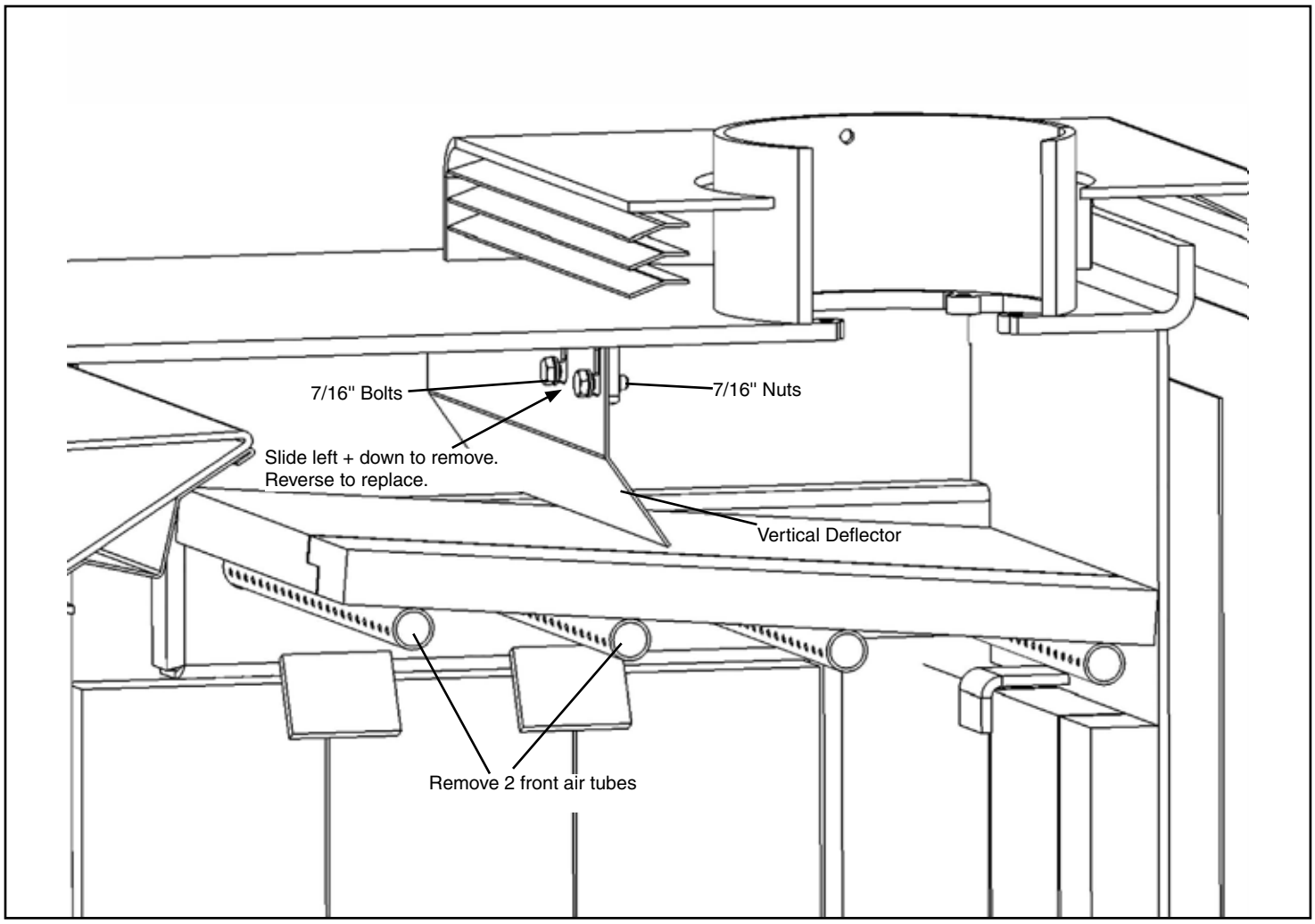


5. To reinstall or replace, first slide left side of tube into hole on left side air channel. Align tab on right side air channel with notch on right hand end of air tube. Firmly grip center of air tube with vise grips, use hammer to tap vise grips from left to right until the tube bottoms out into the air channel on right.

Annual Maintenance	
Completely clean out entire unit	Annually
Inspect air tube, and bricks	Replace any damaged parts.
Adjust door catch assembly	If unable to obtain a tight seal on the door - replace door gasket seal. Readjust door catch after new gasket installed.
Inspect condition and seal of: Glass Gasket Door Gasket	 Perform paper test - replace gasket if required
Paper Test	Test the seal on the loading door with a paper bill. Place a paper bill in the gasket area of the door on a cold stove. Close the door. Try to remove the paper by pulling. The paper should not pull out easily, if it does, try adjusting the door latch, if that doesn't solve the problem replace the door gasket.
Check and lubricate door hinge + latch	Use only high temperature anti seize lube. (ie. never seize)
Check glass for cracks	Replace if required.
Clean blower motor	Disconnect power supply. Remove and clean blower. ***DO NOT LUBRICATE***
Inspect and clean chimney	Annual professional chimney cleaning recommended.
NOTE: Chimney Cleaning We highly recommend that the chimney cleaning be done by a professional as they will have the necessary tools such as a proper sized brush and special vacuum cleaner designed to deal with fine particles.	

IMPORTANT
Before attempting to loosen or remove any bolt from the interior of a wood stove, insert or factory built fireplace, we highly recommend to liberally spray the bolt with a good-quality penetrating oil, one that does not have flammable properties contained within the penetrating oil being used. Allow it to set, then tap or vibrate the bolt to help loosen it before attempting to remove it. For best results, follow the instructions that are provided with the penetrating oil.

Vertical Stainless Deflector Replacement



1. Remove 2 front secondary air tubes / vermiculite baffles as per page 22.
2. Loosen the two 7/16" bolts + nuts to remove / replace vertical deflector.
3. Repeat steps to install new vertical deflector.

