509 Fabrications, Inc.

Project # 24-265
Model: Chinook VCV 2.1.5
Type: Catalytic Wood-Fired Room Heater
Original Date: September 10, 2025
Updated Date: January 14, 2026

ASTM E3053 Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel (EPA ATM Dated 01/04/2024)

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Revision History

September 10, 2025 - Original Issue

December 22, 2025 – Made the following revisions at the request of EPA:

- Removed references to pellet heater from CBI report
- Updated tunnel diagram to show correct dimensions and installation configuration of test unit, see page 18.
- Added air setting photos to Run Notes sheets, see Appendix A

January 14, 2026 – Made the following revisions at the request of EPA:

- Added EPA-ALT154 letter to Appendix A
- Updated hyperlink in owner's manual to function properly, see Appendix B

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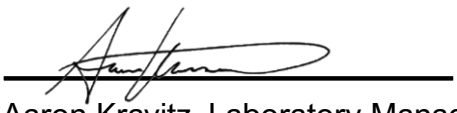
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Affidavit

PFS-TECO was contracted by 509 Fabrications, Inc. to provide testing services for the Chinook VCV 2.1.5 Catalytic Wood-Fired Room Heater per ASTM E3053, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel* and an EPA-issued Alternate Test Method dated January 4, 2024. All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory between 7/16/2025 and 7/18/2025. PFS-TECO's Portland Laboratory is located at 11785 SE Highway 212 – Suite 305, Clackamas, Oregon 97015. Testing procedures followed ASTM E3053 and the EPA ATM. Particulate sampling was performed per ASTM E2515, *Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel.*

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.



Aaron Kravitz, Laboratory Manager

Introduction

509 Fabrications of Post Falls, ID, contracted with PFS-TECO to perform EPA certification testing on the Chinook VCV 2.1.5 Wood-Fired Room Heater. All testing was performed at PFS-TECO's Portland Laboratory. Testing was performed by Mr. Aaron Kravitz.

Notes

- Prior to start of testing, 50 hours of conditioning was performed by the manufacturer at a medium heat setting, per ASTM E3053
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- A separate, independent sample train was utilized to determine 1st hour emissions.
- Four test runs were conducted, two high burns, one low burn, and one medium burn. All runs have been found to be appropriate, no anomalies occurred. See the Run Narrative section for further detail on each run.
- Pall TX-40 filters were used for sample collection, and all filters were weighed in pairs.
- Dilution tunnel temperature never exceeded 104 F during any test run.
- No filter changes were conducted during any test run.

Wood Heater Identification and Testing

- Appliance Tested: ***Chinook VCV 2.1.5***
- Serial Number: ***N/A – Prototype Unit; PFS Tracking #225***
- Manufacturer***: 509 Fabrication, Inc.***
- Catalyst: ***Yes***
- Heat exchange blower: ***Optional***
- Type: **Wood Stove**
- Style: **Free Standing**
- Date Received: **Wednesday, July 24, 2024**
- Testing Period – Start: **Wednesday, July 16, 2025** Finish: **Friday, July 18, 2025**
- Test Location: **PFS-TECO Portland Laboratory, 11785 SE HWY 212 - Suite 305, Clackamas, OR 97015**
- Elevation: **≈131 Feet above sea level**
- Test Technician(s): **Aaron Kravitz**
- Observers: **N/A**

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Aaron Kravitz. All procedures used are directly from ASTM E2779 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
50	Digiweigh DWP12i Platform Scale
129	APEX XC-50-DIR Digital Emissions Sampling Box A
130	APEX XC-50-DIR Digital Emissions Sampling Box B
204	APEX XC-50-DIR Digital Emissions Sampling Box C
55	Apex Ambient Air Sample Box
137	California Analytical ZRE CO2/CO/O2 IR ANALYZER
94	Moisture meter calibration block
95	Anemometer
97	10 lb audit weight
107	Sartorius Analytical Balance
109A/B	Troemner 100mg/200mg Audit Weights
111	Microtector
115	Delmhorst Wood Moisture Meter
190	Mettler 3'x3' floor scale w/digital weight indicator
209	Dewalt Tape Measure
216	Temperature Logger
205	Tunnel Humidity Monitor (S/N 54129)
DT0042934	Gas Analyzer Calibration Span Gas
CC341544	Gas Analyzer Calibration Mid Gas

Barometric pressure data was taken from local National Weather Service station KPDX. As PFS and KPDX are at the same altitude, the correction for altitude per ASTM E2515 6.1.2 is 1:1

Results

The weighted average emissions rate for the 4 run test series was measured to be **1.3 g/hr** with a Higher Heating Value efficiency of **79%.** The average CO emission rate for the 4 tests was **0.63 g/min.** The 509 Fabrications model Chinook VCV 2.1.5 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 #1	Low Fire Test	High Fire Test #2	Medium Fire Test
Date	7/16/2025	7/16/2025	7/18/2025	7/18/2025
Run Number	1	2	3	4
PM Emission Rate (g/hr)	3.16	1.01	2.40	0.82
Burn Rate (kg/hr)	2.48	0.64	2.43	1.25
Heat Output (BTU/hr)	36,400	9,800	36,400	19,000
HHV Efficiency (%)	76%	80%	77%	80%
LHV Efficiency (%)	81%	86%	82%	86%
CO Emissions (g/MJ output)	1.82	1.51	2.04	1.17
CO Emissions (g/kg dry fuel)	27.70	24.10	31.42	18.68
CO Emissions (g/min)	1.17	0.26	1.31	0.39
1st Hour Emission Rate (g/hr)	4.39	4.70	4.06	4.60
Weighting Factor (%)	10%	40%	10%	40%
Weighted particulate emission average of 4 test runs: 1.3 grams per hour.				
Weighted average HHV efficiency of 4 test runs: 79%.				
Average CO emission rate for 4 test runs: 0.63 grams per minute				

Test Run Narrative

Run 1

Run 1 was performed on 7/16/2025 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 59 minutes into the test. Testing was completed when 90% of the test fuel load was consumed. Total test time was 228 minutes, main test fuel load burn time was 169 min. The particulate emissions rate from kindling ignition to test completion was 3.16 g/hr. The burn rate of the test fuel load was 2.48 kg/hr. The main test load portion of the run had an overall HHV efficiency of 76.1%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 2

Run 2 was performed on 7/16/2025 as a low fire test run per ASTM E3053. The overall test duration was 901 minutes. The burn rate for the test run was 0.64 kg/hr. The particulate emissions rate for the test run was 1.01 g/hr. The run had an overall HHV efficiency of 80.0%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 3

Run 3 was performed on 7/18/2025 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 63 minutes into the test. Testing was completed when 90% of the test fuel load was consumed. Total test time was 243 minutes, main test fuel load burn time was 180 min. The particulate emissions rate from kindling ignition to test completion was 2.40 g/hr. The burn rate of the test fuel load was 2.43 kg/hr. The main test load portion of the run had an overall HHV efficiency of 77.1%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 4

Run 4 was performed on 7/18/2025 as a medium fire test run per ASTM E3053. The overall test duration was 473 minutes. The burn rate for the test run was 1.25 kg/hr, therefore the medium fire category requirements were met, less than the mid-point of the average high and low burn rates (1.56 kg/hr). The particulate emissions rate for the test run was 0.82 g/hr. The run had an overall HHV efficiency of 80.2%. 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	72	73	44.8	38.7	29.74	9.67[1]	21.54	23.7%	228[2]
2	72	78	38.7	42.6	29.76	21.54	27.39	20.5%	901
3	76	82	41.3	36.0	29.89	10.60[1]	22.74	22.9%	243[3]
4	82	78	29.7	30.0	29.80	22.74	26.19	20.6%	473

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

[2]Total test time was 228 min, high fire test load burn duration was 169 min.

[3]Total test time was 243 min, high fire test load burn duration was 180 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 (fully open), blower 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 (fully closed) at 15 minutes. Blower off for first 15 min, then set to high.
Run 1	N/A – Cold Start Ignition	Air control set to high fire test setting (fully open), blower set to high
Run 4	Air control set to High Fire Setting in accordance with ASTM E3053	Air control set to medium fire test setting (open 5/16”) at 15 minutes. Blower off for first 15 minutes, then set to high.

Appliance Description

Model(s): Chinook VCV 2.1.5

Appliance Type: Catalytic Wood-Fired Room Heater

Firebox Volume: Total firebox volume is 2.176 ft^3. Usable firebox volume is 2.176 ft^3.

Additional Models: None

Air Introduction System: The VcV 2.1.5 wood stove is equipped with two Variable Choke Venturis (VCVs), one in the primary system, the PVcV, and one in the secondary system, the 2VcV. Both are operated by the draft in the chimney generated by the fire, but function differently. The 2VcV is always operating and has a disc that "floats" up in down on a rod in the tapered bore of the 2VcV. As the fire in the stove increases in intensity, that increases the draft in the chimney, which then lifts the 2VcV disc farther up off the bottom stop which allows more secondary air to enter the stove.

Combustion Control: A control slide located under the firebox regulates combustion air intake. This airflow effectively bypasses the VCV system.

Baffles: A 16" x 16" x 0.5" C Cast panel rests on top of the secondary air tubes.

Refractory Insulation: The firebox is lined with 1.25" thick firebrick.

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

Catalytic Combustor: An Applied Ceramics ceramic-substrate catalyst is installed in the flue gas stream at the top of the firebox. The catalyst is 13" x 2.5" x 2.125" thick. A catalyst bypass plate is installed behind the catalyst, it is actuated by a handle at the top right of the unit. A catalyst temperature probe is installed less that 1" behind the catalyst.

Fan: The Chinook VCV is available with a convection fan that attached to the lower rear of the appliance.

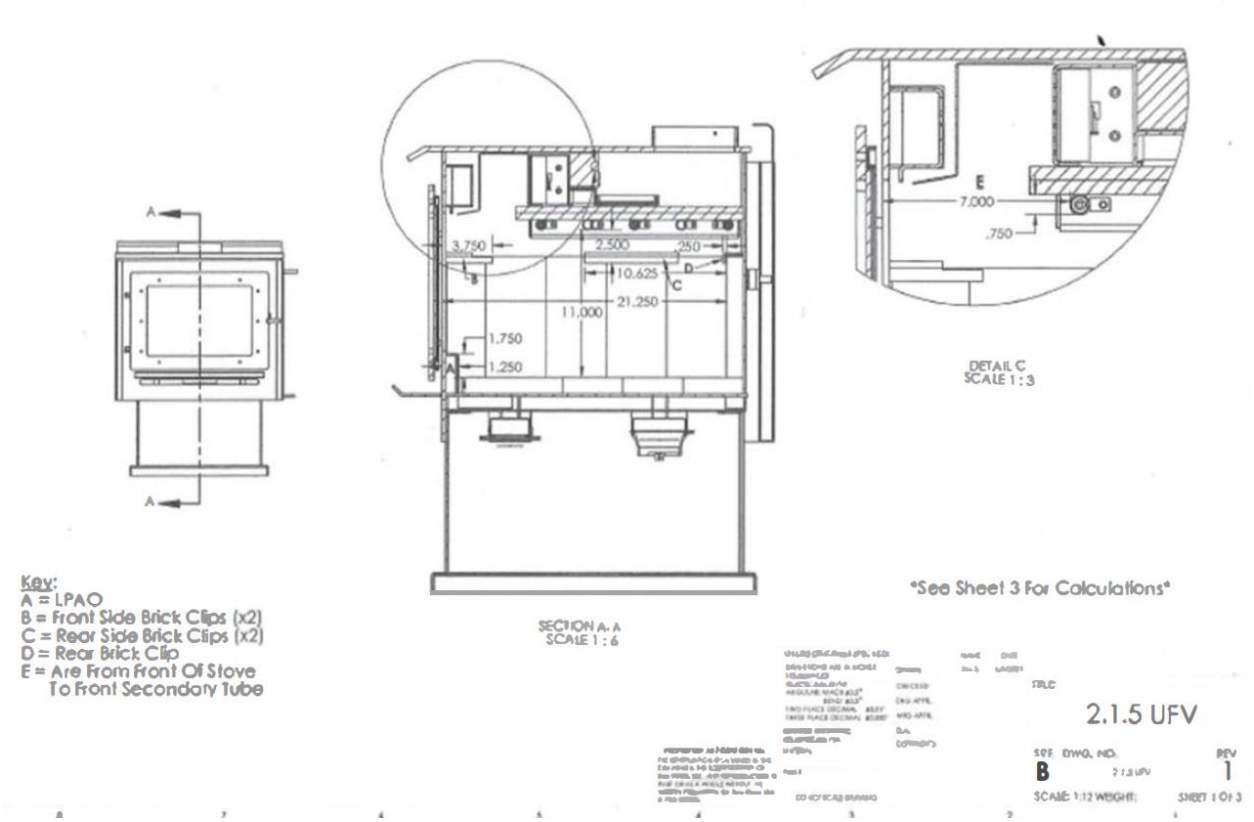
Appliance Dimensions

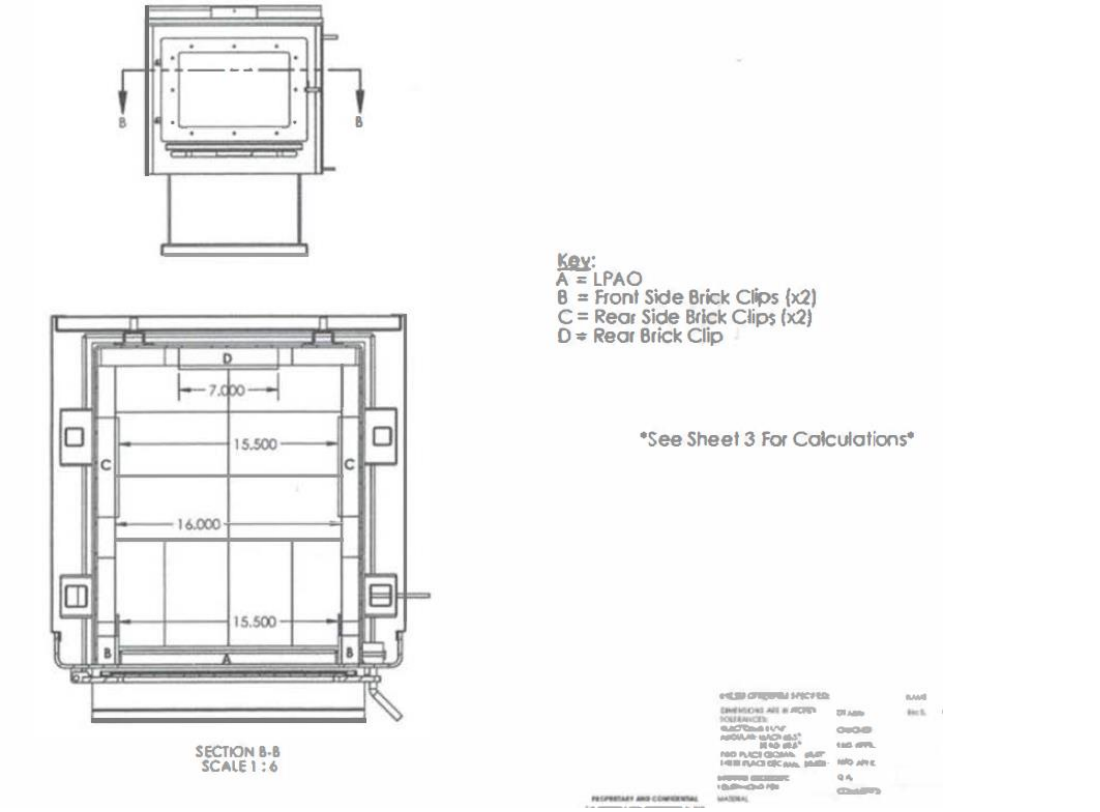
Chinook VCV 2.1.5 Dimensions

Height	Width	Depth
35"	26"	25"

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

Firebox Volume Drawing





2.1.5 UFV Calculations

21.250 (d) x 16.00 (w) x 11.00 (h) = 3740.00 cu. in.

E = 7.00 (d) x 16.00 (w) x 0.75 (h) = 84.00 cu. in.

Less:

A - 1.25 (d) x 16.00 (w) x 1.75 (h) = 35.00 cu. in.

B - (3.75(d) x 0.25 (w) x 4.00 (h))2 = 7.50 cu. in

C - (10.625 (d) x 0.25 (w) x 2.50 (h))2 = 13.281 cu. in.

D - 0.25 (d) x 7.00 (w) x 2.50 (h) = 4.375 cu. in.

3740.00 + 84.00 = 3824.00 cu. in.

35.00 + 7.50 + 13.281 + 4.375 = 63.156 cu. in.

3824.00 - 63.156 = 3760.844 cu. in

3760.844/1728= 2.176 cu. ft.

UFV = 2.176 cu. ft.

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 & Startup Load



Typical High Fire Load



Typical Low/Medium Fire Load



Sample Collection

Verified – Yes:☒ No:☐ (if No Explain)

ASTM E2515-11

Four separate, complete particulate sampling trains were used for each run. Filter face velocity at no time exceeded 150mm/sec during any test run. The dry gas meters were calibrated for the flow rates encountered during the test runs.

The 47mm filter holder assemblies consist of an aluminum front housing and polycarbonate rear housing, with the rear housing located 75mm downstream from the front housing. The front filter support frit is stainless steel.

Probe assemblies are constructed from 316 grade stainless steel tubing with an outside diameter or 6.35mm and 310mm length.

A type K thermocouple filter temperature monitor probe is installed behind the front filter housing with its tip directly exposed to the sample gas.

Sample gas drying systems are located prior to each metering system and include temperature sensors.

The metering systems include vacuum gauges, leak-free diaphragm-type pumps, and type K thermocouple temperature sensors. The gas meters have a resolution of 0.001 cubic feet.

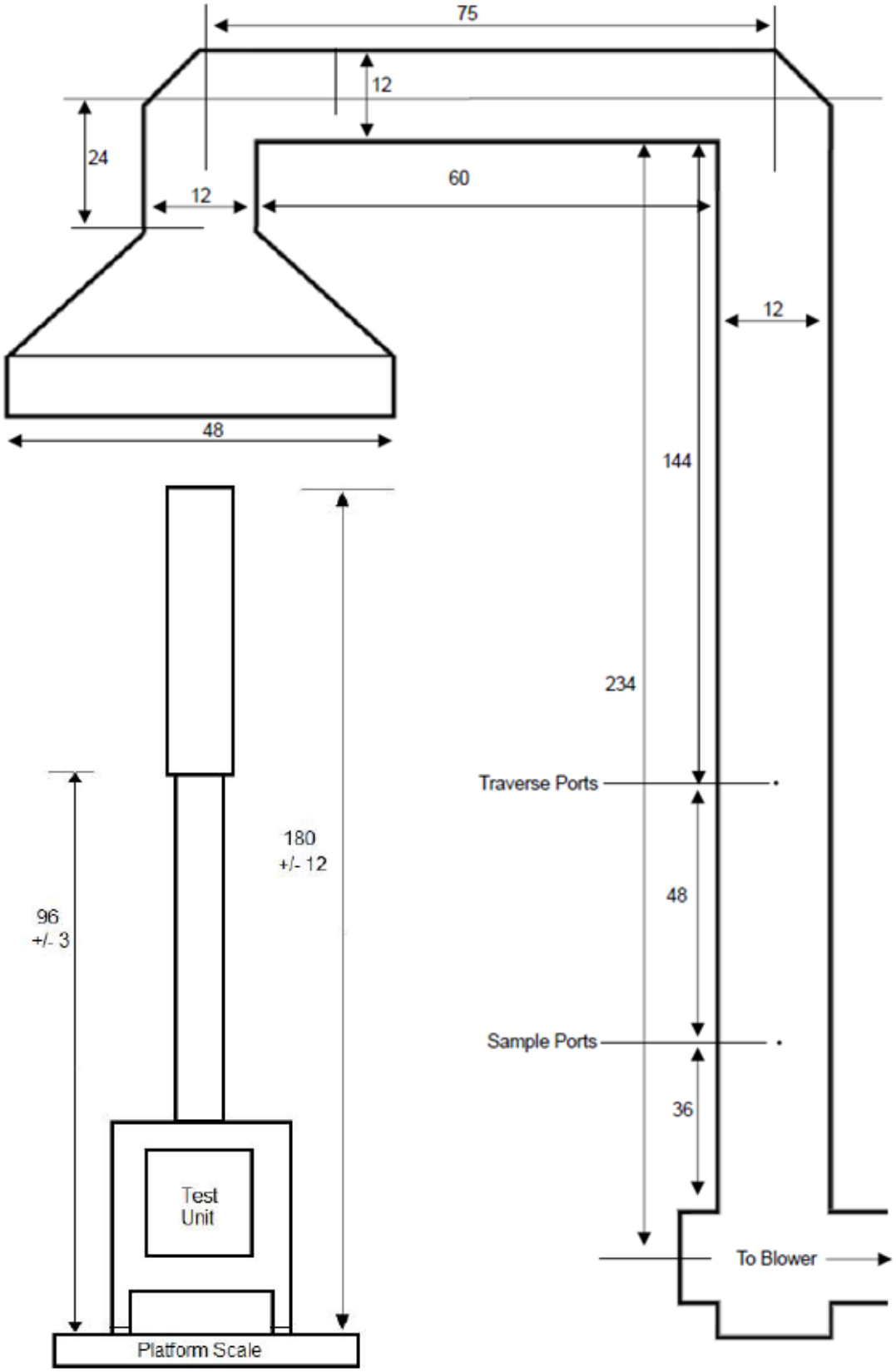
Barometric pressure data was taken from local National Weather Service station KPDX. As PFS and KPDX are at the same altitude, the correction for altitude per ASTM E2515-11 6.1.2 is 1:1.

Dilution tunnel temperature was measured by a type K thermocouple probe.

Dilution tunnel velocity was measured prior to each run by performing a velocity traverse and monitored throughout each run by measuring pitot pressure at the tunnel centroid. Traverses were performed using a Dwyer Model 1430 Microtector in accordance with the instrument owners' manual. This includes leveling and zeroing the instrument prior to each use and performing pre- and post-test leak checks on the pitot tubing.

To monitor and log centroid pitot pressure, the pressure transducer of an Apex Instruments XC-60-DIR sample box was used. Both pieces of equipment offer precision in excess of the +/- 0.001" specified in section 6.1.5 of ASTM E2515-11, and are therefore suitable for use with flows under 800 ft/min. Both pieces of equipment are plumbed to the same pitot tube, which is in accordance with the design shown in Appendix X2 of ASTM E2515-11.

The dilution tunnel is constructed in accordance with the requirements of ASTM E2515-11, as shown below:



Booth #2 Tunnel Schematic

All dimensions are in inches

Sample ports are located 16 feet downstream from any disturbances and 3 feet upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 4 feet upstream from any disturbances. (See below). Flow is induced and maintained by a centrifugal-type blower.

Test facility temperature is monitored by a type T thermocouple probe, located in a 150mm long, 50mm diameter pipe shield located in the 90-degree arc in front of the test unit, between 1-2m away, and in the horizontal plane of the test unit air intake.

Test facility airflow was measured with an anemometer capable of measuring velocities less than 20 ft/min located within 2 feet of the appliance.

Reagents and Standards

Verified – Yes:☒ No:☐ (if No Explain)

Pall Type A/E Glass fiber 47mm filters having at least 99.95% efficiency at 0.3-micron particles were used.

Test samples were conditioned in an airtight desiccator containing calcium sulfate desiccant, with specific humidity of less than 0.005 g/liter prior to and after the testing.

Acetone was used to clean probe assemblies both prior to pretest desiccation and prior to post-test desiccation.

Calibration and Standardization

Verified – Yes:☒ No:☐ (if No Explain)

The gas metering system is calibrated every six months traceable to NIST and demonstrating an uncertainty of +/- 0.75% of the measured volume. Calibration flow rate range is from 0.05 to 0.30 scfm.

All thermocouples discussed in this report are calibrated traceable to NIST every six months. Both Type T (ambient) and Type K (all others) TCs are monitored by the same piece of equipment, a National Instruments 9213.

The analytical balance has a resolution of 0.1mg and is calibrated traceable to NIST every six months. Before each test and before each weighing of samples (both for tare and final analysis), the balance is audited with a calibrated 200mg weight.

All other measurement equipment used for this test is calibrated traceable to NIST at an appropriate interval. See Appendix C for all calibration records.

Procedures

Verified – Yes:☒ No:☐ (if No Explain)

The following procedures were performed and/or observed prior to testing:

- The dilution tunnel was cleaned with an appropriately sized steel brush.

- Induced draft was evaluated by measuring flue static pressure with the dilution tunnel blower operating and no fire in the appliance. No induced static pressure was observed (all readings <0.005" H2O) in any appliance door/air damper configuration.

- Smoke capture was evaluated by operating the appliance at a high burn rate and visually monitoring smoke collection by the hood. No less than 100% smoke collection was observed at the minimum tunnel flow rate.

Prior to ignition for each run, a velocity traverse was conducted to determine dilution tunnel velocity. Traverse points were determined in accordance with Figures 5 and 6 of ASTM E2515-11, which for a 6" diameter tunnel are 0.5" and 1.5" from either side of the duct, on two axes located at 90^0 from each other. Velocity calculated in accordance with section 9.3.2, excluding center readings. The pitot tube was placed in the center of the tunnel for the duration of each test run.

Prior to tare analysis, probes were cleaned with acetone, O-rings cleaned of any residue, and filters were visually check for pinhole leaks or irregularities. Filters, O-rings, and probes were desiccated at 20+/-5C for at least 24 hours and weighed at intervals of not less than 6 hours until constant weight was attained. Filters and O-rings were both weighed in pairs.

Tared samples were assembled into three dual filter holder assemblies (A, B, and first hour) and the single ambient filter assembly. Blunt tweezers and surgical gloves were used to avoid damage or contamination of the samples. The three dual filter assemblies were inserted to the appropriate depth in the tunnel (within the 2" diameter centroid, no closer than 1" apart). The ambient filter holder was installed within 10' of the centroid of the dilution tunnel inlet hood, in the same plane and the hood inlet.

Leak checks were performed on sampling systems as follows:

- Leak checks were performed on the pitot tube lines before and after each test run by applying a pressure differential of at least 3" H2O and sealing the pitot tube opening. Pressure remained stable for at least 15 seconds all checks of both the pressure and suction sides, confirming that no leaks were present.

- All four sampling trains were leak-checked before and after each test run. Pre-test leak checks were conducted at the vacuum level corresponding to each sample pump's flow setting, in accordance with Note 5 of ASTM E2515-11. Post-test checks were conducted at the highest vacuum level encountered during the test, or the pre-test vacuum level, whichever was greater. Of the leak rate limits (0.01 cfm or 4% of sample rate), 4% of the sample rate is lower, and at no point was the measured leakage rate greater than this.

- The portion of the sampling trains from the pumps to the dry gas meters (that is, the positive pressure section of the metering system) was leak checked semiannually during calibration. This check was performed by closing the main inlet valve and pressurizing the outlet of the dry gas meter to at least 7” H2O, and ensuring the pressure remained stable for at least 1 minute.

Sampling began at the start of each test run as defined by the applicable procedure and continued until the defined end of the test run. Readings were collected at 1-minute intervals. During all test runs, the following conditions were maintained:

- Test facility temperature was between 55 and 90 F.
- Air velocities were less than 50ft/min within 2ft of the appliance
- Filter holder temperatures were no greater than 90 F.
- Sample flow rates were maintained within 10% of the initial proportionality ratio.
- Ambient sample flow rate maintained within 20% of the initial flow rate.

Following each test run and its associated leak checks, samples were recovered by disassembling the filter holder components and replacing them in the desiccator. The outside of the probes was cleaned with acetone prior to desiccation.

Sample weights were determined using the same analytical balance and procedures used for tare weights. Filters, O-rings, and probes were desiccated at 20+/-5C for at least 24 hours and weighed at intervals of not less than 6 hours until constant weight was attained. Filters and O-rings were both weighed in pairs. Components were not exposed to laboratory atmosphere for more than 2 minutes per weighing.

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: 6512 W. Seltice Way, Post Falls, ID 83854 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, and Sample Analysis (Non-CBI p. 25)

Appendix B – Labels and Manuals (Non-CBI p. 313)

Appendix C –Equipment Calibration Records (Non-CBI p. 348)

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

Appendix A:

Test Run Data, Conditioning Data, Sample Calculations , Efficiency Data

WOOD HEATER TESTING SUMMARY

SECTION 1 – Model Identification	
Model Name(s)/Number(s)	Chinook VCV 2.1.5
Manufacturer	509 Fabrications, Inc.
Address 1	6512 W. Seltice Way
Address 2	Post Falls, ID 83854
Appliance Category(s) (Free-standing, Insert, etc.)	Free-Standing
Usable Firebox Volume - ft^3	2.18
Catalytic/Non-Cat	Catalytic
Convection Air Fan (No, Standard, Optional)	Standard
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	7/16-18/2025
Test Methods/Standards	ASTM E3053 (ALT-125), ASTM E2515
Dilution Tunnel Inside Diameter - in.	6.00
Filter Diameter - mm	47
Filter Material	Pall Type TX40

SECTION 2 – Test Conditions Summary

Test Run #	1	2	3	4
Date Tested	7/16/2025	7/16/2025	7/18/2025	7/18/2025
Test Run Category (L, M, H)	High Fire	Low Fire	High Fire	Medium Fire
Average Barometric Pressure - in Hg	29.74	29.76	29.89	29.80
Max. Observed Ambient Temp - °F	73	79	83	83
Min. Observed Ambient Temp - °F	66	72	76	78
Max. Observed Filter Temp - °F	86	90	86	89
Test Fuel Load				
Cordwood Fuel Species	Maple, Hard	Maple, Hard	Maple, Hard	Maple, Hard
Specific Gravity (from Table 1)	0.53	0.53	0.53	0.53
Higher Heating Value - Btu/lb (from Annex A1)	8587	8587	8587	8587
Nom. Test Fuel Load Piece Length - in.	18	18	18	18
Number of Test Fuel Pieces	4	5	4	5
Test Fuel Weight				
Kindling - As Fired lb	4.28	N/A	4.30	N/A
Kindling Wt. - As % of Test Fuel Load	20%	N/A	19%	N/A
Kindling Moisture - % DB	10%	N/A	10%	N/A
Kindling - kg DB	1.76	N/A	1.77	N/A
SU Fuel - As Fired lb	5.39	N/A	630%	N/A
SU Fuel Wt. - As % of Test Fuel Load	25%	N/A	28%	N/A
SU Fuel Moisture - % DB	21%	N/A	20%	N/A
SU Fuel - kg DB	2.02	N/A	2.38	N/A
Test Fuel Load - As Fired lb	21.54	27.39	22.74	26.19
Ave. Test Fuel Load MC % DB	23.7%	20.5%	22.9%	20.6%
Test Fuel Load - kg DB	7.90	10.31	8.40	9.85
Test Fuel Loading Density - lb/ft3	9.88	12.59	10.43	12.01
Residual SU Fuel Wt. - As Fired lb	2.35	N/A	245%	N/A
Residual SU Fuel Wt. - As % of Test Fuel Load	11%	N/A	11%	N/A
Test Run Duration - minutes	228	901	243	473
Test Run Duration - h	3.80	15.02	4.05	7.88
Run Duration of High Fire Load Only - minutes	169	N/A	180	N/A
Run Duration of High Fire Load Only - h	2.82	N/A	3.00	N/A
Test Fuel Load Wt. at End of Test - As Fired lb	2.0	1.49	2.45	0
Total Fuel Burned - kg DB	9.71	9.63	10.32	9.85
% Test Fuel Load Wt. at End of Test	9.3%	5.4%	10.8%	0.0%

SECTION 3 – Test Run Results Summary

Test Run #	1	2	3	4
Date Tested	7/16/25	7/16/25	7/18/25	7/18/25
Test Run Category	High Fire	Low Fire	High Fire	Medium Fire
Burn Rate - kg/h DB	2.48	0.64	2.43	1.25
Heat Output - Btu/h	36,414	9,765	36,399	18,975
Average Dilution Tunnel Flow Rate - dscfm	887.18	886.13	884.51	883.99
Average Sample Flow Rates - dscfm				
Train 1	0.147	0.152	0.148	0.150
Train 2	0.146	0.151	0.154	0.154
Total PM Emissions - g				
Train 1	12.63	14.82	9.65	6.87
Train 2	11.38	15.50	9.81	6.09
Average	12.003	15.159	9.729	6.483
PM Emission Train Precision - %	5.2%	2.3%	0.8%	6.0%
PM Emission Train Precision - g/kg	0.06	0.04	0.01	0.04
PM Emission Rate - g/h	3.16	1.01	2.40	0.82
Total CO Emissions - g	197	233	235	184.1
CO Emissions Rate - g/h	70	16	78	23
Overall Efficiency - CSA B415.1-10				
% HHV Basis	76%	80%	77%	80%
% LHV Basis	81%	86%	82%	86%

SECTION 4 - Weighted Average Summary

Test Run Category	High Fire	Low Fire	Medium Fire
Burn Rate - kg/h DB	2.46	0.64	1.25
PM Emission Rate - g/h	2.78	1.01	0.82
CO Emissions Rate - g/h	74.1	15.5	23.3
Overall Efficiency - CSA B415.1-10			
% HHV Basis	77%	80%	80%
% LHV Basis	82%	86%	86%
Heat Output - Btu/h	36400	9800	19000
Category Weighting	20%	40%	40%

ASTM E 3053 Weighted Averages			
PM Emission Rate - g/h	1.3		
CO Emissions Rate - g/h (Arithmetic Average)	37.7		
CO Emissions Rate - g/min (Arithmetic Average)	0.63		
Overall Efficiency - CSA B415.1-10			
% HHV Basis	79%		
% LHV Basis	85%		
Heat Output Range - Btu/h	9800	to	36400

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 1 Data Summary

Client:	509 Fabrication
Model:	VCV
Job #:	24-282
Tracking #:	225
Test Date:	7/16/2025

Techician Signature

9/4/2025
Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

Burn Rate (kg/hr):	2.48

	Ambient Sample	Sample Train A	Sample Train B	Sample Train C - 1st Hour
Total Sample Volume (ft^3)	52.486	33.416	33.249	8.831
Average Gas Velocity in Dilution Tunnel (ft/sec)	19.95			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	53230.9			
Average Gas Meter Temperature (°F)	70.7	90.7	91.3	82.9
Total Sample Volume (dscf)	52.506	32.034	32.001	8.497
Average Tunnel Temperature (°F)	84.9			
Total Time of Test (min)	228			
Total Particulate Catch (mg)	0.0	2.0	1.8	0.7
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000624	0.0000562	0.0000824
Total PM Emissions (g)	0.00	12.63	11.38	4.39
Particulate Emission Rate (g/hr)	0.00	3.32	2.99	4.39
Emissions Factor (g/kg)	-	1.30	1.17	-
Difference from Average Total Particulate Emissions (g)	-	0.63	0.63	-
Difference from Average Total Particulate Emissions (%)	-	5.2%	5.2%	-
Difference from Average Emissions Factor (g/kg)	-	0.06	0.06	-

Final Average Results	
Total Particulate Emissions (g)	12.00
Particulate Emission Rate (g/hr)	3.16
Emissions Factor (g/kg)	1.24
HHV Efficiency (%)	76.1%
LHV Efficiency (%)	81.4%
CO Emissions (g/min)	1.17

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: 80.7/Max: 86.2	OK
Face Velocity	< 30 ft/min	8.5	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:65.6/Max:73.4	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	All but 1 reading between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	509 Fabrication
Model:	VCV
Date:	07/16/25
Run:	1
Control #:	24-282
Test Duration:	169
Output Category:	High

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	76.1%	81.4%
Combustion Efficiency	98.2%	98.2%
Heat Transfer Efficiency	77.5%	82.9%

Output Rate (kJ/h)	38,387	36,414	**(Btu/h)**
Burn Rate (kg/h)	2.53	5.57	**(lb/h)**
Input (kJ/h)	50,414	47,823	**(Btu/h)**

Test Load Weight (dry kg)	7.11	15.68	**dry lb**
MC wet (%)	19.13		
MC dry (%)	23.66		
Particulate (g)	12.00		
CO (g)	197		
Test Duration (h)	2.82		

Emissions	**Particulate**	**CO**
g/MJ Output	0.11	1.82
g/kg Dry Fuel	1.69	27.70
g/h	4.26	69.96
g/min	0.07	1.17
lb/MM Btu Output	0.26	4.24

Air/Fuel Ratio (A/F)	11.12

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

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: 509 Fabrication
Job #: 24-282
Model: VCV
Tracking #: 225
Run #: 1
Technician: AK
Date: 7/16/2025

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.18		
Target Load Weight (lbs):	21.80		
Total Load Weight Range (lbs):	20.70	to	22.90
Core Load Weight Range (lbs):	9.80	to	14.20
Remainder Load Weight Range (lbs):	7.60	to	12.00
Core Load Piece Range (lbs):	3.30	to	5.50
Remainder Load Piece Range (lbs):	2.20	to	12.00
Max Allowable Kindling Weight (lbs):	4.31		
Max Allowable Start-up Fuel Weight (lbs):	6.46		

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	18.00	3.47	In Range	19.3	25.2	25.7	23.4	In Range	2.81	1.28
2	17.96	4.93	In Range	25.6	24.4	20.4	23.5	In Range	3.99	1.81
3	18.00	5.11	In Range	24.2	24.9	19.4	22.8	In Range	4.16	1.89
Core Load Wt. (lbs)		13.51	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	18.00	8.03	In Range	23.4	24.5	25.4	24.4	In Range	6.45	2.93
2			NA				NA	NA	NA	NA
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		8.03	In Range							

Total Load Weight (lbs):	21.54	In Range	
Core Load % of Total Weight:	63%	In Range	45-65%
Remainder % of Total Weight:	37%	In Range	35-55%
Total Load % of Target Weight:	99%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	9.9		
Total Load Average Moisture Content (%DB):	23.7	In Range	19-25%
Total Load Average Moisture Content (%WB):	19.1		
Total Test Load Weight (dry basis):	17.42 lbs	7.90 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
4.28	In Range	10	10	10	10.0	In Range	3.89	1.76

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
5.39	In Range	23.7	19.4	19.6	20.9	In Range	4.46	2.02

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.2	to	4.3	
Actual Residual Start-up Fuel Weight (lb):		2.35		In Range

TEST END POINT

High Fire Test Run End Point Range:	1.9	to	2.4	lb
Actual Fuel Load Ending Weight (lb):		2.00		In Range

Total Weight All Fuel Added: 31.21 lbs, wet basis
25.77 lbs, dry basis
11.69 kg, dry basis

Total Weight All Fuel Burned (dry basis): 21.42 lbs
9.71 kg

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	1	Technician:	AK
Test Start Time:	4:56	Date:	7/16/2025
Test Type:	High Fire		

Recording Interval (min):	1
Total Sampling Time (min):	228
High Fire Test Load Time (min):	59

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.73	29.75	29.74
Relative Humidity (%)	44.8	38.7	
Room Air Velocity (ft/min)	<50	<50	
Platform Scale Audit (lbs)	10.0	10.0	
Fuel Scale Audit (lbs)	10.00	10.00	
Ambient Sample Volume:		52.486	ft^3

Meter Box γ Factor:	1.004 (A)
Meter Box γ Factor:	1.009 (B)
Meter Box γ Factor:	0.997 (C)
Meter Box γ Factor:	1.012 (Ambient)
Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100
Date Flue Pipe Last Cleaned:	7/13/2025

Sample Train Post-Test Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-6 in. Hg
(B)	0.000	0.000	cfm @	-6 in. Hg
(C)	0.000	0.000	cfm @	-6 in. Hg
(Ambient)	0.000	0.000	cfm @	-13 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.073	82
2	0.096	82
3	0.103	82
4	0.102	82
5	0.091	82
6	0.057	82
7	0.062	82
8	0.088	82
9	0.101	82
10	0.106	82
11	0.099	82
12	0.061	82
Center	0.107	82

Static Pressure: -0.156 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	12	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:	0.7854	ft^2
V_{strav}:	19.71	ft/sec
V_{scent}:	22.04	ft/sec
F_p:	0.895	[ratio]
Initial Tunnel Flow:	881.1	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, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Int. West)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Int. 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
	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 Long Leaf	52.60	7.02	40.10	1.30	22.30	9594

WOODSTOVE PREBURN DATA

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

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

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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	-0.061		0.109	0.01	78.0	-0.33		10.24		74.5	75.2	81.1	72.0
1	0.064	0.125	0.109	0.98	78.6	-1.12	-	11.03	0.79	75.6	149.4	80.7	71.1
2	0.212	0.148	0.109	0.94	78.8	-1.05	-	9.76	-1.27	80.4	371.9	81.3	69.8
3	0.359	0.147	0.110	0.95	78.8	-0.99	-	9.70	-0.06	80.7	393.4	81.8	69.6
4	0.504	0.145	0.111	0.94	79.1	-0.94	-	9.57	-0.13	79.3	351.8	83.0	69.3
5	0.648	0.144	0.109	0.93	79.3	-1.04	-	9.45	-0.12	79.1	341.2	83.7	69.3
6	0.794	0.146	0.108	0.92	79.4	-1.01	-	9.31	-0.14	79.2	346.3	84.5	68.8
7	0.937	0.143	0.109	0.92	79.6	-1.05	-	9.16	-0.15	79.5	354.4	84.7	68.7
8	1.080	0.143	0.109	0.91	79.8	-0.92	-	9.00	-0.16	79.8	371.5	85.1	68.0
9	1.222	0.142	0.109	0.92	79.8	-0.99	-	8.88	-0.12	79.9	378.7	84.0	68.4
10	1.366	0.144	0.110	0.91	80.0	-1.01	99	8.73	-0.15	80.1	384.6	83.4	68.2
11	1.508	0.142	0.109	0.90	80.5	-1.09	-	8.63	-0.10	80.3	391.1	82.7	68.1
12	1.650	0.142	0.110	0.90	80.5	-1.09	-	8.51	-0.12	80.5	393.0	82.4	67.4
13	1.791	0.141	0.112	0.91	80.8	-1.09	-	8.39	-0.12	80.7	394.2	82.9	67.5
14	1.932	0.141	0.110	0.90	80.9	-1.14	-	8.27	-0.12	81.0	405.3	83.3	67.4
15	2.073	0.141	0.110	0.90	81.1	-1.01	-	8.08	-0.19	81.4	418.0	84.0	67.1
16	2.214	0.141	0.107	0.90	81.2	-1.12	-	7.91	-0.17	81.9	431.1	84.9	67.3
17	2.355	0.141	0.110	0.89	81.6	-1.14	-	7.73	-0.18	82.4	439.2	85.0	67.3
18	2.498	0.143	0.109	0.88	81.7	-1.23	-	7.54	-0.19	82.8	448.7	85.6	67.2
19	2.641	0.143	0.109	0.90	82.0	-1.24	-	7.35	-0.19	83.2	459.4	84.7	67.3
20	2.781	0.140	0.108	0.88	82.0	-1.25	98	7.18	-0.17	83.3	457.1	83.3	67.4
21	2.921	0.140	0.110	0.88	82.4	-1.28	-	7.00	-0.18	83.6	461.9	83.6	67.2
22	3.064	0.143	0.108	0.89	82.6	-1.28	-	6.82	-0.18	84.0	463.9	83.6	67.0
23	3.204	0.140	0.111	0.89	82.6	-1.26	-	6.63	-0.19	84.0	472.1	83.7	67.4
24	3.343	0.139	0.107	0.88	83.1	-1.20	-	6.42	-0.21	84.4	472.4	84.4	67.5
25	3.484	0.141	0.110	0.89	83.6	-1.36	-	6.26	-0.16	84.9	470.6	84.8	67.6
26	3.626	0.142	0.110	0.90	83.4	-1.28	-	6.10	-0.16	85.1	473.7	84.9	67.4
27	3.763	0.137	0.111	0.88	83.9	-1.41	-	5.93	-0.17	85.4	474.6	84.4	67.3
28	3.903	0.140	0.107	0.88	83.8	-1.38	-	5.77	-0.16	85.5	477.6	82.8	67.3
29	4.045	0.142	0.109	0.87	83.9	-1.45	-	5.62	-0.15	85.3	475.1	83.3	67.5
30	4.185	0.140	0.109	0.89	84.3	-1.39	97	5.45	-0.17	85.7	476.5	82.6	67.2
31	4.327	0.142	0.110	0.87	84.3	-1.37	-	5.32	-0.13	85.9	484.3	83.0	67.2
32	4.468	0.141	0.109	0.88	84.7	-1.43	-	5.15	-0.17	86.0	481.7	83.4	66.8
33	4.608	0.140	0.110	0.88	84.9	-1.49	-	4.97	-0.18	85.8	479.3	85.3	66.7

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
34	4.747	0.139	0.111	0.88	85.0	-1.39	-	4.85	-0.12	85.2	478.6	85.2	67.0
35	4.887	0.140	0.107	0.88	85.1	-1.48	-	4.70	-0.15	85.6	478.8	84.4	67.0
36	5.029	0.142	0.110	0.89	85.5	-1.49	-	4.53	-0.17	85.7	485.9	83.7	66.7
37	5.168	0.139	0.110	0.88	85.5	-1.44	-	4.36	-0.17	85.9	487.0	83.0	66.4
38	5.308	0.140	0.110	0.87	85.5	-1.53	-	4.20	-0.16	86.5	483.9	83.0	66.6
39	5.447	0.139	0.110	0.88	85.9	-1.54	-	4.07	-0.13	86.3	483.1	83.2	67.1
40	5.586	0.139	0.110	0.88	85.9	-1.58	96	3.93	-0.14	86.1	478.8	83.8	66.5
41	5.729	0.143	0.109	0.97	86.0	-1.68	-	3.80	-0.13	86.5	476.8	84.1	66.6
42	5.879	0.150	0.108	0.98	86.4	-1.62	-	3.68	-0.12	86.7	471.3	84.5	66.5
43	6.028	0.149	0.107	0.97	86.4	-1.64	-	3.56	-0.12	86.4	469.2	85.5	66.3
44	6.181	0.153	0.110	0.97	86.7	-1.59	-	3.44	-0.12	86.4	470.1	84.9	66.4
45	6.330	0.149	0.107	0.98	86.5	-1.68	-	3.33	-0.11	86.6	466.8	85.0	66.4
46	6.480	0.150	0.109	0.98	86.9	-1.67	-	3.23	-0.10	86.5	466.5	84.3	66.4
47	6.629	0.149	0.111	0.98	87.0	-1.67	-	3.12	-0.11	86.5	461.0	83.6	66.4
48	6.778	0.149	0.110	0.98	86.9	-1.76	-	3.04	-0.08	86.4	456.4	83.7	66.2
49	6.925	0.147	0.110	0.99	87.1	-1.78	-	2.94	-0.10	86.3	454.3	82.8	66.1
50	7.074	0.149	0.109	0.97	87.6	-1.80	102	2.85	-0.09	85.7	453.4	83.0	66.0
51	7.223	0.149	0.110	0.97	87.4	-1.72	-	2.80	-0.05	85.7	448.6	83.3	66.3
52	7.372	0.149	0.109	0.97	87.5	-1.79	-	2.69	-0.11	85.6	444.7	84.5	65.9
53	7.524	0.152	0.108	0.97	87.7	-1.72	-	2.63	-0.06	84.9	441.9	84.2	66.4
54	7.673	0.149	0.111	0.96	87.6	-1.76	-	2.58	-0.05	84.0	439.6	84.6	66.4
55	7.823	0.150	0.111	0.96	87.6	-1.79	-	2.52	-0.06	84.1	437.4	85.9	66.7
56	7.972	0.149	0.110	0.98	88.1	-1.86	-	2.46	-0.06	84.2	431.9	84.9	66.5
57	8.121	0.149	0.111	0.99	88.3	-1.92	-	2.39	-0.07	84.3	431.0	84.0	66.4
58	8.271	0.150	0.109	0.96	88.1	-1.92	-	2.35	-0.04	84.1	429.2	83.0	66.5
59	8.420	0.149	0.110	0.97	88.3	-1.92	-	23.79	21.44	89.8	443.5	83.4	66.4
60	8.571	0.151	0.110	0.98	88.5	-1.93	103	23.66	-0.13	86.7	421.3	82.5	66.4
61	8.722	0.151	0.110	0.99	88.3	-1.83	-	23.55	-0.11	86.2	441.1	82.7	66.1
62	8.870	0.148	0.110	1.00	88.7	-1.94	-	23.45	-0.10	85.1	446.9	82.7	66.1
63	9.020	0.150	0.110	0.99	88.8	-1.85	-	23.37	-0.08	84.3	443.2	83.5	66.0
64	9.172	0.152	0.110	1.01	88.6	-1.99	-	23.29	-0.08	83.9	433.8	83.7	66.1
65	9.326	0.154	0.110	0.98	88.8	-1.98	-	23.17	-0.12	83.8	424.0	84.5	66.2
66	9.477	0.151	0.111	1.00	88.5	-1.94	-	23.07	-0.10	83.4	413.3	84.5	65.8
67	9.629	0.152	0.109	0.99	88.9	-1.93	-	23.00	-0.07	83.4	403.1	84.2	65.9

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
68	9.780	0.151	0.109	1.00	88.8	-2.05	-	22.89	-0.11	83.7	394.9	83.8	66.3
69	9.930	0.150	0.109	0.99	88.8	-1.94	-	22.80	-0.09	83.4	395.2	83.4	65.6
70	10.081	0.151	0.110	0.99	89.3	-2.03	103	22.74	-0.06	82.9	386.0	84.0	65.9
71	10.232	0.151	0.110	0.99	89.2	-1.99	-	22.65	-0.09	82.5	374.1	83.7	66.4
72	10.384	0.152	0.109	0.99	89.4	-2.12	-	22.57	-0.08	82.3	363.8	85.3	66.8
73	10.535	0.151	0.110	1.00	89.6	-2.04	-	22.47	-0.10	82.2	360.1	85.5	67.3
74	10.683	0.148	0.108	0.99	89.4	-2.11	-	22.37	-0.10	82.2	358.5	85.5	67.7
75	10.834	0.151	0.111	0.99	89.9	-2.11	-	22.27	-0.10	82.3	361.6	84.8	67.9
76	10.985	0.151	0.110	0.99	90.0	-2.07	-	22.15	-0.12	82.4	363.4	84.0	68.1
77	11.135	0.150	0.110	0.99	90.2	-2.08	-	22.04	-0.11	82.5	364.7	82.7	68.4
78	11.289	0.154	0.111	0.99	90.3	-1.99	-	21.93	-0.11	82.6	371.1	82.9	68.7
79	11.440	0.151	0.109	0.99	90.3	-2.10	-	21.82	-0.11	82.8	377.6	83.8	68.9
80	11.591	0.151	0.110	0.98	90.4	-2.07	103	21.71	-0.11	82.9	380.4	84.2	69.2
81	11.742	0.151	0.109	0.97	90.4	-2.01	-	21.61	-0.10	83.0	386.8	84.7	69.4
82	11.893	0.151	0.110	0.98	90.5	-2.05	-	21.49	-0.12	83.1	388.0	85.3	69.6
83	12.043	0.150	0.109	0.99	90.6	-2.10	-	21.38	-0.11	83.2	389.6	84.9	69.8
84	12.193	0.150	0.108	1.00	90.9	-2.04	-	21.26	-0.12	83.2	392.0	84.5	69.9
85	12.343	0.150	0.108	0.98	90.9	-2.04	-	21.15	-0.11	83.4	395.5	83.6	70.1
86	12.491	0.148	0.109	0.99	90.9	-2.00	-	21.03	-0.12	83.5	401.2	82.8	70.3
87	12.642	0.151	0.110	0.98	91.2	-2.01	-	20.91	-0.12	83.6	404.4	83.0	70.4
88	12.793	0.151	0.111	0.98	91.2	-2.01	-	20.76	-0.15	83.7	408.4	83.6	70.5
89	12.943	0.150	0.110	0.99	91.2	-2.05	-	20.61	-0.15	83.9	409.1	85.2	70.7
90	13.097	0.154	0.108	0.99	91.8	-1.99	103	20.44	-0.17	84.0	415.0	85.2	70.8
91	13.248	0.151	0.110	0.98	91.5	-2.02	-	20.27	-0.17	84.2	422.9	85.0	70.9
92	13.397	0.149	0.110	0.98	91.6	-2.08	-	20.10	-0.17	84.4	424.4	83.9	71.0
93	13.547	0.150	0.110	0.98	91.7	-1.99	-	19.92	-0.18	84.6	429.2	83.7	71.0
94	13.698	0.151	0.108	0.98	91.9	-2.08	-	19.74	-0.18	84.7	435.7	82.6	71.2
95	13.848	0.150	0.109	0.97	91.8	-2.08	-	19.54	-0.20	84.9	438.5	83.3	71.2
96	13.998	0.150	0.109	0.97	91.8	-2.04	-	19.35	-0.19	85.0	447.1	85.0	71.3
97	14.149	0.151	0.110	0.97	91.9	-1.96	-	19.17	-0.18	85.3	448.3	85.0	71.4
98	14.296	0.147	0.110	0.95	92.1	-2.04	-	18.97	-0.20	85.4	451.8	85.7	71.4
99	14.447	0.151	0.109	0.98	92.2	-2.05	-	18.77	-0.20	85.5	453.8	85.1	71.4
100	14.597	0.150	0.108	0.98	92.3	-1.97	103	18.58	-0.19	85.7	456.8	85.5	71.5
101	14.747	0.150	0.108	0.98	92.4	-2.03	-	18.38	-0.20	86.0	456.6	84.1	71.7

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
102	14.898	0.151	0.108	0.98	92.3	-2.00	-	18.17	-0.21	86.1	459.1	83.6	71.7
103	15.048	0.150	0.108	0.98	92.5	-1.88	-	17.98	-0.19	86.2	459.4	83.4	71.8
104	15.198	0.150	0.107	0.98	92.7	-1.88	-	17.79	-0.19	86.2	458.6	83.1	71.8
105	15.348	0.150	0.108	0.97	92.8	-1.90	-	17.60	-0.19	86.3	458.6	84.4	71.7
106	15.497	0.149	0.107	0.96	92.3	-1.86	-	17.42	-0.18	86.3	458.6	84.7	71.8
107	15.647	0.150	0.109	0.98	92.4	-1.84	-	17.24	-0.18	86.4	459.6	85.3	71.9
108	15.797	0.150	0.108	0.97	92.4	-1.81	-	17.05	-0.19	86.4	456.9	84.7	71.9
109	15.947	0.150	0.108	0.97	92.7	-1.81	-	16.86	-0.19	86.6	459.1	84.4	71.9
110	16.094	0.147	0.109	0.96	92.6	-1.90	102	16.67	-0.19	86.6	459.7	84.0	72.0
111	16.243	0.149	0.107	0.97	92.9	-1.90	-	16.48	-0.19	86.7	460.1	83.1	72.0
112	16.392	0.149	0.108	0.96	93.0	-1.88	-	16.28	-0.20	86.8	464.3	83.8	72.1
113	16.542	0.150	0.110	0.94	93.0	-1.85	-	16.08	-0.20	86.9	465.0	84.0	72.1
114	16.689	0.147	0.108	0.94	93.0	-1.91	-	15.88	-0.20	87.0	466.6	84.7	72.2
115	16.836	0.147	0.108	0.93	93.3	-1.83	-	15.68	-0.20	87.0	467.1	84.9	72.2
116	16.981	0.145	0.108	0.93	93.2	-1.89	-	15.48	-0.20	87.1	464.3	84.8	72.3
117	17.126	0.145	0.108	0.92	92.9	-1.77	-	15.28	-0.20	87.2	466.1	84.6	72.3
118	17.270	0.144	0.108	0.91	93.4	-1.83	-	15.08	-0.20	87.3	468.8	83.8	72.3
119	17.414	0.144	0.109	0.91	93.1	-1.87	-	14.87	-0.21	87.3	468.1	83.3	72.4
120	17.558	0.144	0.106	0.90	93.0	-1.77	100	14.68	-0.19	87.4	467.7	83.7	72.4
121	17.700	0.142	0.106	0.90	93.3	-1.78	-	14.49	-0.19	87.5	466.7	84.5	72.4
122	17.851	0.151	0.109	1.02	93.2	-1.94	-	14.28	-0.21	87.6	463.9	85.2	72.5
123	18.005	0.154	0.108	1.01	93.3	-1.84	-	14.08	-0.20	87.7	463.9	85.5	72.5
124	18.162	0.157	0.108	1.02	93.4	-1.91	-	13.89	-0.19	87.8	466.7	85.1	72.5
125	18.316	0.154	0.109	1.01	93.5	-1.86	-	13.69	-0.20	87.8	465.3	84.6	72.5
126	18.465	0.149	0.107	1.02	93.2	-1.94	-	13.50	-0.19	87.8	462.5	83.1	72.6
127	18.618	0.153	0.110	1.01	93.4	-1.90	-	13.33	-0.17	87.7	460.4	82.9	72.6
128	18.772	0.154	0.108	1.01	93.6	-1.86	-	13.15	-0.18	87.7	456.8	83.3	72.7
129	18.928	0.156	0.110	1.00	93.5	-1.82	-	12.98	-0.17	87.6	456.4	84.1	72.7
130	19.080	0.152	0.109	0.99	93.3	-1.86	104	12.81	-0.17	87.6	454.7	85.0	72.7
131	19.233	0.153	0.108	1.00	93.4	-1.89	-	12.65	-0.16	87.6	451.0	85.6	72.7
132	19.386	0.153	0.107	1.01	93.7	-1.80	-	12.49	-0.16	87.6	447.8	85.5	72.8
133	19.540	0.154	0.109	1.01	93.6	-1.83	-	12.34	-0.15	87.5	443.6	84.8	72.8
134	19.693	0.153	0.109	1.01	93.6	-1.94	-	12.20	-0.14	87.4	438.2	84.0	72.8
135	19.842	0.149	0.108	1.00	93.4	-1.87	-	12.06	-0.14	87.4	433.7	83.6	72.9

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
136	19.995	0.153	0.107	1.01	93.8	-1.88	-	11.92	-0.14	87.2	431.1	84.1	72.9
137	20.151	0.156	0.110	0.99	93.7	-1.80	-	11.79	-0.13	87.2	427.7	83.8	72.9
138	20.304	0.153	0.110	1.00	93.5	-1.93	-	11.65	-0.14	87.1	426.4	84.3	72.9
139	20.456	0.152	0.109	1.00	93.9	-1.92	-	11.52	-0.13	87.0	421.0	85.6	72.9
140	20.608	0.152	0.109	0.99	94.1	-1.86	104	11.39	-0.13	86.9	417.9	85.9	72.9
141	20.761	0.153	0.108	0.99	93.7	-1.91	-	11.27	-0.12	86.8	418.7	84.8	73.0
142	20.911	0.150	0.108	1.00	93.7	-1.83	-	11.15	-0.12	86.7	414.9	84.6	73.0
143	21.064	0.153	0.108	1.00	93.9	-1.95	-	11.03	-0.12	86.6	413.0	84.1	72.9
144	21.219	0.155	0.111	1.01	93.8	-1.84	-	10.90	-0.13	86.6	411.8	84.0	73.0
145	21.370	0.151	0.108	1.00	94.0	-1.93	-	10.78	-0.12	86.6	411.8	83.2	72.9
146	21.522	0.152	0.110	0.99	93.9	-1.85	-	10.65	-0.13	86.5	412.4	84.6	72.9
147	21.674	0.152	0.108	0.98	94.1	-1.96	-	10.52	-0.13	86.5	414.7	84.8	73.0
148	21.826	0.152	0.109	0.98	94.0	-1.89	-	10.39	-0.13	86.5	415.1	85.4	72.9
149	21.975	0.149	0.108	0.98	93.9	-1.99	-	10.24	-0.15	86.5	416.7	85.1	72.9
150	22.129	0.154	0.109	0.98	94.1	-1.95	103	10.11	-0.13	86.5	418.0	85.2	73.0
151	22.278	0.149	0.108	0.99	94.1	-1.97	-	9.98	-0.13	86.5	417.5	84.8	72.9
152	22.429	0.151	0.110	0.96	94.0	-2.00	-	9.85	-0.13	86.5	417.7	84.2	72.9
153	22.579	0.150	0.110	0.96	93.9	-1.95	-	9.71	-0.14	86.5	418.0	83.4	73.0
154	22.729	0.150	0.110	0.96	94.1	-2.04	-	9.58	-0.13	86.5	419.0	83.6	72.9
155	22.875	0.146	0.109	0.96	94.4	-1.95	-	9.45	-0.13	86.5	419.8	84.4	72.9
156	23.026	0.151	0.107	0.95	94.1	-2.02	-	9.32	-0.13	86.6	419.5	85.0	73.0
157	23.174	0.148	0.110	0.94	94.0	-1.96	-	9.18	-0.14	86.5	418.5	85.0	73.0
158	23.321	0.147	0.108	0.93	94.2	-2.02	-	9.05	-0.13	86.5	418.8	85.0	73.0
159	23.468	0.147	0.108	0.93	94.1	-2.10	-	8.91	-0.14	86.5	420.3	84.8	73.0
160	23.613	0.145	0.109	0.91	94.0	-2.09	101	8.78	-0.13	86.5	420.6	84.2	73.0
161	23.756	0.143	0.108	0.91	94.2	-2.07	-	8.65	-0.13	86.6	422.1	83.7	73.1
162	23.902	0.146	0.108	0.91	94.3	-2.10	-	8.52	-0.13	86.6	423.0	84.2	73.1
163	24.047	0.145	0.109	0.91	94.4	-2.12	-	8.39	-0.13	86.6	424.3	84.9	73.1
164	24.191	0.144	0.108	0.89	94.2	-2.04	-	8.26	-0.13	86.6	424.7	85.0	73.2
165	24.332	0.141	0.111	0.88	94.1	-2.05	-	8.13	-0.13	86.6	423.5	84.6	73.2
166	24.474	0.142	0.109	0.93	94.3	-2.19	-	8.00	-0.13	86.7	423.6	84.8	73.2
167	24.621	0.147	0.108	0.94	94.3	-2.11	-	7.88	-0.12	86.6	425.4	84.3	73.2
168	24.770	0.149	0.108	0.91	94.7	-2.19	-	7.75	-0.13	86.7	423.5	84.7	73.3
169	24.914	0.144	0.108	0.91	94.6	-2.18	-	7.63	-0.12	86.7	421.8	83.3	73.3

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
170	25.058	0.144	0.105	0.90	94.6	-2.25	99	7.52	-0.11	86.7	418.9	83.9	73.2
171	25.203	0.145	0.110	0.89	94.5	-2.19	-	7.41	-0.11	86.6	418.8	85.0	72.9
172	25.343	0.140	0.107	0.90	93.9	-2.29	-	7.29	-0.12	86.1	412.1	84.0	73.1
173	25.486	0.143	0.110	0.89	94.1	-2.28	-	7.20	-0.09	86.0	412.8	83.7	73.3
174	25.633	0.147	0.109	0.98	94.0	-2.36	-	7.10	-0.10	86.0	409.1	83.0	73.4
175	25.783	0.150	0.108	0.96	94.1	-2.44	-	6.99	-0.11	86.0	407.2	83.7	73.4
176	25.933	0.150	0.109	0.95	94.2	-2.43	-	6.89	-0.10	86.1	406.8	83.9	73.2
177	26.081	0.148	0.110	0.94	94.5	-2.41	-	6.79	-0.10	86.1	404.9	84.9	73.2
178	26.225	0.144	0.108	0.92	94.5	-2.38	-	6.70	-0.09	86.1	404.1	85.5	73.2
179	26.374	0.149	0.108	0.92	94.2	-2.42	-	6.61	-0.09	86.0	400.3	84.4	73.1
180	26.520	0.146	0.109	0.91	94.5	-2.41	100	6.51	-0.10	86.1	399.0	84.7	73.2
181	26.665	0.145	0.109	0.92	94.3	-2.41	-	6.43	-0.08	86.0	397.8	83.8	73.2
182	26.810	0.145	0.108	0.92	94.5	-2.42	-	6.34	-0.09	86.0	395.9	83.6	73.1
183	26.952	0.142	0.110	0.91	94.3	-2.41	-	6.27	-0.07	85.9	389.6	84.2	73.2
184	27.099	0.147	0.109	0.91	94.6	-2.52	-	6.20	-0.07	85.8	387.3	85.0	73.2
185	27.245	0.146	0.110	0.92	94.4	-2.48	-	6.13	-0.07	85.7	381.6	84.4	73.2
186	27.389	0.144	0.110	0.90	94.3	-2.56	-	6.06	-0.07	85.6	376.2	86.2	73.2
187	27.533	0.144	0.108	0.90	94.6	-2.57	-	6.01	-0.05	85.4	372.2	84.8	73.2
188	27.674	0.141	0.108	0.91	94.8	-2.57	-	5.95	-0.06	85.4	367.0	84.5	73.2
189	27.820	0.146	0.109	0.91	94.7	-2.59	-	5.89	-0.06	85.2	366.5	83.7	73.1
190	27.964	0.144	0.109	0.92	94.4	-2.47	98	5.84	-0.05	85.2	362.7	83.1	73.2
191	28.108	0.144	0.110	0.90	94.6	-2.53	-	5.78	-0.06	85.1	361.6	83.6	73.2
192	28.253	0.145	0.110	0.89	94.6	-2.52	-	5.73	-0.05	85.0	360.6	83.8	73.2
193	28.393	0.140	0.111	0.90	94.5	-2.50	-	5.68	-0.05	85.0	356.6	84.7	73.3
194	28.538	0.145	0.109	0.88	94.9	-2.64	-	5.62	-0.06	85.0	354.0	85.0	73.3
195	28.680	0.142	0.109	0.90	94.7	-2.60	-	5.58	-0.04	84.9	352.2	84.7	73.3
196	28.822	0.142	0.109	0.89	94.5	-2.65	-	5.53	-0.05	84.8	349.6	83.3	73.3
197	28.966	0.144	0.109	0.89	94.7	-2.55	-	5.48	-0.05	84.7	348.2	84.1	73.3
198	29.107	0.141	0.109	0.90	94.8	-2.62	-	5.44	-0.04	84.6	345.5	83.3	73.3
199	29.248	0.141	0.108	0.88	94.6	-2.60	-	5.40	-0.04	84.6	344.4	83.9	73.3
200	29.389	0.141	0.109	0.88	94.6	-2.63	97	5.35	-0.05	84.5	342.4	84.7	73.3
201	29.540	0.151	0.109	0.97	94.9	-2.76	-	5.32	-0.03	84.4	341.5	84.9	73.3
202	29.691	0.151	0.109	0.97	94.7	-2.73	-	5.28	-0.04	84.3	340.3	84.8	73.3
203	29.840	0.149	0.109	0.97	94.6	-2.78	-	5.24	-0.04	84.2	339.7	84.9	73.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
204	29.993	0.153	0.111	0.98	94.8	-2.83	-	5.19	-0.05	84.2	340.4	85.5	73.2
205	30.143	0.150	0.110	0.95	94.6	-2.83	-	5.16	-0.03	84.1	336.3	85.6	73.3
206	30.292	0.149	0.109	0.96	94.8	-2.93	-	5.13	-0.03	84.0	335.4	84.7	73.2
207	30.440	0.148	0.109	0.95	94.7	-2.83	-	5.09	-0.04	84.0	336.3	84.3	73.2
208	30.588	0.148	0.109	0.94	95.1	-2.87	-	5.05	-0.04	84.0	330.2	84.3	73.3
209	30.735	0.147	0.111	0.93	95.0	-2.92	-	5.01	-0.04	83.9	332.4	83.9	73.3
210	30.882	0.147	0.111	0.93	95.1	-2.89	101	4.99	-0.02	83.9	331.3	84.2	73.3
211	31.028	0.146	0.111	0.92	94.9	-2.97	-	4.95	-0.04	83.8	330.7	84.1	73.3
212	31.172	0.144	0.109	0.91	95.0	-3.04	-	4.92	-0.03	83.8	328.3	84.5	73.3
213	31.316	0.144	0.109	0.90	94.9	-3.01	-	4.88	-0.04	83.7	324.4	84.4	73.3
214	31.458	0.142	0.108	0.90	95.0	-3.04	-	4.84	-0.04	83.7	326.8	85.4	73.3
215	31.601	0.143	0.108	0.89	94.8	-3.05	-	4.81	-0.03	83.6	326.1	84.1	73.4
216	31.743	0.142	0.110	0.88	94.8	-3.05	-	4.77	-0.04	83.6	324.8	83.7	73.4
217	31.882	0.139	0.108	0.86	95.0	-3.06	-	4.74	-0.03	83.6	323.6	83.7	73.4
218	32.020	0.138	0.110	0.85	95.0	-3.19	-	4.70	-0.04	83.5	319.7	83.1	73.3
219	32.160	0.140	0.109	0.84	95.1	-3.20	-	4.66	-0.04	83.5	321.1	83.7	73.3
220	32.295	0.135	0.109	0.82	94.7	-3.18	95	4.62	-0.04	83.4	322.2	85.5	73.4
221	32.431	0.136	0.109	0.81	95.0	-3.22	-	4.58	-0.04	83.5	320.4	85.2	73.3
222	32.563	0.132	0.110	0.79	94.9	-3.22	-	4.55	-0.03	83.3	317.9	86.0	73.2
223	32.697	0.134	0.109	0.79	95.0	-3.21	-	4.53	-0.02	83.2	316.1	85.6	73.3
224	32.828	0.131	0.110	0.80	95.2	-3.25	-	4.50	-0.03	83.1	310.3	84.7	73.3
225	32.961	0.133	0.111	0.80	95.0	-3.22	-	4.49	-0.01	83.1	305.4	83.7	73.2
226	33.094	0.133	0.109	0.78	95.0	-3.33	-	4.46	-0.03	82.9	301.4	83.4	73.3
227	33.225	0.131	0.110	0.78	94.9	-3.26	-	4.44	-0.02	82.8	299.4	84.2	73.3
228	33.355	0.130	0.108	0.80	94.9	-3.36	90	4.40	-0.04	82.7	295.9	84.6	72.5
Avg/Tot	33.416	0.147	0.109	0.94	90.7	-2.01	100			84.9	409.6	84.2	70.7

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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	-0.059		0.00	79.9	-0.53		82.9	0.006	0.20	0.002
1	0.068	0.127	1.06	79.7	-1.34	-	81.4	-0.038	2.08	0.089
2	0.219	0.151	1.06	79.6	-1.33	-	81.6	-0.051	7.46	0.411
3	0.369	0.150	1.03	79.7	-1.34	-	81.9	-0.042	8.89	0.566
4	0.517	0.148	1.03	79.7	-1.34	-	82.0	-0.042	10.87	0.263
5	0.665	0.148	1.02	79.7	-1.34	-	82.2	-0.047	9.83	0.038
6	0.816	0.151	1.03	79.7	-1.32	-	82.5	-0.047	11.01	0.027
7	0.963	0.147	1.02	79.9	-1.32	-	82.6	-0.049	10.85	0.018
8	1.109	0.146	1.03	79.9	-1.30	-	82.7	-0.052	12.95	0.062
9	1.255	0.146	0.98	79.9	-1.30	-	82.7	-0.050	11.56	0.026
10	1.401	0.146	1.01	79.9	-1.36	101	82.7	-0.061	10.95	0.053
11	1.547	0.146	1.02	80.1	-1.28	-	82.7	-0.049	10.11	0.045
12	1.692	0.145	1.01	80.2	-1.31	-	82.4	-0.058	9.71	0.058
13	1.838	0.146	1.00	80.2	-1.35	-	82.2	-0.057	9.20	0.078
14	1.980	0.142	0.98	80.3	-1.27	-	81.9	-0.056	9.93	0.127
15	2.126	0.146	0.99	80.6	-1.33	-	81.6	-0.058	12.19	0.110
16	2.272	0.146	0.99	80.7	-1.40	-	81.4	-0.062	13.23	0.122
17	2.417	0.145	0.96	80.9	-1.35	-	81.4	-0.057	14.38	0.244
18	2.562	0.145	1.00	80.9	-1.33	-	81.7	-0.059	14.62	0.293
19	2.709	0.147	1.02	81.1	-1.25	-	82.2	-0.059	15.52	0.579
20	2.853	0.144	0.98	81.3	-1.38	101	82.4	-0.059	14.50	0.484
21	2.997	0.144	1.01	81.3	-1.40	-	82.5	-0.060	13.68	0.165
22	3.141	0.144	0.98	81.4	-1.37	-	82.6	-0.071	15.04	0.487
23	3.285	0.144	1.00	81.5	-1.41	-	82.7	-0.068	16.07	0.821
24	3.429	0.144	0.97	81.7	-1.39	-	83.1	-0.065	16.59	0.963
25	3.574	0.145	0.98	81.9	-1.29	-	83.6	-0.063	15.34	0.118
26	3.719	0.145	0.98	82.2	-1.24	-	83.6	-0.064	14.94	0.083
27	3.860	0.141	0.99	82.4	-1.42	-	83.3	-0.068	14.83	0.064
28	4.004	0.144	0.98	82.9	-1.38	-	83.1	-0.059	15.14	0.174
29	4.147	0.143	0.99	82.9	-1.40	-	82.8	-0.066	14.56	0.382
30	4.291	0.144	0.98	83.1	-1.30	100	82.5	-0.067	14.28	0.236
31	4.437	0.146	1.01	83.2	-1.31	-	82.3	-0.064	14.36	0.156
32	4.581	0.144	0.98	83.5	-1.38	-	82.3	-0.062	14.75	0.110

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
33	4.726	0.145	0.99	83.6	-1.24	-	82.3	-0.065	15.03	0.271
34	4.869	0.143	0.97	83.8	-1.39	-	82.6	-0.067	14.50	0.126
35	5.013	0.144	0.99	84.0	-1.41	-	83.1	-0.062	14.18	0.198
36	5.156	0.143	0.96	84.4	-1.36	-	83.8	-0.061	14.16	0.641
37	5.299	0.143	0.94	84.5	-1.38	-	83.8	-0.061	14.99	0.419
38	5.443	0.144	0.99	84.6	-1.38	-	83.7	-0.063	14.81	0.093
39	5.586	0.143	0.98	84.8	-1.27	-	83.4	-0.064	14.08	0.047
40	5.729	0.143	0.97	85.0	-1.37	100	83.1	-0.055	13.83	0.043
41	5.872	0.143	0.98	85.4	-1.24	-	82.7	-0.069	13.16	0.027
42	6.016	0.144	0.98	85.5	-1.32	-	82.4	-0.066	12.66	0.033
43	6.159	0.143	0.97	85.9	-1.23	-	82.1	-0.060	12.09	0.044
44	6.305	0.146	0.95	86.1	-1.21	-	81.9	-0.063	11.95	0.043
45	6.449	0.144	0.95	86.2	-1.28	-	82.1	-0.066	11.67	0.056
46	6.594	0.145	0.95	86.3	-1.24	-	82.4	-0.063	11.48	0.058
47	6.737	0.143	0.97	86.7	-1.39	-	82.5	-0.061	11.55	0.049
48	6.881	0.144	0.99	86.7	-1.35	-	82.4	-0.061	10.18	0.058
49	7.021	0.140	0.98	87.0	-1.22	-	82.3	-0.058	10.46	0.046
50	7.165	0.144	0.98	87.1	-1.40	99	82.1	-0.061	9.67	0.057
51	7.308	0.143	0.96	87.4	-1.32	-	82.3	-0.062	9.36	0.063
52	7.453	0.145	0.99	87.4	-1.27	-	82.8	-0.058	8.81	0.072
53	7.600	0.147	0.98	87.7	-1.24	-	82.7	-0.057	8.48	0.087
54	7.744	0.144	1.01	87.7	-1.33	-	82.7	-0.058	8.12	0.090
55	7.887	0.143	0.98	87.7	-1.40	-	82.9	-0.056	7.91	0.085
56	8.031	0.144	0.97	88.0	-1.25	-	82.9	-0.056	7.58	0.086
57	8.174	0.143	0.97	88.1	-1.37	-	82.9	-0.061	7.32	0.090
58	8.318	0.144	0.99	88.1	-1.41	-	82.8	-0.055	7.21	0.101
59	8.462	0.144	0.96	88.3	-1.26	-	83.5	-0.054	5.00	0.165
60	8.607	0.145	1.01	88.4	-1.30	99	83.5	-0.059	5.05	0.555
61	8.752	0.145	1.00	88.6	-1.28	-	83.4	-0.056	6.21	0.258
62	8.895	0.143	0.96	89.0	-1.36	-	83.1	-0.064	5.73	0.231
63	9.039	0.144	0.98	89.0	-1.24	-	82.5	-0.057	5.35	0.236
64	9.185	0.146	0.99	89.1	-1.31	-	81.9	-0.053	5.14	0.240
65	9.332	0.147	1.01	89.1	-1.39	-	81.7	-0.057	5.14	0.272

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
66	9.477	0.145	1.00	89.5	-1.22	-	81.7	-0.056	5.64	0.173
67	9.622	0.145	1.00	89.6	-1.26	-	81.6	-0.055	5.15	0.167
68	9.767	0.145	0.97	89.6	-1.39	-	81.4	-0.059	5.76	0.142
69	9.912	0.145	0.98	89.7	-1.22	-	81.3	-0.049	6.48	0.080
70	10.058	0.146	0.98	89.8	-1.38	99	81.3	-0.047	6.68	0.061
71	10.204	0.146	1.00	89.9	-1.21	-	81.5	-0.053	6.41	0.056
72	10.349	0.145	0.98	89.9	-1.24	-	82.2	-0.050	6.35	0.048
73	10.494	0.145	0.99	89.9	-1.39	-	82.8	-0.046	6.83	0.056
74	10.636	0.142	0.98	89.9	-1.26	-	83.3	-0.050	7.17	0.058
75	10.781	0.145	0.98	90.0	-1.23	-	84.0	-0.051	7.32	0.058
76	10.926	0.145	0.98	90.1	-1.29	-	84.7	-0.053	7.79	0.073
77	11.070	0.144	0.98	90.2	-1.26	-	85.2	-0.052	8.27	0.079
78	11.218	0.148	1.00	90.3	-1.39	-	85.0	-0.052	7.95	0.096
79	11.363	0.145	0.98	90.4	-1.22	-	84.6	-0.051	7.97	0.111
80	11.507	0.144	0.97	90.5	-1.22	99	84.2	-0.049	7.98	0.127
81	11.653	0.146	1.00	90.6	-1.33	-	83.8	-0.051	7.84	0.125
82	11.799	0.146	0.98	90.6	-1.23	-	83.4	-0.053	7.94	0.127
83	11.943	0.144	0.98	90.9	-1.37	-	83.1	-0.055	8.06	0.146
84	12.088	0.145	0.96	90.9	-1.21	-	82.9	-0.049	8.36	0.144
85	12.232	0.144	0.99	91.0	-1.28	-	83.0	-0.054	8.61	0.167
86	12.374	0.142	0.98	91.2	-1.23	-	83.1	-0.049	8.64	0.185
87	12.518	0.144	0.97	91.3	-1.33	-	83.3	-0.057	8.81	0.180
88	12.663	0.145	1.00	91.3	-1.35	-	83.4	-0.054	9.41	0.205
89	12.808	0.145	0.99	91.4	-1.34	-	83.5	-0.056	12.32	0.124
90	12.955	0.147	1.01	91.5	-1.31	99	83.3	-0.055	12.16	0.133
91	13.101	0.146	0.98	91.6	-1.25	-	83.5	-0.061	12.45	0.160
92	13.246	0.145	0.99	91.8	-1.32	-	83.5	-0.057	13.47	0.187
93	13.390	0.144	0.96	91.8	-1.24	-	83.8	-0.051	13.89	0.250
94	13.534	0.144	0.97	92.0	-1.40	-	83.9	-0.052	14.54	0.239
95	13.679	0.145	0.97	92.1	-1.39	-	83.9	-0.058	14.84	0.259
96	13.823	0.144	0.97	92.1	-1.34	-	84.1	-0.063	15.04	0.358
97	13.967	0.144	0.96	92.2	-1.35	-	84.3	-0.060	15.03	0.411
98	14.109	0.142	0.96	92.3	-1.36	-	84.2	-0.055	15.14	0.471

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
99	14.255	0.146	0.96	92.5	-1.35	-	84.0	-0.065	15.38	0.405
100	14.399	0.144	0.97	92.5	-1.25	99	83.9	-0.056	15.37	0.401
101	14.543	0.144	0.99	92.6	-1.21	-	83.9	-0.055	15.54	0.541
102	14.690	0.147	0.99	92.7	-1.25	-	84.0	-0.060	15.51	0.405
103	14.833	0.143	0.97	92.7	-1.38	-	84.0	-0.063	15.48	0.291
104	14.977	0.144	0.96	93.0	-1.38	-	83.9	-0.068	15.39	0.294
105	15.121	0.144	0.96	92.9	-1.40	-	83.9	-0.056	15.34	0.345
106	15.265	0.144	1.00	93.0	-1.24	-	83.7	-0.059	15.09	0.237
107	15.410	0.145	0.98	93.1	-1.22	-	83.7	-0.058	14.98	0.209
108	15.555	0.145	0.98	93.3	-1.22	-	83.6	-0.058	15.12	0.247
109	15.698	0.143	0.96	93.3	-1.24	-	83.6	-0.059	15.25	0.345
110	15.839	0.141	0.96	93.4	-1.41	99	83.6	-0.057	15.46	0.393
111	15.982	0.143	0.95	93.4	-1.23	-	83.7	-0.057	15.51	0.458
112	16.125	0.143	0.96	93.4	-1.41	-	83.9	-0.058	15.58	0.569
113	16.271	0.146	0.95	93.6	-1.27	-	83.9	-0.061	15.72	0.552
114	16.414	0.143	0.97	93.7	-1.35	-	83.9	-0.058	15.74	0.533
115	16.556	0.142	0.93	93.6	-1.24	-	84.0	-0.060	15.84	0.626
116	16.696	0.140	0.92	93.7	-1.24	-	84.0	-0.057	15.91	0.548
117	16.836	0.140	0.92	93.8	-1.33	-	83.8	-0.057	15.86	0.635
118	16.978	0.142	0.94	93.8	-1.39	-	83.8	-0.057	15.89	0.710
119	17.118	0.140	0.93	94.0	-1.28	-	83.8	-0.064	15.86	0.726
120	17.257	0.139	0.93	93.9	-1.32	98	83.9	-0.061	15.78	0.784
121	17.395	0.138	0.91	94.0	-1.31	-	83.8	-0.065	15.71	0.806
122	17.550	0.155	1.11	94.0	-1.46	-	83.9	-0.059	15.66	0.893
123	17.708	0.158	1.09	94.1	-1.41	-	83.8	-0.064	15.65	0.920
124	17.866	0.158	1.09	94.2	-1.47	-	84.0	-0.064	15.53	0.847
125	18.019	0.153	1.07	94.3	-1.54	-	84.2	-0.058	15.41	0.811
126	18.171	0.152	1.09	94.4	-1.43	-	84.1	-0.067	15.40	0.611
127	18.325	0.154	1.08	94.3	-1.54	-	84.3	-0.066	15.14	0.372
128	18.478	0.153	1.07	94.5	-1.47	-	84.3	-0.060	14.95	0.269
129	18.633	0.155	1.08	94.5	-1.40	-	84.2	-0.061	14.75	0.271
130	18.786	0.153	1.09	94.4	-1.52	105	84.1	-0.057	14.57	0.233
131	18.940	0.154	1.09	94.5	-1.39	-	84.2	-0.060	14.21	0.156

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
132	19.093	0.153	1.06	94.6	-1.40	-	84.1	-0.058	13.71	0.111
133	19.245	0.152	1.04	94.7	-1.47	-	84.0	-0.059	13.10	0.109
134	19.399	0.154	1.06	94.7	-1.57	-	84.0	-0.052	12.66	0.102
135	19.549	0.150	1.07	94.7	-1.41	-	84.1	-0.056	12.45	0.110
136	19.703	0.154	1.05	94.7	-1.49	-	84.2	-0.060	12.36	0.117
137	19.857	0.154	1.07	94.9	-1.47	-	84.4	-0.054	12.25	0.115
138	20.010	0.153	1.06	94.8	-1.44	-	84.3	-0.054	12.27	0.130
139	20.164	0.154	1.06	94.8	-1.46	-	84.3	-0.057	12.21	0.125
140	20.317	0.153	1.07	94.8	-1.47	105	84.3	-0.062	12.08	0.127
141	20.469	0.152	1.08	95.0	-1.49	-	84.1	-0.055	11.96	0.128
142	20.619	0.150	1.06	95.0	-1.46	-	84.1	-0.056	11.81	0.124
143	20.772	0.153	1.06	95.0	-1.43	-	84.2	-0.059	11.82	0.123
144	20.928	0.156	1.08	95.0	-1.41	-	84.2	-0.051	11.96	0.130
145	21.081	0.153	1.06	95.1	-1.56	-	84.1	-0.053	11.99	0.142
146	21.231	0.150	1.06	95.0	-1.42	-	84.0	-0.051	12.11	0.137
147	21.384	0.153	1.05	95.2	-1.53	-	83.9	-0.058	12.23	0.154
148	21.537	0.153	1.07	95.2	-1.45	-	83.9	-0.059	12.65	0.189
149	21.686	0.149	1.06	95.3	-1.46	-	83.9	-0.052	12.81	0.213
150	21.841	0.155	1.03	95.3	-1.47	104	83.9	-0.050	12.77	0.212
151	21.992	0.151	1.04	95.3	-1.42	-	83.9	-0.050	12.92	0.227
152	22.143	0.151	1.05	95.3	-1.44	-	83.8	-0.061	12.89	0.257
153	22.294	0.151	1.03	95.4	-1.46	-	83.8	-0.060	12.94	0.300
154	22.445	0.151	1.03	95.4	-1.45	-	83.7	-0.050	12.95	0.322
155	22.593	0.148	1.02	95.5	-1.62	-	83.6	-0.052	13.00	0.331
156	22.745	0.152	1.02	95.5	-1.51	-	83.7	-0.049	13.04	0.348
157	22.895	0.150	1.03	95.6	-1.48	-	83.8	-0.050	13.08	0.350
158	23.044	0.149	1.01	95.5	-1.60	-	83.7	-0.057	13.15	0.392
159	23.192	0.148	1.01	95.5	-1.52	-	83.7	-0.052	13.24	0.454
160	23.340	0.148	1.01	95.5	-1.50	102	83.8	-0.055	13.37	0.472
161	23.484	0.144	0.99	95.6	-1.61	-	83.9	-0.053	13.41	0.523
162	23.633	0.149	1.00	95.6	-1.49	-	84.2	-0.052	13.48	0.495
163	23.779	0.146	0.98	95.6	-1.51	-	84.2	-0.051	13.48	0.432
164	23.925	0.146	0.99	95.7	-1.54	-	84.1	-0.057	13.46	0.476

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
165	24.070	0.145	0.98	95.8	-1.62	-	84.0	-0.054	13.60	0.440
166	24.215	0.145	1.05	95.7	-1.62	-	84.1	-0.051	13.66	0.393
167	24.366	0.151	1.03	95.7	-1.68	-	84.2	-0.054	13.61	0.390
168	24.518	0.152	1.03	95.7	-1.62	-	84.2	-0.050	13.23	0.346
169	24.666	0.148	1.03	95.8	-1.77	-	84.1	-0.051	13.04	0.328
170	24.814	0.148	1.00	95.8	-1.65	101	83.9	-0.050	12.87	0.314
171	24.962	0.148	1.00	95.8	-1.65	-	83.8	-0.051	12.57	0.309
172	25.106	0.144	0.98	96.0	-1.68	-	83.6	-0.056	12.40	0.288
173	25.255	0.149	1.00	96.0	-1.68	-	83.7	-0.052	12.27	0.283
174	25.402	0.147	1.05	96.0	-1.85	-	83.9	-0.053	12.14	0.275
175	25.552	0.150	1.04	95.9	-1.85	-	84.0	-0.055	12.10	0.291
176	25.703	0.151	1.05	96.0	-1.94	-	84.1	-0.054	12.16	0.226
177	25.852	0.149	1.06	95.9	-1.84	-	84.2	-0.048	12.06	0.218
178	25.999	0.147	1.02	95.9	-1.91	-	84.3	-0.051	12.13	0.201
179	26.151	0.152	1.01	96.0	-1.90	-	84.5	-0.047	12.06	0.207
180	26.299	0.148	1.02	96.0	-1.85	102	84.6	-0.053	11.96	0.229
181	26.447	0.148	1.00	95.9	-1.86	-	84.5	-0.054	11.71	0.220
182	26.594	0.147	1.01	95.9	-1.99	-	84.2	-0.049	10.38	0.135
183	26.739	0.145	1.00	95.9	-1.86	-	84.1	-0.043	9.85	0.112
184	26.889	0.150	1.03	95.9	-1.98	-	84.0	-0.051	9.51	0.087
185	27.036	0.147	1.00	96.2	-1.97	-	83.9	-0.048	9.33	0.078
186	27.183	0.147	1.02	96.0	-1.87	-	84.1	-0.051	9.06	0.074
187	27.330	0.147	0.98	96.1	-1.86	-	84.1	-0.048	8.86	0.071
188	27.474	0.144	0.99	96.1	-1.86	-	84.1	-0.043	8.75	0.072
189	27.624	0.150	1.00	96.2	-1.98	-	84.0	-0.044	8.56	0.068
190	27.770	0.146	0.97	96.2	-1.99	100	83.9	-0.050	8.51	0.085
191	27.917	0.147	1.00	96.1	-1.94	-	83.7	-0.049	8.48	0.071
192	28.063	0.146	0.98	96.2	-1.97	-	83.7	-0.047	8.40	0.062
193	28.207	0.144	0.96	96.2	-1.86	-	84.0	-0.048	8.27	0.074
194	28.355	0.148	1.01	96.2	-1.87	-	84.2	-0.047	8.03	0.080
195	28.501	0.146	1.00	96.2	-2.02	-	84.1	-0.044	8.09	0.080
196	28.647	0.146	0.99	96.2	-1.91	-	84.1	-0.048	7.60	0.084
197	28.793	0.146	0.98	96.1	-1.97	-	84.0	-0.049	7.45	0.092

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
198	28.939	0.146	0.97	96.3	-1.91	-	83.9	-0.046	7.27	0.113
199	29.084	0.145	0.96	96.2	-1.90	-	83.9	-0.044	7.27	0.083
200	29.228	0.144	0.97	96.1	-2.03	99	83.8	-0.046	7.11	0.091
201	29.377	0.149	1.02	96.3	-2.11	-	83.7	-0.044	7.07	0.100
202	29.526	0.149	1.03	96.3	-2.06	-	83.7	-0.046	7.00	0.105
203	29.673	0.147	1.01	96.3	-2.12	-	83.7	-0.044	6.90	0.107
204	29.823	0.150	1.01	96.2	-1.98	-	83.7	-0.045	6.88	0.102
205	29.971	0.148	1.00	96.2	-2.13	-	83.7	-0.040	6.88	0.105
206	30.119	0.148	1.02	96.3	-1.99	-	83.6	-0.038	6.83	0.095
207	30.266	0.147	1.00	96.4	-2.08	-	83.7	-0.038	6.68	0.101
208	30.413	0.147	1.00	96.2	-2.15	-	83.8	-0.043	6.61	0.095
209	30.559	0.146	0.99	96.3	-2.02	-	84.0	-0.042	6.46	0.087
210	30.704	0.145	0.97	96.3	-2.15	100	84.0	-0.040	6.40	0.090
211	30.849	0.145	0.98	96.4	-2.17	-	84.0	-0.042	6.32	0.088
212	30.993	0.144	0.97	96.5	-2.21	-	84.1	-0.039	6.32	0.092
213	31.136	0.143	0.95	96.5	-2.09	-	84.2	-0.044	6.34	0.084
214	31.278	0.142	0.93	96.3	-2.11	-	84.2	-0.039	6.35	0.091
215	31.421	0.143	0.94	96.5	-2.25	-	84.2	-0.046	6.38	0.090
216	31.563	0.142	0.92	96.4	-2.14	-	84.3	-0.041	6.32	0.093
217	31.703	0.140	0.90	96.4	-2.13	-	84.3	-0.039	6.28	0.090
218	31.841	0.138	0.92	96.6	-2.28	-	84.3	-0.038	6.31	0.089
219	31.982	0.141	0.89	96.5	-2.32	-	84.4	-0.039	6.43	0.089
220	32.118	0.136	0.87	96.5	-2.20	96	84.1	-0.042	6.75	0.083
221	32.255	0.137	0.89	96.6	-2.30	-	84.0	-0.037	6.76	0.080
222	32.390	0.135	0.87	96.4	-2.24	-	83.8	-0.044	6.61	0.071
223	32.524	0.134	0.85	96.5	-2.27	-	83.8	-0.046	5.96	0.078
224	32.655	0.131	0.84	96.5	-2.27	-	84.1	-0.045	5.79	0.066
225	32.793	0.138	0.83	96.6	-2.32	-	84.3	-0.039	5.67	0.067
226	32.925	0.132	0.86	96.5	-2.39	-	84.4	-0.037	5.62	0.060
227	33.060	0.135	0.86	96.5	-2.40	-	84.3	-0.040	5.62	0.063
228	33.190	0.130	0.86	96.5	-2.40	92	84.2	-0.041	5.62	0.061
Avg/Tot	33.249	0.146	0.99	91.3	-1.53	100	83.5	-0.054	11.02	0.223

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Particulate Sampling 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)
0	0.000		-1.36	78.7	-0.50		80.9
1	0.103	0.103	-0.56	78.5	-1.67	-	81.4
2	0.248	0.145	-0.50	78.6	-1.74	-	82.4
3	0.391	0.143	-0.51	78.8	-1.84	-	82.4
4	0.532	0.141	-0.47	78.6	-1.81	-	83.9
5	0.677	0.145	-0.54	79.1	-1.74	-	83.4
6	0.822	0.145	-0.56	78.9	-1.67	-	82.9
7	0.964	0.142	-0.54	78.8	-1.78	-	83.2
8	1.110	0.146	-0.54	79.3	-1.80	-	83.5
9	1.253	0.143	-0.56	79.2	-1.70	-	83.8
10	1.396	0.143	-0.57	79.2	-1.74	95	84.8
11	1.542	0.146	-0.54	79.1	-1.74	-	85.6
12	1.687	0.145	-0.55	79.1	-1.71	-	85.3
13	1.831	0.144	-0.60	79.2	-1.80	-	84.7
14	1.973	0.142	-0.59	79.3	-1.71	-	84.1
15	2.120	0.147	-0.58	79.7	-1.69	-	82.6
16	2.266	0.146	-0.57	80.0	-1.83	-	82.6
17	2.411	0.145	-0.59	79.8	-1.71	-	82.1
18	2.557	0.146	-0.59	80.3	-1.71	-	82.0
19	2.707	0.150	-0.56	80.2	-1.81	-	82.4
20	2.856	0.149	-0.54	80.3	-1.94	100	82.7
21	3.004	0.148	-0.55	80.6	-1.71	-	82.9
22	3.150	0.146	-0.57	80.8	-1.81	-	83.1
23	3.298	0.148	-0.56	80.9	-1.77	-	84.3
24	3.445	0.147	-0.56	81.0	-1.84	-	85.2
25	3.594	0.149	-0.55	81.1	-1.73	-	85.9
26	3.743	0.149	-0.51	81.5	-1.81	-	85.1
27	3.890	0.147	-0.51	81.8	-1.93	-	84.1
28	4.038	0.148	-0.52	82.0	-1.93	-	83.4
29	4.186	0.148	-0.39	82.4	-1.76	-	82.9
30	4.334	0.148	-0.46	82.2	-1.87	101	82.5
31	4.486	0.152	-0.37	82.5	-1.82	-	81.9

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Particulate Sampling 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)
32	4.634	0.148	-0.33	82.8	-1.90	-	81.9
33	4.784	0.150	-0.49	83.3	-1.94	-	82.3
34	4.935	0.151	-0.48	83.4	-1.91	-	82.1
35	5.084	0.149	-0.44	83.4	-1.73	-	82.1
36	5.234	0.150	-0.47	84.0	-1.87	-	81.1
37	5.383	0.149	-0.49	83.9	-1.77	-	81.4
38	5.532	0.149	-0.49	84.4	-1.78	-	81.5
39	5.678	0.146	-0.47	84.7	-1.89	-	82.0
40	5.828	0.150	-0.40	85.0	-1.92	101	82.9
41	5.977	0.149	-0.37	85.4	-1.91	-	83.6
42	6.127	0.150	-0.38	85.4	-1.84	-	83.5
43	6.277	0.150	-0.42	85.9	-1.90	-	84.1
44	6.429	0.152	-0.37	85.8	-1.74	-	84.1
45	6.580	0.151	-0.37	85.9	-1.91	-	83.6
46	6.730	0.150	-0.37	86.2	-1.92	-	83.8
47	6.880	0.150	-0.40	86.6	-1.82	-	83.1
48	7.031	0.151	-0.38	86.9	-1.74	-	83.7
49	7.177	0.146	-0.40	87.0	-1.73	-	84.1
50	7.327	0.150	-0.33	86.9	-1.86	101	83.4
51	7.476	0.149	-0.41	87.2	-1.80	-	83.3
52	7.626	0.150	-0.41	87.8	-1.79	-	83.0
53	7.779	0.153	-0.41	87.7	-1.76	-	82.9
54	7.929	0.150	-0.38	87.8	-1.76	-	83.0
55	8.078	0.149	-0.29	88.1	-1.79	-	83.8
56	8.228	0.150	-0.43	88.0	-1.89	-	84.3
57	8.379	0.151	-0.38	88.5	-1.80	-	83.3
58	8.530	0.151	-0.38	88.4	-1.93	-	83.8
59	8.681	0.151	-0.43	88.6	-1.75	-	83.0
60	8.831	0.150	-0.44	88.8	-1.91	101	82.5
Avg/Tot	8.831	0.147	-0.49	82.9	-1.78	100	83.2