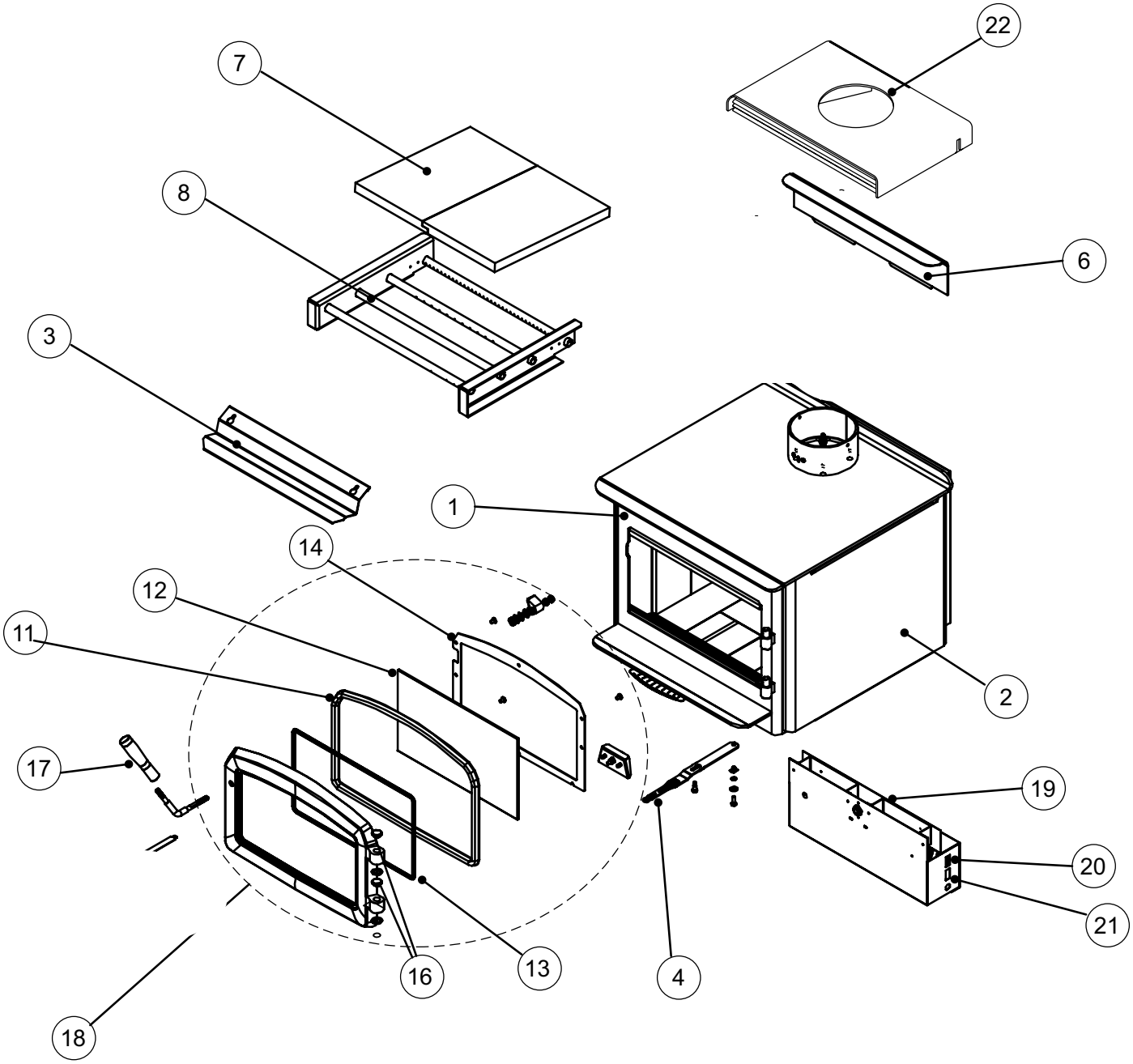
NOTE: ENSURE THAT VERTICAL DEFLECTOR IS PUSHED UP AS FAR AS POSSIBLE. TIGHT TO TOP OF FIREBOX.

parts list

Main Assembly

	Part #	Description
1	021-006	Left Side Heat Shield
2	021-007	Right Side Heat Shield
3	021-018	SS Smoke Deflector
4	021-020	Draft Control Lever
6	815-557	Rear Air Deflector
7	020-957	Baffle Bricks Complete (Set Of 2)
8	033-953	3/4 OD x 19-1/4 Air tube 4 Per Unit (Each)
11	846-570	7/8" Door Gasket Repair Kit
12	846-306	Replacement Glass - Small (Size :9 1/8" X 15 5/8")
13	936-241	Tape 7/8 Window Adhesive Sold per foot (4 Feet required)
14	075-077F	Glass Retainer
15	021-973	Door Handle Assembly Complete
16	948-079BN	Hinge Cap Brush Nickel (Each)
17	948-146	Long Black Handle
18	850-241	Black Door - Complete
18	850-243	Black with Nickel Accent Door - Complete
19	846-515	Fan Assembly Complete
20	910-138	2 Way Switch
21	910-140	3 way Switch
22	850-105	Airmate
23	075-051	SS Slide Holder
8	075-073F	Tool Hanger
N/S	948-223	Regency Logo Plate
N/S	910-157/P	Fan Motor Only With Squirrel cage
N/S	910-142	Fan Thermodisc
N/S	021-032/P	Vertical Stainless Deflector
N/S	021-022	Firebox Floor Gasket

N/S = Not Shown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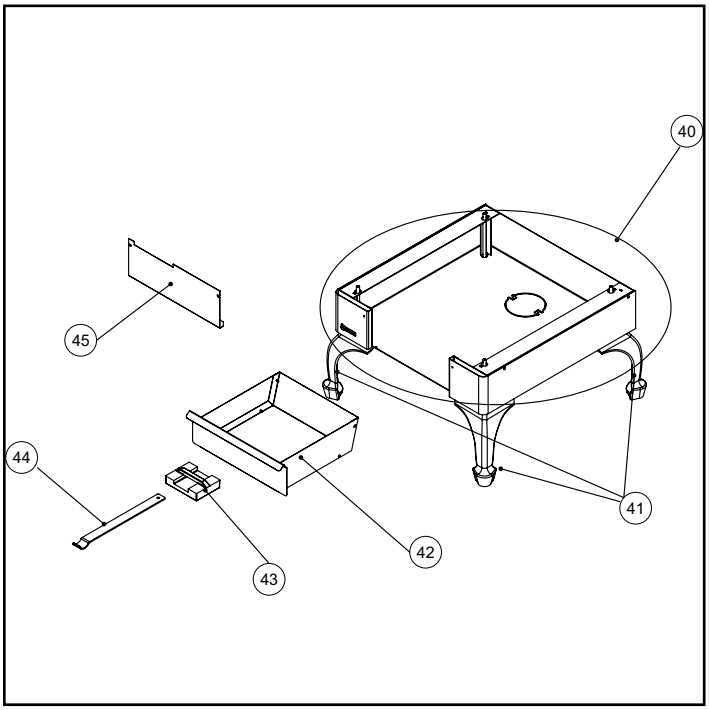
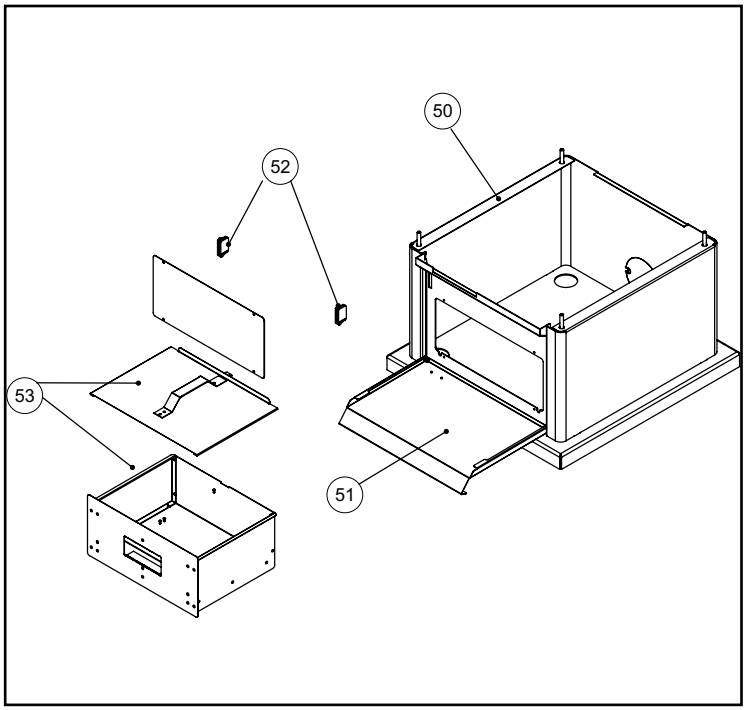
parts list