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
0	75.8	77.6	77.8	76.7	76.3	76.8	76
1	77.6	77.3	77.7	76.9	76.3	77.2	187
2	96.1	76.9	77.9	77.7	76.4	81.0	863
3	123.8	77.3	78.8	79.2	76.0	87.0	1005
4	144.7	76.9	80.4	82.0	76.4	92.1	891
5	162.8	76.8	82.2	85.1	76.2	96.6	836
6	179.2	76.7	84.0	88.3	76.6	101.0	840
7	195.4	77.0	85.9	91.8	76.8	105.4	835
8	212.2	76.8	88.0	96.6	77.0	110.1	866
9	230.1	77.0	90.2	101.2	77.3	115.2	879
10	249.6	76.7	92.7	106.8	77.9	120.7	887
11	265.7	76.8	95.2	111.7	78.8	125.6	890
12	280.5	77.0	98.1	116.7	79.4	130.3	880
13	293.1	77.0	100.9	121.7	79.9	134.5	878
14	301.9	77.1	103.9	126.3	80.6	138.0	909
15	316.6	77.6	107.3	131.3	81.0	142.8	933
16	329.7	77.9	110.6	136.2	81.6	147.2	967
17	343.1	78.4	114.0	141.1	82.5	151.8	1003
18	357.7	78.3	117.7	146.5	83.3	156.7	1025
19	373.4	78.9	121.7	151.8	84.4	162.0	1050
20	386.1	80.1	125.9	156.7	85.3	166.8	1043
21	402.6	80.4	130.3	163.1	86.6	172.6	1038
22	414.0	81.5	135.1	169.2	88.1	177.6	1044
23	424.8	82.9	140.0	175.5	89.4	182.5	1087
24	439.7	85.0	145.5	182.5	90.9	188.7	1106
25	450.7	87.0	150.8	189.7	92.9	194.2	1069
26	462.7	89.2	156.5	197.7	94.5	200.1	1061
27	472.7	91.4	161.7	206.2	96.1	205.6	1060
28	479.8	94.6	167.2	214.3	97.8	210.7	1069
29	486.8	96.5	172.3	223.6	99.4	215.7	1089
30	497.7	99.6	177.6	231.8	101.3	221.6	1093
31	501.7	102.5	183.4	240.3	103.4	226.3	1088
32	509.3	105.2	189.1	248.3	105.4	231.5	1078
33	507.2	108.3	195.6	257.4	107.3	235.2	1084
34	514.5	111.0	202.0	265.8	109.7	240.6	1069
35	523.3	114.3	208.6	273.6	111.4	246.2	1078
36	522.0	117.8	215.1	282.2	113.4	250.1	1089
37	531.0	121.3	221.2	289.9	115.9	255.9	1098
38	535.1	124.9	227.5	297.3	117.7	260.5	1091
39	540.0	128.7	233.4	304.7	120.3	265.4	1076
40	546.4	132.8	239.4	311.8	122.4	270.6	1068
41	540.6	134.4	245.8	319.1	124.3	272.8	1056
42	545.5	138.5	251.6	326.1	126.4	277.6	1038
43	539.8	142.0	257.4	332.8	128.4	280.1	1026
44	541.4	146.2	263.6	339.1	130.0	284.1	1023
45	544.3	149.9	269.2	345.7	130.9	288.0	1019
46	540.5	153.5	274.6	352.1	132.0	290.5	1014
47	539.5	157.1	280.4	357.5	132.4	293.4	1011
48	538.4	159.7	286.0	363.4	133.1	296.1	1001
49	536.7	163.1	291.1	368.6	134.0	298.7	987

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
50	528.7	167.7	296.6	373.6	134.6	300.2	977
51	529.7	171.9	301.7	378.4	134.7	303.3	960
52	519.9	175.7	306.7	383.2	134.7	304.0	950
53	517.7	180.3	311.6	387.4	135.5	306.5	944
54	508.1	185.3	316.3	391.1	134.6	307.1	938
55	513.3	190.0	320.7	395.5	134.4	310.8	930
56	508.9	195.1	325.3	398.0	134.0	312.3	923
57	499.6	199.6	329.4	400.9	134.5	312.8	918
58	493.8	203.6	333.1	403.8	134.5	313.8	911
59	487.9	209.0	337.1	407.1	138.4	315.9	739
60	482.8	214.4	341.7	409.2	136.4	316.9	894
61	481.6	219.4	344.9	411.0	134.7	318.3	1034
62	473.4	223.6	347.0	412.6	134.6	318.2	1033
63	471.2	227.4	348.4	413.1	133.9	318.8	1005
64	467.0	231.6	349.0	412.9	132.4	318.6	979
65	469.7	235.2	348.8	411.8	130.4	319.2	942
66	460.1	238.6	348.0	409.6	130.0	317.3	873
67	450.1	241.8	347.2	407.5	128.8	315.1	814
68	440.6	244.5	345.9	405.2	127.7	312.8	773
69	435.3	247.3	344.2	402.7	126.8	311.3	780
70	390.3	249.5	340.7	399.1	125.4	301.0	782
71	368.4	252.0	337.7	396.1	123.2	295.5	783
72	356.7	254.1	334.6	393.4	121.2	292.0	784
73	345.3	256.0	331.6	390.3	119.8	288.6	787
74	337.9	257.7	328.9	387.2	118.8	286.1	807
75	332.8	259.5	326.1	383.8	118.0	284.0	827
76	326.5	261.2	323.1	380.4	117.2	281.7	848
77	321.2	262.5	320.1	377.2	116.7	279.5	875
78	318.8	264.0	317.4	373.9	116.1	278.0	895
79	321.1	265.2	314.5	371.0	115.6	277.5	911
80	319.0	266.5	311.9	367.7	115.3	276.1	924
81	318.7	267.6	309.3	364.7	114.9	275.0	928
82	318.1	268.7	307.0	361.7	114.4	274.0	929
83	317.5	269.7	304.6	358.7	114.1	272.9	939
84	317.0	270.7	302.4	356.0	113.6	271.9	951
85	317.1	271.7	300.4	353.2	113.4	271.2	961
86	317.1	272.7	298.6	350.6	113.2	270.4	969
87	317.3	273.6	296.7	348.0	113.0	269.7	971
88	318.2	274.4	295.1	345.5	112.7	269.2	970
89	319.2	275.0	293.6	343.3	113.0	268.8	987
90	320.0	275.6	292.4	340.9	113.0	268.4	1019
91	324.8	276.5	291.0	339.0	113.3	268.9	1040
92	330.5	277.3	289.9	337.0	113.7	269.7	1058
93	335.6	277.9	289.2	336.2	114.0	270.6	1065
94	341.0	278.9	288.5	335.4	114.6	271.7	1081
95	349.5	279.9	288.0	334.8	115.0	273.4	1095
96	357.4	280.4	288.2	335.0	115.9	275.4	1110
97	363.8	281.3	288.3	335.3	117.0	277.1	1124
98	373.5	282.0	288.5	336.0	118.0	279.6	1133
99	382.4	283.0	289.1	337.0	119.4	282.2	1139

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
100	388.2	283.6	289.6	338.4	120.8	284.1	1144
101	397.6	284.8	289.9	340.0	122.3	286.9	1151
102	403.3	285.5	290.8	341.9	123.8	289.1	1151
103	410.5	286.2	291.8	344.0	125.5	291.6	1151
104	414.1	287.4	292.7	346.1	127.0	293.5	1150
105	420.0	288.1	293.6	348.8	128.7	295.8	1147
106	424.8	288.5	294.6	351.1	130.2	297.8	1139
107	425.5	289.9	295.8	353.6	132.0	299.4	1134
108	434.2	291.0	297.0	356.1	133.9	302.4	1135
109	432.2	292.4	298.2	358.8	135.8	303.5	1140
110	436.6	292.4	299.6	361.4	137.4	305.5	1144
111	440.2	293.3	301.3	364.1	139.3	307.6	1145
112	439.1	293.9	302.8	367.2	141.2	308.8	1148
113	443.5	294.9	304.3	370.3	143.2	311.2	1150
114	448.7	296.2	306.3	373.3	145.1	313.9	1152
115	447.9	297.2	308.2	376.6	147.0	315.4	1158
116	450.0	298.2	310.2	380.1	148.9	317.5	1161
117	451.8	299.7	312.5	383.4	150.3	319.5	1163
118	455.9	301.1	314.8	387.0	152.4	322.2	1165
119	453.2	302.5	317.1	390.5	153.9	323.4	1166
120	461.4	304.2	319.7	394.3	155.7	327.1	1168
121	459.7	306.2	322.0	397.9	156.8	328.5	1170
122	461.9	310.0	324.7	401.8	158.5	331.4	1170
123	466.4	311.1	327.5	405.5	160.0	334.1	1169
124	468.0	313.5	330.2	409.3	161.5	336.5	1170
125	469.5	315.1	333.0	413.1	163.0	338.7	1168
126	467.8	317.0	335.8	416.7	164.0	340.3	1158
127	467.1	318.8	338.4	420.6	165.3	342.0	1147
128	470.6	320.5	341.0	424.3	166.2	344.5	1139
129	470.8	322.1	343.8	427.8	167.2	346.3	1135
130	464.3	323.7	346.5	431.4	168.4	346.9	1128
131	465.5	325.6	349.2	434.8	169.1	348.8	1118
132	460.7	327.6	351.7	438.1	170.2	349.7	1104
133	460.6	329.5	354.3	441.3	171.0	351.3	1095
134	456.3	331.4	356.8	444.3	171.4	352.0	1078
135	453.2	332.7	359.3	446.9	172.0	352.8	1064
136	449.1	334.1	361.7	449.7	172.6	353.4	1054
137	443.9	336.0	363.6	451.9	172.8	353.6	1048
138	437.2	337.5	366.0	454.3	172.9	353.6	1046
139	436.9	339.1	368.3	456.3	173.1	354.7	1042
140	433.9	340.7	370.5	458.2	173.4	355.3	1038
141	430.0	342.4	372.5	459.8	173.3	355.6	1032
142	427.6	343.9	374.4	461.7	173.2	356.2	1024
143	423.9	345.2	376.5	463.6	173.5	356.5	1016
144	422.5	346.8	378.3	465.3	173.5	357.3	1012
145	415.1	348.4	380.2	466.7	173.6	356.8	1008
146	412.2	350.1	382.0	468.4	173.7	357.3	1008
147	409.2	351.9	383.6	469.7	173.9	357.7	1011
148	411.9	353.5	385.8	471.5	174.3	359.4	1015
149	406.4	354.9	387.7	472.9	174.7	359.3	1019

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
150	405.5	356.9	389.6	474.6	175.0	360.3	1020
151	401.3	358.7	392.0	476.3	175.4	360.7	1020
152	403.6	360.5	394.1	477.9	175.6	362.3	1020
153	400.8	362.4	396.4	479.6	176.1	363.1	1019
154	402.3	364.0	398.7	481.4	176.8	364.6	1019
155	402.9	365.9	401.1	483.0	177.3	366.0	1020
156	402.9	367.5	403.7	484.9	178.2	367.4	1020
157	400.7	368.8	405.8	486.7	178.9	368.2	1020
158	399.9	369.4	408.4	488.5	179.6	369.2	1021
159	399.4	370.7	410.8	490.4	180.3	370.3	1023
160	397.7	372.3	413.3	492.4	181.1	371.4	1028
161	399.3	374.8	415.8	494.2	181.9	373.2	1033
162	402.0	376.4	418.5	496.4	182.6	375.2	1037
163	398.4	377.9	421.2	498.3	183.4	375.8	1039
164	399.8	378.6	423.8	500.4	184.0	377.3	1040
165	401.3	369.3	426.8	502.3	185.1	377.0	1049
166	406.3	383.7	429.4	504.4	185.7	381.9	1053
167	403.5	385.1	432.0	506.5	186.4	382.7	1050
168	408.5	386.8	434.7	508.8	187.0	385.2	1046
169	403.4	389.0	437.3	510.8	187.5	385.6	1042
170	406.4	393.7	439.8	513.2	188.2	388.3	1038
171	407.2	395.6	442.5	515.2	188.9	389.9	1028
172	411.4	397.8	444.5	516.4	189.4	391.9	1019
173	410.8	400.0	446.9	518.8	189.1	393.1	1012
174	406.6	401.6	449.7	520.7	190.0	393.7	1007
175	404.7	401.8	452.0	522.5	190.2	394.2	1004
176	396.4	404.3	454.4	524.2	190.2	393.9	1004
177	398.8	392.3	456.8	526.1	190.5	392.9	1002
178	396.2	369.2	459.4	527.7	190.5	388.6	999
179	402.0	363.9	462.1	529.2	190.8	389.6	996
180	395.4	361.7	464.2	530.8	190.8	388.6	991
181	390.4	356.2	466.7	532.1	190.7	387.2	978
182	389.1	350.9	468.8	533.6	190.7	386.6	957
183	385.8	353.9	471.3	535.1	190.8	387.4	940
184	378.7	360.1	473.6	536.4	190.4	387.8	925
185	378.1	370.6	476.1	537.2	189.9	390.4	913
186	375.8	385.0	478.0	538.3	189.7	393.4	902
187	369.2	406.8	480.4	538.9	189.2	396.9	893
188	367.8	427.7	482.0	539.6	188.9	401.2	888
189	361.8	429.7	483.5	540.0	187.9	400.6	882
190	362.0	431.1	485.3	540.3	187.3	401.2	879
191	353.9	432.2	486.6	540.3	186.6	399.9	876
192	350.6	433.1	487.9	540.1	185.8	399.5	871
193	346.0	434.6	489.0	539.8	185.1	398.9	865
194	343.6	435.2	490.1	539.4	184.2	398.5	860
195	342.1	436.0	490.9	538.8	183.6	398.3	856
196	338.7	436.8	491.7	538.3	183.1	397.7	851
197	333.6	437.3	492.5	537.5	182.1	396.6	844
198	333.4	437.5	493.1	536.5	181.6	396.4	837
199	326.7	437.1	493.3	535.4	180.5	394.6	827

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
200	324.8	438.7	493.5	534.1	179.8	394.2	821
201	322.5	440.4	493.3	532.6	179.0	393.6	818
202	317.2	440.9	493.4	531.2	177.8	392.1	817
203	313.3	441.2	493.1	529.8	177.0	390.9	816
204	310.0	441.6	492.7	528.4	176.1	389.8	812
205	307.5	442.1	492.0	526.8	175.0	388.7	806
206	306.0	442.6	491.8	525.2	174.4	388.0	799
207	301.7	443.4	491.3	523.4	173.4	386.6	799
208	299.4	443.6	490.7	521.8	172.6	385.6	793
209	297.4	443.9	490.2	519.9	172.0	384.7	788
210	294.4	444.1	489.7	518.2	171.1	383.5	784
211	288.9	444.7	489.2	516.4	170.5	381.9	783
212	287.8	444.8	488.6	514.4	169.6	381.0	781
213	286.8	444.8	488.1	512.4	168.6	380.1	777
214	284.3	444.2	487.2	510.7	167.7	378.8	775
215	282.0	443.8	486.0	508.9	166.9	377.5	773
216	280.2	440.6	485.9	507.2	166.0	376.0	772
217	279.7	441.5	485.4	505.3	165.2	375.4	770
218	275.7	441.2	484.8	503.5	164.8	374.0	768
219	274.2	441.2	484.3	501.8	164.3	373.2	765
220	273.1	441.3	483.5	499.9	163.3	372.2	763
221	271.4	440.2	483.0	498.2	162.6	371.1	762
222	266.9	440.3	482.6	496.7	162.0	369.7	756
223	266.6	439.9	482.3	495.1	161.4	369.1	742
224	267.1	439.2	481.9	493.7	161.1	368.6	725
225	263.3	438.8	481.6	491.9	160.4	367.2	709
226	258.2	438.5	480.8	490.5	159.9	365.6	700
227	256.8	440.0	480.4	489.1	159.2	365.1	693
228	255.6	439.2	479.9	487.4	158.8	364.2	686
Average	388.9	285.6	336.9	392.9	144.0	310	969

LAB SAMPLE DATA - ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 1

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	H00182	179.2	180.9	1.7
	B	H00183	181.1	182.8	1.7
	C - 1st Hour	H00184	180.2	180.4	0.2
	Amb	H00185	191.5	191.5	0.0
Probes	**A**	2A	116059.3	116059.5	0.2
	B	2B	116175.9	116175.9	0.0
	C - 1st Hour	2C	116430.4	116430.6	0.2
O-rings	**A**	2A	3551.1	3551.2	0.1
	B	2B	3570.6	3570.7	0.1
	C - 1st Hour	2C	3388.1	3388.4	0.3

Placed in Dessicator on:	7/16/2025

Audit		200.0	7/23 12:30	200.0	7/25 16:00				
Filters	**A**	181.0	7/23 12:30	180.9	7/25 16:00				
	B	183.0	7/23 12:30	182.8	7/25 16:00				
	C - 1st Hour	180.6	7/23 12:30	180.4	7/25 16:00				
	Amb	191.5	7/23 12:30	191.5	7/25 16:00				
Probes	**A**	116059.4	7/23 12:30	116059.5	7/25 16:00				
	B	116175.9	7/23 12:30	116175.9	7/25 16:00				
	C - 1st Hour	116430.7	7/23 12:30	116430.6	7/25 16:00				
O-Rings	**A**	3551.1	7/23 12:30	3551.2	7/25 16:00				
	B	3570.7	7/23 12:30	3570.7	7/25 16:00				
	C - 1st Hour	3388.3	7/23 12:30	3388.4	7/25 16:00				

Train A Aggregate, mg:	**2.0**
Train B Aggregate, mg:	**1.8**
Train C Aggregate, mg:	**0.7**
Ambient Aggregate, mg:	**0.0**

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications Job Number: 24-282 Tracking #: 225
Model: VCV Run Number: 1 Test Date: 7/17/2025

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: N/A – High Burn
Air Control Setting: Fully Open

Time	Notes
	N/A – High Burn

Test Notes
Test Burn Start Time: 4:56
Air Control Setting: Fully Open

Time	Notes
0:00	Ignition – 30s Torch
1:00	Closed Door
4:00	Closed Bypass
58:00	Loaded Test Fuel

Test Burn End Time: 8:44

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	4:25	4:27	4:29	7/18 10:05	7/18 10:06	7/18 10:07
CO_2	0.12	17.35	10.45	0.08	17.45	10.23
CO	-0.007	4.420	2.509	-0.008	4.390	2.536

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

Technician Signature: Date: 12/22/2025

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications | Job Number: 24-282 | Tracking #: 225
Model: VCV | Run Number: 1 | Test Date: 7/17/2025

Test Photos



Kindling Fuel Load



Start-up Fuel Load



High Fire Fuel Load



Technician Signature: _____ Date: 12/22/2025

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications Job Number: 24-282 Tracking #: 225
Model: VCV Run Number: 1 Test Date: 7/17/2025



Residual Start-up Fuel Coal Bed



High Fire Fuel Loaded



Air Setting

Technician Signature: Date: 12/22/2025

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515



Run 2 Data Summary

Client:	509 Fabrication
Model:	VCV
Job #:	24-282
Tracking #:	225
Test Date:	7/16/2025

Technician Signature — Date: 9/4/2025

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

Burn Rate (kg/hr):	0.64

	Ambient Sample	Sample Train A	Sample Train B	Sample Train C - 1st Hour
Total Sample Volume (ft^3)	207.299	136.938	136.293	9.384
Average Gas Velocity in Dilution Tunnel (ft/sec)	19.86			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	53168.1			
Average Gas Meter Temperature (°F)	77.0	99.4	102.2	83.7
Total Sample Volume (dscf)	205.081	129.336	128.750	9.049
Average Tunnel Temperature (°F)	83.4			
Total Time of Test (min)	901			
Total Particulate Catch (mg)	0.0	2.4	2.5	0.8
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000186	0.0000194	0.0000884
Total PM Emissions (g)	0.00	14.82	15.50	4.70
Particulate Emission Rate (g/hr)	0.00	0.99	1.03	4.70
Emissions Factor (g/kg)	-	1.54	1.61	-
Difference from Average Total Particulate Emissions (g)	-	0.34	0.34	-
Difference from Average Total Particulate Emissions (%)	-	2.3%	2.3%	-
Difference from Average Emissions Factor (g/kg)	-	0.04	0.04	-

Final Average Results	
Total Particulate Emissions (g)	15.16
Particulate Emission Rate (g/hr)	1.01
Emissions Factor (g/kg)	1.57
HHV Efficiency (%)	80.0%
LHV Efficiency (%)	85.5%
CO Emissions (g/min)	0.26

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: 81.8/Max: 89.8	OK
Face Velocity	< 30 ft/min	9.9	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:71.5/Max:79.3	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	All but 1 reading between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	509 Fabrication
Model:	VCV
Date:	07/16/25
Run:	2
Control #:	24-282
Test Duration:	901
Output Category:	Low

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	80.0%	85.5%
Combustion Efficiency	98.7%	98.7%
Heat Transfer Efficiency	81.0%	86.7%

Output Rate (kJ/h)	10,294	9,765	**(Btu/h)**
Burn Rate (kg/h)	0.64	1.42	**(lb/h)**
Input (kJ/h)	12,870	12,209	**(Btu/h)**

Test Load Weight (dry kg)	9.68	21.34	**dry lb**
MC wet (%)	17.03		
MC dry (%)	20.52		
Particulate (g)	15.16		
CO (g)	233		
Test Duration (h)	15.02		

Emissions	**Particulate**	**CO**
g/MJ Output	0.10	1.51
g/kg Dry Fuel	1.57	24.10
g/h	1.01	15.54
g/min	0.02	0.26
lb/MM Btu Output	0.23	3.51

Air/Fuel Ratio (A/F)	15.83

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

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: 509 Fabrication
Job #: 24-282
Model: VCV
Tracking #: 225
Run #: 2
Technician: AK
Date: 7/16/2025

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.18		
Target Load Weight (lbs):	21.80		
Total Load Weight Range (lbs):	20.70	to	22.90
Core Load Weight Range (lbs):	9.80	to	14.20
Remainder Load Weight Range (lbs):	7.60	to	12.00
Core Load Piece Range (lbs):	3.30	to	5.50
Remainder Load Piece Range (lbs):	2.20	to	12.00
Max Allowable Kindling Weight (lbs):	4.31		
Max Allowable Start-up Fuel Weight (lbs):	6.46		

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	18.00	3.47	In Range	19.3	25.2	25.7	23.4	In Range	2.81	1.28
2	17.96	4.93	In Range	25.6	24.4	20.4	23.5	In Range	3.99	1.81
3	18.00	5.11	In Range	24.2	24.9	19.4	22.8	In Range	4.16	1.89
Core Load Wt. (lbs)		13.51	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	18.00	8.03	In Range	23.4	24.5	25.4	24.4	In Range	6.45	2.93
2			NA				NA	NA	NA	NA
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		8.03	In Range							

Total Load Weight (lbs):	21.54	In Range	
Core Load % of Total Weight:	63%	In Range	45-65%
Remainder % of Total Weight:	37%	In Range	35-55%
Total Load % of Target Weight:	99%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	9.9		
Total Load Average Moisture Content (%DB):	23.7	In Range	19-25%
Total Load Average Moisture Content (%WB):	19.1		
Total Test Load Weight (dry basis):	17.42 lbs	7.90 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
4.28	In Range	10	10	10	10.0	In Range	3.89	1.76

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
5.39	In Range	23.7	19.4	19.6	20.9	In Range	4.46	2.02

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.2	to	4.3	
Actual Residual Start-up Fuel Weight (lb):		2.35		In Range

LOW & MEDIUM FIRE FUEL LOAD DATA - ASTM E3053

Client: 509 Fabrication
Job #: 24-282
Model: VCV
Tracking #: 225
Run #: 2
Technician: AK
Date: 7/16/2025

Nominal Loading Density (lbs/ft^3, wet basis):	12		
Usable Firebox Volume (ft^3):	2.18		
Target Load Weight (lbs):	26.11		
Total Load Weight Range (lbs):	24.81	to	27.42
Core Load Weight Range (lbs):	11.75	to	16.97
Remainder Load Weight Range (lbs):	9.14	to	14.36
Core Load Piece Range (lbs):	3.92	to	6.53
Remainder Load Piece Range (lbs):	2.61	to	7.83

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	18.00	5.43	In Range	25.4	18.4	21.7	21.8	In Range	4.46	2.02
2	18.00	3.93	In Range	23.5	19.2	19.3	20.7	In Range	3.26	1.48
3	18.00	6.48	In Range	19.2	19.4	19.1	19.2	In Range	5.43	2.47
Core Load Wt. (lbs)		15.84	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	18.00	3.80	In Range	24.1	22.8	25.0	24.0	In Range	3.07	1.39
2	18.00	7.75	In Range	19.5	19.3	18.2	19.0	In Range	6.51	2.95
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		11.55	In Range							

Remainder Load Small/Large Piece Weight Ratio:	49%	In Range	≤ 67%
Total Load Weight (lbs):	27.39	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:	105%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	12.6		
Total Load Average Moisture Content (%DB):	20.5	In Range	19-25%
Total Load Average Moisture Content (%WB):	17.0		
Total Test Load Weight (dry basis):	22.73 lbs	10.31 kg	

TEST FUEL LOADING RANGE

Allowable Charcoal Bed Weight Range (lb):	2.8	to	5.4
Actual Charcoal Bed Wt. (lb):	4.00	In Range	

TEST END POINT

Actual Fuel Load Ending Weight (lb):	1.49	Valid Test (≥90%)
Total Fuel Burned During Test Run:	25.9	lbs, wet basis
	21.2	lbs, dry basis
	9.63	kg, dry basis

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	2	Technician:	AK
Test Start Time:	9:06	Date:	7/16/2025
Test Type:	Low Fire		

Recording Interval (min):	1
Total Sampling Time (min):	901

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.73	29.79	29.76
Relative Humidity (%)	38.7	42.6	
Room Air Velocity (ft/min)	<50	<50	
Platform Scale Audit (lbs)	10.0	10.0	
Fuel Scale Audit (lbs)	10.00	10.00	

Meter Box γ Factor:	1.004 (A)
Meter Box γ Factor:	1.009 (B)
Meter Box γ Factor:	0.997 (C)
Meter Box γ Factor:	1.012 (Ambient)
Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100
Date Flue Pipe Last Cleaned:	7/13/2025

Ambient Sample Volume: 207.299 ft^3

Sample Train Post-Test Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-7 in. Hg
(B)	0.000	0.000	cfm @	-7 in. Hg
(C)	0.000	0.000	cfm @	-6 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.073	82
2	0.096	82
3	0.103	82
4	0.102	82
5	0.091	82
6	0.057	82
7	0.062	82
8	0.088	82
9	0.101	82
10	0.106	82
11	0.099	82
12	0.061	82
Center	0.107	82

Static Pressure: -0.156 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	12	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:	0.7854	ft^2
V_{strav}:	19.71	ft/sec
V_{scent}:	22.04	ft/sec
F_p:	0.895	[ratio]
Initial Tunnel Flow:	881.4	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, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Int. West)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Int. 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
	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 Long Leaf	52.60	7.02	40.10	1.30	22.30	9594

WOODSTOVE PREBURN DATA

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	2	Technician:	AK
		Date:	7/16/2025

Low Fire Performed as a continuation of High Fire Test, see Run 1 test data for details

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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		0.113	0.00	90.4	-1.82		25.72		83.1	298.0	84.7	71.5
1	0.172	0.172	0.110	1.56	90.3	-2.66	-	25.76	0.04	86.0	293.1	85.6	71.6
2	0.356	0.184	0.110	1.01	90.4	-2.27	-	25.69	-0.07	83.9	277.5	86.0	71.7
3	0.508	0.152	0.109	1.02	90.2	-2.07	-	25.60	-0.09	83.7	287.3	85.6	71.6
4	0.661	0.153	0.111	1.01	90.4	-1.96	-	25.52	-0.08	83.9	295.6	84.6	71.8
5	0.814	0.153	0.109	1.01	90.5	-1.96	-	25.43	-0.09	84.4	305.4	84.7	72.0
6	0.967	0.153	0.110	1.00	90.4	-1.84	-	25.33	-0.10	84.4	316.0	85.1	72.2
7	1.120	0.153	0.111	1.01	90.4	-1.75	-	25.22	-0.11	84.7	325.7	85.7	72.3
8	1.271	0.151	0.110	0.99	90.2	-1.76	-	25.11	-0.11	85.4	336.0	85.8	72.5
9	1.423	0.152	0.111	1.00	90.3	-1.69	-	25.00	-0.11	85.9	346.2	85.2	72.6
10	1.576	0.153	0.110	0.99	90.5	-1.67	105	24.89	-0.11	85.4	354.6	84.2	72.6
11	1.731	0.155	0.110	1.00	90.6	-1.69	-	24.79	-0.10	85.3	357.9	84.2	72.7
12	1.883	0.152	0.109	1.00	90.6	-1.61	-	24.67	-0.12	85.6	362.4	85.3	72.8
13	2.034	0.151	0.111	1.00	90.9	-1.65	-	24.57	-0.10	85.5	365.2	86.3	72.9
14	2.184	0.150	0.110	1.00	90.9	-1.63	-	24.45	-0.12	85.2	369.7	86.3	72.9
15	2.335	0.151	0.111	0.99	90.9	-1.64	-	24.34	-0.11	85.0	374.7	85.9	73.0
16	2.487	0.152	0.110	0.99	91.1	-1.54	-	24.23	-0.11	84.0	340.8	84.7	73.1
17	2.640	0.153	0.109	1.00	91.2	-1.51	-	24.15	-0.08	83.5	318.9	84.2	73.2
18	2.800	0.160	0.110	0.98	91.2	-1.55	-	24.09	-0.06	83.3	311.3	85.0	73.2
19	2.951	0.151	0.110	1.00	91.1	-1.58	-	24.04	-0.05	83.7	306.6	86.0	73.3
20	3.102	0.151	0.111	0.99	91.4	-1.51	101	23.97	-0.07	83.3	303.2	86.5	73.5
21	3.253	0.151	0.112	0.99	91.5	-1.55	-	23.92	-0.05	83.3	300.4	85.9	73.4
22	3.405	0.152	0.112	0.99	91.7	-1.53	-	23.86	-0.06	83.3	296.4	85.0	73.6
23	3.560	0.155	0.109	0.98	91.6	-1.50	-	23.82	-0.04	83.3	292.1	84.3	73.5
24	3.712	0.152	0.109	0.98	91.6	-1.51	-	23.77	-0.05	83.4	288.6	84.7	73.5
25	3.862	0.150	0.109	0.98	91.7	-1.47	-	23.72	-0.05	83.4	285.2	85.7	73.5
26	4.013	0.151	0.110	1.00	91.9	-1.53	-	23.67	-0.05	83.2	283.2	86.2	73.6
27	4.161	0.148	0.111	0.99	91.9	-1.54	-	23.62	-0.05	82.9	281.7	86.6	73.6
28	4.313	0.152	0.110	1.00	92.3	-1.54	-	23.58	-0.04	82.8	280.5	86.5	73.6
29	4.464	0.151	0.110	0.98	92.1	-1.52	-	23.52	-0.06	82.7	280.0	86.1	73.6
30	4.616	0.152	0.111	0.99	92.3	-1.59	100	23.48	-0.04	82.5	281.3	84.9	73.5
31	4.769	0.153	0.110	0.99	92.1	-1.61	-	23.42	-0.06	82.1	281.4	84.2	73.6
32	4.921	0.152	0.110	1.01	92.6	-1.57	-	23.37	-0.05	81.6	283.3	84.4	73.6
33	5.072	0.151	0.111	1.00	92.6	-1.61	-	23.33	-0.04	81.5	283.5	85.6	73.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
34	5.224	0.152	0.111	0.99	92.7	-1.52	-	23.27	-0.06	81.3	283.9	86.0	73.6
35	5.379	0.155	0.110	0.98	92.6	-1.61	-	23.21	-0.06	81.2	284.8	86.1	73.6
36	5.531	0.152	0.109	0.99	93.0	-1.59	-	23.18	-0.03	81.3	281.7	85.0	73.6
37	5.683	0.152	0.110	0.99	92.8	-1.56	-	23.11	-0.07	81.2	282.6	84.2	73.7
38	5.837	0.154	0.110	1.00	93.0	-1.67	-	23.06	-0.05	81.2	284.0	84.5	73.8
39	5.986	0.149	0.111	0.99	93.0	-1.67	-	23.01	-0.05	81.3	284.4	85.7	73.7
40	6.138	0.152	0.110	0.99	93.4	-1.69	100	22.96	-0.05	81.3	284.6	86.1	73.8
41	6.290	0.152	0.111	0.99	93.4	-1.71	-	22.91	-0.05	81.3	283.9	85.9	73.8
42	6.443	0.153	0.110	0.99	93.2	-1.66	-	22.85	-0.06	81.5	284.1	85.1	73.9
43	6.595	0.152	0.109	0.98	93.4	-1.67	-	22.80	-0.05	81.4	283.2	84.4	73.9
44	6.748	0.153	0.109	0.99	93.4	-1.67	-	22.75	-0.05	81.3	280.5	84.7	73.9
45	6.900	0.152	0.109	0.99	93.6	-1.67	-	22.70	-0.05	81.2	280.9	85.7	73.9
46	7.050	0.150	0.112	0.99	93.6	-1.68	-	22.65	-0.05	81.2	280.8	86.4	74.0
47	7.205	0.155	0.110	0.99	93.8	-1.77	-	22.60	-0.05	81.4	279.8	86.8	73.9
48	7.358	0.153	0.112	0.99	93.7	-1.79	-	22.55	-0.05	81.3	277.1	85.9	74.0
49	7.510	0.152	0.111	0.99	93.9	-1.74	-	22.51	-0.04	81.3	277.9	84.7	74.0
50	7.662	0.152	0.111	1.00	93.9	-1.81	100	22.46	-0.05	81.2	276.3	84.1	73.9
51	7.811	0.149	0.111	0.99	94.1	-1.69	-	22.41	-0.05	81.3	275.0	84.5	74.0
52	7.963	0.152	0.111	1.00	94.1	-1.74	-	22.37	-0.04	81.2	274.4	85.7	74.0
53	8.113	0.150	0.111	0.99	94.0	-1.76	-	22.32	-0.05	81.2	271.9	86.4	74.1
54	8.266	0.153	0.110	0.98	94.3	-1.74	-	22.27	-0.05	81.1	269.4	86.8	74.1
55	8.418	0.152	0.111	0.99	94.3	-1.78	-	22.22	-0.05	81.1	268.9	86.3	74.1
56	8.570	0.152	0.109	0.98	94.3	-1.82	-	22.17	-0.05	81.1	269.0	85.1	74.1
57	8.724	0.154	0.111	0.99	94.5	-1.83	-	22.13	-0.04	81.2	269.3	84.3	74.0
58	8.877	0.153	0.110	0.99	94.5	-1.87	-	22.08	-0.05	81.1	266.1	84.7	74.1
59	9.029	0.152	0.107	0.99	94.7	-1.88	-	22.04	-0.04	81.1	263.1	85.6	74.0
60	9.183	0.154	0.110	0.99	94.8	-1.86	100	21.99	-0.05	81.1	265.8	85.9	74.0
61	9.336	0.153	0.111	0.98	94.5	-1.84	-	21.96	-0.03	81.0	265.8	86.2	74.0
62	9.489	0.153	0.111	0.99	94.6	-1.84	-	21.89	-0.07	81.0	263.5	85.8	73.9
63	9.640	0.151	0.111	0.99	94.8	-1.81	-	21.85	-0.04	80.9	263.1	84.9	74.0
64	9.792	0.152	0.110	0.99	95.2	-1.82	-	21.81	-0.04	80.9	263.3	84.4	73.9
65	9.945	0.153	0.109	0.99	95.0	-1.86	-	21.76	-0.05	80.9	259.3	84.5	73.9
66	10.097	0.152	0.110	0.99	95.0	-1.96	-	21.71	-0.05	80.9	259.5	85.5	73.8
67	10.249	0.152	0.111	0.98	94.9	-1.87	-	21.67	-0.04	80.8	257.3	86.4	73.8

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
68	10.402	0.153	0.109	1.00	95.0	-1.95	-	21.62	-0.05	80.8	258.3	86.7	73.8
69	10.556	0.154	0.110	0.99	95.1	-1.86	-	21.58	-0.04	80.8	255.3	86.4	73.9
70	10.709	0.153	0.110	0.99	95.2	-1.97	100	21.53	-0.05	80.8	253.4	85.3	74.0
71	10.865	0.156	0.108	0.99	95.3	-1.93	-	21.49	-0.04	80.8	251.9	84.1	74.0
72	11.017	0.152	0.111	0.97	95.5	-1.88	-	21.45	-0.04	80.8	251.8	84.2	74.1
73	11.170	0.153	0.112	0.98	95.3	-2.01	-	21.40	-0.05	80.7	251.7	85.4	74.1
74	11.322	0.152	0.108	0.98	95.6	-2.01	-	21.36	-0.04	80.8	250.9	86.0	74.1
75	11.472	0.150	0.110	0.98	95.8	-1.95	-	21.32	-0.04	80.7	250.3	86.1	74.1
76	11.624	0.152	0.111	0.99	95.9	-1.93	-	21.27	-0.05	80.7	248.3	85.5	74.1
77	11.778	0.154	0.110	0.99	95.7	-1.95	-	21.23	-0.04	80.6	245.5	84.6	74.1
78	11.935	0.157	0.111	0.99	95.7	-2.01	-	21.19	-0.04	80.6	241.9	84.4	74.1
79	12.093	0.158	0.109	0.99	95.7	-1.99	-	21.14	-0.05	80.6	238.1	85.2	73.6
80	12.251	0.158	0.109	0.99	95.8	-2.02	101	21.11	-0.03	80.9	234.3	85.9	73.5
81	12.410	0.159	0.110	0.98	95.9	-1.99	-	21.03	-0.08	80.9	231.6	86.1	73.7
82	12.567	0.157	0.109	0.99	96.0	-2.08	-	20.97	-0.06	80.6	226.8	86.0	73.2
83	12.726	0.159	0.112	0.98	95.8	-2.07	-	20.90	-0.07	80.3	224.8	85.1	73.4
84	12.878	0.152	0.110	0.99	96.1	-2.07	-	20.90	0.00	80.6	224.6	84.4	73.3
85	13.030	0.152	0.112	0.98	96.0	-2.08	-	20.85	-0.05	80.6	223.1	84.6	73.0
86	13.181	0.151	0.110	0.99	95.8	-2.03	-	20.79	-0.06	80.5	227.1	85.8	73.3
87	13.331	0.150	0.111	0.98	95.9	-2.14	-	20.75	-0.04	80.6	227.4	86.3	73.2
88	13.484	0.153	0.108	0.99	96.1	-2.12	-	20.68	-0.07	80.7	233.9	86.0	73.3
89	13.636	0.152	0.111	0.99	96.2	-2.20	-	20.63	-0.05	81.0	240.0	85.0	73.2
90	13.789	0.153	0.111	0.99	95.9	-2.05	101	20.57	-0.06	80.8	243.3	84.3	73.4
91	13.941	0.152	0.109	0.98	95.9	-2.18	-	20.51	-0.06	80.6	245.9	84.9	73.3
92	14.092	0.151	0.112	0.98	96.1	-2.05	-	20.44	-0.07	80.7	247.5	86.0	73.4
93	14.243	0.151	0.110	0.98	96.2	-2.20	-	20.39	-0.05	80.9	249.1	86.6	73.3
94	14.398	0.155	0.111	0.99	96.2	-2.10	-	20.31	-0.08	80.8	248.4	86.9	73.2
95	14.550	0.152	0.112	0.99	96.3	-2.12	-	20.25	-0.06	81.2	249.6	86.9	73.1
96	14.703	0.153	0.111	0.99	96.2	-2.20	-	20.18	-0.07	81.0	251.7	86.3	73.3
97	14.852	0.149	0.111	0.99	96.2	-2.09	-	20.12	-0.06	81.0	255.2	85.0	73.2
98	15.004	0.152	0.112	0.98	96.2	-2.12	-	20.05	-0.07	81.1	258.5	84.3	73.2
99	15.155	0.151	0.110	0.99	96.5	-2.16	-	19.98	-0.07	81.1	261.4	84.6	73.1
100	15.306	0.151	0.109	0.98	96.4	-2.15	99	19.90	-0.08	81.2	264.8	85.6	73.2
101	15.458	0.152	0.111	0.99	96.4	-2.13	-	19.83	-0.07	81.2	267.5	85.9	73.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
102	15.613	0.155	0.111	0.98	96.2	-2.20	-	19.77	-0.06	81.1	273.2	85.4	73.1
103	15.765	0.152	0.111	0.99	96.4	-2.19	-	19.76	-0.01	81.0	268.4	84.5	73.3
104	15.918	0.153	0.113	0.99	96.4	-2.17	-	19.70	-0.06	80.9	267.7	84.7	73.3
105	16.067	0.149	0.109	0.98	96.4	-2.18	-	19.65	-0.05	80.8	269.1	85.7	73.4
106	16.218	0.151	0.109	0.98	96.2	-2.24	-	19.58	-0.07	80.7	272.9	86.1	73.5
107	16.369	0.151	0.110	0.98	96.3	-2.19	-	19.53	-0.05	80.9	273.2	85.7	73.4
108	16.520	0.151	0.109	0.98	96.2	-2.20	-	19.47	-0.06	80.8	273.8	84.9	73.5
109	16.672	0.152	0.109	0.98	96.3	-2.18	-	19.42	-0.05	80.9	274.5	84.5	73.4
110	16.827	0.155	0.108	0.97	96.7	-2.24	100	19.37	-0.05	80.8	271.9	85.2	73.4
111	16.979	0.152	0.111	0.99	96.6	-2.17	-	19.32	-0.05	80.7	264.9	86.2	73.6
112	17.128	0.149	0.110	0.98	96.3	-2.24	-	19.27	-0.05	80.7	262.4	86.8	73.8
113	17.279	0.151	0.110	0.99	96.3	-2.19	-	19.21	-0.06	80.7	261.9	87.1	73.8
114	17.430	0.151	0.111	0.98	96.7	-2.19	-	19.16	-0.05	80.8	260.9	87.3	73.9
115	17.582	0.152	0.109	0.98	96.4	-2.18	-	19.11	-0.05	80.9	260.8	87.5	73.8
116	17.737	0.155	0.110	0.97	96.6	-2.20	-	19.06	-0.05	80.9	260.1	87.6	73.9
117	17.889	0.152	0.111	0.98	96.7	-2.29	-	19.01	-0.05	81.1	262.3	87.7	73.9
118	18.041	0.152	0.110	0.99	96.7	-2.27	-	18.96	-0.05	81.1	261.9	86.8	73.9
119	18.191	0.150	0.108	0.98	96.4	-2.26	-	18.91	-0.05	81.1	260.4	85.7	73.9
120	18.341	0.150	0.109	0.98	96.8	-2.20	100	18.87	-0.04	81.1	260.2	84.6	74.0
121	18.493	0.152	0.109	0.99	96.6	-2.21	-	18.81	-0.06	81.2	258.2	84.2	74.1
122	18.648	0.155	0.108	0.99	96.5	-2.25	-	18.77	-0.04	81.2	259.1	84.9	74.1
123	18.800	0.152	0.111	0.97	96.8	-2.22	-	18.71	-0.06	81.2	259.1	85.9	74.1
124	18.953	0.153	0.108	0.99	96.7	-2.35	-	18.67	-0.04	81.2	259.9	86.4	74.1
125	19.102	0.149	0.108	0.98	96.8	-2.25	-	18.62	-0.05	81.3	259.1	86.5	74.1
126	19.254	0.152	0.111	0.99	96.8	-2.26	-	18.57	-0.05	81.3	258.5	86.4	74.2
127	19.405	0.151	0.110	0.97	96.7	-2.31	-	18.52	-0.05	81.3	259.4	85.8	74.2
128	19.559	0.154	0.111	0.99	96.5	-2.26	-	18.47	-0.05	81.3	258.3	84.8	74.2
129	19.711	0.152	0.109	0.99	96.6	-2.29	-	18.41	-0.06	81.3	257.9	84.3	74.2
130	19.861	0.150	0.108	0.98	96.6	-2.28	100	18.37	-0.04	81.2	249.6	84.7	74.3
131	20.014	0.153	0.108	1.00	97.0	-2.26	-	18.31	-0.06	81.2	245.6	85.7	74.3
132	20.166	0.152	0.108	0.99	96.9	-2.40	-	18.25	-0.06	81.1	245.1	86.4	74.3
133	20.320	0.154	0.109	0.98	96.5	-2.32	-	18.20	-0.05	81.1	245.7	86.4	74.3
134	20.472	0.152	0.110	0.98	96.8	-2.32	-	18.16	-0.04	81.2	246.6	85.7	74.4
135	20.624	0.152	0.107	0.98	96.7	-2.36	-	18.10	-0.06	81.2	246.3	84.7	74.4

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
136	20.773	0.149	0.109	0.99	97.1	-2.34	-	18.07	-0.03	81.2	248.0	84.3	74.4
137	20.926	0.153	0.108	0.98	97.0	-2.38	-	18.01	-0.06	81.2	247.3	85.1	74.4
138	21.078	0.152	0.110	1.00	97.0	-2.35	-	17.97	-0.04	81.2	248.0	86.0	74.4
139	21.232	0.154	0.109	0.99	97.3	-2.40	-	17.92	-0.05	81.2	247.9	86.5	74.4
140	21.382	0.150	0.110	0.99	96.8	-2.35	100	17.87	-0.05	81.2	246.2	86.6	74.5
141	21.531	0.149	0.110	0.98	96.8	-2.35	-	17.83	-0.04	81.2	244.8	85.9	74.4
142	21.682	0.151	0.108	0.97	97.2	-2.38	-	17.79	-0.04	81.1	245.4	84.8	74.3
143	21.834	0.152	0.111	0.99	96.8	-2.46	-	17.73	-0.06	81.2	242.9	84.3	74.5
144	21.989	0.155	0.107	0.99	97.0	-2.41	-	17.69	-0.04	81.2	240.8	84.8	74.4
145	22.141	0.152	0.108	0.98	96.9	-2.39	-	17.65	-0.04	81.1	241.8	86.0	74.4
146	22.293	0.152	0.108	0.99	97.0	-2.44	-	17.61	-0.04	81.2	244.2	86.8	74.5
147	22.441	0.148	0.110	0.96	97.2	-2.43	-	17.56	-0.05	81.2	244.1	87.0	74.4
148	22.592	0.151	0.108	0.98	97.3	-2.51	-	17.51	-0.05	81.2	243.5	86.4	74.5
149	22.744	0.152	0.108	0.99	97.3	-2.53	-	17.47	-0.04	81.2	242.3	85.5	74.5
150	22.899	0.155	0.109	0.98	97.1	-2.44	100	17.42	-0.05	81.2	243.7	84.6	74.5
151	23.052	0.153	0.110	0.98	97.2	-2.48	-	17.37	-0.05	81.2	242.5	84.6	74.5
152	23.201	0.149	0.108	0.99	97.3	-2.54	-	17.34	-0.03	81.2	242.6	85.4	74.5
153	23.354	0.153	0.108	0.97	97.2	-2.43	-	17.28	-0.06	81.2	243.0	86.2	74.6
154	23.505	0.151	0.108	0.99	97.3	-2.53	-	17.24	-0.04	81.3	245.5	86.5	74.6
155	23.656	0.151	0.109	0.99	96.8	-2.56	-	17.19	-0.05	81.3	245.2	86.2	74.6
156	23.811	0.155	0.109	0.98	97.0	-2.46	-	17.15	-0.04	81.4	245.6	85.3	74.7
157	23.962	0.151	0.108	0.99	97.2	-2.52	-	17.10	-0.05	81.4	246.1	84.5	74.7
158	24.112	0.150	0.109	0.98	97.1	-2.58	-	17.05	-0.05	81.4	245.9	84.7	74.7
159	24.264	0.152	0.110	0.98	97.0	-2.47	-	17.01	-0.04	81.4	246.3	85.7	74.7
160	24.416	0.152	0.109	0.98	97.1	-2.56	100	16.96	-0.05	81.4	247.1	86.5	74.6
161	24.569	0.153	0.108	0.98	97.1	-2.56	-	16.90	-0.06	81.4	249.6	86.9	74.6
162	24.721	0.152	0.108	0.98	96.8	-2.58	-	16.86	-0.04	81.5	250.9	87.4	74.7
163	24.870	0.149	0.111	0.99	97.1	-2.49	-	16.81	-0.05	81.4	251.6	87.6	74.7
164	25.023	0.153	0.109	1.00	97.1	-2.57	-	16.76	-0.05	81.4	253.1	87.5	74.6
165	25.174	0.151	0.109	0.98	97.0	-2.60	-	16.71	-0.05	81.4	254.0	86.6	74.6
166	25.329	0.155	0.108	0.98	97.0	-2.52	-	16.65	-0.06	81.5	257.2	85.4	74.6
167	25.481	0.152	0.109	0.98	97.2	-2.60	-	16.60	-0.05	81.5	259.4	84.4	74.6
168	25.632	0.151	0.111	0.99	97.1	-2.65	-	16.55	-0.05	81.6	262.0	84.3	74.7
169	25.781	0.149	0.107	0.99	97.3	-2.60	-	16.49	-0.06	81.6	261.6	85.2	74.7

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
170	25.933	0.152	0.109	0.99	97.1	-2.63	100	16.44	-0.05	81.7	266.0	86.3	74.7
171	26.086	0.153	0.110	0.99	97.2	-2.62	-	16.38	-0.06	81.7	268.0	86.9	74.6
172	26.241	0.155	0.106	0.99	97.3	-2.63	-	16.32	-0.06	81.8	270.0	86.9	74.7
173	26.393	0.152	0.110	0.98	97.0	-2.65	-	16.26	-0.06	81.8	271.4	86.2	74.7
174	26.543	0.150	0.108	0.98	97.3	-2.62	-	16.21	-0.05	81.9	275.0	85.2	74.8
175	26.694	0.151	0.110	0.98	97.3	-2.62	-	16.15	-0.06	82.0	275.5	84.4	74.8
176	26.849	0.155	0.107	1.00	97.3	-2.68	-	16.09	-0.06	82.1	277.1	84.7	74.8
177	27.001	0.152	0.109	0.98	97.5	-2.59	-	16.04	-0.05	82.2	278.3	85.7	74.8
178	27.153	0.152	0.109	0.97	97.2	-2.67	-	15.99	-0.05	82.1	278.3	86.2	74.8
179	27.303	0.150	0.108	1.00	97.0	-2.67	-	15.93	-0.06	82.1	278.4	86.3	74.8
180	27.455	0.152	0.110	0.98	97.4	-2.59	100	15.88	-0.05	82.2	279.9	86.0	74.8
181	27.609	0.154	0.107	0.99	97.4	-2.65	-	15.80	-0.08	82.1	280.7	85.1	74.9
182	27.761	0.152	0.108	0.98	97.4	-2.62	-	15.75	-0.05	82.2	283.2	84.4	74.9
183	27.913	0.152	0.110	0.98	97.3	-2.62	-	15.70	-0.05	82.2	283.1	84.8	74.9
184	28.063	0.150	0.109	0.98	97.2	-2.66	-	15.64	-0.06	82.3	283.7	85.9	74.9
185	28.215	0.152	0.109	0.96	97.8	-2.74	-	15.59	-0.05	82.3	283.6	86.6	74.9
186	28.370	0.155	0.108	0.98	97.6	-2.71	-	15.53	-0.06	82.4	284.4	86.7	74.9
187	28.522	0.152	0.107	0.98	97.3	-2.71	-	15.47	-0.06	82.4	284.8	86.4	74.9
188	28.673	0.151	0.109	0.98	97.5	-2.65	-	15.42	-0.05	82.4	285.0	85.5	75.0
189	28.822	0.149	0.108	0.98	97.4	-2.66	-	15.37	-0.05	82.4	286.4	84.6	74.9
190	28.973	0.151	0.108	0.98	97.4	-2.65	100	15.31	-0.06	82.4	286.9	84.4	75.0
191	29.127	0.154	0.108	0.97	97.5	-2.72	-	15.24	-0.07	82.5	285.6	85.2	74.9
192	29.279	0.152	0.107	0.97	97.3	-2.76	-	15.19	-0.05	82.6	288.9	86.1	74.9
193	29.429	0.150	0.108	0.99	97.6	-2.67	-	15.13	-0.06	82.6	288.7	86.2	75.0
194	29.580	0.151	0.110	0.98	97.4	-2.69	-	15.08	-0.05	82.6	290.8	85.6	75.0
195	29.732	0.152	0.107	0.99	97.3	-2.69	-	15.02	-0.06	82.6	291.0	84.7	75.0
196	29.886	0.154	0.109	0.99	97.4	-2.72	-	14.96	-0.06	82.6	292.1	84.5	75.0
197	30.037	0.151	0.108	0.99	97.1	-2.76	-	14.91	-0.05	82.7	291.6	85.5	75.0
198	30.186	0.149	0.109	0.97	97.5	-2.67	-	14.85	-0.06	82.8	290.8	86.2	75.0
199	30.339	0.153	0.106	0.99	97.5	-2.64	-	14.79	-0.06	82.8	292.4	86.5	75.0
200	30.491	0.152	0.110	0.98	97.2	-2.75	100	14.72	-0.07	82.8	294.3	86.6	75.0
201	30.645	0.154	0.107	0.97	97.4	-2.68	-	14.66	-0.06	82.9	295.1	86.3	75.0
202	30.795	0.150	0.109	0.99	97.5	-2.67	-	14.61	-0.05	82.9	297.3	85.3	75.1
203	30.944	0.149	0.109	0.99	97.6	-2.69	-	14.55	-0.06	83.0	297.9	84.4	75.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
204	31.096	0.152	0.110	0.98	97.5	-2.76	-	14.49	-0.06	83.0	300.2	84.5	75.1
205	31.251	0.155	0.109	0.99	97.2	-2.70	-	14.43	-0.06	83.1	299.7	85.6	75.2
206	31.403	0.152	0.108	0.98	97.3	-2.72	-	14.36	-0.07	83.1	302.2	86.5	75.2
207	31.552	0.149	0.110	0.97	97.3	-2.71	-	14.30	-0.06	83.1	304.7	86.7	75.1
208	31.703	0.151	0.109	0.97	97.8	-2.75	-	14.25	-0.05	83.2	305.1	86.8	75.2
209	31.855	0.152	0.109	0.98	97.5	-2.69	-	14.18	-0.07	83.2	309.2	86.8	75.2
210	32.008	0.153	0.108	0.98	97.6	-2.75	100	14.12	-0.06	83.3	311.5	87.0	75.3
211	32.160	0.152	0.109	0.98	97.5	-2.76	-	14.06	-0.06	83.4	310.5	87.2	75.3
212	32.309	0.149	0.110	0.98	97.7	-2.77	-	14.00	-0.06	83.4	311.7	87.4	75.3
213	32.461	0.152	0.110	0.99	97.7	-2.82	-	13.93	-0.07	83.4	312.9	87.6	75.3
214	32.615	0.154	0.107	0.98	97.4	-2.69	-	13.87	-0.06	83.4	313.4	87.6	75.3
215	32.767	0.152	0.108	0.98	97.6	-2.74	-	13.81	-0.06	83.5	314.0	87.3	75.3
216	32.916	0.149	0.109	0.97	97.5	-2.79	-	13.74	-0.07	83.5	314.9	86.3	75.3
217	33.066	0.150	0.108	1.00	97.5	-2.72	-	13.69	-0.05	83.6	315.5	85.2	75.3
218	33.217	0.151	0.109	0.98	97.3	-2.75	-	13.63	-0.06	83.6	316.4	84.5	75.3
219	33.372	0.155	0.107	0.99	97.6	-2.69	-	13.56	-0.07	83.8	319.0	84.7	75.4
220	33.524	0.152	0.108	0.98	97.3	-2.76	100	13.50	-0.06	83.8	319.6	85.7	75.4
221	33.672	0.148	0.107	0.96	97.8	-2.75	-	13.44	-0.06	83.8	321.0	86.3	75.4
222	33.824	0.152	0.108	0.98	97.6	-2.77	-	13.38	-0.06	83.8	321.2	86.3	75.4
223	33.977	0.153	0.109	0.98	97.7	-2.74	-	13.31	-0.07	83.8	322.9	85.7	75.4
224	34.128	0.151	0.107	0.98	97.7	-2.72	-	13.25	-0.06	83.9	322.2	85.0	75.4
225	34.276	0.148	0.108	0.98	97.9	-2.73	-	13.19	-0.06	83.9	322.6	84.5	75.5
226	34.428	0.152	0.108	0.98	97.7	-2.77	-	13.13	-0.06	84.0	322.5	85.0	75.5
227	34.581	0.153	0.110	0.97	97.8	-2.79	-	13.07	-0.06	84.0	322.9	86.0	75.5
228	34.733	0.152	0.111	0.97	97.6	-2.75	-	13.00	-0.07	83.9	324.9	86.7	75.5
229	34.888	0.155	0.109	0.97	97.5	-2.79	-	12.94	-0.06	83.9	323.6	86.7	75.5
230	35.038	0.150	0.109	0.97	97.6	-2.73	100	12.88	-0.06	83.9	322.7	86.4	75.5
231	35.189	0.151	0.108	0.99	97.7	-2.76	-	12.81	-0.07	83.9	324.0	85.5	75.6
232	35.344	0.155	0.107	1.00	97.8	-2.76	-	12.75	-0.06	83.9	325.7	84.6	75.6
233	35.496	0.152	0.107	0.98	97.8	-2.72	-	12.70	-0.05	84.0	326.4	84.7	75.7
234	35.646	0.150	0.109	0.98	97.5	-2.81	-	12.63	-0.07	84.0	325.0	85.5	75.7
235	35.798	0.152	0.111	0.97	97.5	-2.81	-	12.56	-0.07	84.1	323.8	85.8	75.6
236	35.951	0.153	0.111	0.98	97.6	-2.71	-	12.51	-0.05	84.1	323.8	85.8	75.7
237	36.105	0.154	0.107	0.98	97.6	-2.77	-	12.44	-0.07	84.4	322.9	85.2	75.7

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
238	36.256	0.151	0.109	0.97	97.7	-2.71	-	12.38	-0.06	84.5	322.0	84.4	75.7
239	36.405	0.149	0.108	0.98	97.5	-2.76	-	12.32	-0.06	84.4	320.8	84.6	75.7
240	36.557	0.152	0.108	0.99	97.9	-2.75	100	12.26	-0.06	84.5	322.1	85.6	75.8
241	36.711	0.154	0.109	0.99	97.7	-2.77	-	12.20	-0.06	84.6	321.4	86.3	75.7
242	36.864	0.153	0.109	0.99	97.8	-2.80	-	12.13	-0.07	84.5	319.9	86.6	75.7
243	37.013	0.149	0.110	0.99	97.8	-2.71	-	12.09	-0.04	84.5	320.5	86.2	75.8
244	37.165	0.152	0.107	0.97	97.8	-2.76	-	12.02	-0.07	84.5	323.8	85.4	75.7
245	37.319	0.154	0.109	0.99	97.8	-2.72	-	11.96	-0.06	84.5	322.1	84.6	75.8
246	37.470	0.151	0.108	0.99	97.8	-2.76	-	11.90	-0.06	84.5	325.7	84.8	75.8
247	37.619	0.149	0.109	0.98	97.9	-2.75	-	11.83	-0.07	84.6	324.0	85.6	75.8
248	37.770	0.151	0.110	0.98	97.7	-2.80	-	11.76	-0.07	84.6	324.8	86.3	75.8
249	37.925	0.155	0.107	0.98	97.6	-2.78	-	11.70	-0.06	84.7	328.4	86.9	75.8
250	38.076	0.151	0.109	0.97	97.7	-2.70	100	11.64	-0.06	84.7	331.1	87.1	75.8
251	38.226	0.150	0.108	0.97	98.0	-2.72	-	11.57	-0.07	84.8	334.0	87.0	75.9
252	38.377	0.151	0.106	0.98	97.8	-2.75	-	11.49	-0.08	84.8	336.1	86.1	75.9
253	38.530	0.153	0.109	0.97	97.5	-2.74	-	11.43	-0.06	85.0	338.9	85.2	75.9
254	38.681	0.151	0.109	0.98	97.6	-2.80	-	11.37	-0.06	85.0	340.9	84.6	76.0
255	38.830	0.149	0.111	0.98	98.0	-2.76	-	11.30	-0.07	85.0	340.2	84.9	75.9
256	38.982	0.152	0.109	0.98	97.9	-2.81	-	11.22	-0.08	85.1	343.2	85.7	75.9
257	39.136	0.154	0.110	0.98	97.9	-2.73	-	11.16	-0.06	85.0	345.8	86.4	76.0
258	39.287	0.151	0.106	0.97	98.0	-2.77	-	11.09	-0.07	85.1	347.2	86.8	76.0
259	39.436	0.149	0.108	0.99	97.9	-2.78	-	11.02	-0.07	85.1	344.9	86.6	76.0
260	39.587	0.151	0.107	0.98	98.3	-2.75	100	10.95	-0.07	85.2	347.6	85.9	76.1
261	39.740	0.153	0.109	0.96	98.3	-2.80	-	10.88	-0.07	85.3	344.9	85.0	76.1
262	39.891	0.151	0.111	0.99	97.9	-2.71	-	10.82	-0.06	85.5	344.4	84.5	76.2
263	40.039	0.148	0.111	0.97	98.0	-2.76	-	10.75	-0.07	85.6	343.6	85.1	76.2
264	40.191	0.152	0.110	0.98	97.9	-2.73	-	10.68	-0.07	85.5	343.7	86.0	76.2
265	40.346	0.155	0.109	0.98	97.7	-2.75	-	10.62	-0.06	85.4	342.6	86.7	76.2
266	40.497	0.151	0.110	0.97	97.9	-2.77	-	10.55	-0.07	85.5	345.2	86.7	76.2
267	40.647	0.150	0.110	0.97	97.6	-2.76	-	10.50	-0.05	85.5	343.6	86.0	76.2
268	40.798	0.151	0.109	0.98	97.9	-2.73	-	10.43	-0.07	85.5	344.9	85.1	76.2
269	40.951	0.153	0.108	0.98	98.0	-2.77	-	10.37	-0.06	85.6	344.0	84.5	76.2
270	41.102	0.151	0.108	0.99	97.8	-2.70	101	10.29	-0.08	85.6	345.5	84.8	76.2
271	41.251	0.149	0.108	0.97	97.8	-2.79	-	10.23	-0.06	85.6	346.7	85.7	76.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
272	41.403	0.152	0.108	0.97	97.8	-2.80	-	10.16	-0.07	85.6	345.5	86.2	76.2
273	41.558	0.155	0.108	0.96	97.8	-2.73	-	10.10	-0.06	85.6	346.3	86.3	76.2
274	41.709	0.151	0.109	0.98	98.0	-2.71	-	10.03	-0.07	85.6	348.3	86.1	76.2
275	41.859	0.150	0.108	0.98	97.9	-2.75	-	9.96	-0.07	85.7	346.7	85.3	76.2
276	42.009	0.150	0.107	0.98	98.1	-2.79	-	9.89	-0.07	85.7	348.2	84.6	76.3
277	42.163	0.154	0.108	0.98	97.8	-2.71	-	9.83	-0.06	85.8	348.7	84.9	76.2
278	42.315	0.152	0.109	0.98	98.2	-2.75	-	9.77	-0.06	85.9	349.0	85.8	76.3
279	42.465	0.150	0.107	0.98	97.9	-2.82	-	9.70	-0.07	85.9	352.6	86.6	76.3
280	42.616	0.151	0.108	0.98	98.0	-2.81	100	9.62	-0.08	86.0	349.7	87.2	76.4
281	42.771	0.155	0.107	0.97	97.9	-2.70	-	9.56	-0.06	86.0	352.7	87.4	76.4
282	42.921	0.150	0.109	0.96	97.8	-2.68	-	9.49	-0.07	86.0	353.4	87.0	76.4
283	43.070	0.149	0.108	0.99	98.3	-2.71	-	9.42	-0.07	86.1	353.5	86.1	76.5
284	43.221	0.151	0.110	0.99	98.2	-2.76	-	9.35	-0.07	86.1	352.8	85.2	76.5
285	43.375	0.154	0.110	0.98	98.0	-2.74	-	9.28	-0.07	86.1	352.1	84.6	76.6
286	43.527	0.152	0.109	0.98	98.0	-2.70	-	9.21	-0.07	86.2	352.5	84.9	76.5
287	43.676	0.149	0.109	0.98	97.8	-2.82	-	9.14	-0.07	86.2	350.5	85.8	76.5
288	43.829	0.153	0.109	0.98	97.8	-2.73	-	9.07	-0.07	86.2	353.9	86.6	76.6
289	43.984	0.155	0.110	0.97	97.9	-2.70	-	9.00	-0.07	86.3	355.7	87.2	76.6
290	44.134	0.150	0.109	0.98	98.0	-2.81	100	8.94	-0.06	86.4	354.6	87.0	76.6
291	44.281	0.147	0.110	0.98	98.0	-2.70	-	8.86	-0.08	86.4	355.2	86.2	76.6
292	44.432	0.151	0.108	0.98	98.3	-2.74	-	8.78	-0.08	86.4	356.1	85.3	76.6
293	44.584	0.152	0.111	0.98	98.2	-2.76	-	8.72	-0.06	86.5	357.3	84.6	76.7
294	44.736	0.152	0.108	0.97	98.1	-2.73	-	8.65	-0.07	86.5	362.6	84.9	76.6
295	44.889	0.153	0.109	0.98	97.8	-2.70	-	8.57	-0.08	86.5	363.4	85.8	76.6
296	45.041	0.152	0.109	0.98	97.9	-2.78	-	8.51	-0.06	86.6	361.0	86.6	76.8
297	45.192	0.151	0.109	0.98	98.2	-2.76	-	8.46	-0.05	86.6	360.6	86.6	76.7
298	45.345	0.153	0.108	0.96	98.0	-2.77	-	8.41	-0.05	86.6	356.4	86.6	76.7
299	45.496	0.151	0.110	0.98	98.3	-2.77	-	8.35	-0.06	86.5	353.3	86.8	76.7
300	45.648	0.152	0.110	0.97	98.3	-2.70	100	8.29	-0.06	86.6	352.0	87.2	76.7
301	45.801	0.153	0.108	0.98	98.3	-2.72	-	8.24	-0.05	86.6	347.8	87.6	76.8
302	45.954	0.153	0.108	0.98	98.5	-2.79	-	8.18	-0.06	86.5	344.6	87.5	76.8
303	46.106	0.152	0.109	0.97	98.4	-2.79	-	8.12	-0.06	86.5	342.7	86.9	76.7
304	46.259	0.153	0.107	0.98	98.0	-2.73	-	8.08	-0.04	86.5	338.7	86.0	76.8
305	46.411	0.152	0.109	0.98	98.3	-2.67	-	8.01	-0.07	86.4	336.7	85.1	76.8

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
306	46.564	0.153	0.109	0.98	98.1	-2.74	-	7.97	-0.04	86.4	335.5	84.5	76.8
307	46.715	0.151	0.108	0.98	98.2	-2.81	-	7.91	-0.06	86.4	335.2	84.9	76.8
308	46.867	0.152	0.109	0.98	98.2	-2.69	-	7.86	-0.05	86.4	329.3	86.0	76.9
309	47.019	0.152	0.108	0.97	98.2	-2.78	-	7.82	-0.04	86.3	328.1	86.8	76.8
310	47.171	0.152	0.109	0.98	98.1	-2.80	100	7.76	-0.06	86.3	327.7	87.3	76.9
311	47.323	0.152	0.109	0.98	98.5	-2.80	-	7.71	-0.05	86.3	325.2	87.0	76.9
312	47.475	0.152	0.109	0.97	98.2	-2.75	-	7.65	-0.06	86.3	320.6	86.2	76.9
313	47.627	0.152	0.110	0.99	98.2	-2.71	-	7.61	-0.04	86.2	318.5	85.2	76.9
314	47.779	0.152	0.108	0.99	98.4	-2.77	-	7.56	-0.05	86.2	315.9	84.7	76.9
315	47.931	0.152	0.106	0.98	98.2	-2.83	-	7.51	-0.05	86.2	314.0	85.0	77.0
316	48.084	0.153	0.107	0.98	98.5	-2.72	-	7.47	-0.04	86.1	313.4	85.7	76.9
317	48.237	0.153	0.108	0.99	98.4	-2.78	-	7.41	-0.06	86.1	311.3	86.3	77.1
318	48.388	0.151	0.108	0.96	98.4	-2.77	-	7.37	-0.04	86.1	309.8	86.9	77.0
319	48.541	0.153	0.108	0.98	98.6	-2.80	-	7.33	-0.04	86.1	308.5	87.2	77.0
320	48.692	0.151	0.109	0.97	98.2	-2.78	100	7.28	-0.05	86.0	306.0	87.6	77.0
321	48.844	0.152	0.108	0.98	98.2	-2.78	-	7.23	-0.05	86.0	304.0	87.7	77.0
322	48.995	0.151	0.106	0.98	98.5	-2.74	-	7.18	-0.05	86.0	300.2	87.3	77.0
323	49.147	0.152	0.108	0.97	98.6	-2.84	-	7.13	-0.05	85.9	296.4	86.3	76.9
324	49.299	0.152	0.106	0.97	98.6	-2.76	-	7.09	-0.04	85.9	299.5	85.3	76.9
325	49.451	0.152	0.111	0.95	98.5	-2.84	-	7.04	-0.05	85.9	297.6	84.6	77.0
326	49.601	0.150	0.106	0.97	98.5	-2.79	-	7.00	-0.04	86.0	299.8	84.6	77.0
327	49.753	0.152	0.110	0.98	98.4	-2.90	-	6.94	-0.06	86.0	298.6	85.6	77.0
328	49.904	0.151	0.107	0.98	98.7	-2.78	-	6.90	-0.04	86.0	298.5	86.5	77.0
329	50.056	0.152	0.110	0.98	98.3	-2.86	-	6.84	-0.06	85.9	300.0	86.3	77.0
330	50.208	0.152	0.110	0.98	98.6	-2.78	100	6.79	-0.05	85.9	301.6	85.7	77.0
331	50.359	0.151	0.107	0.97	98.4	-2.91	-	6.74	-0.05	86.0	302.3	84.9	77.1
332	50.511	0.152	0.109	0.98	98.5	-2.85	-	6.69	-0.05	85.9	304.5	84.7	77.1
333	50.662	0.151	0.108	0.97	98.5	-2.84	-	6.64	-0.05	86.0	306.2	85.5	77.1
334	50.815	0.153	0.109	0.96	98.7	-2.90	-	6.58	-0.06	86.0	303.4	86.2	77.1
335	50.967	0.152	0.110	0.99	98.6	-2.92	-	6.54	-0.04	86.0	303.1	86.4	77.1
336	51.118	0.151	0.108	0.97	98.4	-2.89	-	6.49	-0.05	86.0	306.0	86.1	77.1
337	51.269	0.151	0.109	0.98	98.4	-2.87	-	6.43	-0.06	86.0	305.9	85.3	77.1
338	51.419	0.150	0.106	0.98	98.7	-2.89	-	6.38	-0.05	86.0	305.4	84.8	77.2
339	51.571	0.152	0.108	0.99	98.5	-2.84	-	6.35	-0.03	86.0	303.0	85.0	77.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
340	51.723	0.152	0.109	0.97	98.6	-2.83	100	6.31	-0.04	86.0	298.0	85.9	77.2
341	51.874	0.151	0.107	0.98	98.6	-2.91	-	6.28	-0.03	86.0	294.4	86.6	77.3
342	52.026	0.152	0.108	0.98	98.9	-2.83	-	6.24	-0.04	85.8	290.1	86.9	77.3
343	52.178	0.152	0.108	0.97	98.9	-2.90	-	6.19	-0.05	85.9	287.2	87.2	77.2
344	52.330	0.152	0.108	0.97	98.8	-2.83	-	6.16	-0.03	85.9	284.7	86.6	77.2
345	52.480	0.150	0.108	0.98	98.7	-2.93	-	6.12	-0.04	85.9	281.1	85.7	77.2
346	52.633	0.153	0.108	0.98	98.7	-2.80	-	6.08	-0.04	85.8	280.5	85.0	77.3
347	52.784	0.151	0.109	0.97	98.5	-2.84	-	6.04	-0.04	85.8	277.0	84.6	77.3
348	52.937	0.153	0.109	0.97	98.7	-2.85	-	6.01	-0.03	85.7	275.5	85.1	77.2
349	53.089	0.152	0.107	0.98	98.7	-2.83	-	5.97	-0.04	85.8	274.1	85.9	77.2
350	53.242	0.153	0.109	0.97	98.9	-2.89	100	5.93	-0.04	85.7	275.0	86.4	77.2
351	53.395	0.153	0.108	0.96	98.6	-2.94	-	5.90	-0.03	85.7	272.6	86.9	77.2
352	53.546	0.151	0.108	0.97	98.9	-2.91	-	5.86	-0.04	85.7	270.8	87.4	77.2
353	53.696	0.150	0.109	0.97	98.8	-2.84	-	5.82	-0.04	85.7	271.7	87.3	77.2
354	53.849	0.153	0.110	0.98	98.9	-2.87	-	5.78	-0.04	85.7	269.0	86.5	77.3
355	54.001	0.152	0.109	0.97	98.8	-2.96	-	5.74	-0.04	85.7	269.0	85.5	77.2
356	54.152	0.151	0.109	0.97	99.1	-2.85	-	5.70	-0.04	85.6	269.5	84.7	77.2
357	54.305	0.153	0.106	0.97	98.7	-2.86	-	5.67	-0.03	85.7	268.0	84.7	77.1
358	54.457	0.152	0.109	0.96	98.9	-2.88	-	5.62	-0.05	85.7	270.2	85.6	77.2
359	54.609	0.152	0.107	0.98	98.9	-2.97	-	5.59	-0.03	85.7	268.9	86.5	77.2
360	54.759	0.150	0.107	0.98	98.9	-2.99	100	5.55	-0.04	85.6	267.9	87.1	77.2
361	54.911	0.152	0.109	0.98	99.1	-2.89	-	5.51	-0.04	85.7	270.0	87.2	77.2
362	55.063	0.152	0.108	0.99	99.0	-2.91	-	5.47	-0.04	85.7	270.7	86.7	77.2
363	55.214	0.151	0.108	0.97	99.0	-2.92	-	5.43	-0.04	85.7	269.9	86.0	77.2
364	55.365	0.151	0.108	0.98	98.9	-3.01	-	5.38	-0.05	85.7	271.1	85.2	77.2
365	55.518	0.153	0.110	0.99	99.0	-3.00	-	5.34	-0.04	85.7	273.6	84.6	77.2
366	55.669	0.151	0.108	0.97	98.9	-3.00	-	5.30	-0.04	85.7	272.5	85.0	77.2
367	55.821	0.152	0.108	0.98	99.1	-2.90	-	5.26	-0.04	85.7	273.3	86.1	77.2
368	55.971	0.150	0.108	0.98	99.1	-2.93	-	5.22	-0.04	85.7	272.1	86.9	77.2
369	56.123	0.152	0.108	0.98	99.2	-2.96	-	5.18	-0.04	85.8	271.2	87.4	77.2
370	56.275	0.152	0.107	0.99	99.1	-3.00	101	5.13	-0.05	85.8	269.9	87.2	77.1
371	56.426	0.151	0.109	0.97	99.0	-2.97	-	5.10	-0.03	85.8	271.3	86.5	77.2
372	56.578	0.152	0.107	0.98	98.7	-2.98	-	5.06	-0.04	85.8	271.2	85.6	77.1
373	56.730	0.152	0.109	0.98	99.1	-2.93	-	5.01	-0.05	85.8	273.4	85.0	77.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
374	56.882	0.152	0.108	0.98	99.2	-2.94	-	4.97	-0.04	85.8	271.4	84.7	77.1
375	57.033	0.151	0.108	0.97	99.0	-2.96	-	4.94	-0.03	85.8	270.5	85.4	77.1
376	57.183	0.150	0.108	0.97	99.0	-3.02	-	4.89	-0.05	85.8	270.4	86.5	77.2
377	57.335	0.152	0.109	0.98	98.8	-3.02	-	4.85	-0.04	85.8	270.0	87.1	77.1
378	57.486	0.151	0.108	0.97	99.1	-3.07	-	4.81	-0.04	85.8	270.2	87.6	77.2
379	57.638	0.152	0.108	0.96	98.8	-3.06	-	4.78	-0.03	85.8	269.4	87.8	77.2
380	57.790	0.152	0.108	0.98	99.2	-3.07	100	4.74	-0.04	85.8	270.3	87.9	77.2
381	57.941	0.151	0.107	0.97	99.3	-2.96	-	4.69	-0.05	85.8	271.0	88.1	77.2
382	58.093	0.152	0.108	0.98	99.1	-2.95	-	4.65	-0.04	85.8	271.4	87.8	77.1
383	58.244	0.151	0.109	0.98	98.9	-3.07	-	4.61	-0.04	85.8	273.9	86.9	77.2
384	58.394	0.150	0.106	0.96	99.0	-2.96	-	4.57	-0.04	85.8	272.6	86.0	77.2
385	58.545	0.151	0.107	0.97	99.2	-2.94	-	4.53	-0.04	85.8	273.2	85.0	77.2
386	58.697	0.152	0.107	0.98	99.1	-3.01	-	4.49	-0.04	85.8	270.6	84.5	77.2
387	58.848	0.151	0.106	0.97	99.1	-3.00	-	4.45	-0.04	85.9	270.1	85.0	77.2
388	59.001	0.153	0.108	0.97	99.0	-3.00	-	4.41	-0.04	85.8	271.7	86.0	77.2
389	59.153	0.152	0.108	0.98	99.2	-3.04	-	4.37	-0.04	85.8	271.4	86.6	77.2
390	59.305	0.152	0.106	0.98	99.2	-3.03	101	4.34	-0.03	85.8	271.1	86.7	77.1
391	59.456	0.151	0.109	0.96	99.1	-2.98	-	4.30	-0.04	85.8	268.4	86.4	77.1
392	59.607	0.151	0.107	0.98	99.1	-3.04	-	4.26	-0.04	85.8	269.3	85.6	77.2
393	59.759	0.152	0.107	0.98	99.2	-3.07	-	4.22	-0.04	85.9	270.3	84.9	77.2
394	59.912	0.153	0.108	0.97	98.9	-3.09	-	4.20	-0.02	85.8	268.3	84.7	77.1
395	60.063	0.151	0.108	0.96	99.2	-3.00	-	4.15	-0.05	85.9	267.7	85.4	77.1
396	60.216	0.153	0.107	0.97	99.2	-3.07	-	4.12	-0.03	85.9	267.6	86.1	77.2
397	60.368	0.152	0.108	0.98	99.3	-3.05	-	4.09	-0.03	85.9	265.8	86.5	77.2
398	60.521	0.153	0.108	0.97	99.1	-3.03	-	4.05	-0.04	85.9	265.5	86.8	77.2
399	60.671	0.150	0.109	0.97	99.2	-3.05	-	4.01	-0.04	85.9	264.9	87.1	77.2
400	60.823	0.152	0.108	0.97	99.1	-3.06	101	3.98	-0.03	85.9	263.5	87.3	77.2
401	60.975	0.152	0.107	0.96	99.1	-3.03	-	3.94	-0.04	85.9	262.0	87.0	77.2
402	61.127	0.152	0.108	0.98	99.4	-3.09	-	3.91	-0.03	85.9	263.8	86.3	77.2
403	61.279	0.152	0.109	0.97	99.4	-3.07	-	3.87	-0.04	85.9	263.5	85.4	77.2
404	61.432	0.153	0.108	0.98	99.4	-3.08	-	3.84	-0.03	85.9	262.5	84.7	77.2
405	61.585	0.153	0.108	0.97	99.2	-3.02	-	3.81	-0.03	85.9	261.5	84.5	77.2
406	61.735	0.150	0.108	0.98	99.7	-3.08	-	3.78	-0.03	85.9	262.7	85.4	77.3
407	61.886	0.151	0.108	0.98	99.5	-3.08	-	3.73	-0.05	85.9	264.0	86.0	77.3

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
408	62.039	0.153	0.108	0.99	99.1	-3.13	-	3.71	-0.02	85.9	264.1	86.4	77.2
409	62.191	0.152	0.107	0.97	99.4	-3.05	-	3.66	-0.05	85.9	263.4	86.5	77.2
410	62.344	0.153	0.108	0.97	99.3	-3.12	101	3.62	-0.04	85.9	262.1	86.5	77.2
411	62.496	0.152	0.109	0.98	99.2	-3.09	-	3.60	-0.02	85.8	261.9	86.7	77.2
412	62.648	0.152	0.107	0.98	99.4	-3.05	-	3.57	-0.03	86.0	258.9	86.9	77.2
413	62.801	0.153	0.109	0.97	99.0	-3.12	-	3.54	-0.03	85.9	257.3	87.0	77.2
414	62.951	0.150	0.108	0.97	99.4	-3.02	-	3.51	-0.03	85.9	257.4	86.8	77.2
415	63.104	0.153	0.108	0.98	99.3	-3.02	-	3.48	-0.03	85.9	256.3	86.0	77.2
416	63.255	0.151	0.106	0.99	99.1	-3.12	-	3.46	-0.02	85.8	252.3	85.2	77.2
417	63.408	0.153	0.108	0.98	99.3	-3.09	-	3.44	-0.02	85.8	252.7	84.7	77.2
418	63.561	0.153	0.109	0.98	99.4	-3.09	-	3.40	-0.04	85.8	249.7	85.0	77.2
419	63.714	0.153	0.110	0.96	99.1	-3.00	-	3.39	-0.01	85.7	246.3	85.8	77.2
420	63.866	0.152	0.107	0.98	99.2	-3.14	101	3.37	-0.02	85.7	244.7	86.4	77.1
421	64.017	0.151	0.108	0.97	99.3	-3.11	-	3.35	-0.02	85.7	243.5	86.9	77.2
422	64.167	0.150	0.107	0.98	99.4	-3.13	-	3.32	-0.03	85.7	239.3	86.7	77.2
423	64.318	0.151	0.109	0.97	99.4	-3.08	-	3.30	-0.02	85.7	237.1	86.1	77.2
424	64.470	0.152	0.107	0.98	99.2	-3.06	-	3.28	-0.02	85.6	234.5	85.3	77.2
425	64.622	0.152	0.108	0.98	99.3	-3.11	-	3.28	0.00	85.6	232.4	84.6	77.2
426	64.775	0.153	0.109	0.98	99.3	-3.10	-	3.25	-0.03	85.6	228.3	84.8	77.2
427	64.927	0.152	0.108	0.98	99.4	-3.11	-	3.24	-0.01	85.6	225.9	85.9	77.2
428	65.079	0.152	0.108	0.98	99.4	-3.10	-	3.22	-0.02	85.6	225.0	86.6	77.3
429	65.230	0.151	0.108	0.98	99.5	-3.18	-	3.20	-0.02	85.5	220.7	87.0	77.2
430	65.382	0.152	0.108	0.99	99.3	-3.13	100	3.19	-0.01	85.5	216.9	87.1	77.2
431	65.534	0.152	0.109	0.98	99.7	-3.18	-	3.17	-0.02	85.5	215.8	86.6	77.3
432	65.687	0.153	0.109	0.99	99.6	-3.16	-	3.15	-0.02	85.5	214.6	85.8	77.2
433	65.839	0.152	0.108	0.97	99.6	-3.10	-	3.13	-0.02	85.5	209.8	85.0	77.2
434	65.992	0.153	0.109	0.97	99.6	-3.08	-	3.12	-0.01	85.5	209.3	84.7	77.1
435	66.144	0.152	0.109	0.97	99.7	-3.18	-	3.11	-0.01	85.4	207.1	85.6	77.3
436	66.296	0.152	0.106	0.98	99.4	-3.15	-	3.10	-0.01	85.4	208.0	86.2	77.2
437	66.446	0.150	0.108	0.97	99.2	-3.18	-	3.09	-0.01	85.4	207.3	86.4	77.2
438	66.598	0.152	0.109	0.98	99.4	-3.19	-	3.06	-0.03	85.3	206.1	86.4	77.2
439	66.750	0.152	0.108	0.98	99.4	-3.22	-	3.04	-0.02	85.3	205.2	86.3	77.2
440	66.902	0.152	0.108	0.98	99.5	-3.14	100	3.05	0.01	85.3	204.1	85.7	77.3
441	67.054	0.152	0.109	0.97	99.6	-3.14	-	3.02	-0.03	85.2	202.5	84.9	77.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
442	67.206	0.152	0.109	0.97	99.3	-3.21	-	3.01	-0.01	85.2	199.7	84.7	77.2
443	67.358	0.152	0.107	0.97	99.2	-3.24	-	3.01	0.00	85.2	198.5	85.4	77.2
444	67.508	0.150	0.107	0.96	99.5	-3.21	-	2.98	-0.03	85.1	197.6	86.0	77.1
445	67.660	0.152	0.107	0.98	99.6	-3.17	-	2.97	-0.01	85.2	199.0	86.7	77.1
446	67.811	0.151	0.107	0.97	99.3	-3.26	-	2.95	-0.02	85.1	197.3	87.2	77.1
447	67.964	0.153	0.109	0.98	99.4	-3.19	-	2.94	-0.01	85.1	194.8	87.5	77.2
448	68.116	0.152	0.108	0.96	99.6	-3.16	-	2.93	-0.01	85.1	194.8	87.6	77.2
449	68.269	0.153	0.109	0.97	99.4	-3.16	-	2.91	-0.02	85.1	194.4	88.0	77.2
450	68.420	0.151	0.107	0.97	99.5	-3.21	100	2.90	-0.01	85.1	193.9	87.9	77.2
451	68.572	0.152	0.108	0.97	99.4	-3.25	-	2.88	-0.02	85.0	193.0	88.1	77.2
452	68.722	0.150	0.107	0.98	99.3	-3.18	-	2.86	-0.02	85.0	193.9	88.4	77.3
453	68.874	0.152	0.109	0.97	99.3	-3.21	-	2.86	0.00	85.0	192.4	88.8	77.2
454	69.026	0.152	0.107	0.97	99.4	-3.30	-	2.84	-0.02	84.9	191.5	89.1	77.1
455	69.178	0.152	0.109	0.95	99.7	-3.23	-	2.83	-0.01	85.0	189.9	89.5	77.2
456	69.330	0.152	0.108	0.97	99.6	-3.22	-	2.82	-0.01	84.9	189.1	89.7	77.1
457	69.482	0.152	0.107	0.96	99.7	-3.31	-	2.81	-0.01	84.8	188.1	88.9	77.1
458	69.634	0.152	0.109	0.97	99.6	-3.18	-	2.80	-0.01	84.9	187.4	87.6	77.1
459	69.786	0.152	0.109	0.98	99.4	-3.32	-	2.78	-0.02	84.8	183.8	86.6	77.0
460	69.936	0.150	0.110	0.97	99.4	-3.22	100	2.77	-0.01	84.8	183.1	85.7	77.0
461	70.090	0.154	0.108	0.97	99.5	-3.30	-	2.76	-0.01	84.8	184.7	84.9	77.0
462	70.242	0.152	0.108	0.97	99.4	-3.36	-	2.74	-0.02	84.8	184.7	84.9	77.0
463	70.394	0.152	0.110	0.98	99.6	-3.31	-	2.73	-0.01	84.7	185.1	85.6	76.9
464	70.548	0.154	0.108	0.97	99.6	-3.30	-	2.71	-0.02	84.7	185.2	86.4	76.9
465	70.700	0.152	0.109	0.98	99.5	-3.32	-	2.70	-0.01	84.7	184.4	86.7	76.9
466	70.853	0.153	0.109	0.99	99.6	-3.34	-	2.70	0.00	84.6	183.7	87.1	76.9
467	71.004	0.151	0.111	0.97	99.8	-3.25	-	2.68	-0.02	84.6	181.5	87.3	76.9
468	71.157	0.153	0.107	0.96	99.7	-3.33	-	2.66	-0.02	84.5	179.0	86.8	76.8
469	71.309	0.152	0.106	0.99	99.4	-3.26	-	2.66	0.00	84.5	178.2	85.9	76.8
470	71.462	0.153	0.107	0.97	99.7	-3.30	100	2.64	-0.02	84.5	178.8	85.0	76.8
471	71.615	0.153	0.107	0.98	99.5	-3.35	-	2.64	0.00	84.5	178.9	84.6	76.8
472	71.767	0.152	0.107	0.97	99.7	-3.36	-	2.62	-0.02	84.4	178.4	85.1	76.8
473	71.919	0.152	0.107	0.96	99.8	-3.35	-	2.60	-0.02	84.4	177.0	86.0	76.8
474	72.071	0.152	0.107	0.97	99.6	-3.26	-	2.60	0.00	84.4	186.0	86.6	76.8
475	72.222	0.151	0.108	0.99	99.3	-3.38	-	2.59	-0.01	84.3	184.1	86.8	76.8

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
476	72.374	0.152	0.108	0.98	99.6	-3.27	-	2.58	-0.01	84.2	182.6	86.8	76.9
477	72.526	0.152	0.109	0.98	99.3	-3.37	-	2.57	-0.01	84.3	182.6	86.9	76.9
478	72.677	0.151	0.108	0.98	99.5	-3.33	-	2.56	-0.01	84.3	182.6	87.1	76.9
479	72.829	0.152	0.110	0.97	99.7	-3.32	-	2.55	-0.01	84.3	182.6	87.3	77.0
480	72.981	0.152	0.108	0.96	99.4	-3.32	100	2.53	-0.02	84.3	181.7	86.8	77.1
481	73.133	0.152	0.106	0.96	99.1	-3.30	-	2.52	-0.01	84.4	181.3	86.1	77.1
482	73.285	0.152	0.109	0.97	99.7	-3.38	-	2.52	0.00	84.4	180.5	85.4	77.2
483	73.435	0.150	0.107	0.97	99.3	-3.29	-	2.51	-0.01	84.4	179.6	84.7	77.2
484	73.587	0.152	0.109	0.97	99.5	-3.39	-	2.50	-0.01	84.3	178.5	85.0	77.3
485	73.740	0.153	0.109	0.98	99.5	-3.36	-	2.48	-0.02	84.4	177.7	86.0	77.3
486	73.891	0.151	0.108	0.96	99.5	-3.36	-	2.48	0.00	84.3	176.8	86.6	77.4
487	74.044	0.153	0.107	0.96	99.6	-3.33	-	2.47	-0.01	84.3	175.9	86.8	77.5
488	74.195	0.151	0.108	0.98	99.8	-3.28	-	2.45	-0.02	84.4	176.3	86.7	77.5
489	74.346	0.151	0.107	0.97	99.5	-3.33	-	2.44	-0.01	84.4	174.2	86.2	77.5
490	74.497	0.151	0.109	0.97	99.7	-3.33	100	2.44	0.00	84.4	173.7	85.5	77.6
491	74.648	0.151	0.110	0.97	99.3	-3.30	-	2.42	-0.02	84.4	172.5	85.0	77.6
492	74.799	0.151	0.108	0.98	99.5	-3.28	-	2.41	-0.01	84.4	171.5	85.0	77.6
493	74.951	0.152	0.107	0.96	99.6	-3.28	-	2.41	0.00	84.3	171.4	85.7	77.6
494	75.102	0.151	0.109	0.98	99.6	-3.32	-	2.40	-0.01	84.3	170.8	86.3	77.7
495	75.254	0.152	0.107	0.97	99.6	-3.26	-	2.39	-0.01	84.3	169.7	86.7	77.7
496	75.406	0.152	0.109	0.96	99.4	-3.33	-	2.38	-0.01	84.4	169.6	86.8	77.7
497	75.557	0.151	0.108	0.98	99.6	-3.31	-	2.38	0.00	84.3	169.0	87.0	77.8
498	75.708	0.151	0.106	0.97	99.8	-3.29	-	2.36	-0.02	84.4	168.9	87.2	77.8
499	75.859	0.151	0.107	0.97	99.7	-3.29	-	2.35	-0.01	84.3	168.4	86.7	77.8
500	76.011	0.152	0.107	0.99	99.8	-3.38	100	2.35	0.00	84.3	168.2	86.1	77.9
501	76.163	0.152	0.107	0.97	99.7	-3.25	-	2.34	-0.01	84.3	167.4	85.5	77.9
502	76.315	0.152	0.108	0.97	99.9	-3.35	-	2.33	-0.01	84.4	167.2	84.9	77.9
503	76.468	0.153	0.108	0.97	99.6	-3.31	-	2.32	-0.01	84.3	165.1	84.8	77.9
504	76.619	0.151	0.106	0.99	99.7	-3.34	-	2.30	-0.02	84.3	164.1	85.6	77.9
505	76.770	0.151	0.108	0.98	99.9	-3.30	-	2.30	0.00	84.3	162.8	86.4	77.9
506	76.922	0.152	0.107	0.98	99.9	-3.37	-	2.30	0.00	84.3	162.9	86.8	77.9
507	77.074	0.152	0.108	0.97	99.8	-3.37	-	2.28	-0.02	84.3	161.1	87.1	77.9
508	77.225	0.151	0.108	0.97	100.0	-3.33	-	2.28	0.00	84.3	162.2	87.4	78.0
509	77.377	0.152	0.108	0.98	100.0	-3.25	-	2.27	-0.01	84.3	160.9	87.5	78.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
510	77.528	0.151	0.108	0.97	99.9	-3.28	100	2.27	0.00	84.3	160.8	87.2	78.1
511	77.681	0.153	0.107	0.97	100.2	-3.27	-	2.25	-0.02	84.4	159.8	86.5	78.2
512	77.831	0.150	0.107	0.99	99.7	-3.38	-	2.25	0.00	84.3	159.1	85.9	78.1
513	77.982	0.151	0.107	0.97	100.0	-3.25	-	2.23	-0.02	84.3	158.2	85.4	78.1
514	78.134	0.152	0.108	0.98	100.1	-3.36	-	2.24	0.01	84.2	158.1	84.9	78.1
515	78.286	0.152	0.110	0.97	100.0	-3.37	-	2.22	-0.02	84.3	158.4	84.9	78.2
516	78.438	0.152	0.109	0.98	100.1	-3.36	-	2.21	-0.01	84.2	157.0	85.7	78.3
517	78.590	0.152	0.108	0.97	100.1	-3.34	-	2.21	0.00	84.3	155.9	86.5	78.2
518	78.742	0.152	0.108	0.98	100.1	-3.30	-	2.19	-0.02	84.2	154.5	87.2	78.3
519	78.894	0.152	0.108	0.97	100.1	-3.27	-	2.19	0.00	84.3	153.9	87.8	78.3
520	79.045	0.151	0.108	0.97	100.2	-3.26	100	2.18	-0.01	84.2	153.7	88.2	78.4
521	79.196	0.151	0.110	0.96	100.4	-3.26	-	2.18	0.00	84.3	153.7	88.3	78.3
522	79.348	0.152	0.107	0.98	100.1	-3.27	-	2.17	-0.01	84.2	152.7	87.8	78.3
523	79.500	0.152	0.109	0.97	100.4	-3.32	-	2.15	-0.02	84.2	152.5	87.0	78.3
524	79.653	0.153	0.108	0.98	100.3	-3.28	-	2.15	0.00	84.2	151.6	86.4	78.3
525	79.805	0.152	0.108	0.98	100.3	-3.36	-	2.14	-0.01	84.2	150.9	85.8	78.4
526	79.957	0.152	0.106	0.96	100.4	-3.32	-	2.14	0.00	84.2	150.3	85.2	78.4
527	80.109	0.152	0.109	0.97	100.3	-3.35	-	2.13	-0.01	84.2	149.8	84.9	78.4
528	80.260	0.151	0.108	0.97	100.5	-3.37	-	2.12	-0.01	84.2	150.4	85.2	78.4
529	80.413	0.153	0.106	0.97	100.3	-3.30	-	2.12	0.00	84.2	150.2	86.0	78.4
530	80.566	0.153	0.108	0.97	100.6	-3.29	100	2.10	-0.02	84.2	149.8	86.7	78.4
531	80.718	0.152	0.108	0.97	100.4	-3.38	-	2.10	0.00	84.2	148.5	87.5	78.4
532	80.871	0.153	0.109	0.97	100.6	-3.37	-	2.09	-0.01	84.1	147.2	88.3	78.4
533	81.023	0.152	0.107	0.97	100.6	-3.35	-	2.09	0.00	84.2	147.3	88.7	78.5
534	81.175	0.152	0.107	0.98	100.7	-3.28	-	2.09	0.00	84.2	146.4	88.9	78.5
535	81.326	0.151	0.105	0.98	100.7	-3.27	-	2.08	-0.01	84.2	145.2	88.6	78.5
536	81.477	0.151	0.107	0.97	100.5	-3.29	-	2.07	-0.01	84.1	144.7	87.8	78.4
537	81.629	0.152	0.106	0.99	100.6	-3.27	-	2.07	0.00	84.2	143.0	87.0	78.4
538	81.780	0.151	0.108	0.97	100.7	-3.34	-	2.05	-0.02	84.1	142.6	86.3	78.5
539	81.932	0.152	0.109	0.96	100.6	-3.28	-	2.05	0.00	84.1	142.0	85.7	78.5
540	82.084	0.152	0.108	0.97	100.7	-3.28	100	2.05	0.00	84.1	140.6	85.3	78.5
541	82.236	0.152	0.109	0.97	100.8	-3.36	-	2.04	-0.01	84.1	140.2	84.8	78.5
542	82.388	0.152	0.109	0.98	100.5	-3.38	-	2.03	-0.01	84.1	140.4	85.2	78.5
543	82.538	0.150	0.108	0.97	100.8	-3.32	-	2.03	0.00	84.1	140.1	86.1	78.5

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
544	82.690	0.152	0.106	0.98	100.6	-3.36	-	2.02	-0.01	84.1	138.9	86.7	78.5
545	82.842	0.152	0.108	0.98	100.9	-3.32	-	2.01	-0.01	84.1	138.4	87.2	78.5
546	82.994	0.152	0.107	0.97	100.7	-3.40	-	2.00	-0.01	84.1	138.0	87.6	78.5
547	83.146	0.152	0.108	0.98	101.0	-3.37	-	1.99	-0.01	84.1	137.7	87.9	78.5
548	83.298	0.152	0.107	0.95	100.9	-3.42	-	2.00	0.01	84.0	135.7	87.7	78.5
549	83.450	0.152	0.109	0.99	101.0	-3.29	-	1.99	-0.01	84.0	133.8	87.4	78.5
550	83.601	0.151	0.107	0.97	101.1	-3.40	100	1.98	-0.01	84.0	134.2	86.6	78.5
551	83.752	0.151	0.109	0.99	101.0	-3.35	-	1.98	0.00	84.0	134.2	86.0	78.4
552	83.904	0.152	0.107	0.96	101.0	-3.40	-	1.97	-0.01	84.1	133.6	85.3	78.5
553	84.055	0.151	0.107	0.98	100.9	-3.39	-	1.98	0.01	84.1	134.7	85.1	78.5
554	84.207	0.152	0.108	0.97	101.1	-3.37	-	1.96	-0.02	84.0	133.5	85.2	78.5
555	84.359	0.152	0.107	0.97	101.0	-3.31	-	1.96	0.00	84.0	133.1	85.7	78.6
556	84.511	0.152	0.108	0.98	100.8	-3.42	-	1.95	-0.01	84.0	132.6	86.5	78.5
557	84.662	0.151	0.108	0.99	101.0	-3.41	-	1.94	-0.01	84.0	131.5	87.2	78.6
558	84.814	0.152	0.106	0.97	101.1	-3.41	-	1.93	-0.01	84.0	131.9	87.8	78.6
559	84.966	0.152	0.107	0.97	101.0	-3.43	-	1.93	0.00	84.0	131.3	88.4	78.6
560	85.118	0.152	0.107	0.97	100.9	-3.41	100	1.93	0.00	84.0	131.0	88.9	78.6
561	85.270	0.152	0.108	0.98	101.2	-3.36	-	1.93	0.00	84.0	131.2	89.4	78.6
562	85.422	0.152	0.109	0.98	101.1	-3.41	-	1.91	-0.02	84.0	131.1	88.9	78.6
563	85.574	0.152	0.106	0.97	101.2	-3.33	-	1.91	0.00	84.0	130.4	89.3	78.6
564	85.726	0.152	0.109	0.98	101.4	-3.41	-	1.90	-0.01	84.0	129.4	89.6	78.6
565	85.877	0.151	0.107	0.98	101.0	-3.41	-	1.89	-0.01	83.9	129.8	89.4	78.6
566	86.028	0.151	0.108	0.98	101.3	-3.45	-	1.88	-0.01	84.0	129.7	89.6	78.7
567	86.180	0.152	0.107	0.98	101.2	-3.43	-	1.89	0.01	84.0	130.0	88.5	78.7
568	86.332	0.152	0.106	0.97	101.2	-3.38	-	1.88	-0.01	83.9	129.1	87.6	78.7
569	86.485	0.153	0.108	0.98	101.2	-3.35	-	1.88	0.00	83.9	127.9	86.8	78.7
570	86.636	0.151	0.109	0.97	101.2	-3.31	100	1.87	-0.01	83.9	126.8	86.1	78.7
571	86.788	0.152	0.108	0.98	101.1	-3.40	-	1.87	0.00	83.9	125.5	85.7	78.7
572	86.939	0.151	0.108	0.97	101.1	-3.37	-	1.86	-0.01	83.9	124.7	85.7	78.7
573	87.090	0.151	0.107	0.97	101.1	-3.41	-	1.85	-0.01	84.0	124.3	86.1	78.7
574	87.242	0.152	0.108	0.98	101.1	-3.38	-	1.85	0.00	83.9	124.3	86.7	78.7
575	87.394	0.152	0.108	0.98	101.0	-3.38	-	1.84	-0.01	84.0	123.4	87.7	78.8
576	87.545	0.151	0.107	0.96	101.4	-3.38	-	1.85	0.01	84.0	123.9	88.2	78.7
577	87.698	0.153	0.109	0.97	101.5	-3.35	-	1.84	-0.01	84.0	123.3	88.5	78.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
578	87.849	0.151	0.108	0.99	101.1	-3.37	-	1.83	-0.01	84.0	122.3	88.6	78.7
579	88.000	0.151	0.105	0.97	101.3	-3.43	-	1.83	0.00	83.9	122.1	88.8	78.7
580	88.151	0.151	0.109	0.96	101.4	-3.42	99	1.83	0.00	83.9	122.0	88.8	78.7
581	88.304	0.153	0.109	0.96	101.6	-3.35	-	1.82	-0.01	83.9	121.1	88.8	78.8
582	88.455	0.151	0.105	0.97	101.4	-3.44	-	1.81	-0.01	83.9	121.1	88.5	78.8
583	88.607	0.152	0.105	0.97	101.2	-3.33	-	1.81	0.00	83.9	121.4	87.8	78.8
584	88.759	0.152	0.109	0.98	101.3	-3.30	-	1.81	0.00	83.9	121.0	87.0	78.8
585	88.911	0.152	0.108	0.97	101.5	-3.46	-	1.80	-0.01	83.9	121.0	86.3	78.7
586	89.062	0.151	0.109	0.96	101.4	-3.43	-	1.79	-0.01	84.0	121.0	85.8	78.7
587	89.213	0.151	0.109	0.96	101.6	-3.35	-	1.79	0.00	84.0	120.8	85.4	78.8
588	89.365	0.152	0.107	0.98	101.6	-3.42	-	1.78	-0.01	83.9	120.3	85.1	78.8
589	89.516	0.151	0.105	0.97	101.5	-3.39	-	1.77	-0.01	83.9	120.0	85.3	78.8
590	89.668	0.152	0.108	0.97	101.6	-3.32	99	1.77	0.00	83.9	119.6	85.5	78.8
591	89.821	0.153	0.109	0.98	101.7	-3.36	-	1.76	-0.01	83.9	120.0	86.0	78.8
592	89.973	0.152	0.106	0.97	101.4	-3.43	-	1.76	0.00	83.9	120.7	86.6	78.8
593	90.125	0.152	0.110	0.97	101.5	-3.39	-	1.76	0.00	83.9	120.3	87.2	78.8
594	90.275	0.150	0.107	0.97	101.8	-3.33	-	1.76	0.00	83.9	120.8	87.8	78.8
595	90.428	0.153	0.106	0.96	101.8	-3.40	-	1.75	-0.01	83.9	120.9	88.1	78.9
596	90.580	0.152	0.106	0.97	101.8	-3.40	-	1.75	0.00	83.9	121.0	88.4	78.9
597	90.732	0.152	0.109	0.98	101.5	-3.42	-	1.73	-0.02	83.9	120.9	88.8	78.9
598	90.884	0.152	0.107	0.97	101.7	-3.32	-	1.72	-0.01	83.9	120.8	89.1	78.9
599	91.037	0.153	0.107	0.97	101.5	-3.40	-	1.73	0.01	83.9	120.8	89.1	78.9
600	91.189	0.152	0.107	0.96	101.4	-3.42	100	1.72	-0.01	83.9	121.1	88.7	78.9
601	91.341	0.152	0.105	0.99	101.6	-3.43	-	1.71	-0.01	83.9	120.5	88.0	78.9
602	91.491	0.150	0.109	0.97	101.7	-3.37	-	1.71	0.00	83.9	121.0	87.2	78.9
603	91.643	0.152	0.106	0.96	101.8	-3.39	-	1.71	0.00	83.9	121.0	86.5	78.9
604	91.795	0.152	0.104	0.96	101.6	-3.40	-	1.70	-0.01	83.9	121.0	86.0	78.9
605	91.947	0.152	0.108	0.97	101.8	-3.33	-	1.69	-0.01	83.9	121.0	85.6	79.0
606	92.099	0.152	0.107	0.98	101.7	-3.37	-	1.69	0.00	83.9	120.8	85.4	79.0
607	92.250	0.151	0.107	0.98	101.6	-3.38	-	1.68	-0.01	83.9	120.9	85.2	78.9
608	92.401	0.151	0.108	0.97	101.7	-3.30	-	1.68	0.00	83.9	121.5	85.2	78.9
609	92.552	0.151	0.107	0.98	102.0	-3.37	-	1.67	-0.01	83.9	121.7	85.7	78.8
610	92.705	0.153	0.109	1.00	101.7	-3.38	100	1.67	0.00	83.9	121.5	86.5	78.9
611	92.858	0.153	0.108	0.98	101.7	-3.36	-	1.67	0.00	83.9	120.7	87.3	78.8

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
612	93.010	0.152	0.108	0.98	101.9	-3.30	-	1.66	-0.01	83.9	121.3	88.0	78.9
613	93.163	0.153	0.108	0.97	101.8	-3.25	-	1.65	-0.01	83.9	121.8	88.2	78.9
614	93.316	0.153	0.108	0.97	101.8	-3.29	-	1.64	-0.01	83.9	121.5	87.8	78.9
615	93.467	0.151	0.107	0.97	101.8	-3.37	-	1.64	0.00	83.9	121.9	87.2	78.9
616	93.617	0.150	0.106	0.98	101.6	-3.35	-	1.63	-0.01	83.9	121.0	86.6	78.9
617	93.769	0.152	0.108	0.97	102.1	-3.30	-	1.63	0.00	83.9	121.8	86.3	78.9
618	93.920	0.151	0.107	0.98	101.9	-3.25	-	1.63	0.00	83.9	122.1	86.0	79.0
619	94.073	0.153	0.107	0.98	101.9	-3.37	-	1.62	-0.01	83.9	122.1	85.6	78.9
620	94.226	0.153	0.106	0.96	101.9	-3.34	100	1.61	-0.01	83.9	122.1	85.2	78.9
621	94.377	0.151	0.107	0.98	101.9	-3.32	-	1.60	-0.01	83.9	121.7	85.2	79.0
622	94.530	0.153	0.106	0.97	102.0	-3.28	-	1.60	0.00	83.9	122.7	85.7	79.0
623	94.680	0.150	0.107	0.97	101.9	-3.32	-	1.59	-0.01	83.9	122.7	86.2	79.0
624	94.832	0.152	0.106	0.99	101.6	-3.23	-	1.59	0.00	83.9	123.2	86.8	79.0
625	94.984	0.152	0.107	0.98	101.8	-3.34	-	1.58	-0.01	83.9	122.8	87.6	79.0
626	95.135	0.151	0.106	0.97	101.8	-3.25	-	1.58	0.00	83.9	123.5	88.0	79.0
627	95.288	0.153	0.109	0.99	102.0	-3.31	-	1.57	-0.01	83.9	122.3	88.0	79.0
628	95.440	0.152	0.108	0.97	102.0	-3.34	-	1.56	-0.01	83.9	122.7	87.9	79.0
629	95.592	0.152	0.106	0.97	101.9	-3.25	-	1.55	-0.01	83.9	122.8	87.5	79.0
630	95.743	0.151	0.107	0.97	102.0	-3.26	100	1.55	0.00	83.9	122.3	86.8	79.1
631	95.894	0.151	0.109	0.98	102.2	-3.32	-	1.54	-0.01	83.9	122.7	86.3	79.1
632	96.046	0.152	0.107	0.98	102.0	-3.21	-	1.55	0.01	83.9	122.5	85.7	79.1
633	96.197	0.151	0.108	0.98	101.7	-3.27	-	1.54	-0.01	83.9	122.9	85.3	79.1
634	96.350	0.153	0.108	0.98	101.9	-3.23	-	1.53	-0.01	83.9	122.9	85.3	79.1
635	96.501	0.151	0.107	0.96	102.0	-3.25	-	1.53	0.00	83.9	122.2	85.3	79.1
636	96.653	0.152	0.108	0.97	102.1	-3.23	-	1.52	-0.01	83.9	122.3	85.6	79.1
637	96.804	0.151	0.106	0.98	102.1	-3.20	-	1.51	-0.01	83.9	122.3	86.1	79.1
638	96.956	0.152	0.104	0.98	101.9	-3.25	-	1.51	0.00	83.9	122.2	86.8	79.1
639	97.107	0.151	0.108	0.98	102.1	-3.30	-	1.50	-0.01	83.9	121.7	87.5	79.1
640	97.259	0.152	0.109	0.98	102.0	-3.26	100	1.50	0.00	83.9	121.7	88.2	79.1
641	97.411	0.152	0.105	0.96	102.0	-3.22	-	1.49	-0.01	83.9	122.1	88.6	79.1
642	97.562	0.151	0.108	0.98	102.2	-3.24	-	1.48	-0.01	83.8	121.9	89.1	79.1
643	97.714	0.152	0.109	0.98	101.9	-3.28	-	1.48	0.00	83.9	122.3	89.5	79.1
644	97.865	0.151	0.107	0.97	101.9	-3.27	-	1.47	-0.01	83.9	122.8	89.4	79.2
645	98.015	0.150	0.107	0.97	102.2	-3.27	-	1.46	-0.01	83.8	122.5	88.8	79.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
646	98.167	0.152	0.105	0.98	102.2	-3.32	-	1.46	0.00	83.8	122.2	87.9	79.1
647	98.319	0.152	0.108	0.98	102.3	-3.26	-	1.45	-0.01	83.8	122.3	87.1	79.1
648	98.471	0.152	0.108	0.97	102.1	-3.21	-	1.45	0.00	83.8	122.6	86.4	79.1
649	98.623	0.152	0.108	0.96	102.2	-3.31	-	1.45	0.00	83.7	122.4	85.9	79.1
650	98.775	0.152	0.109	0.98	102.3	-3.20	99	1.44	-0.01	83.8	122.0	85.6	79.1
651	98.927	0.152	0.110	0.97	102.2	-3.21	-	1.44	0.00	83.8	122.8	85.5	79.1
652	99.078	0.151	0.105	0.97	102.1	-3.19	-	1.42	-0.02	83.8	123.0	85.8	79.1
653	99.230	0.152	0.107	0.97	102.1	-3.17	-	1.41	-0.01	83.8	122.4	86.4	79.2
654	99.383	0.153	0.106	0.98	102.2	-3.23	-	1.42	0.01	83.8	122.2	87.3	79.2
655	99.535	0.152	0.107	0.98	102.2	-3.29	-	1.41	-0.01	83.8	122.9	88.1	79.2
656	99.687	0.152	0.107	0.98	102.0	-3.30	-	1.40	-0.01	83.8	122.3	88.7	79.1
657	99.839	0.152	0.109	0.97	102.4	-3.21	-	1.41	0.01	83.8	122.0	89.1	79.2
658	99.991	0.152	0.109	0.97	102.1	-3.31	-	1.39	-0.02	83.7	122.6	89.2	79.2
659	100.142	0.151	0.107	0.97	102.1	-3.24	-	1.39	0.00	83.8	122.9	89.5	79.2
660	100.294	0.152	0.109	0.97	102.0	-3.31	99	1.38	-0.01	83.7	122.4	89.7	79.2
661	100.446	0.152	0.108	0.98	102.1	-3.32	-	1.37	-0.01	83.8	122.5	89.3	79.2
662	100.598	0.152	0.107	0.96	102.4	-3.20	-	1.37	0.00	83.8	122.4	88.5	79.2
663	100.751	0.153	0.106	0.97	102.3	-3.27	-	1.36	-0.01	83.7	122.9	87.6	79.2
664	100.909	0.158	0.108	0.98	102.4	-3.26	-	1.36	0.00	83.8	123.3	86.9	79.2
665	101.061	0.152	0.109	0.98	102.6	-3.27	-	1.34	-0.02	83.7	123.2	86.2	79.2
666	101.213	0.152	0.108	0.98	102.4	-3.20	-	1.35	0.01	83.7	122.3	85.9	79.1
667	101.365	0.152	0.108	0.97	102.5	-3.24	-	1.35	0.00	83.7	122.4	85.6	79.2
668	101.511	0.146	0.106	0.98	102.5	-3.32	-	1.34	-0.01	83.7	122.3	85.3	79.2
669	101.660	0.149	0.105	0.97	102.2	-3.21	-	1.33	-0.01	83.7	123.0	85.3	79.2
670	101.812	0.152	0.106	0.98	102.5	-3.32	100	1.33	0.00	83.6	122.3	85.5	79.2
671	101.964	0.152	0.107	0.97	102.2	-3.25	-	1.31	-0.02	83.7	122.8	86.3	79.2
672	102.115	0.151	0.108	0.97	102.2	-3.28	-	1.32	0.01	83.6	121.9	87.1	79.2
673	102.266	0.151	0.105	0.98	102.5	-3.23	-	1.30	-0.02	83.7	122.6	87.8	79.2
674	102.420	0.154	0.107	0.98	102.3	-3.33	-	1.31	0.01	83.7	122.3	88.3	79.2
675	102.569	0.149	0.108	0.99	102.3	-3.21	-	1.29	-0.02	83.6	122.0	88.5	79.2
676	102.720	0.151	0.109	0.97	102.6	-3.33	-	1.29	0.00	83.6	121.1	88.8	79.2
677	102.873	0.153	0.107	0.97	102.7	-3.26	-	1.28	-0.01	83.6	121.8	89.0	79.2
678	103.025	0.152	0.110	0.97	102.5	-3.27	-	1.28	0.00	83.6	120.6	89.3	79.3
679	103.176	0.151	0.110	0.98	102.5	-3.28	-	1.27	-0.01	83.6	120.8	89.3	79.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
680	103.327	0.151	0.107	0.98	102.3	-3.31	100	1.27	0.00	83.6	121.4	88.9	79.2
681	103.479	0.152	0.107	0.98	102.4	-3.28	-	1.26	-0.01	83.6	121.7	88.2	79.3
682	103.630	0.151	0.109	0.98	102.6	-3.29	-	1.25	-0.01	83.6	121.4	87.5	79.3
683	103.782	0.152	0.107	0.97	102.5	-3.34	-	1.25	0.00	83.5	121.8	87.0	79.2
684	103.934	0.152	0.109	0.97	102.7	-3.37	-	1.25	0.00	83.6	121.9	86.5	79.3
685	104.085	0.151	0.107	0.96	102.3	-3.31	-	1.24	-0.01	83.5	121.9	86.1	79.2
686	104.237	0.152	0.109	0.97	102.5	-3.37	-	1.23	-0.01	83.5	122.1	85.7	79.2
687	104.387	0.150	0.109	0.98	102.5	-3.32	-	1.23	0.00	83.5	122.2	85.5	79.2
688	104.539	0.152	0.108	0.98	102.6	-3.30	-	1.23	0.00	83.5	122.7	85.8	79.2
689	104.690	0.151	0.109	0.96	102.6	-3.25	-	1.22	-0.01	83.5	122.0	86.4	79.3
690	104.842	0.152	0.108	0.97	102.4	-3.35	100	1.21	-0.01	83.5	121.5	87.0	79.2
691	104.994	0.152	0.108	0.97	102.7	-3.29	-	1.20	-0.01	83.4	121.9	87.7	79.2
692	105.146	0.152	0.107	0.97	102.5	-3.36	-	1.20	0.00	83.4	122.1	88.4	79.2
693	105.298	0.152	0.108	0.98	102.6	-3.42	-	1.20	0.00	83.4	121.8	89.0	79.2
694	105.451	0.153	0.109	0.98	102.2	-3.32	-	1.19	-0.01	83.4	122.1	89.3	79.2
695	105.600	0.149	0.107	0.98	102.6	-3.42	-	1.19	0.00	83.4	121.9	89.4	79.2
696	105.752	0.152	0.109	0.97	102.5	-3.35	-	1.17	-0.02	83.4	121.8	88.9	79.2
697	105.904	0.152	0.109	0.97	102.4	-3.32	-	1.17	0.00	83.4	121.7	88.0	79.2
698	106.056	0.152	0.107	0.98	102.4	-3.44	-	1.17	0.00	83.3	122.1	87.1	79.2
699	106.209	0.153	0.108	0.97	102.4	-3.33	-	1.16	-0.01	83.3	122.5	86.5	79.3
700	106.360	0.151	0.109	0.98	102.3	-3.40	99	1.15	-0.01	83.3	122.4	86.1	79.3
701	106.510	0.150	0.109	0.99	102.7	-3.43	-	1.15	0.00	83.3	122.3	85.9	79.3
702	106.662	0.152	0.109	0.99	102.6	-3.44	-	1.14	-0.01	83.3	121.6	85.9	79.3
703	106.815	0.153	0.109	0.98	102.6	-3.45	-	1.14	0.00	83.3	121.8	86.4	79.3
704	106.966	0.151	0.107	0.99	102.5	-3.37	-	1.13	-0.01	83.3	122.1	87.1	79.3
705	107.118	0.152	0.108	0.98	102.8	-3.36	-	1.13	0.00	83.2	122.4	87.7	79.3
706	107.270	0.152	0.109	0.97	102.4	-3.39	-	1.13	0.00	83.2	122.0	88.1	79.3
707	107.421	0.151	0.107	0.97	102.4	-3.45	-	1.11	-0.02	83.2	121.5	88.8	79.2
708	107.572	0.151	0.107	0.97	102.5	-3.45	-	1.11	0.00	83.2	120.8	89.5	79.2
709	107.724	0.152	0.107	0.97	102.4	-3.43	-	1.10	-0.01	83.1	120.6	88.9	79.2
710	107.876	0.152	0.106	0.97	102.7	-3.35	100	1.09	-0.01	83.1	120.9	89.3	79.2
711	108.032	0.156	0.108	0.98	102.6	-3.39	-	1.09	0.00	83.1	121.1	89.6	79.2
712	108.180	0.148	0.109	0.97	102.6	-3.42	-	1.08	-0.01	83.1	121.5	89.5	79.2
713	108.335	0.155	0.108	0.97	102.6	-3.40	-	1.08	0.00	83.1	120.9	89.8	79.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
714	108.484	0.149	0.108	0.98	102.5	-3.37	-	1.07	-0.01	83.1	121.3	88.9	79.3
715	108.634	0.150	0.108	0.97	102.4	-3.36	-	1.07	0.00	83.1	122.5	87.8	79.2
716	108.786	0.152	0.107	0.98	102.7	-3.37	-	1.07	0.00	83.1	122.1	87.0	79.2
717	108.939	0.153	0.109	0.99	102.5	-3.38	-	1.05	-0.02	83.1	121.3	86.4	79.2
718	109.090	0.151	0.107	0.96	102.5	-3.44	-	1.06	0.01	83.1	120.8	85.8	79.2
719	109.243	0.153	0.107	0.97	102.7	-3.37	-	1.04	-0.02	83.0	121.1	85.5	79.2
720	109.395	0.152	0.106	0.98	102.7	-3.43	100	1.04	0.00	83.0	121.2	85.3	79.2
721	109.546	0.151	0.110	0.98	102.7	-3.49	-	1.03	-0.01	83.0	121.3	85.2	79.2
722	109.697	0.151	0.109	0.98	102.6	-3.45	-	1.03	0.00	83.0	122.0	85.6	79.1
723	109.850	0.153	0.109	0.98	102.6	-3.42	-	1.02	-0.01	83.0	121.8	86.2	79.2
724	110.002	0.152	0.108	0.98	102.7	-3.40	-	1.02	0.00	83.1	121.7	86.8	79.2
725	110.155	0.153	0.107	0.96	102.5	-3.43	-	1.01	-0.01	83.0	122.2	87.6	79.2
726	110.307	0.152	0.106	0.98	102.8	-3.38	-	1.01	0.00	83.0	122.1	88.3	79.2
727	110.459	0.152	0.107	0.98	102.8	-3.39	-	1.00	-0.01	82.9	122.1	88.8	79.2
728	110.610	0.151	0.108	0.97	102.7	-3.48	-	1.00	0.00	82.9	122.0	89.0	79.2
729	110.761	0.151	0.109	0.96	102.2	-3.51	-	0.99	-0.01	82.9	122.0	88.8	79.2
730	110.913	0.152	0.108	0.97	102.6	-3.43	100	0.99	0.00	82.9	122.2	88.0	79.2
731	111.065	0.152	0.109	0.99	103.1	-3.48	-	0.98	-0.01	82.9	122.5	87.2	79.2
732	111.217	0.152	0.108	0.98	102.6	-3.37	-	0.97	-0.01	82.8	122.2	86.7	79.1
733	111.370	0.153	0.107	0.98	102.4	-3.49	-	0.96	-0.01	82.8	121.3	86.3	79.1
734	111.522	0.152	0.109	0.98	102.5	-3.41	-	0.96	0.00	82.8	121.0	85.8	79.1
735	111.673	0.151	0.110	0.97	102.3	-3.43	-	0.96	0.00	82.8	121.3	85.4	79.1
736	111.824	0.151	0.111	0.97	102.5	-3.43	-	0.95	-0.01	82.8	122.5	85.2	79.1
737	111.975	0.151	0.110	0.98	103.0	-3.41	-	0.95	0.00	82.9	122.8	85.2	79.1
738	112.127	0.152	0.108	0.98	103.0	-3.47	-	0.93	-0.02	83.0	122.7	85.8	79.2
739	112.279	0.152	0.109	0.97	103.1	-3.40	-	0.93	0.00	82.9	122.2	86.4	79.1
740	112.431	0.152	0.108	0.97	102.5	-3.38	99	0.93	0.00	82.8	121.4	86.9	79.1
741	112.584	0.153	0.107	0.97	102.7	-3.46	-	0.92	-0.01	82.7	121.3	87.5	79.1
742	112.735	0.151	0.108	0.96	102.7	-3.51	-	0.90	-0.02	82.7	121.4	87.9	79.2
743	112.886	0.151	0.108	0.98	103.1	-3.46	-	0.90	0.00	82.7	121.3	87.9	79.2
744	113.038	0.152	0.110	0.99	102.6	-3.46	-	0.90	0.00	82.6	121.9	88.3	79.1
745	113.190	0.152	0.108	0.97	102.5	-3.49	-	0.90	0.00	82.6	121.7	88.4	79.2
746	113.344	0.154	0.109	0.97	102.9	-3.38	-	0.88	-0.02	82.6	121.7	88.0	79.1
747	113.493	0.149	0.107	0.97	102.8	-3.47	-	0.88	0.00	82.6	122.1	87.3	79.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
748	113.647	0.154	0.108	0.98	102.6	-3.45	-	0.87	-0.01	82.6	121.0	86.5	79.1
749	113.795	0.148	0.109	0.97	102.7	-3.44	-	0.87	0.00	82.5	120.5	85.8	79.1
750	113.949	0.154	0.109	0.98	102.7	-3.48	99	0.86	-0.01	82.5	121.1	85.6	79.1
751	114.098	0.149	0.108	0.97	102.9	-3.48	-	0.87	0.01	82.6	121.9	85.1	79.2
752	114.253	0.155	0.108	0.97	102.9	-3.35	-	0.85	-0.02	82.5	122.0	85.2	79.1
753	114.402	0.149	0.108	0.96	102.7	-3.44	-	0.85	0.00	82.5	122.1	85.6	79.1
754	114.557	0.155	0.109	0.98	102.4	-3.44	-	0.84	-0.01	82.4	122.3	86.1	79.1
755	114.706	0.149	0.108	0.97	102.6	-3.48	-	0.83	-0.01	82.5	121.5	86.8	79.2
756	114.859	0.153	0.109	0.97	102.8	-3.41	-	0.84	0.01	82.5	121.4	87.5	79.2
757	115.008	0.149	0.107	0.98	102.9	-3.49	-	0.83	-0.01	82.5	121.6	88.3	79.2
758	115.162	0.154	0.107	0.98	102.6	-3.39	-	0.82	-0.01	82.5	121.8	88.8	79.2
759	115.311	0.149	0.107	0.98	102.8	-3.40	-	0.81	-0.01	82.5	122.1	89.0	79.1
760	115.466	0.155	0.109	0.97	102.8	-3.36	99	0.81	0.00	82.5	122.5	89.3	79.1
761	115.615	0.149	0.108	0.97	102.7	-3.43	-	0.80	-0.01	82.4	122.0	89.6	79.1
762	115.769	0.154	0.108	0.99	102.6	-3.38	-	0.80	0.00	82.4	121.8	89.1	79.1
763	115.917	0.148	0.108	0.98	102.4	-3.35	-	0.79	-0.01	82.3	121.2	88.3	79.1
764	116.069	0.152	0.108	0.99	102.6	-3.37	-	0.79	0.00	82.3	122.0	87.4	79.1
765	116.221	0.152	0.109	0.97	102.9	-3.41	-	0.77	-0.02	82.3	122.9	86.5	79.1
766	116.372	0.151	0.109	0.97	102.5	-3.34	-	0.77	0.00	82.3	121.8	85.9	79.1
767	116.525	0.153	0.109	0.98	102.7	-3.37	-	0.76	-0.01	82.3	122.1	85.5	79.1
768	116.677	0.152	0.108	0.97	102.4	-3.40	-	0.75	-0.01	82.3	121.6	85.2	79.1
769	116.828	0.151	0.108	0.98	102.4	-3.41	-	0.75	0.00	82.3	121.5	85.2	79.1
770	116.982	0.154	0.108	0.98	102.8	-3.41	99	0.75	0.00	82.3	121.1	85.5	79.1
771	117.131	0.149	0.108	0.98	102.8	-3.31	-	0.74	-0.01	82.3	121.5	86.2	79.1
772	117.283	0.152	0.107	0.99	102.7	-3.43	-	0.73	-0.01	82.3	121.6	86.8	79.1
773	117.435	0.152	0.108	0.99	102.5	-3.38	-	0.73	0.00	82.3	121.8	87.2	79.0
774	117.587	0.152	0.108	0.97	102.6	-3.39	-	0.72	-0.01	82.3	121.3	87.7	79.1
775	117.739	0.152	0.110	0.97	102.8	-3.35	-	0.72	0.00	82.2	121.6	88.0	79.0
776	117.890	0.151	0.108	0.97	102.8	-3.40	-	0.71	-0.01	82.2	121.4	88.4	79.1
777	118.042	0.152	0.109	0.96	102.9	-3.29	-	0.71	0.00	82.2	121.3	88.6	79.0
778	118.194	0.152	0.108	0.97	103.0	-3.40	-	0.70	-0.01	82.2	121.2	88.4	79.0
779	118.346	0.152	0.109	0.97	102.7	-3.40	-	0.69	-0.01	82.2	122.1	87.7	79.0
780	118.499	0.153	0.107	0.98	102.5	-3.28	100	0.68	-0.01	82.1	121.7	87.1	79.0
781	118.651	0.152	0.107	0.99	102.5	-3.35	-	0.68	0.00	82.1	121.9	86.5	79.0

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
782	118.803	0.152	0.108	0.99	102.7	-3.26	-	0.67	-0.01	82.2	121.5	85.9	79.0
783	118.953	0.150	0.109	0.98	102.9	-3.39	-	0.66	-0.01	82.2	121.9	85.5	79.0
784	119.105	0.152	0.107	0.98	102.7	-3.27	-	0.66	0.00	82.1	121.8	85.1	79.0
785	119.257	0.152	0.110	0.98	102.7	-3.26	-	0.66	0.00	82.1	121.6	85.1	78.9
786	119.409	0.152	0.108	0.98	102.6	-3.34	-	0.65	-0.01	82.1	121.4	85.9	79.0
787	119.561	0.152	0.109	0.98	102.8	-3.35	-	0.65	0.00	82.1	121.6	86.8	78.9
788	119.713	0.152	0.108	0.98	102.6	-3.30	-	0.64	-0.01	82.1	121.0	87.5	78.9
789	119.865	0.152	0.109	0.97	102.4	-3.35	-	0.63	-0.01	82.1	121.4	88.2	78.9
790	120.015	0.150	0.109	0.97	102.8	-3.37	99	0.63	0.00	82.1	121.0	88.6	78.9
791	120.167	0.152	0.108	0.98	102.4	-3.26	-	0.62	-0.01	82.0	121.2	88.8	78.9
792	120.319	0.152	0.108	0.98	102.5	-3.28	-	0.61	-0.01	82.0	120.8	89.1	78.9
793	120.471	0.152	0.108	0.98	102.7	-3.33	-	0.60	-0.01	82.0	120.9	89.4	78.9
794	120.624	0.153	0.108	0.97	103.0	-3.31	-	0.60	0.00	82.0	121.2	89.2	78.8
795	120.776	0.152	0.109	0.98	102.7	-3.35	-	0.60	0.00	82.0	121.7	88.5	78.8
796	120.927	0.151	0.110	0.97	102.6	-3.25	-	0.59	-0.01	81.9	121.3	87.6	78.8
797	121.078	0.151	0.109	0.98	102.7	-3.28	-	0.59	0.00	82.0	121.7	86.7	78.8
798	121.232	0.154	0.110	0.97	102.8	-3.32	-	0.58	-0.01	81.9	121.1	86.1	78.8
799	121.382	0.150	0.107	0.98	102.7	-3.31	-	0.57	-0.01	81.9	121.0	85.6	78.8
800	121.535	0.153	0.108	0.98	102.7	-3.35	99	0.56	-0.01	81.9	120.8	85.3	78.8
801	121.688	0.153	0.110	0.98	102.3	-3.33	-	0.56	0.00	82.0	121.1	85.3	78.8
802	121.839	0.151	0.107	0.97	102.7	-3.33	-	0.55	-0.01	81.9	120.8	85.7	78.8
803	121.990	0.151	0.109	0.96	102.3	-3.31	-	0.55	0.00	81.8	120.5	86.4	78.7
804	122.141	0.151	0.108	0.97	102.5	-3.29	-	0.54	-0.01	81.8	121.1	87.0	78.7
805	122.293	0.152	0.109	0.99	102.7	-3.20	-	0.53	-0.01	81.8	121.3	87.5	78.7
806	122.446	0.153	0.107	0.97	102.7	-3.24	-	0.54	0.01	81.8	121.0	87.9	78.8
807	122.598	0.152	0.108	0.98	102.9	-3.27	-	0.52	-0.02	81.8	119.6	88.2	78.7
808	122.750	0.152	0.109	0.97	102.7	-3.31	-	0.52	0.00	81.8	119.8	88.5	78.7
809	122.902	0.152	0.108	0.98	102.3	-3.19	-	0.51	-0.01	81.8	120.1	88.7	78.7
810	123.053	0.151	0.110	0.98	102.5	-3.19	99	0.51	0.00	81.8	120.1	88.2	78.7
811	123.204	0.151	0.107	0.98	102.7	-3.22	-	0.50	-0.01	81.7	120.4	87.5	78.6
812	123.356	0.152	0.108	0.99	102.7	-3.18	-	0.50	0.00	81.7	120.7	86.8	78.7
813	123.508	0.152	0.108	0.98	102.7	-3.24	-	0.49	-0.01	81.7	121.1	86.1	78.7
814	123.661	0.153	0.109	0.97	102.9	-3.30	-	0.49	0.00	81.7	121.9	85.6	78.7
815	123.813	0.152	0.109	0.97	102.4	-3.30	-	0.48	-0.01	81.7	121.2	85.2	78.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
816	123.966	0.153	0.108	0.98	102.7	-3.24	-	0.48	0.00	81.7	121.2	85.1	78.6
817	124.116	0.150	0.108	0.99	102.7	-3.17	-	0.47	-0.01	81.7	120.8	85.6	78.6
818	124.268	0.152	0.108	0.98	102.5	-3.17	-	0.46	-0.01	81.6	120.6	86.0	78.6
819	124.420	0.152	0.108	0.97	102.6	-3.27	-	0.46	0.00	81.7	121.0	86.6	78.6
820	124.572	0.152	0.108	0.98	102.4	-3.26	99	0.45	-0.01	81.6	120.0	87.2	78.6
821	124.725	0.153	0.109	0.97	102.6	-3.28	-	0.44	-0.01	81.6	120.4	87.6	78.6
822	124.877	0.152	0.109	0.97	102.6	-3.26	-	0.44	0.00	81.6	121.0	87.7	78.6
823	125.029	0.152	0.108	0.98	102.4	-3.24	-	0.44	0.00	81.6	120.9	87.9	78.5
824	125.179	0.150	0.110	0.97	102.3	-3.16	-	0.43	-0.01	81.6	121.6	88.3	78.6
825	125.332	0.153	0.109	0.98	102.8	-3.26	-	0.42	-0.01	81.5	121.2	88.7	78.5
826	125.484	0.152	0.109	0.98	102.4	-3.21	-	0.41	-0.01	81.6	120.6	88.6	78.6
827	125.637	0.153	0.109	0.98	102.5	-3.25	-	0.41	0.00	81.6	120.6	88.0	78.5
828	125.791	0.154	0.109	0.97	102.4	-3.13	-	0.39	-0.02	81.5	120.9	87.0	78.5
829	125.943	0.152	0.109	0.98	102.4	-3.22	-	0.40	0.01	81.5	120.1	86.2	78.5
830	126.094	0.151	0.107	0.97	102.5	-3.13	100	0.39	-0.01	81.5	120.5	85.6	78.5
831	126.245	0.151	0.110	0.98	102.6	-3.17	-	0.38	-0.01	81.5	120.2	85.1	78.5
832	126.398	0.153	0.108	0.99	102.6	-3.23	-	0.38	0.00	81.5	121.2	85.2	78.5
833	126.552	0.154	0.107	0.98	102.3	-3.21	-	0.37	-0.01	81.4	121.0	85.7	78.5
834	126.704	0.152	0.108	0.98	102.5	-3.13	-	0.37	0.00	81.4	120.1	86.7	78.5
835	126.857	0.153	0.109	0.98	102.7	-3.24	-	0.37	0.00	81.4	120.9	87.2	78.5
836	127.010	0.153	0.108	0.97	102.3	-3.15	-	0.36	-0.01	81.4	120.8	87.5	78.5
837	127.161	0.151	0.109	0.98	102.3	-3.22	-	0.35	-0.01	81.4	120.8	87.7	78.5
838	127.312	0.151	0.108	0.98	102.3	-3.25	-	0.34	-0.01	81.4	120.2	87.9	78.5
839	127.464	0.152	0.108	0.98	102.3	-3.17	-	0.34	0.00	81.4	120.4	88.1	78.5
840	127.617	0.153	0.109	0.97	102.5	-3.12	100	0.34	0.00	81.4	120.9	88.3	78.4
841	127.771	0.154	0.107	0.97	102.4	-3.12	-	0.33	-0.01	81.4	119.9	88.6	78.4
842	127.923	0.152	0.109	0.97	102.7	-3.17	-	0.32	-0.01	81.4	119.4	88.3	78.5
843	128.075	0.152	0.111	0.99	102.6	-3.19	-	0.32	0.00	81.3	120.0	87.5	78.4
844	128.227	0.152	0.110	0.99	102.3	-3.18	-	0.31	-0.01	81.3	119.6	86.7	78.4
845	128.379	0.152	0.107	0.98	102.6	-3.18	-	0.31	0.00	81.3	120.0	86.1	78.4
846	128.532	0.153	0.107	0.99	102.2	-3.11	-	0.30	-0.01	81.3	119.9	85.4	78.4
847	128.685	0.153	0.108	0.97	102.2	-3.17	-	0.30	0.00	81.3	119.4	84.9	78.4
848	128.837	0.152	0.107	0.96	102.1	-3.14	-	0.29	-0.01	81.2	119.3	85.3	78.4
849	128.990	0.153	0.109	0.98	102.4	-3.16	-	0.29	0.00	81.2	119.6	86.3	78.4

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
850	129.141	0.151	0.108	0.98	102.4	-3.15	100	0.28	-0.01	81.2	120.0	87.2	78.4
851	129.292	0.151	0.109	0.99	102.5	-3.07	-	0.27	-0.01	81.2	120.7	88.0	78.4
852	129.444	0.152	0.109	0.97	102.5	-3.20	-	0.27	0.00	81.2	120.1	88.6	78.4
853	129.598	0.154	0.108	0.98	102.2	-3.10	-	0.26	-0.01	81.2	119.4	88.7	78.3
854	129.750	0.152	0.110	0.98	102.2	-3.16	-	0.25	-0.01	81.1	119.8	88.5	78.3
855	129.904	0.154	0.108	0.97	102.3	-3.14	-	0.25	0.00	81.2	120.3	87.8	78.3
856	130.056	0.152	0.109	0.96	101.9	-3.11	-	0.24	-0.01	81.2	119.9	87.0	78.3
857	130.207	0.151	0.109	0.97	102.2	-3.19	-	0.23	-0.01	81.1	120.5	86.2	78.3
858	130.359	0.152	0.110	0.97	102.2	-3.15	-	0.24	0.01	81.1	120.8	85.6	78.3
859	130.513	0.154	0.109	0.96	102.6	-3.07	-	0.22	-0.02	81.2	120.7	85.0	78.3
860	130.667	0.154	0.108	0.98	102.2	-3.20	100	0.22	0.00	81.1	120.2	85.1	78.3
861	130.819	0.152	0.109	0.99	102.1	-3.12	-	0.22	0.00	81.1	120.6	85.7	78.3
862	130.972	0.153	0.108	0.98	102.4	-3.14	-	0.20	-0.02	81.1	120.2	87.0	78.3
863	131.125	0.153	0.109	0.98	102.4	-3.19	-	0.20	0.00	81.1	120.0	87.7	78.3
864	131.276	0.151	0.110	0.97	102.3	-3.08	-	0.19	-0.01	81.1	119.3	88.2	78.3
865	131.428	0.152	0.110	0.98	102.6	-3.06	-	0.19	0.00	81.0	119.0	88.3	78.3
866	131.580	0.152	0.109	0.99	102.5	-3.15	-	0.18	-0.01	81.0	119.2	88.4	78.3
867	131.733	0.153	0.109	0.97	102.2	-3.03	-	0.18	0.00	81.0	119.9	88.8	78.3
868	131.886	0.153	0.107	0.97	102.1	-3.14	-	0.17	-0.01	81.0	120.0	88.9	78.3
869	132.038	0.152	0.109	0.98	102.3	-3.15	-	0.17	0.00	81.0	119.7	89.3	78.2
870	132.190	0.152	0.109	0.99	102.2	-3.08	99	0.16	-0.01	81.0	119.6	89.3	78.2
871	132.342	0.152	0.109	0.97	102.5	-3.08	-	0.16	0.00	81.0	119.8	88.7	78.2
872	132.495	0.153	0.109	0.98	102.1	-3.11	-	0.15	-0.01	80.9	119.3	87.8	78.2
873	132.649	0.154	0.108	0.97	102.2	-3.14	-	0.15	0.00	80.9	119.6	86.8	78.2
874	132.800	0.151	0.109	0.98	102.2	-3.10	-	0.14	-0.01	80.9	119.5	86.1	78.2
875	132.954	0.154	0.109	0.98	102.0	-3.15	-	0.14	0.00	80.9	119.6	85.6	78.2
876	133.106	0.152	0.109	0.99	102.0	-3.09	-	0.12	-0.02	80.9	119.3	85.1	78.1
877	133.258	0.152	0.109	0.97	102.3	-3.00	-	0.12	0.00	80.9	119.2	85.1	78.2
878	133.410	0.152	0.109	0.97	102.2	-3.14	-	0.12	0.00	80.9	118.5	85.7	78.2
879	133.562	0.152	0.110	0.99	102.0	-3.15	-	0.11	-0.01	80.8	118.1	86.2	78.2
880	133.716	0.154	0.109	0.97	101.9	-3.17	99	0.11	0.00	80.8	118.2	86.9	78.1
881	133.869	0.153	0.109	0.98	102.3	-3.05	-	0.11	0.00	80.8	117.9	87.5	78.1
882	134.022	0.153	0.108	0.98	102.1	-3.06	-	0.09	-0.02	80.8	118.8	87.9	78.1
883	134.175	0.153	0.109	0.99	102.1	-3.10	-	0.10	0.01	80.8	118.9	88.1	78.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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
884	134.327	0.152	0.108	0.99	101.9	-3.10	-	0.07	-0.03	80.8	118.6	87.8	78.1
885	134.479	0.152	0.109	0.98	102.1	-3.01	-	0.07	0.00	80.7	118.4	87.1	78.1
886	134.632	0.153	0.109	0.99	102.1	-3.00	-	0.07	0.00	80.7	118.5	86.5	78.1
887	134.785	0.153	0.109	0.99	101.8	-3.08	-	0.07	0.00	80.7	118.1	85.8	78.1
888	134.939	0.154	0.108	0.98	102.1	-3.05	-	0.06	-0.01	80.7	118.1	85.2	78.0
889	135.091	0.152	0.108	0.98	102.3	-3.11	-	0.06	0.00	80.7	117.3	85.1	78.1
890	135.244	0.153	0.109	0.98	102.0	-3.07	100	0.05	-0.01	80.6	117.4	85.7	78.0
891	135.396	0.152	0.108	0.98	102.2	-3.06	-	0.05	0.00	80.7	117.3	86.3	78.0
892	135.550	0.154	0.109	0.97	101.7	-3.00	-	0.04	-0.01	80.7	117.2	86.9	78.0
893	135.705	0.155	0.109	0.98	102.0	-2.95	-	0.04	0.00	80.6	116.7	87.6	78.0
894	135.857	0.152	0.109	0.98	101.8	-2.93	-	0.03	-0.01	80.6	116.3	87.8	78.0
895	136.013	0.156	0.109	0.97	101.8	-2.96	-	0.03	0.00	80.6	116.0	87.9	78.0
896	136.168	0.155	0.110	0.98	102.0	-2.96	-	0.02	-0.01	80.6	115.3	87.4	78.0
897	136.322	0.154	0.108	0.97	101.8	-2.95	-	0.01	-0.01	80.5	115.6	86.6	77.9
898	136.475	0.153	0.108	0.98	101.8	-3.06	-	0.01	0.00	80.5	115.8	86.0	78.0
899	136.629	0.154	0.107	0.97	101.8	-3.00	-	0.00	-0.01	80.5	115.6	85.6	78.0
900	136.783	0.154	0.108	0.97	102.3	-3.04	100	0.01	0.01	80.5	116.2	85.0	77.9
901	136.938	0.155	0.109	0.97	101.6	-2.96	101	0.00	-0.01	80.5	116.6	85.1	77.9
Avg/Tot	136.938	0.152	0.108	0.98	99.4	-2.92	100			83.4	207.6	86.4	77.0

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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		0.01	94.9	-0.54		82.6	-0.033	4.91	0.052
1	0.159	0.159	1.44	94.2	-1.49	-	81.8	-0.038	3.62	0.099
2	0.331	0.172	1.08	93.9	-1.32	-	82.5	-0.041	3.67	0.360
3	0.484	0.153	1.08	93.7	-1.28	-	82.9	-0.043	5.27	0.102
4	0.637	0.153	1.08	93.6	-1.39	-	83.3	-0.043	5.89	0.085
5	0.791	0.154	1.06	93.4	-1.37	-	83.8	-0.050	6.40	0.079
6	0.945	0.154	1.07	93.2	-1.31	-	83.9	-0.044	6.76	0.077
7	1.098	0.153	1.06	93.1	-1.29	-	83.4	-0.051	7.07	0.084
8	1.249	0.151	1.07	93.0	-1.34	-	83.5	-0.051	7.52	0.064
9	1.402	0.153	1.08	92.9	-1.28	-	84.0	-0.048	7.72	0.058
10	1.556	0.154	1.08	92.8	-1.34	104	83.9	-0.049	7.66	0.066
11	1.711	0.155	1.06	92.7	-1.34	-	83.4	-0.046	7.94	0.057
12	1.862	0.151	1.06	92.7	-1.33	-	83.7	-0.051	7.89	0.061
13	2.014	0.152	1.08	92.6	-1.36	-	83.3	-0.051	8.15	0.063
14	2.164	0.150	1.04	92.7	-1.37	-	83.5	-0.054	8.12	0.063
15	2.317	0.153	1.07	92.6	-1.25	-	82.7	-0.052	8.07	0.065
16	2.469	0.152	1.05	92.7	-1.37	-	83.8	-0.046	8.59	0.098
17	2.621	0.152	1.03	92.6	-1.32	-	83.0	-0.046	9.87	0.086
18	2.781	0.160	1.07	92.6	-1.25	-	83.1	-0.040	7.57	0.056
19	2.933	0.152	1.05	92.6	-1.34	-	82.7	-0.045	6.55	0.075
20	3.086	0.153	1.05	92.7	-1.27	102	83.7	-0.041	5.99	0.068
21	3.238	0.152	1.07	92.7	-1.24	-	83.4	-0.041	5.82	0.064
22	3.389	0.151	1.05	92.8	-1.36	-	82.9	-0.039	5.69	0.059
23	3.542	0.153	1.05	92.8	-1.37	-	83.3	-0.043	5.65	0.057
24	3.694	0.152	1.08	92.8	-1.25	-	83.4	-0.043	5.54	0.056
25	3.846	0.152	1.07	92.9	-1.35	-	83.7	-0.039	5.53	0.058
26	3.998	0.152	1.06	92.9	-1.39	-	84.1	-0.034	5.59	0.058
27	4.147	0.149	1.05	93.0	-1.36	-	83.5	-0.042	5.54	0.056
28	4.298	0.151	1.05	93.1	-1.38	-	83.5	-0.042	5.72	0.051
29	4.449	0.151	1.04	93.1	-1.24	-	83.9	-0.041	5.84	0.059
30	4.599	0.150	1.05	93.1	-1.40	100	82.9	-0.041	6.01	0.061
31	4.751	0.152	1.05	93.1	-1.29	-	82.6	-0.042	5.96	0.061
32	4.903	0.152	1.02	93.2	-1.26	-	83.7	-0.047	6.04	0.065

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
33	5.054	0.151	1.04	93.3	-1.27	-	84.2	-0.038	6.07	0.066
34	5.206	0.152	1.06	93.4	-1.29	-	83.8	-0.041	6.18	0.074
35	5.358	0.152	1.05	93.4	-1.39	-	83.9	-0.035	6.15	0.070
36	5.509	0.151	1.05	93.5	-1.22	-	83.2	-0.033	6.26	0.069
37	5.660	0.151	1.04	93.6	-1.22	-	83.8	-0.034	6.38	0.072
38	5.812	0.152	1.05	93.7	-1.36	-	83.5	-0.043	6.37	0.071
39	5.961	0.149	1.06	93.8	-1.29	-	83.8	-0.041	6.38	0.070
40	6.113	0.152	1.04	93.8	-1.36	101	83.3	-0.037	6.38	0.072
41	6.264	0.151	1.05	93.9	-1.23	-	83.5	-0.042	6.31	0.077
42	6.414	0.150	1.06	94.0	-1.24	-	83.6	-0.034	6.31	0.065
43	6.565	0.151	1.06	94.0	-1.22	-	83.6	-0.043	6.29	0.061
44	6.716	0.151	1.05	94.1	-1.38	-	83.5	-0.040	6.32	0.068
45	6.868	0.152	1.03	94.3	-1.40	-	83.7	-0.040	6.28	0.071
46	7.020	0.152	1.04	94.3	-1.25	-	83.8	-0.039	6.24	0.070
47	7.173	0.153	1.05	94.3	-1.33	-	83.8	-0.041	6.21	0.070
48	7.323	0.150	1.04	94.4	-1.31	-	84.6	-0.039	6.17	0.067
49	7.474	0.151	1.06	94.5	-1.35	-	84.4	-0.041	6.19	0.071
50	7.626	0.152	1.05	94.5	-1.38	100	84.1	-0.041	6.19	0.071
51	7.775	0.149	1.04	94.6	-1.32	-	83.5	-0.035	6.21	0.069
52	7.927	0.152	1.05	94.7	-1.40	-	83.9	-0.042	6.18	0.068
53	8.078	0.151	1.05	94.8	-1.38	-	83.9	-0.035	6.13	0.071
54	8.229	0.151	1.06	94.9	-1.33	-	83.9	-0.035	6.08	0.068
55	8.379	0.150	1.05	95.0	-1.25	-	83.4	-0.037	6.08	0.067
56	8.530	0.151	1.06	95.0	-1.27	-	84.1	-0.042	6.09	0.075
57	8.682	0.152	1.06	95.1	-1.33	-	83.6	-0.037	6.05	0.072
58	8.834	0.152	1.04	95.1	-1.32	-	83.8	-0.036	6.01	0.073
59	8.986	0.152	1.04	95.1	-1.22	-	83.1	-0.038	5.98	0.069
60	9.139	0.153	1.04	95.3	-1.37	100	84.1	-0.030	5.94	0.072
61	9.289	0.150	1.05	95.4	-1.26	-	83.8	-0.037	5.93	0.073
62	9.441	0.152	1.05	95.3	-1.24	-	83.7	-0.037	5.89	0.072
63	9.590	0.149	1.06	95.4	-1.39	-	82.9	-0.033	5.88	0.075
64	9.742	0.152	1.04	95.5	-1.25	-	82.8	-0.026	5.92	0.082
65	9.894	0.152	1.07	95.5	-1.38	-	83.5	-0.034	5.87	0.083

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
66	10.045	0.151	1.04	95.6	-1.27	-	83.1	-0.033	5.85	0.086
67	10.196	0.151	1.05	95.8	-1.35	-	83.7	-0.036	5.86	0.091
68	10.347	0.151	1.04	95.7	-1.38	-	82.8	-0.032	5.83	0.088
69	10.498	0.151	1.03	95.8	-1.35	-	83.4	-0.032	5.85	0.093
70	10.650	0.152	1.03	95.9	-1.22	100	84.1	-0.028	5.81	0.095
71	10.805	0.155	1.04	96.0	-1.23	-	84.1	-0.034	5.80	0.096
72	10.956	0.151	1.06	96.1	-1.28	-	83.9	-0.030	5.79	0.104
73	11.106	0.150	1.06	96.0	-1.38	-	83.5	-0.035	5.75	0.103
74	11.258	0.152	1.07	96.1	-1.35	-	83.3	-0.031	5.71	0.109
75	11.407	0.149	1.04	96.2	-1.24	-	84.0	-0.030	5.64	0.111
76	11.559	0.152	1.07	96.2	-1.28	-	83.3	-0.030	5.57	0.113
77	11.711	0.152	1.05	96.3	-1.29	-	83.5	-0.032	5.50	0.120
78	11.862	0.151	1.05	96.3	-1.29	-	83.2	-0.036	5.46	0.131
79	12.013	0.151	1.04	96.5	-1.22	-	83.9	-0.030	5.28	0.142
80	12.164	0.151	1.05	96.6	-1.27	100	83.1	-0.029	5.18	0.158
81	12.315	0.151	1.05	96.7	-1.25	-	83.2	-0.034	5.12	0.181
82	12.467	0.152	1.07	96.8	-1.22	-	83.9	-0.028	4.96	0.208
83	12.622	0.155	1.05	96.8	-1.31	-	83.6	-0.027	4.96	0.232
84	12.773	0.151	1.05	97.0	-1.34	-	83.6	-0.034	4.66	0.265
85	12.923	0.150	1.06	97.2	-1.39	-	83.9	-0.029	4.52	0.287
86	13.075	0.152	1.04	97.2	-1.25	-	84.1	-0.031	4.55	0.312
87	13.224	0.149	1.06	97.1	-1.33	-	83.8	-0.034	4.68	0.378
88	13.376	0.152	1.04	97.2	-1.24	-	83.0	-0.034	4.82	0.432
89	13.528	0.152	1.03	97.2	-1.39	-	83.3	-0.030	4.93	0.505
90	13.680	0.152	1.05	97.5	-1.31	100	84.2	-0.034	5.09	0.566
91	13.830	0.150	1.05	97.4	-1.33	-	82.7	-0.031	5.18	0.613
92	13.982	0.152	1.08	97.5	-1.22	-	83.6	-0.031	5.29	0.654
93	14.134	0.152	1.05	97.5	-1.23	-	83.3	-0.032	5.42	0.686
94	14.289	0.155	1.04	97.6	-1.39	-	83.5	-0.034	5.52	0.703
95	14.440	0.151	1.04	97.8	-1.29	-	83.9	-0.033	5.62	0.701
96	14.591	0.151	1.06	97.7	-1.23	-	83.3	-0.038	5.65	0.680
97	14.739	0.148	1.06	97.7	-1.22	-	82.7	-0.034	5.75	0.667
98	14.891	0.152	1.05	97.8	-1.34	-	82.8	-0.037	5.71	0.643

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
99	15.043	0.152	1.04	98.0	-1.22	-	83.3	-0.035	5.80	0.629
100	15.195	0.152	1.02	98.1	-1.23	100	83.2	-0.035	5.73	0.597
101	15.346	0.151	1.05	98.1	-1.30	-	82.5	-0.034	5.86	0.585
102	15.499	0.153	1.01	98.0	-1.35	-	83.5	-0.038	5.83	0.562
103	15.650	0.151	1.05	98.3	-1.22	-	83.2	-0.038	5.82	0.533
104	15.802	0.152	1.03	98.2	-1.21	-	83.4	-0.032	5.96	0.476
105	15.951	0.149	1.06	98.1	-1.23	-	83.1	-0.031	5.88	0.406
106	16.103	0.152	1.06	98.1	-1.40	-	83.5	-0.030	5.77	0.350
107	16.254	0.151	1.04	98.2	-1.31	-	83.7	-0.032	5.75	0.305
108	16.406	0.152	1.04	98.1	-1.23	-	83.0	-0.033	5.63	0.276
109	16.556	0.150	1.05	98.1	-1.37	-	83.7	-0.029	5.57	0.264
110	16.710	0.154	1.04	98.2	-1.28	101	83.0	-0.035	5.52	0.259
111	16.862	0.152	1.05	98.2	-1.23	-	83.8	-0.027	5.59	0.251
112	17.010	0.148	1.04	98.3	-1.39	-	84.1	-0.034	5.92	0.247
113	17.162	0.152	1.03	98.3	-1.23	-	84.3	-0.036	5.97	0.235
114	17.314	0.152	1.03	98.3	-1.31	-	83.7	-0.035	5.97	0.219
115	17.464	0.150	1.05	98.2	-1.40	-	83.7	-0.033	5.93	0.208
116	17.617	0.153	1.06	98.2	-1.32	-	83.7	-0.030	5.86	0.201
117	17.769	0.152	1.05	98.3	-1.22	-	83.7	-0.035	5.88	0.196
118	17.921	0.152	1.06	98.3	-1.34	-	83.5	-0.040	5.84	0.191
119	18.070	0.149	1.05	98.2	-1.38	-	83.1	-0.037	5.84	0.192
120	18.221	0.151	1.03	98.5	-1.32	100	83.9	-0.034	5.86	0.199
121	18.372	0.151	1.05	98.5	-1.40	-	84.2	-0.031	5.86	0.202
122	18.525	0.153	1.04	98.4	-1.31	-	83.9	-0.030	5.84	0.205
123	18.677	0.152	1.04	98.5	-1.21	-	84.1	-0.036	5.86	0.200
124	18.828	0.151	1.04	98.5	-1.22	-	84.3	-0.027	5.86	0.200
125	18.977	0.149	1.03	98.5	-1.29	-	84.0	-0.037	5.89	0.203
126	19.129	0.152	1.05	98.5	-1.34	-	84.2	-0.035	5.92	0.208
127	19.280	0.151	1.06	98.6	-1.37	-	84.2	-0.030	5.92	0.215
128	19.432	0.152	1.04	98.6	-1.28	-	83.9	-0.033	5.90	0.214
129	19.584	0.152	1.05	98.5	-1.24	-	82.9	-0.029	5.98	0.224
130	19.733	0.149	1.04	98.7	-1.40	100	84.0	-0.028	5.98	0.224
131	19.884	0.151	1.04	98.7	-1.26	-	83.6	-0.036	6.50	0.210

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
132	20.036	0.152	1.04	98.7	-1.39	-	83.7	-0.037	6.68	0.189
133	20.189	0.153	1.05	98.6	-1.27	-	83.1	-0.022	6.76	0.171
134	20.340	0.151	1.05	98.7	-1.38	-	83.3	-0.028	6.85	0.161
135	20.491	0.151	1.05	98.7	-1.25	-	83.3	-0.031	6.70	0.143
136	20.640	0.149	1.05	98.8	-1.38	-	84.3	-0.028	6.65	0.130
137	20.792	0.152	1.05	98.8	-1.26	-	84.5	-0.034	6.67	0.119
138	20.943	0.151	1.03	98.7	-1.38	-	84.1	-0.028	6.64	0.105
139	21.097	0.154	1.01	98.9	-1.26	-	84.3	-0.031	6.60	0.097
140	21.247	0.150	1.05	98.8	-1.30	100	83.8	-0.032	6.55	0.093
141	21.396	0.149	1.04	98.8	-1.32	-	83.4	-0.031	6.61	0.087
142	21.547	0.151	1.06	98.8	-1.23	-	83.8	-0.029	6.72	0.085
143	21.699	0.152	1.05	98.9	-1.33	-	83.9	-0.028	6.72	0.081
144	21.853	0.154	1.03	98.9	-1.35	-	83.9	-0.029	6.70	0.075
145	22.004	0.151	1.06	98.9	-1.24	-	83.3	-0.033	6.76	0.077
146	22.154	0.150	1.05	98.9	-1.39	-	83.2	-0.027	6.75	0.071
147	22.303	0.149	1.05	98.9	-1.24	-	83.8	-0.032	6.84	0.070
148	22.454	0.151	1.02	99.1	-1.30	-	84.2	-0.033	6.80	0.068
149	22.606	0.152	1.04	98.9	-1.40	-	83.2	-0.031	6.84	0.069
150	22.760	0.154	1.03	99.0	-1.36	100	83.6	-0.025	6.89	0.071
151	22.912	0.152	1.06	99.1	-1.40	-	84.1	-0.034	6.95	0.071
152	23.061	0.149	1.05	99.0	-1.32	-	84.2	-0.030	6.89	0.068
153	23.211	0.150	1.06	99.1	-1.23	-	83.6	-0.028	6.93	0.069
154	23.362	0.151	1.05	99.2	-1.23	-	84.1	-0.033	6.98	0.069
155	23.513	0.151	1.05	99.2	-1.24	-	83.7	-0.032	6.97	0.067
156	23.668	0.155	1.02	99.1	-1.28	-	83.7	-0.024	7.06	0.066
157	23.819	0.151	1.04	99.2	-1.39	-	84.0	-0.032	7.09	0.070
158	23.968	0.149	1.02	99.1	-1.24	-	84.0	-0.032	7.08	0.073
159	24.118	0.150	1.05	99.2	-1.34	-	84.1	-0.031	7.09	0.072
160	24.269	0.151	1.04	99.2	-1.39	100	83.5	-0.034	7.25	0.067
161	24.424	0.155	1.04	99.2	-1.23	-	83.2	-0.034	7.25	0.071
162	24.575	0.151	1.04	99.2	-1.37	-	84.0	-0.031	7.26	0.070
163	24.724	0.149	1.02	99.2	-1.39	-	83.4	-0.032	7.25	0.076
164	24.875	0.151	1.06	99.3	-1.22	-	83.9	-0.030	7.39	0.079

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
165	25.026	0.151	1.06	99.2	-1.39	-	83.5	-0.031	7.49	0.073
166	25.179	0.153	1.04	99.3	-1.35	-	84.0	-0.035	7.52	0.077
167	25.331	0.152	1.05	99.2	-1.40	-	83.5	-0.033	7.60	0.083
168	25.482	0.151	1.04	99.2	-1.23	-	83.7	-0.036	7.76	0.086
169	25.631	0.149	1.03	99.3	-1.40	-	83.5	-0.033	7.84	0.087
170	25.783	0.152	1.00	99.4	-1.23	100	83.9	-0.037	7.92	0.091
171	25.934	0.151	1.05	99.3	-1.39	-	84.0	-0.038	7.97	0.086
172	26.086	0.152	1.03	99.3	-1.29	-	83.7	-0.037	7.92	0.092
173	26.238	0.152	1.05	99.4	-1.27	-	84.2	-0.035	8.03	0.091
174	26.387	0.149	1.07	99.4	-1.33	-	83.8	-0.036	8.32	0.104
175	26.538	0.151	1.03	99.4	-1.26	-	84.2	-0.036	8.38	0.106
176	26.692	0.154	1.02	99.4	-1.22	-	83.5	-0.040	8.27	0.103
177	26.843	0.151	1.05	99.5	-1.38	-	83.8	-0.034	8.22	0.094
178	26.993	0.150	1.04	99.4	-1.21	-	83.6	-0.032	8.24	0.090
179	27.142	0.149	1.06	99.6	-1.38	-	84.2	-0.037	8.27	0.089
180	27.293	0.151	1.03	99.5	-1.27	100	83.9	-0.035	8.27	0.089
181	27.448	0.155	1.05	99.4	-1.23	-	83.5	-0.037	8.24	0.088
182	27.600	0.152	1.05	99.5	-1.38	-	83.8	-0.033	8.25	0.091
183	27.751	0.151	1.05	99.5	-1.23	-	83.6	-0.039	8.24	0.092
184	27.899	0.148	1.05	99.6	-1.39	-	84.1	-0.036	8.24	0.089
185	28.049	0.150	1.06	99.5	-1.22	-	83.4	-0.033	8.32	0.089
186	28.204	0.155	1.04	99.7	-1.28	-	84.4	-0.039	8.32	0.091
187	28.355	0.151	1.04	99.6	-1.22	-	84.0	-0.038	8.32	0.094
188	28.507	0.152	1.03	99.6	-1.25	-	83.2	-0.038	8.39	0.094
189	28.656	0.149	1.04	99.6	-1.29	-	84.3	-0.033	8.36	0.093
190	28.807	0.151	1.05	99.6	-1.31	100	83.8	-0.036	8.36	0.104
191	28.959	0.152	1.05	99.6	-1.31	-	83.5	-0.029	8.38	0.094
192	29.110	0.151	1.05	99.6	-1.23	-	83.7	-0.039	8.42	0.098
193	29.259	0.149	1.04	99.6	-1.27	-	83.7	-0.033	8.43	0.097
194	29.411	0.152	1.05	99.6	-1.33	-	84.2	-0.038	8.45	0.093
195	29.562	0.151	1.04	99.6	-1.36	-	83.8	-0.033	8.46	0.100
196	29.716	0.154	1.03	99.6	-1.41	-	83.7	-0.040	8.52	0.098
197	29.866	0.150	1.05	99.8	-1.22	-	84.7	-0.040	8.59	0.105

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
198	30.015	0.149	1.05	99.8	-1.24	-	84.3	-0.043	8.62	0.105
199	30.166	0.151	1.03	99.7	-1.37	-	84.2	-0.039	8.65	0.102
200	30.318	0.152	1.05	99.7	-1.37	100	84.2	-0.041	8.67	0.108
201	30.472	0.154	1.06	99.7	-1.33	-	83.9	-0.033	8.72	0.104
202	30.623	0.151	1.04	99.8	-1.37	-	84.0	-0.037	8.72	0.117
203	30.771	0.148	1.03	99.7	-1.23	-	83.5	-0.033	8.78	0.120
204	30.921	0.150	1.03	99.8	-1.21	-	84.1	-0.038	8.91	0.118
205	31.075	0.154	1.01	99.9	-1.22	-	84.4	-0.039	8.97	0.130
206	31.227	0.152	1.06	99.9	-1.29	-	84.5	-0.038	8.97	0.138
207	31.376	0.149	1.04	99.7	-1.37	-	83.4	-0.040	9.09	0.141
208	31.527	0.151	1.07	99.9	-1.35	-	83.9	-0.046	9.13	0.160
209	31.679	0.152	1.03	99.9	-1.40	-	84.7	-0.036	9.06	0.164
210	31.830	0.151	1.03	99.8	-1.23	100	83.8	-0.040	9.06	0.169
211	31.982	0.152	1.05	99.9	-1.25	-	84.4	-0.040	9.03	0.174
212	32.131	0.149	1.05	99.9	-1.35	-	84.5	-0.040	9.04	0.170
213	32.282	0.151	1.06	99.8	-1.32	-	83.7	-0.041	9.13	0.179
214	32.436	0.154	1.05	99.9	-1.30	-	84.6	-0.037	9.12	0.181
215	32.588	0.152	1.05	99.9	-1.36	-	84.1	-0.043	9.07	0.175
216	32.736	0.148	1.06	99.9	-1.40	-	83.6	-0.037	9.12	0.180
217	32.886	0.150	1.03	99.9	-1.39	-	84.3	-0.037	9.14	0.181
218	33.037	0.151	1.05	99.8	-1.32	-	84.2	-0.042	9.19	0.181
219	33.191	0.154	1.05	100.0	-1.23	-	84.3	-0.042	9.23	0.187
220	33.343	0.152	1.05	100.0	-1.32	101	83.9	-0.042	9.26	0.193
221	33.491	0.148	1.04	100.0	-1.40	-	84.5	-0.045	9.24	0.199
222	33.643	0.152	1.01	99.9	-1.31	-	83.4	-0.042	9.28	0.195
223	33.795	0.152	1.03	99.9	-1.32	-	84.2	-0.039	9.30	0.197
224	33.946	0.151	1.06	99.9	-1.40	-	83.6	-0.037	9.24	0.196
225	34.095	0.149	1.06	100.1	-1.28	-	84.7	-0.042	9.22	0.202
226	34.246	0.151	1.07	100.1	-1.40	-	84.5	-0.038	9.20	0.194
227	34.398	0.152	1.05	99.9	-1.26	-	83.8	-0.043	9.17	0.200
228	34.549	0.151	1.02	100.0	-1.35	-	84.3	-0.044	9.20	0.197
229	34.702	0.153	1.03	100.0	-1.27	-	83.8	-0.043	9.29	0.195
230	34.850	0.148	1.06	100.0	-1.35	100	84.0	-0.046	9.27	0.205

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
231	35.001	0.151	1.04	100.1	-1.34	-	84.7	-0.040	9.29	0.204
232	35.155	0.154	1.04	100.0	-1.39	-	83.8	-0.041	9.24	0.198
233	35.307	0.152	1.04	100.1	-1.40	-	84.5	-0.043	9.23	0.195
234	35.455	0.148	1.03	100.0	-1.29	-	83.7	-0.043	9.23	0.198
235	35.607	0.152	1.06	100.2	-1.34	-	84.5	-0.041	9.24	0.194
236	35.757	0.150	1.05	100.1	-1.25	-	84.3	-0.040	9.22	0.190
237	35.910	0.153	1.03	100.0	-1.26	-	83.2	-0.041	9.25	0.188
238	36.061	0.151	1.04	100.2	-1.36	-	84.4	-0.038	9.25	0.184
239	36.210	0.149	1.04	100.1	-1.23	-	84.1	-0.042	9.23	0.182
240	36.362	0.152	1.04	100.2	-1.24	100	84.6	-0.037	9.22	0.186
241	36.516	0.154	1.04	100.2	-1.38	-	84.6	-0.042	9.28	0.182
242	36.666	0.150	1.05	100.2	-1.29	-	84.3	-0.037	9.31	0.176
243	36.814	0.148	1.06	100.2	-1.29	-	84.4	-0.047	9.29	0.185
244	36.965	0.151	1.06	100.1	-1.38	-	84.3	-0.037	9.29	0.188
245	37.119	0.154	1.05	100.1	-1.39	-	83.9	-0.036	9.33	0.186
246	37.270	0.151	1.04	100.1	-1.36	-	83.9	-0.039	9.40	0.195
247	37.419	0.149	1.05	100.1	-1.25	-	83.7	-0.041	9.47	0.209
248	37.570	0.151	1.05	100.3	-1.29	-	84.3	-0.038	9.58	0.223
249	37.722	0.152	1.04	100.2	-1.36	-	84.1	-0.047	9.68	0.234
250	37.873	0.151	1.05	100.2	-1.40	100	83.9	-0.043	9.78	0.243
251	38.022	0.149	1.05	100.3	-1.25	-	84.1	-0.042	9.89	0.265
252	38.173	0.151	1.04	100.2	-1.24	-	83.6	-0.043	9.98	0.271
253	38.328	0.155	1.02	100.3	-1.22	-	83.7	-0.043	10.21	0.280
254	38.479	0.151	1.06	100.3	-1.23	-	84.3	-0.046	10.31	0.288
255	38.627	0.148	1.04	100.4	-1.27	-	84.5	-0.048	10.41	0.294
256	38.777	0.150	1.06	100.3	-1.38	-	83.7	-0.039	10.36	0.296
257	38.930	0.153	1.04	100.4	-1.25	-	84.7	-0.041	10.33	0.292
258	39.081	0.151	1.01	100.3	-1.40	-	84.4	-0.042	10.21	0.299
259	39.230	0.149	1.04	100.3	-1.40	-	84.2	-0.048	10.14	0.296
260	39.381	0.151	1.05	100.3	-1.39	100	84.2	-0.049	10.11	0.292
261	39.535	0.154	1.03	100.4	-1.28	-	84.0	-0.047	9.98	0.294
262	39.686	0.151	1.03	100.3	-1.30	-	83.9	-0.045	9.93	0.291
263	39.834	0.148	1.07	100.4	-1.25	-	84.4	-0.043	9.91	0.289

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
264	39.984	0.150	1.03	100.5	-1.29	-	84.5	-0.047	9.91	0.290
265	40.138	0.154	1.03	100.4	-1.35	-	84.2	-0.047	9.89	0.290
266	40.289	0.151	1.04	100.4	-1.39	-	84.5	-0.047	9.85	0.283
267	40.438	0.149	1.06	100.4	-1.29	-	84.0	-0.043	9.84	0.288
268	40.589	0.151	1.07	100.4	-1.36	-	84.2	-0.044	9.86	0.286
269	40.742	0.153	1.04	100.5	-1.37	-	84.4	-0.045	9.83	0.287
270	40.892	0.150	1.03	100.5	-1.28	101	84.7	-0.038	9.87	0.288
271	41.041	0.149	1.04	100.5	-1.37	-	84.2	-0.047	9.95	0.296
272	41.192	0.151	1.05	100.5	-1.39	-	84.5	-0.049	10.02	0.300
273	41.346	0.154	1.05	100.6	-1.39	-	84.4	-0.047	10.04	0.308
274	41.497	0.151	1.05	100.5	-1.39	-	84.0	-0.045	10.06	0.304
275	41.646	0.149	1.03	100.5	-1.38	-	84.0	-0.046	10.18	0.303
276	41.797	0.151	1.03	100.6	-1.33	-	84.0	-0.046	10.25	0.311
277	41.949	0.152	1.06	100.5	-1.31	-	84.3	-0.044	10.36	0.310
278	42.100	0.151	1.03	100.6	-1.22	-	84.6	-0.042	10.47	0.312
279	42.249	0.149	1.04	100.6	-1.36	-	84.2	-0.048	10.51	0.312
280	42.400	0.151	1.04	100.5	-1.28	100	84.3	-0.046	10.49	0.311
281	42.554	0.154	1.05	100.5	-1.33	-	83.8	-0.046	10.57	0.288
282	42.705	0.151	1.05	100.6	-1.35	-	84.5	-0.043	10.67	0.283
283	42.853	0.148	1.03	100.6	-1.29	-	84.7	-0.042	10.69	0.268
284	43.004	0.151	1.05	100.7	-1.24	-	84.4	-0.053	10.76	0.263
285	43.158	0.154	1.02	100.6	-1.24	-	84.1	-0.044	10.79	0.259
286	43.309	0.151	1.03	100.6	-1.28	-	84.5	-0.044	10.87	0.252
287	43.458	0.149	1.05	100.7	-1.25	-	84.2	-0.050	10.90	0.241
288	43.609	0.151	1.03	100.7	-1.39	-	84.4	-0.048	10.94	0.244
289	43.762	0.153	1.05	100.7	-1.28	-	84.0	-0.039	11.05	0.245
290	43.912	0.150	1.04	100.8	-1.32	100	84.3	-0.045	11.19	0.237
291	44.058	0.146	1.04	100.7	-1.33	-	84.3	-0.047	11.27	0.237
292	44.209	0.151	1.03	100.7	-1.31	-	84.3	-0.044	11.31	0.235
293	44.361	0.152	1.02	100.8	-1.23	-	84.6	-0.043	11.46	0.233
294	44.512	0.151	1.05	100.8	-1.31	-	84.8	-0.047	11.78	0.245
295	44.663	0.151	1.01	100.8	-1.40	-	84.2	-0.052	11.53	0.236
296	44.814	0.151	1.05	100.7	-1.39	-	84.2	-0.054	10.96	0.228

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
297	44.965	0.151	1.04	100.7	-1.33	-	83.4	-0.046	10.41	0.244
298	45.115	0.150	1.05	100.8	-1.24	-	84.3	-0.053	10.14	0.257
299	45.266	0.151	1.05	100.8	-1.33	-	84.8	-0.051	9.96	0.256
300	45.417	0.151	1.05	100.8	-1.36	100	84.0	-0.046	9.77	0.245
301	45.569	0.152	1.04	100.9	-1.25	-	84.6	-0.041	9.62	0.239
302	45.720	0.151	1.04	100.9	-1.23	-	84.7	-0.042	9.57	0.224
303	45.871	0.151	1.03	100.9	-1.27	-	84.2	-0.046	9.56	0.222
304	46.021	0.150	1.03	100.8	-1.40	-	83.5	-0.038	9.40	0.205
305	46.172	0.151	1.05	100.9	-1.38	-	84.1	-0.041	9.36	0.199
306	46.323	0.151	1.04	100.9	-1.34	-	84.6	-0.044	9.30	0.190
307	46.474	0.151	1.03	100.9	-1.26	-	84.0	-0.046	9.20	0.176
308	46.626	0.152	1.00	100.9	-1.39	-	84.3	-0.042	9.11	0.175
309	46.777	0.151	1.04	101.0	-1.37	-	84.2	-0.039	9.00	0.155
310	46.928	0.151	1.03	100.9	-1.33	100	83.8	-0.042	8.94	0.143
311	47.078	0.150	1.04	101.0	-1.24	-	83.8	-0.039	8.94	0.133
312	47.228	0.150	1.04	101.0	-1.31	-	83.9	-0.038	8.76	0.127
313	47.379	0.151	1.01	101.0	-1.39	-	84.1	-0.049	8.73	0.117
314	47.531	0.152	1.03	101.1	-1.27	-	84.1	-0.045	8.73	0.109
315	47.682	0.151	1.03	101.0	-1.35	-	84.0	-0.037	8.59	0.105
316	47.833	0.151	1.04	101.1	-1.38	-	84.3	-0.040	8.52	0.097
317	47.984	0.151	1.06	101.2	-1.32	-	84.3	-0.039	8.52	0.093
318	48.134	0.150	1.05	101.0	-1.23	-	84.3	-0.035	8.47	0.090
319	48.285	0.151	1.06	101.2	-1.22	-	84.2	-0.043	8.39	0.088
320	48.436	0.151	1.03	101.1	-1.30	100	83.3	-0.040	8.38	0.079
321	48.587	0.151	1.05	101.2	-1.21	-	84.4	-0.039	8.31	0.076
322	48.739	0.152	1.03	101.1	-1.31	-	84.0	-0.039	8.36	0.080
323	48.890	0.151	1.01	101.1	-1.36	-	84.2	-0.032	8.36	0.074
324	49.040	0.150	1.07	101.3	-1.36	-	84.4	-0.038	8.37	0.084
325	49.190	0.150	1.04	101.2	-1.23	-	84.3	-0.042	8.68	0.088
326	49.341	0.151	1.05	101.3	-1.36	-	84.4	-0.039	8.78	0.092
327	49.492	0.151	1.04	101.2	-1.38	-	83.5	-0.044	8.93	0.104
328	49.644	0.152	1.03	101.2	-1.34	-	84.0	-0.040	8.97	0.112
329	49.795	0.151	1.04	101.2	-1.22	-	84.2	-0.044	9.02	0.120

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
330	49.946	0.151	1.00	101.2	-1.39	100	84.3	-0.044	9.10	0.129
331	50.097	0.151	1.05	101.2	-1.22	-	83.6	-0.048	9.18	0.141
332	50.246	0.149	1.04	101.2	-1.30	-	83.9	-0.036	9.21	0.144
333	50.398	0.152	1.02	101.4	-1.22	-	84.5	-0.045	9.22	0.149
334	50.549	0.151	1.05	101.4	-1.32	-	84.3	-0.038	9.27	0.148
335	50.700	0.151	1.02	101.3	-1.30	-	83.8	-0.036	9.20	0.142
336	50.851	0.151	1.06	101.3	-1.33	-	83.8	-0.039	9.14	0.138
337	51.003	0.152	1.02	101.5	-1.23	-	84.6	-0.039	9.21	0.146
338	51.153	0.150	1.05	101.5	-1.26	-	84.2	-0.038	9.26	0.158
339	51.303	0.150	1.01	101.4	-1.33	-	83.7	-0.040	8.80	0.140
340	51.454	0.151	1.03	101.4	-1.23	100	84.0	-0.038	8.25	0.088
341	51.605	0.151	1.03	101.4	-1.39	-	84.0	-0.037	8.13	0.076
342	51.756	0.151	1.04	101.5	-1.40	-	84.2	-0.037	8.02	0.073
343	51.908	0.152	1.05	101.5	-1.30	-	83.9	-0.032	8.01	0.068
344	52.059	0.151	1.04	101.4	-1.41	-	84.2	-0.030	7.95	0.067
345	52.209	0.150	1.05	101.5	-1.33	-	84.7	-0.039	7.96	0.060
346	52.359	0.150	1.02	101.5	-1.27	-	83.9	-0.030	7.93	0.061
347	52.510	0.151	1.06	101.5	-1.23	-	83.9	-0.033	7.93	0.061
348	52.662	0.152	1.01	101.5	-1.37	-	83.4	-0.028	7.97	0.058
349	52.813	0.151	1.04	101.5	-1.31	-	83.1	-0.035	7.92	0.064
350	52.964	0.151	1.03	101.5	-1.31	100	83.8	-0.036	8.04	0.060
351	53.115	0.151	1.06	101.7	-1.22	-	84.7	-0.031	7.99	0.064
352	53.265	0.150	1.05	101.6	-1.38	-	84.6	-0.027	8.06	0.060
353	53.416	0.151	1.02	101.6	-1.39	-	84.4	-0.031	8.10	0.064
354	53.567	0.151	1.02	101.7	-1.26	-	84.7	-0.036	8.18	0.060
355	53.718	0.151	1.04	101.7	-1.39	-	84.6	-0.030	8.26	0.059
356	53.870	0.152	1.03	101.7	-1.35	-	84.4	-0.028	8.35	0.063
357	54.021	0.151	1.04	101.7	-1.30	-	84.5	-0.035	8.40	0.066
358	54.172	0.151	1.07	101.8	-1.24	-	84.7	-0.032	8.44	0.069
359	54.321	0.149	1.02	101.7	-1.26	-	84.4	-0.035	8.46	0.072
360	54.472	0.151	1.03	101.6	-1.38	100	83.9	-0.032	8.52	0.069
361	54.623	0.151	1.02	101.8	-1.39	-	84.4	-0.034	8.60	0.069
362	54.775	0.152	1.04	101.7	-1.28	-	83.7	-0.032	8.62	0.065

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
363	54.926	0.151	1.01	101.8	-1.32	-	84.2	-0.031	8.71	0.067
364	55.077	0.151	1.03	101.7	-1.30	-	83.7	-0.032	8.75	0.070
365	55.228	0.151	1.03	101.7	-1.40	-	84.0	-0.033	8.82	0.069
366	55.378	0.150	1.04	101.7	-1.38	-	83.9	-0.033	8.80	0.069
367	55.528	0.150	1.03	101.7	-1.24	-	83.8	-0.030	8.84	0.074
368	55.679	0.151	1.01	101.7	-1.33	-	84.1	-0.043	8.78	0.072
369	55.831	0.152	1.02	101.8	-1.40	-	84.6	-0.033	8.81	0.070
370	55.982	0.151	1.03	101.8	-1.37	101	84.1	-0.038	8.77	0.068
371	56.133	0.151	1.02	101.8	-1.38	-	84.3	-0.030	8.76	0.072
372	56.284	0.151	1.04	101.8	-1.22	-	84.2	-0.039	8.78	0.060
373	56.434	0.150	1.06	101.8	-1.25	-	83.7	-0.030	8.76	0.068
374	56.585	0.151	1.03	101.8	-1.23	-	83.9	-0.039	8.79	0.073
375	56.736	0.151	1.02	101.8	-1.39	-	84.0	-0.033	8.82	0.073
376	56.888	0.152	1.02	101.9	-1.23	-	84.6	-0.033	8.77	0.070
377	57.039	0.151	1.03	101.8	-1.27	-	83.8	-0.032	8.75	0.071
378	57.190	0.151	1.05	101.8	-1.40	-	83.5	-0.033	8.78	0.070
379	57.341	0.151	1.03	101.9	-1.36	-	84.2	-0.032	8.81	0.075
380	57.490	0.149	1.03	101.9	-1.29	100	83.9	-0.035	8.79	0.073
381	57.642	0.152	1.06	101.8	-1.37	-	84.2	-0.026	8.81	0.072
382	57.793	0.151	1.03	101.8	-1.23	-	84.2	-0.032	8.89	0.077
383	57.944	0.151	1.04	101.9	-1.39	-	84.5	-0.028	8.88	0.074
384	58.096	0.152	1.07	101.8	-1.23	-	83.6	-0.035	8.94	0.077
385	58.247	0.151	1.06	101.8	-1.22	-	83.6	-0.037	8.92	0.078
386	58.397	0.150	1.04	102.0	-1.24	-	84.3	-0.036	8.86	0.079
387	58.547	0.150	1.02	101.9	-1.22	-	83.7	-0.029	8.80	0.081
388	58.698	0.151	1.04	101.9	-1.40	-	84.3	-0.035	8.71	0.079
389	58.850	0.152	1.03	102.0	-1.39	-	84.7	-0.033	8.63	0.074
390	59.001	0.151	1.05	102.0	-1.23	101	84.7	-0.034	8.64	0.075
391	59.152	0.151	1.03	101.8	-1.37	-	84.0	-0.031	8.53	0.074
392	59.303	0.151	1.03	101.9	-1.39	-	84.2	-0.031	8.52	0.077
393	59.453	0.150	1.05	102.0	-1.37	-	84.6	-0.034	8.55	0.069
394	59.604	0.151	1.04	101.9	-1.34	-	84.4	-0.028	8.55	0.071
395	59.755	0.151	1.04	101.9	-1.29	-	84.1	-0.030	8.56	0.069

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
396	59.906	0.151	1.03	102.0	-1.24	-	84.3	-0.031	8.60	0.072
397	60.058	0.152	1.04	101.9	-1.37	-	84.0	-0.029	8.56	0.071
398	60.209	0.151	1.03	102.0	-1.23	-	83.8	-0.031	8.56	0.068
399	60.360	0.151	1.03	101.9	-1.37	-	84.3	-0.031	8.50	0.073
400	60.510	0.150	1.04	102.0	-1.35	101	84.4	-0.031	8.57	0.073
401	60.660	0.150	1.03	102.0	-1.24	-	83.8	-0.029	8.53	0.065
402	60.811	0.151	1.04	102.1	-1.23	-	84.3	-0.028	8.61	0.065
403	60.963	0.152	1.06	102.0	-1.30	-	84.6	-0.030	8.64	0.069
404	61.114	0.151	1.04	102.0	-1.23	-	84.4	-0.029	8.61	0.067
405	61.265	0.151	1.03	102.0	-1.22	-	84.1	-0.031	8.66	0.069
406	61.416	0.151	1.05	102.1	-1.38	-	84.4	-0.030	8.67	0.070
407	61.566	0.150	1.02	102.1	-1.35	-	84.5	-0.028	8.68	0.061
408	61.717	0.151	1.03	102.0	-1.23	-	84.0	-0.033	8.65	0.071
409	61.868	0.151	1.05	101.9	-1.23	-	84.0	-0.029	8.66	0.071
410	62.020	0.152	1.06	101.9	-1.35	100	84.3	-0.033	8.60	0.079
411	62.171	0.151	1.04	101.9	-1.23	-	84.1	-0.026	8.58	0.069
412	62.322	0.151	1.01	102.0	-1.32	-	84.4	-0.032	8.49	0.067
413	62.473	0.151	1.03	102.0	-1.28	-	84.5	-0.031	8.39	0.071
414	62.622	0.149	1.04	102.1	-1.27	-	84.5	-0.033	8.27	0.073
415	62.774	0.152	1.02	102.1	-1.25	-	84.2	-0.038	8.17	0.073
416	62.925	0.151	1.07	102.1	-1.29	-	84.4	-0.032	8.04	0.073
417	63.077	0.152	1.02	102.1	-1.38	-	84.4	-0.027	7.91	0.070
418	63.228	0.151	1.03	102.0	-1.34	-	84.0	-0.020	7.79	0.066
419	63.379	0.151	1.04	102.1	-1.22	-	84.6	-0.032	7.63	0.061
420	63.529	0.150	1.04	102.0	-1.36	100	84.2	-0.031	7.55	0.059
421	63.680	0.151	1.03	102.0	-1.40	-	83.5	-0.033	7.51	0.057
422	63.831	0.151	1.04	102.0	-1.34	-	84.0	-0.021	7.40	0.059
423	63.982	0.151	1.05	102.0	-1.23	-	83.4	-0.030	7.39	0.050
424	64.134	0.152	1.04	102.1	-1.25	-	83.7	-0.025	7.31	0.053
425	64.285	0.151	1.01	102.1	-1.31	-	84.8	-0.022	7.27	0.052
426	64.436	0.151	1.03	102.1	-1.30	-	84.7	-0.015	7.09	0.040
427	64.586	0.150	1.04	102.0	-1.37	-	84.8	-0.025	7.07	0.038
428	64.737	0.151	1.06	102.1	-1.23	-	83.8	-0.025	7.01	0.041

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
429	64.888	0.151	1.03	102.0	-1.31	-	83.5	-0.032	7.04	0.039
430	65.039	0.151	1.01	102.1	-1.23	100	84.3	-0.022	7.06	0.043
431	65.191	0.152	1.05	102.2	-1.23	-	84.2	-0.023	7.03	0.039
432	65.342	0.151	1.04	102.0	-1.25	-	82.8	-0.017	7.00	0.035
433	65.493	0.151	1.04	102.0	-1.31	-	83.9	-0.025	7.01	0.043
434	65.642	0.149	1.02	102.2	-1.30	-	84.5	-0.024	7.09	0.038
435	65.793	0.151	1.03	102.2	-1.24	-	85.0	-0.021	7.10	0.043
436	65.945	0.152	1.03	102.1	-1.28	-	84.0	-0.017	7.13	0.044
437	66.096	0.151	1.03	102.1	-1.27	-	84.9	-0.025	7.12	0.041
438	66.248	0.152	1.05	102.2	-1.23	-	84.5	-0.021	7.12	0.039
439	66.399	0.151	1.03	102.1	-1.40	-	84.4	-0.022	7.11	0.041
440	66.549	0.150	1.03	102.2	-1.23	100	84.4	-0.020	7.08	0.040
441	66.699	0.150	1.05	102.1	-1.30	-	84.6	-0.017	7.08	0.042
442	66.851	0.152	1.03	102.0	-1.25	-	84.1	-0.021	7.09	0.040
443	67.002	0.151	1.05	102.1	-1.29	-	84.1	-0.016	7.07	0.043
444	67.154	0.152	1.05	102.2	-1.40	-	84.4	-0.017	7.10	0.040
445	67.305	0.151	1.05	102.1	-1.38	-	84.3	-0.020	7.14	0.043
446	67.456	0.151	1.04	102.2	-1.28	-	85.0	-0.017	7.14	0.048
447	67.606	0.150	1.01	102.1	-1.23	-	84.6	-0.019	7.22	0.042
448	67.757	0.151	1.04	102.2	-1.33	-	84.7	-0.015	7.35	0.050
449	67.908	0.151	1.02	102.1	-1.33	-	84.1	-0.019	7.36	0.045
450	68.060	0.152	1.04	102.1	-1.35	100	84.1	-0.016	7.42	0.048
451	68.211	0.151	1.04	102.2	-1.28	-	84.4	-0.020	7.35	0.050
452	68.362	0.151	1.04	102.1	-1.33	-	84.0	-0.016	7.36	0.045
453	68.513	0.151	1.05	102.1	-1.39	-	83.9	-0.015	7.24	0.046
454	68.663	0.150	1.00	102.2	-1.25	-	84.2	-0.017	7.16	0.040
455	68.814	0.151	1.06	102.2	-1.32	-	84.5	-0.021	7.17	0.046
456	68.966	0.152	1.03	102.1	-1.41	-	83.1	-0.020	7.18	0.041
457	69.117	0.151	1.03	102.2	-1.36	-	84.6	-0.014	7.12	0.044
458	69.269	0.152	1.04	102.1	-1.40	-	84.0	-0.021	7.15	0.045
459	69.420	0.151	1.05	102.1	-1.23	-	83.5	-0.016	7.14	0.041
460	69.570	0.150	1.04	102.2	-1.33	100	83.8	-0.016	7.00	0.041
461	69.721	0.151	1.05	102.2	-1.29	-	84.5	-0.023	6.96	0.043

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
462	69.872	0.151	1.05	102.2	-1.31	-	83.9	-0.018	6.90	0.040
463	70.024	0.152	1.03	102.3	-1.24	-	84.6	-0.022	6.96	0.033
464	70.175	0.151	1.04	102.2	-1.22	-	84.6	-0.018	6.90	0.042
465	70.326	0.151	1.03	102.2	-1.39	-	84.5	-0.017	6.87	0.046
466	70.477	0.151	1.03	102.3	-1.23	-	84.5	-0.021	6.84	0.040
467	70.627	0.150	1.02	102.2	-1.23	-	83.8	-0.019	6.92	0.037
468	70.778	0.151	1.04	102.1	-1.37	-	83.2	-0.017	6.90	0.042
469	70.930	0.152	1.02	102.2	-1.35	-	84.3	-0.014	6.90	0.041
470	71.081	0.151	1.04	102.2	-1.23	100	84.5	-0.013	6.87	0.040
471	71.233	0.152	1.03	102.2	-1.25	-	84.2	-0.013	6.88	0.037
472	71.384	0.151	1.06	102.2	-1.38	-	84.4	-0.014	6.86	0.036
473	71.534	0.150	1.06	102.2	-1.38	-	84.6	-0.013	6.83	0.038
474	71.684	0.150	1.02	102.2	-1.33	-	84.6	-0.008	6.88	0.035
475	71.836	0.152	1.04	102.2	-1.39	-	84.3	-0.017	6.86	0.036
476	71.987	0.151	1.04	102.2	-1.23	-	84.4	-0.012	6.85	0.035
477	72.139	0.152	1.03	102.3	-1.28	-	84.4	-0.014	6.87	0.039
478	72.290	0.151	1.05	102.3	-1.34	-	84.7	-0.017	6.92	0.038
479	72.441	0.151	1.05	102.2	-1.23	-	83.7	-0.016	6.88	0.034
480	72.591	0.150	1.06	102.3	-1.35	100	84.6	-0.013	6.90	0.036
481	72.742	0.151	1.05	102.2	-1.31	-	84.0	-0.013	6.92	0.035
482	72.893	0.151	1.04	102.1	-1.25	-	83.7	-0.013	6.97	0.031
483	73.044	0.151	1.03	102.2	-1.32	-	84.4	-0.014	6.94	0.037
484	73.196	0.152	1.03	102.3	-1.35	-	84.5	-0.015	6.97	0.038
485	73.347	0.151	1.04	102.3	-1.41	-	84.8	-0.017	6.96	0.038
486	73.498	0.151	1.03	102.2	-1.23	-	84.8	-0.010	6.99	0.037
487	73.648	0.150	1.03	102.2	-1.40	-	84.1	-0.012	6.98	0.041
488	73.799	0.151	1.05	102.3	-1.34	-	84.3	-0.013	7.03	0.038
489	73.950	0.151	1.05	102.2	-1.33	-	84.3	-0.013	6.98	0.036
490	74.102	0.152	1.05	102.2	-1.28	100	84.0	-0.012	6.97	0.041
491	74.253	0.151	1.04	102.3	-1.39	-	84.4	-0.015	6.97	0.038
492	74.404	0.151	1.03	102.3	-1.39	-	84.3	-0.017	7.00	0.041
493	74.554	0.150	1.05	102.3	-1.26	-	84.6	-0.012	6.97	0.037
494	74.705	0.151	1.04	102.3	-1.38	-	84.0	-0.012	7.00	0.040