Bases

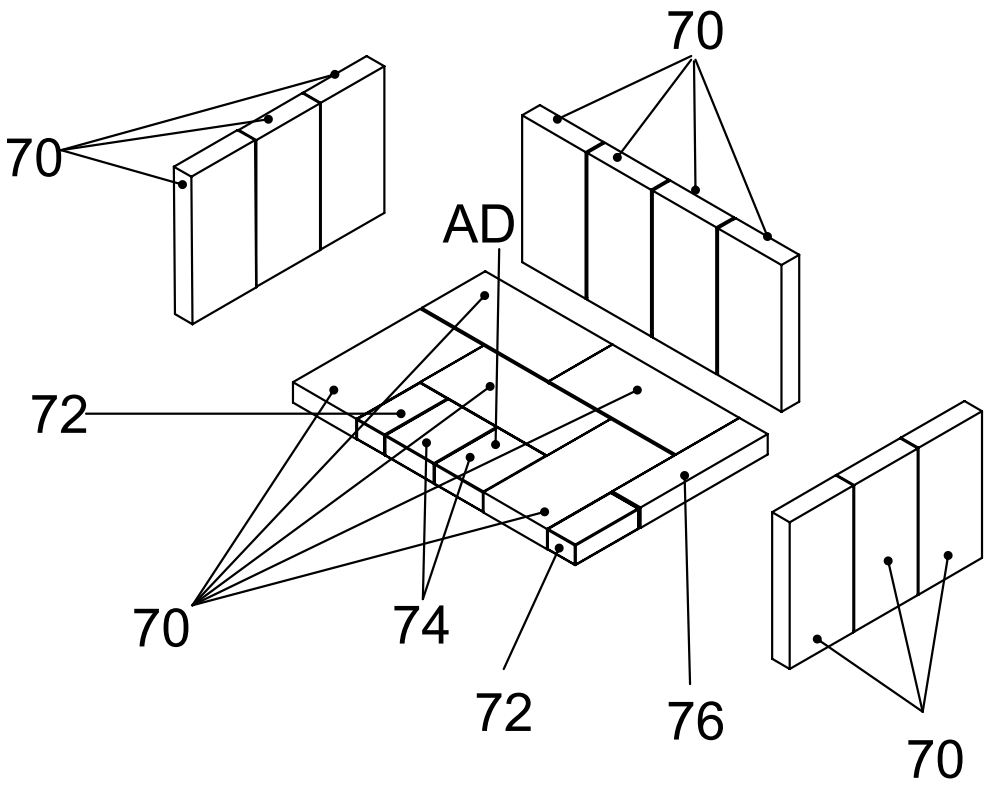
	Part #	Description
40	021-911	Bottom heat Shield
41	850-126	Black Cast legs (Set Of 4)
41	850-128	Nickel Cast legs (Set Of 4)
42	075-914	Ashdrawer Bottom Heat Shield
43	942-110	Ashplug
44	820-249	Ashplug Tool
45	021-024	Blanking Plate
N/S	904-100	5/16" x 5 1/2 " Long Hex Head Bolt (Each)
N/S	820-468F	Metal Washer
N/S	820-456	Metal Spacer/Support Bracket (Each)



	Part #	Description
50	021-915	Pedestal Complete
51	075-069	Pedestal Door
52	904-257	Magnetic Catch (Each)
53	075-910	Ashdrawer
N/S	904-023	5/16 x 1-1/2 Hex Head Bolt (Each)



020-960 Brick Kit Complete	
70)	Brick - Regular Full Size: 1-1/4" x 4-1/2" x 9"
72)	Brick Partial: 1-1/4" x 2" x 4-1/2"
74)	Brick Partial: 1-1/4" x 4-1/2" x 3-1/2"
76)	Brick Partial: 1-1/4" x 2" x 9"
NOTE: This kit contains one spare brick in case of breakage.	



Limited Lifetime Warranty
FPI Fireplace Products International Ltd. (for Canadian customers) and Fireplace Products U.S., Inc. (for U.S. customers) (collectively referred to herein as "FPI") extends this Limited Lifetime Warranty to the original purchaser of this appliance provided the product remains in the original place of installation. The items covered by this limited warranty and the period of such coverage is set forth in the table below.

Some conditions apply (see below).

The policy is not transferable, amendable, or negotiable under any circumstances.

Wood Products	Component Coverage					Labor Coverage
Components Covered	Limited Lifetime	5 years	2 years	1 year	Warranty	(Years)
Welded Firebox Steel	✓					5
All Stainless Steel Components, Smoke Deflectors, Heat Shields etc.	✓					3
Air Tubes	✓					3
Airmate	✓					3
Door handle and latch assembly, all hardware	✓					3
Glass Thermal Breakage Only	✓					3
Steel Faceplates, Accessory Housings	✓					3
All Plating	✓					3
Ash Drawer, Heatshields, Pedestal	✓					
All Baffles, Steel, Ceramic, Vermiculite C-Baffles	✓					
All castings, firebox, surrounds, doors, panels etc.		✓				3
All Electrical, Blower, wiring, switches etc.			✓			2
Glass - Crazing				✓		1
Catalyst Combustor					*10 Years Prorated	
Venting/Chimney				✓		1
Screens				✓		1

*See specific warranty details in regards to the catalyst combustor in unit manual.

Conditions:
Warranty protects against defect in manufacture or FPI factory assembled components only, unless herein specified otherwise.

Any part(s) found to be defective during the warranty period as outlined above will be repaired or replaced at FPI's option through an accredited distributor, dealer or pre-approved and assigned agent provided that the defective part is returned to the distributor, dealer or agent for inspection if requested by FPI. Alternatively, FPI may at its own discretion fully discharge all of its obligations under the warranty by refunding the verified purchase price of the product to the original purchaser. The purchase price must be confirmed by the original Bill of Sale.

The authorized selling dealer, or an alternative authorized FPI dealer if pre-approved by FPI, is responsible for all in-field diagnosis and service work related to all warranty claims. FPI is not responsible for results or costs of workmanship of unauthorized FPI dealers or agents in the negligence of their service work.
At all times FPI reserves the right to inspect reported complaints on location in the field claimed to be defective prior to processing or authorizing of any claim. Failure to allow this upon request will void the warranty.

All warranty claims must be submitted by the dealer servicing the claim, including a copy of the Bill of Sale (proof of purchase by you). All claims must be complete and provide full details as requested by FPI to receive consideration for evaluation. Incomplete claims may be rejected.

Replacement units are limited to one per warranty term. Airtube and baffle replacements are limited to one replacement per term.

Unit must be installed according to all manufacturers' instructions as per the manual.

All Local and National required codes must be met.

The installer is responsible to ensure the unit is operating as designed at the time of installation.