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
495	74.856	0.151	1.02	102.4	-1.29	-	84.3	-0.014	6.96	0.042
496	75.008	0.152	1.05	102.4	-1.40	-	84.4	-0.011	6.99	0.034
497	75.159	0.151	1.03	102.4	-1.33	-	84.2	-0.010	7.01	0.039
498	75.310	0.151	1.03	102.5	-1.29	-	84.1	-0.011	6.97	0.038
499	75.461	0.151	1.03	102.5	-1.31	-	84.3	-0.009	6.99	0.039
500	75.611	0.150	1.04	102.4	-1.35	100	84.1	-0.004	6.94	0.036
501	75.762	0.151	1.04	102.4	-1.38	-	84.1	-0.008	6.98	0.041
502	75.913	0.151	1.04	102.4	-1.24	-	84.4	-0.021	6.96	0.045
503	76.065	0.152	1.03	102.6	-1.26	-	84.4	-0.010	6.95	0.041
504	76.216	0.151	1.02	102.6	-1.41	-	84.1	-0.005	6.98	0.042
505	76.368	0.152	1.03	102.7	-1.24	-	84.3	-0.012	6.96	0.040
506	76.518	0.150	1.02	102.5	-1.34	-	83.9	-0.008	6.98	0.037
507	76.668	0.150	1.04	102.5	-1.33	-	83.6	-0.003	6.99	0.040
508	76.820	0.152	1.04	102.6	-1.25	-	84.7	-0.009	6.99	0.041
509	76.971	0.151	1.04	102.7	-1.26	-	84.8	-0.009	6.93	0.044
510	77.123	0.152	1.04	102.7	-1.26	100	84.3	-0.004	6.95	0.041
511	77.274	0.151	1.03	102.7	-1.31	-	84.4	-0.014	6.94	0.044
512	77.425	0.151	1.03	102.8	-1.24	-	84.4	-0.006	6.95	0.045
513	77.575	0.150	1.04	102.7	-1.25	-	83.7	-0.007	6.93	0.040
514	77.726	0.151	1.03	102.8	-1.40	-	84.4	-0.011	6.97	0.041
515	77.877	0.151	1.04	102.8	-1.25	-	84.0	-0.009	6.95	0.041
516	78.029	0.152	1.02	102.9	-1.26	-	84.1	-0.010	6.94	0.043
517	78.180	0.151	1.02	102.9	-1.32	-	84.7	-0.012	7.02	0.048
518	78.331	0.151	1.02	103.0	-1.35	-	85.0	-0.007	6.94	0.044
519	78.482	0.151	1.03	103.0	-1.25	-	84.1	-0.012	6.96	0.046
520	78.632	0.150	1.06	103.0	-1.23	100	84.1	-0.012	7.03	0.048
521	78.783	0.151	1.00	103.1	-1.23	-	84.3	-0.008	6.95	0.047
522	78.934	0.151	1.03	103.0	-1.29	-	84.1	-0.005	6.95	0.044
523	79.086	0.152	1.04	103.2	-1.35	-	84.8	-0.012	7.03	0.046
524	79.237	0.151	1.05	103.2	-1.36	-	84.7	-0.007	6.98	0.049
525	79.388	0.151	1.04	103.1	-1.33	-	84.0	-0.005	7.02	0.044
526	79.539	0.151	1.04	103.2	-1.33	-	84.3	-0.007	6.83	0.052
527	79.689	0.150	1.05	103.1	-1.25	-	84.3	-0.010	6.84	0.048

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
528	79.840	0.151	1.05	103.2	-1.38	-	84.1	-0.013	6.84	0.045
529	79.992	0.152	1.03	103.3	-1.37	-	84.1	-0.003	6.82	0.050
530	80.143	0.151	1.04	103.4	-1.29	100	84.3	-0.009	6.81	0.046
531	80.295	0.152	1.03	103.3	-1.31	-	84.3	-0.010	6.87	0.050
532	80.446	0.151	1.05	103.3	-1.33	-	84.0	-0.005	6.86	0.052
533	80.596	0.150	1.04	103.5	-1.27	-	84.6	0.001	6.85	0.053
534	80.747	0.151	1.04	103.5	-1.25	-	84.1	-0.007	6.94	0.054
535	80.898	0.151	1.02	103.6	-1.38	-	84.0	-0.003	6.96	0.049
536	81.049	0.151	1.03	103.4	-1.37	-	84.0	-0.006	7.01	0.049
537	81.201	0.152	1.04	103.4	-1.37	-	84.0	-0.002	7.01	0.050
538	81.352	0.151	1.04	103.5	-1.35	-	83.7	-0.008	6.99	0.054
539	81.503	0.151	1.01	103.6	-1.28	-	84.4	-0.004	7.02	0.048
540	81.653	0.150	1.03	103.6	-1.29	100	84.7	-0.008	7.03	0.059
541	81.804	0.151	1.03	103.7	-1.36	-	84.3	-0.001	7.04	0.053
542	81.956	0.152	1.06	103.6	-1.39	-	83.2	-0.004	7.07	0.050
543	82.107	0.151	1.01	103.8	-1.32	-	84.5	-0.001	7.06	0.052
544	82.258	0.151	1.02	103.8	-1.38	-	84.4	-0.007	7.05	0.057
545	82.410	0.152	1.05	103.8	-1.33	-	84.2	-0.007	7.07	0.055
546	82.560	0.150	1.02	103.9	-1.31	-	84.7	-0.007	6.97	0.056
547	82.710	0.150	1.03	103.8	-1.28	-	84.3	-0.003	7.05	0.055
548	82.862	0.152	1.03	103.9	-1.29	-	84.5	-0.006	7.11	0.054
549	83.013	0.151	1.05	103.8	-1.29	-	84.0	-0.004	7.10	0.055
550	83.165	0.152	1.05	104.0	-1.33	100	84.2	-0.005	7.22	0.051
551	83.316	0.151	1.05	104.0	-1.38	-	84.5	-0.008	7.14	0.057
552	83.467	0.151	1.04	104.0	-1.33	-	84.4	-0.002	7.25	0.060
553	83.617	0.150	1.03	103.9	-1.37	-	84.3	0.001	7.28	0.057
554	83.768	0.151	1.04	104.0	-1.33	-	83.7	-0.003	7.22	0.059
555	83.919	0.151	1.03	104.0	-1.29	-	84.0	-0.004	7.29	0.054
556	84.071	0.152	1.02	104.1	-1.38	-	84.5	-0.003	7.33	0.057
557	84.222	0.151	1.03	104.1	-1.26	-	84.2	-0.008	7.36	0.058
558	84.374	0.152	1.06	104.1	-1.24	-	84.4	0.000	7.37	0.061
559	84.524	0.150	1.01	104.0	-1.37	-	83.6	0.002	7.37	0.062
560	84.675	0.151	1.03	104.1	-1.37	100	84.0	0.010	7.35	0.057

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
561	84.826	0.151	1.04	104.2	-1.38	-	84.6	-0.007	7.30	0.059
562	84.978	0.152	1.04	104.2	-1.30	-	84.6	-0.008	7.36	0.060
563	85.129	0.151	1.05	104.2	-1.38	-	84.0	0.001	7.32	0.055
564	85.280	0.151	1.03	104.2	-1.30	-	84.1	0.003	7.34	0.058
565	85.431	0.151	1.06	104.2	-1.34	-	83.9	0.000	7.39	0.060
566	85.581	0.150	1.04	104.4	-1.38	-	84.6	-0.003	7.40	0.057
567	85.732	0.151	1.01	104.4	-1.35	-	84.8	-0.006	7.39	0.060
568	85.884	0.152	1.05	104.4	-1.26	-	84.8	-0.001	7.36	0.060
569	86.036	0.152	1.04	104.4	-1.28	-	84.4	0.001	7.49	0.061
570	86.187	0.151	1.06	104.4	-1.37	100	84.3	0.003	7.62	0.058
571	86.339	0.152	1.04	104.5	-1.37	-	84.0	0.001	7.65	0.068
572	86.489	0.150	1.05	104.5	-1.29	-	84.2	-0.005	7.66	0.058
573	86.639	0.150	1.04	104.5	-1.34	-	84.2	-0.004	7.73	0.066
574	86.791	0.152	1.04	104.5	-1.25	-	84.7	-0.004	7.77	0.067
575	86.942	0.151	1.05	104.4	-1.28	-	83.6	-0.007	7.73	0.064
576	87.094	0.152	1.05	104.5	-1.37	-	84.4	-0.005	7.80	0.067
577	87.245	0.151	1.05	104.5	-1.25	-	84.2	0.000	7.71	0.068
578	87.396	0.151	1.02	104.6	-1.39	-	83.6	-0.004	7.79	0.069
579	87.546	0.150	1.04	104.6	-1.35	-	84.2	0.001	7.85	0.071
580	87.697	0.151	1.05	104.7	-1.24	99	84.0	-0.003	7.78	0.071
581	87.849	0.152	1.05	104.7	-1.29	-	84.3	0.000	7.88	0.067
582	88.001	0.152	1.04	104.6	-1.36	-	84.1	-0.006	7.85	0.069
583	88.152	0.151	0.99	104.7	-1.25	-	84.4	-0.003	7.91	0.068
584	88.303	0.151	1.05	104.6	-1.39	-	84.4	0.002	7.91	0.071
585	88.453	0.150	1.04	104.6	-1.36	-	84.2	0.001	7.88	0.073
586	88.604	0.151	1.03	104.8	-1.23	-	84.6	0.002	7.89	0.072
587	88.756	0.152	1.04	104.7	-1.32	-	84.1	0.003	7.85	0.071
588	88.907	0.151	1.05	104.8	-1.34	-	84.6	0.001	7.92	0.069
589	89.059	0.152	1.02	104.8	-1.32	-	84.8	0.002	7.95	0.074
590	89.210	0.151	1.06	104.9	-1.25	100	84.8	-0.001	7.93	0.074
591	89.361	0.151	1.04	104.8	-1.35	-	84.7	-0.003	7.95	0.078
592	89.511	0.150	1.05	104.9	-1.33	-	84.4	-0.004	7.90	0.077
593	89.663	0.152	1.01	104.9	-1.34	-	84.4	-0.002	7.96	0.074

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
594	89.814	0.151	1.03	104.9	-1.38	-	84.2	0.001	7.95	0.080
595	89.966	0.152	1.02	105.0	-1.25	-	84.7	-0.001	7.95	0.075
596	90.117	0.151	1.04	104.9	-1.39	-	84.0	-0.009	8.00	0.076
597	90.268	0.151	1.02	104.9	-1.38	-	84.4	0.003	7.98	0.081
598	90.418	0.150	1.03	105.0	-1.31	-	84.2	0.000	8.01	0.076
599	90.570	0.152	1.02	105.0	-1.25	-	84.3	0.006	8.03	0.077
600	90.721	0.151	1.03	104.9	-1.23	100	83.9	0.002	8.06	0.077
601	90.873	0.152	1.03	105.0	-1.26	-	84.3	0.001	8.10	0.079
602	91.025	0.152	1.05	105.1	-1.24	-	84.9	0.000	7.99	0.076
603	91.176	0.151	1.06	105.1	-1.33	-	84.9	0.004	8.03	0.074
604	91.326	0.150	1.08	105.0	-1.38	-	84.1	-0.002	8.03	0.080
605	91.477	0.151	1.06	105.2	-1.37	-	84.6	0.002	7.98	0.079
606	91.628	0.151	1.03	105.1	-1.40	-	84.3	0.005	7.97	0.072
607	91.780	0.152	1.06	105.1	-1.36	-	83.3	-0.001	7.99	0.078
608	91.932	0.152	1.03	105.1	-1.27	-	83.8	0.002	8.02	0.078
609	92.083	0.151	1.04	105.1	-1.28	-	84.2	-0.005	8.01	0.079
610	92.234	0.151	1.02	105.3	-1.30	100	84.8	-0.002	8.04	0.075
611	92.384	0.150	1.04	105.2	-1.37	-	84.7	0.002	7.99	0.075
612	92.536	0.152	1.03	105.1	-1.31	-	83.9	0.005	8.01	0.077
613	92.687	0.151	1.02	105.2	-1.33	-	83.9	0.002	7.99	0.078
614	92.839	0.152	1.05	105.2	-1.22	-	84.1	0.005	8.03	0.078
615	92.990	0.151	1.04	105.3	-1.38	-	84.4	0.000	8.06	0.078
616	93.141	0.151	1.04	105.3	-1.32	-	84.6	0.001	8.09	0.077
617	93.291	0.150	1.03	105.3	-1.27	-	84.4	0.002	8.10	0.076
618	93.443	0.152	1.03	105.3	-1.24	-	84.5	-0.006	8.06	0.079
619	93.594	0.151	1.04	105.2	-1.34	-	83.7	-0.004	8.10	0.078
620	93.746	0.152	1.06	105.3	-1.26	100	84.4	-0.002	8.03	0.081
621	93.898	0.152	1.04	105.3	-1.38	-	84.0	-0.003	8.07	0.078
622	94.049	0.151	1.03	105.3	-1.38	-	84.4	0.004	8.06	0.075
623	94.199	0.150	1.05	105.3	-1.38	-	84.3	-0.006	8.05	0.075
624	94.350	0.151	1.04	105.3	-1.32	-	84.2	-0.003	8.03	0.080
625	94.501	0.151	1.04	105.3	-1.38	-	84.4	0.006	8.04	0.073
626	94.653	0.152	1.05	105.3	-1.37	-	84.4	0.001	7.96	0.078

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
627	94.805	0.152	1.02	105.4	-1.23	-	84.4	0.000	7.87	0.072
628	94.956	0.151	1.04	105.3	-1.33	-	83.6	0.002	7.87	0.080
629	95.107	0.151	1.04	105.5	-1.32	-	84.5	0.007	7.89	0.078
630	95.257	0.150	1.04	105.4	-1.31	100	84.2	0.002	7.84	0.076
631	95.409	0.152	1.04	105.4	-1.23	-	84.7	-0.001	7.82	0.080
632	95.560	0.151	1.03	105.5	-1.26	-	84.8	0.000	7.84	0.073
633	95.712	0.152	1.01	105.5	-1.39	-	84.4	-0.002	7.82	0.083
634	95.864	0.152	1.03	105.5	-1.32	-	84.2	0.000	7.80	0.077
635	96.015	0.151	1.06	105.4	-1.38	-	83.7	0.001	7.79	0.078
636	96.164	0.149	1.03	105.5	-1.37	-	83.9	-0.001	7.85	0.084
637	96.316	0.152	1.05	105.5	-1.39	-	84.4	0.001	7.86	0.076
638	96.468	0.152	1.02	105.6	-1.33	-	84.9	0.000	7.85	0.075
639	96.619	0.151	1.05	105.6	-1.25	-	84.8	0.005	7.86	0.080
640	96.771	0.152	1.02	105.5	-1.35	100	84.1	0.005	7.89	0.081
641	96.922	0.151	1.05	105.6	-1.28	-	84.6	0.009	7.87	0.084
642	97.072	0.150	1.02	105.5	-1.25	-	84.4	0.000	7.87	0.082
643	97.223	0.151	1.05	105.7	-1.34	-	84.3	-0.001	7.85	0.081
644	97.375	0.152	1.07	105.6	-1.31	-	84.9	0.004	7.81	0.082
645	97.526	0.151	1.04	105.6	-1.38	-	84.3	0.002	7.85	0.082
646	97.678	0.152	1.05	105.5	-1.24	-	84.4	0.000	7.83	0.084
647	97.830	0.152	1.02	105.7	-1.30	-	84.7	0.000	7.87	0.081
648	97.980	0.150	1.05	105.7	-1.26	-	84.6	-0.007	7.85	0.078
649	98.131	0.151	1.02	105.7	-1.38	-	84.3	0.006	7.81	0.087
650	98.282	0.151	1.03	105.6	-1.25	99	84.3	0.001	7.84	0.084
651	98.434	0.152	1.03	105.7	-1.37	-	84.7	0.002	7.83	0.081
652	98.586	0.152	1.01	105.7	-1.36	-	84.5	-0.001	7.88	0.085
653	98.737	0.151	1.03	105.7	-1.28	-	84.8	-0.003	7.83	0.080
654	98.888	0.151	1.04	105.8	-1.23	-	85.2	0.003	7.84	0.087
655	99.038	0.150	1.03	105.7	-1.30	-	84.3	0.003	7.81	0.083
656	99.190	0.152	1.02	105.6	-1.29	-	83.9	-0.004	7.79	0.082
657	99.342	0.152	1.05	105.7	-1.25	-	83.8	-0.001	7.82	0.083
658	99.494	0.152	1.04	105.7	-1.25	-	84.4	0.003	7.80	0.080
659	99.645	0.151	1.04	105.8	-1.40	-	84.7	0.004	7.80	0.083

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
660	99.796	0.151	1.04	105.8	-1.37	99	85.0	0.000	7.85	0.082
661	99.946	0.150	1.03	105.9	-1.24	-	84.8	0.001	7.78	0.086
662	100.097	0.151	1.03	105.9	-1.39	-	85.0	0.001	7.78	0.084
663	100.249	0.152	1.05	105.7	-1.23	-	83.8	0.005	7.75	0.082
664	100.409	0.160	1.05	105.9	-1.38	-	84.8	-0.001	7.82	0.082
665	100.559	0.150	1.04	105.7	-1.37	-	84.2	-0.001	7.78	0.086
666	100.710	0.151	1.05	105.8	-1.40	-	83.9	0.004	7.80	0.082
667	100.862	0.152	1.04	105.8	-1.22	-	84.7	0.000	7.76	0.086
668	101.008	0.146	1.03	105.9	-1.29	-	84.2	-0.001	7.71	0.085
669	101.157	0.149	1.05	105.9	-1.24	-	84.8	-0.002	7.72	0.080
670	101.308	0.151	1.02	105.9	-1.25	100	84.4	0.000	7.70	0.083
671	101.460	0.152	1.04	105.9	-1.37	-	84.2	0.000	7.74	0.085
672	101.612	0.152	1.04	105.9	-1.28	-	84.5	-0.004	7.62	0.081
673	101.762	0.150	1.02	105.8	-1.29	-	84.7	-0.005	7.64	0.086
674	101.915	0.153	1.05	105.8	-1.35	-	83.7	0.000	7.69	0.085
675	102.064	0.149	1.04	105.9	-1.23	-	84.8	0.002	7.71	0.084
676	102.216	0.152	1.04	106.0	-1.23	-	84.7	-0.003	7.69	0.091
677	102.368	0.152	1.04	105.9	-1.36	-	84.3	-0.002	7.58	0.086
678	102.519	0.151	1.03	106.0	-1.27	-	84.9	-0.007	7.65	0.084
679	102.670	0.151	1.01	106.0	-1.24	-	84.7	0.002	7.57	0.083
680	102.820	0.150	1.05	106.0	-1.22	100	84.3	0.001	7.58	0.084
681	102.972	0.152	1.05	106.1	-1.38	-	84.8	-0.001	7.60	0.081
682	103.123	0.151	1.03	106.0	-1.22	-	84.8	0.000	7.60	0.088
683	103.275	0.152	1.03	105.9	-1.35	-	84.5	0.006	7.61	0.090
684	103.427	0.152	1.03	106.0	-1.38	-	84.3	-0.004	7.55	0.086
685	103.578	0.151	1.05	105.9	-1.28	-	83.6	0.002	7.57	0.090
686	103.728	0.150	1.05	106.0	-1.29	-	84.6	0.002	7.60	0.092
687	103.879	0.151	1.06	106.0	-1.22	-	84.3	0.002	7.61	0.090
688	104.031	0.152	1.04	106.0	-1.38	-	84.4	0.001	7.58	0.090
689	104.183	0.152	1.04	106.1	-1.38	-	84.9	0.009	7.55	0.092
690	104.334	0.151	1.02	106.1	-1.23	100	84.8	-0.001	7.60	0.095
691	104.486	0.152	1.05	106.1	-1.23	-	84.5	0.001	7.59	0.095
692	104.636	0.150	1.05	106.0	-1.37	-	84.1	0.000	7.53	0.090

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
693	104.787	0.151	1.05	106.1	-1.39	-	84.3	-0.002	7.55	0.100
694	104.941	0.154	1.04	106.0	-1.28	-	84.1	-0.002	7.60	0.092
695	105.090	0.149	1.04	106.1	-1.29	-	84.8	0.000	7.58	0.095
696	105.242	0.152	1.07	106.0	-1.32	-	84.4	-0.003	7.51	0.102
697	105.394	0.152	1.06	106.1	-1.25	-	84.8	0.000	7.58	0.095
698	105.544	0.150	1.02	106.0	-1.22	-	84.3	0.001	7.54	0.101
699	105.695	0.151	1.03	106.2	-1.25	-	84.4	0.000	7.51	0.100
700	105.847	0.152	1.01	106.1	-1.32	99	83.9	0.003	7.54	0.101
701	105.998	0.151	1.05	106.2	-1.22	-	84.6	0.001	7.52	0.100
702	106.150	0.152	1.05	106.2	-1.39	-	84.6	0.001	7.48	0.098
703	106.302	0.152	1.02	106.2	-1.24	-	85.0	-0.002	7.53	0.099
704	106.452	0.150	1.01	106.1	-1.31	-	84.8	0.000	7.49	0.099
705	106.603	0.151	1.03	106.1	-1.23	-	84.3	-0.001	7.47	0.102
706	106.755	0.152	1.02	106.1	-1.22	-	83.8	0.003	7.48	0.102
707	106.907	0.152	1.04	106.1	-1.38	-	84.2	0.000	7.47	0.108
708	107.059	0.152	1.03	106.1	-1.23	-	84.4	0.000	7.47	0.106
709	107.210	0.151	1.05	106.1	-1.32	-	84.2	-0.002	7.46	0.104
710	107.360	0.150	1.03	106.2	-1.34	100	84.6	-0.004	7.46	0.105
711	107.514	0.154	1.06	106.1	-1.33	-	84.1	0.003	7.48	0.104
712	107.663	0.149	1.04	106.2	-1.26	-	84.8	0.000	7.39	0.107
713	107.818	0.155	1.03	106.2	-1.36	-	84.8	0.007	7.48	0.110
714	107.967	0.149	1.02	106.2	-1.39	-	84.2	0.000	7.49	0.105
715	108.119	0.152	1.04	106.1	-1.35	-	84.0	-0.003	7.64	0.115
716	108.269	0.150	1.04	106.1	-1.24	-	84.0	0.004	7.66	0.109
717	108.420	0.151	1.04	106.3	-1.35	-	85.0	0.000	7.67	0.104
718	108.572	0.152	1.05	106.2	-1.32	-	84.9	0.004	7.61	0.101
719	108.724	0.152	1.06	106.1	-1.24	-	84.1	0.000	7.65	0.101
720	108.875	0.151	1.06	106.2	-1.25	101	84.4	0.001	7.64	0.093
721	109.027	0.152	1.03	106.2	-1.35	-	84.3	-0.001	7.67	0.095
722	109.178	0.151	1.03	106.2	-1.35	-	83.6	-0.002	7.68	0.088
723	109.329	0.151	1.01	106.2	-1.34	-	84.2	-0.002	7.59	0.096
724	109.480	0.151	1.02	106.3	-1.29	-	84.6	-0.002	7.39	0.087
725	109.632	0.152	1.05	106.3	-1.37	-	84.8	0.004	7.36	0.093

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
726	109.784	0.152	1.06	106.3	-1.27	-	85.1	0.002	7.38	0.094
727	109.936	0.152	1.05	106.3	-1.27	-	84.5	-0.007	7.43	0.101
728	110.086	0.150	1.03	106.2	-1.33	-	84.2	-0.001	7.47	0.093
729	110.237	0.151	1.03	106.2	-1.26	-	84.2	-0.001	7.40	0.101
730	110.389	0.152	1.03	106.3	-1.37	100	84.6	0.007	7.43	0.096
731	110.541	0.152	1.03	106.3	-1.39	-	84.5	0.000	7.50	0.094
732	110.692	0.151	1.04	106.3	-1.36	-	84.5	-0.005	7.52	0.094
733	110.844	0.152	1.07	106.4	-1.36	-	85.0	-0.003	7.51	0.099
734	110.995	0.151	1.03	106.4	-1.38	-	84.8	-0.002	7.54	0.097
735	111.145	0.150	1.04	106.2	-1.31	-	84.2	-0.002	7.54	0.090
736	111.297	0.152	1.03	106.2	-1.32	-	83.8	-0.002	7.59	0.092
737	111.448	0.151	1.04	106.4	-1.32	-	83.8	-0.004	7.57	0.094
738	111.600	0.152	1.03	106.3	-1.38	-	84.1	-0.002	7.56	0.095
739	111.752	0.152	1.04	106.3	-1.23	-	84.0	-0.001	7.56	0.097
740	111.903	0.151	1.03	106.3	-1.33	100	84.4	-0.003	7.59	0.091
741	112.053	0.150	1.05	106.4	-1.38	-	84.8	0.004	7.58	0.097
742	112.205	0.152	1.05	106.4	-1.24	-	84.6	0.002	7.60	0.094
743	112.357	0.152	1.04	106.3	-1.38	-	83.8	0.001	7.58	0.096
744	112.509	0.152	1.04	106.4	-1.25	-	84.3	0.001	7.54	0.094
745	112.660	0.151	1.04	106.3	-1.36	-	84.3	-0.003	7.52	0.096
746	112.813	0.153	1.04	106.4	-1.35	-	85.0	0.000	7.56	0.094
747	112.962	0.149	1.04	106.3	-1.28	-	84.2	-0.002	7.55	0.104
748	113.116	0.154	1.03	106.4	-1.37	-	84.6	0.003	7.61	0.102
749	113.265	0.149	1.04	106.3	-1.32	-	84.2	0.006	7.56	0.102
750	113.420	0.155	1.02	106.4	-1.31	99	84.7	-0.005	7.57	0.104
751	113.569	0.149	1.05	106.4	-1.37	-	84.8	0.005	7.59	0.104
752	113.721	0.152	1.03	106.4	-1.35	-	84.6	0.001	7.55	0.105
753	113.870	0.149	1.03	106.3	-1.39	-	84.0	0.002	7.54	0.108
754	114.025	0.155	1.06	106.3	-1.38	-	84.0	0.002	7.51	0.109
755	114.174	0.149	1.05	106.4	-1.31	-	84.9	0.003	7.52	0.107
756	114.328	0.154	1.04	106.4	-1.40	-	84.7	-0.002	7.50	0.109
757	114.477	0.149	1.04	106.5	-1.37	-	84.5	-0.001	7.53	0.108
758	114.630	0.153	1.05	106.4	-1.40	-	85.0	0.007	7.48	0.119

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
759	114.779	0.149	1.05	106.4	-1.40	-	84.5	-0.002	7.53	0.109
760	114.933	0.154	1.03	106.3	-1.28	99	84.0	0.000	7.47	0.118
761	115.082	0.149	1.05	106.5	-1.37	-	85.0	-0.002	7.52	0.121
762	115.237	0.155	1.04	106.4	-1.39	-	84.2	0.002	7.52	0.122
763	115.386	0.149	1.02	106.4	-1.24	-	84.8	0.000	7.52	0.120
764	115.537	0.151	1.05	106.3	-1.25	-	84.0	0.005	7.49	0.121
765	115.687	0.150	1.02	106.3	-1.23	-	84.3	0.006	7.44	0.122
766	115.839	0.152	1.03	106.3	-1.36	-	84.1	0.000	7.45	0.124
767	115.991	0.152	1.04	106.3	-1.30	-	84.2	-0.001	7.52	0.127
768	116.143	0.152	1.02	106.3	-1.23	-	84.2	-0.006	7.46	0.128
769	116.294	0.151	1.02	106.2	-1.22	-	84.5	-0.003	7.48	0.129
770	116.447	0.153	1.04	106.3	-1.30	99	83.9	0.002	7.44	0.126
771	116.596	0.149	1.02	106.4	-1.39	-	84.6	-0.002	7.46	0.127
772	116.748	0.152	1.02	106.4	-1.34	-	84.3	-0.008	7.44	0.126
773	116.900	0.152	1.06	106.3	-1.24	-	83.9	0.001	7.47	0.134
774	117.051	0.151	1.04	106.3	-1.27	-	84.0	0.005	7.45	0.135
775	117.203	0.152	1.05	106.3	-1.32	-	83.9	0.000	7.51	0.134
776	117.354	0.151	1.04	106.4	-1.39	-	85.2	0.003	7.45	0.136
777	117.505	0.151	1.06	106.3	-1.25	-	84.5	0.003	7.46	0.135
778	117.656	0.151	1.04	106.4	-1.35	-	84.7	0.004	7.49	0.138
779	117.809	0.153	1.02	106.3	-1.38	-	84.4	0.002	7.46	0.136
780	117.961	0.152	1.01	106.4	-1.25	100	84.6	-0.007	7.43	0.138
781	118.112	0.151	1.05	106.3	-1.30	-	84.5	0.001	7.41	0.144
782	118.263	0.151	1.05	106.3	-1.31	-	84.7	-0.005	7.37	0.140
783	118.414	0.151	1.04	106.4	-1.36	-	85.2	-0.001	7.36	0.138
784	118.565	0.151	1.02	106.4	-1.33	-	85.3	-0.001	7.39	0.141
785	118.718	0.153	1.02	106.3	-1.31	-	84.7	0.003	7.32	0.142
786	118.870	0.152	1.03	106.4	-1.30	-	84.5	0.000	7.40	0.149
787	119.021	0.151	1.02	106.3	-1.37	-	83.8	-0.008	7.38	0.146
788	119.172	0.151	1.06	106.2	-1.36	-	83.6	-0.004	7.34	0.145
789	119.323	0.151	1.05	106.3	-1.38	-	84.5	-0.002	7.30	0.145
790	119.475	0.152	1.04	106.4	-1.31	99	84.8	-0.007	7.35	0.150
791	119.627	0.152	1.03	106.4	-1.34	-	84.5	0.002	7.32	0.152

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
792	119.778	0.151	1.06	106.3	-1.38	-	84.1	-0.003	7.35	0.144
793	119.930	0.152	1.04	106.3	-1.38	-	84.0	-0.006	7.37	0.157
794	120.080	0.150	1.04	106.3	-1.28	-	84.2	0.005	7.31	0.151
795	120.232	0.152	1.02	106.2	-1.37	-	84.2	0.003	7.34	0.153
796	120.383	0.151	1.02	106.2	-1.39	-	83.8	0.002	7.31	0.155
797	120.535	0.152	1.04	106.4	-1.23	-	84.6	0.004	7.28	0.155
798	120.690	0.155	1.05	106.3	-1.23	-	84.1	-0.002	7.31	0.159
799	120.839	0.149	1.04	106.3	-1.33	-	85.0	-0.002	7.37	0.158
800	120.989	0.150	1.03	106.2	-1.38	99	84.4	0.002	7.39	0.162
801	121.140	0.151	1.03	106.3	-1.24	-	84.4	0.000	7.35	0.159
802	121.292	0.152	1.04	106.2	-1.39	-	84.2	0.000	7.34	0.158
803	121.444	0.152	1.06	106.2	-1.24	-	84.3	-0.003	7.30	0.174
804	121.596	0.152	1.04	106.3	-1.27	-	84.6	0.003	7.31	0.158
805	121.748	0.152	1.01	106.2	-1.36	-	84.5	0.002	7.35	0.155
806	121.898	0.150	1.04	106.2	-1.39	-	84.3	-0.006	7.28	0.155
807	122.049	0.151	1.04	106.2	-1.25	-	84.4	-0.003	7.33	0.161
808	122.201	0.152	1.03	106.4	-1.23	-	84.6	0.001	7.30	0.158
809	122.353	0.152	1.06	106.2	-1.33	-	83.9	0.002	7.28	0.162
810	122.505	0.152	1.03	106.3	-1.30	99	84.6	0.002	7.30	0.167
811	122.656	0.151	1.04	106.3	-1.38	-	84.4	0.000	7.28	0.169
812	122.807	0.151	1.06	106.1	-1.38	-	84.3	0.005	7.30	0.176
813	122.958	0.151	1.03	106.2	-1.37	-	84.5	0.004	7.28	0.174
814	123.110	0.152	1.04	106.2	-1.24	-	84.3	-0.004	7.24	0.173
815	123.262	0.152	1.03	106.3	-1.35	-	84.4	-0.003	7.20	0.173
816	123.414	0.152	1.04	106.2	-1.23	-	84.1	0.001	7.24	0.178
817	123.565	0.151	1.01	106.3	-1.39	-	84.3	-0.002	7.22	0.178
818	123.715	0.150	1.03	106.1	-1.25	-	84.2	-0.005	7.16	0.178
819	123.867	0.152	1.03	106.2	-1.37	-	84.5	-0.003	7.17	0.179
820	124.019	0.152	1.04	106.2	-1.34	99	84.7	0.001	7.14	0.192
821	124.171	0.152	1.06	106.1	-1.27	-	83.8	-0.002	7.15	0.193
822	124.323	0.152	1.05	106.1	-1.29	-	83.9	-0.003	7.11	0.200
823	124.474	0.151	1.05	106.2	-1.29	-	83.9	0.001	7.19	0.199
824	124.625	0.151	1.03	106.1	-1.23	-	83.8	0.002	7.14	0.200

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
825	124.776	0.151	1.05	106.1	-1.33	-	83.6	-0.004	7.13	0.192
826	124.929	0.153	1.05	106.2	-1.24	-	84.7	-0.002	7.12	0.190
827	125.081	0.152	1.06	106.2	-1.26	-	84.5	0.003	7.14	0.189
828	125.232	0.151	1.03	106.2	-1.25	-	84.4	-0.010	7.12	0.189
829	125.383	0.151	1.02	106.2	-1.28	-	84.4	0.000	7.15	0.195
830	125.534	0.151	1.04	106.3	-1.39	100	84.6	-0.002	7.20	0.194
831	125.686	0.152	1.03	106.1	-1.24	-	83.9	0.002	7.19	0.193
832	125.838	0.152	1.03	106.1	-1.37	-	84.2	-0.002	7.16	0.191
833	125.990	0.152	1.04	106.2	-1.33	-	84.8	0.000	7.14	0.194
834	126.142	0.152	1.04	106.2	-1.36	-	85.0	0.002	7.10	0.194
835	126.292	0.150	1.04	106.1	-1.35	-	84.1	0.006	7.19	0.197
836	126.443	0.151	1.04	106.1	-1.34	-	84.0	-0.003	7.18	0.194
837	126.595	0.152	1.04	106.1	-1.23	-	84.4	-0.002	7.20	0.195
838	126.747	0.152	1.05	106.1	-1.26	-	84.3	0.001	7.22	0.192
839	126.899	0.152	1.03	106.0	-1.35	-	83.9	-0.002	7.21	0.195
840	127.051	0.152	1.04	106.2	-1.38	100	84.4	0.004	7.15	0.205
841	127.201	0.150	1.04	106.2	-1.29	-	84.8	-0.005	7.22	0.202
842	127.352	0.151	1.04	106.2	-1.33	-	84.9	-0.001	7.19	0.203
843	127.504	0.152	1.02	106.1	-1.38	-	84.8	0.000	7.17	0.203
844	127.656	0.152	1.05	106.1	-1.29	-	84.6	-0.001	7.19	0.215
845	127.808	0.152	1.04	106.0	-1.34	-	83.8	-0.002	7.10	0.222
846	127.960	0.152	1.05	106.0	-1.37	-	83.9	-0.006	7.16	0.232
847	128.110	0.150	1.05	106.1	-1.30	-	84.6	0.006	7.19	0.225
848	128.262	0.152	1.06	106.1	-1.23	-	84.7	0.001	7.18	0.226
849	128.414	0.152	1.02	106.0	-1.25	-	84.4	0.006	7.14	0.228
850	128.566	0.152	1.04	106.0	-1.33	99	84.0	0.006	7.17	0.230
851	128.718	0.152	1.03	106.0	-1.25	-	83.4	0.002	7.00	0.232
852	128.869	0.151	1.05	106.1	-1.34	-	84.1	0.000	6.96	0.245
853	129.019	0.150	1.03	106.0	-1.25	-	83.5	-0.001	7.00	0.264
854	129.171	0.152	1.03	106.0	-1.27	-	84.1	0.007	7.03	0.274
855	129.323	0.152	1.03	106.0	-1.38	-	83.9	0.004	6.96	0.275
856	129.475	0.152	1.04	106.0	-1.30	-	83.9	-0.002	6.93	0.283
857	129.627	0.152	1.02	106.1	-1.25	-	84.8	0.002	6.96	0.290

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
858	129.778	0.151	1.06	106.0	-1.34	-	84.3	0.000	6.93	0.295
859	129.928	0.150	1.05	106.0	-1.33	-	84.2	0.005	6.91	0.305
860	130.080	0.152	1.05	105.9	-1.33	99	83.1	0.003	6.90	0.310
861	130.232	0.152	1.04	106.1	-1.24	-	84.4	-0.002	6.91	0.317
862	130.384	0.152	1.04	106.1	-1.36	-	84.7	-0.005	6.86	0.320
863	130.536	0.152	1.04	106.1	-1.32	-	84.7	-0.001	6.86	0.324
864	130.687	0.151	1.05	106.0	-1.30	-	84.8	0.002	6.93	0.332
865	130.838	0.151	1.04	106.0	-1.34	-	85.0	0.000	6.87	0.333
866	130.989	0.151	1.03	106.0	-1.36	-	84.5	-0.001	6.84	0.331
867	131.142	0.153	1.05	106.0	-1.27	-	84.5	-0.006	6.82	0.338
868	131.294	0.152	1.04	106.0	-1.30	-	84.3	-0.004	6.77	0.334
869	131.445	0.151	1.04	105.9	-1.25	-	84.2	-0.001	6.82	0.348
870	131.596	0.151	1.03	105.9	-1.23	99	83.9	-0.005	6.77	0.349
871	131.747	0.151	1.05	105.9	-1.29	-	84.1	0.000	6.77	0.354
872	131.899	0.152	1.04	105.9	-1.32	-	83.8	0.000	6.69	0.356
873	132.051	0.152	1.04	106.0	-1.23	-	84.1	0.002	6.65	0.373
874	132.203	0.152	1.05	105.9	-1.39	-	84.3	0.000	6.71	0.378
875	132.354	0.151	1.05	106.0	-1.34	-	84.2	0.005	6.68	0.378
876	132.505	0.151	1.03	105.9	-1.35	-	84.4	0.002	6.70	0.380
877	132.656	0.151	1.05	105.9	-1.39	-	84.6	0.001	6.63	0.384
878	132.808	0.152	1.02	105.9	-1.38	-	83.8	0.001	6.61	0.390
879	132.960	0.152	1.02	105.8	-1.38	-	83.8	-0.005	6.57	0.404
880	133.112	0.152	1.07	105.9	-1.39	99	84.0	-0.006	6.59	0.413
881	133.264	0.152	1.05	105.9	-1.39	-	84.5	-0.001	6.55	0.414
882	133.414	0.150	1.05	105.8	-1.23	-	84.0	0.000	6.44	0.426
883	133.565	0.151	1.03	105.8	-1.32	-	84.1	0.001	6.52	0.436
884	133.717	0.152	1.04	105.8	-1.25	-	84.4	0.003	6.50	0.447
885	133.869	0.152	1.06	105.8	-1.28	-	83.5	0.000	6.48	0.451
886	134.021	0.152	1.04	105.9	-1.25	-	83.6	0.003	6.51	0.469
887	134.172	0.151	1.02	105.8	-1.29	-	83.6	0.000	6.43	0.489
888	134.323	0.151	1.06	105.8	-1.28	-	84.1	0.002	6.48	0.511
889	134.474	0.151	1.04	105.8	-1.26	-	83.9	-0.006	6.43	0.518
890	134.626	0.152	1.04	105.7	-1.37	99	83.7	0.003	6.44	0.531

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	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 (%)
891	134.778	0.152	1.05	105.8	-1.28	-	84.5	0.000	6.49	0.548
892	134.930	0.152	1.04	105.8	-1.38	-	84.7	-0.002	6.40	0.560
893	135.082	0.152	1.05	105.8	-1.37	-	84.8	0.001	6.36	0.575
894	135.232	0.150	1.04	105.7	-1.38	-	83.6	0.000	6.40	0.590
895	135.383	0.151	1.03	105.8	-1.33	-	83.7	0.003	6.39	0.600
896	135.536	0.153	1.04	105.8	-1.25	-	84.6	0.000	6.43	0.616
897	135.688	0.152	1.05	105.8	-1.33	-	83.9	-0.001	6.39	0.614
898	135.840	0.152	1.04	105.7	-1.24	-	84.0	0.002	6.39	0.623
899	135.991	0.151	1.04	105.8	-1.27	-	84.0	-0.002	6.40	0.622
900	136.141	0.150	1.03	105.7	-1.38	99	84.5	-0.002	6.41	0.625
901	136.293	0.152	1.04	105.7	-1.37	99	83.8	-0.006	6.35	0.622
Avg/Tot	136.293	0.151	1.04	102.2	-1.31	100	84.1	-0.019	7.60	0.138

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Particulate Sampling 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)
0	0.000		0.04	78.9	-0.50		84.0
1	0.112	0.112	0.95	78.9	-1.81	-	83.9
2	0.251	0.139	0.93	78.6	-1.85	-	83.9
3	0.398	0.147	1.06	78.7	-1.85	-	83.9
4	0.550	0.152	1.05	78.7	-1.98	-	84.0
5	0.701	0.151	1.05	78.7	-1.82	-	84.3
6	0.853	0.152	1.06	78.7	-1.93	-	84.3
7	1.006	0.153	1.05	78.8	-1.94	-	84.2
8	1.159	0.153	1.06	78.9	-2.00	-	84.3
9	1.312	0.153	1.06	78.9	-2.01	-	85.1
10	1.466	0.154	1.06	79.1	-1.84	94	86.0
11	1.623	0.157	1.08	79.2	-1.92	-	86.0
12	1.777	0.154	1.08	79.3	-1.85	-	85.6
13	1.931	0.154	1.08	79.5	-1.95	-	85.3
14	2.083	0.152	1.09	79.5	-2.00	-	85.3
15	2.238	0.155	1.10	79.7	-1.93	-	85.3
16	2.392	0.154	1.10	79.8	-1.98	-	85.5
17	2.547	0.155	1.11	80.2	-1.88	-	86.5
18	2.704	0.157	1.10	80.3	-1.97	-	87.5
19	2.861	0.157	1.10	80.5	-1.99	-	87.6
20	3.019	0.158	1.10	80.6	-1.92	99	87.3
21	3.176	0.157	1.11	80.8	-1.89	-	86.7
22	3.331	0.155	1.12	81.1	-2.01	-	86.3
23	3.492	0.161	1.12	81.3	-2.03	-	86.0
24	3.651	0.159	1.12	81.7	-1.90	-	86.0
25	3.808	0.157	1.13	81.9	-1.98	-	86.0
26	3.965	0.157	1.13	82.0	-1.98	-	85.9
27	4.121	0.156	1.12	82.3	-2.04	-	85.8
28	4.281	0.160	1.12	82.5	-2.00	-	85.8
29	4.439	0.158	1.14	82.7	-1.90	-	85.9
30	4.596	0.157	1.13	83.2	-1.96	100	86.8
31	4.756	0.160	1.12	83.5	-1.91	-	87.6

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Particulate Sampling 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)
32	4.916	0.160	1.12	83.6	-2.01	-	87.5
33	5.074	0.158	1.14	83.8	-1.93	-	87.1
34	5.231	0.157	1.14	84.1	-1.94	-	86.5
35	5.396	0.165	1.13	84.6	-2.03	-	86.2
36	5.554	0.158	1.13	84.8	-1.96	-	85.9
37	5.711	0.157	1.13	84.9	-2.00	-	85.8
38	5.872	0.161	1.12	85.3	-1.89	-	85.8
39	6.030	0.158	1.13	85.6	-1.92	-	86.2
40	6.189	0.159	1.14	85.9	-2.04	101	87.2
41	6.347	0.158	1.14	86.1	-2.00	-	87.8
42	6.507	0.160	1.13	86.5	-1.90	-	87.6
43	6.667	0.160	1.14	86.8	-1.91	-	87.1
44	6.824	0.157	0.40	86.9	-1.98	-	86.6
45	6.985	0.161	-0.54	87.3	-2.00	-	86.2
46	7.146	0.161	-0.59	87.6	-1.92	-	86.1
47	7.306	0.160	-0.63	87.9	-2.04	-	86.0
48	7.467	0.161	-0.69	88.2	-1.89	-	86.5
49	7.628	0.161	-0.60	88.4	-1.92	-	87.1
50	7.785	0.157	-0.82	88.6	-2.06	100	86.7
51	7.943	0.158	-0.90	88.8	-2.06	-	86.2
52	8.104	0.161	-0.88	89.1	-2.03	-	86.0
53	8.264	0.160	-0.81	89.4	-1.90	-	85.9
54	8.422	0.158	-0.41	89.6	-1.92	-	86.0
55	8.583	0.161	-0.11	89.8	-1.89	-	86.3
56	8.743	0.160	0.26	90.2	-2.07	-	86.5
57	8.901	0.158	0.10	90.4	-1.92	-	86.6
58	9.063	0.162	0.21	90.8	-1.98	-	86.9
59	9.224	0.161	0.15	90.9	-2.04	-	86.8
60	9.384	0.160	0.05	91.2	-2.02	100	86.4
Avg/Tot	9.384	0.156	0.68	83.7	-1.93	99	86.0

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
0	303.5	386.0	467.2	462.3	156.0	355.0	636
1	299.5	353.6	467.3	461.5	157.5	347.9	476
2	300.4	354.1	467.5	460.7	155.9	347.7	515
3	299.1	353.5	467.1	459.5	155.3	346.9	584
4	301.0	352.6	465.7	458.2	154.7	346.4	628
5	303.0	354.2	463.6	456.9	153.0	346.1	649
6	306.8	363.3	460.6	455.0	151.5	347.4	671
7	310.9	367.6	457.7	452.6	150.2	347.8	699
8	316.2	369.6	454.2	449.7	148.9	347.7	721
9	320.3	394.9	450.5	446.4	147.7	352.0	738
10	324.2	413.7	446.6	443.0	146.7	354.8	748
11	329.7	415.6	442.6	439.6	145.8	354.7	749
12	335.1	416.4	438.8	435.9	145.0	354.2	755
13	339.9	419.8	434.9	432.8	144.3	354.3	765
14	342.4	414.2	431.3	429.2	143.8	352.2	776
15	341.5	405.9	427.4	426.0	143.3	348.8	784
16	346.6	406.9	424.3	422.5	145.5	349.2	808
17	354.1	407.6	421.4	419.4	147.7	350.0	853
18	367.8	404.9	418.2	416.3	149.7	351.4	874
19	375.4	406.6	415.3	413.4	151.5	352.4	890
20	370.5	404.8	412.3	410.3	153.0	350.2	887
21	377.0	410.7	409.5	407.3	154.2	351.7	872
22	383.8	411.7	406.9	404.2	155.2	352.4	856
23	381.6	411.0	404.2	401.1	155.9	350.8	840
24	380.2	411.1	401.8	398.2	156.5	349.6	823
25	380.7	415.3	399.1	395.1	157.0	349.4	807
26	382.1	415.4	396.8	392.0	157.4	348.7	798
27	379.8	406.5	394.7	389.2	157.5	345.5	794
28	377.7	398.2	392.5	386.3	157.5	342.4	794
29	380.1	396.9	390.0	383.3	157.4	341.5	798
30	371.2	403.9	388.1	380.7	157.3	340.2	805
31	370.3	399.8	386.1	378.0	157.0	338.2	812
32	368.3	393.1	384.0	375.3	156.8	335.5	815
33	366.2	388.5	382.0	372.7	156.6	333.2	818
34	364.5	385.3	379.9	370.1	156.1	331.2	821
35	361.9	384.0	377.7	367.7	155.6	329.4	825
36	359.7	384.3	375.7	365.4	155.4	328.1	828
37	358.8	380.4	373.7	363.0	155.0	326.2	832
38	357.6	377.1	371.7	360.8	154.5	324.3	836
39	357.1	377.0	369.8	358.8	154.2	323.4	838
40	356.6	377.5	367.8	357.0	153.9	322.6	839
41	356.7	378.4	365.9	354.8	153.6	321.9	839
42	354.3	377.2	364.1	353.0	153.2	320.4	834
43	354.1	376.5	362.2	351.2	152.8	319.4	832
44	352.3	376.1	360.5	349.6	152.6	318.2	828
45	351.9	371.2	358.6	347.8	152.2	316.3	825
46	349.3	369.4	356.9	346.2	151.8	314.7	824
47	349.6	367.2	355.2	344.7	151.6	313.7	821
48	347.0	362.3	353.5	343.1	151.3	311.4	819
49	346.2	363.7	351.9	341.7	151.0	310.9	817

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
50	345.3	361.8	350.3	340.3	150.8	309.7	815
51	343.3	360.5	348.9	338.7	150.5	308.4	811
52	342.2	358.3	347.4	337.3	150.2	307.1	807
53	337.3	356.4	345.9	336.1	149.9	305.1	804
54	339.1	353.1	344.5	334.7	149.7	304.2	800
55	335.9	349.8	343.0	333.5	149.4	302.3	798
56	336.2	352.3	341.7	332.1	148.9	302.2	798
57	333.3	355.9	340.3	331.0	148.8	301.9	795
58	331.1	353.3	339.1	329.9	148.6	300.4	789
59	329.1	353.2	337.7	328.8	148.3	299.4	783
60	329.0	347.3	336.4	327.5	147.9	297.6	778
61	325.8	343.5	335.1	326.3	147.5	295.6	772
62	327.0	343.3	333.9	325.3	147.1	295.3	768
63	322.1	340.8	332.7	324.4	146.8	293.4	766
64	319.4	340.5	331.5	323.4	146.6	292.3	766
65	318.5	338.4	330.3	322.4	146.3	291.2	763
66	316.7	336.0	329.1	321.6	146.1	289.9	760
67	314.6	334.7	328.0	320.5	145.8	288.7	755
68	314.9	333.7	326.9	319.7	145.5	288.1	752
69	312.4	332.3	325.9	318.8	145.3	286.9	748
70	311.2	331.0	324.8	317.9	145.0	286.0	744
71	308.6	329.4	323.8	317.2	145.0	284.8	743
72	308.2	328.1	322.8	316.3	144.7	284.0	741
73	304.6	326.6	321.9	315.8	144.6	282.7	737
74	305.0	325.6	321.0	315.0	144.4	282.2	732
75	303.2	325.8	320.1	314.1	144.2	281.5	729
76	301.8	324.6	319.1	313.4	144.0	280.6	725
77	299.4	324.1	318.2	312.6	143.8	279.6	722
78	297.8	323.5	317.3	311.8	143.5	278.8	715
79	293.6	325.0	316.5	310.9	143.5	277.9	708
80	296.8	321.7	315.6	310.0	144.4	277.7	701
81	289.5	322.5	314.8	309.4	144.9	276.2	691
82	290.5	320.3	313.7	308.2	146.1	275.8	681
83	285.1	318.9	312.7	307.9	145.5	274.0	669
84	287.1	318.9	311.8	307.3	145.0	274.0	648
85	285.6	317.5	310.7	306.2	144.9	273.0	623
86	278.7	316.0	309.8	305.7	143.9	270.8	598
87	277.5	314.4	308.9	305.2	143.0	269.8	583
88	274.1	313.6	307.8	304.6	142.1	268.4	583
89	275.7	312.5	306.9	303.9	141.2	268.0	603
90	270.6	311.8	305.9	303.2	140.2	266.3	640
91	273.3	310.7	304.8	302.6	139.3	266.1	676
92	270.6	310.0	304.0	302.1	138.2	265.0	705
93	269.9	307.8	302.9	301.8	137.4	264.0	726
94	269.9	306.4	302.0	301.3	136.1	263.1	742
95	274.3	305.1	301.1	300.5	135.9	263.4	754
96	275.1	302.9	300.2	300.4	135.2	262.8	766
97	276.8	302.0	299.2	300.3	134.2	262.5	776
98	274.6	300.9	298.3	299.9	133.6	261.5	784
99	282.2	302.1	297.6	299.3	133.5	262.9	790

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
100	283.4	301.0	296.5	298.9	133.2	262.6	794
101	283.7	299.6	296.0	299.0	132.8	262.2	799
102	281.4	299.9	295.2	298.8	132.2	261.5	807
103	285.4	305.0	294.5	298.2	132.2	263.1	805
104	285.8	303.1	294.0	298.2	132.0	262.6	808
105	284.7	303.2	293.3	298.5	131.5	262.2	803
106	285.8	302.6	292.9	298.5	131.4	262.2	793
107	287.1	302.3	292.1	298.5	131.2	262.2	784
108	284.6	301.8	291.8	298.5	131.0	261.5	773
109	284.5	301.2	291.4	298.5	131.0	261.3	760
110	284.9	293.1	291.0	298.2	131.0	259.6	748
111	284.4	292.9	290.4	298.1	131.1	259.4	748
112	280.8	292.8	290.4	298.1	131.1	258.6	757
113	281.9	292.5	290.2	298.1	131.0	258.7	759
114	279.9	291.9	289.9	298.4	131.3	258.3	761
115	279.7	291.7	289.6	298.5	131.2	258.1	760
116	278.6	291.4	289.5	298.5	131.2	257.8	758
117	278.0	291.1	289.4	298.7	131.3	257.7	756
118	278.3	290.6	289.2	298.8	131.4	257.7	755
119	277.4	291.3	289.1	298.9	131.3	257.6	753
120	275.1	292.2	288.9	298.8	131.3	257.3	754
121	277.2	289.6	288.8	298.9	131.4	257.2	754
122	274.7	288.6	288.6	299.1	131.4	256.5	753
123	273.4	288.7	288.5	299.1	131.4	256.2	752
124	273.6	286.4	288.3	299.1	131.4	255.8	752
125	273.4	285.6	288.2	299.4	131.3	255.6	753
126	272.6	286.2	288.1	299.3	131.2	255.5	755
127	272.4	287.7	288.0	299.4	131.4	255.8	757
128	271.0	287.0	287.8	299.4	131.2	255.3	759
129	272.0	285.8	287.8	299.5	131.2	255.3	762
130	273.6	283.2	287.7	299.2	131.6	255.1	756
131	274.0	280.1	287.7	299.4	132.0	254.6	766
132	274.3	279.5	287.7	299.5	132.5	254.7	782
133	274.7	278.2	287.7	299.8	132.7	254.6	794
134	276.7	277.6	287.7	299.9	133.1	255.0	801
135	277.2	277.7	287.7	300.1	133.4	255.2	801
136	279.3	278.5	287.8	300.1	133.7	255.9	798
137	280.6	278.2	287.9	300.0	133.8	256.1	794
138	281.0	277.1	288.1	300.4	134.1	256.1	790
139	282.9	276.7	288.2	300.3	134.2	256.5	785
140	282.6	276.3	288.4	300.6	134.4	256.5	780
141	283.1	275.9	288.5	300.8	134.7	256.6	776
142	284.0	275.7	288.6	300.8	134.6	256.7	776
143	284.8	275.5	288.8	300.8	134.8	256.9	775
144	284.6	275.1	288.9	301.1	135.1	257.0	775
145	284.9	274.8	289.0	301.2	135.2	257.0	774
146	284.9	274.5	289.2	301.3	135.3	257.0	773
147	286.3	274.2	289.3	301.2	135.4	257.3	773
148	285.7	274.1	289.5	301.2	135.4	257.2	774
149	285.1	273.6	289.6	301.5	135.5	257.1	775

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
150	285.8	273.4	289.7	301.4	135.6	257.2	775
151	286.1	273.2	289.9	301.3	135.5	257.2	776
152	286.3	272.8	289.9	301.5	135.6	257.2	778
153	288.2	272.9	290.1	301.5	135.5	257.6	781
154	287.8	273.0	290.1	301.5	135.5	257.6	783
155	288.6	272.9	290.3	301.4	135.5	257.7	785
156	289.4	272.7	290.4	301.6	135.4	257.9	787
157	291.2	272.6	290.5	301.6	135.4	258.3	790
158	290.7	272.2	290.5	301.7	135.5	258.1	792
159	293.0	272.4	290.7	301.6	135.5	258.6	795
160	292.5	272.2	290.9	301.9	135.6	258.6	800
161	294.9	271.6	291.0	302.0	135.6	259.0	805
162	294.9	272.1	291.1	302.1	135.5	259.1	810
163	296.5	272.4	291.2	302.3	135.6	259.6	814
164	299.0	272.5	291.4	302.3	135.6	260.2	819
165	300.9	272.4	291.5	302.5	135.6	260.6	825
166	302.5	272.3	291.7	302.5	135.7	260.9	834
167	303.2	272.0	291.8	302.8	135.7	261.1	844
168	306.6	271.7	291.9	302.9	135.7	261.8	857
169	308.6	271.4	292.0	303.2	135.8	262.2	868
170	311.3	272.0	292.1	303.1	135.7	262.8	879
171	314.5	272.3	292.2	303.4	135.6	263.6	886
172	316.8	272.5	292.2	303.7	135.8	264.2	892
173	319.3	272.5	292.3	303.7	135.7	264.7	900
174	323.0	274.1	292.4	304.0	135.7	265.8	913
175	325.5	274.7	292.6	304.1	135.8	266.5	919
176	329.2	274.4	292.7	304.5	135.8	267.3	916
177	330.4	274.2	292.9	304.8	135.9	267.6	913
178	332.3	274.4	293.0	304.9	136.0	268.1	912
179	334.2	273.9	293.2	304.9	135.8	268.4	913
180	337.6	273.4	293.3	305.3	136.0	269.1	915
181	339.1	274.7	293.6	305.6	135.8	269.8	917
182	339.8	273.5	293.8	305.7	135.9	269.7	919
183	342.7	272.9	294.2	306.1	136.0	270.4	920
184	342.5	272.7	294.4	306.2	136.0	270.4	921
185	344.4	273.2	294.6	306.6	136.1	271.0	922
186	346.8	272.2	295.1	306.7	136.2	271.4	924
187	348.7	271.5	295.3	307.0	136.2	271.7	925
188	350.0	270.7	295.7	307.4	136.3	272.0	927
189	352.2	270.6	296.0	307.5	136.1	272.5	928
190	353.3	270.2	296.5	307.8	136.2	272.8	929
191	355.3	270.2	296.8	308.2	136.1	273.3	931
192	355.7	270.0	297.3	308.6	136.2	273.6	933
193	356.8	270.2	297.5	308.9	136.2	273.9	935
194	358.8	270.7	298.0	309.2	136.2	274.6	938
195	359.9	270.3	298.4	309.7	136.3	274.9	941
196	361.7	270.2	298.9	310.1	136.4	275.5	943
197	362.9	270.6	299.4	310.2	136.5	275.9	946
198	364.0	269.8	299.8	310.5	136.4	276.1	948
199	366.2	269.1	300.2	310.9	136.5	276.6	951

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
200	368.8	268.7	300.6	311.3	136.6	277.2	953
201	369.7	268.7	301.1	311.7	136.8	277.6	957
202	371.4	269.2	301.5	312.0	136.8	278.2	960
203	372.5	269.0	302.0	312.4	136.7	278.5	964
204	373.6	269.4	302.6	312.8	136.8	279.0	970
205	377.1	269.2	303.1	313.1	137.0	279.9	977
206	378.5	268.5	303.6	313.4	136.9	280.2	983
207	379.1	267.6	304.1	313.9	137.1	280.4	991
208	381.6	267.4	304.8	314.4	137.2	281.1	999
209	383.7	267.2	305.5	314.7	137.2	281.7	1007
210	387.7	267.1	306.2	315.3	137.2	282.7	1013
211	388.9	266.9	306.8	315.8	137.5	283.2	1018
212	392.7	266.8	307.5	316.2	137.4	284.1	1021
213	395.1	266.5	308.1	317.0	137.5	284.8	1024
214	396.5	266.6	308.9	317.3	137.5	285.4	1026
215	400.0	266.4	309.6	318.2	137.7	286.4	1027
216	401.3	266.4	310.4	318.8	137.8	286.9	1029
217	405.3	266.4	311.1	319.4	137.9	288.0	1030
218	405.4	266.4	311.8	320.1	137.8	288.3	1032
219	407.4	266.6	312.5	320.8	137.9	289.0	1035
220	409.3	266.6	313.2	321.5	138.0	289.7	1036
221	410.7	266.6	314.0	322.1	138.2	290.3	1037
222	412.8	266.6	314.8	323.0	138.3	291.1	1037
223	413.0	266.6	315.6	323.6	138.3	291.4	1038
224	415.2	266.6	316.4	324.4	138.5	292.2	1039
225	415.9	266.9	317.2	325.0	138.5	292.7	1040
226	416.3	266.6	318.0	325.8	138.7	293.1	1039
227	416.9	266.6	318.9	326.8	138.8	293.6	1038
228	420.5	266.8	319.7	327.3	139.0	294.7	1038
229	420.7	266.4	320.5	328.2	139.2	295.0	1038
230	421.7	266.5	321.5	329.0	139.3	295.6	1036
231	424.8	266.7	322.2	329.5	139.3	296.5	1035
232	424.6	266.5	323.2	330.3	139.4	296.8	1034
233	424.4	266.6	324.1	331.0	139.6	297.1	1033
234	423.3	266.2	324.9	331.7	139.5	297.1	1031
235	425.2	266.7	325.9	332.2	139.5	297.9	1030
236	423.4	266.5	326.8	332.9	139.7	297.9	1029
237	423.3	266.6	327.7	333.8	139.9	298.3	1027
238	424.0	266.9	328.7	334.3	140.0	298.8	1026
239	424.7	266.6	329.5	335.0	140.2	299.2	1024
240	423.7	267.2	330.5	335.5	140.3	299.4	1022
241	423.7	267.0	331.4	336.0	140.3	299.7	1021
242	423.0	267.0	332.2	336.6	140.5	299.9	1022
243	425.1	266.7	333.1	337.3	140.7	300.6	1022
244	425.0	266.8	334.0	337.8	140.9	300.9	1024
245	424.0	266.8	335.0	338.3	140.8	301.0	1027
246	423.7	266.7	335.9	338.8	141.0	301.2	1032
247	425.8	266.7	336.9	339.4	141.3	302.0	1039
248	428.0	266.9	337.9	339.7	141.3	302.8	1046
249	426.9	266.8	338.9	340.2	141.3	302.8	1055

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
250	429.8	266.6	339.9	340.7	141.4	303.7	1063
251	431.3	266.7	340.9	341.1	141.5	304.3	1071
252	434.6	266.8	342.0	341.5	141.5	305.3	1080
253	436.4	266.8	343.1	342.0	141.7	306.0	1090
254	438.5	267.1	344.2	342.3	141.7	306.8	1098
255	441.6	267.1	345.3	342.7	141.8	307.7	1106
256	445.0	267.3	346.4	343.4	142.0	308.8	1110
257	449.0	267.2	347.5	343.7	142.1	309.9	1112
258	450.6	267.6	348.7	344.2	142.1	310.6	1110
259	453.8	267.6	349.8	344.8	142.2	311.6	1107
260	456.1	267.7	350.9	345.5	142.5	312.5	1104
261	457.6	268.0	352.0	346.0	142.6	313.2	1101
262	459.3	268.0	353.1	346.7	142.8	314.0	1100
263	460.3	268.3	354.1	347.2	142.9	314.6	1098
264	461.9	268.4	355.0	347.6	143.0	315.2	1096
265	462.7	268.5	356.0	348.2	142.9	315.7	1094
266	463.6	268.8	356.8	348.7	143.0	316.2	1092
267	465.3	268.8	357.6	349.2	143.1	316.8	1092
268	466.1	269.0	358.3	349.8	143.4	317.3	1092
269	466.0	269.4	359.0	350.2	143.5	317.6	1089
270	469.4	269.6	359.6	350.7	143.6	318.6	1089
271	468.1	269.6	360.2	351.3	143.8	318.6	1091
272	467.3	269.5	360.7	351.9	144.0	318.7	1093
273	470.4	269.6	361.2	352.5	144.0	319.5	1095
274	469.0	269.4	361.7	353.4	144.2	319.5	1099
275	470.5	269.5	362.1	354.0	144.3	320.1	1104
276	470.6	269.4	362.5	354.8	144.5	320.4	1110
277	472.8	269.4	362.9	355.5	144.5	321.0	1115
278	473.2	269.4	363.3	356.3	144.8	321.4	1121
279	475.4	269.6	363.7	357.1	145.0	322.2	1127
280	477.0	269.9	364.1	357.9	145.0	322.8	1131
281	478.3	269.9	364.5	358.8	145.2	323.3	1139
282	479.8	270.0	364.9	359.4	145.3	323.9	1144
283	482.4	270.6	365.4	360.1	145.4	324.8	1148
284	484.8	271.2	365.9	360.8	145.7	325.7	1151
285	488.0	271.3	366.3	361.8	145.9	326.7	1153
286	491.4	272.7	366.8	362.3	146.0	327.8	1156
287	493.5	273.1	367.4	362.9	146.1	328.6	1158
288	497.1	274.0	368.0	363.8	146.4	329.9	1161
289	499.1	273.9	368.5	364.4	146.4	330.5	1167
290	499.9	273.8	369.2	365.2	146.6	330.9	1172
291	504.1	274.0	369.7	365.9	146.8	332.1	1175
292	506.4	274.0	370.2	366.8	147.0	332.9	1181
293	509.9	274.2	370.8	367.6	147.2	333.9	1185
294	513.4	274.3	371.4	368.3	147.3	334.9	1192
295	515.7	274.1	372.0	369.2	147.5	335.7	1184
296	517.0	274.4	372.7	370.3	147.6	336.4	1162
297	516.1	275.0	373.2	371.3	147.8	336.7	1137
298	513.7	275.3	373.9	372.0	147.9	336.6	1119
299	512.6	274.3	374.4	372.9	148.2	336.5	1104

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
300	507.3	273.5	375.0	374.0	148.5	335.7	1090
301	504.5	273.0	375.6	374.6	148.6	335.3	1081
302	501.6	273.8	376.1	375.3	148.7	335.1	1074
303	496.2	273.7	376.7	376.1	148.9	334.3	1067
304	491.9	274.3	377.2	376.9	148.9	333.8	1060
305	488.0	274.2	377.8	377.5	149.1	333.3	1052
306	485.8	274.7	378.4	378.1	149.2	333.2	1043
307	483.4	274.6	378.9	378.9	149.4	333.0	1034
308	478.0	275.8	379.5	379.4	149.5	332.4	1023
309	474.0	275.6	380.1	379.9	149.5	331.8	1012
310	469.7	275.1	380.7	380.5	149.5	331.1	1005
311	464.6	273.8	381.2	381.0	149.7	330.1	999
312	461.3	273.4	381.7	381.5	149.9	329.6	992
313	461.8	273.5	382.3	381.9	149.9	329.9	985
314	453.3	274.2	382.9	382.3	149.8	328.5	979
315	453.8	273.8	383.3	382.8	150.0	328.7	972
316	447.1	273.3	383.8	383.1	149.9	327.4	965
317	446.4	274.1	384.3	383.4	150.1	327.7	963
318	440.8	273.5	384.8	383.8	150.0	326.6	954
319	439.1	274.0	385.3	384.1	150.1	326.5	948
320	430.7	274.6	385.7	384.6	150.1	325.1	941
321	427.7	274.8	386.2	384.7	149.9	324.7	937
322	426.4	275.0	386.7	385.2	150.1	324.7	933
323	422.8	273.4	387.1	385.4	150.0	323.7	930
324	420.8	273.8	387.5	385.7	149.9	323.5	934
325	418.4	274.5	388.0	386.1	149.8	323.4	937
326	415.8	274.1	388.4	386.3	149.8	322.9	944
327	415.6	274.1	388.9	386.9	149.8	323.1	951
328	415.4	274.9	389.3	387.2	149.8	323.3	957
329	414.3	275.3	389.7	387.7	149.8	323.4	962
330	415.7	275.4	390.1	388.3	149.8	323.9	969
331	414.7	275.4	390.6	389.1	149.9	323.9	974
332	415.1	275.4	391.1	389.7	149.8	324.2	979
333	414.2	275.7	391.6	390.4	149.8	324.3	981
334	414.3	275.7	392.0	391.3	149.9	324.6	980
335	413.7	275.8	392.5	392.4	149.9	324.9	977
336	414.0	275.8	392.9	393.4	149.9	325.2	975
337	414.8	276.5	393.5	394.3	149.9	325.8	978
338	413.8	276.2	393.9	395.4	149.9	325.8	975
339	413.6	276.2	394.4	396.8	149.9	326.2	949
340	412.3	276.7	394.9	398.0	150.0	326.4	921
341	409.1	277.2	395.4	399.0	150.0	326.1	898
342	405.1	277.7	395.8	399.9	150.0	325.7	882
343	400.9	278.0	396.4	401.1	150.0	325.3	873
344	400.1	277.9	396.8	402.0	150.1	325.4	864
345	395.6	278.4	397.2	402.6	150.1	324.8	859
346	390.8	278.4	397.6	403.6	150.0	324.1	853
347	389.3	278.6	398.1	404.1	149.9	324.0	848
348	387.1	278.1	398.4	404.9	150.0	323.7	845
349	386.0	278.2	398.8	405.6	150.0	323.7	844

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
350	382.1	278.3	399.2	406.2	150.1	323.2	842
351	379.0	278.6	399.6	406.7	150.2	322.8	840
352	376.4	278.7	399.9	407.3	150.1	322.5	840
353	375.1	278.6	400.1	408.1	150.3	322.4	841
354	373.0	278.8	400.5	408.6	150.4	322.3	843
355	370.9	279.1	400.8	409.2	150.3	322.1	843
356	369.9	279.1	401.1	409.8	150.4	322.1	844
357	368.8	279.6	401.3	410.2	150.4	322.1	845
358	368.0	279.3	401.6	410.8	150.4	322.0	848
359	368.1	279.3	401.8	411.5	150.5	322.2	850
360	366.7	279.3	402.0	412.0	150.6	322.1	853
361	366.1	279.5	402.2	412.4	150.7	322.2	855
362	365.9	279.4	402.4	413.1	150.8	322.3	857
363	366.0	279.4	402.6	413.3	150.8	322.4	860
364	366.4	279.4	402.7	414.0	150.9	322.7	864
365	367.3	280.0	402.8	414.4	151.0	323.1	868
366	366.1	280.1	403.0	414.8	151.1	323.0	869
367	366.0	280.3	403.1	415.2	151.1	323.1	869
368	367.5	280.4	403.1	415.5	151.2	323.5	870
369	368.0	280.4	403.2	415.8	151.3	323.7	870
370	369.1	280.3	403.2	416.3	151.6	324.1	870
371	368.8	280.6	403.3	416.4	151.6	324.1	868
372	369.4	280.6	403.4	416.9	151.7	324.4	867
373	369.1	280.8	403.5	417.2	152.0	324.5	866
374	368.8	280.6	403.5	417.5	152.2	324.5	867
375	369.5	280.9	403.6	417.8	152.4	324.8	866
376	368.3	281.2	403.6	417.9	152.5	324.7	866
377	368.7	281.1	403.6	418.4	152.8	324.9	867
378	370.0	281.3	403.6	418.6	152.8	325.3	867
379	368.3	281.6	403.6	418.7	152.9	325.0	868
380	370.6	281.5	403.6	419.1	153.3	325.6	870
381	370.6	281.6	403.6	419.3	153.4	325.7	874
382	370.5	281.7	403.6	419.7	153.6	325.8	878
383	371.8	282.1	403.6	419.6	153.7	326.2	882
384	371.2	282.0	403.6	419.9	153.9	326.1	883
385	372.3	282.0	403.6	420.2	154.2	326.5	884
386	373.9	282.4	403.6	420.2	154.3	326.9	883
387	373.2	282.3	403.6	420.6	154.6	326.9	877
388	373.3	282.5	403.6	420.6	154.7	326.9	872
389	373.5	282.7	403.7	420.7	154.9	327.1	867
390	373.3	282.7	403.8	420.9	155.2	327.2	859
391	371.3	282.6	403.7	421.2	155.3	326.8	854
392	371.3	282.9	403.8	421.3	155.4	326.9	851
393	371.4	283.1	403.8	421.4	155.7	327.1	849
394	370.5	283.0	403.8	421.6	155.8	326.9	847
395	370.2	283.1	403.8	421.8	156.0	327.0	846
396	369.5	283.1	403.8	422.0	156.3	326.9	844
397	369.4	283.2	403.8	422.1	156.4	327.0	844
398	367.4	283.4	403.9	422.2	156.5	326.7	844
399	366.9	283.4	403.9	422.2	156.6	326.6	843

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
400	366.6	283.6	404.0	422.3	156.8	326.7	843
401	367.2	283.6	404.1	422.7	157.0	326.9	846
402	366.1	283.7	404.1	422.7	157.3	326.8	848
403	365.0	283.7	404.2	422.7	157.3	326.6	849
404	364.7	284.0	404.4	423.0	157.6	326.7	850
405	365.0	284.1	404.5	423.1	157.7	326.9	853
406	363.6	284.6	404.7	423.1	157.8	326.8	855
407	365.5	284.7	404.8	423.2	158.0	327.2	854
408	364.6	284.7	404.9	423.4	158.2	327.2	853
409	366.0	284.8	405.2	423.5	158.3	327.6	853
410	365.2	285.2	405.3	423.6	158.4	327.5	849
411	364.9	285.2	405.5	423.6	158.5	327.5	844
412	364.1	285.6	405.7	423.5	158.7	327.5	839
413	364.5	285.5	405.8	423.6	158.8	327.6	831
414	363.8	285.8	405.9	423.5	158.8	327.6	824
415	360.8	286.0	405.9	423.4	158.9	327.0	814
416	359.2	286.1	406.0	423.4	159.0	326.7	803
417	357.7	285.9	405.9	423.5	159.1	326.4	792
418	356.4	286.1	405.8	423.5	159.2	326.2	780
419	353.9	286.4	405.7	423.3	159.2	325.7	769
420	351.0	285.9	405.6	423.2	159.3	325.0	759
421	348.5	285.8	405.4	423.1	159.4	324.4	751
422	346.1	287.1	405.1	423.0	159.6	324.2	740
423	343.3	287.9	404.8	422.8	159.7	323.7	730
424	341.6	288.3	404.6	422.4	159.7	323.3	721
425	338.7	289.8	404.3	422.1	159.8	322.9	710
426	334.9	290.9	404.1	421.9	159.9	322.3	698
427	332.0	292.4	403.8	421.7	160.0	322.0	688
428	330.7	292.4	403.5	421.3	159.9	321.6	678
429	325.6	290.6	403.3	421.1	160.1	320.1	670
430	323.1	290.3	403.2	420.6	160.1	319.5	664
431	321.8	289.6	403.0	420.3	160.2	319.0	658
432	318.0	291.5	402.9	420.2	160.2	318.6	652
433	316.0	291.8	402.7	419.9	160.2	318.1	648
434	313.6	292.4	402.6	419.3	160.2	317.6	646
435	311.4	293.0	402.6	418.9	160.2	317.2	643
436	309.3	292.9	402.5	418.6	160.2	316.7	640
437	307.3	291.7	402.4	418.3	160.1	316.0	638
438	306.4	291.7	402.4	417.8	160.1	315.7	635
439	304.5	292.0	402.3	417.4	160.0	315.2	633
440	302.4	291.6	402.4	417.2	160.2	314.8	630
441	300.4	291.6	402.3	416.8	160.1	314.2	628
442	298.4	293.0	402.3	416.6	160.0	314.1	626
443	296.5	292.7	402.3	416.1	159.8	313.5	624
444	294.7	292.1	402.3	415.5	159.8	312.9	622
445	293.3	291.6	402.3	415.3	159.9	312.5	621
446	292.7	289.8	402.4	414.8	159.7	311.9	619
447	292.0	288.6	402.4	414.5	159.8	311.5	618
448	289.9	289.0	402.4	414.0	159.6	311.0	619
449	288.3	290.4	402.4	413.8	159.6	310.9	620

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
450	288.2	291.6	402.4	413.2	159.5	311.0	620
451	287.2	292.0	402.5	412.8	159.3	310.8	619
452	287.8	292.3	402.5	412.5	159.4	310.9	617
453	285.6	294.2	402.6	411.9	159.4	310.7	616
454	285.6	295.8	402.6	411.4	159.3	310.9	613
455	283.5	297.8	402.6	411.1	159.2	310.8	611
456	282.0	299.8	402.7	410.9	159.2	310.9	608
457	280.9	301.1	402.7	410.3	159.2	310.8	605
458	280.4	301.8	402.7	410.1	159.3	310.9	603
459	279.1	301.2	402.7	409.8	159.1	310.4	600
460	278.5	303.9	402.8	409.3	159.0	310.7	597
461	279.8	303.8	402.7	409.0	158.9	310.8	595
462	277.4	304.0	402.8	408.7	158.9	310.4	592
463	276.0	305.2	402.7	408.2	158.9	310.2	590
464	274.6	304.0	402.6	407.8	158.8	309.6	587
465	273.8	303.3	402.5	407.4	158.7	309.1	584
466	272.4	303.2	402.5	407.2	158.7	308.8	582
467	273.0	302.7	402.4	407.0	158.7	308.8	579
468	270.9	302.3	402.3	406.7	158.5	308.1	577
469	271.6	302.1	402.2	406.3	158.3	308.1	574
470	269.7	301.7	402.0	405.9	158.3	307.5	572
471	268.8	301.3	401.8	405.8	158.3	307.2	569
472	267.7	301.4	401.7	405.2	158.0	306.8	567
473	268.7	301.5	401.5	405.0	157.9	306.9	565
474	266.6	301.3	401.3	404.8	158.0	306.4	563
475	266.7	301.3	401.2	404.5	157.7	306.3	560
476	265.3	301.4	401.0	404.2	157.6	305.9	558
477	266.3	301.5	400.9	404.0	157.6	306.1	556
478	265.1	301.6	400.6	403.6	157.6	305.7	553
479	264.8	301.4	400.5	403.6	157.6	305.6	551
480	263.5	301.5	400.4	403.2	157.4	305.2	549
481	262.9	301.4	400.2	403.2	157.4	305.0	547
482	263.0	301.3	400.0	402.9	157.4	304.9	546
483	262.3	301.4	399.9	402.5	157.3	304.7	544
484	261.8	301.4	399.8	402.3	157.4	304.5	542
485	260.0	301.4	399.7	402.1	157.4	304.1	540
486	260.4	301.2	399.5	401.9	157.2	304.0	538
487	260.1	301.0	399.5	402.0	157.3	304.0	536
488	258.5	300.9	399.4	401.8	157.4	303.6	534
489	257.3	301.0	399.4	401.5	157.3	303.3	532
490	256.7	300.7	399.3	401.5	157.4	303.1	531
491	256.3	300.7	399.4	401.2	157.4	303.0	528
492	256.4	300.4	399.3	401.1	157.5	302.9	526
493	254.4	300.4	399.4	400.8	157.4	302.5	525
494	254.0	300.3	399.5	400.6	157.3	302.3	523
495	253.2	300.3	399.4	400.1	157.3	302.1	521
496	252.3	300.3	399.5	399.8	157.3	301.8	519
497	252.1	300.0	399.5	399.6	157.4	301.7	518
498	250.3	300.1	399.5	399.2	157.3	301.3	516
499	249.6	300.0	399.5	398.9	157.1	301.0	514

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
500	248.5	299.9	399.6	398.7	157.1	300.8	513
501	248.5	300.1	399.5	398.3	157.0	300.7	511
502	248.6	299.6	399.6	398.2	157.0	300.6	509
503	247.4	299.2	399.5	397.6	156.9	300.1	508
504	246.9	298.6	399.5	397.2	156.8	299.8	507
505	245.6	298.6	399.6	396.7	156.7	299.4	505
506	244.9	299.2	399.5	396.5	156.6	299.3	504
507	244.4	298.4	399.4	396.0	156.5	298.9	502
508	244.7	298.0	399.3	395.4	156.5	298.8	501
509	242.5	298.0	399.3	394.8	156.2	298.2	499
510	242.4	297.6	399.2	394.4	156.1	297.9	498
511	241.2	296.8	399.1	393.8	156.3	297.4	496
512	240.8	296.9	399.0	393.0	156.0	297.1	495
513	240.8	296.6	399.0	392.6	155.9	297.0	493
514	239.8	296.6	398.8	392.0	155.6	296.6	492
515	239.2	296.4	398.6	391.5	155.8	296.3	490
516	238.9	296.3	398.4	390.9	155.6	296.0	489
517	238.2	295.7	398.1	390.2	155.4	295.5	488
518	236.8	295.9	398.0	389.4	155.1	295.0	486
519	237.7	295.7	397.7	388.8	155.1	295.0	485
520	236.4	295.4	397.5	388.1	155.0	294.5	483
521	236.0	295.3	397.2	387.5	154.9	294.2	481
522	234.8	294.6	396.9	387.0	154.7	293.6	480
523	234.8	294.8	396.5	386.1	154.5	293.3	478
524	234.8	294.6	396.2	385.5	154.4	293.1	477
525	233.8	294.0	395.8	385.1	154.2	292.6	475
526	232.1	294.1	395.4	384.1	154.0	291.9	473
527	232.3	293.5	395.1	383.7	153.9	291.7	472
528	232.1	293.4	394.7	382.9	153.7	291.4	471
529	232.0	294.0	394.2	382.2	153.4	291.2	469
530	231.1	294.9	393.9	381.5	153.2	290.9	468
531	229.6	294.1	393.5	381.0	153.2	290.3	465
532	229.6	294.3	393.0	380.3	153.0	290.0	464
533	229.8	294.9	392.6	379.5	152.9	289.9	462
534	229.1	295.1	392.2	378.9	152.8	289.6	460
535	228.1	295.7	391.8	378.3	152.7	289.3	458
536	228.0	295.6	391.3	377.8	152.6	289.1	456
537	227.3	296.1	390.9	377.2	152.4	288.8	453
538	226.4	296.7	390.4	376.6	152.2	288.5	451
539	226.6	296.6	389.9	375.8	151.9	288.2	447
540	226.1	295.9	389.4	375.0	151.7	287.6	445
541	225.8	294.6	389.0	374.2	151.6	287.0	443
542	224.5	293.7	388.5	373.7	151.5	286.4	439
543	224.9	293.4	388.1	372.9	151.4	286.1	437
544	224.3	292.5	387.6	372.2	151.3	285.6	436
545	223.4	292.3	387.1	371.4	151.0	285.0	431
546	223.3	293.1	386.6	370.7	150.8	284.9	427
547	223.0	300.0	386.1	370.0	150.6	285.9	422
548	222.8	300.7	385.6	369.3	150.6	285.8	417
549	221.6	299.9	385.1	368.6	150.3	285.1	412

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
550	221.6	298.5	384.6	367.6	150.2	284.5	414
551	220.3	296.5	384.0	367.0	150.1	283.6	410
552	220.4	294.2	383.5	366.3	149.9	282.9	411
553	220.1	293.2	383.0	365.8	149.8	282.4	411
554	219.1	292.3	382.4	364.9	149.4	281.6	410
555	218.9	291.2	381.9	364.2	149.2	281.1	408
556	218.8	291.2	381.2	363.3	149.2	280.7	408
557	218.2	291.0	380.6	362.6	148.9	280.3	405
558	217.0	290.1	380.1	361.7	148.8	279.5	405
559	216.7	290.1	379.4	361.2	148.6	279.2	402
560	217.1	290.7	378.9	360.5	148.5	279.1	402
561	215.8	290.6	378.3	359.8	148.3	278.6	400
562	215.5	291.2	377.7	358.9	148.1	278.3	399
563	215.3	292.3	377.1	358.3	147.9	278.2	398
564	215.4	292.3	376.6	357.6	147.7	277.9	396
565	214.7	291.5	376.0	356.9	147.5	277.3	395
566	214.8	291.5	375.4	356.0	147.2	277.0	394
567	214.1	291.9	374.8	355.2	147.0	276.6	394
568	213.5	292.8	374.3	354.5	146.8	276.4	384
569	212.3	292.3	373.7	354.0	146.8	275.8	377
570	212.5	292.7	373.1	353.2	146.4	275.6	373
571	211.6	292.7	372.5	352.4	146.2	275.1	370
572	211.3	292.1	371.9	351.7	146.0	274.6	369
573	210.5	292.0	371.3	351.0	145.9	274.1	367
574	210.7	291.4	370.8	350.4	145.7	273.8	366
575	210.2	291.1	370.2	349.9	145.6	273.4	363
576	210.0	291.5	369.6	349.1	145.6	273.2	363
577	209.1	289.7	368.8	348.6	145.4	272.3	362
578	208.6	289.5	368.4	347.9	145.1	271.9	361
579	208.0	289.0	367.7	347.2	144.9	271.4	361
580	207.7	288.5	367.1	346.4	144.7	270.9	361
581	208.1	287.7	366.5	346.0	144.7	270.6	359
582	207.5	287.5	365.9	345.3	144.5	270.1	358
583	207.0	287.4	365.2	344.5	144.2	269.7	356
584	206.5	287.0	364.6	344.1	144.1	269.3	355
585	206.1	287.3	364.0	343.3	144.0	268.9	354
586	206.6	287.7	363.5	342.6	143.9	268.9	353
587	205.9	287.5	362.8	342.1	143.7	268.4	353
588	205.5	287.7	362.2	341.2	143.5	268.0	352
589	204.7	287.7	361.7	340.6	143.2	267.6	352
590	204.5	287.6	361.1	340.0	143.1	267.3	351
591	204.3	286.8	360.5	339.5	143.0	266.8	351
592	204.5	286.1	360.1	338.9	142.6	266.4	351
593	204.1	285.4	359.6	338.4	142.6	266.0	351
594	202.8	284.7	359.1	337.8	142.2	265.3	351
595	203.3	284.1	358.6	337.3	142.1	265.1	352
596	202.7	283.0	358.1	336.8	141.8	264.5	351
597	202.5	283.2	357.6	336.4	141.7	264.3	350
598	202.3	283.3	357.1	335.6	141.4	263.9	351
599	202.0	282.5	356.6	335.1	141.3	263.5	351

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
600	201.8	281.6	356.2	334.8	141.2	263.1	353
601	201.9	280.9	355.7	334.2	140.8	262.7	353
602	202.0	279.7	355.3	333.6	140.5	262.2	353
603	201.6	279.7	354.9	333.2	140.5	262.0	351
604	201.5	279.3	354.5	332.8	140.3	261.7	351
605	201.0	279.2	354.1	332.2	140.0	261.3	351
606	201.3	279.2	353.7	331.8	139.8	261.2	350
607	200.4	278.3	353.3	331.5	139.7	260.6	351
608	200.1	277.8	352.9	331.1	139.5	260.3	352
609	199.9	278.1	352.3	330.4	139.3	260.0	353
610	200.7	278.0	352.3	330.0	139.1	260.0	354
611	199.5	277.6	351.9	329.7	138.9	259.5	353
612	200.2	277.3	351.5	329.3	138.8	259.4	352
613	199.6	277.1	351.2	328.8	138.5	259.0	352
614	199.4	277.0	350.9	328.4	138.3	258.8	353
615	199.6	277.5	350.5	328.0	138.2	258.8	355
616	199.1	277.8	350.2	327.4	137.9	258.5	354
617	199.8	278.5	349.9	327.1	137.8	258.6	354
618	199.2	278.3	349.6	326.9	137.7	258.3	355
619	198.8	278.2	349.2	326.5	137.4	258.0	355
620	199.4	279.0	349.0	326.0	137.3	258.1	354
621	199.2	278.7	348.7	325.8	137.2	257.9	355
622	198.6	278.5	348.4	325.4	137.1	257.6	353
623	199.0	278.1	348.1	325.2	136.8	257.4	354
624	199.1	279.0	347.9	324.8	136.6	257.5	355
625	198.8	278.9	347.7	324.4	136.5	257.3	354
626	198.8	279.2	347.4	324.2	136.3	257.2	354
627	198.7	279.3	347.2	323.7	136.2	257.0	354
628	198.2	278.8	347.0	323.6	135.9	256.7	354
629	198.0	278.9	346.8	323.0	135.8	256.5	353
630	198.2	278.7	346.6	322.9	135.7	256.4	351
631	198.2	279.3	346.4	322.5	135.6	256.4	351
632	198.1	281.2	346.2	322.1	135.4	256.6	352
633	197.7	281.8	346.0	321.8	135.2	256.5	352
634	197.7	282.0	345.8	321.4	135.1	256.4	351
635	197.4	281.8	345.6	321.3	135.0	256.2	350
636	197.8	281.4	345.4	321.0	134.9	256.1	352
637	197.1	281.5	345.2	320.7	134.7	255.8	351
638	197.1	282.1	345.1	320.2	134.7	255.8	351
639	197.0	281.8	345.0	319.8	134.6	255.6	351
640	197.3	281.3	344.8	319.7	134.4	255.5	351
641	197.2	281.1	344.7	319.3	134.2	255.3	352
642	197.2	280.5	344.5	319.0	134.1	255.1	352
643	197.1	280.6	344.4	318.5	134.0	254.9	352
644	197.2	280.2	344.3	318.3	134.0	254.8	353
645	196.9	279.7	344.0	318.1	133.8	254.5	352
646	197.3	280.0	343.9	317.7	133.5	254.5	351
647	196.7	279.4	343.8	317.3	133.5	254.1	352
648	196.9	278.1	343.6	317.0	133.5	253.8	351
649	196.1	277.5	343.6	316.6	133.2	253.4	351

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
650	196.9	276.9	343.4	316.5	133.2	253.4	353
651	196.9	276.5	343.3	316.1	133.0	253.2	352
652	196.2	276.3	343.2	315.9	133.0	252.9	351
653	196.1	275.9	343.1	315.7	132.9	252.7	351
654	195.9	275.8	343.0	315.3	132.8	252.6	351
655	195.5	275.2	342.9	315.2	132.7	252.3	351
656	195.1	275.5	342.7	314.9	132.5	252.1	351
657	195.8	275.1	342.6	314.7	132.6	252.2	351
658	195.4	275.1	342.5	314.2	132.3	251.9	350
659	195.8	275.0	342.4	313.9	132.3	251.9	350
660	195.5	274.8	342.3	313.5	132.2	251.7	351
661	195.1	274.2	342.2	313.3	132.1	251.4	352
662	195.7	273.9	342.1	313.0	132.1	251.4	351
663	195.7	273.4	341.9	312.8	131.9	251.1	351
664	195.5	274.0	341.8	312.3	131.9	251.1	351
665	195.5	273.4	341.7	312.3	131.9	251.0	351
666	195.3	273.2	341.6	311.8	131.6	250.7	351
667	195.1	272.7	341.4	311.5	131.7	250.5	350
668	195.6	272.6	341.4	311.2	131.6	250.5	351
669	195.4	272.2	341.2	310.9	131.4	250.2	349
670	194.9	271.8	341.1	310.5	131.4	249.9	350
671	194.7	271.3	341.0	310.3	131.3	249.7	349
672	194.8	271.1	340.8	310.0	131.1	249.6	348
673	194.7	270.9	340.7	309.9	131.3	249.5	348
674	194.3	270.4	340.5	309.8	131.2	249.2	348
675	194.8	270.4	340.3	309.2	131.1	249.2	349
676	194.7	270.5	340.3	309.0	131.1	249.1	348
677	195.2	270.5	340.2	309.0	131.1	249.2	348
678	194.5	270.7	340.0	308.5	131.0	248.9	348
679	195.0	270.4	339.9	308.1	130.9	248.9	349
680	194.3	270.2	339.7	308.0	130.9	248.6	348
681	194.0	270.3	339.5	307.6	130.8	248.4	348
682	194.4	269.7	339.4	307.4	130.9	248.4	348
683	194.2	269.6	339.2	307.0	130.6	248.1	347
684	194.2	269.9	339.0	306.7	130.7	248.1	347
685	194.1	270.1	338.6	306.4	130.6	248.0	347
686	193.6	269.8	338.7	306.0	130.5	247.7	346
687	193.8	269.1	338.5	305.8	130.5	247.5	346
688	193.2	269.2	338.5	305.4	130.3	247.3	346
689	193.9	268.8	338.2	305.1	130.5	247.3	347
690	193.7	268.5	338.0	304.7	130.4	247.1	346
691	192.8	269.2	337.8	304.4	130.2	246.9	346
692	193.4	268.6	337.7	304.1	130.2	246.8	346
693	193.5	268.3	337.4	303.7	130.1	246.6	346
694	193.1	267.5	337.3	303.7	130.1	246.3	346
695	192.9	267.3	337.1	303.3	129.9	246.1	346
696	193.0	266.7	336.9	303.1	130.0	245.9	345
697	193.6	266.4	336.8	302.6	130.0	245.9	344
698	192.6	265.7	336.5	302.3	129.9	245.4	345
699	193.0	265.3	336.3	302.0	130.0	245.3	344

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
700	192.9	264.3	336.2	301.9	130.0	245.1	344
701	192.9	264.2	335.9	301.5	129.9	244.9	344
702	192.7	264.0	335.8	301.2	129.9	244.7	345
703	192.6	263.8	335.7	300.9	129.9	244.6	343
704	192.5	263.4	335.4	300.8	129.9	244.4	343
705	192.2	263.2	335.2	300.6	129.8	244.2	344
706	192.5	263.0	334.9	300.2	129.7	244.1	344
707	192.3	262.6	334.8	300.0	129.6	243.9	344
708	191.9	262.6	334.5	299.6	129.6	243.6	344
709	191.9	262.5	334.4	299.4	129.4	243.5	345
710	191.8	262.4	334.1	298.9	129.3	243.3	345
711	192.0	261.9	333.8	298.9	129.4	243.2	345
712	191.5	262.0	333.7	298.5	129.3	243.0	344
713	192.1	262.3	333.5	298.2	129.2	243.1	343
714	191.2	262.4	333.3	297.9	129.2	242.8	344
715	191.5	262.2	333.2	297.7	129.2	242.8	344
716	191.1	262.2	332.6	297.5	129.2	242.5	344
717	191.5	261.9	332.6	297.1	129.2	242.5	344
718	191.8	261.6	332.5	296.8	129.2	242.4	344
719	190.7	261.7	332.3	296.8	129.1	242.1	345
720	191.4	262.3	332.3	296.4	129.0	242.3	344
721	191.2	262.2	332.1	296.3	129.0	242.2	344
722	191.6	261.8	331.6	296.0	128.9	242.0	345
723	191.4	261.4	331.5	295.9	129.1	241.9	344
724	191.2	261.2	331.6	295.5	129.0	241.7	345
725	191.9	261.0	331.4	295.3	128.9	241.7	346
726	191.3	261.0	331.3	295.0	128.8	241.5	345
727	191.6	260.6	331.1	294.9	128.8	241.4	344
728	191.4	260.4	331.0	294.7	128.8	241.3	344
729	191.6	260.3	330.9	294.3	128.5	241.1	344
730	191.3	260.4	330.8	293.8	128.5	241.0	343
731	191.5	260.1	330.8	293.7	128.6	240.9	344
732	191.2	259.8	330.7	293.3	128.6	240.7	344
733	191.8	259.7	330.7	292.8	128.4	240.7	344
734	191.1	259.3	330.7	292.5	128.4	240.4	345
735	191.9	258.8	330.6	292.3	128.3	240.4	344
736	191.2	258.7	330.4	292.1	128.4	240.2	344
737	192.3	259.1	330.4	291.6	128.7	240.4	344
738	192.5	258.3	330.6	291.4	128.7	240.3	342
739	191.2	258.4	330.7	291.2	128.7	240.0	343
740	192.1	258.1	331.0	291.0	128.6	240.2	345
741	191.7	258.3	331.1	290.6	128.5	240.0	345
742	191.9	257.8	331.2	290.3	128.5	239.9	345
743	191.4	257.2	331.2	290.2	128.4	239.7	345
744	191.4	257.3	331.4	289.8	128.2	239.6	345
745	190.9	256.7	331.4	289.8	128.3	239.4	344
746	191.5	257.0	331.6	289.3	128.0	239.5	345
747	191.4	256.7	331.7	289.2	127.9	239.4	345
748	191.0	256.5	331.7	288.9	127.9	239.2	345
749	191.1	256.2	331.9	288.8	127.8	239.2	345

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
750	191.2	256.3	332.0	288.5	127.6	239.1	345
751	191.1	256.1	332.2	288.3	127.7	239.1	346
752	191.3	255.9	332.3	288.2	127.7	239.1	345
753	191.1	255.5	332.4	288.0	127.6	238.9	345
754	191.3	255.4	332.6	287.8	127.6	238.9	344
755	191.2	255.5	332.8	287.5	127.5	238.9	345
756	191.2	255.1	333.0	287.4	127.6	238.9	346
757	190.9	255.2	333.2	287.2	127.5	238.8	344
758	190.0	255.0	333.3	287.0	127.5	238.6	344
759	190.4	254.7	333.5	286.8	127.5	238.6	344
760	190.5	254.5	333.7	286.9	127.3	238.6	345
761	190.6	254.6	333.8	286.5	127.3	238.6	344
762	190.4	254.6	334.0	286.2	127.1	238.5	345
763	190.7	254.4	334.1	286.1	127.1	238.5	344
764	190.6	253.9	334.4	286.1	127.1	238.4	344
765	191.0	254.0	334.5	285.9	127.2	238.5	344
766	190.0	253.8	334.6	285.9	127.1	238.3	343
767	190.3	253.6	334.8	285.6	127.0	238.3	343
768	189.6	253.6	335.0	285.5	127.0	238.1	343
769	189.9	253.6	335.1	285.5	127.0	238.2	343
770	189.5	253.5	335.3	285.3	126.9	238.1	343
771	189.8	253.3	335.5	285.1	127.1	238.2	343
772	189.4	253.3	335.6	284.9	127.0	238.0	343
773	189.9	252.9	335.8	284.9	126.9	238.1	343
774	189.4	252.8	335.9	284.9	126.9	238.0	343
775	189.5	252.9	336.0	284.7	126.9	238.0	342
776	189.1	252.9	336.2	284.4	126.9	237.9	342
777	189.1	252.4	336.3	284.3	126.8	237.8	342
778	189.0	252.6	336.4	284.1	126.9	237.8	341
779	189.1	252.3	336.5	284.1	126.9	237.8	341
780	189.4	252.4	336.7	284.0	126.9	237.9	342
781	188.8	252.1	336.8	283.9	126.7	237.7	342
782	188.6	251.9	336.9	283.9	126.8	237.6	342
783	189.0	251.9	337.1	283.8	126.8	237.7	341
784	189.0	251.8	337.2	283.5	126.7	237.6	341
785	188.5	251.6	337.3	283.6	126.8	237.6	341
786	189.1	251.9	337.5	283.3	126.7	237.7	341
787	188.2	251.4	337.6	283.4	126.8	237.5	341
788	188.6	251.4	337.6	283.4	126.7	237.5	341
789	188.5	251.6	337.8	283.1	126.6	237.5	340
790	188.5	251.4	337.9	282.9	126.7	237.5	341
791	188.1	251.2	338.0	282.8	126.6	237.3	341
792	188.3	251.0	338.1	283.0	126.7	237.4	341
793	187.7	251.1	338.3	282.8	126.6	237.3	340
794	187.8	250.9	338.3	282.8	126.6	237.3	339
795	187.5	251.0	338.4	282.7	126.5	237.2	340
796	188.2	250.8	338.4	282.6	126.6	237.3	339
797	188.0	250.9	338.6	282.4	126.6	237.3	341
798	187.9	250.9	338.6	282.3	126.4	237.2	340
799	188.4	250.7	338.7	282.2	126.5	237.3	340

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
800	187.9	250.6	338.8	282.2	126.3	237.2	339
801	188.4	250.7	338.9	282.1	126.3	237.3	338
802	187.6	250.5	338.8	282.2	126.4	237.1	339
803	187.8	250.3	339.0	282.0	126.2	237.1	339
804	187.6	250.6	339.2	281.8	126.2	237.1	339
805	187.7	250.4	339.2	281.9	126.1	237.1	339
806	187.6	250.3	339.4	281.9	126.2	237.1	339
807	187.9	250.2	339.4	281.8	126.3	237.1	338
808	187.9	250.5	339.5	281.6	126.1	237.1	338
809	188.0	250.1	339.5	281.7	126.0	237.1	338
810	187.6	250.3	339.6	281.4	126.0	237.0	338
811	186.7	250.1	339.7	281.3	125.9	236.7	337
812	186.8	249.8	339.7	281.5	126.0	236.8	337
813	187.3	249.7	339.8	281.3	125.9	236.8	337
814	187.1	249.6	339.9	281.2	125.9	236.7	338
815	186.9	250.0	340.1	281.0	125.7	236.7	338
816	186.0	249.7	340.1	281.1	125.9	236.6	337
817	186.1	249.9	340.3	280.8	125.7	236.6	338
818	186.7	249.5	340.2	281.0	125.7	236.6	337
819	186.7	249.7	340.4	280.7	125.6	236.6	336
820	186.5	249.8	340.5	280.6	125.6	236.6	336
821	186.5	249.5	340.6	280.8	125.6	236.6	336
822	186.4	249.5	340.7	280.7	125.4	236.5	336
823	186.3	249.7	340.8	280.4	125.4	236.5	335
824	186.2	249.5	340.9	280.5	125.4	236.5	335
825	186.2	249.4	341.0	280.4	125.3	236.5	336
826	186.1	249.5	341.1	280.3	125.4	236.5	335
827	185.7	249.4	341.1	280.1	125.3	236.3	335
828	185.7	249.5	341.4	280.1	125.2	236.4	335
829	185.5	249.5	341.4	279.9	125.3	236.3	335
830	185.8	249.4	341.6	279.9	125.2	236.4	336
831	185.5	249.2	341.6	279.9	125.1	236.3	335
832	185.6	249.3	341.8	279.9	125.0	236.3	335
833	185.2	249.3	341.7	279.7	125.1	236.2	335
834	184.7	249.4	342.0	279.6	125.0	236.1	335
835	185.4	249.2	342.1	279.8	125.0	236.3	336
836	185.2	249.3	342.3	279.6	125.0	236.3	335
837	185.6	249.1	342.5	279.7	124.9	236.4	335
838	185.6	249.1	342.6	279.4	124.8	236.3	335
839	185.1	249.1	342.8	279.6	124.7	236.3	334
840	185.2	249.1	343.0	279.2	124.7	236.2	336
841	185.6	249.0	343.0	279.2	124.7	236.3	335
842	185.5	249.0	343.2	279.1	124.6	236.3	335
843	185.6	249.0	343.4	279.2	124.6	236.4	336
844	185.3	248.9	343.6	279.0	124.4	236.2	336
845	184.9	248.7	343.8	279.1	124.4	236.2	336
846	184.8	248.8	344.1	279.1	124.3	236.2	335
847	185.2	248.9	344.3	279.0	124.4	236.4	334
848	185.0	248.7	344.5	278.9	124.3	236.3	335
849	184.8	248.5	344.6	279.1	124.3	236.3	334

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
850	184.8	248.4	345.0	279.0	124.2	236.3	334
851	184.5	248.5	345.1	278.9	124.1	236.2	334
852	184.3	248.3	345.3	278.8	124.2	236.2	334
853	184.1	248.1	345.4	278.8	124.0	236.1	334
854	184.5	248.2	345.6	278.6	123.9	236.2	333
855	184.7	248.1	345.8	278.7	124.0	236.3	334
856	184.8	248.3	345.8	278.4	123.8	236.2	334
857	184.7	248.2	346.0	278.4	123.9	236.2	333
858	184.9	248.3	346.1	278.3	123.7	236.3	333
859	183.8	248.2	346.1	278.3	123.8	236.0	332
860	184.1	248.3	346.1	278.4	123.6	236.1	332
861	184.2	248.3	346.1	278.1	123.7	236.1	332
862	183.5	248.2	346.0	278.0	123.5	235.8	331
863	183.8	248.1	346.2	278.0	123.6	235.9	331
864	184.2	248.3	346.3	277.8	123.3	236.0	331
865	183.4	248.1	346.2	277.8	123.4	235.8	331
866	183.6	248.3	346.1	277.5	123.3	235.8	330
867	183.7	248.1	346.1	277.4	123.3	235.7	330
868	183.9	248.0	346.2	277.2	123.3	235.7	330
869	183.4	248.0	346.2	277.3	123.1	235.6	330
870	183.0	247.8	346.2	277.2	123.1	235.5	329
871	183.3	247.7	346.2	277.1	123.0	235.5	328
872	182.6	247.6	346.1	277.0	123.0	235.3	329
873	182.6	247.8	346.1	276.7	123.0	235.2	328
874	182.6	247.6	345.9	276.7	122.9	235.1	327
875	182.4	247.6	345.9	276.5	122.9	235.1	326
876	182.1	247.6	345.9	276.3	122.8	234.9	326
877	182.0	247.4	345.8	276.3	123.0	234.9	326
878	182.1	247.2	345.6	276.3	122.8	234.8	325
879	181.9	247.1	345.6	276.1	122.8	234.7	325
880	181.7	247.4	345.6	275.9	122.7	234.7	325
881	181.8	247.2	345.4	275.8	122.8	234.6	323
882	180.6	247.0	345.3	275.8	122.7	234.3	323
883	180.6	247.0	345.3	275.7	122.6	234.2	322
884	180.9	247.1	345.1	275.6	122.5	234.2	321
885	180.1	246.9	344.8	275.5	122.6	234.0	321
886	180.6	247.0	344.9	275.4	122.6	234.1	320
887	180.0	247.0	344.7	275.3	122.5	233.9	319
888	180.4	246.8	344.4	275.2	122.4	233.8	318
889	180.4	246.8	344.5	275.2	122.5	233.9	317
890	179.9	246.8	344.4	275.0	122.4	233.7	315
891	179.6	246.7	344.3	274.8	122.4	233.6	312
892	178.4	246.6	344.0	274.7	122.3	233.2	311
893	178.7	246.5	344.1	274.7	122.3	233.3	310
894	178.2	246.4	344.0	274.6	122.2	233.1	308
895	178.4	246.4	343.9	274.4	122.2	233.1	308
896	178.4	246.4	343.7	274.3	122.2	233.0	307
897	177.6	246.5	343.7	274.0	122.1	232.8	307
898	177.6	246.1	343.6	274.1	122.1	232.7	307
899	177.4	246.3	343.5	273.9	121.9	232.6	307

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
900	177.2	246.1	343.5	273.8	122.0	232.5	308
901	176.6	246.1	343.4	273.6	121.8	232.3	310
Average	285.0	283.6	355.1	340.8	141.1	281	628

LAB SAMPLE DATA - ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 2

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/16/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	H00186	182.7	184.9	2.2
	B	H00187	191.6	194.0	2.4
	C - 1st Hour	H00188	187.7	188.3	0.6
	Amb	H00189	186.3	186.3	0.0
Probes	**A**	3A	115882.0	115882.1	0.1
	B	3B	116122.2	116122.2	0.0
	C - 1st Hour	3C	116619.7	116619.8	0.1
O-rings	**A**	3A	3577.6	3577.7	0.1
	B	3B	3565.9	3566.0	0.1
	C - 1st Hour	3C	3620.4	3620.5	0.1

Placed in Dessicator on:	7/17/2025

Audit		200.0	7/23 12:30	200.0	7/25 16:00				
Filters	**A**	184.9	7/23 12:30	184.9	7/25 16:00				
	B	194.1	7/23 12:30	194.0	7/25 16:00				
	C - 1st Hour	188.4	7/23 12:30	188.3	7/25 16:00				
	Amb	186.3	7/23 12:30	186.3	7/25 16:00				
Probes	**A**	115882.1	7/23 12:30	115882.1	7/25 16:00				
	B	116122.2	7/23 12:30	116122.2	7/25 16:00				
	C - 1st Hour	116619.7	7/23 12:30	116619.8	7/25 16:00				
O-Rings	**A**	3577.7	7/23 12:30	3577.7	7/25 16:00				
	B	3565.9	7/23 12:30	3566.0	7/25 16:00				
	C - 1st Hour	3620.5	7/23 12:30	3620.5	7/25 16:00				

Train A Aggregate, mg:	**2.4**
Train B Aggregate, mg:	**2.5**
Train C Aggregate, mg:	**0.8**
Ambient Aggregate, mg:	**0.0**

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications | Job Number: 24-282 | Tracking #: 225
Model: VCV | Run Number: 2 | Test Date: 7/17/2025

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: 8:45
Air Control Setting: Fully Closed

Time	Notes
	-None-

Test Notes
Test Burn Start Time: 9:06
Air Control Setting: Fully Closed

Time	Notes
0:40	Test Fuel Loaded
1:00	Closed Door
2:00	Closed Bypass
15:00	Set air to test setting

Test Burn End Time: 7/18 00:07

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	4:25	4:27	4:29	7/18 10:05	7/18 10:06	7/18 10:07
CO_2	0.12	17.35	10.45	0.08	17.45	10.23
CO	-0.007	4.420	2.509	-0.008	4.390	2.536

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

Technician Signature:  Date: 12/22/25

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications | Job Number: 24-282 | Tracking #: 225
Model: VCV | Run Number: 2 | Test Date: 7/17/2025

Test Photos



Low Fire Fuel Load



Low Fire Fuel Loaded



Air Setting

Technician Signature: _____ Date: 12/22/25

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515



Run 3 Data Summary

Client:	509 Fabrication
Model:	VCV
Job #:	24-282
Tracking #:	225
Test Date:	7/18/2025

Technician Signature — Date: 9/4/2025

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

Burn Rate (kg/hr):	2.43

	Ambient Sample	Sample Train A	Sample Train B	Sample Train C - 1st Hour
Total Sample Volume (ft^3)	55.954	35.900	37.304	9.235
Average Gas Velocity in Dilution Tunnel (ft/sec)	20.02			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	53070.4			
Average Gas Meter Temperature (°F)	80.1	95.8	95.3	83.7
Total Sample Volume (dscf)	55.274	34.265	35.828	8.931
Average Tunnel Temperature (°F)	91.1			
Total Time of Test (min)	243			
Total Particulate Catch (mg)	0.1	1.6	1.7	0.7
Particulate Concentration, dry-standard (g/dscf)	0.0000018	0.0000467	0.0000474	0.0000784
Total PM Emissions (g)	0.39	9.65	9.81	4.06
Particulate Emission Rate (g/hr)	0.10	2.38	2.42	4.06
Emissions Factor (g/kg)	-	0.93	0.95	-
Difference from Average Total Particulate Emissions (g)	-	0.08	0.08	-
Difference from Average Total Particulate Emissions (%)	-	0.8%	0.8%	-
Difference from Average Emissions Factor (g/kg)	-	0.01	0.01	-

Final Average Results	
Total Particulate Emissions (g)	9.73
Particulate Emission Rate (g/hr)	2.40
Emissions Factor (g/kg)	0.94
HHV Efficiency (%)	77.1%
LHV Efficiency (%)	82.5%
CO Emissions (g/min)	1.31

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: 82.4/Max: 86.4	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:75.9/Max:82.7	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	All but 1 reading between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	509 Fabrication
Model:	VCV
Date:	07/18/25
Run:	3
Control #:	24-282
Test Duration:	180
Output Category:	High

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	77.1%	82.5%
Combustion Efficiency	97.9%	97.9%
Heat Transfer Efficiency	78.7%	84.2%

Output Rate (kJ/h)	38,371	36,399	**(Btu/h)**
Burn Rate (kg/h)	2.49	5.49	**(lb/h)**
Input (kJ/h)	49,759	47,201	**(Btu/h)**

Test Load Weight (dry kg)	7.48	16.48	**dry lb**
MC wet (%)	18.60		
MC dry (%)	22.85		
Particulate (g)	9.73		
CO (g)	235		
Test Duration (h)	3.00		

Emissions	**Particulate**	**CO**
g/MJ Output	0.08	2.04
g/kg Dry Fuel	1.30	31.42
g/h	3.24	78.33
g/min	0.05	1.31
lb/MM Btu Output	0.20	4.74

Air/Fuel Ratio (A/F)	10.54

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

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: 509 Fabrication
Job #: 24-282
Model: VCV
Tracking #: 225
Run #: 3
Technician: AK
Date: 7/18/2025

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.18		
Target Load Weight (lbs):	21.80		
Total Load Weight Range (lbs):	20.70	to	22.90
Core Load Weight Range (lbs):	9.80	to	14.20
Remainder Load Weight Range (lbs):	7.60	to	12.00
Core Load Piece Range (lbs):	3.30	to	5.50
Remainder Load Piece Range (lbs):	2.20	to	12.00
Max Allowable Kindling Weight (lbs):	4.55		
Max Allowable Start-up Fuel Weight (lbs):	6.82		

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	18.00	5.38	In Range	21.2	18.7	19.5	19.8	In Range	4.49	2.04
2	18.00	4.45	In Range	20.0	25.2	21.6	22.3	In Range	3.64	1.65
3	18.00	4.26	In Range	21.2	25.7	24.7	23.9	In Range	3.44	1.56
Core Load Wt. (lbs)		14.09	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	18.00	8.65	In Range	25.8	25.4	22.7	24.6	In Range	6.94	3.15
2			NA			0.0	NA	NA	NA	NA
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		8.65	In Range							

Total Load Weight (lbs):	22.74	In Range	
Core Load % of Total Weight:	62%	In Range	45-65%
Remainder % of Total Weight:	38%	In Range	35-55%
Total Load % of Target Weight:	104%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	10.4		
Total Load Average Moisture Content (%DB):	22.9	In Range	19-25%
Total Load Average Moisture Content (%WB):	18.6		
Total Test Load Weight (dry basis):	18.51 lbs	8.40 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
4.30	In Range	10	10	10	10.0	In Range	3.91	1.77

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
6.30	In Range	21.9	20.3	18.6	20.3	In Range	5.24	2.38

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.3	to	4.5	
Actual Residual Start-up Fuel Weight (lb):		2.45		In Range

TEST END POINT

High Fire Test Run End Point Range:	2.0	to	2.5	lb
Actual Fuel Load Ending Weight (lb):		2.45		In Range

Total Weight All Fuel Added: 33.34 lbs, wet basis
27.66 lbs, dry basis
12.55 kg, dry basis

Total Weight All Fuel Burned (dry basis): 22.76 lbs
10.32 kg

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	3	Technician:	AK
Test Start Time:	13:37	Date:	7/18/2025
Test Type:	High Fire		

Recording Interval (min):	1
Total Sampling Time (min):	243
High Fire Test Load Time (min):	63

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.83	29.94	29.89
Relative Humidity (%)	41.3	36.0	
Room Air Velocity (ft/min)	<50	<50	
Platform Scale Audit (lbs)	10.0	10.0	
Fuel Scale Audit (lbs)	10.00	10.00	
Ambient Sample Volume:		55.954	ft^3

Meter Box γ Factor:	1.004 (A)
Meter Box γ Factor:	1.009 (B)
Meter Box γ Factor:	0.997 (C)
Meter Box γ Factor:	1.012 (Ambient)
Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100
Date Flue Pipe Last Cleaned:	7/31/2025

Sample Train Post-Test Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-7 in. Hg
(B)	0.000	0.000	cfm @	-7 in. Hg
(C)	0.000	0.000	cfm @	-7 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.067	75
2	0.089	75
3	0.104	75
4	0.109	75
5	0.094	75
6	0.057	75
7	0.079	76
8	0.099	76
9	0.112	76
10	0.108	76
11	0.100	76
12	0.072	76
Center	0.111	76

Static Pressure: -0.156 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	12	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:	0.7854	ft^2
V_{strav}:	20.06	ft/sec
V_{scent}:	22.29	ft/sec
F_p:	0.900	[ratio]
Initial Tunnel Flow:	910.4	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, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Int. West)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Int. 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
	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 Long Leaf	52.60	7.02	40.10	1.30	22.30	9594

WOODSTOVE PREBURN DATA

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	3	Technician:	AK
		Date:	7/18/2025

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

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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	-0.001		0.108	0.01	77.8	-0.28		10.62		79.4	78.5	84.6	76.0
1	0.129	0.130	0.109	1.04	79.0	-1.11	-	10.49	-0.13	79.8	129.7	84.5	75.9
2	0.283	0.154	0.108	1.03	79.2	-1.08	-	10.24	-0.25	83.9	320.1	84.9	76.2
3	0.436	0.153	0.109	1.02	79.3	-1.08	-	10.25	0.01	83.4	346.0	84.9	76.1
4	0.590	0.154	0.108	1.02	79.4	-1.03	-	10.04	-0.21	83.2	349.9	84.8	76.1
5	0.743	0.153	0.107	1.00	79.6	-0.98	-	9.88	-0.16	83.2	360.1	84.8	76.1
6	0.894	0.151	0.108	1.00	79.8	-1.00	-	9.71	-0.17	83.7	375.0	84.7	76.1
7	1.047	0.153	0.108	1.00	80.0	-1.08	-	9.50	-0.21	84.2	392.4	84.4	76.1
8	1.198	0.151	0.106	1.00	80.2	-0.99	-	9.32	-0.18	84.8	406.2	84.7	76.1
9	1.349	0.151	0.109	1.00	80.2	-1.09	-	9.12	-0.20	85.2	416.1	84.8	76.1
10	1.500	0.151	0.110	0.98	80.6	-1.04	103	8.95	-0.17	85.6	425.0	84.9	76.1
11	1.650	0.150	0.108	1.00	80.8	-1.12	-	8.80	-0.15	85.9	432.4	84.8	76.2
12	1.800	0.150	0.106	0.98	81.2	-1.15	-	8.66	-0.14	86.0	432.6	84.7	76.1
13	1.950	0.150	0.107	1.00	81.3	-1.10	-	8.51	-0.15	86.0	428.5	84.8	76.0
14	2.099	0.149	0.109	0.98	81.5	-1.16	-	8.37	-0.14	86.8	429.7	84.6	76.1
15	2.248	0.149	0.108	0.99	81.7	-1.13	-	8.20	-0.17	87.0	436.6	84.7	76.1
16	2.397	0.149	0.107	0.98	82.1	-1.09	-	8.02	-0.18	87.2	446.4	84.7	76.2
17	2.546	0.149	0.108	0.97	82.4	-1.16	-	7.85	-0.17	87.9	451.2	84.8	76.5
18	2.692	0.146	0.109	0.98	82.6	-1.17	-	7.69	-0.16	87.9	455.6	84.9	77.2
19	2.841	0.149	0.111	0.98	82.9	-1.12	-	7.52	-0.17	87.9	457.2	84.7	77.1
20	2.990	0.149	0.110	0.97	83.4	-1.24	102	7.38	-0.14	88.5	459.4	84.8	77.2
21	3.139	0.149	0.109	0.96	83.8	-1.15	-	7.23	-0.15	89.3	459.3	84.9	77.1
22	3.288	0.149	0.109	0.97	83.7	-1.17	-	7.05	-0.18	89.5	463.4	84.9	77.3
23	3.436	0.148	0.110	0.98	84.1	-1.19	-	6.88	-0.17	89.2	464.2	84.6	77.3
24	3.588	0.152	0.106	0.97	84.2	-1.21	-	6.75	-0.13	89.0	464.4	84.8	77.6
25	3.736	0.148	0.106	0.97	84.5	-1.20	-	6.58	-0.17	89.4	472.0	84.9	77.4
26	3.885	0.149	0.109	0.96	85.0	-1.34	-	6.43	-0.15	90.4	473.8	84.8	77.5
27	4.034	0.149	0.108	0.96	85.2	-1.35	-	6.27	-0.16	90.7	475.0	84.8	77.6
28	4.182	0.148	0.109	0.97	85.7	-1.31	-	6.12	-0.15	90.9	469.0	84.7	77.7
29	4.331	0.149	0.107	0.97	85.8	-1.34	-	5.97	-0.15	91.5	467.4	84.8	77.7
30	4.479	0.148	0.106	0.97	85.8	-1.38	103	5.83	-0.14	91.0	466.3	84.8	77.9
31	4.622	0.143	0.109	0.97	86.0	-1.31	-	5.68	-0.15	90.2	465.2	84.9	77.8
32	4.770	0.148	0.107	0.97	86.6	-1.30	-	5.53	-0.15	90.4	463.1	84.7	77.7
33	4.918	0.148	0.106	0.97	86.7	-1.38	-	5.40	-0.13	91.4	463.3	84.7	77.8

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
34	5.067	0.149	0.108	0.95	87.1	-1.43	-	5.26	-0.14	91.8	460.8	85.0	78.0
35	5.215	0.148	0.108	0.96	87.4	-1.45	-	5.12	-0.14	91.4	460.5	85.1	77.9
36	5.363	0.148	0.109	0.97	87.4	-1.38	-	5.01	-0.11	91.1	460.0	84.9	78.4
37	5.511	0.148	0.107	0.97	87.8	-1.46	-	4.88	-0.13	91.6	460.4	84.8	78.4
38	5.659	0.148	0.107	0.97	88.3	-1.35	-	4.76	-0.12	91.5	456.4	85.0	78.5
39	5.807	0.148	0.107	0.96	88.5	-1.46	-	4.63	-0.13	91.2	453.7	84.9	78.6
40	5.955	0.148	0.107	0.97	88.6	-1.39	102	4.53	-0.10	91.5	450.7	85.0	78.7
41	6.103	0.148	0.107	0.97	88.9	-1.41	-	4.43	-0.10	91.4	443.9	85.0	78.6
42	6.251	0.148	0.107	0.97	89.1	-1.39	-	4.33	-0.10	92.7	440.2	85.1	78.6
43	6.399	0.148	0.108	0.96	89.3	-1.43	-	4.23	-0.10	92.4	439.3	85.1	78.6
44	6.546	0.147	0.107	0.97	89.6	-1.56	-	4.12	-0.11	91.3	440.4	84.9	78.4
45	6.694	0.148	0.110	0.96	89.7	-1.56	-	3.99	-0.13	91.6	443.8	84.7	78.4
46	6.842	0.148	0.107	0.96	90.0	-1.46	-	3.91	-0.08	91.6	443.0	84.8	78.5
47	6.990	0.148	0.109	0.95	90.1	-1.48	-	3.80	-0.11	91.2	441.5	84.8	78.5
48	7.138	0.148	0.109	0.96	90.5	-1.53	-	3.67	-0.13	91.5	442.1	85.0	78.6
49	7.285	0.147	0.108	0.96	90.5	-1.60	-	3.58	-0.09	90.2	437.2	85.0	78.5
50	7.433	0.148	0.108	0.96	90.7	-1.58	101	3.49	-0.09	90.0	433.9	84.7	78.5
51	7.581	0.148	0.109	0.96	91.0	-1.50	-	3.38	-0.11	91.2	438.0	84.7	78.6
52	7.729	0.148	0.108	0.96	91.0	-1.52	-	3.28	-0.10	91.4	436.8	84.7	78.5
53	7.876	0.147	0.106	0.95	91.2	-1.64	-	3.17	-0.11	90.8	436.7	84.8	78.4
54	8.024	0.148	0.109	0.94	91.4	-1.67	-	3.08	-0.09	90.7	431.8	84.9	78.4
55	8.172	0.148	0.106	0.96	91.8	-1.64	-	2.99	-0.09	90.4	427.3	84.8	78.3
56	8.320	0.148	0.108	0.96	91.7	-1.74	-	2.90	-0.09	89.9	422.9	85.1	78.2
57	8.468	0.148	0.109	0.96	91.9	-1.71	-	2.83	-0.07	90.8	424.7	85.1	78.3
58	8.616	0.148	0.110	0.95	92.3	-1.70	-	2.74	-0.09	90.5	419.7	84.9	78.7
59	8.764	0.148	0.109	0.97	92.0	-1.72	-	2.66	-0.08	90.0	419.4	84.7	78.7
60	8.912	0.148	0.108	0.96	92.6	-1.73	101	2.59	-0.07	90.5	417.7	84.7	78.9
61	9.059	0.147	0.108	0.96	92.3	-1.64	-	2.52	-0.07	90.4	414.9	84.8	79.0
62	9.207	0.148	0.109	0.96	92.6	-1.65	-	2.45	-0.07	90.2	410.4	85.0	79.0
63	9.355	0.148	0.107	0.94	92.9	-1.74	-	25.05	22.60	98.5	490.0	84.8	79.1
64	9.502	0.147	0.109	0.95	93.2	-1.82	-	24.92	-0.13	94.0	433.9	85.0	79.2
65	9.650	0.148	0.107	0.95	93.1	-1.74	-	24.75	-0.17	92.0	425.6	84.9	79.2
66	9.797	0.147	0.105	0.95	93.2	-1.74	-	24.60	-0.15	91.6	418.4	84.9	79.3
67	9.945	0.148	0.108	0.95	93.4	-1.74	-	24.45	-0.15	91.5	418.3	85.1	79.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
68	10.092	0.147	0.106	0.95	94.0	-1.85	-	24.31	-0.14	91.3	415.0	84.9	79.1
69	10.239	0.147	0.109	0.94	93.8	-1.87	-	24.15	-0.16	91.0	410.8	84.9	78.8
70	10.387	0.148	0.108	0.95	93.8	-1.78	100	24.07	-0.08	90.5	405.0	84.8	78.9
71	10.534	0.147	0.108	0.94	93.8	-1.81	-	23.96	-0.11	90.4	402.2	84.6	78.7
72	10.681	0.147	0.108	0.94	94.3	-1.79	-	23.81	-0.15	90.6	402.0	84.9	78.9
73	10.828	0.147	0.108	0.95	94.3	-1.78	-	23.68	-0.13	90.4	406.7	84.8	78.8
74	10.976	0.148	0.110	0.94	94.4	-1.75	-	23.54	-0.14	90.1	407.4	84.7	78.7
75	11.123	0.147	0.107	0.95	94.3	-1.82	-	23.42	-0.12	90.2	409.5	84.6	78.6
76	11.270	0.147	0.109	0.95	94.1	-1.87	-	23.29	-0.13	90.3	409.5	84.8	78.6
77	11.417	0.147	0.109	0.93	94.1	-1.80	-	23.15	-0.14	90.0	410.9	85.2	78.7
78	11.564	0.147	0.108	0.94	94.4	-1.78	-	23.03	-0.12	89.7	412.9	85.2	78.6
79	11.711	0.147	0.107	0.95	94.8	-1.82	-	22.88	-0.15	89.9	415.2	85.1	78.6
80	11.858	0.147	0.107	0.95	94.6	-1.77	100	22.75	-0.13	90.2	414.8	85.0	78.7
81	12.005	0.147	0.109	0.95	94.9	-1.77	-	22.61	-0.14	90.1	415.1	84.6	78.6
82	12.153	0.148	0.107	0.94	95.1	-1.80	-	22.46	-0.15	90.4	415.9	84.7	78.9
83	12.300	0.147	0.109	0.95	95.1	-1.90	-	22.27	-0.19	90.6	416.8	84.7	79.2
84	12.447	0.147	0.109	0.94	95.2	-1.89	-	22.13	-0.14	90.4	416.4	85.1	79.4
85	12.594	0.147	0.111	0.95	95.5	-1.80	-	22.07	-0.06	90.6	416.1	85.2	79.6
86	12.741	0.147	0.108	0.95	95.6	-1.90	-	21.93	-0.14	90.2	419.3	85.3	79.6
87	12.888	0.147	0.108	0.93	95.7	-1.82	-	21.77	-0.16	90.7	423.9	85.5	79.5
88	13.035	0.147	0.107	0.94	95.8	-1.87	-	21.61	-0.16	91.0	425.5	85.5	79.5
89	13.181	0.146	0.107	0.94	95.8	-1.84	-	21.44	-0.17	91.1	430.6	85.5	79.5
90	13.329	0.148	0.108	0.95	95.9	-1.82	100	21.26	-0.18	91.5	434.8	85.4	79.6
91	13.475	0.146	0.109	0.94	96.2	-1.87	-	21.07	-0.19	91.5	438.5	85.3	80.2
92	13.622	0.147	0.108	0.94	96.1	-1.89	-	20.89	-0.18	91.4	445.1	85.0	79.8
93	13.769	0.147	0.109	0.95	96.1	-1.88	-	20.69	-0.20	91.3	453.3	84.9	79.7
94	13.916	0.147	0.108	0.94	96.5	-1.95	-	20.49	-0.20	91.5	454.9	84.8	79.9
95	14.062	0.146	0.108	0.94	96.3	-1.84	-	20.25	-0.24	91.9	458.4	84.9	81.0
96	14.209	0.147	0.107	0.95	96.6	-1.93	-	20.09	-0.16	92.1	460.0	85.2	80.6
97	14.356	0.147	0.109	0.94	96.7	-1.91	-	19.84	-0.25	92.6	460.8	85.4	80.6
98	14.502	0.146	0.109	0.94	96.8	-1.81	-	19.66	-0.18	92.5	462.3	85.5	80.8
99	14.649	0.147	0.107	0.93	97.0	-1.93	-	19.47	-0.19	92.2	463.4	85.5	80.7
100	14.795	0.146	0.107	0.94	97.1	-1.91	99	19.26	-0.21	92.3	464.2	85.8	80.7
101	14.941	0.146	0.108	0.95	97.0	-1.83	-	19.04	-0.22	92.9	465.2	85.9	80.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
102	15.088	0.147	0.107	0.93	97.3	-1.90	-	18.82	-0.22	93.1	462.2	86.1	81.0
103	15.235	0.147	0.109	0.93	97.3	-1.82	-	18.66	-0.16	93.3	463.7	86.2	81.0
104	15.381	0.146	0.109	0.94	97.4	-1.77	-	18.45	-0.21	93.2	465.0	86.2	81.4
105	15.528	0.147	0.106	0.93	97.6	-1.86	-	18.25	-0.20	93.0	465.9	86.4	81.4
106	15.674	0.146	0.106	0.94	97.5	-1.85	-	18.08	-0.17	92.5	468.8	86.0	81.3
107	15.820	0.146	0.107	0.92	97.8	-1.78	-	17.87	-0.21	93.0	468.1	85.9	81.3
108	15.965	0.145	0.106	0.93	97.8	-1.77	-	17.63	-0.24	93.4	468.4	85.7	81.2
109	16.111	0.146	0.106	0.92	97.9	-1.78	-	17.48	-0.15	93.3	469.1	85.8	81.5
110	16.256	0.145	0.108	0.93	97.9	-1.79	99	17.27	-0.21	93.7	469.9	85.7	81.3
111	16.402	0.146	0.107	0.93	98.1	-1.84	-	17.06	-0.21	93.8	470.0	85.9	81.4
112	16.547	0.145	0.107	0.92	98.1	-1.86	-	16.86	-0.20	93.8	469.9	86.0	81.2
113	16.693	0.146	0.106	0.92	98.3	-1.84	-	16.66	-0.20	94.1	470.0	86.1	81.1
114	16.838	0.145	0.108	0.92	98.3	-1.77	-	16.46	-0.20	94.1	468.8	86.2	81.2
115	16.983	0.145	0.108	0.91	98.3	-1.80	-	16.25	-0.21	94.3	470.3	86.2	81.2
116	17.129	0.146	0.107	0.92	98.5	-1.79	-	16.05	-0.20	94.4	469.4	86.1	80.8
117	17.275	0.146	0.106	0.92	98.4	-1.78	-	15.84	-0.21	94.6	467.8	85.9	80.9
118	17.420	0.145	0.106	0.91	98.4	-1.77	-	15.66	-0.18	94.6	470.1	86.0	81.2
119	17.564	0.144	0.107	0.91	98.4	-1.77	-	15.42	-0.24	94.7	468.8	85.9	81.2
120	17.708	0.144	0.107	0.93	98.5	-1.76	98	15.26	-0.16	94.8	469.1	85.9	81.3
121	17.853	0.145	0.107	0.91	98.6	-1.80	-	15.03	-0.23	94.8	468.8	85.9	81.2
122	17.996	0.143	0.107	0.91	98.9	-1.86	-	14.85	-0.18	94.6	469.3	86.0	82.0
123	18.140	0.144	0.108	0.91	98.7	-1.85	-	14.66	-0.19	93.8	470.7	85.9	81.5
124	18.285	0.145	0.107	0.91	98.8	-1.80	-	14.47	-0.19	94.1	467.4	85.9	81.7
125	18.429	0.144	0.106	0.91	98.8	-1.84	-	14.29	-0.18	94.1	468.5	86.2	81.7
126	18.572	0.143	0.107	0.90	98.8	-1.80	-	14.11	-0.18	94.2	467.1	86.1	81.6
127	18.720	0.148	0.105	0.97	99.0	-1.83	-	13.93	-0.18	94.4	465.5	86.2	81.7
128	18.870	0.150	0.106	0.98	99.0	-1.89	-	13.75	-0.18	94.3	465.3	86.2	81.6
129	19.021	0.151	0.108	0.98	98.8	-1.85	-	13.58	-0.17	93.7	463.1	86.0	81.4
130	19.171	0.150	0.107	0.98	98.7	-1.80	99	13.39	-0.19	93.8	462.2	85.8	81.4
131	19.320	0.149	0.108	0.97	98.8	-1.81	-	13.23	-0.16	93.9	457.7	85.9	81.7
132	19.471	0.151	0.108	0.98	99.0	-1.87	-	13.09	-0.14	93.5	458.0	85.9	81.7
133	19.621	0.150	0.107	0.96	98.9	-1.89	-	12.92	-0.17	93.5	456.7	85.7	81.7
134	19.771	0.150	0.107	0.97	99.1	-1.85	-	12.76	-0.16	93.6	457.1	85.7	81.7
135	19.921	0.150	0.107	0.97	99.0	-1.81	-	12.56	-0.20	93.8	454.5	85.5	81.5

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
136	20.072	0.151	0.106	0.96	99.6	-1.91	-	12.42	-0.14	93.9	450.4	85.3	81.6
137	20.221	0.149	0.104	0.97	99.3	-1.91	-	12.33	-0.09	93.6	446.3	85.3	81.6
138	20.372	0.151	0.105	0.96	99.6	-1.81	-	12.21	-0.12	93.3	440.3	85.3	81.6
139	20.522	0.150	0.107	0.98	99.5	-1.92	-	12.08	-0.13	93.5	435.2	85.2	81.4
140	20.671	0.149	0.108	0.96	99.1	-1.84	101	11.95	-0.13	93.6	432.2	85.2	81.3
141	20.820	0.149	0.107	0.97	99.2	-1.92	-	11.83	-0.12	93.9	429.3	85.1	81.3
142	20.969	0.149	0.108	0.97	99.5	-1.89	-	11.68	-0.15	93.7	425.2	85.1	81.3
143	21.119	0.150	0.107	0.97	99.6	-1.94	-	11.58	-0.10	93.3	422.7	84.9	81.3
144	21.269	0.150	0.108	0.97	99.6	-1.95	-	11.46	-0.12	93.5	419.5	84.9	81.5
145	21.419	0.150	0.106	0.97	99.8	-1.92	-	11.36	-0.10	93.3	417.4	85.0	81.5
146	21.569	0.150	0.109	0.95	99.9	-1.97	-	11.25	-0.11	93.3	412.9	85.1	81.5
147	21.718	0.149	0.107	0.96	99.6	-1.97	-	11.12	-0.13	93.2	412.2	85.1	81.6
148	21.868	0.150	0.110	0.96	99.9	-1.91	-	10.97	-0.15	92.9	412.3	85.3	81.7
149	22.018	0.150	0.107	0.96	100.1	-1.92	-	10.91	-0.06	93.1	411.5	85.6	82.0
150	22.168	0.150	0.107	0.96	100.0	-2.00	101	10.79	-0.12	92.7	412.3	85.7	82.1
151	22.317	0.149	0.106	0.96	100.3	-1.98	-	10.58	-0.21	93.0	411.8	86.0	82.2
152	22.466	0.149	0.107	0.95	100.2	-1.95	-	10.56	-0.02	92.7	411.1	86.2	82.7
153	22.615	0.149	0.108	0.96	100.4	-1.96	-	10.41	-0.15	92.1	409.1	86.3	82.6
154	22.764	0.149	0.110	0.96	100.2	-2.04	-	10.27	-0.14	92.1	408.4	86.3	82.7
155	22.913	0.149	0.108	0.96	100.1	-2.05	-	10.21	-0.06	91.9	410.0	86.2	82.6
156	23.062	0.149	0.109	0.97	100.2	-2.01	-	10.13	-0.08	91.8	407.7	86.2	82.7
157	23.211	0.149	0.108	0.96	100.2	-2.00	-	10.00	-0.13	92.2	408.9	86.2	82.6
158	23.361	0.150	0.109	0.96	100.4	-2.03	-	9.89	-0.11	92.5	407.0	86.0	82.4
159	23.510	0.149	0.108	0.95	100.4	-2.08	-	9.78	-0.11	92.6	404.4	85.7	82.3
160	23.659	0.149	0.108	0.97	100.7	-2.01	100	9.70	-0.08	92.5	399.6	85.5	82.4
161	23.808	0.149	0.108	0.96	100.3	-2.09	-	9.60	-0.10	92.6	394.8	85.3	82.3
162	23.958	0.150	0.109	0.95	100.6	-2.12	-	9.51	-0.09	92.6	392.9	85.2	82.1
163	24.107	0.149	0.109	0.96	100.6	-2.12	-	9.42	-0.09	92.5	390.7	85.0	81.9
164	24.256	0.149	0.109	0.96	100.5	-2.04	-	9.33	-0.09	92.5	393.0	85.1	81.7
165	24.406	0.150	0.109	0.96	100.4	-2.13	-	9.23	-0.10	92.4	392.0	85.2	82.0
166	24.555	0.149	0.108	0.97	100.8	-2.14	-	9.14	-0.09	92.5	392.5	85.3	81.7
167	24.704	0.149	0.109	0.95	100.6	-2.15	-	9.05	-0.09	92.4	388.7	85.5	81.7
168	24.852	0.148	0.108	0.95	100.9	-2.10	-	8.96	-0.09	92.3	386.1	85.3	81.8
169	25.001	0.149	0.108	0.96	100.9	-2.10	-	8.88	-0.08	92.1	386.8	85.6	81.7

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
170	25.149	0.148	0.109	0.95	101.0	-2.13	100	8.80	-0.08	92.0	382.5	85.6	81.5
171	25.298	0.149	0.108	0.96	100.9	-2.19	-	8.71	-0.09	92.1	381.7	85.6	81.6
172	25.447	0.149	0.107	0.96	101.2	-2.20	-	8.63	-0.08	92.1	379.3	85.4	81.6
173	25.596	0.149	0.109	0.96	100.8	-2.22	-	8.55	-0.08	91.9	378.2	85.2	81.6
174	25.745	0.149	0.107	0.94	100.9	-2.22	-	8.47	-0.08	91.9	379.5	85.0	81.4
175	25.894	0.149	0.109	0.95	101.1	-2.14	-	8.38	-0.09	91.8	379.9	84.8	81.6
176	26.043	0.149	0.110	0.96	101.1	-2.26	-	8.31	-0.07	91.7	378.8	84.7	81.4
177	26.192	0.149	0.109	0.96	100.8	-2.22	-	8.22	-0.09	91.7	378.1	84.9	81.4
178	26.340	0.148	0.109	0.95	100.7	-2.28	-	8.14	-0.08	91.7	377.4	85.0	81.4
179	26.489	0.149	0.108	0.96	101.1	-2.20	-	8.08	-0.06	91.8	377.3	85.1	81.3
180	26.637	0.148	0.106	0.97	101.0	-2.23	100	7.99	-0.09	91.8	374.8	85.1	81.3
181	26.786	0.149	0.107	0.95	100.8	-2.22	-	7.91	-0.08	91.6	373.9	85.2	81.4
182	26.935	0.149	0.108	0.95	101.2	-2.24	-	7.84	-0.07	91.5	370.3	85.2	81.3
183	27.083	0.148	0.107	0.94	101.0	-2.34	-	7.78	-0.06	91.6	369.9	84.8	81.3
184	27.232	0.149	0.107	0.95	101.0	-2.32	-	7.71	-0.07	91.6	367.9	84.7	81.2
185	27.380	0.148	0.107	0.96	100.9	-2.31	-	7.64	-0.07	91.6	366.3	84.7	81.1
186	27.528	0.148	0.106	0.96	101.0	-2.33	-	7.58	-0.06	91.6	362.9	84.9	81.0
187	27.677	0.149	0.108	0.94	101.3	-2.30	-	7.51	-0.07	91.5	360.4	84.9	81.0
188	27.825	0.148	0.109	0.95	100.9	-2.33	-	7.46	-0.05	91.4	355.9	84.7	80.8
189	27.973	0.148	0.108	0.95	101.3	-2.38	-	7.39	-0.07	91.3	352.9	84.7	80.7
190	28.121	0.148	0.107	0.95	101.1	-2.43	100	7.34	-0.05	91.2	350.1	84.8	80.7
191	28.269	0.148	0.106	0.94	101.1	-2.36	-	7.29	-0.05	91.2	348.9	84.9	80.6
192	28.416	0.147	0.105	0.95	101.1	-2.39	-	7.24	-0.05	91.1	345.7	84.7	80.5
193	28.564	0.148	0.108	0.93	101.3	-2.42	-	7.18	-0.06	91.0	343.0	84.8	80.4
194	28.712	0.148	0.106	0.95	101.3	-2.40	-	7.14	-0.04	90.9	342.7	84.6	80.4
195	28.860	0.148	0.107	0.94	101.4	-2.47	-	7.09	-0.05	90.8	341.8	84.7	80.4
196	29.008	0.148	0.108	0.95	101.2	-2.49	-	7.04	-0.05	90.8	341.7	84.6	80.4
197	29.156	0.148	0.108	0.93	101.3	-2.49	-	6.98	-0.06	90.7	341.7	84.6	80.3
198	29.303	0.147	0.108	0.94	101.4	-2.49	-	6.94	-0.04	90.6	341.0	84.7	80.2
199	29.451	0.148	0.108	0.95	101.5	-2.58	-	6.88	-0.06	90.6	338.1	84.8	80.1
200	29.598	0.147	0.108	0.94	101.6	-2.57	99	6.84	-0.04	90.5	337.2	85.0	80.2
201	29.746	0.148	0.109	0.94	101.5	-2.50	-	6.79	-0.05	90.3	341.9	84.8	80.2
202	29.894	0.148	0.109	0.94	101.4	-2.60	-	6.75	-0.04	89.9	341.4	84.6	80.2
203	30.041	0.147	0.110	0.93	101.6	-2.56	-	6.70	-0.05	89.8	338.2	84.8	80.3

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
204	30.188	0.147	0.109	0.94	101.3	-2.59	-	6.65	-0.05	89.7	336.4	84.7	80.4
205	30.336	0.148	0.110	0.94	101.3	-2.61	-	6.65	0.00	90.5	349.6	84.7	80.3
206	30.483	0.147	0.109	0.94	101.4	-2.56	-	6.45	-0.20	90.1	340.2	84.5	80.5
207	30.630	0.147	0.108	0.94	101.2	-2.71	-	6.41	-0.04	90.2	340.6	84.5	80.7
208	30.777	0.147	0.108	0.95	101.5	-2.67	-	6.34	-0.07	90.3	343.2	84.4	80.7
209	30.925	0.148	0.110	0.93	101.2	-2.70	-	6.28	-0.06	90.3	347.3	84.4	80.8
210	31.072	0.147	0.108	0.94	101.4	-2.70	99	6.21	-0.07	90.2	350.8	84.4	80.7
211	31.218	0.146	0.105	0.94	101.6	-2.70	-	6.15	-0.06	90.2	353.0	84.5	80.9
212	31.365	0.147	0.109	0.94	101.5	-2.70	-	6.08	-0.07	90.3	354.7	84.6	80.9
213	31.512	0.147	0.107	0.93	101.4	-2.71	-	6.01	-0.07	90.4	354.7	84.8	81.0
214	31.659	0.147	0.109	0.92	101.7	-2.78	-	5.94	-0.07	90.3	358.4	84.9	81.1
215	31.806	0.147	0.108	0.93	101.6	-2.74	-	5.89	-0.05	90.5	357.9	84.6	81.1
216	31.952	0.146	0.110	0.93	101.8	-2.76	-	5.82	-0.07	90.5	358.5	84.8	81.1
217	32.098	0.146	0.108	0.93	101.9	-2.75	-	5.77	-0.05	90.5	358.8	84.7	81.2
218	32.245	0.147	0.108	0.94	101.8	-2.80	-	5.71	-0.06	90.6	357.6	84.8	81.3
219	32.391	0.146	0.108	0.94	102.0	-2.73	-	5.64	-0.07	90.7	359.2	84.7	81.3
220	32.537	0.146	0.109	0.92	101.5	-2.81	98	5.58	-0.06	90.6	358.9	84.6	81.4
221	32.684	0.147	0.107	0.93	102.0	-2.77	-	5.53	-0.05	90.6	355.0	84.5	81.5
222	32.830	0.146	0.108	0.93	101.5	-2.79	-	5.49	-0.04	90.5	352.6	84.5	81.4
223	32.976	0.146	0.109	0.93	101.7	-2.79	-	5.44	-0.05	90.5	349.9	84.7	81.5
224	33.123	0.147	0.109	0.94	101.8	-2.74	-	5.41	-0.03	90.5	346.2	84.9	81.5
225	33.269	0.146	0.109	0.93	101.9	-2.79	-	5.37	-0.04	90.5	340.5	85.1	81.5
226	33.415	0.146	0.109	0.92	101.9	-2.85	-	5.33	-0.04	90.4	336.2	85.1	81.5
227	33.562	0.147	0.110	0.94	101.9	-2.81	-	5.30	-0.03	90.5	331.7	85.3	81.6
228	33.708	0.146	0.109	0.93	102.1	-2.89	-	5.27	-0.03	90.4	329.5	85.2	81.6
229	33.855	0.147	0.111	0.93	102.2	-2.85	-	5.23	-0.04	90.3	326.9	85.0	81.7
230	34.002	0.147	0.106	0.93	102.1	-2.80	98	5.20	-0.03	90.2	323.5	84.9	81.6
231	34.147	0.145	0.107	0.94	102.0	-2.90	-	5.17	-0.03	90.1	323.1	84.8	81.7
232	34.294	0.147	0.107	0.94	102.1	-2.85	-	5.14	-0.03	90.2	319.1	84.7	81.6
233	34.440	0.146	0.110	0.93	102.0	-2.88	-	5.10	-0.04	90.3	315.4	85.0	81.7
234	34.586	0.146	0.107	0.93	101.9	-2.83	-	5.07	-0.03	90.2	313.7	84.7	81.7
235	34.731	0.145	0.106	0.93	102.0	-2.93	-	5.04	-0.03	90.2	312.5	84.8	81.6
236	34.877	0.146	0.107	0.92	102.2	-2.93	-	5.01	-0.03	90.2	312.2	84.7	81.6
237	35.023	0.146	0.109	0.94	102.3	-2.85	-	4.97	-0.04	90.1	311.2	84.6	81.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
238	35.169	0.146	0.108	0.91	102.1	-2.88	-	4.94	-0.03	89.9	310.9	84.7	81.7
239	35.315	0.146	0.109	0.91	102.1	-2.98	-	4.92	-0.02	89.9	311.5	84.6	81.7
240	35.461	0.146	0.107	0.92	102.4	-2.87	98	4.89	-0.03	89.9	308.5	84.4	81.7
241	35.607	0.146	0.109	0.93	102.4	-2.92	-	4.86	-0.03	90.0	308.8	84.6	81.7
242	35.753	0.146	0.111	0.93	102.3	-2.93	-	4.83	-0.03	89.9	307.2	84.8	81.7
243	35.899	0.146	0.107	0.93	102.3	-2.93	97	4.80	-0.03	89.8	307.5	84.9	81.6
Avg/Tot	35.900	0.148	0.108	0.95	95.8	-1.95	100			91.1	405.9	85.1	80.1

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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	-0.001		0.00	76.6	-0.55		83.2	0.008	0.14	0.003
1	0.133	0.134	1.16	76.6	-1.25	-	83.2	-0.031	1.44	0.084
2	0.292	0.159	1.12	76.6	-1.35	-	83.7	-0.049	5.96	0.303
3	0.447	0.155	1.11	76.5	-1.30	-	82.4	-0.046	11.13	1.444
4	0.604	0.157	1.10	76.7	-1.30	-	84.2	-0.047	15.03	2.639
5	0.760	0.156	1.12	76.7	-1.31	-	83.7	-0.051	14.04	1.003
6	0.914	0.154	1.11	76.9	-1.30	-	84.3	-0.048	14.49	1.066
7	1.074	0.160	1.11	77.0	-1.28	-	84.2	-0.052	14.86	1.144
8	1.229	0.155	1.11	77.0	-1.27	-	83.5	-0.053	14.88	1.333
9	1.381	0.152	1.09	77.2	-1.32	-	84.0	-0.058	14.94	0.969
10	1.536	0.155	1.10	77.2	-1.26	102	83.0	-0.057	14.64	0.747
11	1.691	0.155	1.09	77.5	-1.27	-	84.7	-0.053	14.02	0.594
12	1.844	0.153	1.10	77.6	-1.28	-	84.3	-0.054	12.95	0.144
13	1.997	0.153	1.09	77.7	-1.25	-	83.8	-0.053	12.67	0.175
14	2.151	0.154	1.10	77.9	-1.31	-	84.3	-0.057	13.03	0.367
15	2.305	0.154	1.10	78.1	-1.23	-	83.0	-0.059	13.49	0.698
16	2.458	0.153	1.09	78.2	-1.36	-	83.7	-0.055	13.97	0.948
17	2.609	0.151	1.08	78.6	-1.33	-	84.5	-0.062	14.59	0.918
18	2.760	0.151	1.08	78.8	-1.36	-	84.0	-0.059	15.06	0.950
19	2.913	0.153	1.08	79.0	-1.36	-	84.9	-0.062	14.16	0.265
20	3.066	0.153	1.09	79.3	-1.26	101	85.0	-0.056	12.62	0.115
21	3.219	0.153	1.09	79.5	-1.28	-	85.1	-0.058	12.48	0.118
22	3.370	0.151	1.08	79.6	-1.24	-	84.3	-0.064	14.45	0.286
23	3.522	0.152	1.07	80.0	-1.27	-	84.7	-0.061	14.42	0.280
24	3.679	0.157	1.08	80.1	-1.27	-	84.4	-0.062	13.44	0.134
25	3.831	0.152	1.07	80.5	-1.36	-	84.5	-0.056	13.14	0.154
26	3.982	0.151	1.10	80.7	-1.26	-	84.6	-0.062	13.60	0.217
27	4.134	0.152	1.08	81.0	-1.32	-	84.1	-0.060	13.08	0.180
28	4.287	0.153	1.08	81.2	-1.34	-	83.8	-0.061	12.96	0.430
29	4.439	0.152	1.08	81.5	-1.24	-	84.3	-0.058	12.85	0.294
30	4.592	0.153	1.08	81.8	-1.35	102	84.7	-0.065	12.64	0.109
31	4.738	0.146	1.08	82.0	-1.37	-	83.6	-0.065	13.22	0.126
32	4.890	0.152	1.07	82.4	-1.35	-	84.5	-0.060	13.00	0.087

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
33	5.041	0.151	1.07	82.6	-1.23	-	84.6	-0.063	13.96	0.117
34	5.193	0.152	1.08	82.8	-1.35	-	83.8	-0.057	13.71	0.106
35	5.346	0.153	1.09	83.1	-1.37	-	83.8	-0.064	13.34	0.138
36	5.498	0.152	1.06	83.4	-1.26	-	84.0	-0.055	12.28	0.072
37	5.650	0.152	1.07	83.7	-1.37	-	83.7	-0.055	11.74	0.091
38	5.801	0.151	1.07	84.0	-1.21	-	83.6	-0.062	11.76	0.085
39	5.953	0.152	1.08	84.4	-1.26	-	84.9	-0.055	12.13	0.092
40	6.105	0.152	1.09	84.7	-1.24	101	85.0	-0.060	11.44	0.102
41	6.258	0.153	1.06	84.9	-1.29	-	84.9	-0.057	10.96	0.045
42	6.410	0.152	1.07	85.2	-1.25	-	85.2	-0.057	10.57	0.047
43	6.560	0.150	1.06	85.4	-1.23	-	84.1	-0.053	10.71	0.052
44	6.712	0.152	1.09	85.6	-1.21	-	83.7	-0.061	11.26	0.054
45	6.864	0.152	1.05	85.9	-1.33	-	83.4	-0.047	11.75	0.053
46	7.016	0.152	1.06	86.2	-1.30	-	83.6	-0.056	11.73	0.057
47	7.168	0.152	1.06	86.4	-1.34	-	83.6	-0.051	11.74	0.060
48	7.320	0.152	1.07	86.7	-1.32	-	84.4	-0.055	11.50	0.055
49	7.471	0.151	1.07	87.1	-1.23	-	84.1	-0.054	11.61	0.058
50	7.623	0.152	1.08	87.3	-1.36	101	84.7	-0.056	11.38	0.048
51	7.775	0.152	1.05	87.5	-1.29	-	84.1	-0.059	11.29	0.046
52	7.928	0.153	1.07	87.8	-1.37	-	84.7	-0.053	11.48	0.067
53	8.080	0.152	1.07	88.0	-1.36	-	84.7	-0.058	11.35	0.053
54	8.230	0.150	1.07	88.2	-1.22	-	84.7	-0.058	11.25	0.052
55	8.382	0.152	1.04	88.6	-1.29	-	84.8	-0.057	10.93	0.048
56	8.535	0.153	1.07	88.7	-1.36	-	83.8	-0.055	11.03	0.034
57	8.688	0.153	1.07	88.9	-1.23	-	83.0	-0.051	10.36	0.051
58	8.840	0.152	1.09	89.3	-1.29	-	84.1	-0.052	10.24	0.055
59	8.991	0.151	1.08	89.5	-1.29	-	84.6	-0.053	9.69	0.069
60	9.143	0.152	1.07	89.7	-1.30	100	84.9	-0.055	9.71	0.078
61	9.295	0.152	1.06	89.9	-1.22	-	84.9	-0.054	9.47	0.068
62	9.448	0.153	1.06	90.2	-1.23	-	84.7	-0.054	8.93	0.071
63	9.600	0.152	1.07	90.4	-1.24	-	85.2	-0.057	6.40	0.138
64	9.751	0.151	1.05	90.6	-1.24	-	84.5	-0.053	8.57	0.219
65	9.902	0.151	1.05	90.8	-1.38	-	83.9	-0.056	10.89	0.180

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
66	10.054	0.152	1.08	91.0	-1.37	-	83.5	-0.055	10.48	0.115
67	10.207	0.153	1.07	91.2	-1.35	-	84.3	-0.054	10.78	0.132
68	10.359	0.152	1.06	91.4	-1.23	-	84.6	-0.055	9.24	0.157
69	10.511	0.152	1.08	91.7	-1.31	-	84.9	-0.053	9.36	0.120
70	10.662	0.151	1.06	91.8	-1.35	100	83.9	-0.054	8.55	0.116
71	10.813	0.151	1.07	92.0	-1.22	-	84.1	-0.055	8.77	0.125
72	10.966	0.153	1.06	92.1	-1.29	-	83.6	-0.055	9.14	0.135
73	11.119	0.153	1.04	92.2	-1.37	-	83.4	-0.054	9.70	0.140
74	11.271	0.152	1.07	92.5	-1.26	-	84.4	-0.052	9.56	0.153
75	11.422	0.151	1.07	92.7	-1.21	-	84.9	-0.048	9.53	0.157
76	11.573	0.151	1.05	92.8	-1.26	-	83.6	-0.052	9.36	0.158
77	11.725	0.152	1.07	93.0	-1.38	-	84.4	-0.056	9.67	0.168
78	11.877	0.152	1.06	93.1	-1.23	-	84.0	-0.052	9.83	0.171
79	12.030	0.153	1.07	93.2	-1.21	-	83.6	-0.059	10.06	0.160
80	12.181	0.151	1.04	93.4	-1.25	100	83.8	-0.053	10.30	0.158
81	12.332	0.151	1.04	93.5	-1.35	-	83.9	-0.056	10.61	0.141
82	12.484	0.152	1.06	93.9	-1.22	-	85.2	-0.052	10.57	0.135
83	12.637	0.153	1.05	94.0	-1.27	-	85.2	-0.061	10.71	0.125
84	12.789	0.152	1.04	94.1	-1.32	-	84.2	-0.053	10.99	0.132
85	12.941	0.152	1.07	94.4	-1.28	-	84.6	-0.055	11.13	0.135
86	13.092	0.151	1.05	94.4	-1.29	-	84.5	-0.052	11.31	0.141
87	13.243	0.151	1.05	94.6	-1.20	-	84.6	-0.054	12.03	0.159
88	13.396	0.153	1.04	94.8	-1.34	-	85.0	-0.054	13.14	0.268
89	13.548	0.152	1.08	94.9	-1.34	-	85.1	-0.052	13.48	0.354
90	13.701	0.153	1.06	95.0	-1.37	99	84.8	-0.057	13.84	0.479
91	13.852	0.151	1.06	95.2	-1.31	-	85.0	-0.055	14.29	0.482
92	14.003	0.151	1.06	95.3	-1.21	-	84.6	-0.058	14.63	0.639
93	14.155	0.152	1.05	95.3	-1.38	-	84.2	-0.055	15.19	0.805
94	14.307	0.152	1.08	95.5	-1.39	-	84.1	-0.057	15.52	0.916
95	14.460	0.153	1.06	95.6	-1.20	-	84.2	-0.058	15.49	0.989
96	14.612	0.152	1.04	95.7	-1.36	-	84.3	-0.059	15.65	1.107
97	14.762	0.150	1.04	95.9	-1.32	-	85.0	-0.059	15.58	1.200
98	14.913	0.151	1.08	96.0	-1.20	-	84.4	-0.057	15.64	1.216

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
99	15.066	0.153	1.06	96.2	-1.38	-	85.3	-0.057	15.53	1.201
100	15.218	0.152	1.05	96.4	-1.36	99	85.2	-0.061	15.56	1.181
101	15.370	0.152	1.05	96.4	-1.34	-	84.8	-0.055	15.41	1.062
102	15.521	0.151	1.06	96.6	-1.20	-	85.2	-0.060	15.48	0.881
103	15.671	0.150	1.06	96.8	-1.30	-	85.3	-0.058	15.53	0.844
104	15.823	0.152	1.05	96.9	-1.27	-	85.3	-0.055	15.49	0.868
105	15.975	0.152	1.06	97.0	-1.27	-	85.1	-0.058	15.62	0.808
106	16.127	0.152	1.05	97.2	-1.27	-	85.2	-0.059	15.70	0.867
107	16.278	0.151	1.06	97.2	-1.36	-	84.5	-0.055	15.79	0.956
108	16.430	0.152	1.06	97.5	-1.21	-	85.4	-0.062	15.81	1.020
109	16.580	0.150	1.04	97.5	-1.39	-	84.7	-0.060	15.97	1.061
110	16.731	0.151	1.05	97.7	-1.26	99	85.7	-0.061	16.02	1.131
111	16.883	0.152	1.03	97.8	-1.34	-	86.0	-0.061	16.03	1.111
112	17.034	0.151	1.05	97.8	-1.39	-	85.1	-0.058	16.18	1.087
113	17.186	0.152	1.06	97.9	-1.29	-	85.5	-0.058	16.33	1.021
114	17.337	0.151	1.04	97.9	-1.22	-	84.9	-0.060	16.31	1.045
115	17.487	0.150	1.04	98.0	-1.34	-	84.5	-0.057	16.46	1.036
116	17.637	0.150	1.06	98.2	-1.22	-	84.6	-0.057	16.62	1.016
117	17.788	0.151	1.07	98.4	-1.30	-	85.8	-0.060	16.64	0.872
118	17.939	0.151	1.03	98.4	-1.25	-	85.5	-0.065	16.71	0.860
119	18.090	0.151	1.04	98.5	-1.38	-	85.6	-0.058	16.75	0.952
120	18.241	0.151	1.03	98.6	-1.24	98	85.5	-0.058	16.78	1.015
121	18.391	0.150	1.03	98.8	-1.24	-	85.7	-0.057	16.81	0.979
122	18.541	0.150	1.05	98.8	-1.37	-	85.0	-0.054	16.80	0.942
123	18.690	0.149	1.01	99.0	-1.32	-	85.5	-0.059	16.80	0.831
124	18.840	0.150	1.02	99.0	-1.31	-	85.7	-0.059	16.86	0.808
125	18.990	0.150	1.05	99.2	-1.40	-	85.7	-0.059	16.73	0.650
126	19.140	0.150	1.03	99.1	-1.25	-	85.5	-0.050	16.60	0.424
127	19.295	0.155	1.10	99.2	-1.46	-	85.4	-0.061	16.33	0.396
128	19.451	0.156	1.11	99.3	-1.34	-	85.0	-0.054	16.14	0.400
129	19.608	0.157	1.11	99.3	-1.29	-	84.9	-0.056	16.16	0.368
130	19.766	0.158	1.12	99.4	-1.47	99	84.6	-0.055	16.06	0.367
131	19.921	0.155	1.11	99.5	-1.47	-	84.8	-0.060	15.84	0.384

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
132	20.079	0.158	1.13	99.8	-1.47	-	85.8	-0.060	15.70	0.338
133	20.236	0.157	1.11	99.9	-1.30	-	85.8	-0.054	15.56	0.324
134	20.391	0.155	1.11	99.7	-1.43	-	84.6	-0.059	15.54	0.389
135	20.549	0.158	1.10	99.8	-1.40	-	84.8	-0.057	15.36	0.384
136	20.704	0.155	1.09	99.9	-1.29	-	85.0	-0.062	14.75	0.248
137	20.861	0.157	1.12	100.0	-1.48	-	85.5	-0.055	13.77	0.186
138	21.018	0.157	1.10	100.1	-1.43	-	85.8	-0.054	13.36	0.164
139	21.173	0.155	1.11	100.1	-1.43	-	85.7	-0.061	13.12	0.162
140	21.330	0.157	1.11	100.2	-1.47	101	85.9	-0.055	12.99	0.165
141	21.487	0.157	1.09	100.3	-1.46	-	85.6	-0.057	12.88	0.152
142	21.642	0.155	1.10	100.3	-1.29	-	85.1	-0.053	12.77	0.158
143	21.799	0.157	1.11	100.4	-1.48	-	85.3	-0.053	12.66	0.156
144	21.955	0.156	1.09	100.6	-1.48	-	85.6	-0.050	12.50	0.132
145	22.111	0.156	1.10	100.7	-1.46	-	85.8	-0.055	12.34	0.110
146	22.268	0.157	1.10	100.6	-1.31	-	85.4	-0.049	12.36	0.118
147	22.423	0.155	1.11	100.7	-1.46	-	85.2	-0.048	12.41	0.121
148	22.580	0.157	1.09	100.8	-1.46	-	85.3	-0.051	12.44	0.123
149	22.737	0.157	1.10	100.9	-1.33	-	85.5	-0.052	12.53	0.127
150	22.892	0.155	1.08	101.0	-1.33	101	86.0	-0.051	12.65	0.115
151	23.049	0.157	1.11	101.1	-1.36	-	85.5	-0.054	12.71	0.117
152	23.206	0.157	1.11	101.2	-1.41	-	86.1	-0.050	12.78	0.122
153	23.360	0.154	1.12	101.2	-1.29	-	85.8	-0.055	12.80	0.133
154	23.517	0.157	1.11	101.3	-1.41	-	85.7	-0.055	12.93	0.136
155	23.673	0.156	1.09	101.4	-1.36	-	85.8	-0.046	12.80	0.143
156	23.828	0.155	1.11	101.4	-1.30	-	85.8	-0.055	12.76	0.126
157	23.985	0.157	1.07	101.4	-1.45	-	86.0	-0.050	12.54	0.122
158	24.141	0.156	1.10	101.4	-1.49	-	85.0	-0.053	12.19	0.097
159	24.296	0.155	1.10	101.6	-1.45	-	86.2	-0.050	11.67	0.111
160	24.453	0.157	1.09	101.5	-1.31	101	85.8	-0.049	11.08	0.100
161	24.608	0.155	1.11	101.6	-1.36	-	86.0	-0.050	10.91	0.117
162	24.764	0.156	1.10	101.7	-1.43	-	85.0	-0.050	10.86	0.131
163	24.921	0.157	1.12	101.8	-1.47	-	85.8	-0.048	10.85	0.124
164	25.075	0.154	1.08	101.8	-1.31	-	85.2	-0.047	10.90	0.128

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
165	25.232	0.157	1.10	101.9	-1.35	-	85.8	-0.046	10.76	0.124
166	25.389	0.157	1.11	102.0	-1.34	-	85.8	-0.052	10.66	0.122
167	25.543	0.154	1.09	101.9	-1.44	-	84.8	-0.053	10.51	0.120
168	25.700	0.157	1.12	102.0	-1.42	-	85.2	-0.048	10.53	0.118
169	25.856	0.156	1.11	102.0	-1.31	-	84.6	-0.053	10.43	0.120
170	26.011	0.155	1.07	102.1	-1.45	100	85.0	-0.045	10.42	0.115
171	26.167	0.156	1.09	102.2	-1.45	-	85.4	-0.047	10.32	0.116
172	26.324	0.157	1.10	102.2	-1.49	-	85.4	-0.045	10.24	0.109
173	26.478	0.154	1.07	102.3	-1.41	-	85.4	-0.045	10.35	0.099
174	26.635	0.157	1.10	102.3	-1.38	-	85.1	-0.054	10.40	0.094
175	26.791	0.156	1.11	102.4	-1.33	-	85.2	-0.043	10.44	0.090
176	26.946	0.155	1.09	102.4	-1.49	-	84.8	-0.050	10.45	0.091
177	27.103	0.157	1.10	102.4	-1.46	-	84.8	-0.044	10.27	0.094
178	27.258	0.155	1.10	102.3	-1.37	-	84.2	-0.049	10.09	0.106
179	27.413	0.155	1.10	102.5	-1.32	-	85.7	-0.047	10.05	0.107
180	27.570	0.157	1.06	102.5	-1.43	101	85.5	-0.047	10.09	0.112
181	27.725	0.155	1.08	102.5	-1.31	-	84.4	-0.049	9.85	0.110
182	27.880	0.155	1.11	102.4	-1.34	-	84.7	-0.048	9.54	0.102
183	28.036	0.156	1.09	102.5	-1.33	-	84.7	-0.048	9.28	0.103
184	28.192	0.156	1.09	102.5	-1.33	-	84.4	-0.044	9.23	0.101
185	28.346	0.154	1.09	102.7	-1.42	-	85.3	-0.051	9.22	0.103
186	28.503	0.157	1.09	102.6	-1.50	-	84.3	-0.046	9.11	0.094
187	28.658	0.155	1.09	102.6	-1.31	-	84.4	-0.044	9.00	0.095
188	28.812	0.154	1.08	102.6	-1.49	-	84.3	-0.044	8.69	0.084
189	28.968	0.156	1.10	102.7	-1.41	-	84.6	-0.045	8.34	0.084
190	29.124	0.156	1.06	102.7	-1.48	101	84.4	-0.042	8.15	0.089
191	29.278	0.154	1.09	102.8	-1.50	-	84.3	-0.043	7.99	0.081
192	29.434	0.156	1.09	102.9	-1.39	-	85.0	-0.045	7.85	0.085
193	29.590	0.156	1.08	102.8	-1.39	-	85.0	-0.041	7.83	0.085
194	29.743	0.153	1.07	102.8	-1.38	-	84.6	-0.043	7.75	0.092
195	29.899	0.156	1.07	102.9	-1.33	-	84.8	-0.043	7.75	0.084
196	30.055	0.156	1.07	102.9	-1.39	-	84.5	-0.044	7.70	0.086
197	30.208	0.153	1.08	102.8	-1.35	-	83.5	-0.036	7.73	0.092

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
198	30.364	0.156	1.09	102.9	-1.33	-	84.7	-0.041	7.67	0.087
199	30.520	0.156	1.07	103.0	-1.51	-	84.8	-0.038	7.69	0.088
200	30.673	0.153	1.09	102.9	-1.44	100	84.8	-0.041	7.47	0.086
201	30.828	0.155	1.08	103.0	-1.45	-	84.9	-0.036	7.33	0.102
202	30.984	0.156	1.08	102.9	-1.36	-	84.7	-0.049	7.25	0.099
203	31.139	0.155	1.08	103.0	-1.38	-	84.7	-0.041	7.23	0.097
204	31.293	0.154	1.07	103.0	-1.33	-	84.6	-0.043	7.24	0.101
205	31.449	0.156	1.08	103.0	-1.35	-	84.9	-0.044	5.73	0.168
206	31.604	0.155	1.09	103.0	-1.32	-	85.2	-0.034	9.00	0.069
207	31.757	0.153	1.10	103.0	-1.34	-	85.1	-0.040	9.04	0.088
208	31.913	0.156	1.06	103.0	-1.33	-	85.0	-0.045	9.13	0.088
209	32.068	0.155	1.04	103.0	-1.51	-	84.7	-0.037	9.37	0.089
210	32.221	0.153	1.09	103.1	-1.39	99	85.1	-0.046	9.48	0.103
211	32.376	0.155	1.07	103.1	-1.51	-	85.0	-0.042	9.56	0.096
212	32.532	0.156	1.07	103.0	-1.51	-	83.8	-0.042	9.67	0.100
213	32.686	0.154	1.07	103.1	-1.46	-	83.9	-0.046	9.83	0.098
214	32.839	0.153	1.09	103.1	-1.43	-	84.9	-0.044	9.77	0.109
215	32.994	0.155	1.08	103.2	-1.40	-	85.3	-0.042	9.80	0.090
216	33.149	0.155	1.07	103.1	-1.50	-	84.5	-0.045	9.62	0.092
217	33.302	0.153	1.08	103.2	-1.34	-	84.9	-0.049	9.49	0.094
218	33.456	0.154	1.04	103.2	-1.41	-	84.7	-0.044	9.44	0.092
219	33.611	0.155	1.07	103.3	-1.45	-	84.5	-0.043	9.24	0.102
220	33.765	0.154	1.06	103.4	-1.41	99	84.8	-0.047	9.09	0.096
221	33.918	0.153	1.07	103.4	-1.47	-	85.4	-0.038	8.93	0.073
222	34.073	0.155	1.06	103.4	-1.51	-	84.8	-0.041	8.38	0.081
223	34.228	0.155	1.06	103.5	-1.47	-	84.9	-0.045	7.74	0.076
224	34.381	0.153	1.06	103.4	-1.41	-	84.6	-0.038	7.66	0.068
225	34.534	0.153	1.09	103.6	-1.35	-	85.0	-0.045	7.54	0.070
226	34.689	0.155	1.10	103.5	-1.50	-	84.7	-0.039	7.52	0.071
227	34.844	0.155	1.06	103.5	-1.42	-	84.2	-0.038	7.45	0.066
228	34.996	0.152	1.10	103.7	-1.40	-	85.6	-0.041	7.44	0.061
229	35.150	0.154	1.05	103.7	-1.47	-	85.6	-0.043	7.37	0.065
230	35.305	0.155	1.09	103.6	-1.34	99	85.2	-0.041	7.27	0.067

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
231	35.459	0.154	1.06	103.7	-1.34	-	85.2	-0.036	7.29	0.059
232	35.612	0.153	1.07	103.7	-1.34	-	85.0	-0.038	7.19	0.062
233	35.766	0.154	1.06	103.8	-1.34	-	85.3	-0.032	7.21	0.066
234	35.920	0.154	1.07	103.8	-1.39	-	84.5	-0.037	7.15	0.069
235	36.074	0.154	1.09	103.8	-1.35	-	85.1	-0.039	7.08	0.071
236	36.227	0.153	1.06	103.9	-1.45	-	85.8	-0.035	7.12	0.069
237	36.381	0.154	1.06	103.9	-1.35	-	85.6	-0.037	7.16	0.072
238	36.536	0.155	1.04	104.0	-1.49	-	85.3	-0.042	7.12	0.072
239	36.689	0.153	1.06	103.9	-1.35	-	84.5	-0.044	7.18	0.070
240	36.842	0.153	1.07	104.1	-1.51	99	85.2	-0.041	7.11	0.065
241	36.996	0.154	1.08	104.2	-1.44	-	85.3	-0.036	7.07	0.069
242	37.150	0.154	1.07	104.1	-1.51	-	84.7	-0.032	7.01	0.064
243	37.303	0.153	1.08	104.1	-1.50	98	85.2	-0.035	6.98	0.065
Avg/Tot	37.304	0.154	1.07	95.3	-1.34	100	84.8	-0.051	11.49	0.301

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Particulate Sampling 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)
0	0.000		-1.06	77.3	-0.50		86.5
1	0.120	0.120	-0.21	77.3	-1.88	-	86.2
2	0.270	0.150	-0.17	77.3	-1.89	-	86.0
3	0.419	0.149	-0.20	77.5	-1.93	-	86.1
4	0.569	0.150	-0.15	77.7	-1.97	-	86.5
5	0.718	0.149	-0.25	77.7	-2.02	-	86.9
6	0.867	0.149	-0.02	77.8	-1.86	-	86.8
7	1.019	0.152	1.03	78.0	-1.94	-	86.5
8	1.169	0.150	1.03	78.2	-1.84	-	86.2
9	1.319	0.150	1.03	78.3	-2.00	-	86.1
10	1.470	0.151	1.04	78.5	-1.85	95	85.9
11	1.621	0.151	1.06	78.6	-1.92	-	85.9
12	1.772	0.151	1.05	78.6	-2.03	-	86.1
13	1.924	0.152	1.06	78.8	-2.05	-	86.2
14	2.077	0.153	1.08	79.0	-1.87	-	86.1
15	2.229	0.152	1.06	79.3	-2.04	-	86.1
16	2.382	0.153	1.06	79.4	-1.89	-	86.1
17	2.536	0.154	1.06	79.6	-1.90	-	86.4
18	2.686	0.150	1.08	80.0	-1.90	-	86.3
19	2.841	0.155	1.08	80.1	-2.08	-	86.2
20	2.995	0.154	-0.46	80.4	-1.92	99	86.6
21	3.150	0.155	-0.16	80.5	-2.05	-	87.3
22	3.304	0.154	0.04	80.9	-1.95	-	87.9
23	3.459	0.155	-0.13	81.0	-2.00	-	87.9
24	3.615	0.156	0.14	81.4	-2.07	-	87.6
25	3.770	0.155	-0.22	81.7	-2.03	-	87.2
26	3.927	0.157	-0.30	81.9	-1.91	-	86.9
27	4.083	0.156	-0.32	82.2	-2.00	-	86.8
28	4.240	0.157	-0.43	82.4	-2.07	-	86.7
29	4.395	0.155	-0.32	82.7	-1.96	-	86.6
30	4.550	0.155	-0.47	83.0	-2.09	101	86.8
31	4.702	0.152	-0.44	83.4	-1.96	-	86.7

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Particulate Sampling 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)
32	4.856	0.154	-0.47	83.5	-1.99	-	86.5
33	5.013	0.157	-0.39	83.9	-1.93	-	86.5
34	5.170	0.157	-0.45	84.4	-2.06	-	86.8
35	5.328	0.158	-0.13	84.6	-2.07	-	87.0
36	5.483	0.155	-0.29	85.0	-1.92	-	87.0
37	5.639	0.156	-0.36	85.3	-1.93	-	87.0
38	5.794	0.155	-0.29	85.7	-1.97	-	87.1
39	5.952	0.158	-0.20	85.9	-1.95	-	87.1
40	6.109	0.157	0.10	86.2	-1.93	102	87.0
41	6.266	0.157	0.26	86.4	-1.94	-	86.9
42	6.421	0.155	0.01	86.7	-1.94	-	86.9
43	6.576	0.155	0.08	87.1	-2.00	-	86.9
44	6.732	0.156	0.06	87.5	-2.06	-	86.8
45	6.890	0.158	-0.07	87.9	-2.04	-	86.8
46	7.047	0.157	-0.07	88.1	-1.97	-	86.7
47	7.203	0.156	-0.05	88.4	-1.96	-	87.0
48	7.359	0.156	-0.05	88.8	-2.06	-	87.2
49	7.514	0.155	-0.03	89.0	-2.09	-	87.2
50	7.671	0.157	0.00	89.2	-1.93	101	86.9
51	7.828	0.157	-0.01	89.6	-1.96	-	86.9
52	7.985	0.157	-0.05	89.8	-2.10	-	86.8
53	8.142	0.157	-0.04	90.1	-2.01	-	86.9
54	8.297	0.155	0.00	90.5	-2.06	-	87.1
55	8.452	0.155	0.01	90.8	-1.96	-	87.0
56	8.610	0.158	-0.01	91.1	-1.96	-	86.9
57	8.767	0.157	-0.03	91.4	-1.97	-	86.8
58	8.925	0.158	-0.01	91.6	-1.96	-	86.6
59	9.081	0.156	-0.01	91.9	-1.94	-	86.7
60	9.235	0.154	-0.02	92.1	-1.93	100	86.9
Avg/Tot	9.235	0.154	0.10	83.7	-1.95	100	86.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
0	77.8	81.2	82.1	80.7	76.7	79.7	79
1	79.1	81.2	82.1	80.5	76.7	79.9	140
2	94.7	81.1	82.1	80.7	76.7	83.1	814
3	120.5	81.0	82.2	81.1	76.7	88.3	1034
4	142.4	81.1	82.7	81.8	76.6	92.9	1009
5	164.4	80.8	83.4	83.3	76.9	97.8	987
6	185.0	80.9	84.6	85.2	77.1	102.6	992
7	210.2	80.9	86.3	88.1	77.4	108.6	1029
8	236.9	80.7	88.2	91.9	77.9	115.1	1046
9	262.2	80.9	90.6	96.1	78.5	121.7	1041
10	285.3	80.6	93.1	101.4	79.2	127.9	1027
11	305.4	80.9	96.0	106.9	80.0	133.8	1027
12	323.0	80.8	98.9	113.1	81.2	139.4	998
13	337.7	80.7	102.1	119.4	82.2	144.4	973
14	357.1	80.8	105.7	126.1	83.3	150.6	978
15	369.1	81.0	109.4	133.0	84.5	155.4	1005
16	387.0	81.2	113.5	139.9	86.1	161.5	1054
17	401.2	81.7	117.7	146.9	87.6	167.0	1064
18	410.4	82.1	122.5	154.1	89.3	171.7	1073
19	425.7	82.3	127.4	161.7	91.1	177.6	1056
20	441.6	82.9	132.6	169.2	92.6	183.8	1066
21	453.8	83.5	137.6	177.0	94.2	189.2	1066
22	461.0	83.9	142.6	185.0	95.7	193.6	1072
23	465.3	84.6	147.4	192.9	97.4	197.5	1066
24	471.1	85.5	151.1	201.2	98.9	201.6	1068
25	481.4	86.5	154.9	208.6	100.0	206.3	1081
26	490.1	87.5	159.2	215.8	101.2	210.8	1087
27	495.8	88.9	164.0	222.7	102.4	214.8	1064
28	500.4	90.3	169.0	229.3	103.8	218.6	1052
29	503.1	93.0	174.5	235.6	105.0	222.2	1048
30	510.6	94.7	179.7	241.6	105.9	226.5	1037
31	510.4	95.1	184.8	247.6	106.9	229.0	1038
32	509.6	96.5	190.2	253.4	108.1	231.6	1033
33	514.7	97.0	195.6	259.5	109.4	235.2	1066
34	521.7	98.6	201.2	265.9	110.6	239.6	1067
35	519.1	100.2	206.9	272.2	112.1	242.1	1040
36	518.4	102.0	212.9	278.5	113.8	245.1	1022
37	518.4	103.4	218.5	284.9	115.2	248.1	1014
38	522.9	107.3	224.0	291.2	116.6	252.4	1008
39	520.9	106.9	229.6	297.1	118.0	254.5	1006
40	521.1	107.6	235.3	303.3	119.1	257.3	990
41	519.3	108.2	240.6	308.9	119.9	259.4	977
42	517.2	109.6	246.0	314.7	120.9	261.7	967
43	516.8	111.9	250.9	320.3	121.8	264.3	959
44	508.8	113.4	255.9	325.7	122.5	265.3	965
45	505.6	115.1	260.6	330.9	123.1	267.1	974
46	505.0	115.9	265.5	336.3	123.9	269.3	974
47	500.8	118.1	270.1	341.7	124.8	271.1	971
48	496.1	119.7	274.7	347.0	125.8	272.7	966
49	503.9	123.0	278.7	352.0	126.8	276.9	961

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
50	498.9	125.8	283.4	357.3	127.5	278.6	958
51	493.6	128.2	288.1	362.7	128.4	280.2	959
52	491.2	131.9	292.4	367.3	129.1	282.4	960
53	487.8	137.1	296.8	372.3	129.7	284.7	950
54	495.1	139.9	300.9	377.2	130.8	288.8	941
55	493.3	145.3	305.2	381.3	131.5	291.3	936
56	493.8	152.7	309.4	385.7	132.5	294.8	934
57	486.1	153.2	313.7	390.1	133.5	295.3	930
58	489.5	163.2	317.9	394.1	135.4	300.0	922
59	485.4	165.8	321.8	397.6	136.3	301.4	918
60	480.7	172.6	325.9	401.1	137.6	303.6	913
61	483.1	175.6	329.4	404.2	138.6	306.2	904
62	476.9	183.8	333.5	407.3	140.4	308.4	899
63	470.2	176.3	338.0	411.0	146.9	308.5	787
64	420.3	184.3	341.6	412.7	145.2	300.8	870
65	418.8	195.4	344.0	414.5	143.8	303.3	967
66	401.3	205.9	346.6	416.2	142.9	302.6	998
67	406.1	211.5	348.3	417.6	141.5	305.0	1032
68	398.6	209.7	349.4	418.7	140.8	303.4	1009
69	388.1	204.4	349.5	418.7	139.6	300.1	978
70	390.2	207.6	348.3	418.4	138.5	300.6	960
71	385.8	214.1	347.5	417.6	137.6	300.5	962
72	379.2	227.7	346.3	416.9	137.1	301.4	969
73	378.2	230.4	344.3	415.3	135.6	300.8	981
74	380.0	235.1	342.4	413.4	134.8	301.1	985
75	375.8	239.1	340.3	411.3	134.3	300.2	983
76	375.0	241.4	337.9	409.1	133.3	299.3	983
77	374.3	241.5	335.2	406.5	132.6	298.0	985
78	370.8	243.4	333.0	403.8	132.1	296.6	986
79	371.1	241.5	330.8	401.8	132.3	295.5	993
80	368.7	241.2	328.7	399.2	132.1	294.0	1000
81	366.4	240.4	326.4	396.7	132.1	292.4	1001
82	360.7	238.1	323.8	393.7	132.3	289.7	995
83	364.0	236.9	321.6	391.3	132.8	289.3	990
84	358.6	235.1	319.3	388.4	133.3	286.9	992
85	361.0	233.8	317.0	386.1	135.0	286.6	995
86	371.8	235.3	314.9	383.7	134.6	288.1	998
87	368.5	233.7	312.8	381.7	134.3	286.2	1015
88	378.3	234.8	310.7	379.8	134.1	287.5	1031
89	377.2	237.1	309.2	378.0	134.1	287.1	1052
90	381.3	238.9	307.7	377.0	134.5	287.9	1072
91	378.8	237.2	306.2	375.7	135.1	286.6	1091
92	399.3	239.5	304.1	375.0	135.0	290.6	1114
93	405.8	238.2	303.0	374.6	134.6	291.2	1131
94	404.5	246.5	302.2	374.0	136.0	292.6	1140
95	402.7	249.3	301.5	374.0	136.7	292.8	1145
96	424.8	254.2	300.6	374.5	137.3	298.3	1150
97	422.8	255.2	300.8	375.3	138.2	298.5	1150
98	424.3	265.7	300.7	375.2	139.0	301.0	1153
99	442.6	268.2	301.0	376.3	139.7	305.6	1155

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
100	446.4	267.0	301.7	377.5	140.2	306.6	1155
101	451.9	267.1	302.5	378.6	140.6	308.1	1151
102	444.3	277.5	303.5	379.6	141.7	309.3	1150
103	451.6	277.5	304.6	380.4	143.0	311.4	1154
104	445.3	280.2	306.0	381.7	144.0	311.4	1158
105	461.1	279.4	307.3	382.8	145.2	315.2	1164
106	465.3	277.5	308.6	384.2	146.1	316.3	1169
107	470.9	277.1	310.2	386.5	146.8	318.3	1176
108	461.9	280.5	311.5	387.7	147.6	317.8	1180
109	477.2	282.7	313.1	389.9	148.0	322.2	1185
110	476.7	285.8	315.8	391.7	149.2	323.8	1190
111	482.9	287.6	317.5	393.8	149.8	326.3	1192
112	488.6	288.4	319.8	396.2	150.4	328.7	1193
113	486.3	288.0	322.2	398.2	151.7	329.3	1194
114	491.8	288.5	324.6	400.7	152.7	331.7	1193
115	492.6	288.8	327.1	403.0	153.5	333.0	1194
116	492.0	287.0	329.7	405.2	154.6	333.7	1196
117	491.6	289.1	332.6	407.6	156.1	335.4	1195
118	493.3	291.2	335.0	410.5	156.6	337.3	1195
119	487.3	292.4	338.2	413.0	158.2	337.8	1197
120	497.7	294.1	340.8	415.8	158.6	341.4	1199
121	498.6	294.9	344.0	418.2	160.4	343.2	1197
122	493.1	300.6	346.7	421.3	161.7	344.7	1195
123	503.0	301.7	349.7	424.4	162.6	348.3	1198
124	497.9	302.8	352.3	427.7	164.1	349.0	1194
125	502.6	305.1	355.6	431.2	164.9	351.9	1184
126	494.3	307.0	359.0	434.8	166.6	352.3	1173
127	499.7	308.0	362.5	438.2	167.8	355.2	1163
128	500.8	310.4	365.1	441.3	168.6	357.2	1155
129	501.9	309.1	368.0	444.5	169.2	358.5	1154
130	480.4	312.4	371.6	446.7	171.2	356.5	1149
131	475.2	310.7	375.1	449.6	172.9	356.7	1146
132	490.7	313.5	378.2	452.8	174.1	361.9	1143
133	483.7	315.2	381.3	455.9	175.4	362.3	1142
134	490.4	316.9	384.4	459.3	175.6	365.3	1145
135	479.6	318.5	387.8	461.8	177.2	365.0	1141
136	474.8	320.1	391.0	464.6	178.2	365.7	1120
137	483.6	321.9	393.9	467.8	178.9	369.2	1091
138	479.3	322.9	397.2	470.7	178.9	369.8	1071
139	477.4	320.4	400.1	473.5	178.8	370.0	1058
140	466.2	321.9	403.1	475.8	179.4	369.3	1050
141	458.5	323.9	405.9	478.3	180.0	369.3	1042
142	453.9	330.3	408.5	480.5	181.1	370.9	1037
143	452.3	334.2	410.8	482.8	181.5	372.3	1032
144	437.0	332.9	413.0	483.8	182.1	369.8	1024
145	443.9	337.3	414.6	486.2	181.9	372.8	1018
146	441.5	340.7	416.5	488.4	182.2	373.9	1015
147	437.8	341.7	417.9	490.2	182.1	373.9	1013
148	423.2	342.8	419.4	492.0	182.1	371.9	1012
149	428.9	342.7	420.2	493.2	182.6	373.5	1012

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
150	429.9	339.7	421.5	495.0	182.1	373.6	1011
151	410.2	342.7	423.0	495.9	183.1	371.0	1012
152	414.9	354.8	424.4	497.1	184.0	375.0	1013
153	413.2	359.2	425.2	497.2	184.1	375.8	1013
154	408.1	358.9	426.1	498.9	185.4	375.5	1011
155	416.0	359.1	426.5	500.0	185.6	377.4	1006
156	411.6	362.8	427.6	501.2	185.6	377.8	1003
157	415.2	360.6	429.1	503.1	185.7	378.7	1001
158	412.8	354.1	430.2	504.6	185.4	377.4	989
159	399.7	344.1	431.4	505.5	185.7	373.3	977
160	401.4	341.6	432.7	507.3	185.5	373.7	965
161	405.6	339.6	433.9	508.8	185.2	374.6	958
162	402.0	339.8	435.9	509.8	185.0	374.5	954
163	394.9	341.4	437.5	510.6	185.2	373.9	953
164	390.5	342.6	439.0	511.6	185.2	373.8	953
165	390.7	340.4	440.2	511.9	184.9	373.6	951
166	384.6	339.0	441.5	511.9	184.7	372.3	946
167	385.4	338.4	442.4	512.2	184.7	372.6	942
168	386.9	339.5	443.5	512.2	184.8	373.4	939
169	382.7	342.3	444.3	511.6	184.9	373.2	935
170	382.5	343.7	444.8	510.9	184.8	373.3	934
171	380.4	345.5	445.3	510.4	185.2	373.4	932
172	380.1	344.2	445.6	509.8	185.3	373.0	928
173	376.6	342.7	445.6	509.0	185.2	371.8	927
174	374.5	344.8	445.8	508.4	185.4	371.8	927
175	373.0	347.0	445.6	507.4	185.6	371.7	928
176	371.3	349.3	445.7	506.5	185.9	371.7	929
177	366.1	352.5	445.5	505.6	185.9	371.1	927
178	368.1	358.7	445.4	505.0	186.3	372.7	925
179	364.9	362.9	445.5	504.0	186.6	372.8	924
180	364.7	361.2	445.4	503.2	187.0	372.3	917
181	360.9	359.6	445.4	502.3	186.9	371.0	908
182	359.9	360.3	445.5	501.4	186.9	370.8	892
183	355.1	359.8	445.8	500.4	186.9	369.6	882
184	349.7	360.5	445.8	499.7	186.8	368.5	878
185	349.9	356.6	446.1	498.6	186.8	367.6	877
186	345.0	361.2	446.1	497.7	186.8	367.4	872
187	343.9	364.9	446.1	496.8	186.6	367.7	865
188	338.5	359.0	446.2	495.6	186.7	365.2	850
189	337.1	353.5	446.0	494.6	186.7	363.6	839
190	332.4	353.8	445.6	493.7	186.8	362.5	832
191	328.2	351.6	445.3	492.6	186.7	360.9	825
192	327.2	349.3	444.9	491.6	186.9	360.0	821
193	325.2	348.5	444.4	490.6	186.5	359.0	821
194	323.5	345.1	443.7	489.9	186.5	357.7	820
195	320.1	345.0	443.2	488.6	186.1	356.6	819
196	316.8	343.0	442.7	487.7	185.9	355.2	818
197	313.9	342.2	442.0	486.7	185.6	354.1	819
198	311.2	342.3	441.5	485.4	185.2	353.1	821
199	312.5	340.0	440.9	484.2	184.8	352.5	819

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
200	309.8	340.0	440.3	483.4	184.2	351.5	814
201	308.4	340.3	439.8	482.3	183.8	350.9	815
202	305.0	340.2	438.8	481.0	182.8	349.6	811
203	306.2	340.7	438.1	479.9	181.7	349.3	807
204	304.7	340.9	437.5	478.9	181.0	348.6	805
205	301.2	361.6	437.3	477.6	180.9	351.7	751
206	297.1	361.2	436.6	476.2	179.8	350.2	788
207	294.5	361.3	435.9	474.7	178.7	349.0	818
208	297.0	361.5	435.4	474.2	178.2	349.3	836
209	299.0	361.8	434.2	473.5	177.6	349.2	849
210	300.4	362.4	434.4	472.9	177.1	349.4	865
211	299.8	362.5	434.5	473.0	176.8	349.3	874
212	303.1	362.9	434.8	473.1	176.5	350.1	880
213	303.9	364.6	434.8	473.0	176.2	350.5	889
214	305.3	363.7	435.4	473.2	176.4	350.8	898
215	306.9	362.6	436.1	473.3	176.6	351.1	897
216	308.8	362.4	436.2	473.7	176.5	351.5	904
217	310.9	362.2	436.6	474.0	176.5	352.0	896
218	311.0	362.1	437.4	474.4	176.8	352.3	886
219	313.3	364.5	437.3	474.5	176.9	353.3	884
220	315.2	364.1	438.0	474.5	177.1	353.8	879
221	313.6	363.7	438.3	474.6	177.3	353.5	861
222	314.3	363.6	439.4	474.8	177.3	353.9	856
223	313.5	363.5	439.3	474.7	177.2	353.6	844
224	310.1	363.3	440.0	474.9	177.4	353.1	827
225	310.9	363.4	441.0	474.6	177.2	353.4	813
226	308.8	362.9	441.0	474.8	176.6	352.8	801
227	305.8	362.6	441.6	474.7	176.6	352.3	792
228	303.6	362.4	441.6	474.3	176.0	351.6	783
229	301.0	360.5	442.2	474.4	175.6	350.7	775
230	296.9	360.2	442.0	474.4	175.1	349.7	767
231	289.4	360.3	442.9	474.3	174.8	348.3	762
232	289.9	362.2	443.3	473.9	174.2	348.7	758
233	289.7	362.0	443.9	474.1	173.5	348.6	753
234	285.6	362.5	443.6	474.2	173.2	347.8	749
235	284.0	360.8	444.7	474.1	172.6	347.2	745
236	280.6	358.9	445.1	474.2	172.4	346.2	742
237	282.1	362.9	445.3	473.9	171.7	347.2	741
238	280.0	362.9	444.9	473.6	170.9	346.5	739
239	276.0	362.9	446.3	473.9	170.6	345.9	737
240	274.2	362.7	446.4	473.5	170.0	345.4	732
241	272.1	362.7	446.7	473.6	169.4	344.9	731
242	272.5	362.1	447.1	473.7	169.0	344.9	727
243	270.3	361.5	446.9	473.3	168.4	344.1	724
Average	394.9	261.1	341.7	399.1	151.5	310	973

LAB SAMPLE DATA - ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 3

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	H00190	181.6	182.8	1.2
	B	H00191	178.8	180.1	1.3
	C - 1st Hour	H00192	194.8	195.1	0.3
	Amb	H00193	191.5	191.6	0.1
Probes	**A**	4A	116024.9	116025.2	0.3
	B	4B	116183.5	116183.9	0.4
	C - 1st Hour	4C	116999.1	116999.3	0.2
O-rings	**A**	4A	3373.4	3373.5	0.1
	B	4B	3577.1	3577.1	0.0
	C - 1st Hour	4C	3369.1	3369.3	0.2

Placed in Dessicator on:	7/18/2025

Audit		200.0	7/23 12:30	200.0	7/25 16:00				
Filters	**A**	182.9	7/23 12:30	182.8	7/25 16:00				
	B	180.0	7/23 12:30	180.1	7/25 16:00				
	C - 1st Hour	195.1	7/23 12:30	195.1	7/25 16:00				
	Amb	191.5	7/23 12:30	191.6	7/25 16:00				
Probes	**A**	116025.1	7/23 12:30	116025.2	7/25 16:00				
	B	116184.0	7/23 12:30	116183.9	7/25 16:00				
	C - 1st Hour	116999.5	7/23 12:30	116999.3	7/25 16:00				
O-Rings	**A**	3373.5	7/23 12:30	3373.5	7/25 16:00				
	B	3577.2	7/23 12:30	3577.1	7/25 16:00				
	C - 1st Hour	3369.3	7/23 12:30	3369.3	7/25 16:00				

Train A Aggregate, mg:	**1.6**
Train B Aggregate, mg:	**1.7**
Train C Aggregate, mg:	**0.7**
Ambient Aggregate, mg:	**0.1**

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications Job Number: 24-282 Tracking #: 225
Model: VCV Run Number: 3 Test Date: 7/18/2025

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: N/A – High Burn
Air Control Setting: Fully Open

Time	Notes
	N/A – High Burn

Test Notes
Test Burn Start Time: 13:37
Air Control Setting: Fully Open

Time	Notes
0:00	Ignition – 30s Torch
1:00	Closed Door
3:00	Closed Bypass
62:00	Loaded Test Fuel

Test Burn End Time: 17:40

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	10:05	10:06	10:07	7/19 9:30	7/19 9:31	7/19 9:32
CO_2	0.08	17.45	10.23	0.16	17.22	10.09
CO	-0.008	4.390	2.536	0.019	4.316	2.469

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

Technician Signature:  Date: 12/22/25

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications | Job Number: 24-282 | Tracking #: 225
Model: VCV | Run Number: 3 | Test Date: 7/18/2025

Test Photos



Kindling Fuel Load



Start-up Fuel Load



High Fire Fuel Load



Kindling Fuel Loaded

Technician Signature: _____ Date: 12/22/25

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications | Job Number: 24-282 | Tracking #: 225
Model: VCV | Run Number: 3 | Test Date: 7/18/2025