The original purchaser is responsible for annual maintenance of the unit, as outlined in the owner's manual. As outlined below, the warranty may be voided due to problems caused by lack of maintenance.

Repair/replacement parts purchased by the consumer from FPI after the original coverage has expired on the unit will carry a 90 day warranty, valid with a receipt only. Any item shown to be defective will be repaired or replaced at our discretion. No labor coverage is included with these parts.

Exclusions:
This Limited Lifetime Warranty does not extend to rust or corrosion of any kind due to: a lack of maintenance or improper venting, lack of combustion air provision, or exposure to corrosive chemicals (i.e. chlorine, salt, air, etc.).

This Limited Lifetime Warranty also does not extend to: paint, firebricks (rear, sides, or bottom), door gasketing, glass gasketing (or any other additional factory fitted gasketing), vermiculite floor bricks, andiron assemblies, and flue damper rods.

Malfunction, damage or performance based issues as a result of environmental conditions, location, chemical damages, downdrafts, installation error, installation by an unqualified installer, incorrect chimney components (including but not limited to cap size or type), operator error, abuse, misuse, use of improper fuels (such as unseasoned cordwood, mill-ends, construction lumber or debris, off-cuts, treated or painted lumber, metal or foil, plastics, garbage, solvents, cardboard, coal or coal products, oil based products, waxed cartons, compressed pre-manufactured logs, kiln dried wood), lack of regular maintenance and upkeep, acts of God, weather related problems from hurricanes, tornados, earthquakes, floods, lightning strikes/bolts or acts of terrorism or war, which result in malfunction of the appliance are not covered under the terms of this Limited Lifetime Warranty.

FPI has no obligation to enhance or modify any unit once manufactured (i.e. as products evolve, field modifications or upgrades will not be performed on existing appliances).

This warranty does not cover dealer travel costs for diagnostic or service work. All labor rates paid to authorized dealers are subsidized, pre-determined rates. Dealers may charge homeowner for travel and additional time beyond their subsidy.

Any unit showing signs of neglect or misuse will not be covered under the terms of this warranty policy and may void this warranty. This includes units with rusted or corroded fireboxes which have not been reported as rusted or corroded within three (3) months of installation/purchase.

Units which show evidence of being operated while damaged, or with problems known to the purchaser and causing further damages will void this warranty.

Units where the serial no. has been altered, deleted, removed or made illegible will void this warranty.

Minor movement, expansion and contraction of the steel is normal and is not covered under the terms of this warranty.

FPI is not liable for the removal or replacement of facings or finishing in order to repair or replace any appliance in the field.

Freight damages for products or parts are not covered under the terms of the warranty.

Products made or provided by other manufacturers and used in conjunction with the FPI appliance without prior authorization from FPI may void this warranty.

Limitations of Liability:
The original purchaser's exclusive remedy under this warranty, and FPI's sole obligation under this warranty, express or implied, in contract or in tort, shall be limited to replacement, repair, or refund, as outlined above. IN NO EVENT WILL FPI BE LIABLE UNDER THIS WARRANTY FOR ANY INCIDENTAL OR CONSEQUENTIAL COMMERCIAL DAMAGES OR DAMAGES TO PROPERTY. TO THE EXTENT PERMITTED BY APPLICABLE LAW, FPI MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE. IF IMPLIED WARRANTIES CANNOT BE DISCLAIMED, THEN SUCH WARRANTIES ARE LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY.

Some U.S. states do not allow limitations on how long an implied warranty lasts, or allow exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

Customers located outside the U.S. should consult their local, provincial or national legal codes for additional terms which may be applicable to this warranty.

How to Obtain Warranty Service:
Customers should contact the authorized selling dealer to obtain all warranty and service. In the event the authorized selling dealer is unable to provide warranty / service, please contact FPI by mail at the address listed on the next page. Please include a brief description of the problem and your address, email and telephone contact information. A representative will contact you to make arrangements for an inspection and/or warranty service, by an alternative dealer.

Product Registration and Customer Support:
Thank you for choosing a Regency Fireplace. Regency strives to be a world leader in the design, manufacture, and marketing of hearth products. To provide the best support for your product, we request that you complete a product registration form at http://www.regency-fire.com/Customer-Care/Warranty-Registration.aspx within ninety (90) days of purchase.

Revision Date: July 2019

Regency Wood Products Warranty

REGENCY
FIREPLACE PRODUCTS

Product Registration and Customer Support:

Thank you for choosing a Regency Fireplace. Regency strives to be a world leader in the design, manufacture, and marketing of hearth products. To provide the best support for your product, we request that you complete a product registration form found on our Web Site under Customer Care within ninety (90) days of purchase.

For purchases made in **CANADA or the UNITED STATES**:
http://www.regency-fire.com/Customer-Care/Warranty-Registration.aspx

For purchases made in AUSTRALIA:
http://www.regency-fire.com.au/Customer-Care/Warranty-Registration.aspx

You may also complete the warranty registration form below to register your Regency Fireplace Product and mail and/or fax it back to us, and we will register the warranty for you. It is important you provide us with all the information below in order for us to serve you better.

Warranty Registration Form (or Register online immediately at the above Web Site):

Warranty Details	
Serial Number (required):	
Purchase Date (required) (mm/dd/yyyy):	
Product Details	
Product Model (required):	
Dealer Details	
Dealer Name (required):	
Dealer Address:	
Dealer Phone #:	
Installer:	
Date Installed (mm/dd/yyyy):	
Your Contact Details (required)	
Name:	
Address:	
Phone:	
Email:	

For purchases made in CANADA:

FPI Fireplace Products International Ltd.
6988 Venture St.
Delta, British Columbia
Canada, V4G 1H4

Phone: 604-946-5155
Fax: 1-866-393-2806

For purchases made in the UNITED STATES:

Fireplace Products US, Inc.
PO Box 2189 PMB 125
Blaine, WA
United States, 98231

Phone: 604-946-5155
Fax: 1-866-393-2806

For purchases made in AUSTRALIA:

Fireplace Products Australia Pty Ltd
1- 3 Conquest Way
Hallam, VIC
Australia, 3803

Phone: +61 3 9799 7277
Fax: +61 3 9799 7822

For fireplace care and tips and answers to most common questions please visit our Customer Care section on our Web Site. Please feel free to contact your selling dealer if you have any questions about your Regency product.

warranty

notes

Installer: Please complete the following information

Dealer Name & Address:_____

_____

Installer: _____

Phone #: _____

Date Installed: _____

Serial #:_____

Printed in Canada

Established 1974

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A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI01A05026181218

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Rice Lake	IQ+355E-2A x 100(	A05026	#041	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
lbs	0.1	QC033	12/18/18	6/13/18	12/2019

FUNCTIONAL CHECKS

SHIFT TEST	LINEARITY	REPEATABILITY	ENVIRONMENTAL CONDITIONS
Test Wt: 250 Tol: 1	Test Wt: HB44 Tol: HB44	Test Wt: 100 Tol: 1	☐ Good ☑ Fair ☐ Poor
As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	Temperature: 16.9°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	999.3	1000.2	0.12
700	699.7	700.1	0.12
500	499.7	500.1	0.08
300	299.8	300.1	0.08
100	99.9	100.0	0.05
50	50.0	50.0	0.05

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	11/24/17	11/2019	20172265

Permanent Information Concerning this Equipment:
12 month calibration cycle. 2000lb platform.