Residual Start-up Fuel Coal Bed



High Fire Fuel Loaded



Air Setting

Technician Signature: _____ Date: 12/22/25

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 4 Data Summary

Client: 509 Fabrication
Model: VCV
Job #: 24-282
Tracking #: 225
Test Date: 7/18/2025

Techician Signature

9/4/2025
Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

Burn Rate (kg/hr):	1.25

	Ambient Sample	Sample Train A	Sample Train B	Sample Train C - 1st Hour
Total Sample Volume (ft^3)	108.598	71.075	72.903	9.673
Average Gas Velocity in Dilution Tunnel (ft/sec)	19.96			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	53039.4			
Average Gas Meter Temperature (°F)	80.0	102.0	104.8	91.3
Total Sample Volume (dscf)	106.991	66.910	68.644	9.218
Average Tunnel Temperature (°F)	88.2			
Total Time of Test (min)	473			
Total Particulate Catch (mg)	0.0	1.1	1.0	0.8
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000164	0.0000146	0.0000868
Total PM Emissions (g)	0.00	6.87	6.09	4.60
Particulate Emission Rate (g/hr)	0.00	0.87	0.77	4.60
Emissions Factor (g/kg)	-	0.70	0.62	-
Difference from Average Total Particulate Emissions (g)	-	0.39	0.39	-
Difference from Average Total Particulate Emissions (%)	-	6.0%	6.0%	-
Difference from Average Emissions Factor (g/kg)	-	0.04	0.04	-

Final Average Results	
Total Particulate Emissions (g)	6.48
Particulate Emission Rate (g/hr)	0.82
Emissions Factor (g/kg)	0.66
HHV Efficiency (%)	80.2%
LHV Efficiency (%)	85.7%
CO Emissions (g/min)	0.39

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: 82.3/Max: 88.8	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:77.9/Max:82.8	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	All but 1 reading between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	509 Fabrication
Model:	VCV
Date:	07/18/25
Run:	4
Control #:	24-282
Test Duration:	473
Output Category:	Medium

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	80.2%	85.7%
Combustion Efficiency	99.0%	99.0%
Heat Transfer Efficiency	81.0%	86.6%

Output Rate (kJ/h)	20,003	18,975	**(Btu/h)**
Burn Rate (kg/h)	1.25	2.76	**(lb/h)**
Input (kJ/h)	24,953	23,671	**(Btu/h)**

Test Load Weight (dry kg)	9.86	21.72	**dry lb**
MC wet (%)	17.06		
MC dry (%)	20.57		
Particulate (g)	6.48		
CO (g)	184		
Test Duration (h)	7.88		

Emissions	Particulate	CO
g/MJ Output	0.04	1.17
g/kg Dry Fuel	0.66	18.68
g/h	0.82	23.35
g/min	0.01	0.39
lb/MM Btu Output	0.10	2.71

Air/Fuel Ratio (A/F)	13.94

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

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: 509 Fabrication
Job #: 24-282
Model: VCV
Tracking #: 225
Run #: 4
Technician: AK
Date: 7/18/2025

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.18		
Target Load Weight (lbs):	21.80		
Total Load Weight Range (lbs):	20.70	to	22.90
Core Load Weight Range (lbs):	9.80	to	14.20
Remainder Load Weight Range (lbs):	7.60	to	12.00
Core Load Piece Range (lbs):	3.30	to	5.50
Remainder Load Piece Range (lbs):	2.20	to	12.00
Max Allowable Kindling Weight (lbs):	4.55		
Max Allowable Start-up Fuel Weight (lbs):	6.82		

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	18.00	5.38	In Range	21.2	18.7	19.5	19.8	In Range	4.49	2.04
2	18.00	4.45	In Range	20.0	25.2	21.6	22.3	In Range	3.64	1.65
3	18.00	4.26	In Range	21.2	25.7	24.7	23.9	In Range	3.44	1.56
Core Load Wt. (lbs)		14.09	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	18.00	8.65	In Range	25.8	25.4	22.7	24.6	In Range	6.94	3.15
2			NA				NA	NA	NA	NA
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		8.65	In Range							

Total Load Weight (lbs):	22.74	In Range	
Core Load % of Total Weight:	62%	In Range	45-65%
Remainder % of Total Weight:	38%	In Range	35-55%
Total Load % of Target Weight:	104%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	10.4		
Total Load Average Moisture Content (%DB):	22.9	In Range	19-25%
Total Load Average Moisture Content (%WB):	18.6		
Total Test Load Weight (dry basis):	18.51 lbs	8.40 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
4.30	In Range	10	10	10	10.0	In Range	3.91	1.77

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
6.30	In Range	21.9	20.3	18.6	20.3	In Range	5.24	2.38

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.3	to	4.5	
Actual Residual Start-up Fuel Weight (lb):		2.45		In Range

LOW & MEDIUM FIRE FUEL LOAD DATA - ASTM E3053

Client: 509 Fabrication
Job #: 24-282
Model: VCV
Tracking #: 225
Run #: 4
Technician: AK
Date: 7/18/2025

Nominal Loading Density (lbs/ft^3, wet basis):	12		
Usable Firebox Volume (ft^3):	2.18		
Target Load Weight (lbs):	26.16		
Total Load Weight Range (lbs):	24.85	to	27.47
Core Load Weight Range (lbs):	11.77	to	17.00
Remainder Load Weight Range (lbs):	9.16	to	14.39
Core Load Piece Range (lbs):	3.92	to	6.54
Remainder Load Piece Range (lbs):	2.62	to	7.85

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	18.00	4.42	In Range	19.4	23.5	18.3	20.4	In Range	3.67	1.67
2	18.00	4.27	In Range	18.4	25.1	19.7	21.1	In Range	3.53	1.60
3	18.00	6.43	In Range	23.6	20.0	19.4	21.0	In Range	5.31	2.41
Core Load Wt. (lbs)		15.12	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	18.00	3.55	In Range	22.9	19.2	19.6	20.6	In Range	2.94	1.34
2	18.00	7.52	In Range	18.2	23.5	18.4	20.0	In Range	6.26	2.84
3			NA				NA	NA	NA	NA
Remainder Load (lbs)		11.07	In Range							

Remainder Load Small/Large Piece Weight Ratio:	47%	In Range	≤ 67%
Total Load Weight (lbs):	26.19	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:	100%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	12.0		
Total Load Average Moisture Content (%DB):	20.6	In Range	19-25%
Total Load Average Moisture Content (%WB):	17.1		
Total Test Load Weight (dry basis):	21.72 lbs	9.85 kg	

TEST FUEL LOADING RANGE

Allowable Charcoal Bed Weight Range (lb):	2.7	to	5.2
Actual Charcoal Bed Wt. (lb):	4.12	In Range	

TEST END POINT

Actual Fuel Load Ending Weight (lb): 0.00 Valid Test (≥90%)

Total Fuel Burned During Test Run: 26.2 lbs, wet basis
21.7 lbs, dry basis
9.85 kg, dry basis

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	4	Technician:	AK
Test Start Time:	18:08	Date:	7/18/2025
Test Type:	Medium Fire		

Recording Interval (min):	1
Total Sampling Time (min):	473

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.80	29.80	29.80
Relative Humidity (%)	29.7	30.0	
Room Air Velocity (ft/min)	<50	<50	
Platform Scale Audit (lbs)	10.0	10.0	
Fuel Scale Audit (lbs)	10.00	10.00	

Meter Box γ Factor:	1.004 (A)
Meter Box γ Factor:	1.009 (B)
Meter Box γ Factor:	0.997 (C)
Meter Box γ Factor:	1.012 (Ambient)
Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100
Date Flue Pipe Last Cleaned:	7/13/2025

Ambient Sample Volume: 108.598 ft^3

Sample Train Post-Test Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-6 in. Hg
(B)	0.000	0.000	cfm @	-5 in. Hg
(C)	0.000	0.000	cfm @	-6 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.067	75
2	0.089	75
3	0.104	75
4	0.109	75
5	0.094	75
6	0.057	75
7	0.079	76
8	0.099	76
9	0.112	76
10	0.108	76
11	0.100	76
12	0.072	76
Center	0.111	76

Static Pressure: -0.156 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	12	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:	0.7854	ft^2
V_{strav}:	20.07	ft/sec
V_{scent}:	22.30	ft/sec
F_p:	0.900	[ratio]
Initial Tunnel Flow:	909.1	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, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Int. West)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Int. 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
	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 Long Leaf	52.60	7.02	40.10	1.30	22.30	9594

WOODSTOVE PREBURN DATA

Client:	509 Fabrication	Job #:	24-282
Model:	VCV	Tracking #:	225
Run #:	4	Technician:	AK
		Date:	7/18/2025

Medium Fire Performed as a continuation of High Fire Test, see Run 3 test data for details

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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		0.111	0.00	97.1	-2.57		26.19		92.5	313.4	84.9	81.8
1	0.144	0.144	0.108	0.97	96.9	-3.14	-	26.15	-0.04	96.5	313.9	85.9	82.0
2	0.293	0.149	0.107	0.97	96.8	-2.92	-	26.04	-0.11	94.0	296.8	86.1	82.2
3	0.444	0.151	0.109	0.98	97.0	-2.75	-	25.91	-0.13	93.6	325.7	86.3	82.1
4	0.596	0.152	0.107	0.98	97.2	-2.60	-	25.79	-0.12	93.4	347.4	87.0	81.6
5	0.748	0.152	0.111	0.98	97.1	-2.53	-	25.65	-0.14	93.8	361.9	86.9	81.8
6	0.899	0.151	0.110	0.97	97.3	-2.37	-	25.50	-0.15	93.1	380.2	86.7	81.5
7	1.050	0.151	0.109	0.98	97.2	-2.35	-	25.36	-0.14	93.3	391.9	87.7	81.6
8	1.201	0.151	0.109	0.97	97.1	-2.30	-	25.22	-0.14	94.1	400.7	87.1	81.6
9	1.351	0.150	0.110	0.99	97.2	-2.15	-	25.05	-0.17	94.5	407.7	87.6	81.5
10	1.501	0.150	0.109	0.97	97.5	-2.17	100	24.92	-0.13	94.9	413.1	88.0	81.5
11	1.652	0.151	0.108	0.97	97.5	-2.16	-	24.77	-0.15	94.6	418.6	88.7	81.9
12	1.803	0.151	0.110	0.96	97.9	-2.15	-	24.61	-0.16	94.9	423.0	88.8	81.7
13	1.953	0.150	0.106	0.98	97.6	-1.98	-	24.48	-0.13	94.6	427.6	88.4	81.9
14	2.103	0.150	0.110	0.98	97.8	-2.10	-	24.33	-0.15	95.3	430.9	87.8	81.8
15	2.253	0.150	0.108	0.97	97.8	-2.05	-	24.23	-0.10	95.7	434.4	87.9	81.8
16	2.403	0.150	0.107	0.97	97.7	-1.93	-	24.03	-0.20	96.1	440.1	87.7	81.8
17	2.553	0.150	0.107	0.96	98.0	-1.97	-	23.85	-0.18	96.2	451.9	86.3	81.8
18	2.702	0.149	0.107	0.96	98.2	-1.93	-	23.67	-0.18	96.0	459.5	86.5	81.9
19	2.850	0.148	0.108	0.96	98.3	-1.96	-	23.49	-0.18	96.0	467.4	86.2	82.0
20	2.999	0.149	0.106	0.97	98.3	-1.93	101	23.30	-0.19	96.7	465.0	86.4	81.9
21	3.148	0.149	0.108	0.96	98.4	-1.81	-	23.10	-0.20	97.4	469.6	86.7	81.9
22	3.296	0.148	0.106	0.95	98.5	-1.86	-	22.90	-0.20	98.1	471.4	87.0	82.1
23	3.444	0.148	0.107	0.95	99.0	-1.88	-	22.70	-0.20	98.0	476.4	86.9	82.1
24	3.592	0.148	0.108	0.96	98.6	-1.92	-	22.51	-0.19	98.6	478.2	87.4	82.3
25	3.740	0.148	0.106	0.94	98.9	-1.91	-	22.30	-0.21	99.2	479.5	87.6	82.4
26	3.888	0.148	0.108	0.93	98.6	-1.86	-	22.11	-0.19	99.6	481.8	88.6	82.5
27	4.035	0.147	0.108	0.94	98.8	-1.81	-	21.91	-0.20	99.7	487.2	88.4	82.6
28	4.183	0.148	0.103	0.93	99.1	-1.86	-	21.71	-0.20	99.6	486.2	88.2	82.6
29	4.330	0.147	0.105	0.93	99.2	-1.79	-	21.51	-0.20	99.3	488.3	88.8	82.8
30	4.490	0.160	0.107	0.94	99.2	-1.88	101	21.36	-0.15	97.7	455.9	87.4	82.7
31	4.637	0.147	0.106	0.94	99.4	-1.79	-	21.20	-0.16	95.9	429.3	88.0	82.6
32	4.786	0.149	0.104	0.99	99.7	-1.82	-	21.06	-0.14	95.3	408.9	87.6	82.4
33	4.936	0.150	0.105	0.97	99.6	-1.87	-	20.93	-0.13	94.8	392.3	86.7	82.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
34	5.087	0.151	0.107	0.97	99.8	-1.89	-	20.80	-0.13	94.4	380.7	86.1	81.9
35	5.238	0.151	0.106	0.98	99.9	-1.83	-	20.68	-0.12	94.2	372.2	86.6	81.7
36	5.389	0.151	0.106	0.96	99.6	-1.79	-	20.56	-0.12	94.0	369.3	86.8	81.5
37	5.540	0.151	0.107	0.98	100.0	-1.80	-	20.44	-0.12	93.9	365.6	86.4	81.5
38	5.691	0.151	0.108	0.98	100.3	-1.79	-	20.33	-0.11	93.8	357.8	86.3	81.6
39	5.840	0.149	0.106	0.99	100.1	-1.87	-	20.21	-0.12	93.6	353.0	86.0	81.4
40	5.991	0.151	0.106	0.98	100.2	-1.92	101	20.09	-0.12	93.4	352.0	86.5	81.2
41	6.143	0.152	0.108	0.97	100.3	-1.92	-	19.98	-0.11	93.2	348.5	86.7	81.5
42	6.294	0.151	0.106	0.98	100.5	-1.92	-	19.85	-0.13	93.2	349.8	86.8	81.4
43	6.445	0.151	0.106	0.97	100.4	-1.88	-	19.73	-0.12	93.1	350.4	87.5	81.3
44	6.597	0.152	0.106	0.98	100.3	-1.88	-	19.62	-0.11	93.0	348.5	87.6	81.3
45	6.748	0.151	0.107	0.97	100.6	-1.98	-	19.50	-0.12	93.1	349.7	87.8	81.4
46	6.897	0.149	0.107	0.99	100.7	-1.94	-	19.37	-0.13	92.8	342.7	87.6	81.4
47	7.048	0.151	0.107	0.99	100.7	-1.97	-	19.27	-0.10	92.7	340.5	86.9	81.3
48	7.199	0.151	0.105	0.97	100.9	-2.00	-	19.15	-0.12	92.6	337.4	86.9	81.2
49	7.351	0.152	0.104	0.96	101.1	-2.04	-	19.04	-0.11	92.5	334.8	86.9	81.2
50	7.502	0.151	0.105	0.98	101.0	-2.00	102	18.94	-0.10	92.5	332.3	86.8	81.2
51	7.653	0.151	0.108	0.98	101.2	-2.05	-	18.82	-0.12	92.3	331.4	86.2	81.1
52	7.805	0.152	0.107	0.98	101.2	-2.00	-	18.72	-0.10	92.2	330.5	85.9	81.1
53	7.955	0.150	0.107	0.99	101.2	-2.01	-	18.62	-0.10	92.1	328.6	85.6	81.1
54	8.106	0.151	0.105	0.99	101.2	-2.10	-	18.51	-0.11	92.1	327.5	86.4	81.2
55	8.257	0.151	0.105	0.98	101.4	-2.04	-	18.42	-0.09	92.0	323.0	85.9	81.2
56	8.409	0.152	0.105	0.98	101.4	-2.08	-	18.32	-0.10	92.0	321.5	85.8	81.1
57	8.560	0.151	0.107	0.96	101.3	-2.15	-	18.22	-0.10	91.9	318.5	86.5	81.0
58	8.712	0.152	0.108	0.99	101.7	-2.09	-	18.12	-0.10	91.8	318.8	86.2	81.0
59	8.863	0.151	0.107	0.98	101.6	-2.17	-	18.02	-0.10	91.8	317.1	87.4	81.0
60	9.013	0.150	0.107	0.98	101.5	-2.09	102	17.93	-0.09	91.7	315.5	87.7	81.0
61	9.165	0.152	0.105	0.98	101.9	-2.12	-	17.85	-0.08	91.6	315.3	88.1	80.9
62	9.316	0.151	0.107	0.99	101.9	-2.12	-	17.74	-0.11	91.5	316.5	87.6	80.9
63	9.468	0.152	0.104	0.97	101.9	-2.15	-	17.66	-0.08	91.4	314.9	88.4	80.9
64	9.620	0.152	0.108	0.98	102.1	-2.27	-	17.56	-0.10	91.3	319.5	88.2	80.8
65	9.772	0.152	0.105	0.98	102.0	-2.20	-	17.46	-0.10	91.3	321.7	87.0	80.8
66	9.922	0.150	0.106	0.98	101.9	-2.26	-	17.38	-0.08	91.2	323.7	87.2	80.7
67	10.073	0.151	0.108	0.98	101.9	-2.16	-	17.29	-0.09	91.1	323.1	86.3	80.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
68	10.225	0.152	0.108	0.99	102.3	-2.20	-	17.19	-0.10	91.0	320.2	86.3	80.7
69	10.377	0.152	0.105	0.97	101.9	-2.33	-	17.12	-0.07	90.9	318.3	86.4	80.5
70	10.529	0.152	0.107	0.97	102.2	-2.24	101	17.02	-0.10	90.9	314.0	85.8	80.5
71	10.680	0.151	0.106	0.98	102.2	-2.31	-	16.93	-0.09	90.8	311.3	85.7	80.5
72	10.832	0.152	0.107	0.98	102.1	-2.28	-	16.84	-0.09	90.8	310.7	85.9	80.5
73	10.982	0.150	0.104	0.98	102.0	-2.27	-	16.76	-0.08	90.8	306.6	85.7	80.6
74	11.134	0.152	0.105	0.98	102.3	-2.27	-	16.66	-0.10	90.8	306.3	85.8	80.6
75	11.286	0.152	0.104	0.98	102.3	-2.27	-	16.58	-0.08	90.7	304.1	86.1	80.8
76	11.438	0.152	0.105	0.99	102.4	-2.40	-	16.49	-0.09	90.6	303.9	86.3	80.7
77	11.590	0.152	0.106	0.99	102.3	-2.32	-	16.39	-0.10	90.6	304.1	86.6	80.6
78	11.741	0.151	0.107	0.97	102.6	-2.34	-	16.28	-0.11	90.6	304.1	87.1	80.5
79	11.891	0.150	0.106	0.98	102.7	-2.42	-	16.19	-0.09	90.6	303.9	87.4	80.5
80	12.043	0.152	0.104	0.99	102.9	-2.42	102	16.10	-0.09	90.6	302.4	86.5	80.5
81	12.195	0.152	0.105	0.98	102.7	-2.45	-	16.00	-0.10	90.5	303.0	87.8	80.4
82	12.347	0.152	0.106	0.98	102.7	-2.38	-	15.90	-0.10	90.5	304.1	86.7	80.5
83	12.499	0.152	0.108	0.99	102.6	-2.38	-	15.80	-0.10	90.4	303.4	87.0	80.4
84	12.651	0.152	0.107	0.98	102.7	-2.47	-	15.71	-0.09	90.4	303.2	85.8	80.5
85	12.801	0.150	0.107	0.98	102.8	-2.37	-	15.61	-0.10	90.4	304.3	86.2	80.4
86	12.953	0.152	0.107	0.99	102.7	-2.44	-	15.52	-0.09	90.3	304.4	85.8	80.4
87	13.105	0.152	0.106	0.99	102.6	-2.40	-	15.42	-0.10	90.2	306.0	85.8	80.5
88	13.257	0.152	0.104	0.98	102.8	-2.40	-	15.33	-0.09	90.2	304.7	85.3	80.5
89	13.409	0.152	0.108	1.00	102.7	-2.47	-	15.23	-0.10	90.2	303.9	85.2	80.4
90	13.561	0.152	0.109	0.99	102.8	-2.40	102	15.14	-0.09	90.1	303.0	86.3	80.4
91	13.711	0.150	0.108	0.99	102.7	-2.50	-	15.05	-0.09	90.1	301.2	86.0	80.4
92	13.863	0.152	0.106	0.98	102.9	-2.52	-	14.95	-0.10	90.1	299.4	86.6	80.5
93	14.015	0.152	0.106	0.98	102.7	-2.47	-	14.86	-0.09	90.1	302.2	86.7	80.5
94	14.166	0.151	0.108	0.99	102.9	-2.51	-	14.77	-0.09	90.1	302.7	86.6	80.5
95	14.319	0.153	0.105	0.99	103.1	-2.46	-	14.67	-0.10	90.2	303.4	87.1	80.6
96	14.471	0.152	0.105	0.99	102.9	-2.54	-	14.58	-0.09	90.1	301.0	86.9	80.6
97	14.621	0.150	0.108	0.99	103.1	-2.54	-	14.47	-0.11	90.1	301.7	87.4	80.6
98	14.772	0.151	0.107	0.98	103.3	-2.48	-	14.38	-0.09	90.1	302.1	87.2	80.6
99	14.924	0.152	0.108	0.99	103.0	-2.52	-	14.28	-0.10	90.1	303.7	87.2	80.5
100	15.076	0.152	0.107	0.97	103.3	-2.52	101	14.19	-0.09	90.1	303.4	88.0	80.4
101	15.228	0.152	0.107	0.99	103.3	-2.46	-	14.10	-0.09	90.0	301.6	87.8	80.4

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
102	15.380	0.152	0.106	0.99	103.2	-2.57	-	14.01	-0.09	90.1	301.6	87.8	80.6
103	15.531	0.151	0.107	0.98	103.1	-2.57	-	13.92	-0.09	90.0	302.4	86.9	80.5
104	15.682	0.151	0.105	0.99	103.1	-2.56	-	13.83	-0.09	90.0	301.8	87.7	80.5
105	15.833	0.151	0.102	0.97	103.1	-2.50	-	13.74	-0.09	90.0	299.8	86.9	80.5
106	15.985	0.152	0.105	0.97	103.2	-2.56	-	13.66	-0.08	89.9	298.5	86.5	80.5
107	16.138	0.153	0.106	0.97	103.1	-2.48	-	13.58	-0.08	89.9	296.4	86.4	80.4
108	16.289	0.151	0.106	0.98	103.0	-2.51	-	13.49	-0.09	89.8	295.8	85.6	80.4
109	16.440	0.151	0.107	0.97	103.1	-2.49	-	13.42	-0.07	89.8	295.4	85.0	80.3
110	16.591	0.151	0.106	0.98	103.3	-2.58	101	13.34	-0.08	89.7	292.5	85.1	80.2
111	16.743	0.152	0.107	0.97	103.0	-2.60	-	13.25	-0.09	89.8	293.7	85.2	80.5
112	16.895	0.152	0.105	0.98	103.0	-2.61	-	13.18	-0.07	89.7	295.3	85.7	80.5
113	17.047	0.152	0.107	0.98	103.0	-2.53	-	13.10	-0.08	89.8	293.5	85.5	80.5
114	17.199	0.152	0.106	0.98	103.2	-2.50	-	13.01	-0.09	89.8	293.0	85.5	80.4
115	17.350	0.151	0.106	0.99	102.9	-2.52	-	12.93	-0.08	89.7	292.9	86.4	80.5
116	17.500	0.150	0.107	0.98	102.9	-2.55	-	12.85	-0.08	89.6	292.7	86.2	80.5
117	17.652	0.152	0.107	0.99	103.3	-2.51	-	12.77	-0.08	89.7	292.3	87.1	80.5
118	17.804	0.152	0.107	0.98	103.2	-2.54	-	12.69	-0.08	89.7	292.4	87.3	80.5
119	17.956	0.152	0.107	0.98	103.5	-2.57	-	12.60	-0.09	89.7	293.3	87.1	80.4
120	18.108	0.152	0.108	0.98	103.3	-2.64	101	12.53	-0.07	89.6	292.2	87.0	80.5
121	18.260	0.152	0.108	0.97	103.4	-2.59	-	12.44	-0.09	89.6	291.0	87.9	80.5
122	18.410	0.150	0.107	0.99	103.4	-2.67	-	12.36	-0.08	89.6	289.6	87.8	80.4
123	18.561	0.151	0.108	0.99	103.5	-2.57	-	12.28	-0.08	89.5	287.8	87.7	80.4
124	18.713	0.152	0.106	0.99	103.5	-2.56	-	12.21	-0.07	89.4	287.9	87.7	80.3
125	18.865	0.152	0.107	0.97	103.2	-2.60	-	12.14	-0.07	89.4	286.2	86.9	80.3
126	19.017	0.152	0.106	0.99	103.5	-2.65	-	12.06	-0.08	89.3	283.4	86.6	80.2
127	19.169	0.152	0.107	0.98	103.0	-2.61	-	11.99	-0.07	89.2	283.3	85.8	80.2
128	19.319	0.150	0.107	0.97	103.3	-2.63	-	11.93	-0.06	89.2	282.4	86.3	80.1
129	19.470	0.151	0.107	0.97	103.2	-2.66	-	11.85	-0.08	89.2	282.8	85.6	80.1
130	19.622	0.152	0.106	0.98	103.3	-2.71	101	11.79	-0.06	89.2	283.1	85.5	80.1
131	19.774	0.152	0.107	0.99	103.1	-2.62	-	11.71	-0.08	89.2	282.3	85.6	80.1
132	19.926	0.152	0.108	0.97	103.1	-2.64	-	11.64	-0.07	89.1	283.7	85.3	80.2
133	20.077	0.151	0.105	0.98	103.5	-2.69	-	11.58	-0.06	89.2	283.3	86.3	80.2
134	20.229	0.152	0.107	0.98	103.2	-2.63	-	11.51	-0.07	89.2	281.3	86.0	80.3
135	20.379	0.150	0.106	0.98	103.4	-2.71	-	11.43	-0.08	89.2	281.7	86.2	80.3

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
136	20.531	0.152	0.107	0.99	103.2	-2.67	-	11.37	-0.06	89.2	279.0	86.9	80.4
137	20.683	0.152	0.107	0.98	103.3	-2.75	-	11.30	-0.07	89.1	277.1	86.1	80.3
138	20.834	0.151	0.107	0.98	103.4	-2.67	-	11.23	-0.07	89.0	277.1	86.4	80.2
139	20.986	0.152	0.106	0.99	103.1	-2.71	-	11.17	-0.06	89.0	274.7	87.0	80.2
140	21.138	0.152	0.107	0.98	103.2	-2.69	101	11.11	-0.06	89.0	273.6	87.2	80.2
141	21.288	0.150	0.108	0.97	103.0	-2.68	-	11.04	-0.07	88.9	273.4	87.8	80.1
142	21.439	0.151	0.107	0.98	103.1	-2.72	-	10.99	-0.05	88.9	272.7	87.5	80.1
143	21.591	0.152	0.106	0.99	103.1	-2.69	-	10.91	-0.08	88.9	272.7	87.4	80.0
144	21.742	0.151	0.108	0.98	103.1	-2.71	-	10.85	-0.06	88.8	274.2	87.0	80.1
145	21.894	0.152	0.106	0.97	103.3	-2.67	-	10.78	-0.07	88.7	271.9	86.8	80.2
146	22.046	0.152	0.105	0.97	103.2	-2.69	-	10.72	-0.06	88.7	272.7	86.0	80.1
147	22.197	0.151	0.108	0.99	103.0	-2.70	-	10.67	-0.05	88.6	271.6	86.0	80.1
148	22.348	0.151	0.109	0.99	103.4	-2.70	-	10.59	-0.08	88.5	270.7	85.7	80.0
149	22.499	0.151	0.108	0.98	103.3	-2.78	-	10.54	-0.05	88.5	268.5	84.9	80.0
150	22.651	0.152	0.107	0.98	103.0	-2.75	101	10.48	-0.06	88.4	267.6	84.7	80.0
151	22.803	0.152	0.107	0.99	103.1	-2.73	-	10.42	-0.06	88.3	267.7	84.9	79.9
152	22.955	0.152	0.107	0.98	103.6	-2.81	-	10.36	-0.06	88.3	268.7	85.0	79.9
153	23.106	0.151	0.108	0.99	103.1	-2.72	-	10.30	-0.06	88.3	270.5	85.9	79.8
154	23.256	0.150	0.108	0.99	103.1	-2.81	-	10.24	-0.06	88.4	278.3	85.8	79.9
155	23.408	0.152	0.107	0.97	103.1	-2.71	-	10.18	-0.06	88.4	284.3	86.7	79.9
156	23.559	0.151	0.106	0.99	103.2	-2.76	-	10.13	-0.05	88.5	288.0	86.7	80.0
157	23.711	0.152	0.107	0.98	103.2	-2.76	-	10.06	-0.07	88.5	286.3	85.9	79.9
158	23.863	0.152	0.107	0.98	103.1	-2.73	-	10.02	-0.04	88.5	287.4	87.0	79.9
159	24.015	0.152	0.107	0.98	103.0	-2.73	-	9.96	-0.06	88.5	286.3	86.2	79.9
160	24.165	0.150	0.107	0.98	103.4	-2.84	101	9.90	-0.06	88.5	287.0	85.7	79.8
161	24.316	0.151	0.107	1.00	103.3	-2.74	-	9.84	-0.06	88.5	284.9	85.7	79.9
162	24.467	0.151	0.107	0.99	103.3	-2.76	-	9.79	-0.05	88.5	286.0	85.8	80.0
163	24.619	0.152	0.110	0.98	103.2	-2.73	-	9.74	-0.05	88.5	283.1	85.4	79.8
164	24.771	0.152	0.107	0.98	103.2	-2.88	-	9.69	-0.05	88.4	283.2	85.4	79.9
165	24.922	0.151	0.107	0.99	103.5	-2.83	-	9.63	-0.06	88.4	284.4	86.2	79.9
166	25.074	0.152	0.107	0.99	103.2	-2.87	-	9.58	-0.05	88.4	283.2	86.4	80.0
167	25.224	0.150	0.108	0.98	103.1	-2.85	-	9.51	-0.07	88.4	284.6	86.6	80.1
168	25.375	0.151	0.109	0.97	103.1	-2.80	-	9.46	-0.05	88.4	282.6	86.6	79.9
169	25.527	0.152	0.108	0.97	103.2	-2.79	-	9.42	-0.04	88.3	279.3	86.1	80.0

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
170	25.678	0.151	0.107	0.98	103.0	-2.89	101	9.36	-0.06	88.2	277.6	86.5	79.9
171	25.830	0.152	0.108	0.98	103.1	-2.82	-	9.29	-0.07	88.8	310.7	86.5	79.8
172	25.982	0.152	0.108	0.96	103.3	-2.87	-	9.21	-0.08	89.2	324.2	86.8	79.9
173	26.132	0.150	0.106	0.98	103.2	-2.81	-	9.14	-0.07	89.5	328.4	86.8	79.8
174	26.282	0.150	0.109	0.97	103.2	-2.85	-	9.06	-0.08	89.6	331.1	86.1	79.8
175	26.434	0.152	0.108	0.97	102.8	-2.83	-	8.98	-0.08	89.6	331.2	85.9	79.9
176	26.585	0.151	0.109	0.98	103.1	-2.88	-	8.90	-0.08	89.7	330.4	85.8	79.9
177	26.736	0.151	0.108	0.97	103.1	-2.86	-	8.84	-0.06	89.7	332.3	84.9	79.9
178	26.888	0.152	0.108	0.97	103.2	-2.81	-	8.76	-0.08	89.6	333.3	85.4	79.9
179	27.039	0.151	0.109	0.98	103.1	-2.92	-	8.68	-0.08	89.6	334.3	85.1	80.0
180	27.190	0.151	0.109	0.98	103.0	-2.90	100	8.61	-0.07	89.6	336.7	84.7	79.9
181	27.340	0.150	0.107	0.98	103.1	-2.80	-	8.53	-0.08	89.7	336.4	85.1	80.0
182	27.491	0.151	0.106	0.99	102.7	-2.89	-	8.47	-0.06	89.7	335.0	85.6	80.0
183	27.642	0.151	0.107	0.98	102.9	-2.81	-	8.39	-0.08	89.8	336.4	85.3	80.0
184	27.794	0.152	0.108	0.98	103.1	-2.81	-	8.31	-0.08	89.8	337.0	85.8	79.9
185	27.945	0.151	0.108	0.99	103.1	-2.87	-	8.24	-0.07	89.8	339.2	85.5	80.0
186	28.096	0.151	0.107	0.96	103.0	-2.76	-	8.16	-0.08	89.8	340.5	85.9	80.0
187	28.247	0.151	0.107	0.98	102.7	-2.85	-	8.10	-0.06	89.8	337.4	85.9	80.0
188	28.397	0.150	0.106	0.98	102.9	-2.78	-	8.02	-0.08	89.9	338.6	86.0	80.1
189	28.548	0.151	0.107	0.98	103.1	-2.75	-	7.96	-0.06	90.0	341.0	86.3	80.2
190	28.699	0.151	0.107	0.97	102.8	-2.81	100	7.88	-0.08	90.0	339.3	86.4	80.3
191	28.851	0.152	0.108	0.98	103.1	-2.88	-	7.81	-0.07	90.0	338.1	87.0	80.4
192	29.002	0.151	0.107	0.97	103.2	-2.84	-	7.74	-0.07	90.0	337.2	87.1	80.3
193	29.153	0.151	0.108	0.98	103.2	-2.88	-	7.67	-0.07	90.1	338.8	87.1	80.3
194	29.304	0.151	0.106	0.98	103.0	-2.83	-	7.59	-0.08	90.1	340.8	87.6	80.3
195	29.454	0.150	0.106	0.97	102.9	-2.81	-	7.53	-0.06	90.2	341.2	87.3	80.1
196	29.605	0.151	0.108	0.98	102.9	-2.76	-	7.44	-0.09	90.2	342.4	86.4	80.2
197	29.755	0.150	0.107	0.97	103.0	-2.79	-	7.37	-0.07	90.3	342.7	86.0	80.3
198	29.907	0.152	0.108	0.98	103.1	-2.76	-	7.29	-0.08	90.2	344.4	85.9	80.2
199	30.058	0.151	0.107	0.99	102.8	-2.77	-	7.21	-0.08	90.3	344.5	85.1	80.2
200	30.209	0.151	0.107	0.97	102.7	-2.73	101	7.14	-0.07	90.3	345.9	85.0	80.3
201	30.360	0.151	0.107	0.97	103.1	-2.78	-	7.05	-0.09	90.3	347.8	85.5	80.3
202	30.511	0.151	0.106	0.98	103.0	-2.81	-	6.96	-0.09	90.5	351.8	86.3	80.4
203	30.660	0.149	0.108	0.97	103.0	-2.78	-	6.88	-0.08	90.5	353.7	86.1	80.4

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
204	30.811	0.151	0.106	0.98	103.1	-2.81	-	6.80	-0.08	90.6	353.2	86.2	80.5
205	30.962	0.151	0.108	0.99	103.0	-2.72	-	6.71	-0.09	90.6	354.5	85.9	80.5
206	31.113	0.151	0.106	0.97	103.0	-2.73	-	6.62	-0.09	90.6	356.1	85.6	80.5
207	31.264	0.151	0.106	0.98	102.9	-2.76	-	6.54	-0.08	90.7	354.8	86.4	80.5
208	31.415	0.151	0.109	0.97	103.1	-2.74	-	6.46	-0.08	90.8	356.2	86.7	80.6
209	31.566	0.151	0.107	0.98	103.1	-2.82	-	6.37	-0.09	90.8	357.8	86.8	80.6
210	31.716	0.150	0.107	0.98	103.0	-2.71	101	6.29	-0.08	90.8	359.9	87.0	80.6
211	31.866	0.150	0.106	0.98	103.1	-2.77	-	6.20	-0.09	90.8	358.7	87.2	80.6
212	32.016	0.150	0.107	0.97	102.9	-2.79	-	6.12	-0.08	90.8	356.6	87.1	80.4
213	32.167	0.151	0.106	0.97	103.2	-2.72	-	6.04	-0.08	90.8	355.3	87.9	80.3
214	32.317	0.150	0.107	0.97	102.7	-2.79	-	5.98	-0.06	90.7	355.5	87.3	80.4
215	32.467	0.150	0.106	0.97	103.0	-2.77	-	5.91	-0.07	90.7	351.6	86.7	80.4
216	32.618	0.151	0.108	0.97	102.9	-2.69	-	5.86	-0.05	90.6	346.4	86.2	80.4
217	32.769	0.151	0.108	0.97	102.6	-2.76	-	5.81	-0.05	90.6	343.1	86.3	80.4
218	32.919	0.150	0.108	0.97	102.9	-2.76	-	5.76	-0.05	90.5	340.4	85.8	80.4
219	33.069	0.150	0.109	0.97	103.0	-2.68	-	5.72	-0.04	90.5	338.0	86.0	80.5
220	33.218	0.149	0.107	0.98	102.9	-2.80	100	5.67	-0.05	90.4	336.9	85.4	80.4
221	33.368	0.150	0.107	0.97	102.9	-2.77	-	5.62	-0.05	90.4	333.6	85.2	80.3
222	33.518	0.150	0.108	0.97	102.9	-2.69	-	5.58	-0.04	90.4	333.8	85.4	80.4
223	33.669	0.151	0.108	0.97	102.8	-2.71	-	5.54	-0.04	90.4	332.0	85.5	80.5
224	33.819	0.150	0.108	0.96	102.7	-2.77	-	5.49	-0.05	90.3	331.4	85.4	80.5
225	33.969	0.150	0.107	0.97	102.9	-2.81	-	5.43	-0.06	90.3	329.1	86.4	80.5
226	34.120	0.151	0.108	0.98	103.1	-2.70	-	5.39	-0.04	90.3	327.2	86.4	80.4
227	34.270	0.150	0.105	0.96	102.9	-2.73	-	5.34	-0.05	90.2	327.5	86.2	80.5
228	34.420	0.150	0.108	0.96	102.8	-2.78	-	5.30	-0.04	90.2	327.3	86.5	80.4
229	34.570	0.150	0.107	0.97	102.6	-2.69	-	5.25	-0.05	90.1	327.4	86.5	80.5
230	34.719	0.149	0.106	0.96	102.8	-2.74	100	5.19	-0.06	90.1	326.9	85.6	80.5
231	34.868	0.149	0.108	0.96	103.0	-2.79	-	5.14	-0.05	90.1	326.0	86.1	80.5
232	35.018	0.150	0.108	0.97	102.8	-2.76	-	5.09	-0.05	90.1	326.8	86.1	80.5
233	35.168	0.150	0.107	0.97	102.9	-2.85	-	5.05	-0.04	90.0	326.3	85.4	80.4
234	35.319	0.151	0.110	0.97	102.5	-2.82	-	5.00	-0.05	90.0	326.3	85.5	80.4
235	35.469	0.150	0.107	0.97	102.8	-2.86	-	4.95	-0.05	89.9	326.8	84.9	80.4
236	35.620	0.151	0.107	0.96	102.8	-2.84	-	4.91	-0.04	89.8	325.5	85.9	80.4
237	35.769	0.149	0.108	0.97	102.8	-2.87	-	4.87	-0.04	89.8	324.7	86.1	80.5

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
238	35.920	0.151	0.110	0.96	102.8	-2.76	-	4.81	-0.06	89.8	325.1	85.9	80.5
239	36.069	0.149	0.108	0.96	103.0	-2.81	-	4.77	-0.04	89.8	323.4	86.5	80.5
240	36.219	0.150	0.108	0.98	103.1	-2.77	100	4.74	-0.03	89.8	322.6	86.0	80.5
241	36.368	0.149	0.109	0.98	102.6	-2.87	-	4.69	-0.05	89.7	321.3	86.4	80.5
242	36.518	0.150	0.108	0.96	102.8	-2.79	-	4.64	-0.05	89.6	319.5	86.5	80.4
243	36.668	0.150	0.108	0.98	102.7	-2.81	-	4.60	-0.04	89.6	317.9	86.8	80.5
244	36.818	0.150	0.107	0.96	102.7	-2.84	-	4.56	-0.04	89.6	316.9	86.9	80.5
245	36.968	0.150	0.108	0.96	102.9	-2.89	-	4.52	-0.04	89.6	313.9	86.4	80.5
246	37.119	0.151	0.107	0.96	102.9	-2.78	-	4.49	-0.03	89.6	314.9	86.0	80.5
247	37.269	0.150	0.108	0.98	102.7	-2.87	-	4.45	-0.04	89.5	313.0	85.8	80.3
248	37.419	0.150	0.108	0.95	102.6	-2.79	-	4.41	-0.04	89.4	311.7	86.4	80.3
249	37.569	0.150	0.108	0.96	102.6	-2.86	-	4.38	-0.03	89.4	310.3	85.0	80.3
250	37.718	0.149	0.109	0.98	102.7	-2.87	99	4.34	-0.04	89.3	308.6	86.0	80.3
251	37.868	0.150	0.108	0.96	102.6	-2.88	-	4.30	-0.04	89.2	306.7	85.4	80.2
252	38.018	0.150	0.108	0.97	102.3	-2.87	-	4.27	-0.03	89.2	304.8	85.8	80.3
253	38.167	0.149	0.107	0.96	102.5	-2.93	-	4.23	-0.04	89.2	302.2	85.3	80.3
254	38.317	0.150	0.108	0.96	102.7	-2.86	-	4.20	-0.03	89.1	301.8	86.0	80.4
255	38.468	0.151	0.108	0.96	102.7	-2.80	-	4.17	-0.03	89.0	300.8	86.2	80.4
256	38.617	0.149	0.108	0.97	102.7	-2.85	-	4.14	-0.03	88.9	298.5	85.9	80.4
257	38.768	0.151	0.108	0.97	102.7	-2.86	-	4.12	-0.02	88.9	295.8	86.0	80.4
258	38.918	0.150	0.108	0.97	102.9	-2.92	-	4.09	-0.03	88.8	295.3	86.2	80.4
259	39.067	0.149	0.109	0.95	102.6	-2.90	-	4.07	-0.02	88.7	294.5	86.8	80.4
260	39.217	0.150	0.110	0.95	102.7	-2.89	99	4.04	-0.03	88.7	293.9	86.7	80.4
261	39.367	0.150	0.107	0.97	102.4	-2.93	-	4.02	-0.02	88.6	291.7	87.3	80.4
262	39.516	0.149	0.107	0.96	102.8	-2.95	-	4.00	-0.02	88.6	290.6	86.9	80.3
263	39.665	0.149	0.108	0.97	102.8	-2.85	-	3.99	-0.01	88.5	290.7	85.9	80.4
264	39.815	0.150	0.107	0.99	103.0	-2.92	-	3.96	-0.03	88.4	288.7	86.0	80.4
265	39.965	0.150	0.109	0.97	102.5	-2.90	-	3.94	-0.02	88.3	283.7	85.3	80.4
266	40.115	0.150	0.108	0.97	102.7	-2.94	-	3.92	-0.02	88.2	282.6	86.0	80.4
267	40.265	0.150	0.108	0.95	102.7	-2.88	-	3.90	-0.02	88.2	280.8	85.4	80.3
268	40.415	0.150	0.110	0.96	102.8	-2.95	-	3.88	-0.02	88.1	277.6	85.1	80.4
269	40.565	0.150	0.108	0.95	102.5	-2.91	-	3.86	-0.02	88.0	275.9	84.6	80.3
270	40.715	0.150	0.107	0.96	102.4	-2.94	99	3.84	-0.02	87.9	276.3	84.4	80.2
271	40.865	0.150	0.107	0.96	102.6	-2.99	-	3.81	-0.03	87.9	273.9	84.6	80.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
272	41.014	0.149	0.108	0.97	102.7	-2.99	-	3.79	-0.02	87.9	273.0	84.9	80.2
273	41.163	0.149	0.108	0.98	102.7	-2.97	-	3.78	-0.01	87.8	272.4	85.2	80.1
274	41.313	0.150	0.108	0.96	102.5	-2.97	-	3.76	-0.02	87.7	272.6	84.1	80.1
275	41.463	0.150	0.107	0.96	102.5	-2.89	-	3.74	-0.02	87.6	271.6	85.0	80.1
276	41.613	0.150	0.109	0.96	102.6	-2.97	-	3.72	-0.02	87.5	270.0	85.4	80.2
277	41.763	0.150	0.109	0.98	102.6	-2.99	-	3.71	-0.01	87.5	268.4	85.8	80.2
278	41.913	0.150	0.109	0.96	102.6	-2.94	-	3.69	-0.02	87.4	266.3	86.1	80.2
279	42.063	0.150	0.108	0.97	102.9	-2.92	-	3.67	-0.02	87.3	264.6	85.9	80.1
280	42.213	0.150	0.109	0.96	102.6	-2.97	99	3.65	-0.02	87.2	263.4	86.3	80.1
281	42.363	0.150	0.107	0.95	102.2	-3.01	-	3.62	-0.03	87.2	262.7	86.6	80.1
282	42.513	0.150	0.105	0.97	102.5	-2.91	-	3.61	-0.01	87.2	261.9	86.3	80.2
283	42.662	0.149	0.109	0.96	102.6	-3.01	-	3.59	-0.02	87.0	260.7	85.7	80.1
284	42.811	0.149	0.107	0.96	102.5	-3.02	-	3.57	-0.02	87.0	260.5	85.9	80.2
285	42.961	0.150	0.105	0.97	102.7	-3.05	-	3.56	-0.01	86.9	259.7	85.3	80.1
286	43.111	0.150	0.109	0.97	102.8	-3.03	-	3.55	-0.01	86.9	259.2	85.3	80.1
287	43.260	0.149	0.108	0.96	102.6	-2.96	-	3.52	-0.03	86.8	258.3	84.8	80.0
288	43.410	0.150	0.106	0.97	102.4	-3.02	-	3.50	-0.02	86.7	256.9	84.3	80.0
289	43.560	0.150	0.108	0.97	102.6	-2.95	-	3.48	-0.02	86.7	257.2	85.0	80.1
290	43.710	0.150	0.107	0.95	102.3	-3.05	99	3.47	-0.01	86.6	256.9	84.7	80.1
291	43.860	0.150	0.107	0.97	102.6	-2.94	-	3.44	-0.03	86.6	256.2	85.2	80.0
292	44.010	0.150	0.109	0.96	102.7	-2.93	-	3.43	-0.01	86.6	256.8	85.3	80.0
293	44.160	0.150	0.107	0.97	102.5	-3.02	-	3.41	-0.02	86.5	255.5	85.5	79.9
294	44.310	0.150	0.108	0.97	102.8	-3.05	-	3.40	-0.01	86.5	254.7	85.2	79.9
295	44.459	0.149	0.109	0.97	102.4	-2.95	-	3.38	-0.02	86.4	252.8	86.3	79.9
296	44.608	0.149	0.107	0.97	102.3	-3.05	-	3.36	-0.02	86.3	251.8	85.2	79.9
297	44.758	0.150	0.107	0.96	102.2	-2.97	-	3.34	-0.02	86.3	251.3	85.5	79.9
298	44.907	0.149	0.107	0.96	102.7	-3.03	-	3.33	-0.01	86.3	251.5	85.4	79.9
299	45.057	0.150	0.108	0.97	102.3	-2.95	-	3.31	-0.02	86.2	251.1	84.8	79.9
300	45.207	0.150	0.108	0.96	102.8	-2.95	99	3.29	-0.02	86.2	249.8	84.8	79.9
301	45.357	0.150	0.109	0.96	102.7	-2.98	-	3.27	-0.02	86.2	250.0	85.2	79.9
302	45.508	0.151	0.108	0.95	102.4	-2.96	-	3.25	-0.02	86.1	247.9	84.4	79.9
303	45.658	0.150	0.109	0.97	102.4	-2.96	-	3.24	-0.01	86.0	247.5	84.8	79.9
304	45.807	0.149	0.106	0.97	102.3	-2.97	-	3.22	-0.02	86.1	247.0	84.7	79.8
305	45.958	0.151	0.108	0.97	102.6	-3.01	-	3.20	-0.02	86.0	247.2	84.1	79.9

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
306	46.107	0.149	0.108	0.97	102.4	-2.99	-	3.19	-0.01	85.9	248.9	84.3	79.9
307	46.256	0.149	0.108	0.97	102.7	-3.02	-	3.17	-0.02	85.9	248.8	85.6	79.8
308	46.405	0.149	0.110	0.97	102.5	-3.06	-	3.15	-0.02	85.9	248.3	85.6	79.8
309	46.555	0.150	0.109	0.96	102.5	-3.01	-	3.13	-0.02	85.9	249.7	86.3	79.9
310	46.705	0.150	0.108	0.96	102.4	-3.02	99	3.11	-0.02	85.9	247.6	86.2	79.8
311	46.855	0.150	0.108	0.97	102.3	-3.05	-	3.09	-0.02	85.8	248.2	86.4	79.8
312	47.005	0.150	0.107	0.96	102.3	-2.97	-	3.08	-0.01	85.8	248.6	86.5	79.9
313	47.155	0.150	0.107	0.96	102.3	-3.00	-	3.06	-0.02	85.8	248.7	86.5	79.8
314	47.304	0.149	0.106	0.96	102.3	-3.00	-	3.03	-0.03	85.7	249.7	87.3	79.8
315	47.454	0.150	0.108	0.98	102.3	-3.01	-	3.01	-0.02	85.7	248.2	87.2	79.7
316	47.604	0.150	0.108	0.96	102.3	-2.96	-	3.00	-0.01	85.7	249.5	87.3	79.7
317	47.754	0.150	0.107	0.97	102.3	-3.05	-	2.98	-0.02	85.7	249.6	86.3	79.7
318	47.903	0.149	0.108	0.96	102.2	-3.03	-	2.96	-0.02	85.6	250.4	85.9	79.8
319	48.052	0.149	0.109	0.96	102.1	-3.02	-	2.94	-0.02	85.6	250.2	86.0	79.7
320	48.202	0.150	0.108	0.97	102.2	-2.97	99	2.92	-0.02	85.6	251.8	85.1	79.7
321	48.351	0.149	0.108	0.96	102.1	-3.08	-	2.90	-0.02	85.6	251.6	84.7	79.8
322	48.501	0.150	0.108	0.98	102.1	-3.03	-	2.89	-0.01	85.6	252.7	84.8	79.7
323	48.651	0.150	0.108	0.97	102.3	-2.98	-	2.87	-0.02	85.6	253.8	84.9	79.7
324	48.801	0.150	0.108	0.97	102.2	-3.07	-	2.84	-0.03	85.5	253.9	84.7	79.7
325	48.951	0.150	0.108	0.96	102.4	-2.98	-	2.82	-0.02	85.6	253.7	84.4	79.8
326	49.101	0.150	0.108	0.95	102.1	-3.04	-	2.80	-0.02	85.5	254.1	84.6	79.7
327	49.251	0.150	0.108	0.97	102.4	-3.08	-	2.79	-0.01	85.5	254.2	84.2	79.7
328	49.401	0.150	0.108	0.96	102.3	-2.97	-	2.76	-0.03	85.5	253.1	84.9	79.7
329	49.550	0.149	0.107	0.97	102.5	-2.99	-	2.75	-0.01	85.5	254.2	84.9	79.8
330	49.699	0.149	0.107	0.97	102.3	-2.96	99	2.74	-0.01	85.4	253.8	84.5	79.6
331	49.849	0.150	0.109	0.97	102.2	-3.08	-	2.71	-0.03	85.4	253.3	84.9	79.6
332	49.999	0.150	0.108	0.96	102.4	-3.07	-	2.70	-0.01	85.3	253.0	85.8	79.6
333	50.148	0.149	0.107	0.97	102.3	-3.08	-	2.68	-0.02	85.4	252.6	85.9	79.6
334	50.298	0.150	0.108	0.96	102.2	-3.08	-	2.66	-0.02	85.3	253.7	85.4	79.5
335	50.448	0.150	0.108	0.96	102.6	-3.07	-	2.64	-0.02	85.3	252.6	85.4	79.6
336	50.598	0.150	0.108	0.97	102.2	-2.97	-	2.62	-0.02	85.3	251.3	85.2	79.6
337	50.748	0.150	0.106	0.96	102.2	-3.07	-	2.59	-0.03	85.3	251.8	84.6	79.6
338	50.898	0.150	0.109	0.97	102.0	-2.98	-	2.57	-0.02	85.2	252.2	84.3	79.6
339	51.048	0.150	0.108	0.96	102.3	-3.06	-	2.55	-0.02	85.2	253.0	83.9	79.6

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
340	51.197	0.149	0.108	0.97	102.3	-3.04	99	2.54	-0.01	85.2	254.1	84.2	79.5
341	51.346	0.149	0.109	0.96	102.1	-3.05	-	2.51	-0.03	85.2	253.6	83.4	79.5
342	51.495	0.149	0.107	0.96	102.0	-2.99	-	2.50	-0.01	85.2	253.1	83.0	79.4
343	51.645	0.150	0.107	0.96	102.2	-2.98	-	2.48	-0.02	85.2	252.5	83.5	79.3
344	51.795	0.150	0.107	0.97	102.5	-2.96	-	2.45	-0.03	85.2	252.1	83.8	79.4
345	51.945	0.150	0.108	0.97	102.3	-2.97	-	2.43	-0.02	85.1	252.6	83.7	79.3
346	52.095	0.150	0.108	0.96	102.2	-2.98	-	2.40	-0.03	85.1	252.8	84.0	79.4
347	52.244	0.149	0.107	0.97	102.2	-2.94	-	2.39	-0.01	85.1	252.7	84.4	79.4
348	52.394	0.150	0.108	0.97	101.9	-2.96	-	2.38	-0.01	85.1	253.0	85.0	79.3
349	52.544	0.150	0.107	0.96	102.1	-3.06	-	2.35	-0.03	85.1	253.4	84.5	79.4
350	52.694	0.150	0.108	0.97	102.1	-2.95	99	2.32	-0.03	85.1	254.0	84.5	79.4
351	52.844	0.150	0.106	0.95	102.0	-3.04	-	2.31	-0.01	85.1	254.7	84.8	79.3
352	52.993	0.149	0.108	0.95	101.9	-3.02	-	2.29	-0.02	85.1	255.6	85.1	79.4
353	53.142	0.149	0.109	0.97	101.7	-3.01	-	2.27	-0.02	85.0	256.7	85.5	79.4
354	53.291	0.149	0.108	0.96	102.1	-2.97	-	2.25	-0.02	85.0	257.0	84.9	79.4
355	53.441	0.150	0.109	0.96	102.3	-2.96	-	2.23	-0.02	85.1	257.3	85.5	79.4
356	53.590	0.149	0.109	0.97	102.0	-3.03	-	2.20	-0.03	85.1	258.1	84.6	79.4
357	53.740	0.150	0.107	0.96	101.9	-3.00	-	2.19	-0.01	85.0	256.2	85.0	79.4
358	53.890	0.150	0.108	0.97	101.8	-2.97	-	2.17	-0.02	85.0	255.5	84.5	79.3
359	54.039	0.149	0.108	0.97	102.1	-2.96	-	2.15	-0.02	85.0	256.4	84.7	79.4
360	54.189	0.150	0.110	0.96	101.8	-2.95	99	2.13	-0.02	84.9	253.6	83.3	79.4
361	54.339	0.150	0.107	0.97	101.7	-2.90	-	2.11	-0.02	84.9	252.5	83.5	79.4
362	54.489	0.150	0.108	0.96	101.9	-2.95	-	2.09	-0.02	84.9	252.6	83.7	79.3
363	54.639	0.150	0.107	0.97	101.9	-2.96	-	2.08	-0.01	84.9	255.0	84.0	79.3
364	54.789	0.150	0.107	0.95	102.0	-3.04	-	2.05	-0.03	84.9	254.9	84.5	79.3
365	54.937	0.148	0.107	0.96	102.0	-3.00	-	2.04	-0.01	84.8	253.9	84.3	79.3
366	55.086	0.149	0.109	0.97	102.2	-3.01	-	2.02	-0.02	84.8	255.4	85.1	79.2
367	55.236	0.150	0.108	0.97	101.8	-3.03	-	2.00	-0.02	84.8	254.7	84.6	79.2
368	55.386	0.150	0.108	0.97	101.7	-3.04	-	1.98	-0.02	84.8	254.2	84.8	79.2
369	55.535	0.149	0.107	0.96	101.9	-3.06	-	1.97	-0.01	84.8	253.5	85.4	79.2
370	55.685	0.150	0.108	0.97	101.9	-2.98	99	1.95	-0.02	84.8	253.7	84.7	79.2
371	55.835	0.150	0.109	0.97	101.9	-2.93	-	1.92	-0.03	84.8	253.5	85.2	79.2
372	55.984	0.149	0.109	0.95	101.9	-2.92	-	1.91	-0.01	84.8	253.6	85.0	79.1
373	56.135	0.151	0.108	0.98	102.0	-3.08	-	1.90	-0.01	84.6	251.8	84.4	79.1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
374	56.284	0.149	0.108	0.97	101.8	-3.01	-	1.88	-0.02	84.7	252.9	84.2	79.2
375	56.434	0.150	0.108	0.97	101.7	-2.91	-	1.86	-0.02	84.6	252.8	83.7	79.1
376	56.584	0.150	0.108	0.95	101.8	-2.95	-	1.84	-0.02	84.6	253.3	83.7	79.1
377	56.733	0.149	0.109	0.97	101.8	-2.93	-	1.82	-0.02	84.5	254.4	83.1	79.1
378	56.882	0.149	0.109	0.96	101.6	-2.93	-	1.80	-0.02	84.6	254.1	83.8	79.1
379	57.031	0.149	0.107	0.97	101.9	-2.97	-	1.78	-0.02	84.6	254.3	83.6	79.0
380	57.181	0.150	0.107	0.98	101.9	-2.91	99	1.76	-0.02	84.5	253.7	83.6	79.1
381	57.330	0.149	0.109	0.98	101.7	-3.03	-	1.75	-0.01	84.6	254.4	83.9	79.1
382	57.480	0.150	0.108	0.96	101.8	-2.92	-	1.72	-0.03	84.6	255.3	84.6	79.1
383	57.630	0.150	0.108	0.96	101.7	-2.99	-	1.71	-0.01	84.5	255.9	85.1	79.1
384	57.779	0.149	0.108	0.97	101.8	-2.93	-	1.68	-0.03	84.5	255.0	85.4	79.0
385	57.930	0.151	0.109	0.96	101.8	-2.98	-	1.66	-0.02	84.5	255.3	86.0	79.0
386	58.079	0.149	0.108	0.96	101.6	-2.95	-	1.65	-0.01	84.5	255.6	86.1	79.0
387	58.229	0.150	0.108	0.97	101.6	-3.02	-	1.63	-0.02	84.5	255.2	85.2	79.0
388	58.378	0.149	0.107	0.96	101.7	-2.91	-	1.61	-0.02	84.5	253.9	85.0	78.9
389	58.528	0.150	0.108	0.98	101.6	-2.96	-	1.59	-0.02	84.4	252.2	84.5	79.0
390	58.677	0.149	0.108	0.97	101.7	-2.95	99	1.57	-0.02	84.4	251.5	84.4	78.9
391	58.826	0.149	0.107	0.96	101.6	-2.97	-	1.56	-0.01	84.4	251.2	84.0	78.9
392	58.975	0.149	0.109	0.96	101.6	-2.98	-	1.54	-0.02	84.4	252.4	83.7	78.8
393	59.125	0.150	0.108	0.96	101.6	-2.98	-	1.51	-0.03	84.3	251.1	83.7	78.9
394	59.275	0.150	0.106	0.97	101.7	-3.03	-	1.50	-0.01	84.3	252.5	83.7	78.8
395	59.424	0.149	0.109	0.98	101.6	-2.96	-	1.49	-0.01	84.3	251.8	83.4	78.8
396	59.574	0.150	0.106	0.97	101.3	-2.92	-	1.47	-0.02	84.3	250.2	82.8	78.8
397	59.724	0.150	0.109	0.97	101.4	-2.93	-	1.45	-0.02	84.3	249.0	83.3	78.8
398	59.874	0.150	0.107	0.97	101.4	-3.03	-	1.43	-0.02	84.2	248.7	83.3	78.8
399	60.023	0.149	0.108	0.95	101.6	-2.98	-	1.41	-0.02	84.2	248.1	83.3	78.8
400	60.173	0.150	0.108	0.96	101.5	-2.94	99	1.39	-0.02	84.2	247.0	83.9	78.8
401	60.323	0.150	0.108	0.96	101.6	-2.98	-	1.38	-0.01	84.2	246.8	83.9	78.9
402	60.472	0.149	0.108	0.97	101.3	-2.96	-	1.36	-0.02	84.1	244.9	84.0	78.8
403	60.621	0.149	0.107	0.96	101.6	-2.91	-	1.34	-0.02	84.1	244.2	84.4	78.8
404	60.770	0.149	0.108	0.97	101.5	-3.03	-	1.33	-0.01	84.1	243.7	84.0	78.7
405	60.920	0.150	0.108	0.95	101.3	-3.04	-	1.31	-0.02	84.0	244.7	84.2	78.8
406	61.069	0.149	0.109	0.96	101.7	-2.96	-	1.30	-0.01	84.0	244.9	84.0	78.7
407	61.219	0.150	0.106	0.98	101.4	-3.01	-	1.28	-0.02	84.0	243.1	84.8	78.7

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
408	61.368	0.149	0.107	0.95	101.5	-2.92	-	1.26	-0.02	83.9	243.2	84.0	78.7
409	61.518	0.150	0.108	0.95	101.5	-2.93	-	1.25	-0.01	83.9	245.1	83.8	78.7
410	61.668	0.150	0.109	0.96	101.4	-3.03	99	1.23	-0.02	83.9	244.9	83.6	78.7
411	61.818	0.150	0.107	0.96	101.2	-2.95	-	1.20	-0.03	83.9	246.2	83.2	78.6
412	61.967	0.149	0.108	0.96	101.4	-2.92	-	1.18	-0.02	83.9	246.3	82.7	78.5
413	62.117	0.150	0.107	0.96	101.6	-2.94	-	1.17	-0.01	83.8	245.2	82.9	78.5
414	62.267	0.150	0.107	0.96	101.4	-2.90	-	1.15	-0.02	83.9	246.3	83.0	78.4
415	62.415	0.148	0.108	0.95	101.7	-3.03	-	1.12	-0.03	83.8	247.2	83.2	78.5
416	62.564	0.149	0.109	0.96	101.4	-2.99	-	1.11	-0.01	83.8	247.0	83.7	78.5
417	62.714	0.150	0.108	0.96	101.7	-2.98	-	1.09	-0.02	83.9	246.8	82.7	78.5
418	62.863	0.149	0.108	0.97	101.5	-2.99	-	1.07	-0.02	83.8	246.9	84.0	78.5
419	63.013	0.150	0.109	0.97	101.2	-2.96	-	1.05	-0.02	83.8	246.6	84.0	78.5
420	63.163	0.150	0.110	0.96	101.1	-2.89	98	1.03	-0.02	83.7	246.9	83.6	78.3
421	63.312	0.149	0.109	0.98	101.3	-2.91	-	1.01	-0.02	83.8	246.4	83.3	78.4
422	63.462	0.150	0.108	0.96	101.4	-2.90	-	0.99	-0.02	83.7	246.9	83.8	78.4
423	63.612	0.150	0.108	0.98	101.4	-2.97	-	0.96	-0.03	83.7	244.6	84.3	78.3
424	63.761	0.149	0.108	0.96	101.1	-2.96	-	0.95	-0.01	83.7	245.7	84.2	78.4
425	63.911	0.150	0.108	0.96	101.1	-3.05	-	0.92	-0.03	83.7	245.6	83.9	78.4
426	64.061	0.150	0.108	0.96	101.6	-2.91	-	0.90	-0.02	83.7	245.1	84.1	78.4
427	64.210	0.149	0.109	0.96	101.4	-3.03	-	0.88	-0.02	83.6	245.5	82.9	78.4
428	64.359	0.149	0.108	0.96	101.4	-2.90	-	0.86	-0.02	83.6	244.7	83.7	78.4
429	64.508	0.149	0.110	0.97	101.0	-2.97	-	0.83	-0.03	83.6	243.1	83.2	78.3
430	64.657	0.149	0.110	0.96	101.1	-2.89	98	0.81	-0.02	83.6	244.6	83.0	78.3
431	64.807	0.150	0.108	0.97	101.2	-2.95	-	0.80	-0.01	83.6	244.1	82.5	78.3
432	64.956	0.149	0.107	0.96	101.4	-2.88	-	0.77	-0.03	83.5	243.2	83.3	78.3
433	65.106	0.150	0.108	0.97	101.2	-3.01	-	0.76	-0.01	83.5	244.2	83.0	78.3
434	65.256	0.150	0.110	0.96	100.9	-2.91	-	0.73	-0.03	83.5	244.2	83.7	78.3
435	65.405	0.149	0.111	0.96	101.1	-3.01	-	0.72	-0.01	83.5	244.5	84.5	78.2
436	65.555	0.150	0.108	0.97	100.9	-2.92	-	0.68	-0.04	83.4	245.8	84.2	78.2
437	65.704	0.149	0.108	0.96	101.0	-2.99	-	0.67	-0.01	83.5	244.6	84.4	78.3
438	65.854	0.150	0.107	0.95	101.3	-2.89	-	0.65	-0.02	83.5	244.9	84.8	78.2
439	66.003	0.149	0.108	0.96	101.2	-2.90	-	0.62	-0.03	83.5	246.0	85.1	78.2
440	66.153	0.150	0.108	0.96	101.1	-2.96	99	0.60	-0.02	83.4	244.8	84.4	78.2
441	66.301	0.148	0.110	0.97	101.4	-2.92	-	0.58	-0.02	83.5	246.0	84.7	78.2

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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
442	66.450	0.149	0.109	0.97	100.9	-2.99	-	0.57	-0.01	83.5	247.3	85.5	78.1
443	66.599	0.149	0.108	0.96	101.0	-2.91	-	0.54	-0.03	83.5	249.3	85.0	78.1
444	66.748	0.149	0.108	0.96	101.1	-2.89	-	0.53	-0.01	83.5	250.8	85.4	78.2
445	66.897	0.149	0.108	0.96	101.5	-2.99	-	0.50	-0.03	83.5	251.1	85.1	78.2
446	67.047	0.150	0.109	0.96	101.3	-2.96	-	0.48	-0.02	83.5	251.5	83.8	78.1
447	67.196	0.149	0.106	0.95	101.1	-3.00	-	0.47	-0.01	83.5	250.9	84.4	78.2
448	67.345	0.149	0.109	0.97	101.0	-2.94	-	0.45	-0.02	83.5	252.4	83.9	78.1
449	67.495	0.150	0.109	0.97	101.3	-2.94	-	0.43	-0.02	83.5	251.2	83.5	78.2
450	67.644	0.149	0.107	0.96	101.2	-2.91	99	0.41	-0.02	83.5	251.6	83.5	78.1
451	67.794	0.150	0.107	0.96	100.8	-2.98	-	0.39	-0.02	83.5	251.5	83.4	78.1
452	67.943	0.149	0.109	0.96	101.0	-2.93	-	0.36	-0.03	83.5	252.2	82.7	78.1
453	68.092	0.149	0.108	0.98	100.8	-2.97	-	0.34	-0.02	83.5	251.3	82.3	78.1
454	68.242	0.150	0.108	0.96	100.9	-2.91	-	0.32	-0.02	83.5	250.6	83.2	78.0
455	68.391	0.149	0.108	0.95	100.9	-2.99	-	0.30	-0.02	83.6	251.8	83.0	78.0
456	68.540	0.149	0.109	0.97	100.8	-2.99	-	0.28	-0.02	83.6	252.5	83.0	78.0
457	68.689	0.149	0.109	0.96	101.0	-2.91	-	0.27	-0.01	83.6	252.7	83.8	78.0
458	68.837	0.148	0.110	0.95	100.9	-2.91	-	0.23	-0.04	83.5	252.2	83.6	78.0
459	68.987	0.150	0.109	0.97	100.8	-2.96	-	0.22	-0.01	83.5	254.3	83.8	78.0
460	69.136	0.149	0.110	0.96	100.8	-2.93	99	0.20	-0.02	83.5	255.0	84.4	78.0
461	69.285	0.149	0.109	0.96	100.9	-2.90	-	0.18	-0.02	83.5	254.2	84.0	78.1
462	69.434	0.149	0.106	0.95	100.9	-2.97	-	0.16	-0.02	83.5	251.9	83.3	78.0
463	69.584	0.150	0.109	0.96	100.8	-3.03	-	0.15	-0.01	83.5	251.8	82.6	78.0
464	69.733	0.149	0.109	0.96	100.9	-3.02	-	0.13	-0.02	83.5	250.1	82.6	77.9
465	69.882	0.149	0.109	0.97	100.9	-2.93	-	0.11	-0.02	83.5	250.5	82.4	77.9
466	70.032	0.150	0.109	0.97	101.0	-2.97	-	0.10	-0.01	83.4	249.4	82.9	77.9
467	70.181	0.149	0.108	0.97	100.8	-2.89	-	0.09	-0.01	83.5	249.3	82.9	78.0
468	70.331	0.150	0.107	0.96	101.1	-2.90	-	0.07	-0.02	83.4	250.6	83.6	77.9
469	70.480	0.149	0.108	0.95	100.7	-2.90	-	0.06	-0.01	83.4	248.7	84.0	77.9
470	70.629	0.149	0.109	0.97	100.6	-2.90	98	0.05	-0.01	83.4	248.2	84.8	77.9
471	70.778	0.149	0.109	0.96	100.8	-2.99	-	0.03	-0.02	83.3	248.4	84.6	78.0
472	70.927	0.149	0.110	0.95	100.9	-3.01	-	0.02	-0.01	83.3	246.0	84.6	78.0
473	71.075	0.148	0.109	0.97	100.6	-2.99	98	0.00	-0.02	83.4	245.6	84.1	78.0
Avg/Tot	71.075	0.150	0.107	0.97	102.0	-2.73	100			88.2	294.6	85.6	80.0

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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		0.01	101.3	-0.54		85.3	-0.031	5.34	0.062
1	0.148	0.148	1.10	100.7	-1.30	-	86.1	-0.036	2.94	0.139
2	0.304	0.156	1.07	100.6	-1.30	-	86.2	-0.041	5.93	0.774
3	0.460	0.156	1.11	100.4	-1.30	-	86.2	-0.044	8.24	0.193
4	0.614	0.154	1.09	100.2	-1.28	-	86.2	-0.045	9.61	0.117
5	0.770	0.156	1.08	100.2	-1.29	-	86.2	-0.049	10.89	0.084
6	0.925	0.155	1.07	100.1	-1.28	-	86.3	-0.055	11.88	0.087
7	1.079	0.154	1.09	99.9	-1.29	-	86.2	-0.054	12.17	0.073
8	1.233	0.154	1.05	99.8	-1.25	-	86.2	-0.050	11.90	0.078
9	1.388	0.155	1.09	99.8	-1.32	-	86.2	-0.061	12.35	0.067
10	1.543	0.155	1.09	99.7	-1.23	101	86.3	-0.050	12.34	0.083
11	1.695	0.152	1.08	99.7	-1.36	-	86.4	-0.058	12.43	0.105
12	1.850	0.155	1.08	99.7	-1.24	-	86.5	-0.057	12.42	0.100
13	2.004	0.154	1.06	99.7	-1.34	-	86.4	-0.060	12.50	0.128
14	2.158	0.154	1.07	99.6	-1.30	-	86.5	-0.057	12.81	0.159
15	2.310	0.152	1.05	99.7	-1.28	-	86.6	-0.055	12.95	0.206
16	2.464	0.154	1.06	99.6	-1.24	-	86.6	-0.062	13.04	0.195
17	2.618	0.154	1.05	99.8	-1.26	-	86.7	-0.059	15.44	0.603
18	2.771	0.153	1.07	99.7	-1.35	-	86.7	-0.060	15.22	0.649
19	2.921	0.150	1.06	99.8	-1.26	-	86.7	-0.057	14.96	0.589
20	3.074	0.153	1.07	99.8	-1.37	101	86.7	-0.059	15.16	0.768
21	3.227	0.153	1.06	99.8	-1.37	-	86.8	-0.060	15.72	0.796
22	3.379	0.152	1.04	100.0	-1.25	-	86.9	-0.056	16.30	1.080
23	3.530	0.151	1.05	100.0	-1.29	-	86.9	-0.056	16.42	0.920
24	3.681	0.151	1.04	100.1	-1.27	-	87.1	-0.063	16.38	0.895
25	3.832	0.151	1.06	100.1	-1.26	-	87.1	-0.061	16.09	0.766
26	3.983	0.151	1.04	100.1	-1.26	-	87.1	-0.063	16.08	0.737
27	4.134	0.151	1.04	100.2	-1.24	-	87.2	-0.060	16.34	0.831
28	4.285	0.151	1.05	100.3	-1.29	-	87.2	-0.060	16.50	0.910
29	4.436	0.151	1.04	100.3	-1.34	-	87.1	-0.066	16.43	0.887
30	4.595	0.159	1.03	100.5	-1.23	101	87.0	-0.058	15.87	1.670
31	4.745	0.150	1.04	100.4	-1.32	-	86.7	-0.058	15.87	1.016
32	4.898	0.153	1.07	100.5	-1.27	-	86.5	-0.056	15.03	0.626

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
33	5.054	0.156	1.09	100.7	-1.34	-	86.5	-0.047	13.96	0.432
34	5.209	0.155	1.09	100.8	-1.25	-	86.5	-0.047	13.66	0.160
35	5.363	0.154	1.08	100.8	-1.42	-	86.6	-0.050	13.18	0.129
36	5.518	0.155	1.08	100.8	-1.26	-	86.6	-0.050	12.89	0.129
37	5.674	0.156	1.08	100.9	-1.41	-	86.5	-0.047	12.82	0.123
38	5.827	0.153	1.09	101.0	-1.34	-	86.5	-0.058	13.02	0.118
39	5.983	0.156	1.10	101.2	-1.36	-	86.4	-0.049	13.16	0.121
40	6.139	0.156	1.08	101.2	-1.25	102	86.4	-0.050	13.32	0.129
41	6.293	0.154	1.10	101.2	-1.26	-	86.5	-0.044	13.29	0.128
42	6.447	0.154	1.10	101.4	-1.25	-	86.5	-0.045	13.34	0.139
43	6.603	0.156	1.09	101.4	-1.25	-	86.4	-0.044	13.18	0.131
44	6.758	0.155	1.08	101.5	-1.27	-	86.3	-0.044	13.22	0.139
45	6.912	0.154	1.08	101.6	-1.36	-	86.3	-0.048	13.22	0.149
46	7.068	0.156	1.07	101.7	-1.41	-	86.3	-0.048	13.37	0.205
47	7.224	0.156	1.09	101.8	-1.24	-	86.2	-0.042	13.37	0.173
48	7.377	0.153	1.09	101.8	-1.33	-	86.1	-0.045	13.23	0.184
49	7.533	0.156	1.09	101.9	-1.41	-	86.0	-0.042	13.06	0.145
50	7.688	0.155	1.09	101.9	-1.40	102	86.1	-0.049	12.81	0.128
51	7.842	0.154	1.09	102.1	-1.41	-	86.0	-0.048	12.74	0.126
52	7.998	0.156	1.10	102.1	-1.41	-	86.0	-0.043	12.30	0.139
53	8.154	0.156	1.09	102.2	-1.28	-	86.1	-0.044	12.01	0.146
54	8.307	0.153	1.09	102.2	-1.41	-	86.0	-0.041	11.93	0.142
55	8.463	0.156	1.08	102.4	-1.33	-	86.0	-0.040	11.76	0.151
56	8.619	0.156	1.07	102.4	-1.41	-	86.0	-0.036	11.95	0.118
57	8.773	0.154	1.10	102.4	-1.25	-	86.0	-0.043	11.95	0.109
58	8.928	0.155	1.07	102.6	-1.41	-	85.9	-0.038	11.74	0.123
59	9.084	0.156	1.08	102.6	-1.40	-	85.8	-0.046	11.70	0.122
60	9.239	0.155	1.07	102.7	-1.34	102	85.8	-0.042	11.55	0.125
61	9.394	0.155	1.11	102.7	-1.25	-	85.9	-0.043	11.37	0.129
62	9.550	0.156	1.11	102.8	-1.37	-	85.9	-0.045	11.29	0.129
63	9.705	0.155	1.10	102.8	-1.29	-	85.9	-0.042	11.38	0.120
64	9.860	0.155	1.08	102.8	-1.29	-	85.9	-0.048	10.77	0.162
65	10.016	0.156	1.07	103.0	-1.36	-	85.8	-0.039	10.66	0.193

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
66	10.171	0.155	1.09	102.9	-1.33	-	85.7	-0.048	10.48	0.193
67	10.326	0.155	1.11	103.1	-1.39	-	85.6	-0.041	10.36	0.191
68	10.482	0.156	1.09	103.2	-1.34	-	85.7	-0.040	10.86	0.164
69	10.638	0.156	1.11	103.0	-1.36	-	85.7	-0.043	10.90	0.143
70	10.792	0.154	1.10	103.3	-1.40	102	85.7	-0.041	10.92	0.124
71	10.948	0.156	1.09	103.2	-1.30	-	85.6	-0.047	11.07	0.121
72	11.104	0.156	1.07	103.3	-1.41	-	85.6	-0.039	11.22	0.109
73	11.258	0.154	1.09	103.4	-1.26	-	85.5	-0.041	11.50	0.089
74	11.414	0.156	1.10	103.5	-1.25	-	85.6	-0.042	11.74	0.084
75	11.570	0.156	1.10	103.5	-1.27	-	85.7	-0.033	12.11	0.077
76	11.724	0.154	1.05	103.5	-1.39	-	85.6	-0.042	12.37	0.076
77	11.880	0.156	1.06	103.6	-1.40	-	85.7	-0.039	12.65	0.075
78	12.037	0.157	1.09	103.6	-1.33	-	85.7	-0.035	12.76	0.079
79	12.191	0.154	1.09	103.7	-1.37	-	85.6	-0.042	12.92	0.085
80	12.347	0.156	1.09	103.8	-1.41	102	85.5	-0.043	12.93	0.083
81	12.503	0.156	1.10	103.8	-1.39	-	85.6	-0.037	12.93	0.091
82	12.657	0.154	1.07	103.9	-1.34	-	85.6	-0.039	12.97	0.093
83	12.813	0.156	1.06	103.9	-1.37	-	85.6	-0.036	12.92	0.106
84	12.970	0.157	1.08	104.0	-1.34	-	85.5	-0.040	12.96	0.092
85	13.124	0.154	1.07	104.0	-1.26	-	85.5	-0.040	12.96	0.086
86	13.280	0.156	1.09	104.0	-1.35	-	85.5	-0.036	12.97	0.079
87	13.436	0.156	1.08	104.0	-1.29	-	85.4	-0.039	12.90	0.073
88	13.590	0.154	1.09	104.1	-1.34	-	85.4	-0.040	12.84	0.072
89	13.747	0.157	1.08	104.2	-1.25	-	85.4	-0.043	12.96	0.074
90	13.903	0.156	1.06	104.1	-1.40	102	85.4	-0.042	12.75	0.076
91	14.057	0.154	1.08	104.2	-1.30	-	85.5	-0.041	12.76	0.088
92	14.214	0.157	1.08	104.2	-1.35	-	85.5	-0.042	12.61	0.095
93	14.370	0.156	1.09	104.3	-1.29	-	85.5	-0.040	12.70	0.074
94	14.524	0.154	1.08	104.3	-1.26	-	85.6	-0.038	12.79	0.087
95	14.681	0.157	1.09	104.3	-1.27	-	85.5	-0.037	12.90	0.103
96	14.837	0.156	1.08	104.5	-1.25	-	85.6	-0.040	13.05	0.110
97	14.991	0.154	1.10	104.4	-1.33	-	85.6	-0.040	13.10	0.106
98	15.147	0.156	1.09	104.5	-1.24	-	85.5	-0.039	13.14	0.115

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
99	15.303	0.156	1.07	104.6	-1.30	-	85.6	-0.046	12.89	0.130
100	15.457	0.154	1.10	104.5	-1.41	101	85.6	-0.034	12.95	0.127
101	15.614	0.157	1.09	104.6	-1.27	-	85.5	-0.047	12.49	0.093
102	15.770	0.156	1.08	104.6	-1.25	-	85.7	-0.042	12.25	0.093
103	15.924	0.154	1.07	104.7	-1.30	-	85.6	-0.039	11.98	0.085
104	16.081	0.157	1.09	104.6	-1.41	-	85.7	-0.044	11.97	0.094
105	16.237	0.156	1.11	104.7	-1.40	-	85.6	-0.035	11.85	0.085
106	16.391	0.154	1.09	104.8	-1.27	-	85.5	-0.040	11.76	0.101
107	16.548	0.157	1.06	104.7	-1.27	-	85.5	-0.038	11.63	0.091
108	16.704	0.156	1.08	104.8	-1.26	-	85.4	-0.040	11.63	0.090
109	16.858	0.154	1.10	104.9	-1.40	-	85.4	-0.034	11.58	0.096
110	17.015	0.157	1.07	104.9	-1.26	102	85.4	-0.036	11.66	0.108
111	17.170	0.155	1.09	104.9	-1.38	-	85.4	-0.038	11.48	0.110
112	17.325	0.155	1.08	104.9	-1.31	-	85.5	-0.039	11.49	0.110
113	17.482	0.157	1.08	105.0	-1.40	-	85.5	-0.035	11.68	0.124
114	17.637	0.155	1.10	105.0	-1.29	-	85.5	-0.036	11.63	0.133
115	17.792	0.155	1.10	104.9	-1.35	-	85.5	-0.039	11.74	0.130
116	17.949	0.157	1.10	105.1	-1.37	-	85.5	-0.040	11.70	0.116
117	18.104	0.155	1.06	105.0	-1.26	-	85.5	-0.043	11.81	0.133
118	18.259	0.155	1.11	104.9	-1.38	-	85.5	-0.036	11.88	0.128
119	18.416	0.157	1.08	105.2	-1.34	-	85.4	-0.042	12.13	0.163
120	18.571	0.155	1.08	105.2	-1.30	101	85.4	-0.039	12.23	0.187
121	18.726	0.155	1.10	105.1	-1.41	-	85.4	-0.039	12.12	0.145
122	18.882	0.156	1.10	105.2	-1.30	-	85.3	-0.030	11.99	0.114
123	19.037	0.155	1.09	105.1	-1.37	-	85.2	-0.034	11.71	0.096
124	19.192	0.155	1.08	105.1	-1.31	-	85.4	-0.038	11.48	0.099
125	19.349	0.157	1.08	105.2	-1.38	-	85.4	-0.038	11.23	0.096
126	19.504	0.155	1.08	105.2	-1.25	-	85.5	-0.038	11.18	0.093
127	19.659	0.155	1.11	105.3	-1.25	-	85.4	-0.038	11.01	0.096
128	19.816	0.157	1.12	105.2	-1.25	-	85.4	-0.031	10.82	0.089
129	19.970	0.154	1.08	105.3	-1.25	-	85.4	-0.039	10.76	0.084
130	20.126	0.156	1.08	105.3	-1.40	101	85.5	-0.039	10.64	0.089
131	20.282	0.156	1.06	105.3	-1.40	-	85.4	-0.039	10.93	0.081

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
132	20.437	0.155	1.10	105.4	-1.25	-	85.4	-0.036	10.69	0.087
133	20.592	0.155	1.08	105.3	-1.42	-	85.4	-0.038	10.59	0.086
134	20.749	0.157	1.08	105.5	-1.41	-	85.5	-0.042	10.66	0.078
135	20.904	0.155	1.09	105.4	-1.41	-	85.4	-0.033	10.60	0.080
136	21.059	0.155	1.08	105.4	-1.25	-	85.4	-0.036	10.51	0.084
137	21.215	0.156	1.09	105.5	-1.28	-	85.4	-0.036	10.62	0.077
138	21.370	0.155	1.08	105.4	-1.24	-	85.4	-0.032	10.68	0.070
139	21.525	0.155	1.08	105.5	-1.35	-	85.4	-0.036	10.69	0.067
140	21.682	0.157	1.08	105.5	-1.37	101	85.4	-0.032	10.53	0.070
141	21.837	0.155	1.08	105.4	-1.27	-	85.3	-0.032	10.87	0.074
142	21.992	0.155	1.10	105.5	-1.30	-	85.3	-0.033	10.82	0.073
143	22.148	0.156	1.08	105.5	-1.37	-	85.3	-0.033	10.82	0.081
144	22.303	0.155	1.09	105.6	-1.30	-	85.2	-0.034	10.73	0.075
145	22.458	0.155	1.11	105.5	-1.42	-	85.3	-0.029	10.65	0.074
146	22.615	0.157	1.12	105.6	-1.41	-	85.3	-0.028	10.57	0.076
147	22.769	0.154	1.09	105.6	-1.27	-	85.4	-0.037	10.48	0.081
148	22.924	0.155	1.10	105.5	-1.38	-	85.4	-0.036	10.45	0.080
149	23.081	0.157	1.08	105.7	-1.42	-	85.4	-0.032	10.36	0.078
150	23.236	0.155	1.11	105.6	-1.25	101	85.3	-0.025	10.23	0.078
151	23.391	0.155	1.09	105.6	-1.42	-	85.4	-0.041	9.98	0.077
152	23.547	0.156	1.09	105.7	-1.25	-	85.4	-0.036	9.58	0.090
153	23.702	0.155	1.06	105.6	-1.42	-	85.4	-0.035	9.60	0.111
154	23.857	0.155	1.10	105.6	-1.25	-	85.5	-0.034	9.42	0.158
155	24.014	0.157	1.09	105.6	-1.28	-	85.4	-0.039	9.33	0.179
156	24.169	0.155	1.09	105.6	-1.37	-	85.4	-0.031	9.30	0.176
157	24.323	0.154	1.10	105.8	-1.41	-	85.4	-0.035	9.20	0.164
158	24.480	0.157	1.09	105.6	-1.33	-	85.4	-0.037	9.20	0.157
159	24.635	0.155	1.09	105.7	-1.31	-	85.4	-0.038	9.18	0.155
160	24.789	0.154	1.08	105.7	-1.29	101	85.4	-0.041	9.21	0.151
161	24.946	0.157	1.07	105.6	-1.26	-	85.4	-0.042	9.14	0.140
162	25.101	0.155	1.07	105.7	-1.39	-	85.5	-0.033	9.16	0.139
163	25.255	0.154	1.09	105.8	-1.42	-	85.4	-0.030	9.06	0.141
164	25.412	0.157	1.08	105.7	-1.39	-	85.3	-0.041	9.07	0.139

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
165	25.567	0.155	1.09	105.7	-1.30	-	85.4	-0.041	9.03	0.137
166	25.721	0.154	1.08	105.7	-1.33	-	85.3	-0.030	9.05	0.134
167	25.877	0.156	1.11	105.8	-1.33	-	85.4	-0.038	9.00	0.127
168	26.033	0.156	1.09	105.7	-1.41	-	85.5	-0.035	8.98	0.133
169	26.187	0.154	1.08	105.9	-1.37	-	85.4	-0.043	9.01	0.124
170	26.343	0.156	1.07	105.8	-1.33	101	85.4	-0.035	9.18	0.123
171	26.499	0.156	1.06	105.8	-1.34	-	85.4	-0.039	9.28	0.135
172	26.653	0.154	1.12	105.8	-1.39	-	85.4	-0.038	8.76	0.152
173	26.809	0.156	1.06	105.8	-1.33	-	85.5	-0.044	9.40	0.125
174	26.965	0.156	1.09	105.8	-1.31	-	85.5	-0.040	9.83	0.105
175	27.118	0.153	1.09	105.8	-1.35	-	85.4	-0.038	10.07	0.085
176	27.274	0.156	1.05	105.8	-1.41	-	85.4	-0.045	10.10	0.080
177	27.430	0.156	1.08	105.9	-1.37	-	85.4	-0.040	10.24	0.071
178	27.583	0.153	1.06	105.7	-1.32	-	85.3	-0.037	10.13	0.078
179	27.739	0.156	1.10	105.7	-1.29	-	85.2	-0.045	10.15	0.078
180	27.895	0.156	1.09	105.9	-1.27	100	85.2	-0.037	10.21	0.074
181	28.049	0.154	1.06	105.8	-1.41	-	85.2	-0.041	10.29	0.078
182	28.204	0.155	1.09	105.8	-1.28	-	85.3	-0.049	10.38	0.072
183	28.360	0.156	1.09	105.9	-1.29	-	85.3	-0.043	10.53	0.068
184	28.514	0.154	1.08	105.9	-1.41	-	85.3	-0.042	10.58	0.071
185	28.668	0.154	1.07	105.8	-1.38	-	85.3	-0.042	10.73	0.071
186	28.824	0.156	1.08	105.8	-1.36	-	85.4	-0.042	10.35	0.068
187	28.980	0.156	1.08	105.8	-1.29	-	85.3	-0.043	10.34	0.067
188	29.133	0.153	1.09	105.9	-1.27	-	85.4	-0.043	10.34	0.062
189	29.289	0.156	1.09	105.9	-1.40	-	85.4	-0.043	10.25	0.059
190	29.444	0.155	1.08	105.9	-1.29	100	85.4	-0.050	10.34	0.061
191	29.598	0.154	1.06	106.0	-1.33	-	85.4	-0.040	10.36	0.057
192	29.754	0.156	1.06	105.9	-1.31	-	85.3	-0.049	10.44	0.057
193	29.909	0.155	1.08	106.0	-1.36	-	85.4	-0.045	10.46	0.057
194	30.063	0.154	1.07	105.9	-1.28	-	85.4	-0.044	10.47	0.059
195	30.218	0.155	1.10	105.9	-1.34	-	85.5	-0.051	10.61	0.059
196	30.374	0.156	1.09	106.0	-1.25	-	85.4	-0.042	10.68	0.060
197	30.528	0.154	1.06	106.0	-1.35	-	85.5	-0.046	10.68	0.064

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
198	30.682	0.154	1.07	105.9	-1.40	-	85.4	-0.041	10.75	0.060
199	30.837	0.155	1.08	106.0	-1.40	-	85.4	-0.042	10.83	0.066
200	30.993	0.156	1.08	106.0	-1.32	101	85.5	-0.042	11.04	0.055
201	31.146	0.153	1.10	106.0	-1.38	-	85.4	-0.043	11.11	0.069
202	31.302	0.156	1.06	105.9	-1.42	-	85.5	-0.045	11.29	0.070
203	31.457	0.155	1.06	105.9	-1.42	-	85.5	-0.054	11.39	0.069
204	31.610	0.153	1.09	105.9	-1.27	-	85.5	-0.043	11.20	0.053
205	31.765	0.155	1.09	105.9	-1.35	-	85.5	-0.049	11.07	0.049
206	31.921	0.156	1.10	106.0	-1.30	-	85.4	-0.047	11.09	0.058
207	32.075	0.154	1.06	106.1	-1.41	-	85.4	-0.043	11.17	0.055
208	32.229	0.154	1.07	106.0	-1.38	-	85.5	-0.049	11.34	0.057
209	32.384	0.155	1.06	105.9	-1.41	-	85.5	-0.050	11.27	0.058
210	32.539	0.155	1.07	106.0	-1.33	101	85.5	-0.045	11.12	0.054
211	32.692	0.153	1.05	106.0	-1.44	-	85.7	-0.043	11.15	0.061
212	32.847	0.155	1.08	106.0	-1.36	-	85.6	-0.043	11.15	0.074
213	33.002	0.155	1.07	105.9	-1.45	-	85.5	-0.045	10.91	0.068
214	33.155	0.153	1.07	106.0	-1.27	-	85.4	-0.050	10.19	0.059
215	33.308	0.153	1.09	106.0	-1.30	-	85.5	-0.041	9.80	0.060
216	33.463	0.155	1.07	106.1	-1.36	-	85.4	-0.045	9.43	0.055
217	33.618	0.155	1.07	106.0	-1.41	-	85.4	-0.045	8.93	0.050
218	33.771	0.153	1.05	105.9	-1.41	-	85.4	-0.045	8.63	0.049
219	33.925	0.154	1.07	106.0	-1.28	-	85.5	-0.043	8.52	0.049
220	34.080	0.155	1.07	106.0	-1.43	100	85.3	-0.040	8.40	0.052
221	34.234	0.154	1.06	106.0	-1.42	-	85.3	-0.042	8.44	0.045
222	34.386	0.152	1.08	106.0	-1.37	-	85.4	-0.051	8.39	0.047
223	34.541	0.155	1.07	106.1	-1.44	-	85.5	-0.042	8.36	0.043
224	34.696	0.155	1.06	106.1	-1.29	-	85.4	-0.041	8.33	0.046
225	34.850	0.154	1.08	105.9	-1.44	-	85.6	-0.046	8.66	0.047
226	35.002	0.152	1.08	106.0	-1.43	-	85.6	-0.038	8.67	0.054
227	35.157	0.155	1.06	106.0	-1.35	-	85.6	-0.038	8.69	0.054
228	35.312	0.155	1.08	106.0	-1.28	-	85.6	-0.044	8.74	0.052
229	35.465	0.153	1.07	106.0	-1.38	-	85.6	-0.042	8.78	0.061
230	35.618	0.153	1.05	106.0	-1.38	100	85.5	-0.039	8.79	0.054

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
231	35.772	0.154	1.09	106.0	-1.34	-	85.6	-0.040	8.54	0.052
232	35.927	0.155	1.07	105.9	-1.43	-	85.7	-0.041	8.56	0.056
233	36.079	0.152	1.06	106.0	-1.33	-	85.7	-0.038	8.59	0.057
234	36.233	0.154	1.09	106.0	-1.41	-	85.6	-0.043	8.62	0.054
235	36.388	0.155	1.07	106.0	-1.41	-	85.6	-0.042	8.62	0.057
236	36.543	0.155	1.07	105.9	-1.30	-	85.5	-0.040	8.51	0.064
237	36.695	0.152	1.05	105.9	-1.29	-	85.4	-0.039	8.43	0.065
238	36.849	0.154	1.08	106.0	-1.28	-	85.4	-0.041	8.28	0.065
239	37.004	0.155	1.08	106.0	-1.43	-	85.4	-0.033	8.18	0.060
240	37.158	0.154	1.07	106.1	-1.39	100	85.5	-0.041	8.11	0.061
241	37.310	0.152	1.05	106.0	-1.29	-	85.3	-0.039	7.98	0.062
242	37.465	0.155	1.06	105.9	-1.35	-	85.3	-0.044	7.90	0.065
243	37.619	0.154	1.08	105.9	-1.29	-	85.4	-0.041	7.85	0.063
244	37.773	0.154	1.09	105.9	-1.43	-	85.4	-0.035	7.79	0.064
245	37.926	0.153	1.06	106.1	-1.34	-	85.5	-0.039	7.71	0.063
246	38.080	0.154	1.08	106.1	-1.44	-	85.5	-0.039	7.59	0.067
247	38.235	0.155	1.07	106.0	-1.42	-	85.6	-0.046	7.58	0.059
248	38.387	0.152	1.09	105.9	-1.32	-	85.5	-0.041	7.57	0.061
249	38.541	0.154	1.06	106.1	-1.29	-	85.5	-0.041	7.48	0.060
250	38.695	0.154	1.07	105.9	-1.28	99	85.4	-0.042	7.37	0.072
251	38.850	0.155	1.07	105.9	-1.40	-	85.5	-0.042	7.32	0.072
252	39.002	0.152	1.04	105.9	-1.44	-	85.5	-0.038	7.26	0.066
253	39.156	0.154	1.07	106.0	-1.42	-	85.5	-0.043	7.20	0.076
254	39.310	0.154	1.07	106.0	-1.33	-	85.5	-0.035	7.08	0.066
255	39.464	0.154	1.09	105.9	-1.32	-	85.4	-0.036	7.00	0.071
256	39.616	0.152	1.08	106.0	-1.34	-	85.3	-0.038	6.93	0.077
257	39.770	0.154	1.06	106.0	-1.31	-	85.4	-0.042	6.81	0.071
258	39.925	0.155	1.08	105.9	-1.37	-	85.3	-0.034	6.56	0.071
259	40.079	0.154	1.08	105.9	-1.41	-	85.4	-0.037	6.21	0.083
260	40.231	0.152	1.06	106.0	-1.28	99	85.4	-0.041	6.02	0.089
261	40.385	0.154	1.06	105.9	-1.44	-	85.4	-0.036	5.97	0.082
262	40.539	0.154	1.07	105.9	-1.43	-	85.3	-0.038	5.93	0.088
263	40.693	0.154	1.06	106.0	-1.40	-	85.3	-0.036	5.97	0.084