Comments/Information Concerning this Calibration
12/18 - RH = 67%. Adjusted span.

Report prepared/reviewed by: ServiceTechDC **Date:** 12/28/18 **Technician:** R.Kauble **Signature:**

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy.

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A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0182484A0912013i181218

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Digiweigh	DWP12i 400x.01	82484A0912013i	#050	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
lbs	0.01	QC033	12/18/18	6/13/18	12/2019

FUNCTIONAL CHECKS

SHIFT TEST	LINEARITY	REPEATABILITY	ENVIRONMENTAL CONDITIONS
Test Wt: 50 Tol: 0.05	Test Wt: HB44 Tol: HB44	Test Wt: 50 Tol: 0.01	☐ Good ☑ Fair ☐ Poor
As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	Temperature: 16.4°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
400	399.99	399.99	0.058
300	300.00	300.00	0.058
200	200.03	200.03	0.058
100	100.01	100.01	0.012
50	50.00	50.00	0.012
20	20.00	20.00	0.012

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	11/24/17	11/2019	20172265

Permanent Information Concerning this Equipment:
12 month calibration cycle.

Comments/Information Concerning this Calibration
12/18 - RH = 64%. Adjusted span.

Report prepared/reviewed by: ServiceTechJC **Date:** 12/28/18 **Technician:** R.Kauble
Signature:

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy.

Dry Gas Meter Calibration

Meter Manufacturer:	Apex
Model:	XC-60-ED
Lab ID #:	53
Serial #:	1902130
Calibration Date:	12/17/2018
Calibration Expiration:	6/17/2019
Barometric Pressure:	29.87 in. Hg

PFS·TECO

Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	3/5/2019
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	12/13/2018
γ Factor:	1.002
Allowable Deviation (±5%):	0.0501
Actual Deviation:	0.00
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	166.180	147.027	169.354
Standard DGM Temperature (°F)	71.7	72.5	73.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.950	5.296	6.132
DGM Temperature (°F)	83.0	91.0	93.0
DGM Pressure (in H_2O)	2.60	2.00	1.5
Time (min)	37.0	37.0	49.0
Net Volume for Standard DGM (ft^3)	5.869	5.192	5.981
Net Volume for DGM (ft^3)	5.950	5.296	6.132
Dry Gas Meter γ Factor	0.999	1.007	1.006
γ Factor Deviation From Average	0.999	1.007	1.006

Average Gas Meter γ Factor: 1.004

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is ±0.5%.

Technician: _____ 12/17/2018

Dry Gas Meter Calibration

Meter Manufacturer:	Apex
Model:	XC-60-ED
Lab ID #:	54
Serial #:	1902133
Calibration Date:	12/17/2018
Calibration Expiration:	6/17/2019
Barometric Pressure:	29.87 in. Hg

Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	3/5/2019
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	12/13/2018
γ Factor:	0.997
Allowable Deviation (±5%):	0.04985
Actual Deviation:	0.00
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	153.596	138.287	193.022
Standard DGM Temperature (°F)	73.0	73.0	74.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.594	5.047	7.058
DGM Temperature (°F)	94.5	95.0	96.0
DGM Pressure (in H_2O)	2.60	2.00	1.5
Time (min)	35.0	36.0	57.0
Net Volume for Standard DGM (ft^3)	5.424	4.884	6.816
Net Volume for DGM (ft^3)	5.594	5.047	7.058
Dry Gas Meter γ Factor	1.000	1.001	1.000
γ Factor Deviation From Average	1.000	1.001	1.000

Average Gas Meter γ Factor: 1.000

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is ±0.5%.

Technician: 12/17/2018

Dry Gas Meter Calibration

Meter Manufacturer:	Apex
Model:	Apex-AK-600
Lab ID #:	055
Serial #:	810016
Calibration Date:	6/15/2018
Calibration Expiration:	6/15/2019
Barometric Pressure:	29.83 in. Hg

Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	047
Serial #:	1101001
Calibration Expiration Date:	3/5/2019
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	1/18/2017
γ Factor:	0.997
Allowable Deviation (±5%):	0.04985
Actual Deviation:	0.00
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	145.479	148.058	143.802
Standard DGM Temperature (°F)	71.0	71.0	71.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.146	5.254	5.114
DGM Temperature (°F)	75.0	76.5	77.5
DGM Pressure (in H_2O)	1.80	1.80	1.8
Time (min)			
Net Volume for Standard DGM (ft^3)	5.138	5.229	5.078
Net Volume for DGM (ft^3)	5.146	5.254	5.114

Dry Gas Meter γ Factor	0.999	0.999	0.999
γ Factor Deviation From Average	0.999	0.999	0.999

Average Gas Meter γ Factor: 0.999

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is ±0.5%.

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Calibration Services

Certificate Number: 1550.01

Laboratory code: 115953

Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 03/21/17
Submitted By: John Steiner
Traceable Number: 20170468

Test Item: 200mg and 100mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner

Material	Assumed Density	Range	Tolerance Class
Stainless Steel	7.95 g/cm^3	200mg & 100mg	ASTM Class 1

Method and Traceability
The procedure used for this calibration is NIST IR 6969 SOP 4 Double Substitution Weighing Design. Standards used for comparison are traceable to the National Institute of Standards and Technology (reports on file) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and traceability within the level of uncertainty reported. The Traceable Number listed above is Traceable to National Standards through an unbroken chain of comparison each having stated uncertainties.

Standards Used:
100g to 1mg Working Standards Were Calibrated: 03/03/17 Due: 03/31/18 Standards ID: 723318
Mass Comparators Used: MET-05 **Tested by:** D. Thompson

Conventional Mass: "The conventional value of the result of weighing a body in air is equal to the mass of a standard, of conventionally chosen density, at a conventionally chosen temperature, which balances this body at this reference temperature in air of conventionally chosen density. International Recommendation 33 (OIML IR 33 1973, 1979). "Conventional Value of the Result of Weighing in Air" **(Previously known as "Apparent Mass vs. 8.0g/cm^3).**

Uncertainty Statement: The uncertainty conforms to the ISO Guide to the Expressions of Uncertainty in Measurement. Uncertainty as reported is based on a coverage factor k=2 for an approximate 95 percent level of uncertainty. Uncertainty components include the standard deviation of the process, the uncertainty of the standard used, an uncertainty component associated with the potential drift of the standard used, and the estimated uncertainty related to measuring and determining the air buoyancy effect.

Conventional Mass Values are listed on page 2 of this report.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 03/21/17

Signature David S. Thompson

Established 1974

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ACCREDITED

Calibration Services

Certificate Number: 1550.01

Laboratory code: 115953

Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 03/21/17
Submitted By: John Steiner
Traceable Number: 20170468

Test Item: 200mg and 100mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.967	753.44	49.44

Conventional Mass Value

Nominal Value	As Found grams	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
200mg SN 1000101395	0.2000061	0.0061	0.0026	0.01
100mg SN 1000126267	0.1000046	0.0046	0.0028	0.01

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: These weights were new from the manufacturer and were within ASTM Class 1 tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories.* This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 03/21/17

Signature David S. Thompson

Established 1974

QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293
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ACCREDITED
Calibration Services
Certificate Number: 1550.01
Laboratory code: 115953

Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 01/15/16
Purchase Order: 1001
Traceable Number: 20152489

Test Item: 20lb and 10lb Individual Grip Handle Weights
Serial No.: Listed in Table

Manufacturer: Unknown

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.448	760.64	44.58

Conventional Mass Value

Nominal Value	As Found pounds	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
20lb #098	19.9995450	-206.4	6.4	910
10lb #097	10.0006510	295.3	5.1	450
10lb #051	10.0003421	155.2	5.1	450

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: These weights were received in good condition and were within NIST Handbook 105-1 Class F tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 01/15/16

Signature David S. Thompson

Established 1974

QUALITY CONTROL SERVICES

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A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0134307497181218

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Sartorius	ENTRIS224-1S	34307497	#107	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
g	0.0001	QC012	12/18/18	6/13/18	12/2019

FUNCTIONAL CHECKS

ECCENTRICITY
Test Wt: 100 Tol: 0.0003
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

LINEARITY
Test Wt: 50 x 4 Tol: 0.0002
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

STANDARD DEVIATION
Test Wt: 100 Tol: 0.0001

1. 100.0001	5. 100.0002	9. 100.0001
2. 100.0001	6. 100.0001	10. 100.0001
3. 100.0001	7. 100.0001	**Result**
4. 100.0001	8. 100.0002	0.00004

ENVIRONMENTAL CONDITIONS
☐ Good ☑ Fair ☐ Poor
Temperature: 21.3°C

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	200.0002	200.0001	0.00014
100	100.0001	100.0001	0.00014
50	50.0003	50.0001	0.00014
20	20.0001	20.0001	0.00014
1	1.0001	1.0000	0.00014
0.1	0.1000	0.1000	0.00014

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	R.L./Troemner	10kg to 1mg	G782	1/3/18	1/2019	20172421

Permanent Information Concerning this Equipment:
12 month calibration cycle.

Comments/Info Concerning this Calibration:
12/18 - RH = 56%. Adjusted span.

Report prepared/reviewed by: ServiceTech JC **Date:** 12/28/18 **Technician:** R.Kauble

Signature:

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation and readability of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

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NIST Traceable
Calibration Report

REPORT NUMBER
1375092

Reference Number: 1200788
PO Number: JSTEINERT013118

PFS-TECO
11785 SE Highway 212
Suite 305
Clackamas, OR 97015 United States

Manufacturer:	Dwyer Instruments Inc.	**Calibration Date:**	02/14/2018
Model Number:	471	**Calibration Due Date:**	02/14/2019
Description:	Air Velocity, Digital Thermo Anemometer	**Condition As Found:**	Limited In Tol See Comments
Asset Number:	#095	**Condition As Left:**	Limited See Comments
Serial Number:	#095		
Procedure:	DS Universal Speed/Time/Temperature		

Remarks:

NIST-traceable calibration performed on the unit referenced above in accordance with customer requirements, published specifications and the lab's standard operating procedures. No adjustments were made to the unit.

This calibration is considered limited due to the requested test range.

Standards Utilized

Asset No.	Manufacturer	Model No.	Description	Cal. Date	Due Date
CP105979	Kanomax	X5602	Air Velocity, Wind Tunnel, Open Jet	01/06/2018	01/31/2019
CP144554	Fluke Corporation	1551A EX	Temperature, Stik Thermometer	01/08/2018	01/31/2019

Calibration Data

FUNCTION TESTED	Nominal Value	As Found	Out of Tol	As Left	Out of Tol	CALIBRATION TOLERANCE
Speed Accuracy Air Velocity	50 ft/min	43		Same		35 to 65 ft/min [EMU 1.3 ft/min][TUR 12:1]
Speed Accuracy Air Velocity	100 ft/min	90		Same		85 to 115 ft/min [EMU 1.5 ft/min][TUR 9.8:1]
Speed Accuracy Air Velocity	150 ft/min	140		Same		135 to 165 ft/min [EMU 1.8 ft/min][TUR 8.3:1]
Speed Accuracy Air Velocity	200 ft/min	192		Same		185 to 215 ft/min [EMU 2.1 ft/min][TUR 7.1:1]
Speed Accuracy Air Velocity	250 ft/min	240		Same		235 to 265 ft/min [EMU 2.4 ft/min][TUR 6.2:1]
Speed Accuracy Air Velocity	300 ft/min	288		Same		285 to 315 ft/min [EMU 2.7 ft/min][TUR 5.6:1]
Speed Accuracy Air Velocity	400 ft/min	395		Same		385 to 415 ft/min [EMU 3.3 ft/min][TUR 4.5:1]
Speed Accuracy Air Velocity	500 ft/min	485		Same		485 to 515 ft/min [EMU 3.9 ft/min][TUR 3.8:1]
Temperature Accuracy	72.0 °F	71.9		Same		70.0 to 74.0 °F [EMU 0.11 °F][TUR 18:1]

Temperature: 23° C
Humidity: 20% RH
Rpt. No.: 1375092

Calibration Performed By:				Quality Reviewer:	
Mathews, Rich	314	Metrologist	847-327-5314	Szplit, Tony	02/14/2018
Name	ID #	Title	Phone	Name	Date

Model 1430 Microtector® Electronic Point Gage

Installation and Operating Instructions

Model 1430 Microtector® Portable Electronic Point Gage combines modern, solid-state integrated circuit electronics with a time-proven point gage manometer to provide fast, accurate pressure measurements.

SPECIFICATIONS AND FEATURES

- Accurate and repeatable to ± .00025 inches water column
- Pressure range: 0 - 2″ w.c., positive, negative, or differential pressures
- Non-toxic and inexpensive gage fluid consists of distilled water mixed with a small amount of fluorescein green color concentrate
- Convenient, portable, lightweight and self-contained, the unit requires no external power connections and is operated by a 1.5 volt penlight cell
- A.C. detector current eliminates point plating, fouling and erosion
- Micrometers are manufactured in accordance with ASME B89.1.13-2001, and are traceable to a standard at the National Institute of Standards and Technology
- Three-point mounting, dual leveling adjustment, and circular level vial assure rapid setup
- Durablock® precision-machined acrylic plastic gage body
- Sensitive 0 - 50 microamp D.C. meter acts as a detector and also indicates battery and probe condition
- Heavy 2″ thick steel base plate provides steady mounting
- Top-quality glass epoxy circuit board and solid-state, integrated circuit electronics
- Electronic enclosure of tough, molded styrene acrylonitrile provides maximum protection to components yet allows easy access to battery compartment
- Rugged sheet steel cover and carrying case protects the entire unit when not in use
- Accessories included are (2) 3-foot lengths Tygon® tubing, (2) 1/8″ pipe thread adapters and 3/4 oz. bottle of fluorescein green color concentrate with wetting agent

Maximum pressure: 100 psig with optional pipe thread connections.