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
264	40.846	0.153	1.07	106.0	-1.41	-	85.4	-0.032	5.95	0.086
265	41.000	0.154	1.08	106.0	-1.32	-	85.4	-0.032	5.96	0.085
266	41.154	0.154	1.06	105.9	-1.32	-	85.4	-0.036	5.96	0.085
267	41.308	0.154	1.07	105.9	-1.30	-	85.4	-0.040	5.97	0.082
268	41.460	0.152	1.06	105.9	-1.29	-	85.3	-0.039	5.96	0.082
269	41.614	0.154	1.07	106.0	-1.29	-	85.3	-0.040	5.98	0.079
270	41.769	0.155	1.08	106.0	-1.44	99	85.3	-0.033	5.95	0.079
271	41.922	0.153	1.05	106.0	-1.28	-	85.3	-0.035	5.93	0.078
272	42.075	0.153	1.07	105.9	-1.37	-	85.3	-0.033	5.92	0.079
273	42.229	0.154	1.06	105.9	-1.35	-	85.4	-0.036	5.95	0.078
274	42.383	0.154	1.04	106.0	-1.36	-	85.3	-0.031	5.96	0.081
275	42.536	0.153	1.07	105.9	-1.41	-	85.3	-0.033	5.95	0.085
276	42.689	0.153	1.08	106.0	-1.34	-	85.3	-0.038	5.68	0.079
277	42.843	0.154	1.08	105.9	-1.40	-	85.2	-0.029	5.66	0.079
278	42.997	0.154	1.06	105.9	-1.32	-	85.3	-0.035	5.63	0.075
279	43.150	0.153	1.06	105.9	-1.38	-	85.3	-0.036	5.65	0.074
280	43.303	0.153	1.06	105.8	-1.40	99	85.3	-0.027	5.65	0.077
281	43.458	0.155	1.09	105.9	-1.41	-	85.3	-0.032	5.62	0.080
282	43.612	0.154	1.07	106.1	-1.32	-	85.3	-0.033	5.64	0.082
283	43.765	0.153	1.07	106.0	-1.32	-	85.3	-0.032	5.61	0.085
284	43.918	0.153	1.06	106.0	-1.42	-	85.2	-0.031	5.65	0.080
285	44.072	0.154	1.07	105.9	-1.31	-	85.3	-0.036	5.70	0.082
286	44.226	0.154	1.08	106.0	-1.39	-	85.3	-0.029	5.66	0.087
287	44.379	0.153	1.07	106.0	-1.33	-	85.2	-0.034	5.64	0.081
288	44.532	0.153	1.06	106.0	-1.28	-	85.1	-0.032	5.65	0.084
289	44.687	0.155	1.06	105.9	-1.31	-	85.2	-0.027	5.64	0.084
290	44.841	0.154	1.09	105.9	-1.41	99	85.1	-0.029	5.62	0.086
291	44.993	0.152	1.08	105.9	-1.43	-	85.2	-0.035	5.57	0.086
292	45.147	0.154	1.06	106.0	-1.31	-	85.3	-0.034	5.58	0.085
293	45.301	0.154	1.05	106.0	-1.34	-	85.3	-0.034	5.57	0.085
294	45.455	0.154	1.10	106.0	-1.45	-	85.2	-0.029	5.56	0.089
295	45.607	0.152	1.07	105.8	-1.35	-	85.1	-0.034	5.46	0.085
296	45.761	0.154	1.05	106.0	-1.31	-	85.1	-0.029	5.45	0.092

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
297	45.916	0.155	1.06	106.0	-1.34	-	85.1	-0.036	5.42	0.089
298	46.070	0.154	1.06	105.9	-1.37	-	85.0	-0.028	5.42	0.090
299	46.221	0.151	1.06	105.9	-1.30	-	85.1	-0.032	5.39	0.091
300	46.376	0.155	1.07	105.9	-1.31	99	85.2	-0.033	5.41	0.089
301	46.530	0.154	1.06	105.8	-1.39	-	85.2	-0.027	5.34	0.090
302	46.684	0.154	1.06	105.8	-1.35	-	85.2	-0.030	5.38	0.088
303	46.836	0.152	1.09	105.8	-1.39	-	85.2	-0.031	5.40	0.088
304	46.990	0.154	1.07	105.8	-1.40	-	85.2	-0.029	5.43	0.093
305	47.145	0.155	1.10	106.0	-1.35	-	85.1	-0.029	5.45	0.095
306	47.298	0.153	1.05	105.9	-1.45	-	85.2	-0.030	5.45	0.096
307	47.450	0.152	1.06	105.9	-1.43	-	85.2	-0.025	5.49	0.097
308	47.604	0.154	1.07	105.9	-1.34	-	85.1	-0.039	5.49	0.097
309	47.759	0.155	1.06	105.9	-1.34	-	85.2	-0.038	5.54	0.099
310	47.912	0.153	1.08	105.9	-1.38	99	85.1	-0.029	5.52	0.101
311	48.065	0.153	1.07	105.9	-1.31	-	85.1	-0.032	5.57	0.103
312	48.219	0.154	1.07	105.9	-1.45	-	85.1	-0.028	5.57	0.103
313	48.373	0.154	1.06	105.9	-1.45	-	85.1	-0.034	5.51	0.101
314	48.526	0.153	1.07	105.8	-1.29	-	85.1	-0.024	5.57	0.101
315	48.679	0.153	1.06	105.8	-1.29	-	85.1	-0.028	5.58	0.107
316	48.833	0.154	1.06	105.9	-1.41	-	85.1	-0.022	5.56	0.100
317	48.987	0.154	1.07	105.8	-1.37	-	85.0	-0.030	5.54	0.108
318	49.141	0.154	1.07	105.8	-1.43	-	85.0	-0.030	5.53	0.110
319	49.293	0.152	1.03	105.8	-1.32	-	85.0	-0.032	5.57	0.108
320	49.447	0.154	1.07	105.8	-1.43	99	85.0	-0.031	5.56	0.113
321	49.601	0.154	1.07	105.9	-1.38	-	85.1	-0.033	5.67	0.109
322	49.755	0.154	1.07	105.8	-1.42	-	85.2	-0.034	5.68	0.119
323	49.907	0.152	1.08	105.8	-1.45	-	85.1	-0.030	5.73	0.125
324	50.061	0.154	1.06	105.7	-1.35	-	85.2	-0.034	5.77	0.123
325	50.216	0.155	1.07	105.8	-1.43	-	85.1	-0.026	5.78	0.110
326	50.369	0.153	1.08	105.7	-1.44	-	85.1	-0.031	5.77	0.112
327	50.521	0.152	1.07	105.8	-1.41	-	85.1	-0.029	5.68	0.114
328	50.676	0.155	1.07	105.8	-1.40	-	85.1	-0.040	5.71	0.117
329	50.830	0.154	1.07	105.8	-1.37	-	85.1	-0.033	5.62	0.112

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
330	50.983	0.153	1.08	105.8	-1.38	99	85.0	-0.033	5.70	0.119
331	51.136	0.153	1.07	105.8	-1.38	-	84.9	-0.028	5.73	0.120
332	51.290	0.154	1.06	105.7	-1.38	-	84.9	-0.029	5.68	0.111
333	51.444	0.154	1.07	105.7	-1.35	-	84.9	-0.032	5.62	0.113
334	51.597	0.153	1.07	105.8	-1.44	-	85.0	-0.025	5.69	0.111
335	51.750	0.153	1.08	105.8	-1.31	-	85.0	-0.021	5.78	0.108
336	51.904	0.154	1.06	105.7	-1.41	-	85.0	-0.027	5.85	0.111
337	52.058	0.154	1.06	105.8	-1.44	-	85.0	-0.029	5.85	0.109
338	52.211	0.153	1.08	105.7	-1.43	-	85.0	-0.025	5.90	0.108
339	52.364	0.153	1.05	105.8	-1.33	-	85.1	-0.033	5.93	0.107
340	52.518	0.154	1.05	105.7	-1.36	99	85.1	-0.032	5.91	0.107
341	52.672	0.154	1.07	105.7	-1.31	-	85.0	-0.030	5.93	0.121
342	52.825	0.153	1.06	105.7	-1.45	-	85.0	-0.034	5.98	0.108
343	52.978	0.153	1.08	105.8	-1.31	-	85.0	-0.029	6.04	0.111
344	53.132	0.154	1.10	105.7	-1.33	-	85.0	-0.029	6.04	0.114
345	53.286	0.154	1.05	105.7	-1.43	-	84.9	-0.029	6.06	0.105
346	53.439	0.153	1.07	105.7	-1.45	-	84.9	-0.034	6.11	0.110
347	53.591	0.152	1.07	105.7	-1.28	-	85.0	-0.026	6.09	0.109
348	53.745	0.154	1.06	105.6	-1.44	-	85.0	-0.029	6.10	0.108
349	53.900	0.155	1.07	105.7	-1.38	-	85.1	-0.030	6.09	0.109
350	54.052	0.152	1.04	105.7	-1.34	99	85.0	-0.032	6.08	0.112
351	54.205	0.153	1.08	105.7	-1.44	-	85.0	-0.036	6.10	0.110
352	54.359	0.154	1.07	105.7	-1.45	-	85.0	-0.029	6.05	0.107
353	54.513	0.154	1.08	105.7	-1.38	-	85.0	-0.025	6.05	0.112
354	54.666	0.153	1.08	105.7	-1.28	-	85.0	-0.031	6.00	0.115
355	54.819	0.153	1.06	105.6	-1.30	-	85.1	-0.033	6.01	0.116
356	54.973	0.154	1.04	105.7	-1.45	-	85.1	-0.029	6.02	0.117
357	55.127	0.154	1.05	105.6	-1.39	-	85.1	-0.023	6.05	0.118
358	55.280	0.153	1.07	105.6	-1.39	-	85.1	-0.031	6.02	0.111
359	55.432	0.152	1.06	105.6	-1.34	-	85.1	-0.028	6.02	0.116
360	55.586	0.154	1.05	105.7	-1.31	98	85.0	-0.033	5.79	0.072
361	55.740	0.154	1.06	105.6	-1.43	-	85.1	-0.030	5.70	0.094
362	55.894	0.154	1.07	105.7	-1.30	-	85.0	-0.031	5.64	0.104

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
363	56.046	0.152	1.08	105.6	-1.35	-	85.1	-0.028	5.62	0.106
364	56.200	0.154	1.06	105.6	-1.39	-	85.0	-0.033	5.61	0.110
365	56.354	0.154	1.06	105.5	-1.30	-	84.9	-0.030	5.62	0.109
366	56.507	0.153	1.06	105.5	-1.33	-	84.9	-0.029	5.63	0.106
367	56.660	0.153	1.08	105.5	-1.40	-	84.9	-0.033	5.60	0.104
368	56.814	0.154	1.08	105.5	-1.31	-	84.8	-0.027	5.57	0.103
369	56.968	0.154	1.08	105.5	-1.40	-	84.9	-0.027	5.62	0.109
370	57.121	0.153	1.05	105.6	-1.31	98	85.0	-0.027	5.63	0.109
371	57.273	0.152	1.08	105.4	-1.36	-	85.0	-0.032	5.65	0.107
372	57.428	0.155	1.07	105.5	-1.31	-	85.1	-0.032	5.68	0.111
373	57.581	0.153	1.08	105.5	-1.31	-	85.0	-0.031	5.72	0.111
374	57.735	0.154	1.07	105.5	-1.36	-	85.0	-0.027	5.72	0.115
375	57.887	0.152	1.06	105.5	-1.44	-	84.9	-0.035	5.78	0.110
376	58.041	0.154	1.05	105.5	-1.45	-	84.9	-0.028	5.76	0.117
377	58.195	0.154	1.07	105.4	-1.30	-	85.0	-0.025	5.79	0.118
378	58.348	0.153	1.07	105.4	-1.42	-	84.9	-0.027	5.79	0.119
379	58.500	0.152	1.06	105.4	-1.33	-	85.0	-0.025	5.73	0.126
380	58.654	0.154	1.07	105.5	-1.34	99	85.0	-0.030	5.80	0.126
381	58.808	0.154	1.04	105.5	-1.45	-	85.0	-0.033	5.89	0.118
382	58.962	0.154	1.07	105.4	-1.44	-	85.0	-0.037	5.87	0.115
383	59.114	0.152	1.05	105.4	-1.40	-	85.0	-0.033	5.87	0.118
384	59.268	0.154	1.06	105.4	-1.31	-	84.9	-0.027	5.95	0.114
385	59.422	0.154	1.06	105.4	-1.31	-	85.0	-0.028	5.97	0.117
386	59.576	0.154	1.07	105.4	-1.39	-	85.0	-0.029	5.95	0.117
387	59.727	0.151	1.08	105.4	-1.36	-	85.0	-0.040	5.88	0.108
388	59.881	0.154	1.05	105.4	-1.30	-	84.9	-0.031	5.82	0.110
389	60.035	0.154	1.05	105.4	-1.44	-	84.9	-0.030	5.83	0.115
390	60.189	0.154	1.06	105.3	-1.36	99	84.9	-0.036	5.76	0.108
391	60.341	0.152	1.07	105.4	-1.45	-	84.9	-0.032	5.81	0.110
392	60.494	0.153	1.05	105.3	-1.36	-	84.9	-0.025	5.82	0.110
393	60.649	0.155	1.08	105.4	-1.43	-	84.9	-0.030	5.83	0.115
394	60.802	0.153	1.06	105.3	-1.43	-	84.9	-0.026	5.88	0.120
395	60.954	0.152	1.05	105.4	-1.45	-	84.9	-0.033	5.79	0.109

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
396	61.108	0.154	1.07	105.4	-1.42	-	84.9	-0.026	5.63	0.095
397	61.262	0.154	1.07	105.4	-1.31	-	84.8	-0.031	5.60	0.096
398	61.416	0.154	1.09	105.3	-1.43	-	84.9	-0.028	5.61	0.093
399	61.568	0.152	1.06	105.4	-1.36	-	84.9	-0.027	5.51	0.090
400	61.721	0.153	1.06	105.3	-1.37	99	84.9	-0.034	5.52	0.096
401	61.875	0.154	1.06	105.4	-1.29	-	84.9	-0.031	5.52	0.093
402	62.029	0.154	1.06	105.4	-1.32	-	84.9	-0.033	5.47	0.096
403	62.181	0.152	1.07	105.3	-1.38	-	84.9	-0.027	5.49	0.097
404	62.334	0.153	1.07	105.4	-1.30	-	84.9	-0.030	5.54	0.099
405	62.488	0.154	1.08	105.3	-1.41	-	84.9	-0.027	5.58	0.093
406	62.642	0.154	1.09	105.3	-1.38	-	84.9	-0.026	5.66	0.094
407	62.795	0.153	1.07	105.2	-1.41	-	85.0	-0.026	5.68	0.097
408	62.947	0.152	1.07	105.3	-1.31	-	84.9	-0.031	5.68	0.101
409	63.101	0.154	1.08	105.3	-1.40	-	84.8	-0.023	5.71	0.105
410	63.255	0.154	1.06	105.2	-1.45	99	84.8	-0.028	5.74	0.099
411	63.408	0.153	1.07	105.2	-1.38	-	84.8	-0.033	5.96	0.107
412	63.560	0.152	1.07	105.3	-1.39	-	84.8	-0.034	6.05	0.095
413	63.715	0.155	1.08	105.2	-1.32	-	84.9	-0.026	5.99	0.097
414	63.868	0.153	1.06	105.2	-1.37	-	84.9	-0.030	5.90	0.096
415	64.021	0.153	1.07	105.2	-1.32	-	84.9	-0.028	5.99	0.101
416	64.174	0.153	1.04	105.2	-1.32	-	84.9	-0.027	6.03	0.096
417	64.328	0.154	1.07	105.3	-1.40	-	84.9	-0.030	6.05	0.099
418	64.481	0.153	1.06	105.1	-1.42	-	84.9	-0.031	6.05	0.097
419	64.635	0.154	1.05	105.2	-1.44	-	84.9	-0.028	6.10	0.095
420	64.787	0.152	1.05	105.2	-1.41	98	84.9	-0.030	6.20	0.089
421	64.941	0.154	1.06	105.2	-1.36	-	84.8	-0.033	6.22	0.091
422	65.095	0.154	1.06	105.2	-1.34	-	84.8	-0.030	6.22	0.085
423	65.248	0.153	1.06	105.1	-1.31	-	84.8	-0.028	6.27	0.083
424	65.400	0.152	1.06	105.1	-1.37	-	84.8	-0.031	6.28	0.081
425	65.553	0.153	1.07	105.1	-1.30	-	84.7	-0.030	6.28	0.075
426	65.707	0.154	1.08	105.1	-1.33	-	84.7	-0.027	6.30	0.080
427	65.861	0.154	1.06	105.2	-1.34	-	84.7	-0.026	6.31	0.080
428	66.013	0.152	1.07	105.1	-1.32	-	84.7	-0.029	6.33	0.078

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
429	66.166	0.153	1.07	105.0	-1.41	-	84.8	-0.036	6.37	0.072
430	66.320	0.154	1.06	105.1	-1.43	98	84.8	-0.031	6.42	0.069
431	66.474	0.154	1.08	105.1	-1.32	-	84.7	-0.029	6.44	0.069
432	66.626	0.152	1.07	105.1	-1.31	-	84.7	-0.027	6.51	0.073
433	66.779	0.153	1.06	105.1	-1.44	-	84.7	-0.032	6.52	0.066
434	66.933	0.154	1.06	105.0	-1.35	-	84.7	-0.026	6.57	0.070
435	67.086	0.153	1.05	105.0	-1.39	-	84.8	-0.030	6.58	0.073
436	67.239	0.153	1.05	105.1	-1.32	-	84.8	-0.030	6.59	0.064
437	67.391	0.152	1.07	105.1	-1.32	-	84.8	-0.026	6.66	0.068
438	67.545	0.154	1.06	105.0	-1.44	-	84.8	-0.029	6.65	0.068
439	67.699	0.154	1.07	105.0	-1.40	-	84.8	-0.028	6.63	0.069
440	67.852	0.153	1.07	105.1	-1.37	98	84.8	-0.027	6.59	0.064
441	68.004	0.152	1.07	105.0	-1.35	-	84.8	-0.033	6.54	0.066
442	68.158	0.154	1.06	105.0	-1.30	-	84.8	-0.032	6.53	0.083
443	68.312	0.154	1.06	105.0	-1.34	-	84.8	-0.031	6.24	0.096
444	68.465	0.153	1.06	105.0	-1.41	-	84.8	-0.028	6.23	0.093
445	68.617	0.152	1.05	105.0	-1.42	-	84.8	-0.033	6.24	0.093
446	68.770	0.153	1.05	105.0	-1.33	-	84.7	-0.032	6.24	0.091
447	68.924	0.154	1.05	104.9	-1.34	-	84.8	-0.027	6.24	0.087
448	69.078	0.154	1.08	104.9	-1.32	-	84.8	-0.032	6.27	0.088
449	69.229	0.151	1.06	105.0	-1.33	-	84.8	-0.027	6.25	0.091
450	69.383	0.154	1.06	104.9	-1.39	99	84.9	-0.034	6.29	0.086
451	69.536	0.153	1.05	104.9	-1.36	-	84.8	-0.029	6.35	0.093
452	69.690	0.154	1.06	105.0	-1.33	-	84.8	-0.035	6.34	0.091
453	69.842	0.152	1.05	105.0	-1.31	-	84.8	-0.026	6.37	0.093
454	69.995	0.153	1.07	104.9	-1.39	-	84.8	-0.034	6.41	0.092
455	70.149	0.154	1.05	104.9	-1.31	-	84.8	-0.036	6.39	0.090
456	70.302	0.153	1.09	104.8	-1.37	-	84.8	-0.034	6.60	0.099
457	70.455	0.153	1.07	104.9	-1.34	-	84.8	-0.027	6.59	0.100
458	70.607	0.152	1.06	104.9	-1.35	-	84.8	-0.028	6.66	0.101
459	70.761	0.154	1.05	104.9	-1.34	-	84.7	-0.023	6.66	0.106
460	70.914	0.153	1.05	104.8	-1.41	98	84.8	-0.029	6.67	0.098
461	71.068	0.154	1.06	104.8	-1.42	-	84.7	-0.028	5.98	0.080

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	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 (%)
462	71.219	0.151	1.07	104.9	-1.43	-	84.9	-0.032	5.84	0.077
463	71.372	0.153	1.07	104.9	-1.43	-	84.8	-0.025	5.78	0.075
464	71.526	0.154	1.06	104.8	-1.42	-	84.8	-0.036	5.74	0.078
465	71.680	0.154	1.06	104.8	-1.45	-	84.8	-0.035	5.13	0.105
466	71.831	0.151	1.06	104.7	-1.39	-	84.8	-0.030	5.03	0.109
467	71.984	0.153	1.09	104.9	-1.42	-	84.8	-0.033	5.00	0.110
468	72.138	0.154	1.04	104.8	-1.42	-	84.7	-0.034	4.92	0.112
469	72.292	0.154	1.05	104.8	-1.43	-	84.8	-0.028	4.91	0.101
470	72.444	0.152	1.06	104.7	-1.40	98	84.8	-0.038	4.90	0.099
471	72.596	0.152	1.06	104.8	-1.31	-	84.8	-0.037	4.86	0.092
472	72.750	0.154	1.07	104.7	-1.37	-	84.8	-0.033	4.85	0.093
473	72.903	0.153	1.06	104.8	-1.35	98	84.8	-0.032	4.85	0.086
Avg/Tot	72.903	0.154	1.07	104.8	-1.35	100	85.4	-0.037	8.66	0.124

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Particulate Sampling 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)
0	0.000		0.05	85.7	-0.50		87.6
1	0.132	0.132	1.11	86.0	-1.79	-	87.5
2	0.290	0.158	1.11	85.7	-1.76	-	87.5
3	0.446	0.156	1.12	85.6	-1.95	-	87.4
4	0.605	0.159	1.13	86.0	-1.83	-	87.5
5	0.766	0.161	1.12	86.0	-1.95	-	87.2
6	0.924	0.158	1.15	86.0	-1.97	-	87.5
7	1.083	0.159	1.14	86.2	-1.80	-	87.7
8	1.245	0.162	1.14	86.1	-1.81	-	87.8
9	1.406	0.161	1.16	86.6	-1.94	-	87.9
10	1.565	0.159	1.17	86.5	-1.92	98	87.9
11	1.728	0.163	1.14	86.8	-1.80	-	88.2
12	1.888	0.160	1.16	86.9	-1.87	-	88.0
13	2.051	0.163	1.16	87.1	-2.03	-	88.0
14	2.215	0.164	1.17	87.2	-1.91	-	87.6
15	2.376	0.161	1.18	87.4	-1.82	-	88.0
16	2.541	0.165	1.18	87.4	-1.86	-	88.0
17	2.702	0.161	1.18	87.6	-2.02	-	87.8
18	2.867	0.165	1.16	87.7	-1.95	-	87.9
19	3.028	0.161	1.18	88.0	-1.98	-	87.7
20	3.192	0.164	1.16	88.0	-2.01	102	87.6
21	3.355	0.163	1.18	88.6	-1.99	-	87.6
22	3.517	0.162	1.17	88.6	-2.07	-	88.1
23	3.680	0.163	1.16	88.8	-1.87	-	87.9
24	3.841	0.161	1.17	89.0	-1.92	-	87.8
25	4.005	0.164	1.17	89.4	-1.91	-	87.6
26	4.166	0.161	1.17	89.8	-2.04	-	88.0
27	4.328	0.162	1.16	90.0	-1.92	-	87.5
28	4.491	0.163	1.16	90.3	-2.04	-	87.7
29	4.651	0.160	1.16	90.6	-1.86	-	87.7
30	4.815	0.164	1.15	90.6	-2.04	102	87.9
31	4.976	0.161	1.16	91.1	-1.90	-	87.9

BOX C TEST DATA - ASTM E3053 / ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Particulate Sampling 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)
32	5.137	0.161	1.16	91.5	-2.03	-	87.8
33	5.300	0.163	1.16	91.5	-2.03	-	87.7
34	5.460	0.160	1.17	91.8	-1.92	-	87.6
35	5.623	0.163	1.15	92.1	-2.00	-	87.7
36	5.785	0.162	1.16	92.7	-1.94	-	87.7
37	5.946	0.161	1.16	92.8	-2.04	-	87.6
38	6.109	0.163	1.16	93.0	-1.88	-	87.9
39	6.269	0.160	1.16	93.2	-2.03	-	87.7
40	6.432	0.163	1.14	93.6	-1.96	101	87.6
41	6.595	0.163	1.16	93.7	-2.03	-	87.9
42	6.755	0.160	1.15	94.0	-2.02	-	87.8
43	6.919	0.164	1.14	94.5	-1.87	-	87.3
44	7.079	0.160	1.17	94.7	-1.89	-	87.6
45	7.242	0.163	1.15	94.9	-1.88	-	87.9
46	7.404	0.162	1.16	95.2	-1.94	-	87.8
47	7.565	0.161	1.16	95.5	-1.90	-	87.6
48	7.729	0.164	1.16	95.8	-1.88	-	87.4
49	7.889	0.160	1.16	95.9	-1.94	-	87.5
50	8.052	0.163	1.14	96.4	-2.05	101	87.9
51	8.214	0.162	1.16	96.4	-1.87	-	87.8
52	8.375	0.161	1.15	97.0	-1.87	-	87.5
53	8.539	0.164	1.15	97.0	-2.03	-	87.9
54	8.699	0.160	-0.25	97.5	-1.94	-	87.8
55	8.862	0.163	-0.40	97.5	-1.84	-	87.6
56	9.025	0.163	-0.30	97.7	-1.99	-	88.0
57	9.186	0.161	-0.34	98.0	-1.89	-	87.9
58	9.350	0.164	-0.32	98.2	-1.90	-	87.8
59	9.510	0.160	-0.38	98.4	-1.93	-	87.9
60	9.673	0.163	-0.37	98.9	-1.88	100	87.4
Avg/Tot	9.673	0.161	0.97	91.3	-1.91	101	87.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
0	348.1	338.1	470.2	473.1	164.5	358.8	680
1	346.9	340.9	470.6	473.7	167.6	359.9	498
2	342.0	340.8	472.0	472.7	166.6	358.8	548
3	343.3	345.2	472.2	471.7	165.8	359.6	713
4	343.9	354.9	471.5	470.7	165.2	361.2	801
5	351.6	355.4	469.8	468.7	164.5	362.0	854
6	352.9	351.8	467.3	465.8	165.5	360.7	900
7	360.1	350.2	464.1	463.6	166.1	360.8	931
8	374.4	348.3	460.3	460.5	166.2	361.9	942
9	383.9	351.4	456.0	457.5	165.7	362.9	954
10	398.3	348.7	451.9	454.3	166.0	363.8	963
11	408.8	348.0	447.4	451.1	166.1	364.3	975
12	418.3	347.1	443.4	447.2	166.6	364.5	983
13	423.7	347.0	439.5	443.5	166.8	364.1	991
14	439.0	346.1	435.3	439.8	167.4	365.5	1004
15	455.7	349.1	431.1	436.7	168.5	368.2	1015
16	466.6	349.6	427.4	433.5	169.6	369.3	1030
17	479.8	352.5	423.6	429.8	170.3	371.2	1102
18	483.8	352.0	419.5	426.9	171.1	370.7	1118
19	495.7	354.8	416.1	424.3	171.9	372.6	1133
20	518.5	354.7	412.5	422.2	173.2	376.2	1140
21	527.8	358.0	408.7	420.3	173.9	377.7	1157
22	541.5	361.2	405.9	418.6	175.4	380.5	1178
23	552.0	357.5	402.9	417.1	176.3	381.2	1182
24	563.3	363.3	399.8	416.2	177.4	384.0	1190
25	570.9	367.1	396.9	415.5	178.3	385.7	1192
26	580.4	371.1	394.9	415.4	179.5	388.3	1197
27	584.1	366.0	393.0	414.7	180.4	387.6	1201
28	595.8	363.8	391.0	414.3	181.5	389.3	1208
29	600.7	362.2	389.4	414.3	182.6	389.8	1212
30	569.7	363.7	387.0	413.5	187.0	384.2	1173
31	551.5	361.8	384.7	413.5	190.4	380.4	1156
32	536.5	357.3	383.7	413.2	193.5	376.8	1130
33	525.0	352.7	382.4	412.5	195.5	373.6	1104
34	516.6	352.4	381.4	412.0	197.2	371.9	1099
35	512.7	351.8	380.5	411.7	198.7	371.1	1104
36	499.9	345.7	379.7	411.5	199.4	367.2	1101
37	491.1	341.6	379.0	411.0	199.8	364.5	1068
38	483.8	338.6	378.1	410.8	200.2	362.3	1049
39	478.9	337.7	377.3	410.2	200.1	360.8	1038
40	471.9	337.1	376.6	409.6	199.7	359.0	1033
41	464.1	335.5	375.7	409.2	199.6	356.8	1031
42	456.2	336.7	374.8	408.5	198.7	355.0	1027
43	453.8	335.5	374.2	408.2	197.9	353.9	1019
44	444.5	334.2	373.5	407.6	197.2	351.4	1015
45	443.9	332.5	372.6	407.2	197.1	350.7	1012
46	440.9	326.0	371.9	406.6	196.9	348.5	1014
47	431.7	325.1	371.1	405.8	196.7	346.1	1014
48	429.6	323.8	370.4	405.2	196.5	345.1	1008
49	426.3	322.4	369.7	404.8	196.9	344.0	1003

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
50	426.4	320.8	368.7	404.8	196.9	343.5	999
51	419.4	319.2	368.0	404.0	196.7	341.5	999
52	421.5	317.2	367.3	403.6	196.5	341.2	1001
53	416.0	315.8	366.8	402.8	196.5	339.6	1003
54	415.2	314.4	366.7	402.6	196.0	339.0	999
55	414.1	313.2	366.0	401.8	195.8	338.2	995
56	411.4	312.0	365.4	401.5	195.4	337.1	979
57	402.7	310.3	364.7	401.1	194.9	334.7	972
58	402.3	309.8	364.0	400.1	194.3	334.1	970
59	399.0	308.4	363.2	399.8	193.9	332.9	970
60	395.1	307.4	362.4	399.2	193.2	331.5	972
61	393.0	306.1	361.6	398.6	193.0	330.5	979
62	389.3	305.6	360.9	397.6	192.1	329.1	982
63	386.8	305.6	359.9	397.2	191.5	328.2	982
64	388.1	304.0	359.0	396.6	191.2	327.8	1024
65	389.0	303.5	358.3	395.4	190.3	327.3	1038
66	389.3	301.8	357.2	394.8	189.5	326.5	1037
67	388.5	301.0	356.1	393.8	188.8	325.6	1030
68	388.5	300.0	355.2	392.7	187.7	324.8	1011
69	385.8	298.7	354.2	392.2	186.9	323.6	992
70	382.1	297.8	353.0	391.0	186.2	322.0	981
71	380.7	296.5	351.9	390.1	185.4	320.9	969
72	375.4	295.3	350.8	389.5	185.0	319.2	959
73	373.1	295.1	349.3	388.4	184.4	318.1	945
74	369.9	293.9	348.1	387.6	184.4	316.8	934
75	366.0	292.9	347.0	387.1	184.3	315.5	934
76	364.4	292.9	346.1	386.2	184.0	314.7	933
77	362.6	293.1	345.5	386.1	184.3	314.3	935
78	361.3	293.9	344.6	385.8	184.5	314.0	940
79	359.1	292.8	343.6	385.6	184.6	313.1	944
80	358.7	292.4	342.9	385.1	184.8	312.8	946
81	359.5	290.4	342.1	385.6	185.1	312.5	948
82	361.9	289.4	341.3	385.1	185.2	312.6	951
83	358.9	288.0	340.4	385.5	185.6	311.7	952
84	358.9	286.8	340.0	385.4	185.9	311.4	953
85	361.7	285.8	339.4	385.7	185.9	311.7	953
86	361.7	284.7	338.7	386.3	186.4	311.6	955
87	361.0	283.7	338.2	386.8	186.5	311.2	953
88	363.4	283.0	337.7	387.2	186.7	311.6	951
89	366.1	282.5	337.4	387.5	186.8	312.1	952
90	365.0	281.8	336.7	388.4	187.0	311.8	949
91	365.1	282.2	336.3	388.8	186.9	311.9	949
92	364.3	280.5	335.9	389.8	187.3	311.6	947
93	364.4	279.3	335.5	390.4	187.2	311.4	947
94	366.7	278.0	335.3	391.0	187.2	311.6	945
95	366.1	276.3	334.6	392.2	187.3	311.3	944
96	364.3	276.8	334.8	393.2	187.5	311.3	947
97	364.3	283.1	334.6	394.5	187.6	312.8	947
98	364.2	281.0	334.4	395.6	187.6	312.6	948
99	364.9	280.1	334.4	396.7	187.9	312.8	947

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
100	365.5	280.4	334.2	398.1	188.1	313.3	945
101	365.0	279.1	334.3	399.0	187.9	313.1	950
102	364.3	277.1	334.2	400.2	188.3	312.8	947
103	365.2	276.4	334.6	401.0	188.2	313.1	941
104	363.4	275.3	334.8	402.4	188.3	312.8	932
105	362.1	274.1	335.1	402.9	188.2	312.5	929
106	362.7	274.7	335.3	403.9	188.2	313.0	927
107	361.0	274.6	335.4	404.9	188.1	312.8	925
108	361.1	275.5	335.7	405.3	187.9	313.1	922
109	361.4	274.7	335.6	405.8	187.9	313.1	919
110	360.2	273.3	335.5	406.3	187.8	312.6	920
111	354.5	273.7	335.4	406.7	187.5	311.6	921
112	356.4	272.0	335.1	407.3	187.3	311.6	920
113	355.1	269.0	335.0	407.3	187.0	310.7	918
114	355.2	266.7	335.4	408.2	186.9	310.5	916
115	352.1	264.3	335.1	409.2	186.6	309.5	913
116	354.8	264.6	334.9	409.7	186.4	310.1	908
117	349.9	263.2	334.8	411.2	186.3	309.1	908
118	350.4	264.1	334.5	412.3	186.1	309.5	904
119	348.0	262.8	334.4	413.3	186.0	308.9	908
120	347.1	261.6	334.1	414.5	185.9	308.6	912
121	346.3	261.2	334.0	416.4	186.0	308.8	909
122	346.9	261.7	333.9	417.6	185.8	309.2	906
123	346.4	260.3	333.7	419.1	185.8	309.1	903
124	345.0	257.6	333.5	420.7	186.0	308.6	902
125	347.9	256.7	333.5	421.7	185.6	309.1	904
126	347.7	256.2	333.4	423.3	185.7	309.3	904
127	346.6	255.8	333.3	424.2	185.1	309.0	904
128	346.0	254.7	333.3	425.9	185.0	309.0	899
129	341.6	254.5	333.2	426.8	184.7	308.2	897
130	344.2	253.7	333.2	427.9	184.5	308.7	896
131	342.0	253.3	333.3	428.9	183.9	308.3	901
132	340.8	253.0	333.3	429.5	183.5	308.0	907
133	342.1	252.1	333.1	430.8	183.4	308.3	907
134	341.8	252.2	333.2	431.0	182.9	308.2	902
135	340.9	251.6	333.4	431.5	182.6	308.0	899
136	337.6	250.9	333.0	432.3	182.4	307.2	896
137	337.8	250.7	333.6	432.4	182.1	307.3	889
138	336.2	250.0	333.7	433.2	181.9	307.0	881
139	335.2	249.6	333.9	433.6	181.7	306.8	871
140	331.9	249.2	333.8	433.9	181.5	306.1	866
141	330.4	248.7	333.9	434.2	181.0	305.6	870
142	328.3	248.3	333.8	434.4	181.0	305.2	872
143	326.0	247.8	333.8	434.7	180.8	304.6	871
144	325.8	247.7	334.0	434.6	180.4	304.5	868
145	323.1	247.0	333.8	435.2	180.2	303.9	866
146	324.2	246.8	333.7	435.0	180.1	304.0	864
147	325.6	246.5	333.9	435.1	179.7	304.2	864
148	323.5	245.8	333.7	435.3	179.7	303.6	864
149	322.7	245.8	333.7	435.1	179.3	303.3	864

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
150	322.0	245.7	333.7	435.0	179.0	303.1	865
151	321.2	245.0	333.6	435.4	179.1	302.9	864
152	321.7	244.7	333.6	435.2	178.8	302.8	880
153	319.3	244.2	333.5	435.4	178.4	302.2	899
154	321.5	244.1	333.5	435.0	177.7	302.4	942
155	324.9	243.4	333.5	435.3	177.4	302.9	960
156	325.9	243.0	333.4	435.0	176.7	302.8	957
157	327.2	243.4	333.3	434.3	175.9	302.8	952
158	328.3	243.2	333.1	434.0	175.2	302.8	947
159	331.5	244.2	332.9	433.2	174.4	303.2	941
160	330.1	243.4	332.5	432.4	173.6	302.4	936
161	328.7	243.0	332.4	431.9	172.6	301.7	933
162	326.4	242.4	332.0	431.1	171.9	300.8	930
163	326.8	242.0	331.8	430.0	171.0	300.3	928
164	324.3	241.4	331.7	429.8	170.2	299.5	925
165	323.1	240.8	331.5	429.3	169.5	298.8	923
166	322.9	240.5	331.0	428.5	168.5	298.3	920
167	322.1	240.7	330.7	427.7	167.7	297.8	918
168	317.0	239.9	330.2	427.3	167.1	296.3	914
169	315.9	240.2	330.1	426.5	166.3	295.8	911
170	316.4	240.2	329.5	426.2	165.8	295.6	907
171	315.5	239.2	329.2	425.4	162.9	294.4	904
172	313.3	239.3	328.6	425.1	160.5	293.4	861
173	311.9	238.7	328.4	425.2	158.6	292.6	846
174	307.2	242.2	327.9	424.8	157.1	291.8	844
175	305.1	244.3	327.9	424.3	155.8	291.5	842
176	301.8	241.9	327.8	424.5	155.2	290.2	848
177	301.0	241.7	327.8	424.2	154.7	289.9	854
178	302.7	238.6	327.9	424.5	154.8	289.7	864
179	301.4	242.2	328.1	424.8	154.9	290.3	869
180	303.5	245.5	328.4	424.7	155.1	291.4	872
181	306.3	247.6	328.7	425.5	155.7	292.8	877
182	306.9	250.0	329.2	425.6	156.4	293.6	881
183	309.9	249.5	329.5	425.8	157.3	294.4	885
184	312.5	252.0	329.9	426.4	158.2	295.8	891
185	311.0	253.9	330.3	427.1	159.2	296.3	895
186	317.1	252.0	330.9	427.8	160.1	297.6	893
187	317.7	251.7	331.3	428.2	160.9	298.0	891
188	320.0	252.8	331.9	428.8	162.1	299.1	889
189	320.3	254.2	332.4	429.6	163.2	299.9	888
190	322.4	253.6	333.0	430.1	164.4	300.7	886
191	324.1	252.7	333.6	430.9	165.6	301.4	886
192	325.3	254.4	334.1	431.6	166.5	302.4	885
193	326.3	254.8	334.8	432.3	168.0	303.2	886
194	327.9	253.7	335.4	433.2	168.9	303.8	886
195	329.1	255.3	335.9	433.8	170.1	304.8	887
196	329.7	256.7	336.8	434.0	171.1	305.7	889
197	329.1	256.9	337.3	435.0	172.3	306.1	890
198	330.3	258.2	338.1	435.7	173.1	307.1	891
199	331.7	259.1	339.0	436.0	174.3	308.0	895

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
200	331.9	261.0	339.7	436.8	175.4	309.0	904
201	333.2	262.4	340.5	437.7	176.4	310.0	909
202	336.7	261.2	341.3	438.9	177.9	311.2	914
203	336.1	262.6	342.3	439.8	178.8	311.9	918
204	339.0	262.8	343.4	440.7	180.1	313.2	923
205	342.2	263.3	344.5	441.4	180.9	314.5	925
206	344.5	264.1	345.8	442.3	181.9	315.7	930
207	343.2	262.2	347.1	443.4	183.0	315.8	936
208	345.9	262.4	348.7	444.6	183.8	317.1	942
209	349.7	263.0	350.2	445.8	184.7	318.7	943
210	350.7	267.3	351.5	447.1	185.5	320.4	942
211	351.5	270.1	353.0	448.5	186.9	322.0	936
212	354.2	272.0	354.7	449.6	187.3	323.6	935
213	355.5	272.3	356.4	451.2	188.0	324.7	931
214	353.6	271.4	358.2	452.4	188.3	324.8	924
215	355.5	272.1	359.6	453.6	189.1	326.0	913
216	354.9	274.9	361.7	454.6	189.1	327.0	903
217	354.2	274.3	363.4	455.8	189.5	327.4	894
218	352.3	276.4	365.0	456.8	189.4	328.0	884
219	352.2	273.7	366.8	457.4	189.1	327.8	876
220	348.9	274.6	368.1	457.7	188.6	327.6	870
221	346.6	275.3	369.3	457.9	188.2	327.5	865
222	343.3	275.3	370.5	458.3	187.7	327.0	861
223	340.0	274.3	371.4	458.6	187.5	326.4	858
224	335.5	276.2	372.5	458.7	186.7	325.9	854
225	335.6	275.8	373.4	459.2	186.2	326.0	847
226	332.2	278.0	374.5	459.4	185.9	326.0	842
227	331.9	282.6	375.4	459.5	185.6	327.0	841
228	328.3	284.2	376.2	460.0	185.2	326.8	841
229	328.3	285.2	377.2	460.3	184.8	327.2	840
230	325.4	289.1	378.3	460.6	184.2	327.5	840
231	323.8	288.8	379.0	461.5	183.8	327.4	836
232	322.2	287.0	380.2	462.1	183.8	327.1	834
233	319.6	287.5	381.1	462.5	183.7	326.9	833
234	318.5	287.2	382.6	463.0	183.4	326.9	832
235	315.6	287.4	383.4	463.5	183.4	326.7	833
236	315.0	287.6	384.7	464.6	183.2	327.0	831
237	312.9	288.1	385.9	465.6	183.0	327.1	830
238	310.7	289.7	386.9	466.0	182.4	327.1	828
239	312.1	292.3	387.8	467.0	182.1	328.3	823
240	309.2	298.5	388.9	467.7	181.9	329.2	819
241	309.0	301.1	389.8	468.4	181.3	329.9	816
242	304.1	299.4	390.8	469.6	180.9	329.0	811
243	303.1	297.6	391.5	470.3	180.5	328.6	806
244	301.7	301.3	392.1	471.0	180.0	329.2	803
245	301.5	299.8	392.9	471.4	179.8	329.1	799
246	299.0	302.6	393.5	471.9	179.3	329.3	799
247	297.3	300.5	394.3	472.5	178.8	328.7	794
248	295.4	296.3	394.9	473.0	178.2	327.6	789
249	295.4	296.8	395.6	472.7	177.4	327.6	787

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
250	293.2	298.2	396.2	473.2	176.8	327.5	782
251	294.0	298.0	396.9	473.6	176.6	327.8	777
252	292.7	298.7	397.4	473.7	175.8	327.7	772
253	289.4	301.1	398.3	473.7	175.2	327.5	767
254	288.3	301.0	398.8	473.9	174.5	327.3	760
255	286.2	301.8	399.6	473.7	173.9	327.0	755
256	283.2	302.0	400.1	473.4	173.1	326.4	752
257	284.3	301.7	400.9	473.2	172.7	326.6	747
258	282.0	301.9	401.4	472.8	171.9	326.0	743
259	279.7	302.1	401.9	472.7	171.5	325.6	743
260	276.2	302.5	402.4	471.9	171.1	324.8	738
261	275.4	302.6	402.6	471.4	170.4	324.5	730
262	273.3	303.1	403.2	470.4	169.6	323.9	722
263	271.8	303.6	403.2	469.1	169.1	323.4	715
264	269.4	303.7	403.1	468.3	168.7	322.6	708
265	264.7	304.6	403.0	466.8	167.9	321.4	702
266	265.6	304.7	402.7	466.1	167.4	321.3	697
267	260.6	305.3	402.4	465.0	166.8	320.0	691
268	259.8	305.6	402.3	463.9	166.2	319.6	686
269	257.3	305.9	402.0	462.5	165.6	318.7	683
270	255.4	306.5	401.6	461.5	165.2	318.0	679
271	252.7	306.7	401.1	460.6	164.7	317.2	675
272	251.2	306.9	400.7	459.7	164.2	316.5	672
273	248.6	307.3	400.5	459.0	163.7	315.8	670
274	246.6	308.1	400.0	457.7	162.9	315.1	668
275	245.0	308.3	399.6	457.0	162.4	314.5	666
276	244.3	308.4	399.2	456.4	162.2	314.1	662
277	241.9	308.8	399.0	455.6	161.4	313.3	657
278	238.9	308.4	398.4	455.0	161.0	312.3	652
279	238.5	308.5	397.8	454.3	160.6	311.9	649
280	236.3	308.4	397.7	453.7	160.2	311.3	645
281	235.2	308.2	397.3	452.8	159.6	310.6	643
282	233.1	308.0	397.2	451.8	159.2	309.9	642
283	231.3	308.0	396.8	451.3	158.9	309.3	640
284	230.4	306.6	396.6	450.4	158.2	308.4	639
285	229.6	305.6	396.0	449.8	158.0	307.8	638
286	227.7	304.8	396.2	449.2	157.6	307.1	637
287	225.5	304.8	395.9	448.0	156.9	306.2	635
288	224.9	305.2	395.7	447.4	156.4	305.9	634
289	225.1	305.2	395.8	447.2	156.0	305.9	632
290	224.7	305.7	395.2	446.4	155.4	305.5	631
291	223.2	305.9	395.2	446.0	155.2	305.1	629
292	221.4	307.3	395.3	445.2	154.7	304.8	627
293	221.0	307.2	395.2	444.5	154.2	304.4	625
294	219.0	308.7	395.1	444.1	153.7	304.1	624
295	219.0	308.5	395.1	443.9	153.3	304.0	621
296	218.0	309.2	395.2	443.0	152.9	303.7	619
297	217.9	311.3	395.1	442.3	152.5	303.8	617
298	216.0	312.7	395.1	442.0	151.9	303.5	616
299	214.6	314.3	394.9	441.0	151.7	303.3	615

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
300	214.9	314.1	394.8	440.6	151.8	303.2	614
301	214.4	314.6	394.6	440.2	151.3	303.0	613
302	212.9	313.2	394.7	439.3	150.6	302.1	611
303	211.3	313.0	394.6	438.8	150.5	301.6	611
304	212.2	311.1	394.5	438.0	150.1	301.2	611
305	210.4	310.0	394.3	437.1	149.7	300.3	612
306	211.8	309.2	394.5	436.6	149.4	300.3	612
307	210.7	308.5	394.4	436.2	149.3	299.8	613
308	210.6	308.9	394.3	435.4	148.9	299.6	614
309	209.4	309.0	394.3	435.0	148.6	299.3	615
310	209.5	309.3	394.3	434.5	148.3	299.2	618
311	208.3	309.8	394.5	433.6	147.8	298.8	619
312	209.0	309.8	394.2	433.5	147.7	298.8	620
313	208.2	310.5	394.4	432.7	147.3	298.6	622
314	207.6	310.4	394.3	432.5	147.0	298.4	622
315	208.3	310.9	394.6	431.9	146.6	298.5	624
316	207.9	311.0	394.4	431.5	146.6	298.3	625
317	208.4	311.3	394.6	431.2	146.3	298.4	625
318	207.9	311.6	394.7	430.8	145.9	298.2	625
319	208.6	311.8	394.9	430.5	145.7	298.3	625
320	207.0	312.3	395.2	429.8	145.4	297.9	625
321	209.0	312.5	395.6	429.6	145.3	298.4	628
322	207.1	312.9	395.7	429.3	144.9	298.0	632
323	207.1	312.9	396.2	429.2	144.8	298.0	635
324	207.7	313.1	396.7	428.7	144.5	298.1	633
325	207.9	314.8	397.2	427.9	144.4	298.4	631
326	207.4	316.4	397.6	427.9	144.2	298.7	632
327	208.3	316.8	397.9	427.4	143.8	298.8	635
328	208.9	317.2	398.6	427.3	143.7	299.1	636
329	209.2	317.4	399.4	426.9	143.3	299.2	636
330	208.3	317.4	400.1	426.6	143.3	299.1	635
331	207.9	317.7	400.5	426.3	143.1	299.1	636
332	208.7	317.4	401.1	426.5	143.1	299.4	633
333	207.9	317.5	401.9	426.5	142.7	299.3	630
334	208.7	318.0	402.9	426.1	142.4	299.6	629
335	208.4	318.1	403.1	425.9	142.3	299.6	630
336	207.4	318.1	404.3	426.0	141.9	299.5	632
337	208.0	318.3	405.1	425.7	141.9	299.8	634
338	207.8	320.9	405.7	425.7	141.6	300.3	635
339	208.4	320.8	406.9	425.5	141.5	300.6	638
340	207.7	320.8	407.6	425.6	141.4	300.6	637
341	207.1	321.3	408.8	425.6	141.0	300.8	637
342	208.3	321.6	410.0	425.6	140.7	301.2	634
343	208.4	322.1	411.0	425.7	140.9	301.6	634
344	208.7	321.2	412.1	425.9	141.0	301.8	633
345	208.5	320.4	413.3	425.8	140.6	301.7	635
346	209.4	319.2	414.8	425.9	140.7	302.0	636
347	208.1	317.6	416.1	426.1	140.7	301.7	637
348	208.5	316.6	417.9	426.4	140.4	302.0	637
349	211.4	316.5	419.1	426.3	140.3	302.7	638

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
350	209.4	316.2	421.0	426.5	140.0	302.6	638
351	210.0	317.3	422.1	426.6	140.2	303.2	638
352	209.2	316.1	424.4	426.9	140.2	303.4	638
353	211.2	315.9	426.2	427.3	140.0	304.1	640
354	210.1	316.2	427.8	427.3	139.8	304.2	642
355	210.5	316.1	429.6	427.9	139.8	304.8	642
356	211.2	316.5	431.1	427.8	139.7	305.3	640
357	210.5	316.6	433.1	428.5	139.6	305.7	634
358	210.8	316.7	435.4	428.8	139.5	306.2	632
359	210.8	316.7	437.5	428.8	139.3	306.6	633
360	209.4	316.6	439.8	428.6	139.4	306.8	621
361	210.6	316.2	441.8	428.8	139.5	307.4	624
362	209.8	316.3	443.7	429.0	139.3	307.6	630
363	209.4	316.5	445.5	429.3	139.6	308.1	632
364	209.4	317.8	446.5	429.3	139.4	308.5	632
365	208.8	317.1	447.6	429.8	139.4	308.5	630
366	208.9	317.8	448.3	429.9	139.4	308.9	628
367	209.6	320.4	448.7	429.5	139.2	309.5	627
368	209.0	320.2	449.1	429.6	139.2	309.4	626
369	209.9	322.4	449.0	429.9	139.3	310.1	625
370	208.6	322.9	449.4	429.6	139.0	309.9	626
371	207.7	323.2	449.1	429.8	139.1	309.8	626
372	207.7	324.1	448.9	430.1	139.4	310.0	627
373	208.3	326.2	448.6	429.7	139.3	310.4	627
374	208.9	332.0	448.7	429.6	139.3	311.7	627
375	208.1	331.9	448.1	429.7	139.1	311.4	628
376	207.7	334.6	448.0	429.4	139.1	311.8	629
377	207.4	335.4	447.8	429.3	138.8	311.7	629
378	207.2	335.2	447.4	429.3	138.8	311.6	631
379	208.2	335.5	447.3	429.1	138.8	311.8	635
380	207.2	335.0	447.2	428.6	138.7	311.3	636
381	208.0	334.3	447.0	428.3	138.6	311.2	635
382	207.5	330.7	446.8	428.6	138.6	310.4	634
383	206.8	329.1	446.9	428.5	138.5	310.0	634
384	208.1	329.8	446.8	428.2	138.2	310.2	635
385	209.3	331.7	446.9	428.2	138.5	310.9	634
386	208.7	332.0	447.0	428.2	138.5	310.9	630
387	208.1	333.9	446.9	428.0	138.5	311.1	628
388	206.8	335.8	447.1	428.1	138.4	311.2	626
389	207.3	336.4	447.5	428.0	138.1	311.5	625
390	206.8	337.5	447.6	428.0	138.2	311.6	623
391	206.4	339.6	448.2	427.9	138.3	312.1	622
392	206.3	340.7	448.3	427.8	138.1	312.2	622
393	206.3	342.4	448.8	427.6	138.2	312.7	624
394	207.1	340.6	449.2	427.6	138.0	312.5	625
395	206.5	341.7	450.0	427.2	138.0	312.7	619
396	206.1	341.5	450.5	426.9	137.8	312.6	614
397	205.8	342.3	450.9	426.9	138.0	312.8	614
398	205.7	342.5	451.5	426.7	138.0	312.9	612
399	204.1	342.5	452.3	426.3	137.7	312.6	610

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
400	203.7	343.5	452.6	426.4	137.7	312.8	607
401	205.0	345.7	453.1	425.7	137.6	313.4	605
402	203.6	345.6	453.8	425.5	137.5	313.2	603
403	204.6	345.6	454.3	425.3	137.6	313.5	601
404	203.1	345.9	454.9	424.6	137.4	313.2	600
405	202.1	345.6	455.0	424.5	137.4	312.9	599
406	202.1	345.6	455.8	424.1	137.3	313.0	599
407	202.7	345.2	456.4	424.1	137.3	313.1	599
408	201.7	345.2	456.7	423.7	137.3	312.9	600
409	201.5	345.5	457.6	423.2	136.9	312.9	601
410	200.8	345.1	458.1	423.2	137.1	312.9	602
411	201.4	345.4	458.9	422.7	137.2	313.1	605
412	201.5	345.7	459.4	422.3	136.9	313.2	608
413	201.6	345.9	459.8	422.4	137.0	313.3	609
414	201.3	346.3	460.9	422.2	137.0	313.5	609
415	201.2	346.3	461.7	422.1	136.7	313.6	609
416	200.9	346.1	462.8	422.1	136.7	313.7	609
417	201.8	344.4	464.2	421.5	136.4	313.7	610
418	202.0	342.9	465.2	421.8	136.4	313.7	610
419	202.2	340.8	466.8	421.4	136.4	313.5	611
420	202.6	343.9	468.1	421.3	136.3	314.4	610
421	202.1	342.6	470.2	421.2	136.1	314.4	607
422	201.5	341.9	472.1	421.1	136.1	314.5	605
423	201.8	346.2	474.0	421.3	135.9	315.8	603
424	201.6	347.3	476.4	421.4	136.0	316.5	602
425	201.4	347.2	478.5	421.4	135.9	316.9	602
426	200.9	348.2	480.7	421.7	136.0	317.5	601
427	202.1	340.5	483.2	421.5	135.8	316.6	602
428	201.1	338.1	485.3	421.8	135.7	316.4	601
429	201.3	334.2	487.7	422.0	135.6	316.2	601
430	201.2	330.0	489.8	421.8	135.5	315.7	601
431	202.5	329.3	492.1	421.8	135.6	316.3	600
432	201.1	326.3	494.2	422.2	135.6	315.9	600
433	201.5	324.5	496.4	422.2	135.6	316.0	600
434	200.6	319.0	499.0	422.9	135.5	315.4	601
435	201.7	317.6	501.1	423.1	135.6	315.8	602
436	202.5	317.6	503.4	423.1	135.4	316.4	603
437	203.0	316.2	505.6	423.5	135.6	316.8	604
438	201.4	317.6	507.9	423.9	135.5	317.3	604
439	202.0	316.9	510.3	424.4	135.6	317.8	605
440	202.8	316.8	513.2	424.3	135.4	318.5	608
441	203.8	315.8	515.4	424.7	135.5	319.0	610
442	204.2	313.4	517.5	425.2	135.5	319.2	612
443	203.6	311.5	520.3	425.2	135.4	319.2	614
444	204.7	309.8	522.3	425.7	135.7	319.6	615
445	204.7	308.9	524.5	426.2	135.7	320.0	615
446	205.8	308.9	526.8	426.1	135.5	320.6	615
447	206.2	308.6	528.6	426.9	135.4	321.1	615
448	205.3	308.7	530.4	427.1	135.4	321.4	615
449	206.5	308.7	532.0	427.4	135.4	322.0	615

WOODSTOVE SURFACE TEMPERATURE DATA

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

	Temperature Data (°F)						
Elapsed Time (min)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stove Surface Average	Catalyst Exit
450	206.8	308.6	533.3	427.8	135.6	322.4	616
451	206.6	308.3	534.9	427.8	135.2	322.6	619
452	208.2	308.7	536.1	427.8	135.4	323.2	620
453	207.4	308.6	537.6	428.1	135.3	323.4	621
454	206.3	308.6	538.6	428.9	135.3	323.5	620
455	207.4	308.7	539.8	429.0	135.2	324.0	621
456	207.7	308.6	540.9	429.3	135.3	324.4	625
457	207.3	309.4	542.0	429.2	135.3	324.6	628
458	208.8	309.5	543.0	429.5	135.0	325.2	628
459	208.3	309.8	544.0	429.7	135.0	325.4	630
460	209.8	309.7	545.4	430.2	135.2	326.1	632
461	210.2	310.0	546.3	430.4	135.1	326.4	623
462	209.2	310.5	547.5	430.5	135.2	326.6	616
463	209.2	311.1	548.8	430.4	135.0	326.9	613
464	209.4	311.4	550.0	430.7	134.8	327.3	611
465	209.7	311.7	551.4	431.1	135.1	327.8	614
466	210.5	312.2	552.5	431.3	134.7	328.2	614
467	208.9	313.0	553.7	431.1	134.6	328.3	614
468	209.2	313.3	553.8	431.2	134.4	328.4	612
469	209.0	313.9	554.0	431.0	134.4	328.5	609
470	207.4	314.0	553.6	431.1	134.4	328.1	604
471	207.3	314.6	552.8	430.4	134.3	327.9	599
472	207.1	314.7	551.9	430.2	134.2	327.6	595
473	207.3	315.6	550.7	429.3	134.1	327.4	591
Average	296.4	301.8	399.3	429.9	163.9	318	790

LAB SAMPLE DATA - ASTM E2515

Client: 509 Fabrication
Model: VCV
Run #: 4

Job #: 24-282
Tracking #: 225
Technician: AK
Date: 7/18/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	H00194	180.7	181.4	0.7
	B	H00195	179.5	180.0	0.5
	C - 1st Hour	H00196	185.7	186.2	0.5
	Amb	H00197	187.0	187.0	0.0
Probes	**A**	5A	116758.7	116758.8	0.1
	B	5B	116876.8	116877.0	0.2
	C - 1st Hour	5C	115856.9	115857.0	0.1
O-rings	**A**	5A	3533.8	3534.1	0.3
	B	5B	3528.9	3529.2	0.3
	C - 1st Hour	5C	3372.5	3372.7	0.2

Placed in Dessicator on:	7/19/2025

Audit		200.0	7/23 12:30	200.0	7/25 16:00				
Filters	**A**	181.4	7/23 12:30	181.4	7/25 16:00				
	B	179.9	7/23 12:30	180.0	7/25 16:00				
	C - 1st Hour	186.2	7/23 12:30	186.2	7/25 16:00				
	Amb	187.0	7/23 12:30	187.0	7/25 16:00				
Probes	**A**	116758.7	7/23 12:30	116758.8	7/25 16:00				
	B	116877.0	7/23 12:30	116877.0	7/25 16:00				
	C - 1st Hour	115857.0	7/23 12:30	115857.0	7/25 16:00				
O-Rings	**A**	3534.2	7/23 12:30	3534.1	7/25 16:00				
	B	3529.3	7/23 12:30	3529.2	7/25 16:00				
	C - 1st Hour	3372.7	7/23 12:30	3372.7	7/25 16:00				

Train A Aggregate, mg:	**1.1**
Train B Aggregate, mg:	**1.0**
Train C Aggregate, mg:	**0.8**
Ambient Aggregate, mg:	**0.0**

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications Job Number: 24-282 Tracking #: 225
Model: VCV Run Number: 4 Test Date: 7/18/2025

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: 17:41
Air Control Setting: Open 5/16”

Time	Notes
	-None-

Test Notes
Test Burn Start Time: 18:08
Air Control Setting: Open 5/16

Time	Notes
0:30	Test Fuel Loaded
0:45	Closed Door
1:30	Closed Bypass
15:00	Set air to test setting

Test Burn End Time: 7/19 2:01

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	10:05	10:06	10:07	7/19 9:30	7/19 9:31	7/19 9:32
CO_2	0.08	17.45	10.23	0.16	17.22	10.09
CO	-0.008	4.390	2.536	0.019	4.316	2.469

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

Technician Signature: Date: 12/22/25

ASTM E3053 Wood Heater Run Sheets

Client: 509 Fabrications | Job Number: 24-282 | Tracking #: 225
Model: VCV | Run Number: 4 | Test Date: 7/18/2025

Test Photos



Medium Fire Fuel Load



Medium Fire Fuel Loaded



Air Setting

Technician Signature: _____ Date: 12/22/25

ASTM E2515 - TX40 Filters

Date:	7/2/25	7/14/25	"	"			
Time:	0930	13:45	"	"			
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
H00182	179.2	179.2	"	"	AS	↑	↑
H00183	181.2	181.1	"	"	AS	24-282	#1
H00184	~~273.8~~ 180.2	180.2	"	"	AS	↓	↓
H00185	191.3	191.5	"	"	AS		
H00186	182.7	182.7	"	"	AS	↑	↑
H00187	191.4	191.6	"	"	AS	24-282	#2
H00188	187.6	187.7	"	"	AS	↓	↓
H00189	~~177.8~~ 186.5	186.3	"	"	AS		
H00190	181.4	181.6	"	"	AS	↑	↑
H00191	178.7	178.8	"	"	AS	24-282	#3
H00192	194.8	194.8	"	"	AS	↓	↓
H00193	191.6	191.5	"	"	AS		
H00194	180.9	180.7	"	"	AS	↑	↑
H00195	179.5	179.5	"	"	AS	24-282	#4
H00196	185.8	185.7	"	"	AS	↓	↓
H00197	187.1	187.0	"	"	AS		

Date:							
Time:							
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
H00198							
H00199							
H00200							
H00201							
H00202							
H00203							
H00204							
H00205							
H00206							
H00207							
H00208							
H00209							
H00210							
H00211							
H00212							
H00213							

ASTM E2515 - Probe Samples 1-10

Date:	6/30/25	7/2/25	7/14/25	7/15/25			
Time:	4:30	0930	13:30	11:00			
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
1A	115629.1	115628.4	115628.3	-	A	22-791	Maple3
1B	115903.8	115903.7	-	-	A		
1C	116434.5	116434.1	116434.0	-	A		
2A	116060.3	116059.9	116059.1	116059.3	A	24-282	#1
2B	116175.7	116175.9	-	-	A		
2C	116430.4	116430.4	-	-	A		
3A	115882.7	115882.1	115881.8	115892.0	A	24-282	#2
3B	116122.1	116122.2	-	-	A		
3C	116619.5	116619.7	-	-	A		
4A	116025.4	116024.9	116024.9	-	A	24-282	#3
4B	116183.9	116183.3	116183.5	-	A		
4C	116999.3	116999.1	-	-	A		
5A	116759.4	116758.8	116758.7	-	A	24-282	#4
5B	116877.5	116877.0	116876.8	-	A		
5C	115857.1	115856.9	-	-	A		

Date:	8/9/25	8/11/25	-	-			
Time:	10:30	0815	-	-			
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
6A	116383.8	116384.0	-	-	A	25-422	#1
6B	115956.0	115955.9	-	-	A		
6C	115129.4	115129.3	-	-	A		
7A	116559.8	116560.0	-	-	A	25-422	#2
7B	117130.2	117130.3	-	-	A		
7C	116551.4	116552.0	-	-	A		
8A	116635.1	116635.3	-	-	A	25-422	#3
8B	116667.2	116667.0	-	-	A		
8C	116663.9	116664.0	-	-	A		
9A	116532.4	116532.4	-	-	A	25-422	#4
9B	117739.7	117739.8	-	-	A		
9C	116603.9	116604.0	-	-	A		
10A	116647.9	116647.9	-	-	A		
10B	117755.1	117755.3	-	-	A		
10C	116729.6	116729.8	-	-	A		

ASTM E2515 - O-Ring Samples 1-10

Date:	6/30/25	7/2/25	7/14/25				
Time:	4:15	15:00	13:30				
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
1A	3566.2	3566.4	-	-	A	22-791	Maple3
1B	3554.8	3555.0	-	-	A		
1C	4165.87	4165.8	-	-	A		
2A	3551.3	3551.5	-	-	A	24-282	#1
2B	3570.8	3570.7	-	-	A		
2C	3388.6	3388.8	-	-	A		
3A	3577.4	3577.6	-	-	A	24-282	#2
3B	3565.9	3566.0	-	-	A		
3C	3620.6	3620.6	-	-	A		
4A	3376.2	3374.9	3374.8	-	A	24-282	#3
4B	3578.4	3577.9	3577.7	-	A		
4C	3372.0	3370.8	3370.6	-	A		
5A	3534.1	3534.5	3534.4	-	A	24-282	#4
5B	3530.3	3529.6	3529.4	-	A		
5C	3375.3	3373.9	3373.8	-	A		

Date:	8/9/25	8/11/25	-	-			
Time:	10:45	08:30	-	-			
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
6A	3394.6	3394.7	-	-	A	25-422	#1
6B	3611.3	3611.4	-	-	A		
6C	3399.0	3399.1	-	-	A		
7A	3569.1	3569.1	-	-	A	25-422	#2
7B	3520.7	3520.6	-	-	A		
7C	3404.2	3404.2	-	-	A		
8A	3550.3	3550.1	-	-	A	25-422	#3
8B	3356.1	3356.2	-	-	A		
8C	3584.2	3584.1	-	-	A		
9A	3578.4	3578.4	-	-	A	25-422	#4
9B	3521.5	3521.5	-	-	A		
9C	3427.7	3427.7	-	-	A		
10A	3359.2	3359.4	-	-	A		
10B	3568.5	3568.6	-	-	A		
10C	3364.2	3364.3	-	-	A		

Wood Heater Aging Data
Woodstove Test Data Sheet #25
WST 5-Form 3, Rev 1/15

Unit: VcV 2.1.5
Date: 8/6 - 11/11/2020
Technicians: ATM ESS
Page : 1 of 2

		T/C#	7	1	16	17	
Hr. #	2020 Date	Time	Firebox Temp	Stack @ 8'	Pre Cat	Post Cat	Comments
1	8/6	1144	700	339	866	767	R#D 13 PAC: Hi
2	↓	1244	550	357	1341	1028	Fire Started 1009
3	↓	1344	707	347	1170	914	
4	8/7	1259	752	339	867	772	R#D 14 PAC Hi F. Started 1124
5	8/11	1120	518	313	851	728	R#D 15 PAC Hi F. Started 1050
6	8/12	1145	726	330	813	768	R#D 16 PAC: Hi
7	↓	1245	448	368	1224	951	Fire Started 1010
8	↓	1345	580	329	838	827	
9	↓	1445	740	307	1023	811	
10	8/13	1200	807	330	900	765	R#D 17 PAC Hi
11	↓	1300	464	350	1143	883	Fire Started 1035
12	↓	1400	509	323	978	837	
13	↓	1500	541	300	865	772	
14	8/26	1230	777	387	930	806	R#D 20 PAC: Hi
15	↓	1330	457	402	1144	924	Fire Started 1115
16	↓	1430	603	384	1124	894	
17	↓	1530	968	357	991	812	
18	8/28	1254	797	378	930	806	R#D 21 PAC: Hi
19	↓	1354	382	399	1197	955	Fire Started 1144
20	↓	1454	425	363	980	848	
21	↓	1554	512	335	839	783	
22	9/21	1522	839	375	850	757	R#D 25 PAC: Hi
23	↓	1622	751	398	1163	959	Fire Started 1050
24	↓	1722	711	365	1024	865	
25	↓	1822	993	326	864	775	
26	10/23	1055	923	370	934	821	R#D 29 PAC: Hi
27	↓	1155	515	387	1203	960	Fire Started 945
28	↓	1255	553	351	1080	883	
29	↓	1355	796	326	911	839	

WOODHEATER AGING DATA UNIT: VCV 2.1.5 Page 1 of 3 Rev. 3 6.13.24

Load #	Tech	Date	Pc #	Length (in.)	Pc. Wt. (lbs.)	Moisture Readings (%DB) End	Center	End	Avg.	Comments
13	ATM	8/6	1	18.00	3.700	17.7	20.3	20.1	19.867	Loaded @ 1144
Wood Temp			2	17 7/8	5.850	20.5	23.2	21.4	22.200	
65			3	18 1/16	4.614	18.7	18.7	19.5	19.533	Load Avg 21.001 (%DB)
Correction			4	18 1/16	4.072	21.5	21.2	21.2	21.800	Total Wt.
+0.5			5	18.00	3.008	20.0	22.7	19.5	21.233	21.244 lbs.
14	ATM	8/7	1	17 15/16	5.818	19.5	20.3	22.7	21.733	Loaded @ 12:59
Wood Temp			2	18.00	4.828	18.0	18.3	19.8	19.433	
61			3	17 15/16	3.856	18.9	21.7	21.5	22.600	Load Avg 21.102 (%DB)
Correction			4	18 1/8	2.696	19.2	21.9	23.8	22.533	Total Wt.
+0.9			5	18.0	4.054	18.9	19.1	20.3	20.333	21.252 lbs.
15	ATM	8/11	1	17 7/8	2.664	17.6	18.7	19.9	19.633	Loaded @ 1120
Wood Temp			2	18.00	4.742	18.9	20.5	21.3	21.133	
61			3	17 5/16	5.528	18.1	19.2	19.1	19.700	Load Avg 20.009 (%DB)
Correction			4	18.0	4.954	20.0	18.7	18.1	19.333	Total Wt.
+0.9			5	18.0	3.434	18.3	18.8	18.7	19.500	21.322 lbs.
16	ATM	8/12	1	18.0	2.664	19.2	18.1	19.3	19.667	Loaded @ 1145
Wood Temp			2	18.0	4.754	19.4	20.4	21.5	21.367	
62			3	18 1/8	5.534	18.7	18.9	18.9	19.633	Load Avg 20.034 (%DB)
Correction			4	18.0	4.958	19.7	19.4	18.3	19.933	Total Wt.
+0.8			5	18.0	3.436	18.0	18.8	18.6	19.267	21.34 lbs.
17	ATM	8/13	1	18.0	4.854	19.1	19.3	19.7	20.467	Loaded @ 1200
Wood Temp			2	18.0	4.130	22.0	26.5	21.9	24.567	
59			3	17 7/8	2.456	18.3	18.4	19.2	19.733	Load Avg 21.366 (%DB)
Correction			4	18.0	5.992	22.0	19.0	17.5	20.600	Total Wt.
+1.1			5	18 1/16	3.804	20.4	19.2	21.0	21.300	21.236 lbs.

WOOD HEATER AGING DATA
Woodstove Data Sheet # 26
WST 5 Form 4, Rev. 4. 6/12/24

Unit: VcV 2.15
Date: 8/6/20 - 11/4/20
Technicians: ATM ESS
Page: 1 of 4

AGING-FUEL LOAD WT., LBS. BURNT AND DRY BURN RATE INFO

LOAD 1 (L 1): Date: 8/6/20 R7013

				Clock	Elapsed
1. Fuel Load M.C., %DB	21.001	%	Fire Started @:	10:09	
2. Residual K/S Wt.:	2.6	lbs.	L1 Loaded @ (Start):	11:14	0:00
3. Fuel Added: Wet:	21.244	lbs.	Bypass Closed:		2:41
4. Fuel Added: Dry:	17.558	lbs.	PAC @: WO	11:44	0:00
5. Fuel to be Burnt: (2 + 4)	20.158	lbs.	End L1:	1439	175
6. Fuel Left: Dry:	2.2	lbs.	7. Burn Time: (Min.) (L1 End - L1 Start)	175	
7. Fuel Burnt: Dry: (5 - 6)	17.958 / 8.1456	lbs. / kg	8. Dry Burn Rate:	2.792	kg/h

LOAD 2 (L 2): Date: 8/7/20 R7014

9. Fuel Load M.C., %DB	21.202	%	Fire Started @:	11:24	
10. Residual K/S Wt.:	2.4	lbs.	L2 Loaded @ (Start):	12:55	0:00
11. Fuel Added: Wet:	21.252	lbs.	Bypass Closed:		2:10
12. Fuel Added: Dry:	17.535	lbs.	PAC @: WO	11:24	0:00
13. Fuel to be Burnt: (10 + 12)	19.935	lbs.	End L2: Aborted	14:29	90:00
14. Fuel Left: Dry:	15.1	lbs.	16. Burn Time: (Min.) (L2 End - L2 Start)	90:00	
15. Fuel Burnt: Dry: (13 - 14)	4.835 / 2.192	lbs. / kg	17. Dry Burn Rate:	1.4162	kg/h

LOAD 3 (L 3): Date: 8/11/20 R7015

18. Fuel Load M.C., %DB	20.009	%	Fire Started @:	10:20	
19. Residual K/S Wt.:	2.5	lbs.	L3 Loaded @ (Start):	12:00	0:00
20. Fuel Added: Wet:	21.322	lbs.	Bypass Closed:		2:28
21. Fuel Added: Dry:	17.768	lbs.	PAC @: WO		0:00
22. Fuel to be Burnt: (19 + 21)	20.268	lbs.	End L3: Aborted	13:15	75
23. Fuel Left: Dry:	15.2	lbs.	24. Burn Time: (min.) (L3 End - L3 Start)	75	
24. Fuel Burnt: Dry: (22 - 21)	5.068 / 2.298	lbs. / kg	25. Dry Burn Rate:	1.838	kg/h

LOAD 4 (L 4):Date: 8/12/20 R7016

26. Fuel Load M.C., %DB	20.034	%	Fire Started @:	10:10	
27. Residual K/S Wt.:	2.6	lbs.	L4 Loaded @ (Start):	11:45	0:00
28. Fuel Added: Wet:	21.346	lbs.	Bypass Closed:		
29. Fuel Added: Dry:	17.784	lbs.	PAC @: WO	11:45	0:00
30. Fuel to be Burnt: (27 + 29)	20.650	lbs.	End L4:	15:25	220:00
31. Fuel Left: Dry:	2.2	lbs.	33. Burn Time: (min.) (L4 End - L4 Start)	220	
32. Fuel Burnt: Dry: (30-31)	18.450 / 8.369	lbs. / kg	34. Dry Burn Rate:	2.282	kg/h

See ASTM E3053 Section 8.5.8 Moisture content of fuel left at end of a fuel load burn is assumed to be 0%.

Wood Heater Aging Data
Woodstove Test Data Sheet #25
WST 5-Form 3, Rev 1/15

Unit: VcV 2.1.5
Date: 8/6 - 11/11/2020
Technicians: AM ESS
Page : 2 of 2

		T/C#	7	1	16	17	
Hr. #	2020 Date	Time	Firebox Temp	Stack @ 8'	Pre Cat	Post Cat	Comments
30	10/28	1150	749	355	847	770	R#D 30 PAC Hi
31	↓	1250	457	388	1161	951	Fire Started 1040
32	↓	1350	522	374	1154	923	
33	11/2	1232	769	358	861	782	R#D 31 PAC Hi
34	↓	1332	497	376	1122	932	Fire Started 1107
35	↓	1432	691	388	1183	949	
36	↓	1532	801	314	879	803	
37	11/4	1128	787	362	903	794	R#D 32 PAC: Hi
38	↓	1228	481	393	1196	958	Fire Started 10:13
39	↓	1328	588	355	990	878	
40	↓	1428	848	324	944	802	
41	11/11	1219	749	356	838	802	R#D 33 PAC: Hi
42	↓	1319	629	407	1185	962	Fire Started 1059
43	↓	1419	948	358	1021	847	
44	↓	1519	913	310	784	756	
45	↓	1625	535	131	556	517	R#D 33 PAC: Low
46	↓	1725	323	190	677	767	Fire Started 1059
47	↓	1825	308	179	677	752	
48	↓	1925	324	194	823	858	
49	↓	2025	351	185	840	850	
50	↓	2125	375	168	814	798	
51	↓	2225	444	218	1296	1089	

WOODHEATER AGING DATA UNIT: VcV 2.1.5 Page 2 of 3 Rev. 3 6.13.24

Load #	Tech	Date	Pc #	Length (in.)	Pc. Wt. (lbs.)	Moisture Readings (%DB) End	Center	End	Avg.	Comments
RED 2020										
20	ATM	8/26	1	17 5/8	3.090	20.9	18.4	22.2	21.800	Loaded @ 12:30
Wood Temp			2	18.0	3.470	15.0	19.0	18.1	18.667	
57			3	17 15/16	5.528	17.1	18.8	19.4	19.900	Load Avg 20.404
Correction			4	17 1/2	4.568	16.7	18.6	19.9	19.767	(%DB) Total Wt.
+1.3			5	17 5/8	4.494	21.3	20.3	20.6	22.033	21.100 lbs.
**********										
RED										
21	ATM	9/28	1	18.00	4.348	19.0	17.7	19.3	19.767	Loaded @ 1254
Wood Temp			2	18.00	5.540	16.8	17.2	18.8	18.700	
59			3	18.0	2.554	16.6	16.4	17.9	18.067	Load Avg 19.126
Correction			4	17 15/16	4.674	16.2	16.1	19.3	18.500	(%DB) Total Wt.
+1.1			5	18.0	4.268	20.1	17.7	20.6	20.567	21.434 lbs.
**********										
RED										
25	ATM	9/21	1	18 1/16	3.762	20.0	19.7	20.0	20.800	Loaded @ 1522
Wood Temp			2	18.0	4.826	19.7	18.7	19.0	20.033	
61			3	18 1/16	2.368	17.9	18.0	18.4	19.900	Load Avg 20.194
Correction			4	18.0	4.546	20.2	17.9	22.5	21.100	(%DB) Total Wt.
+0.9			5	18.0	5.664	19.3	19.2	17.9	19.700	21.166 lbs.
**********										
RED										
29	ATM	10/13	1	17 15/16	4.702	19.7	21.0	22.7	22.633	Loaded @ 1055
Wood Temp			2	18 1/8	5.884	18.8	19.0	19.1	20.467	
55			3	18.00	3.716	25.3	15.0	21.9	22.253	Load Avg 21.706
Correction			4	18.00	4.608	22.3	21.9	21.9	23.533	(%DB) Total Wt.
+1.5			5	18.00	2.448	17.2	17.2	17.1	18.667	21.358 lbs.
**********										
RED										
30	ATM	10/18	1	18.00	3.498	21.9	19.9	22.1	23.267	Loaded @ 1150
Wood Temp			2	17 15/16	5.236	19.4	19.0	19.7	21.267	
51			3	18.00	3.046	17.6	17.2	15.0	18.500	Load Avg 20.181
Correction			4	17 13/16	5.800	17.2	18.8	14.5	18.733	(%DB) Total Wt.
+1.9			5	18 1/16	3.640	17.2	19.0	16.4	19.483	21.220 lbs.

WOOD HEATER AGING DATA
Woodstove Data Sheet # 26
WST 5 Form 4, Rev. 4. 6/12/24

Unit: VCV 2.15
Date: 8/6/20 - 11/4/20
Technicians: ATM ESS
Page: 2 of 4

AGING-FUEL LOAD WT., LBS. BURNT AND DRY BURN RATE INFO

LOAD 5 (L 5): Date: 8/13/20 R&D #: 17

				Clock	Elapsed
35. Fuel Load M.C., %DB	21.366	%	Fire Started @:	10:35	
36. Residual K/S Wt.:	2.6	lbs.	L5 Loaded @ (Start):	12:00	0:00
37. Fuel Added: Wet:	21.236	lbs.	Bypass Closed:	12:02	2:02
38. Fuel Added: Dry:	17.499	lbs.	PAC @: WO	12:00	0:00
39. Fuel to be Burnt: (2 + 4) dry	20.099	lbs.	End L5:	15:40	3:10
40. Fuel Left: Dry:	3.2	lbs.	42. Burn Time: (Min.)	220	
41. Fuel Burnt: Dry:	17.899	lbs.	(L5 End - L5 Start)		
(5 - 6)	8.119	kg	43. Dry Burn Rate:	2.214	kg/h

LOAD 6 (L 6): Date: R&D #:

				Clock	Elapsed
44. Fuel Load M.C., %DB	20.104	%	Fire Started @:	11:15	
45. Residual K/S Wt.:	2.7	lbs.	L6 Loaded @ (Start):	12:30	0:00
46. Fuel Added: Wet:	21.100	lbs.	Bypass Closed:	14:40	2:10
47. Fuel Added: Dry:	17.527	lbs.	PAC @: WO	12:30	0:00
48. Fuel to be Burnt: (10 + 12) dry	20.227	lbs.	End L6:	15:35	3:05
49. Fuel Left: Dry:	2.1	lbs.	51. Burn Time: (Min.)	185	
50. Fuel Burnt: Dry:	18.127	lbs.	(L6 End - L6 Start)		
(13 - 14)	8.222	kg	52. Dry Burn Rate:	2.667	kg/h

LOAD 7 (L 7): Date: 8/28 R&D #: 21

				Clock	Elapsed
53. Fuel Load M.C., %DB	19.126	%	Fire Started @:	11:44	
54. Residual K/S Wt.:	2.7	lbs.	L7 Loaded @ (Start):	12:54	0:00
55. Fuel Added: Wet:	21.434	lbs.	Bypass Closed:	12:56:16	2:16
56. Fuel Added: Dry:	17.993	lbs.	PAC @: WO	12:54	0:00
57. Fuel to be Burnt: (19 + 21)	20.693	lbs.	End L7:	16:29	2:50:00
58. Fuel Left: Dry:	2.0	lbs.	60. Burn Time: (min.)	215	
59. Fuel Burnt: Dry:	18.693	lbs.	(L7 End - L7 Start)		
(22 - 21)	8.479	kg	61. Dry Burn Rate:	2.366	kg/h

LOAD 8 (L 8): Date: R&D #: 25

				Clock	Elapsed
62. Fuel Load M.C., %DB	20.194	%	Fire Started @:	14:07	
63. Residual K/S Wt.:	2.6	lbs.	L8 Loaded @ (Start):	15:22	0:00
64. Fuel Added: Wet:	21.166	lbs.	Bypass Closed:	15:23:45	1:45
65. Fuel Added: Dry:	17.611	lbs.	PAC @: WO	15:22	0:00
66. Fuel to be Burnt: (27 + 29)	20.211	lbs.	End L8:	18:37	185:00
67. Fuel Left: Dry:	2.2	lbs.	69. Burn Time: (min.)	185	
68. Fuel Burnt: Dry:	18.011	lbs.	(L8 End - L8 Start)		
(30-31)	8.170	kg	70. Dry Burn Rate:	2.650	kg/h

See ASTM E3053 Section 8.5.8 Moisture content of fuel left at end of a fuel load burn is assumed to be 0%.

WOOD HEATER AGING DATA
Woodstove Data Sheet # 26
WST 5 Form 4, Rev. 4. 6/12/24

Unit: VCU 2.1.5
Date: 8/6/20 - 11/4/20
Technicians: ATM ESS
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AGING-FUEL LOAD WT., LBS. BURNT AND DRY BURN RATE INFO

LOAD 5 (L 5): Date: 8/13/20 R&D #: 17

				Clock	Elapsed
35. Fuel Load M.C., %DB	21.366	%	Fire Started @:	10:35	
36. Residual K/S Wt.:	2.6	lbs.	L5 Loaded @ (Start):	12:00	0:00
37. Fuel Added: Wet:	21.236	lbs.	Bypass Closed:	12:02	2:02
38. Fuel Added: Dry:	17.499	lbs.	PAC @: WO	12:00	0:00
39. Fuel to be Burnt: (2 + 4) dry	20.099	lbs.	End L5:	15:40	3:10
40. Fuel Left: Dry:	2.2	lbs.	42. Burn Time: (Min.)	220	
41. Fuel Burnt: Dry:	17.899	lbs.	(L5 End - L5 Start)		
(5 - 6)	8.119	kg	43. Dry Burn Rate:	2.214	kg/h

LOAD 6 (L 6): Date: R&D #:

				Clock	Elapsed
44. Fuel Load M.C., %DB	20.404	%	Fire Started @:	11:15	
45. Residual K/S Wt.:	2.7	lbs.	L6 Loaded @ (Start):	12:30	0:00
46. Fuel Added: Wet:	21.100	lbs.	Bypass Closed:	14:40	2:10
47. Fuel Added: Dry:	17.527	lbs.	PAC @: WO	12:30	0:00
48. Fuel to be Burnt: dry (10 + 12)	20.227	lbs.	End L6:	15:35	3:05
49. Fuel Left: Dry:	2.1	lbs.	51. Burn Time: (Min.)	185	
50. Fuel Burnt: Dry:	18.127	lbs.	(L6 End - L6 Start)		
(13 - 14)	8.222	kg	52. Dry Burn Rate:	2.667	kg/h

LOAD 7 (L 7): Date: 8/28 R&D #: 21

				Clock	Elapsed
53. Fuel Load M.C., %DB	19.126	%	Fire Started @:	11:44	
54. Residual K/S Wt.:	2.7	lbs.	L7 Loaded @ (Start):	12:54	0:00
55. Fuel Added: Wet:	21.434	lbs.	Bypass Closed:	12:58:16	2:16
56. Fuel Added: Dry:	17.993	lbs.	PAC @: WO	12:54	0:00
57. Fuel to be Burnt: (19 + 21)	20.693	lbs.	End L7:	16:29	25:00
58. Fuel Left: Dry:	2.0	lbs.	60. Burn Time: (min.)	215	
59. Fuel Burnt: Dry:	18.693	lbs.	(L7 End - L7 Start)		
(22 - 21)	8.479	kg	61. Dry Burn Rate:	2.366	kg/h

LOAD 8 (L 8):Date: R&D #: 25

				Clock	Elapsed
62. Fuel Load M.C., %DB	20.194	%	Fire Started @:	14:07	
63. Residual K/S Wt.:	2.6	lbs.	L8 Loaded @ (Start):	15:22	0:00
64. Fuel Added: Wet:	21.166	lbs.	Bypass Closed:	15:23:45	1:45
65. Fuel Added: Dry:	17.611	lbs.	PAC @: WO	15:22	0:00
66. Fuel to be Burnt: (27 + 29)	20.211	lbs.	End L8:	18:37	185:00
67. Fuel Left: Dry:	2.2	lbs.	69. Burn Time: (min.)	185	
68. Fuel Burnt: Dry:	18.011	lbs.	(L8 End - L8 Start)		
(30-31)	8.170	kg	70. Dry Burn Rate:	2.650	kg/h

See ASTM E3053 Section 8.5.8 Moisture content of fuel left at end of a fuel load burn is assumed to be 0%.

WOODHEATER AGING DATA UNIT: VcV 2.1.5 Page 3 of 3 Rev. 3 6.13.24

Load #	Tech	Date	Pc #	Length (in.)	Pc. Wt. (lbs.)	Moisture Readings (%DB) End	Center	End	Avg.	Comments
R40 31	ATM	11/2	1	18.00	4.682	16.4	17.6	19.9	19.967	Loaded @ 1232
Wood Temp			2	18.00	2.634	19.2	12.8	18.5	18.933	
50			3	17 5/4	4.938	20.0	19.9	25.9	25.233	Load Avg 21.020 (%DB)
Correction			4	17 15/16	5.810	18.6	17.5	16.1	19.400	Total Wt.
+2.0			5	18.00	3.378	21.0	20.3	20.6		21.442 lbs.
R40 32	ATM	11/4	1	18.00	4.312	22.2	22.3	25.0	24.000	Loaded @ 1128
Wood Temp			2	17 7/8	3.656	17.5	20.9	19.2	20.700	
55			3	17 7/8	5.894	20.4	20.3	23.2	22.800	Load Avg 21.618 (%DB)
Correction			4	17 11/16	4.630	16.8	19.4	19.2	19.967	Total Wt.
+1.5			5	17 15/16	2.494	18.6	16.1	18.4	19.200	20.986 lbs.
R40 33H	ATM	11/11	1	18 1/8	5.590	21.9	21.4	22.3	24.567	Loaded @ 1219
Wood Temp			2	17 15/16	3.678	18.7	18.8	22.2	22.600	
43			3	18.00	4.248	16.2	17.7	20.1	21.367	Load Avg 22.005 (%DB)
Correction			4	17 13/16	2.334	17.0	18.3	17.7	20.567	Total Wt.
+2.7			5	18 1/16	5.932	18.7	15.9	18.3	20.167	31.282 lbs.
R40 33L	ATM	11/11	1	18.00	5.756	18.4	17.6	21.2	19.967	Loaded @ 1625
Wood Temp			2	18.00	5.644	22.0	22.4	21.7	22.933	
61			3	18 1/8	2.738	21.1	20.9	21.9	22.200	Load Avg 20.651 (%DB)
Correction			4	18 1/16	4.220	11.4	17.6	22.5	18.567	Total Wt.
+0.9			5	18.00	6.864	16.6	21.0	19.0	19.767	25.222 lbs.
			1							Loaded @
Wood Temp			2							
			3							Load Avg (%DB)
Correction			4							Total Wt.
			5							lbs.

WOOD HEATER AGING DATA
Woodstove Data Sheet # 26
WST 5 Form 4, Rev. 4. 6/12/24

Unit: VcV
Date: 8/6/20 - 11/4/20
Technicians: AM ESS
Page: 3 of 4

AGING-FUEL LOAD WT., LBS. BURNT AND DRY BURN RATE INFO

				Clock	Elapsed
LOAD 9 (L 9): 10/23/20 R#D 29					
71. Fuel Load M.C., %DB	21.706	%	Fire Started @:	9:45	
72. Residual K/S wt.:	2.6	lbs.	L9 Loaded @ (Start):	2:55	0:00
73. Fuel Added: Wet:	21.358	lbs.	Bypass Closed:	10:57	2:08
74. Fuel Added: Dry:	17.551	lbs.	PAC @: WO	10:55	0:00
75. Fuel to be Burnt: (72 + 74)	20.151	lbs.	End L9:	14:10	195
76. Fuel Left: Dry:	2.2	lbs.	80. Burn Time: (Min.)	195	
77. Fuel Burnt: Dry:	17.951	lbs.	(L9 End - L9 Start)		
(75 - 76)	8.142	kg	81. Dry Burn Rate:	2.505	kg/h
LOAD 10 (L 10): 10/28/20 R#D 30					
82. Fuel Load M.C., %DB	20.181	%	Fire Started @:	10:40	
83. Residual K/S wt.:	2.6	lbs.	L10 Loaded @ (Start):	11:50	0:00
84. Fuel Added: Wet:	21.220	lbs.	Bypass Closed:	11:52:16	2:16
84. Fuel Added: Dry:	17.660	lbs.	PAC @: WO	11:50	0:00
85. Fuel to be Burnt: (83 + 85)	20.260	lbs.	End L10:	14:45	175:00
86. Fuel Left: Dry:	2.1	lbs.	88. Burn Time: (min.)	175	
87. Fuel Burnt: Dry:	18.160	lbs.	(L10 End - L10 Start)		
(85 - 86)	9.237	kg	89. Dry Burn Rate:	2.824	kg/h
LOAD 11 (L 11): 11/2/20 R#D 31					
90. Fuel Load M.C., %DB	21.020	%	Fire Started @:	11:07	
91. Residual K/S Fuel:	2.7	lbs.	L11 Loaded @ (Start):	12:32	0:00
92. Fuel Added: Wet:	21.442	lbs.	Bypass Closed:	12:34:45	2:45
93. Fuel Added: Dry:	17.723	lbs.	PAC @: WO	12:32	0:00
94. Fuel to be Burnt: (91 + 93)	20.423	lbs.	End L11:	15:52	200:00
95. Fuel Left: Dry:	2.1	lbs.	99. Burn Time: (min.)	200	
96. Fuel Burnt: Dry:	18.323	lbs.	(L11 End - L11 Start)		
(94 - 95)	8.311	kg	100. Dry Burn Rate:	2.493	kg/h
LOAD 12 (L 12): 11/4/20 R#D 32					
101. Fuel Load M.C., %DB	21.628	%	Fire Started @:	10:13	
102. Residual K/S Fuel:	2.7	lbs.	L12 Loaded @ (Start):	11:28	0:00
103. Fuel Added: Wet:	20.986	lbs.	Bypass Closed:	11:30:05	2:05
104. Fuel Added: Dry:	17.257	lbs.	PAC @: WO	11:28	0:00
105. Fuel to be Burnt: (102 + 104)	19.957	lbs.	End L12:	14:38	190:00
106. Fuel Left: Dry:	1.9	lbs.	108. Burn Time: (min.)	190	
107. Fuel Burnt: Dry:	18.057	lbs.	(L12 End - L12 Start)		
(105 - 106)	8.191	kg	109. Dry Burn Rate:	2.586	kg/h

See ASTM E3053 Section 8.5.8 Moisture content of fuel left at end of a fuel load burn is assumed to be 0%.

WOOD HEATER AGING DATA
Woodstove Data Sheet # 26
WST 5 Form 4, Rev. 4. 6/12/24

Unit: VcU 2.15
Date: 8/6/20 - 11/14/20
Technicians: ATM ESS
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AGING-FUEL LOAD WT., LBS. BURNT AND DRY BURN RATE INFO

				Clock	Elapsed
LOAD 13 (L 13):Date: 11/4/20 R&D #: 33 Hi					
110. Fuel Load M.C., %DB	22.005	%	Fire Started @:	10:59	
111. Residual K/S wt.:	2.6	lbs.	L13 Loaded @ (Start):	12:19	00:00
112. Fuel Added: Wet:	21.282	lbs.	Bypass Closed:	12:21:15	2:15
113. Fuel Added: Dry:	17.447	lbs.	PAC @: WO	12:19	0:00
114. Fuel to be Burnt: (111 + 113)	20.047	lbs.	End L13:	1519	180
115. Fuel Left: Dry:	2.1	lbs.	117. Burn Time: (Min.) (L13 End - L13 Start)	180	
116. Fuel Burnt: Dry:	17.947	lbs.			
(114 - 115)	8.141	kg	118. Dry Burn	2.711	kg/h
LOAD 14 (L 14):Date: 11/4 R&D #: 33 Low					
119. Fuel Load M.C., %DB	20.651	%	Fire Started @:	10:59	
120. Residual K/S Fuel:	—	lbs.	L14 Loaded @ (Start):	16:25	0:00
121. Fuel Added: Wet:	25.222	lbs.	Bypass Closed:	16:26:47	1.47
122. Fuel Added: Dry:	20.908	lbs.	PAC @: Closed	16:44:17	17:30
(120 + 122)			End L14:	02:31	616
123. Fuel to be Burnt:	20.908	lbs.			
124. Fuel Left: Dry:	—	lbs.	126. Burn Time: (min.) (L14 End - L14 Start)	616	
125. Fuel Burnt: Dry:	20.908	lbs.			
(123-124)	9.844	kg	127. Dry Burn Rate:	0.924	kg/h
LOAD 15 (L 15):Date: R&D #:					
128. Fuel Load M.C., %DB		%	Fire Started @:		
129. Residual K/S Fuel:		lbs.	L15 Loaded @ (Start):		
130. Fuel Added: Wet:		lbs.	Bypass Closed:		
131. Fuel Added: Dry:		lbs.	PAC @:		
132. Fuel to be Burnt: (129 + 131)		lbs.	End L15:		
133. Fuel Left: Dry:		lbs.	135. Burn Time: (min.) (L15 End - L15 Start)		
134. Fuel Burnt: Dry:		lbs.			
(132 -133)		kg	136. Dry Burn Rate:		kg/h
LOAD 16 (L 16):Date: R&D #:					
137. Fuel Load M.C., %DB		%	Fire Started @:		
138. Residual K/S Fuel.		lbs.	L16 Loaded @ (Start):		
139. Fuel Added: Wet:		lbs.	Bypass Closed:		
140. Fuel Added: Dry:		lbs.	PAC @:		
141. Fuel to be Burnt: (138 + 140)		lbs.	End L16:		
142. Fuel Left: Dry:		lbs.	144. Burn Time: (min.) (L16 End - L16 Start)		
143. Fuel Burnt: Dry:		lbs.			
(141 - 142)		kg	145. Dry Burn Rate:		kg/h

See ASTM E3053 Section 8.5.8 Moisture content of fuel left at end of a fuel load burn is assumed to be 0%.