Tygon® is a registered trademark of Saint-Gobain Corporation

DWYER INSTRUMENTS, INC.
P.O. BOX 373
MICHIGAN CITY, INDIANA 46361,U.S.A
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Fax: 219/872-9057
www.dwyer-inst.com
e-mail: info@dwyer-inst.com

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22017

DocNumber: 000113537

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:
PXPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD
TUALATIN OR 97062

Praxair Order Number: 70337802
Customer P. O. Number:
Customer Reference Number:

Fill Date: 8/7/2017
Part Number: NI CD17CO8E-AS
Lot Number: 70086721903
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 1290 psig 99 cu. ft.

Certified Concentration:

Expiration Date: 8/11/2025
Cylinder Number: CC700832

			NIST Traceable Analytical Uncertainty:
4.33	%	CARBON MONOXIDE	± 0.5 %
16.93	%	CARBON DIOXIDE	± 0.3 %
16.99	%	OXYGEN	± 0.3 %
Balance		NITROGEN	± 0.2 %

Certifcation Information: Certification Date: 8/11/2017 Term: 96 Months Expiration Date: 8/11/2025
This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for O2 IR boardening effect. O2 responses have been corrected for CO2 interference.

Analytical Data: (R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 4.25 %
Certified Concentration: 4.33 %
Instrument Used: Horiba VIA-510 S/N UB9UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 7/23/2017

First Analysis Data: Date: 8/11/2017

Z: 0	R: 5	C: 4.33	Conc:	4.333
R: 4.99	Z: 0	C: 4.33	Conc:	4.333
Z: 0	C: 4.32	R: 5	Conc:	4.323

UOM: % Mean Test Assay: 4.33 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC242633
Ref. Std. Conc: 5.00%
Ref. Std. Traceable to SRM # : 2642a
SRM Sample # : 51-D-23
SRM Cylinder # : FF23106

Second Analysis Data: Date:

Z: 0	R: 0	C: 0	Conc:	0
R: 0	Z: 0	C: 0	Conc:	0
Z: 0	C: 0	R: 0	Conc:	0

UOM: % Mean Test Assay: 0 %

2. Component: CARBON DIOXIDE

Requested Concentration: 17 %
Certified Concentration: 16.93 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 7/20/2017

First Analysis Data: Date: 8/11/2017

Z: 0	R: 20.08	C: 16.99	Conc:	16.936
R: 20.08	Z: 0	C: 16.99	Conc:	16.936
Z: 0	C: 16.98	R: 20.09	Conc:	16.926

UOM: % Mean Test Assay: 16.933 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA10234
Ref. Std. Conc: 20.02%
Ref. Std. Traceable to SRM # : RGM#CC28
SRM Sample # : N/A
SRM Cylinder # : RGM#CC28033

Second Analysis Data: Date:

Z: 0	R: 0	C: 0	Conc:	0
R: 0	Z: 0	C: 0	Conc:	0
Z: 0	C: 0	R: 0	Conc:	0

UOM: % Mean Test Assay: 0 %

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DocNumber: 223791

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22018

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PXPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD ROAD
TUALATIN OR 97062

Certificate Modification Date: 09/05/2018
Praxair Order Number: 70716136
Part Number: NI CD10CO33E-AS

Fill Date: 08/31/2018
Lot Number: 70086824308
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	09/05/2026	NIST Traceable
Cylinder Number:	CC170624	Expanded Uncertainty
10.00 %	Carbon dioxide	± 0.3 %
2.51 %	Carbon monoxide	± 0.7 %
10.50 %	Oxygen	± 0.6 %
Balance	Nitrogen	

Certification Information:

Certification Date: 09/05/2018 *Term:* 96 Months *Expiration Date:* 09/05/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

CO responses have been corrected for CO2 interference. CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Carbon dioxide**

Requested Concentration: 10 %
Certified Concentration: 10.00 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 08/20/2018

First Analysis Data: **Date** 09/05/2018

Z:	0	R:	14.02	C:	10	Conc:	10
R:	14.02	Z:	0	C:	10	Conc:	10
Z:	0	C:	10	R:	14.02	Conc:	10

UOM: % **Mean Test Assay:** 10 %

Reference Standard: Type / Cylinder #: GMIS / CC141375
Concentration / Uncertainty: 14.02 % ±0.3%
Expiration Date: 06/11/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 1675b / 6-F-51 / CAL014538
SRM Concentration / Uncertainty: 13.963% / ±0.034%
SRM Expiration Date: 05/16/2022

Second Analysis Data: **Date**

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: % **Mean Test Assay:** %

2. ***Component:*** **Carbon monoxide**

Requested Concentration: 2.5 %
Certified Concentration: 2.51 %
Instrument Used: Horiba VIA-510 S/N UB9UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 08/20/2018

First Analysis Data: **Date** 09/05/2018

Z:	0	R:	2.48	C:	2.51	Conc:	2.51
R:	2.48	Z:	0	C:	2.51	Conc:	2.51
Z:	0	C:	2.51	R:	2.48	Conc:	2.51

UOM: % **Mean Test Assay:** 2.51 %

Reference Standard: Type / Cylinder #: GMIS / CC102045
Concentration / Uncertainty: 2.48 % ±0.448%
Expiration Date: 04/03/2025
Traceable to: SRM # / Sample # / Cylinder #: SRM 2641a / 52-D-30 / CAL017193
SRM Concentration / Uncertainty: 4.009% / ±0.017%
SRM Expiration Date: 07/15/2019

Second Analysis Data: **Date**

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: % **Mean Test Assay:** %

3. ***Component:*** **Oxygen**

Requested Concentration: 10.5 %
Certified Concentration: 10.50 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 09/04/2018

First Analysis Data: **Date** 09/05/2018

Z:	0	R:	9.88	C:	10.49	Conc:	10.49
R:	9.88	Z:	0	C:	10.5	Conc:	10.5
Z:	0	C:	10.5	R:	9.88	Conc:	10.5

UOM: % **Mean Test Assay:** 10.5 %

Reference Standard: Type / Cylinder #: NTRM / DT0010402
Concentration / Uncertainty: 9.88 % ±0.4%
Expiration Date: 11/18/2022
Traceable to: SRM # / Sample # / Cylinder #: NTRM #170701 / N/A / NTRM #DT0010402
SRM Concentration / Uncertainty: 9.875% / ±0.040%
SRM Expiration Date: 11/18/2022

Second Analysis Data: **Date**

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: % **Mean Test Assay:** %

Analyzed By: **Danielle Burns**

Certified By: **Jose Vasquez**

Verification of Standardization

of

Tape Measure

by

Advanced Calibration Technologies
28111 S.E. Wally Road
Boring, OR 97009
1-800-259-5058

ACCREDITED
Calibration
Cert# 1342.01

Customer:	PFS Teco, Inc	Street:	11785 Southeast Highway 212 Suite 305
City:	Clackamas State: OR	Zip:	97015 Location: In House
Machine Manufacturer:	Dewalt	Model:	16' Tape Measure
Capacity:	0.000 - 192.000 inches 0.125 Divisions	Serial #:	090
Calibration Cycle:	12 Months	Lab ID#:	#090
Previous Calibration Date:	January 2019	Calibration Procedure:	Ad-Tek SR
Equipment Used:	Gauge Blocks S/N: ADGB002	Action Recommended:	
If Other, Explain:			

Verification Data

Purpose:

This method provides instructions for checking the critical dimensions of the equipment.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test method.

Procedure:

Verified using manufacturer's procedures.

Actual Dimensions (inches)	Unit Under Test As Found (inches)	Unit Under Test As Left (inches)	Difference (inches)
0.0000	0.000	0.000	0.000
0.1250	0.050	0.050	-0.075
0.2500	0.250	0.250	0.000
0.5000	0.500	0.500	0.000
0.7500	0.750	0.750	0.000
1.0000	1.000	1.000	0.000
3.0000	3.000	3.000	0.000
5.0000	5.000	5.000	0.000
7.0000	7.000	7.000	0.000
9.0000	9.000	9.000	0.000
12.0000	12.000	12.000	0.000

The overall condition of the device as found:	Within Specification
The overall condition of the device as left:	Within Specification
The measurement of uncertainty (MU) was calculated to be:	0.00060

File No: PFS-101666-0119D0120-AH-SR-090

Temperature: 72.1°F Humidity: 41.1%

The equipment used in the verification of this instrument has been calibrated and is NIST traceable.
The uncertainty of calibration was estimated at the 95% confidence level, coverage factor (k=2).

Remarks:

This certificate of verification is issued as a statement of fact that on the date of verification the above instrument had an accuracy as indicated and was calibrated to meet the requirements of the manufacturer's specifications. This certificate should not be construed or regarded as a guarantee or warranty of any kind that the instrument will retain the same percentage of accuracy as determined on the date when the verification was performed and reported. Ad-Tek, Inc. hereby expressly disclaims any and all liability for damage or loss by all parties arising or resulting from deterioration, obsolescence, malfunction, subsequent calibration performed by another agency or substandard performance of said instrument.

Service Technician: Alisa Houser Date of Service: January 16, 2019

Technical Manager: Nicole Ostrowski Date Next Due: January 2020

We sincerely appreciate your business and thank you for selecting Advanced Calibration Technologies, Inc. for servicing your equipment.
To reschedule, please call (800) 259-5058. Thank You.

Verification of Standardization

of

Calipers

by

Advanced Calibration Technologies
28111 S.E. Wally Road
Boring, OR 97009
1-800-259-5058

ACCREDITED
Calibration
Cert# 1342.01

Customer:	PFS Teco, Inc	Street:	11785 Southeast Highway 212 Suite 305
City:	Clackamas State: OR	Zip:	97015 Location: In House
Machine Manufacturer:	General	Model:	6" Digital Caliper
Capacity:	0.0000 - 6.0000 inches 0.0005 Divisions	Serial #:	092
Calibration Cycle:	12 Months	Lab ID#:	092
Previous Calibration Date:	January 2018	Calibration Procedure:	Ad-Tek DC
Equipment Used:	Gauge Blocks S/N: ADGB002	Action Recommended:	
If Other, Explain:			

Verification Data

Purpose:

This method provides instructions for checking the critical dimensions of the inside diameter of the equipment.

Tolerance:

Equipment shall meet the dimensional tolerances specified by the manufacturer for the inside diameter.

Procedure:

Verified using the procedure to meet manufacturer's tolerance for inside diameter.

Actual Dimensions (inches)	Unit Under Test As Found (inches)	Unit Under Test As Left (inches)	Difference (inches)
0.0000	0.0000	0.0000	0.0000
0.0500	0.0500	0.0500	0.0000
0.1000	0.1000	0.1000	0.0000
0.1010	0.1010	0.1010	0.0000
0.1050	0.1050	0.1050	0.0000
0.1100	0.1100	0.1100	0.0000
0.1500	0.1500	0.1500	0.0000
0.5000	0.5000	0.5000	0.0000
1.0000	1.0000	1.0000	0.0000
3.0000	2.9995	2.9995	-0.0005
5.0000	4.9990	4.9990	-0.0010

The overall condition of the device as found:	Within Specification
The overall condition of the device as left:	Within Specification
The measurement of uncertainty (MU) was calculated to be:	0.00062

This certificate does not reflect meausrements for inside jaws, step height, or depth.

File No: PFS-101666-0119D0120-AH-DC-092

Temperature: 68.2°F Humidity: 41.6%

The equipment used in the verification of this instrument has been calibrated and is NIST traceable.
The uncertainty of calibration was estimated at the 95% confidence level, coverage factor (k=2).

Remarks:

This certificate of verification is issued as a statement of fact that on the date of verification the above instrument had an accuracy as indicated and was calibrated to meet the requirements of the manufacturer's specifications. This certificate should not be construed or regarded as a guarantee or warranty of any kind that the instrument will retain the same percentage of accuracy as determined on the date when the verification was performed and reported. Ad-Tek, Inc. hereby expressly disclaims any and all liability for damage or loss by all parties arising or resulting from deterioration, obsolescence, malfunction, subsequent calibration performed by another agency or substandard performance of said instrument.

Service Technician: Alisa Houser Date of Service: January 15, 2019

Technical Manager: Nicole Ostrowski Date Next Due: January 2020

We sincerely appreciate your business and thank you for selecting Advanced Calibration Technologies, Inc. for servicing your equipment.
To reschedule, please call (800) 259-5058. Thank You.

J-2000

owner's manual

DELMHORST®
INSTRUMENT CO.

WHEN ACCURACY IS THE POINT.™

ACCREDITED
A2LA Certificate No. 1750.01
Calibration

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4198-9765787

Traceable® Certificate of Calibration for Hand Held Barometer

Customer :PFS TECO Suite 305 ,11785 SE Highway 212 ,Clackamas ,OR-97015 ,U.S.A.

Instrument Identification:

Model: 4198, S/N: 80531676 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Digital Barometer	D4540001	09 Oct 2018	1000415948
Digital Thermometer	111879345	09 Apr 2019	4000-9377595

Certificate Information:

Technician: 57 Procedure: CAL-32 Cal Date: 29 Aug 2018 Cal Due Date: 29 Aug 2019

Test Conditions: 62.73%RH 23.92°C 1018mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	24.10	24.1	Y	23.51	23.9	Y	22.01	25.01	0.05	>4:1
mb/hPa	551.55	552	Y	551.62	546	Y	544	560	0.62	>4:1
mb/hPa	751.22	744	Y	748.87	746	Y	741	757	0.62	>4:1
mb/hPa	1015.90	1011	Y	1018.22	1017	Y	1010	1026	0.62	>4:1

This certificate indicates Traceability to standards provided by (NIST) National Institute of Standards and Technology and/or a National Standards Laboratory.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement : (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ± U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min=As Left Nominal(Rounded) – Tolerance; Max= As Left Nominal(Rounded) + Tolerance;

Nicol Rodriguez

Nicol Rodriguez, Quality Manager

Aaron Judice

Aaron Judice. Technical Manager

Note :

Maintaining Accuracy:

In our opinion once calibrated your Hand Held Barometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Hand Held Barometer change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 12554 Galveston RD Suite B230 Webster TX USA 77598
Phone 281 482-1714 Fax 281 482-9448 sales@control3.com www.control3.com

Control Company is an ISO/IEC 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by DNV GL, Certificate No. CERT-01805-2006-AQ-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).