Sample Calculations – ASTM E3053 & E2515

Client: 509 Fabrication
Model: VCV
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	3.47	23.4	3.47 (100) / (100+ 23.4)) =		2.81	
2	4.93	23.5	4.93 (100) / (100+ 23.5)) =		3.99	
3	5.11	22.8	5.11 (100) / (100+ 22.8)) =		4.16	
4	8.03	24.4	8.03 (100) / (100+ 24.4)) =		6.45	
5		NA	N/A		-	
6		NA	N/A		-	
7	N/A	N/A	N/A		-	
				SUM	17.42	lbs

M_{Fldb} = **17.42** lbs
M_{Fldb} = **7.90** 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} = 5.39

MC_{SU} = 20.9

M_{SUdb} = 5.4 (100/(100+ 20.9)

M_{SUdb} = **4.46** lbs

= **2.02** 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} = 4.28

MC_K = 10.0

M_{Kdb} = 4.28 (100/(100+ 10.0)

M_{Kdb} = **3.89** lbs

= **1.76** 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} = 2.35

M_{FLEHdb} = 2

M_{FREHdb} = 2.35 + 2

M_{FREHdb} = **4.35** lbs

= **1.97** 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} = 3.89

M_{SUdb} = 4.46

M_{FLdb} = 17.42

M_{FREHdb} = 4.35

M_{TFBHdb} = 3.89 + 4.46 + 17.42 - 4.35

= **21.42** lbs

= **9.71** 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} = 17.42

M_{FLEHdb} = 2.00

θ_{H1} = 169

$$BR_H = \frac{60\ (\ 17.42\ -\ 2.00\ )}{169}$$

BR_H = **5.47** lb/hr

= **2.48** 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:

$$Fp = \frac{19.71}{22.04} = 0.895$$

$$V_s = 0.895 \times 85.49 \times 0.99 \times 0.330 \times \left(\frac{84.9 + 460}{\left(29.74 + \frac{-0.16}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **19.95** 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:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 19.95 \times 0.7854 \times \frac{528}{84.9 + 460} \times \frac{29.74 + \frac{-0.16}{13.6}}{29.92}$$

Q_{sd} = **53230.9** 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 A:

$$V_{m(std)} = 17.64 \times 33.416 \times 1.004 \times \frac{\left(29.74 + \frac{0.94}{13.6}\right)}{(90.7 + 460)}$$

$V_{m(std)}$ = **32.034** dscf

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 33.249 \times 1.009 \times \frac{\left(29.74 + \frac{0.99}{13.6}\right)}{(91.3 + 460)}$$

$V_{m(std)}$ = **32.001** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 52.49 \times 1.012 \times \frac{\left(29.74 + \frac{0.00}{13.6}\right)}{(70.7 + 460)}$$

$V_{m(std)}$ = **52.506** 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:

m_n = 0.2 + 1.7 + 0.1

m_n = 2.0 mg

Using equation for Train B:

m_n = 0 + 1.7 + 0.1

m_n = **1.8** 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 A:

$$C_s = 0.001 \times \frac{2.0}{32.03}$$

C_s = **0.00006** g/dscf

For Train B

$$C_s = 0.001 \times \frac{1.8}{32.00}$$

C_s = **0.00006** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{52.51}$$

C_r = **0.000000** 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 A

E_T = (0.000062 - 0.000000) x 53230.9 x 228 /60

E_T = **12.63** g

For Train B

E_T = (0.000056 - 0.000000) x 53230.9 x 228 /60

E_T = **11.38** g

Average

E = **12.00** 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 A difference =	0.63
Train B difference =	0.63

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 10 minute interval of Train A):

$$PR = \left(\frac{228 \times 1.427 \times 19.95 \times (77.3 + 460) \times (90.7 + 460)}{10 \times 33.416 \times 19.85 \times (84.9 + 460) \times (79.0 + 460)} \right) \times 100$$

PR = **99** %

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} = 12.00

θ_{H2} = 228

PM_{RH} = 60(12.00 / 228)

PM_{RH} = **3.16** 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} = 12.00

M_{TFBHdb} = 9.71

PM_{FH} = 12.00 / 9.71

= **1.24** 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

Stack Loss Efficiency and CO emissions calculations are done in accordance with CSA B415.1, using the password protected excel spreadsheet provided with the test standard. No alterations or alternative calculations are used for determining efficiency or CO emissions. The following pages are a sample of the calculations page from the B415.1 Spreadsheet (V2_4 - Dated April 15, 2010).

Manufacturer: 509 Fabrication
Model: VCV
Date: 07/16/25
Run: 1
Control #: 24-282
Test Duration: 169 min

	HHV	LHV
Eff	76.14%	81.44%
Comb Eff	98.23%	98.23%
HT Eff	77.52%	82.91%
Output	38,387	kJ/h
Burn Rate	2.53	kg/h
Grams CO	197	g
Input	50,414	kJ/h
MC wet	19.13	

Note: In the “Input data”, "Calc. % O_2", "Fuel Properties", and “Mass Balance” columns, [e], [d], [g], [a]. [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO_2
$CO_{2\text{-ult}}$ 20.23
F_0
1.031

Overall Heating Efficiency:	76.14%	Air Fue	
Combustion Efficiency:	98.23%	Dry Molecular W	
Heat Transfer Efficiency:	77.52%	Dry Moles Exhaus	
		Air Fuel Ratio	
Heat Output:	36,414 Btu/h	38,387	kJ/h
Heat Input:	47,823 Btu/h	50,414	kJ/h
Burn Duration:	2.82 h		
Burn Rate:	5.57 lb/h	2.526	kg/h
Stack Temp:	401.8 Deg. F	205.5	Deg. C

Averages	**0.24**	**10.76**	**1.10**	**20.56**	**9.67**	**205.60**	**22.16**	**98.6%**	**76.8%**	**75.7%**	**1281.6%**	**359.8%**
INPUT DATA			**Oxygen Calculation**			**Input Data**		**Combust**	**Heat**	**Net**	**Air**	**Wet Wt**
Elapsed Time	**Weight Remaining (kg)**	**% CO [e]**	**% CO_2 [d]**	**Excess Air EA**	**Total O_2**	**Calc. % O_2 [g]**	**Flue Gas (°C)**	**Room Temp (°C)**	**Eff %**	**Transfer %**	**Eff %**	**Fuel Ratio**	**Now Wt**
0	8.80	0.17	5.00	292.1%	20.76	15.68	228.6	19.1	98.1%	62.0%	60.9%	23.9	8.80
1	8.74	0.56	5.05	260.9%	20.74	15.41	216.3	19.1	92.2%	64.0%	59.0%	21.8	8.74
2	8.69	0.26	6.21	212.9%	20.71	14.38	227.3	18.9	97.2%	67.2%	65.3%	19.1	8.69
3	8.64	0.23	5.73	239.2%	20.73	14.88	230.5	18.9	97.4%	65.1%	63.4%	20.7	8.64
4	8.61	0.24	5.35	262.4%	20.75	15.28	228.4	18.9	97.1%	63.7%	61.9%	22.1	8.61
5	8.57	0.24	5.14	276.4%	20.75	15.50	223.2	18.9	97.0%	63.4%	61.5%	22.9	8.57
6	8.52	0.27	5.14	274.0%	20.75	15.48	217.8	19.0	96.5%	64.2%	61.9%	22.8	8.52
7	8.47	0.17	5.64	248.0%	20.74	15.01	211.8	18.8	98.2%	67.0%	65.8%	21.2	8.47
8	8.44	0.17	5.15	280.6%	20.75	15.52	206.2	18.8	98.1%	65.8%	64.5%	23.2	8.44
9	8.39	0.14	5.76	243.0%	20.73	14.91	201.6	19.1	98.6%	68.7%	67.8%	21.0	8.39
10	8.35	0.08	6.48	208.4%	20.71	14.19	201.8	18.7	99.6%	70.9%	70.6%	18.9	8.35
11	8.32	0.06	6.68	200.0%	20.70	13.99	196.7	18.8	99.8%	72.0%	71.9%	18.4	8.32
12	8.28	0.06	6.41	213.0%	20.71	14.28	190.1	19.1	99.9%	72.0%	72.0%	19.2	8.28
13	8.24	0.05	6.35	216.4%	20.72	14.35	184.3	19.3	100.0%	72.5%	72.5%	19.4	8.24
14	8.20	0.06	6.83	193.8%	20.70	13.84	182.3	19.6	99.9%	73.9%	73.8%	18.0	8.20
15	8.15	0.06	7.17	180.1%	20.69	13.49	181.4	19.8	99.8%	74.7%	74.6%	17.2	8.15
16	8.11	0.06	7.32	174.3%	20.68	13.33	183.1	19.9	99.8%	74.8%	74.7%	16.8	8.11
17	8.05	0.07	7.79	157.4%	20.67	12.84	184.1	20.1	99.7%	75.6%	75.3%	15.8	8.05
18	8.00	0.08	8.27	142.3%	20.65	12.34	184.8	20.2	99.6%	76.3%	76.0%	14.8	8.00
19	7.95	0.10	7.95	151.6%	20.66	12.66	188.4	20.4	99.4%	75.5%	75.0%	15.4	7.95
20	7.90	0.11	7.97	150.4%	20.66	12.63	192.0	20.5	99.3%	75.2%	74.6%	15.3	7.90
21	7.85	0.13	7.98	149.6%	20.66	12.61	193.6	20.7	99.1%	75.1%	74.4%	15.3	7.85
22	7.81	0.13	7.84	154.0%	20.66	12.76	197.1	20.8	99.1%	74.5%	73.9%	15.5	7.81
23	7.75	0.13	7.94	151.0%	20.66	12.66	197.8	20.9	99.1%	74.6%	74.0%	15.4	7.75
24	7.70	0.15	8.06	146.6%	20.65	12.52	198.7	21.0	98.9%	74.8%	74.0%	15.1	7.70
25	7.65	0.14	8.36	138.0%	20.64	12.21	200.0	21.1	98.9%	75.2%	74.4%	14.6	7.65
26	7.60	0.17	8.61	130.6%	20.63	11.94	201.9	21.2	98.7%	75.4%	74.4%	14.1	7.60
27	7.55	0.19	8.64	129.2%	20.63	11.90	205.1	21.3	98.6%	75.2%	74.1%	14.0	7.55
28	7.49	0.18	8.81	125.2%	20.63	11.73	206.9	21.3	98.6%	75.3%	74.3%	13.8	7.49
29	7.42	0.21	9.41	110.5%	20.60	11.09	209.1	21.4	98.5%	75.9%	74.8%	12.9	7.42
30	7.35	0.12	12.32	62.6%	20.51	8.13	209.5	21.5	99.3%	78.9%	78.4%	10.0	7.35
31	7.28	0.13	12.16	64.6%	20.51	8.29	212.8	21.6	99.3%	78.6%	78.0%	10.1	7.28
32	7.20	0.16	12.45	60.5%	20.50	7.97	217.2	21.6	99.1%	78.5%	77.8%	9.8	7.20
33	7.12	0.19	13.47	48.1%	20.46	6.90	218.0	21.7	99.0%	79.2%	78.4%	9.1	7.12
34	7.04	0.25	13.89	43.1%	20.45	6.43	220.7	21.7	98.6%	79.3%	78.2%	8.8	7.04
35	6.96	0.24	14.54	36.9%	20.42	5.77	224.3	21.8	98.7%	79.5%	78.5%	8.4	6.96

el Ratio (A/F)	
Weight (M_d)	30.11
st Gas (N_r):	386.34
o (A/F)	11.12

%HC
0.88

Combustion Efficiency: 98.23%
Total Input (kJ): 142,000 134,680 (Btu)
Total Output (kJ): 108,124 102,550 (Btu)
Efficiency: 76.14%
Total CO (g): 197.05

Moisture of Wood (wet basis): 19.1349
Initial Dry Weight Wt_{do} (kg): 7.11
Moisture Content Dry 23.66

Load Weight (kg): **8.80**

Fuel Heating Value in kj/kg - CV:	**HHV**	**LHV**	Btu/lb	**HHV**	**LHV**
	19,960	**18,662**		**8587.0**	**8028.6**

5910.4%	**306.6%**	**5690.6%**	**142171**	**4.22**	**6.02**	**2.62**	**19960.00**	**19.13**	**79.32**	**21.04**	**2.61**	**7.82**	**0.02**	**0.26**	**41.87**	**48.96**
% Wet Consumed	**Dry Wt. Now**	**% Dry Comsumed**	**Total**	**Fuel Properties**				**Mw Moisture**	**Mass Balance (moles/100 mole dry flue gas)**					**kg Wood per 100 mole dfp**		**M**
x	**Wt_{dn}**	**y**	**Input**	**Carbon /12= [a]**	**Hydrogen /1= [b]**	**Oxygen /16= [c]**	**Calorific Value**	**Fuel Burnt**	**[h]**	**[u]**	**[w]**	**[j]**	**[k]**	**Nk**	**CO_2**	**O_2**
0.00	7.11	0.00	0	4.22	6.02	2.62	19960.00	19.13	79.16	21.00	1.22	3.68	0.00	0.12	41.42	130.04
0.67	7.07	0.67	1355	4.22	6.02	2.62	19960.00	19.13	78.98	20.95	1.34	3.93	0.05	0.13	38.18	116.49
1.24	7.03	1.24	769	4.22	6.02	2.62	19960.00	19.13	79.16	21.00	1.54	4.59	0.01	0.15	40.98	94.89
1.75	6.99	1.75	659	4.22	6.02	2.62	19960.00	19.13	79.15	21.00	1.42	4.24	0.01	0.14	41.06	106.56
2.17	6.96	2.17	586	4.22	6.02	2.62	19960.00	19.13	79.14	20.99	1.33	3.97	0.01	0.13	40.90	116.85
2.58	6.93	2.58	732	4.22	6.02	2.62	19960.00	19.13	79.13	20.99	1.28	3.82	0.01	0.13	40.79	123.12
3.20	6.89	3.20	806	4.22	6.02	2.62	19960.00	19.13	79.11	20.98	1.29	3.84	0.01	0.13	40.52	122.06
3.71	6.85	3.71	622	4.22	6.02	2.62	19960.00	19.13	79.18	21.00	1.38	4.15	0.00	0.14	41.50	110.39
4.07	6.82	4.07	659	4.22	6.02	2.62	19960.00	19.13	79.16	21.00	1.26	3.79	0.00	0.12	41.44	124.92
4.64	6.78	4.64	732	4.22	6.02	2.62	19960.00	19.13	79.19	21.01	1.40	4.21	0.00	0.14	41.77	108.15
5.11	6.75	5.11	549	4.22	6.02	2.62	19960.00	19.13	79.25	21.02	1.55	4.69	-0.01	0.15	42.32	92.69
5.42	6.73	5.42	549	4.22	6.02	2.62	19960.00	19.13	79.26	21.03	1.60	4.83	-0.01	0.16	42.47	88.90
5.88	6.70	5.88	622	4.22	6.02	2.62	19960.00	19.13	79.26	21.02	1.53	4.63	-0.01	0.15	42.50	94.70
6.29	6.67	6.29	659	4.22	6.02	2.62	19960.00	19.13	79.26	21.02	1.51	4.58	-0.02	0.15	42.56	96.19
6.81	6.63	6.81	732	4.22	6.02	2.62	19960.00	19.13	79.27	21.03	1.63	4.93	-0.01	0.16	42.51	86.16
7.32	6.59	7.32	732	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	1.71	5.17	-0.01	0.17	42.51	80.02
7.84	6.56	7.84	806	4.22	6.02	2.62	19960.00	19.13	79.29	21.03	1.75	5.28	-0.01	0.17	42.51	77.45
8.46	6.51	8.46	842	4.22	6.02	2.62	19960.00	19.13	79.30	21.03	1.86	5.62	-0.01	0.18	42.43	69.96
9.03	6.47	9.03	806	4.22	6.02	2.62	19960.00	19.13	79.31	21.04	1.98	5.97	-0.01	0.20	42.41	63.27
9.59	6.43	9.59	806	4.22	6.02	2.62	19960.00	19.13	79.29	21.03	1.90	5.74	-0.01	0.19	42.30	67.41
10.16	6.39	10.16	806	4.22	6.02	2.62	19960.00	19.13	79.29	21.03	1.91	5.77	0.00	0.19	42.21	66.89
10.73	6.35	10.73	769	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	1.92	5.78	0.00	0.19	42.12	66.57
11.24	6.31	11.24	806	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	1.89	5.68	0.00	0.19	42.12	68.55
11.86	6.27	11.86	842	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	1.91	5.75	0.00	0.19	42.11	67.19
12.43	6.23	12.43	842	4.22	6.02	2.62	19960.00	19.13	79.27	21.03	1.94	5.85	0.00	0.19	42.01	65.27
13.05	6.19	13.05	842	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	2.02	6.06	0.00	0.20	42.05	61.43
13.62	6.15	13.62	842	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	2.08	6.25	0.00	0.21	41.94	58.21
14.23	6.10	14.23	879	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	2.09	6.29	0.01	0.21	41.85	57.60
14.85	6.06	14.85	989	4.22	6.02	2.62	19960.00	19.13	79.28	21.03	2.13	6.40	0.01	0.21	41.89	55.80
15.63	6.00	15.63	1099	4.22	6.02	2.62	19960.00	19.13	79.29	21.03	2.28	6.84	0.01	0.22	41.81	49.32
16.40	5.95	16.40	1172	4.22	6.02	2.62	19960.00	19.13	79.43	21.07	2.95	8.87	0.00	0.29	42.33	27.93
17.28	5.89	17.28	1245	4.22	6.02	2.62	19960.00	19.13	79.42	21.07	2.91	8.76	0.01	0.29	42.29	28.83
18.15	5.82	18.15	1245	4.22	6.02	2.62	19960.00	19.13	79.42	21.07	2.99	8.98	0.01	0.29	42.20	27.04
19.03	5.76	19.03	1282	4.22	6.02	2.62	19960.00	19.13	79.44	21.07	3.24	9.72	0.02	0.32	42.14	21.57
19.96	5.69	19.96	1318	4.22	6.02	2.62	19960.00	19.13	79.43	21.07	3.36	10.05	0.03	0.33	41.95	19.43
20.89	5.63	20.89	1391	4.22	6.02	2.62	19960.00	19.13	79.46	21.08	3.51	10.51	0.02	0.35	42.02	16.67

Moisture Content M_{Cwb}: 19.13492

Dry kg : 7.11
CA: 51
HY: 6
OX: 41.99

0.87	0.05	351.23	30.42	13.15	478.75	7487.64	5554.98	5382.14	5326.62	7383.21	6434.34	295.31	53219.81	42654.26	42451.69
					Stack	Heat Content Change - Ambient to Stack Temperature						Room			Energy Lo
loles per kg of Dry Wood				Moisture	Temp	Flue Gas Constituent						Temp			Flu
CO	HC	N_2	H_2O	Present	K	CO_2	O_2	CO	N_2	CH_4	H_2O	K	CO_2	O_2	CO
1.37	-0.01	656.38	30.53	13.15	501.76	8600.67	6359.39	6156.21	6093.82	8527.41	7358.05	292.26	356.23	826.97	395.52
4.19	0.41	596.82	29.70	13.15	489.43	8059.09	5974.07	5786.99	5727.54	7957.31	6917.95	292.26	307.67	695.90	1211.15
1.70	0.09	522.48	30.33	13.15	500.43	8548.24	6322.57	6121.05	6058.92	8471.17	7316.19	292.09	350.33	599.96	492.35
1.65	0.07	566.75	30.38	13.15	503.65	8690.34	6423.43	6217.64	6154.75	8621.28	7431.28	292.09	356.80	684.48	478.36
1.80	0.07	605.23	30.37	13.15	501.59	8601.77	6360.71	6157.62	6095.19	8527.39	7359.77	292.04	351.82	743.26	521.88
1.91	0.08	628.62	30.36	13.15	496.37	8369.83	6195.77	5999.58	5938.41	8283.07	7171.40	292.09	341.44	762.80	551.01
2.15	0.11	623.92	30.29	13.15	490.93	8128.94	6024.13	5835.05	5775.20	8030.06	6975.27	292.15	329.39	735.31	619.57
1.27	0.01	582.35	30.50	13.15	484.98	7877.67	5845.36	5663.74	5605.26	7765.57	6771.08	291.93	326.90	645.26	367.30
1.34	0.00	637.08	30.52	13.15	479.32	7628.93	5667.37	5492.92	5435.86	7505.96	6567.38	291.98	316.13	707.96	387.72
1.03	-0.02	574.60	30.56	13.15	474.76	7422.89	5519.27	5350.61	5294.77	7292.38	6397.63	292.21	310.05	596.92	297.08
0.52	-0.07	517.62	30.65	13.15	474.93	7444.89	5535.88	5366.78	5310.75	7313.43	6416.99	291.82	315.10	513.12	150.68
0.39	-0.08	503.68	30.68	13.15	469.82	7217.56	5372.36	5209.63	5154.96	7078.02	6229.52	291.98	306.55	477.59	111.71
0.37	-0.09	525.67	30.70	13.15	463.21	6922.27	5159.38	5004.79	4951.91	6773.51	5985.12	292.26	294.20	488.59	106.97
0.32	-0.10	531.46	30.72	13.15	457.48	6668.40	4975.88	4828.21	4776.90	6512.56	5774.41	292.48	283.80	478.65	92.64
0.35	-0.08	493.43	30.68	13.15	455.43	6569.90	4904.21	4759.13	4708.45	6412.37	5691.92	292.76	279.31	422.53	100.30
0.34	-0.08	470.24	30.66	13.15	454.54	6523.46	4870.23	4726.32	4675.95	6365.55	5652.74	292.98	277.30	389.73	98.98
0.34	-0.07	460.55	30.66	13.15	456.26	6592.86	4920.14	4774.29	4723.51	6437.41	5709.96	293.09	280.28	381.09	96.95
0.40	-0.05	432.05	30.62	13.15	457.26	6631.42	4947.77	4800.81	4749.81	6477.58	5741.59	293.21	281.38	346.16	114.47
0.41	-0.04	406.71	30.59	13.15	457.98	6655.99	4965.18	4817.48	4766.35	6503.61	5761.45	293.37	282.30	314.14	116.59
0.51	-0.03	422.05	30.58	13.15	461.54	6802.09	5070.21	4918.40	4866.41	6655.01	5881.84	293.54	287.72	341.77	147.12
0.59	-0.02	419.87	30.55	13.15	465.15	6953.06	5178.72	5022.66	4969.78	6811.53	6006.20	293.65	293.49	346.40	169.30
0.67	-0.01	418.42	30.53	13.15	466.71	7013.68	5222.00	5064.17	5010.95	6875.03	6055.69	293.82	295.39	347.63	193.08
0.67	-0.01	425.88	30.54	13.15	470.26	7162.79	5328.94	5166.87	5112.78	7030.11	6178.18	293.93	301.68	365.28	193.51
0.67	-0.01	420.75	30.53	13.15	470.93	7187.35	5346.35	5183.54	5129.32	7056.11	6198.04	294.04	302.68	359.22	194.24
0.76	0.01	413.24	30.50	13.15	471.82	7221.53	5370.66	5206.82	5152.42	7092.11	6225.80	294.15	303.38	350.56	219.34
0.72	0.01	398.81	30.50	13.15	473.15	7277.07	5410.40	5244.97	5190.25	7150.08	6271.28	294.21	305.98	332.35	208.78
0.81	0.02	386.37	30.46	13.15	475.09	7357.02	5467.51	5299.74	5244.58	7233.73	6336.59	294.32	308.55	318.25	234.62
0.90	0.04	383.82	30.44	13.15	478.26	7490.10	5562.63	5391.01	5335.09	7372.87	6445.41	294.43	313.43	320.39	258.30
0.86	0.03	377.13	30.44	13.15	480.04	7565.21	5616.27	5442.47	5386.12	7451.47	6506.76	294.48	316.89	313.38	246.96
0.91	0.05	352.46	30.41	13.15	482.26	7659.74	5683.78	5507.21	5450.34	7550.45	6583.96	294.54	320.29	280.31	262.89
0.43	0.02	273.00	30.48	13.15	482.65	7672.44	5692.61	5515.63	5458.70	7564.26	6593.97	294.65	324.81	158.98	122.95
0.46	0.02	276.29	30.47	13.15	485.93	7813.18	5793.05	5611.95	5554.23	7711.75	6708.80	294.71	330.46	166.99	133.53
0.54	0.03	269.29	30.44	13.15	490.32	8002.84	5928.24	5741.55	5682.79	7910.84	6863.31	294.76	337.73	160.28	156.64
0.58	0.05	248.48	30.41	13.15	491.15	8037.20	5952.60	5764.88	5705.94	7947.19	6891.10	294.82	338.72	128.39	168.89
0.76	0.08	239.90	30.36	13.15	493.82	8154.06	6035.84	5844.66	5785.08	8069.99	6986.21	294.82	342.04	117.29	218.10
0.69	0.07	229.67	30.37	13.15	497.43	8308.40	6145.39	5949.57	5889.17	8233.03	7111.24	294.93	349.08	102.47	199.61

SUMS				AVERAGE	SUMS						
305055.28	6941.97	260639.83	112643.20	4844.74	33869.82	2507.95	31361.87	108301.55	2514.06	197.05	9.28
osses (kJ/kg of Dry Fuel)				Total							
e Gas Constituent				Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
N_2	CH_4	H_2O Comb	H_2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
3999.85	-8.42	1567.05	674.75	7811.94	0.00	0	0.00	0	0	0.00	0.00
3418.33	365.02	1511.29	668.96	8178.34	555.12	105	450.00	800	105	7.97	0.44
3165.66	82.33	1555.41	674.20	6920.24	266.60	22	244.89	502	22	1.84	0.06
3488.21	60.02	1561.46	675.71	7305.04	241.22	17	223.80	418	17	1.53	0.04
3688.97	64.70	1558.75	674.77	7604.15	223.20	17	206.32	363	17	1.48	0.03
3732.99	68.78	1552.56	672.30	7681.88	281.85	22	259.55	450	22	1.96	0.04
3603.28	100.16	1543.05	669.72	7600.48	306.75	29	278.24	499	29	2.42	0.07
3264.23	6.78	1547.41	667.03	6824.92	212.85	11	201.41	410	11	1.11	0.00
3463.10	-4.36	1542.45	664.36	7077.36	233.70	12	221.29	425	12	1.24	0.00
3042.38	-20.49	1539.08	662.12	6427.14	235.81	10	225.86	497	10	1.06	-0.01
2748.98	-62.77	1544.42	662.38	5871.91	161.58	2	159.23	388	2	0.40	-0.03
2596.46	-74.42	1539.98	659.91	5617.78	154.59	1	153.60	395	1	0.30	-0.04
2603.05	-84.46	1533.60	656.70	5598.65	174.60	1	173.94	448	1	0.32	-0.05
2538.74	-92.71	1528.05	653.93	5483.11	181.06	0	181.09	478	0	0.30	-0.05
2323.28	-75.47	1523.61	652.85	5226.41	191.76	1	190.89	541	1	0.36	-0.05
2198.84	-67.56	1521.53	652.33	5071.16	186.06	1	184.95	546	1	0.35	-0.04
2175.43	-64.90	1522.99	653.08	5044.92	203.61	1	202.36	602	1	0.38	-0.05
2052.14	-46.92	1521.97	653.50	4922.70	207.71	3	204.92	634	3	0.47	-0.04
1938.52	-36.74	1521.45	653.76	4790.02	193.32	3	190.17	612	3	0.46	-0.03
2053.86	-29.20	1524.29	655.34	4980.90	201.02	5	196.36	605	5	0.58	-0.02
2086.64	-18.86	1526.94	656.98	5060.89	204.25	6	198.30	601	6	0.66	-0.01
2096.66	-8.08	1527.25	657.63	5109.55	196.84	7	189.85	572	7	0.72	-0.01
2177.44	-10.66	1531.28	659.24	5217.76	210.58	7	203.34	595	7	0.76	-0.01
2158.14	-8.47	1531.64	659.50	5196.95	219.28	8	211.58	623	8	0.80	-0.01
2129.21	5.10	1530.97	659.87	5198.43	219.34	9	210.04	623	9	0.90	0.00
2069.93	5.81	1532.28	660.46	5115.59	215.85	9	206.95	626	9	0.86	0.00
2026.34	21.49	1532.51	661.32	5103.10	215.32	11	204.70	627	11	0.96	0.02
2047.70	32.61	1534.58	662.75	5169.75	227.61	13	215.03	651	13	1.10	0.03
2031.27	30.15	1536.72	663.56	5138.93	254.54	13	241.06	734	13	1.19	0.03
1921.05	46.03	1537.28	664.57	5032.44	276.96	17	260.26	822	17	1.40	0.05
1490.20	14.80	1541.11	664.71	4317.55	253.46	8	245.52	918	8	0.70	0.02
1534.59	18.13	1544.23	666.22	4394.14	274.08	9	264.79	971	9	0.81	0.02
1530.32	30.63	1547.52	668.25	4431.38	276.40	11	264.93	969	11	0.95	0.03
1417.83	43.53	1546.91	668.61	4312.89	276.92	13	263.52	1005	13	1.05	0.05
1387.86	67.86	1547.04	669.86	4350.05	287.29	19	268.73	1031	19	1.40	0.08
1352.54	63.63	1551.32	671.51	4290.15	299.07	18	281.05	1092	18	1.35	0.08

Sample Calculations – ASTM E3053 & E2515

Client: 509 Fabrication
Model: VCV
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	5.43	21.8	5.43 (100) / (100+ 21.8)) =	4.46	
2	3.93	20.7	3.93 (100) / (100+ 20.7)) =	3.26	
3	6.48	19.2	6.48 (100) / (100+ 19.2)) =	5.43	
4	3.80	24.0	3.8 (100) / (100+ 24)) =	3.07	
5	7.75	19.0	7.75 (100) / (100+ 19)) =	6.51	
6		NA	N/A	-	
7			N/A	-	
			SUM	22.73	lbs

M_{Fldb} = **22.73** lbs

M_{Fldb} = **10.31** 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} = 22.73

M_{FREdb} = 1.49

M_{TFBdb} = 22.73 - 1.49

= **21.24** lbs

= **9.63** 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} = 21.24

θ = 901

$$BR = \frac{60 \times 21.24}{901}$$

BR = **1.41** lb/hr

= **0.64** 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:

$$Fp = \frac{19.71}{22.04} = 0.895$$

$$V_s = 0.895 \times 85.49 \times 0.99 \times 0.329 \times \left(\frac{83.4 + 460}{\left(29.76 + \frac{-0.16}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **19.86** 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:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 19.86 \times 0.7854 \times \frac{528}{83.4 + 460} \times \frac{29.76 + \frac{-0.16}{13.6}}{29.92}$$

Q_{sd} = **53168.1** 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 A:

$$V_{m(std)} = 17.64 \times 136.938 \times 1.004 \times \frac{\left(29.76 + \frac{0.98}{13.6}\right)}{(99.4 + 460)}$$

$V_{m(std)}$ = **129.336** dscf

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 136.293 \times 1.009 \times \frac{\left(29.76 + \frac{1.04}{13.6}\right)}{(\#\#\#\#\# + 460)}$$

$V_{m(std)}$ = **128.750** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 207.30 \times 1.012 \times \frac{\left(\underline{29.76} + \frac{0.00}{13.6}\right)}{(77.0 + 460)}$$

$V_{m(std)}$ = **205.081** 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:

m_n = 0.1 + 2.2 + 0.1

m_n = 2.4 mg

Using equation for Train B:

m_n = 0 + 2.4 + 0.1

m_n = **2.5** 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 A:

$$C_s = 0.001 \times \frac{2.4}{129.34}$$

C_s = **0.00002** g/dscf

For Train B

$$C_s = 0.001 \times \frac{2.5}{128.75}$$

C_s = **0.00002** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{205.08}$$

C_r = **0.000000** 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 A

E_T = (0.000019 - 0.000000) x 53168.1 x 901 /60

E_T = **14.82** g

For Train B

E_T = (0.000019 - 0.000000) x 53168.1 x 901 /60

E_T = **15.50** g

Average

E = **15.16** g

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

7.5% of the average =	1.14
Train A difference =	0.34
Train B difference =	0.34

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 10 minute interval of Train A):

$$PR = \left(\frac{901 \times 1.576 \times 19.86 \times (84.3 + 460) \times (99.4 + 460)}{10 \times 136.94 \times 20.16 \times (83.4 + 460) \times (90.5 + 460)} \right) \times 100$$

PR = **104** %

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 = 15.16
θ = 901

PM_R = 60(15.16 / 901)

PM_{RH} = **1.01** 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 = 15.16
M_{TFBdb} = 9.63

PM_{FH} = 15.16 / 9.63
= **1.57** g/kg

Stack Loss Efficiency and CO emissions calculations are done in accordance with CSA B415.1, using the password protected excel spreadsheet provided with the test standard. No alterations or alternative calculations are used for determining efficiency or CO emissions. The following pages are a sample of the calculations page from the B415.1 Spreadsheet (V2_4 - Dated April 15, 2010).

Manufacturer: 509 Fabrication
Model: VCV
Date: 07/16/25
Run: 2
Control #: 24-282
Test Duration: 901 min

	HHV	LHV
Eff	79.99%	85.55%
Comb Eff	98.73%	98.73%
HT Eff	81.02%	86.65%
Output	10,294	kJ/h
Burn Rate	0.64	kg/h
Grams CO	233	g
Input	12,870	kJ/h
MC wet	17.03	

Note: In the “Input data”, "Calc. % O_2", "Fuel Properties", and “Mass Balance” columns, [e], [d], [g], [a]. [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO_2
$CO_{2\text{-ult}}$ 20.23
F_0
1.030

Overall Heating Efficiency:	79.99%	Air Fue	
Combustion Efficiency:	98.73%	Dry Molecular W	
Heat Transfer Efficiency:	81.02%	Dry Moles Exhaus	
		Air Fuel Ratio	
Heat Output:	9,765 Btu/h	10,294	kJ/h
Heat Input:	12,209 Btu/h	12,870	kJ/h
Burn Duration:	15.02 h		
Burn Rate:	1.42 lb/h	0.645	kg/h
Stack Temp:	207.5 Deg. F	97.5	Deg. C

Averages	0.14	7.60	1.68	20.67	13.01	97.56	25.01	98.9%	84.1%	#DIV/0!	1637.3%	327.9%

INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO_2 [d]	Excess Air EA	Total O_2	Calc. % O_2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt
0	11.67	0.05	4.91	307.7%	20.77	15.83	147.8	21.9	100.0%	73.7%	73.7%	25.0	11.67
1	11.69	0.10	3.62	443.5%	20.81	17.14	145.1	22.0	99.0%	68.6%	67.9%	33.3	11.69
2	11.66	0.36	3.67	402.6%	20.80	16.95	136.4	22.1	93.5%	70.3%	65.7%	30.5	11.66
3	11.62	0.10	5.27	276.7%	20.75	15.43	141.8	22.0	99.2%	75.5%	74.9%	23.1	11.62
4	11.58	0.09	5.89	238.8%	20.73	14.80	146.4	22.1	99.5%	76.4%	76.0%	20.7	11.58
5	11.54	0.08	6.40	212.3%	20.71	14.27	151.9	22.2	99.6%	76.9%	76.6%	19.1	11.54
6	11.49	0.08	6.76	196.1%	20.70	13.91	157.8	22.3	99.6%	77.0%	76.7%	18.1	11.49
7	11.44	0.08	7.07	182.8%	20.69	13.58	163.2	22.4	99.5%	77.0%	76.6%	17.3	11.44
8	11.39	0.06	7.52	166.8%	20.68	13.12	168.9	22.5	99.8%	77.2%	77.0%	16.3	11.39
9	11.34	0.06	7.72	160.1%	20.67	12.92	174.6	22.6	99.8%	77.0%	76.9%	15.9	11.34
10	11.29	0.07	7.66	161.8%	20.67	12.97	179.2	22.6	99.7%	76.5%	76.3%	16.0	11.29
11	11.25	0.06	7.94	153.0%	20.66	12.69	181.1	22.6	99.8%	76.8%	76.7%	15.5	11.25
12	11.19	0.06	7.89	154.4%	20.66	12.74	183.6	22.7	99.8%	76.5%	76.3%	15.6	11.19
13	11.15	0.06	8.15	146.5%	20.65	12.48	185.1	22.7	99.8%	76.7%	76.6%	15.1	11.15
14	11.09	0.06	8.12	147.2%	20.65	12.50	187.6	22.7	99.8%	76.5%	76.3%	15.1	11.09
15	11.04	0.07	8.07	148.8%	20.66	12.56	190.4	22.8	99.8%	76.2%	76.0%	15.2	11.04
16	10.99	0.10	8.59	132.8%	20.64	11.99	171.6	22.8	99.4%	78.5%	78.1%	14.3	10.99
17	10.96	0.09	9.87	103.2%	20.59	10.68	159.4	22.9	99.6%	80.8%	80.5%	12.4	10.96
18	10.93	0.06	7.57	165.3%	20.67	13.08	155.2	22.9	99.9%	78.6%	78.5%	16.3	10.93
19	10.91	0.08	6.55	205.6%	20.71	14.12	152.6	22.9	99.6%	77.2%	76.9%	18.7	10.91
20	10.88	0.07	5.99	234.2%	20.73	14.71	150.7	23.1	99.7%	76.3%	76.1%	20.5	10.88
21	10.85	0.06	5.82	244.2%	20.73	14.89	149.1	23.0	99.8%	76.1%	75.9%	21.1	10.85
22	10.83	0.06	5.69	252.2%	20.74	15.02	146.9	23.1	99.9%	76.1%	76.0%	21.6	10.83
23	10.81	0.06	5.65	254.9%	20.74	15.07	144.5	23.1	99.9%	76.2%	76.2%	21.7	10.81
24	10.78	0.06	5.54	261.7%	20.74	15.18	142.6	23.1	99.9%	76.2%	76.2%	22.2	10.78
25	10.76	0.06	5.53	262.0%	20.74	15.18	140.7	23.1	99.9%	76.4%	76.4%	22.2	10.76
26	10.74	0.06	5.59	258.5%	20.74	15.13	139.6	23.1	99.9%	76.7%	76.6%	22.0	10.74
27	10.72	0.06	5.54	261.5%	20.74	15.18	138.7	23.1	99.9%	76.7%	76.6%	22.2	10.72
28	10.70	0.05	5.72	250.5%	20.74	14.99	138.1	23.1	100.0%	77.2%	77.2%	21.5	10.70
29	10.67	0.06	5.84	243.2%	20.73	14.87	137.8	23.1	99.9%	77.5%	77.4%	21.0	10.67
30	10.65	0.06	6.01	233.3%	20.73	14.69	138.5	23.1	99.8%	77.7%	77.6%	20.4	10.65
31	10.63	0.06	5.96	236.2%	20.73	14.74	138.6	23.1	99.8%	77.6%	77.5%	20.6	10.63
32	10.60	0.07	6.04	231.6%	20.73	14.66	139.6	23.1	99.8%	77.7%	77.5%	20.3	10.60
33	10.59	0.07	6.07	229.6%	20.73	14.62	139.7	23.1	99.8%	77.7%	77.5%	20.2	10.59
34	10.56	0.07	6.18	223.4%	20.72	14.50	139.9	23.1	99.6%	77.9%	77.6%	19.8	10.56
35	10.53	0.07	6.15	225.5%	20.72	14.54	140.4	23.1	99.7%	77.8%	77.5%	19.9	10.53

el Ratio (A/F)	
Weight (M_d)	29.74
st Gas (N_r):	549.55
o (A/F)	15.83

%HC
0.88

Combustion Efficiency: 98.73%
Total Input (kJ): 193,268 183,305 (Btu)
Total Output (kJ): 154,586 146,618 (Btu)
Efficiency: 79.99%
Total CO (g): 233.31

Moisture of Wood (wet basis): 17.0264
Initial Dry Weight Wt_{do} (kg): 9.68
Moisture Content Dry 20.52

Load Weight (kg): **11.67**

Fuel Heating Value in kj/kg - CV:	**HHV**	**LHV**	Btu/lb	**HHV**	**LHV**
	19,960	**18,662**		**8587.0**	**8028.6**

7189.8%	**291.7%**	**6987.3%**	**193354**	**4.22**	**6.02**	**2.62**	**19960.00**	**17.03**	**79.26**	**21.02**	**1.83**	**5.52**	**0.00**	**0.18**	**42.00**	**74.67**
% Wet Consumed	**Dry Wt. Now**	**% Dry Comsumed**	**Total**	**Fuel Properties**				**Mw Moisture**	**Mass Balance (moles/100 mole dry flue gas)**					**kg Wood per 100 mole dfp**		**M**
x	**Wt_{dn}**	**y**	**Input**	**Carbon /12= [a]**	**Hydrogen /1= [b]**	**Oxygen /16= [c]**	**Calorific Value**	**Fuel Burnt**	**[h]**	**[u]**	**[w]**	**[j]**	**[k]**	**Nk**	**CO_2**	**O_2**
0.00	9.68	0.00	0	4.22	6.02	2.62	19960.00	17.03	79.21	21.01	1.17	3.56	-0.02	0.12	42.48	136.91
-0.16	9.70	-0.16	-38	4.22	6.02	2.62	19960.00	17.03	79.14	20.99	0.88	2.67	-0.01	0.09	41.78	197.57
0.12	9.67	0.12	601	4.22	6.02	2.62	19960.00	17.03	79.02	20.96	0.96	2.84	0.02	0.09	38.72	179.06
0.47	9.64	0.47	639	4.22	6.02	2.62	19960.00	17.03	79.20	21.01	1.27	3.84	-0.01	0.13	42.04	123.10
0.78	9.61	0.78	639	4.22	6.02	2.62	19960.00	17.03	79.23	21.01	1.41	4.27	-0.01	0.14	42.25	106.22
1.13	9.57	1.13	714	4.22	6.02	2.62	19960.00	17.03	79.25	21.02	1.53	4.64	-0.01	0.15	42.33	94.41
1.52	9.54	1.52	789	4.22	6.02	2.62	19960.00	17.03	79.26	21.02	1.62	4.89	-0.01	0.16	42.36	87.18
1.94	9.49	1.94	827	4.22	6.02	2.62	19960.00	17.03	79.27	21.03	1.69	5.12	-0.01	0.17	42.33	81.26
2.37	9.45	2.37	827	4.22	6.02	2.62	19960.00	17.03	79.29	21.03	1.79	5.42	-0.01	0.18	42.48	74.13
2.80	9.41	2.80	827	4.22	6.02	2.62	19960.00	17.03	79.30	21.04	1.84	5.56	-0.01	0.18	42.52	71.15
3.23	9.37	3.23	789	4.22	6.02	2.62	19960.00	17.03	79.30	21.03	1.83	5.53	-0.01	0.18	42.47	71.89
3.62	9.33	3.62	827	4.22	6.02	2.62	19960.00	17.03	79.31	21.04	1.89	5.72	-0.01	0.19	42.53	68.01
4.08	9.29	4.08	827	4.22	6.02	2.62	19960.00	17.03	79.31	21.04	1.88	5.69	-0.01	0.19	42.51	68.64
4.47	9.25	4.47	827	4.22	6.02	2.62	19960.00	17.03	79.32	21.04	1.94	5.87	-0.01	0.19	42.50	65.10
4.94	9.20	4.94	864	4.22	6.02	2.62	19960.00	17.03	79.31	21.04	1.94	5.85	-0.01	0.19	42.50	65.42
5.37	9.16	5.37	827	4.22	6.02	2.62	19960.00	17.03	79.31	21.04	1.92	5.81	-0.01	0.19	42.49	66.14
5.79	9.12	5.79	714	4.22	6.02	2.62	19960.00	17.03	79.31	21.04	2.06	6.21	0.00	0.20	42.32	59.07
6.10	9.09	6.10	526	4.22	6.02	2.62	19960.00	17.03	79.36	21.05	2.36	7.11	0.00	0.23	42.43	45.91
6.34	9.07	6.34	413	4.22	6.02	2.62	19960.00	17.03	79.30	21.03	1.80	5.46	-0.01	0.18	42.53	73.47
6.53	9.05	6.53	451	4.22	6.02	2.62	19960.00	17.03	79.25	21.02	1.57	4.74	-0.01	0.15	42.37	91.40
6.80	9.02	6.80	451	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.43	4.34	-0.01	0.14	42.39	104.16
7.00	9.01	7.00	413	4.22	6.02	2.62	19960.00	17.03	79.23	21.02	1.39	4.21	-0.01	0.14	42.41	108.59
7.23	8.98	7.23	376	4.22	6.02	2.62	19960.00	17.03	79.23	21.02	1.36	4.12	-0.01	0.13	42.45	112.16
7.39	8.97	7.39	338	4.22	6.02	2.62	19960.00	17.03	79.23	21.02	1.35	4.09	-0.02	0.13	42.46	113.34
7.58	8.95	7.58	376	4.22	6.02	2.62	19960.00	17.03	79.23	21.02	1.32	4.01	-0.02	0.13	42.47	116.40
7.78	8.93	7.78	376	4.22	6.02	2.62	19960.00	17.03	79.23	21.01	1.32	4.01	-0.02	0.13	42.45	116.51
7.97	8.91	7.97	376	4.22	6.02	2.62	19960.00	17.03	79.23	21.02	1.33	4.05	-0.02	0.13	42.45	114.97
8.16	8.89	8.16	338	4.22	6.02	2.62	19960.00	17.03	79.23	21.02	1.32	4.01	-0.02	0.13	42.47	116.31
8.32	8.88	8.32	376	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.36	4.14	-0.02	0.13	42.52	111.42
8.55	8.85	8.55	376	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.39	4.22	-0.01	0.14	42.46	108.14
8.71	8.84	8.71	376	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.44	4.35	-0.01	0.14	42.45	103.73
8.94	8.82	8.94	413	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.42	4.31	-0.01	0.14	42.44	105.02
9.14	8.80	9.14	338	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.44	4.37	-0.01	0.14	42.42	103.01
9.29	8.78	9.29	376	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.45	4.40	-0.01	0.14	42.41	102.09
9.53	8.76	9.53	451	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.48	4.48	-0.01	0.15	42.35	99.33
9.76	8.74	9.76	338	4.22	6.02	2.62	19960.00	17.03	79.24	21.02	1.47	4.45	-0.01	0.15	42.38	100.28

Moisture Content M_{Cwb}: 17.02635

Dry kg : 9.68
CA: 51
HY: 6
OX: 41.99

0.78	-0.01	448.71	30.52	11.40	370.71	2877.32	2171.02	2112.53	2088.83	2757.55	2528.42	298.16	108983.33	140371.76	201866.01
					Stack	Heat Content Change - Ambient to Stack Temperature						Room			Energy Lo
Moles per kg of Dry Wood				Moisture	Temp	Flue Gas Constituent						Temp			Flu
CO	HC	N_2	H_2O	Present	K	CO_2	O_2	CO	N_2	CH_4	H_2O	K	CO_2	O_2	CO
0.45	-0.15	685.08	30.81	11.40	420.93	5023.56	3775.52	3670.16	3629.75	4847.05	4391.54	295.09	213.38	516.92	128.91
1.14	-0.15	912.42	30.80	11.40	418.21	4907.91	3690.69	3588.23	3548.60	4730.87	4293.66	295.15	205.06	729.16	327.10
3.80	0.26	834.61	30.00	11.40	409.54	4545.76	3424.67	3331.13	3294.02	4367.97	3986.52	295.21	176.01	613.23	1088.69
0.81	-0.08	631.77	30.66	11.40	414.98	4773.79	3592.32	3493.19	3454.49	4596.18	4180.13	295.15	200.69	442.22	233.11
0.61	-0.08	568.54	30.67	11.40	419.59	4961.57	3729.86	3626.01	3586.03	4785.21	4338.78	295.26	209.61	396.19	174.83
0.52	-0.07	524.11	30.66	11.40	425.04	5184.85	3893.09	3783.56	3742.09	5010.65	4526.94	295.37	219.46	367.53	149.84
0.48	-0.07	496.91	30.65	11.40	430.93	5427.66	4070.22	3954.43	3911.35	5256.67	4730.98	295.48	229.93	354.84	138.52
0.50	-0.06	474.46	30.62	11.40	436.32	5652.50	4233.94	4112.29	4067.74	5485.12	4919.45	295.54	239.27	344.05	144.35
0.36	-0.06	447.92	30.64	11.40	442.04	5890.17	4406.54	4278.59	4232.52	5727.65	5117.96	295.65	250.21	326.67	103.86
0.32	-0.07	436.76	30.64	11.40	447.71	6128.56	4579.36	4445.02	4397.45	5971.55	5316.61	295.71	260.61	325.81	91.82
0.37	-0.06	439.44	30.63	11.40	452.37	6327.32	4723.24	4583.54	4534.72	6175.36	5481.93	295.71	268.73	339.57	105.18
0.31	-0.06	424.92	30.64	11.40	454.21	6403.46	4778.19	4636.39	4587.11	6253.81	5544.99	295.76	272.37	324.95	87.84
0.33	-0.06	427.23	30.63	11.40	456.71	6508.21	4853.75	4709.07	4659.15	6361.81	5631.70	295.82	276.66	333.14	94.54
0.33	-0.05	413.84	30.62	11.40	458.26	6572.68	4900.18	4753.70	4703.40	6428.45	5684.96	295.87	279.36	318.98	94.59
0.33	-0.05	415.05	30.62	11.40	460.76	6679.84	4977.48	4828.04	4777.09	6538.95	5773.65	295.87	283.91	325.61	94.89
0.34	-0.05	417.74	30.62	11.40	463.54	6797.01	5061.79	4909.08	4857.43	6660.21	5870.32	295.93	288.80	334.77	98.57
0.48	-0.02	390.60	30.56	11.40	444.71	5990.53	4478.78	4348.03	4301.36	5831.44	5200.81	295.98	253.51	264.57	138.68
0.37	-0.02	341.15	30.55	11.40	432.54	5474.25	4103.27	3986.08	3942.75	5305.92	4768.69	296.04	232.26	188.37	106.09
0.31	-0.07	445.54	30.65	11.40	428.32	5296.82	3973.84	3861.21	3819.06	5126.15	4619.59	296.04	225.29	291.94	90.26
0.49	-0.07	512.85	30.66	11.40	425.71	5185.24	3892.23	3782.45	3741.04	5013.54	4525.52	296.09	219.67	355.74	139.18
0.48	-0.09	561.11	30.70	11.40	423.82	5101.93	3831.15	3723.44	3682.61	4929.82	4455.04	296.21	216.27	399.05	138.06
0.47	-0.10	577.90	30.72	11.40	422.26	5039.02	3785.21	3679.11	3638.69	4866.19	4402.09	296.15	213.72	411.02	133.82
0.44	-0.11	591.49	30.73	11.40	420.04	4941.99	3714.00	3610.31	3570.56	4768.84	4319.90	296.26	209.78	416.56	126.24
0.43	-0.11	596.00	30.74	11.40	417.65	4844.53	3642.65	3541.42	3502.33	4670.63	4237.62	296.21	205.72	412.87	122.86
0.43	-0.12	607.55	30.75	11.40	415.71	4763.59	3583.28	3484.06	3445.53	4589.34	4169.11	296.21	202.30	417.08	123.02
0.45	-0.12	607.94	30.75	11.40	413.82	4685.08	3525.64	3428.37	3390.38	4510.58	4102.58	296.21	198.88	410.79	127.48
0.44	-0.12	602.12	30.74	11.40	412.71	4636.82	3490.11	3394.02	3356.37	4462.39	4061.53	296.26	196.84	401.26	126.24
0.43	-0.12	607.22	30.75	11.40	411.87	4602.24	3464.70	3369.46	3332.05	4427.76	4032.19	296.26	195.45	402.98	122.91
0.38	-0.12	588.87	30.75	11.40	411.21	4574.59	3444.38	3349.82	3312.60	4400.08	4008.72	296.26	194.50	383.76	108.53
0.43	-0.11	576.32	30.73	11.40	410.93	4563.07	3435.91	3341.63	3304.50	4388.56	3998.94	296.26	193.73	371.56	122.88
0.43	-0.10	559.65	30.71	11.40	411.65	4595.14	3459.56	3364.51	3327.15	4420.48	4026.29	296.21	195.05	358.87	123.37
0.43	-0.10	564.49	30.71	11.40	411.71	4595.33	3459.62	3364.55	3327.19	4420.84	4026.32	296.26	195.04	363.32	124.44
0.46	-0.10	556.83	30.70	11.40	412.76	4639.13	3491.81	3395.66	3357.99	4464.70	4063.49	296.26	196.77	359.68	130.81
0.46	-0.09	553.37	30.70	11.40	412.87	4643.74	3495.20	3398.93	3361.24	4469.32	4067.40	296.26	196.94	356.84	132.00
0.51	-0.08	542.80	30.68	11.40	413.09	4652.96	3501.97	3405.48	3367.72	4478.57	4075.22	296.26	197.07	347.87	145.17
0.48	-0.09	546.44	30.69	11.40	413.59	4673.73	3517.23	3420.22	3382.32	4499.38	4092.83	296.26	198.08	352.71	138.25

SUMS				AVERAGE	SUMS						
824241.22	-4398.39	1280128.18	478132.10	3358.45	38687.82	2464.21	36223.62	154666.55	2458.03	233.31	1.91
osses (kJ/kg of Dry Fuel)				Total							
e Gas Constituent				Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
N_2	CH_4	H_2O Comb	H_2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
2486.66	-132.75	1489.92	551.32	5254.36	0.00	0	0.00	0	0	0.00	0.00
3237.80	-129.96	1486.60	550.20	6405.97	-12.06	0	-11.69	-26	0	-0.06	0.00
2749.22	228.26	1438.74	546.70	6840.85	206.03	39	166.78	395	39	3.21	0.12
2182.44	-68.15	1476.46	548.91	5015.67	160.50	5	155.30	478	5	0.73	-0.04
2038.80	-70.34	1481.56	550.72	4781.36	153.00	3	149.72	486	3	0.55	-0.04
1961.28	-64.99	1486.75	552.86	4672.73	167.12	3	164.14	547	3	0.52	-0.04
1943.57	-60.00	1492.46	555.19	4654.51	183.99	3	180.95	605	3	0.53	-0.04
1929.98	-49.33	1497.07	557.34	4662.74	193.09	4	189.23	633	4	0.58	-0.04
1895.82	-57.17	1504.00	559.60	4582.98	189.79	2	187.90	637	2	0.42	-0.04
1920.61	-58.34	1510.22	561.87	4612.59	191.01	1	189.67	636	1	0.37	-0.04
1992.73	-53.58	1514.75	563.75	4731.14	187.02	2	185.03	602	2	0.40	-0.04
1949.15	-55.77	1516.93	564.47	4659.92	192.97	1	191.69	634	1	0.35	-0.04
1990.52	-53.74	1519.36	565.46	4725.93	195.71	2	194.07	631	2	0.38	-0.04
1946.46	-48.83	1520.45	566.07	4677.06	193.68	2	191.84	633	2	0.38	-0.04
1982.75	-49.16	1523.20	567.08	4728.27	204.71	2	202.78	659	2	0.40	-0.04
2029.13	-48.58	1526.09	568.18	4796.96	198.65	2	196.63	628	2	0.40	-0.04
1680.13	-21.20	1502.59	560.55	4378.82	156.61	4	152.48	557	4	0.48	-0.01
1345.09	-17.14	1488.95	555.62	3899.22	102.76	2	100.45	423	2	0.27	-0.01
1701.54	-62.08	1489.27	553.92	4290.13	88.83	1	88.26	324	1	0.18	-0.02
1918.58	-65.48	1486.76	552.85	4607.30	104.07	2	102.44	347	2	0.31	-0.03
2066.36	-83.57	1486.55	552.04	4774.76	107.85	1	106.65	343	1	0.30	-0.03
2102.82	-91.52	1485.79	551.44	4807.09	99.53	1	98.68	314	1	0.27	-0.03
2111.97	-99.73	1484.15	550.50	4799.47	90.34	0	89.86	285	0	0.23	-0.03
2087.39	-102.82	1481.95	549.57	4757.53	80.60	0	80.27	258	0	0.20	-0.03
2093.32	-106.94	1480.29	548.78	4757.86	89.56	0	89.27	286	0	0.23	-0.04
2061.16	-105.14	1478.05	548.03	4719.25	88.83	0	88.43	287	0	0.23	-0.04
2020.93	-103.53	1476.62	547.56	4665.91	87.83	0	87.42	288	0	0.23	-0.03
2023.29	-106.83	1476.07	547.22	4661.09	78.96	0	78.71	259	0	0.20	-0.03
1950.68	-106.35	1475.30	546.96	4553.38	85.71	0	85.68	290	0	0.20	-0.04
1904.45	-95.56	1473.84	546.84	4517.74	85.04	0	84.54	291	0	0.23	-0.03
1862.05	-89.27	1474.01	547.16	4471.23	84.16	1	83.54	292	1	0.23	-0.03
1878.18	-90.58	1474.15	547.16	4491.71	93.00	1	92.32	320	1	0.25	-0.03
1869.84	-85.03	1474.69	547.58	4494.35	76.14	1	75.38	262	1	0.22	-0.03
1860.00	-83.25	1474.62	547.62	4484.76	84.42	1	83.52	291	1	0.24	-0.03
1827.99	-73.70	1473.84	547.71	4465.95	100.88	2	99.29	350	2	0.32	-0.03
1848.24	-78.03	1474.84	547.91	4482.01	75.93	1	74.93	262	1	0.23	-0.02

OPERATING INSTRUCTIONS FOR THE VcV 2.1.5 WOOD STOVE DURING CERTIFICATION TESTING

VcV INFORMATION:

The VcV 2.1.5 wood stove is equipped with two Variable Choke Venturis (VCVs), one in the primary system, the PVcV, and one in the secondary system, the 2VcV. Both are operated by the draft in the chimney generated by the fire, but function differently. The 2VcV is always operating and has a disc that "floats" up in down on a rod in the tapered bore of the 2VcV. As the fire in the stove increases in intensity, that increases the draft in the chimney, which then lifts the 2VcV disc farther up off the bottom stop which allows more secondary air to enter the stove. When the fire starts to decrease, then the amount of draft being generated decreases and the 2VcV disc will slowly "sink" down towards the bottom stop in the 2VcV. The 2VcV is designed to optimize the amount of secondary air entering the stove because it floats up and down based upon the dry burn rate (DBR)/ amount of fire in the stove and static pressure in the chimney, which optimizes the overall efficiency (%OE) by allowing just the right amount of secondary air to enter the stove.

The PVcV also has a disc that moves up and down on a shaft (rod). When there is no fire in a stove, the PVcV disc is resting on what is called the "bottom stop". As soon as a fire is started in a cold stove, the draft in the chimney immediately starts to increase and will continue to increase as long as the PAC is set at wide open and there is enough fuel to allow the fire to continue to increase in intensity. As long as the PAC is set at wide open, the PVcV disc will remain on the bottom stop. However, if at any time, the PAC is adjusted to fully or almost fully closed, the PVcV is now engaged. The PVcV disc will remain on the bottom stop until the draft in the chimney reaches a certain pre-set amount, e.g., -0.060" – 0.080" H_2O. When that amount of draft in the chimney is achieved, the PVcV disc will "pop up" to the top stop. When the PVcV disc "pops up", the PAC is now set at the minimum air or low burn setting, or, depending upon the PAC setting, perhaps a medium burn. The PVcV will stay at the top stop until the stove door is opened or the fire's intensity is so low that the fire is not generating enough draft to keep the PVcV disc at the top stop. When the draft in the chimney decreases to that point, the PVcV disc may either "float" in the PVcV's bore or it may drop down to the bottom stop. If the former happens, the fire's intensity may "pick up" a bit because of the small amount of extra air entering the stove. Eventually the increase in intensity will increase the draft and that increase in draft will cause the PVcV disc to return to the top stop and the fire's intensity will start to decrease again. A stove can go through a number of these "floating in the bore" cycles during a burn. However, if the PVcV disc drops down to the bottom stop, then the amount of primary combustion air entering the stove has increased very substantially and the color/ brightness in the coal bed will also increase very quickly. This scenario tends to happen most frequently at the very end of a long burn cycle. Both scenarios are normal and both can happen during the same test run and are to be expected.

That is the beauty of the VcV's. The 2VcV "automatically" optimizes the amount of secondary air entering the stove and, thus, the %OE, based upon the fire's intensity. The PVcV is designed to "automatically" regulate the amount of primary air entering the stove and will not allow a stove to be shut down to a low or overnight burn until the draft in the chimney reaches a point that will ensure that the fire will sustain a clean burn and not go into some sort of "smolder mode", resulting in excess smoke emissions and lower %OE's. So, after reloading, one can set the PAC to its minimum setting and walk away,

knowing that the PVcV will not shut the stove down to the low burn setting until the draft in the chimney is sufficient to maintain a clean burning fire. Just remember that smoke is nothing more than unburnt fuel (hydrocarbon aerosols), so any visible smoke means you are wasting wood. Photo below shows the two VcVs.



NOMINAL TEST FUEL LENGTH:

The nominal test fuel piece length is 18.0 ±0.5″. (See Item 3.b in ATM request.)

OPERATING CONTROLS:

Every stove installation is different, as are the daily outside meteorological conditions, so the instructions below are a good place to start. As you work with your stove, you will quickly learn about how it works best and you can modify your cold start and reloading procedures accordingly. The object of all cold starts and reloads is to get the stove up to temperature as quickly as possible to minimize emissions and maximize overall efficiency.

The VcV 2.1.5 wood stove has two operating controls, the CAT BYPASS and the PRIMARY AIR CONTROL (PAC). Operate these controls as follows during testing.

1. CAT BYPASS:

The cat bypass is used to route the air inside the stove. When the bypass is open, most of the air exiting the stove will flow up through the cat bypass and then to the chimney, bypassing the catalytic combustor. However, some of the air will flow forward and then up and through the catalytic combustor (cat). This air flow is what starts warming up the cat and gets the cat to start working. Cats must have an internal temperature of about 4-500 F to start functioning properly. Typically, it takes 8-15 minutes after ignition to get the cat up to temperature and working properly.

The cat bypass handle is located at the center top right side of the stove. When the handle is pushed all the way in, the bypass is closed. When the bypass handle is pulled all the way out, the bypass is open.

Before starting a fire in a cold stove, open the bypass completely and lay the fire. Once the fire has been laid, ignite the fire. Leave the bypass open for the first 8-15 minutes after ignition to allow the fire to get going. Once the fire has

established itself, typically 10-12 minutes after ignition, close the bypass. After the bypass is closed, the fire may decrease somewhat for a couple of minutes, but then the fire will turn itself around and begin to increase in intensity again. If the fire really falters and appears to be going out after the bypass is closed, immediately reopen the bypass and let the fire get going again. Give the fire about 2-5 more minutes to establish itself and then close the bypass again.

When reloading your stove, open the bypass completely before opening the door to load the fuel pieces. Close the bypass as soon as the door has been closed. Opening the bypass before opening the door should prevent any smoke and flame spillage. Closing the door quickly after reloading will facilitate getting the cat back up to optimum operating temperature as fast as possible, thus minimizing emissions and optimizing %OE.

2. PRIMARY AIR CONTROL (PAC) with VARIABLE CHOKE VENTURIS (VcVs):

The PAC is located at the bottom right front corner of the stove. If you pull the PAC rod out, away from the stove, you will increase the amount of combustion air entering the stove which will make the fire burn faster. Pushing the PAC rod all the way in will decrease the amount of combustion air entering the stove, so the stove's burn rate will decrease. Pushing the PAC control rod all the way in, or almost all the way in, will also engage the primary VcV (PVcV). When the PAC rod is all the way out and the PAC is wide open, the PVcV is essentially bypassed.

When the PVcV is engaged, the disc in the PVcV will stay down at the "bottom stop" and it will remain there until the fire generates enough draft (static pressure) in the chimney to cause the PVcV to "pop up" to the top stop. When the PVcV does "pop up", the amount of combustion air entering the stove will be decreased substantially and the PAC will now be set at the "low" or minimum burn setting. Thus, when the PVcV disc does "pop up", the fire will immediately respond to the reduced amount of primary air and start to die back. Eventually the fire "die back" will slow and then stop, leaving some hot, glowing coals and some small flames at the front of the coal bed. This is normal. Once the "die back" stops, the color and flames in the coal bed will slowly increase and then stabilize and a low burn is underway.

Set the PAC as follows to obtain the desired, necessary dry burn rates:

A. HIGH Burn: Pull the PAC rod all the way out, away from the stove and leave the PAC in that position for the entire high burn test, which includes both the kindling/ starter fuel cold start and actual high burn fuel segments. Using a hand-held propane torch is recommended for ignition. Use the torch for up to 60 seconds, 30-45 seconds is usually sufficient, to ignite the kindling and starter fuel Always have (1.) the torch burning before ignition at the test start and always have (2.) a back-up torch on hand to ensure the proper ignition of the kindling/ starter fuel.

B. MEDIUM BURN:

(1.)Pre-Burn Segment: At the end of the high Burn test run, push the PAC rod in until it is 1/8" from being fully closed. To do this, using a Combination square, on a cold stove, you must first measure how far the rod extends out from the side of the stove when the PAC rod is pushed all the way in. To make this measurement, place the narrow end of the ruler in a Combination square flat against the side of the stove and then slide the adjustable head of the Combination square with the flat 90° part of the head flat up against the end of the PAC control rod along the ruler until it will not move anymore because the

PAC is set at the low burn "Stop", which is the stove's minimum PAC setting. Note the measurement on the ruler. Then add 1/8" to that setting, move the adjustable Head to that setting and then set the adjustable Head by turning the knob until the knob is tight. Note and record that setting for reference. Make this measurement 2 or 3 times just to ensure the measurement and setting are correct. Note: Given that dry burn rates (DBRs) can vary based upon many different variables, e.g., barometric pressure, wood moisture content, fuel piece size, etc., it may be necessary to increase or decrease the 1/8" PAC setting to obtain a medium burn with the correct DBR.

(2.)Medium Burn Test Start: When the residual coal bed weight is 12-14% of the wet medium burn fuel load weight, start the test and adjust the PAC to wide open. Then at the end of "Air Control Adjustment Time" (ASTM E3053 Section 8.6.7) when either 15% of the wet fuel load weight has been consumed or 15 minutes have elapsed since the end of the "Test Run Load Time", close the PAC to the desired PAC setting with the Combination square. Once done, no further adjustments of the PAC are allowed or necessary. When the PAC is adjusted to the run setting, one of two things will happen: (1.) the disc in the PVcV will immediately "pop up". If it does, the fire will immediately start to decrease. Or, (2.) the fire will continue to burn vigorously and slowly increase in intensity until it generates enough static pressure in the chimney to cause the PVcV disc to "pop up", and when that happens, the fire's intensity will quickly start to decrease and the decrease will continue until an equilibrium between the DBR and the amount of air entering the stove is achieved. Either way, once the PVcV disc "pops up", there should be enough primary combustion air entering the stove to sustain the fire and achieve a medium burn. Note: the 12-14% coal bed weight is suggested because it may be difficult to load the fuel load on a larger coal bed and because the 12-14% coal bed weight will provide enough of a "weight cushion" so that once the residual coal bed is leveled and the fuel load is loaded, the coal bed weight will still be above the 10% minimum allowed.

C. LOW BURN:

(1.)Pre-Burn Segment: At the end of the high burn test run, push the PAC rod all the way in until it is fully closed.

(2.)Low Burn Test Start: When the residual coal bed weight is 12-14% of the wet low burn fuel load weight, start the test and adjust the PAC to wide open. Then, at the end of "Air Control Adjustment Time" (ASTM E3053 Section 8.6.7) when either 15% of the wet fuel load weight has been consumed or 15 minutes have elapsed since the end of the "Test Run Load Time", close the PAC to the fully closed Low burn PAC setting. No further adjustments of the PAC are allowed or necessary. When the PAC is adjusted to the run setting, one of two things will happen: (1.) the disc in the PVcV will immediately "pop up". If it does, the fire will immediately start to decrease. Or (2.) the fire will continue to burn vigorously and slowly increase in intensity until it generates enough static pressure in the chimney to cause the PVcV disc to "pop up", and when that happens, the fire's intensity will quickly start to decrease and the decrease will continue until an equilibrium between the DBR and the amount of air is achieved.

3. DOOR:

Operate the door as follows. Always close the door slowly, because "slamming" the door shut may cause the PVcV disc to prematurely "pop up", which is something to be

avoided. If the PVcV disc does pop up prematurely, crack open the door and the PVcV disc will drop down to the bottom stop. Then SLOWLY close the door again.

A. Ignition: Once the fire has been ignited and the necessary post-ignition photograph has been taken, close and latch the door. Once the door is closed, check to ensure the door is fully/ tightly closed by tapping lightly down on the door handle a couple of times. Typically, ignition with the torch takes 30-45 seconds, so by 45-60 seconds the door should be closed. You can crack the door open about 1″ on the latch side if the fire really starts to falter after the door is closed. Leave the door in this position until the fire has reestablished itself, typically 15-120 seconds.

B. Reloading: (Defined as when the High, Medium and Low burn fuel loads are added to the stove.) Prior to reloading, always have the reload fuel pieces arranged in order and ready for loading near the stove. Then, at test start, if possible, take the required photograph of the pre-leveled, residual coal bed through the door glass. If that is not possible due to "dirty glass", open the door and take the photograph. After taking the photo, use a "poker" to gently break-up and level the residual coal bed from the previous fire. Once the coal bed is leveled, take another photo of the "leveled" coal bed, then load the fuel load into the stove, making certain to gently "bed" the bottom, outside pieces into the coal bed. After all 5 of the fuel pieces are loaded, take a photograph of the fuel load in the stove and then close and latch the door. Once the door is closed, check to ensure the door is fully/ tightly closed by tapping lightly down on the door handle. If possible, close the door first and then take the photograph of the fuel load loaded in the stove through the glass with the door closed.

4. STARTING A FIRE:

When using kindling and starter fuel (K/S fuel) to start a fire in a cold stove, always use a top-down fire-starting fuel configuration, which means the larger pieces of fuel are placed on the bricks in the bottom of the firebox and the piece size gets smaller in the successive layers. (See photo below.) The pieces are loaded in a crisscross fashion, with the ends of the pieces in the bottom layer facing the door. (Item 9.b in our ATM Request dated Sept 5, 2023.)

Bottom Layer: Start-up fuel: 3-13-14″ long pieces that weigh about 0.9 to 1.1 lb. each. Pieces are nominally 1.75 to 2.5″ wide, 18-28% moisture DB. Load pieces in a North-South (N/S)(front to back) configuration with the rear ends about 0.5″ off the rear wall of the firebox. Evenly space the 3 pieces in the firebox with about 1.0″ between the firebox wall and the outside edge of the two outside pieces with the center piece centered between the outside two.

Next Layer Up: Start-up fuel: 4-11-12″ long pieces that weigh 0.6 to 0.9 lbs. each. Pieces are nominally 1.0 to 2.0″ wide. 18-28% moisture DB. Load these pieces East/ West (E/W)(side to side) and center these pieces on top of the bottom layer with even spaces more or less (MOL) between the pieces.

Next Layer up: Kindling: 4 pieces about 12″ long that weigh 0.7 to 0.9 lbs. each. 6-16% moisture DB. Load N/S, centered on top of the second layer, with even spaces MOL between the pieces.

Next Layer Up: Kindling: 6 pieces about 6-7″ long that weigh about 0.2 lbs. each. 6-16% moisture DB. Load E/W, centered on top of the third layer, with even spaces MOL between the pieces.

Next Layer Up: Kindling: 6 pieces about 9-10″ long that weigh about 0.250 to 0.375 lbs. when weighed together. 6-16% moisture DB. Loaded N/S, centered on top of the fourth layer with even spaces MOL between the pieces.

Next Layer Up: Kindling: 10 pieces about 6″ long that weigh about 0.100 to 0.175 lbs. when weighed together. 6-16% moisture DB. Loaded E/W, centered on top of the fifth layer with even spaces MOL between the pieces.

Top Layer: Kindling: "Splinters" Small pieces of kindling that are of uneven length, shape and weight. Load on top of the sixth layer, crisscrossed as much as possible. 6-16% Moisture DB. When lighting a fire with a handheld propane torch, focus on igniting the "splinters" and the kindling layer directly under the splinters. Use the torch to first ignite one side of the splinters and top layer of the kindling, then slowly move the burning torch nozzle to the front and opposite side of the K/S fuel pile. The goal is to get an even ignition of the top of the fuel pile.

The photo below shows a Top Down Kindling/ Start-up Cold Start fuel pile configuration similar to the one described above.



5. COAL BED AND LOADING:
   A. High Burn:
      (1.)Clean the stove out before each test.
      (2.)Have the 5 high burn fuel pieces sequentially arranged and ready for loading in an easy access location.
      (3.)When the weight of the residual coals from the K/S fuel weigh 12-14% of the wet high burn fuel load weight, open the bypass, then open the door and take a photo.
      (4.)Break up and level the residual coals and take a photo.

(5.)Load the high burn fuel pieces placing the 2 largest fuel pieces next to the firebox wall in a way that will enable placing a second fuel piece on top of that piece so that the second fuel piece placed on top of the first piece will remain there. In short, a stable fuel pile. (See photo below.)



HIGH BURN FUEL LOADED

(6.)Load the smallest piece last in the center of the firebox so that there is a 0.5 – 1.0″ MOL space between the two bottom outside pieces and the center piece.
(7.)Using a poker, clear the coals away from in front of the three Lower Primary Air Orifice (LPAO) holes. (The LPAO is the 3 holes in the primary air cross duct at the bottom of and just behind the door opening. When clearing the coals away from in front of the LPAO, ensure that the air exiting the LPAO holes has an unobstructed pathway back to the fuel pieces. Once all 5 fuel pieces are loaded and the coals are cleared away from the LPAO, take a photo.
(8.)Slowly close and latch the door and check to ensure it is tightly latched by tapping lightly downward a couple of times on the handle.
(9.)Close the Bypass.
(10.)Turn the Fan on High at 5 minutes.

B.MEDIUM BURN:

(1.)MEDIUM BURN "PREBURN":

(a.)At the end of a high burn, immediately adjust the PAC to the medium burn setting.

(b.)Do not adjust or level the coal bed. Leave it as is and let it burn naturally.

(c.)Leave the fan on "High".

(d.)Have the 5 medium burn fuel pieces sequentially arranged and ready for loading in an easy access location.

(e.)Note: Depending upon the burn rate during medium preburn – the time between the end of the high burn test and the start of the medium burn test. – it may be necessary to rake the hot, burning coals forward to facilitate weight loss. If that is necessary, open the bypass, open the door, rake the coals, close the door and then close the bypass. Do this as quickly as possible. Remember that when you open the door, the PVcV disc will drop down to the bottom stop, which will allow more primary air to enter the stove and thus increase the DBR.

(2.)MEDIUM BURN TEST START:

(a.)When the weight of the residual coals from the kindling, starter fuel and high burn fuel load weighs 12-14% of the wet medium burn fuel load weight, start the medium burn test. One needs to wait until the 12-14% is achieved, otherwise loading the fuel load in the stove can be difficult due to fuel piece size and shape. So at test start:

(b.)Start PM Sampling.

(c.)Adjust the PAC to wide open.

(d.)Turn the fan OFF.

(e.)Open the bypass.

(f.)Open the door

(g.)Take a photo of the coal bed before leveling.

(h.)Break up and level the residual coals.

(i.)Take a photo of the leveled coal bed.

(j.)Load the medium burn fuel pieces with the two largest fuel pieces placed on

the coal bed next to the firebox wall, one on each side, in a way that will enable placing a second fuel piece on top of that piece, so that the second fuel piece placed on top of the first piece will remain there, i.e., it is stable.

(k.) Load the smallest piece in the fuel load last in the center of the firebox so that there is a 0.5 – 1.0″ MOL space between the two bottom outside pieces and the center piece.

(l.) Using a poker, clear the coals away from in front of the three Lower Primary Air Orifice (LPAO) holes. (The LPAO is the 3 holes in the bottom primary air cross duct at the bottom of and just behind the door opening.) Make certain the pathway between the LPAO holes and the fuel pieces is unobstructed.

(m.) Take a photo of the fuel load loaded in the stove after all 5 fuel pieces are loaded and the coals are cleared away from the LPAO.

(n.) Slowly close and latch the door. Check to ensure it is tightly latched by tapping lightly downward on the handle a couple of times.

(o.) Close the cat bypass.

(p.) PAC

(i.) At the end of "Air Control Adjustment Time" (ASTM E3053 Section 8.6.7) when either 15% of the wet fuel load weight has been consumed or 15 minutes have elapsed since the end of the "Test Run Load Time", close the PAC to the medium burn PAC setting or

(ii.) If the test start conditions warrant, i.e., if the fire really takes off (a jackrabbit start), close the PAC early to the medium burn setting. Let the fire burn for at least 12 minutes before closing the PAC.

(q.) Turn the fan on High at 30 minutes after the start of the test.

C. <u>LOW BURN:</u>

(1.) <u>LOW BURN "PREBURN":</u>

(a.) At the end of a high burn, immediately adjust the PAC to the Low burn setting (fully closed).

(b.) Do not adjust or level the coal bed. Leave it as is and let it burn naturally.

(c.) Leave the fan on "High".

(d.)Have the 5 low burn fuel pieces sequentially arranged and ready for loading in an easy access location.

(e.)Note: Depending upon the burn rate during the low preburn – The time between the end of the high burn test and the start of the low burn test. – it may be necessary to rake the hot, burning coals forward to facilitate weight loss. If that is necessary, open the bypass, open the door, rake the coals, close the door and then close the bypass. Do this as quickly as possible. Remember that when you open the door, the PVcV disc will drop down to the bottom stop, which will allow more primary air to enter the stove and thus increase the DBR.

(2.)<u>LOW BURN TEST START:</u>

(a.)When the weight of the residual coals from the kindling, starter fuel and high burn fuel load weighs 12-14% of the wet low burn fuel load weight, start the low burn test. One needs to wait until the 12-14% is achieved, otherwise loading the fuel load in the stove can be difficult due to fuel piece size and shape.

At test start:

(b.)Start PM Sampling.

(c.)PAC options:

(i.)Adjust the PAC to wide open, which will cause the PVcV disc to drop down to the bottom stop or

(ii.)Leave the PAC set at the low burn setting. When the door is opened to load the fuel, the PVcV disc will automatically drop down to the bottom stop.

(d.)Turn the fan OFF.

(e.)Open the bypass.

(f.)Open the door

(g.)Take a photo of the coal bed before leveling.

(h.)Break up and level the residual coals.

(i.)Take a photo of the leveled coal bed.

(j.)Load the low burn fuel pieces with the two largest fuel pieces placed on the coal bed next to the firebox wall, one on each side, in a way that will enable placing a second fuel piece on top of that piece, so that the

second fuel piece placed on top of the first piece will remain there, i.e., it is stable.

(k.) Load the smallest piece in the fuel load last in the center of the firebox so that there is a 0.5 – 1.0″ MOL space between the two bottom outside pieces and the center piece.

(l.) Using a poker, clear the coals away from in front of the three Lower Primary Air Orifice (LPAO) holes. (The LPAO is the 3 holes in the bottom primary air cross duct at the bottom of and just behind the door opening.) make certain the pathway between the LPAO holes and the fuel pieces is unobstructed.

(m.) Take a photo of the fuel load loaded in the stove after all 5 fuel pieces are loaded and the coals are cleared away from in front of the LPAO.

(n.) Slowly close and latch the door. Check to ensure it is tightly latched by tapping lightly downward on the handle a couple of times.

(o.) Close the cat bypass.

(p.) PAC

(*i*.) Option 1

(*a*.) If the test start conditions warrant, i.e., if the fire really takes off (a jackrabbit start), and if the PAC was adjusted to wide open at the start of the test, close the PAC early to the low burn setting fully closed).

(*b*.) At the end of "Air Control Adjustment Time" (ASTM E3053 Section 8.6.7) when either 15% of the wet fuel load weight has been consumed or 15 minutes have elapsed since the end of the "Test Run Load Time", close the PAC to the burn PAC setting or

(ii.) Option 2

(*a*.) If the PAC was left at the low burn setting at the start of the test, no adjustments are necessary because the PVcV is already at the low burn setting and it will operate as intended.

Note: The PVcV is set so that the PVcV disc will not "pop up" until a specified, pre-set static pressure is achieved in the chimney, so even though the PAC had been adjusted to the fully closed position, the fire may not start to die back when the PAC

is closed. That is normal because the fire is not generating the required static pressure. However, once that pre-set static pressure is achieved, the disc will pop up and when that happens you will visually see it in the firebox, i.e., the fire's intensity will start to decrease rapidly.

(q.) Turn the fan on High at 30 minutes after the start of the test.

(r.) If a fuel load adjustment becomes necessary, open the bypass, open the door, adjust the fuel load, close the door and close the bypass. 30 seconds is the maximum time allowed for an adjustment. If a fuel load adjustment is made, the PVcV disc will drop down to the bottom stop, letting more air into the firebox, which will decrease the burn time and increase the burn rate, so be cautious when deciding to make this adjustment. Remember that when a fire is burning very slowly, the PVcV disc may start to "float in the bore", letting a little bit more of extra primary air into the stove, or if the static in the chimney decreases past a certain point, the PVcV disc will drop down to the bottom stop on its own. Either scenario should resolve the burn rate issue without having to make a fuel load adjustment.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

January 4, 2024

Mr. Ben Myren
President
Myren Consulting, Inc
512 Williams Lake Road
Coleville, WA 99114

Dear Mr. Myren,

This letter is in response to your alternative test method request dated September 1, 2023, and the additional information provided via emails and during a conference call on April 20, 2023. With this request, you seek the use of alternative testing procedures to demonstrate compliance with 40 CFR part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters (Subpart AAA). The Office of Air Quality Planning and Standards, as the delegated authority, must make the determination on any major alternatives to test methods and procedures required under 40 CFR parts 59, 60, 61, 63, and 65. Your proposed alternative testing procedures and our approval decisions are discussed below.

On behalf of 509 Fabrication, LLC of Post Falls, ID and Ecovision, LTD. of Auckland, New Zealand, and Myren Consulting, Inc, (The Group), you request an alternative test method and a modified version of ASTM 3053-18 to certify the VcV 2.1.5 hybrid stove model line. You state the VcV 2.1 series was previously certified under an ATM and now needs to be recertified due to multiple k-list design changes. You state the newly designed VcV 2.1.5 is a typical hybrid stove that uses both non-catalytic (secondary burn) and a catalytic combustor to achieve compliance with EPA's 2020 cord wood emission weighed average standard of 2.5 g/hr.

Currently, as required by section 60.534(a)(2) of Subpart AAA, a manufacturer using the 2020 cord wood alternative compliance option must have their appliance tested by an EPA-approved test laboratory. Testing must be conducted with cord wood using an alternative cord wood test method approved by the EPA Administrator or his delegated authority to establish the certification test conditions and the particulate matter (PM) emission values.

You request to use the modifications to ASTM E3053-18, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel* (ASTM E3053-18), as the alternative cord wood test method to certify the VcV 2.1.5 hybrid stove model line. According to the information provided, you are seeking a cord wood alternative test method to use for compliance

testing. You state that your appliance has a usable firebox volume of 2.176 ft^3 and an overall firebox volume of 2.176 ft^3. Because the longest length for both usable firebox and overall firebox is the same at 21.25 inches, measured north-south parallel to the firebox side walls, you propose a north-south loading configuration. You state that you will use cord wood fuel 18 inches in length for testing, which represents 84.70% of the usable firebox length.

We also understand from your request, that you seek use of a number of alternative testing procedures, detailed below, when conducting sampling as required by 40 CFR 60.534(c) and (d), which requires that PM emission concentrations be measured using ASTM E2515-11, *Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel* (ASTM E2515-11).

Additionally, you seek to use a separate sampling train for collecting the first hour of PM emissions, which is required by 40 CFR 60.534(d), which states that the "approved test laboratory must also measure the first hour of PM emissions for each test run using a separate filter in one of the two parallel trains." In your request, you propose to use a third identical and independent sampling train to sample concurrently for the first hour of the PM paired train compliance testing to independently measure the first hour of PM emissions for each test run, thus avoiding the need to change filters in one of the paired trains.

Based on the information provided and as detailed below, we are approving your request to use ASTM E3053-18 as the alternative cord wood test method when conducting certification testing as required by Subpart AAA, section 60.534(a)(2), on the VcV 2.1.5 Series room heater with the modifications detailed below. We also approve your request for the modifications to ASTM E2515-11 when conducting sampling as required by 40 CFR 60.534(c) and (d) as discussed below.

When using ASTM E3053-18 as the alternative cord wood test method to certify the US2500E Series, these changes and modifications must be made:

1. Section 3.2.3 - Additional requirements:

- No square or near-square fuel pieces are allowed. A variety of test fuel piece shapes in each load is allowed.
- The top of any trapezoidal shaped piece may not be greater in dimension than 70% of the base dimension of the trapezoid.

2. Sections 3.2.6 and 8.4.2.8 - Modification to the requirements:

- Fuel length must represent 80% to 95% of the longest length of the usable firebox volume. This represents a range of 17.0 inches to 20.187 inches. Your request stated that you will use a fuel length of 18 inches, which represents 84.70% of the longest firebox dimension of 21.25 inches for all testing. You must use the above criteria of 80% to 95% of the longest firebox length of 21.25 inches resulting in test fuel length of 17.0 inches to 20.187 inches. No piece shorter than 17 inches may be used for testing, and no piece longer than 20.187 inches may be used for this

testing. The average length of all fuel pieces used in each test load must meet or exceed 17.00 inches. **Your declared piece length of 18 inches meets these criteria.**

- All test fuel used must be the same nominal length ± 0.5 inches.
- **There will be no additional ± 1 inch allowance to the nominal length as stated in the ASTM method, so your 18-inch pieces must have actual lengths between 17.5 inches and 18.5 inches.**

3. Sections 8.1.4, 8.1.5, 8.1.6 and 8.1.7 - Additional requirements:

- 50 hours of pre-conditioning will be conducted on the stove at multiple burn rates (high, medium, and low). Pre-conditioning will be done by Myren Consulting, Inc.
- Pre-conditioning data will include all fuel parameters (species, moisture content, piece and load weights, number of pieces and the length of the fuel pieces used), air settings used, time spent at each air setting phase and amount of fuel burnt at each air setting.
- Pre-conditioning fuel piece length may not be the same length (18.0 ±0.5") as the test fuel pieces.
- Photos of the air settings used for pre-conditioning of the appliance will be provided in the test report with the Pre-conditioning data.

4. Overall firebox dimensions and useable firebox dimensions are provided in Appendix A. There is no difference between the Overall and Useable firebox dimensions. The useable firebox dimensions will be illustrated in the Owner's Manual with instructions to the end user for appropriate fueling/ loading. A copy of these proposed instructions is available in Appendix B.

- The overall firebox volume (OFV) and useable firebox volume (UFV) will be reported in the test report and will agree with the dimensions and volumes stated in Appendix A in this ATM.
- The fuel load density/ weights will be based on the useable firebox volume (UFV) listed below.
- VcV 2.1.5 useable firebox volume (UFV) is 2.176 ft3.
    - See Appendix A for UFV drawings and calculations.
    - There is no difference between the UFV and OFV, so the volume is the same, 2.176 ft3.
    - See Appendix A for the OFV drawings and calculations. Since the volumes are the same, the dimensions and calculations are the same.

5. The allowable fuel species specified in ASTM E3053-18 according to Figure 2 "Specific Gravity of Commercially Imported Species of Wood Based on Oven-Dry Weight and Oven-Dry Volume" can be used for certification testing.

- If test fuel pieces have adhered bark, the bark will not be removed. If a fuel piece must be split to "make weight," the fuel piece will be split in such a way as to minimize bark loss, i.e., lengthwise along a side without bark.

6. All fuel pieces will be air dried to achieve the target moisture range for the test fuel.

7. Emissions will be measured and reported for all start-up/high fire test runs.

- First hour emissions will be reported for every test run.
- (PM sampling) trains will not be disassembled until after a post-test leak check is performed.
- The blower on the VcV 2.1.5 model line is manually operated and will immediately be engaged on the highest setting as soon as the fuel is loaded and the door (1st) and catalytic bypass (2nd) are closed during a High burn test run segment. The blower will not be engaged during the Kindling/ Start-up Cold Start (K/S) segment of a High burn test run.

8. The High burn test wet fuel load weights will be between 21.760 and 22.848 lbs. (2.176 ft3 (UFV) * 10.0 lbs./ ft3 = 21.760 lbs., (21.760 lbs. + (21.760 * 0.05) = 22.848 lbs.)

- The Medium and Low burn test wet fuel load weights will be between 26.112 and 27.416 lbs. 2.176 ft3 (UFV) * 12.0 lbs./ft3 = 26.112 lbs., (26.112 lbs. + (26.112 lbs. * 0.05)) = 27.416 lbs.)

9. **All** of the manufacturer's and/or consultant's instructions to the test lab will in writing and will be included in the test report.

- We propose to use a top-down start with all the kindling and start-up fuel loaded in the firebox before ignition. General guidance will be provided on the number of pieces to be used as start-up fuel and kindling, their approximate length and number of layers for the kindling and start-up fuel. (See Appendix C for proposed kindling and start-up fuel instructions.)

10. Since the longest dimension for both the overall and useable firebox is the same at 21.25", measured N/S parallel to the firebox side walls, we propose to load the stove N/S. The fuel pieces will be loaded onto a nominally level coal bed.

- The fuel pieces will be stacked N/S, one on top of another, as per the Operating Instructions. Angling will only be allowed in order to get the fuel pieces to fit.

11. All fuel load adjustments as per sections 8.5.9.5(1) and (2) and sections 8.6.8 (1) and (2) and will be documented.

- Documentation will include photos of the fuel load before and after any test fuel load adjustment is made and the time when the adjustment is made.

12. The Primary Air Control (PAC) will be set at wide open for the entire high fire test, including the cold start kindling/ start-up fuel (K/S) segment.

- Photographs will be taken of the PAC setting used for each High burn test run.
- The amount of secondary air entering the stove will be controlled automatically by the secondary VcV (2VcV). (See Appendix D for a discussion about how the Primary VcV (PVcV) and 2VcV work.)

13. The low fire primary air control setting will be based upon the operation of the PVcV.

(1) At the start of the test, after the catalytic bypass (1st) and the door (2nd) are opened to level the coal bed and load the test fuel, the disc in the PVcV will automatically drop down to the lower stop. Once the door and bypass are opened, adjust the PAC to the wide-open setting and leave the PAC at the wide-open setting until either (1) the maximum amount of time for combustion air adjustment has elapsed or (2) 15% of the wet fuel load weight has been burnt. Then, whichever of the above comes first, close the PAC to the specified run setting (i.e., push the PAC rod all the way in so that the slider plate hits the "Stop.") The lowest heat output of the VCV equipped stove is typically below 1.0 kg/hr, and often below 0.8 kg/hr. The bottom stop on the Primary (PVCV) is set so the disc in the PVCV pops up when the static pressure in the chimney reaches a certain level. A slow start will result in a longer burn time and dry burn rate (DBR) and a fast start will result in a faster DBR. At the end of the allowable start/fuel load time, if the static pressure is not above the set amount, the PVcV disc will stay down until the required static pressure is achieved, thus eliminating the possibility of a start with excess emissions. If there is enough static pressure in the stack, the PVcV disc should "pop up" soon/ immediately after the PAC is closed. Note: When the PVcV is down, the Primary air control (PAC) is basically set at wide open allowing plenty of air to ignite test fuel load. A difference in start times can be caused by wood piece size, fuel load configuration when loaded, wood moisture, and power in the coal bed etc.

(2) Once the PVcV disc is at the top stop, the disc in the PVcV should remain at the top stop for the remainder of the test run, or, if the static pressure drops below a certain level, the disc may "float in the bore" of the PVcV, allowing a bit more air to enter the stove which causes the burn rate and static pressure to increase, which will cause the PVcV disc to go back up to the top stop. The Operating Instructions, test report and Owner's Manual will all illustrate how to operate the PAC for a low burn.

- Photos will be taken of the set point for the PAC for low burn test run. These photos will be included in the test report.
- The amount of secondary air entering the stove will be controlled automatically by the 2VcV.
- The blower on the VcV 2.1.5 model line is manually operated and will be immediately engaged on the highest setting as soon as the maximum time for the combustion air control adjustment period has elapsed.

14. If the PAC is set at halfway between the lowest and highest setting as measured on the control rod, because of the way the PVcV operates, the stove will not achieve a medium dry burn rate (DBR) between (the High burn rate * 0.5) and (the Low burn rate * 1.3.) (i.e., the DBR will be greater than the high burn DBR * 0.5). Therefore, the Operating Instructions provided to the test lab will stipulate how to operate the PAC and obtain a Medium burn with a DBR between the (High burn rate * 0.5) and the (Low burn rate * 1.3). This setting will be something like "the stop plus ¼", which means the PAC will be set so that a small amount of extra primary air (1/4") will enter the stove once the PVcV is at the top stop.

- Photos will be taken of the set point for the PAC for medium test run. These photos will be included in the test report.
- The amount of secondary air entering the stove will be controlled automatically by the 2VcV.
- Due to the instructions provided in 14(a), the provisions in ASTM E-3053 that would require retesting of the medium fire test category per section 8.8.1 do not apply.
- The blower on the VcV 2.1.5 model line is manually operated and will be immediately engaged on the highest setting as soon as the maximum time for the combustion air control adjustment period has elapsed.

15. Written Operating Instructions will be provided to the test laboratory about using a top-down start, the number and length of kindling and start-up fuel pieces, the number of layers and layering arrangement to be used (i.e., largest pieces on the bottom, smallest pieces on the top, the type of fuel to be used, how to operate the PAC for low and medium burn rates, UFV and OFV, fuel piece length, door position to be used for each test (kindling/ start-up cold start, high, medium and low burns), appliance set-up and appliance venting). (See Appendices B and C.)

- The instructions in the Owner's Manual and the Manufacturer's Written Operating Instructions will be consistent with all Certification Testing Procedures.
- All fuel loading and door operating procedures provided to the test lab in the Written Operating Instructions will be included in the Owner's Manual.

16. Clear and representative photos with legible writing will be included in the test report when and where required.

- A close-up photo of the cross-sectional area of each fuel load will be included in the test report.
- Photos of the complete test installation including venting and front, L side, Back and R side views will be included in the test report.
- A photo of the empty firebox will be included in the test report.
- A photo of the kindling and start-up fuel before it is placed in the stove will be included in the test report.
- A photo of the kindling and start-up fuel in the firebox before ignition will be included in the test report.
- Photos of the residual kindling and start-up fuel before and after raking (leveling) will be included in the test report.
- Photos of each test fuel load before and after it is placed in the firebox will be included in the test report.
- Photos of the residual high burn fuel loads before and after raking (leveling) will be included in the test report.
- If a fuel load adjustment is made, a description of the adjustment and before and after adjustment photos will be included in the test report.
- Photos will be taken of the PAC setting used for each test run and included in the test report.

17. All rounding will follow the information found in EPA Technical Information Document 024, except for those instances where said rounding would result in a number that would exceed an allowable criterion in the test methods. For example, if a fuel load weighs 19.8 lbs., the upper 20% limit of the coal bed would be 2.96 lbs., which would round to 3.0 lbs. using the criteria in 024. Instead, we propose to use what is now known as "EPA Rules of Rounding," which would require that the 2.96 be rounded to 2.9 to stay within the 20% spec in sections 8.5.8 or 8.6.4. These "EPA Rules of Rounding" have been in effect since the late 1980's.

18. All coal beds shall be basically a "level" plane for all test runs. These coal beds will be documented with photos. Additional information about coal beds may be found in the Manufacturer's Written Operating instructions.

When using ASTM E2515-11 to conduct testing as required by 40 CFR 60.534(c) and (d) these changes and modifications must be made:

1. The dilution tunnel flow rate will be maintained to keep the Tunnel temperature below 125 degrees F, excluding periods when the appliance door is open.

- The dilution tunnel flow rate will be maintained to keep the tunnel temperature 10-minute rolling averages below 104 degrees F, excluding periods when the appliance door is open. Two exceedances are allowed of the 10-minute rolling average data points in each test run.
- Except when the appliance door is open, and based upon 1-minute readings, the tunnel relative humidity (%RH) must be kept below 90% at 80 degrees F.
- Optionally, real time tunnel dewpoint temperature measurements made at a minimum rate of one reading per minute can be used to override the maximum tunnel temperature requirement of (125 degrees F maximum and 104 degrees F on a 10-minute rolling average). One-minute dewpoint temperature measurements in the dilution tunnel must be below the 1-minute ASTM E2515-11 filter temperature measurements. If there is an exceedance of the tunnel dew point temperature above the ASTM E2515-11 filter temperature, then the test run is invalid and must be repeated.
    - Or, alternatively, the tunnel relative humidity may be measured and recorded every 2 minutes using a psychrometer to measure the wet bulb temperature in the dilution tunnel. These measurements are to be based upon ASTM E0377-15, *Standard Test Method for Measuring Humidity with a Psychrometer*.
- With respect to ASTM E2515-11 section 9.2.2, you are excluded from the following requirement: "The maximum tunnel flow rate shall not exceed five times the minimum flow rate as shown in 9.2.4."

2. Filter temperatures will be maintained between 80 and 90 degrees F during testing.

- Filters will be weighed in pairs, both pre- and post-test, to reduce weighing error propagation errors. **You must follow the guidance in ALT-154 for this procedure.**

- Sample filters must be Pall TX-40, or equivalent Teflon-coated glass fiber filters, and 47, 90, 100 or 110 mm in diameter.
- Only one point per sampling train is allowed outside the +/-10 percent proportionality range per test run.
- Non-desiccated post-test filter weights must be taken within an hour after the post-test leak check. These initial weights will be included in the test report.
- Oven drying desiccation, at any temperature, is not allowed.
- Dual train precision comparison (precision) must be calculated in terms of percent difference between the two sample trains in term of percent difference between the two sample trains and in terms of calculated emissions difference on a g/kg basis. Both values will be clearly reported for each test run in the test report.
- Negative filter weights must be discussed in the test report. Where negative mass (i.e., filter material left on the O-rings and gaskets, or on frits if filters larger than 47 mm are used), is subtracted from the overall PM mass, the resultant catch must be reported with the mass subtracted and with the mass not subtracted for comparison purposes.

3. Ambient background sampling and filter collection must be conducted per ASTM E2515-11 section 4.3 and all other method specific room air sampling requirements.

4. Particulate matter emission concentrations must be measured with ASTM E2515-11 with the following exceptions.

- Post test mandatory leak checks of each sampling train will be conducted at the conclusion of each sampling run before sample recovery. Each leak check will be performed in accordance with the procedures stipulated in ASTM E2515-11, section 9.6.4.1, except that a leak check must be conducted at a vacuum equal to or greater than the maximum vacuum measured during the sampling run. If the leakage rate is found to be no greater than 0.0003 m3/min (0.01 cfm) or 4% of the average sample rate (whichever is less), the leak check results are acceptable. If a higher leakage rate is obtained, the sampling run is invalid.
- Additionally, if a component change (e.g., filter assembly) is needed in any sampling train during a test run, then a leak check must be conducted on that sampling train immediately before the change is made. Record the sample volume before and after each leak check. The leak check sample volume will not be included in the total sample volume for that sampling train. These leak checks must be done according to the procedures outlined in ASTM E2515-11, section 9.6.4.1, except that each leak check must be done at a vacuum equal to or greater than the maximum vacuum measured during the sampling run. If the leakage rate is found to be no greater than 0.0003 m3/min (0.01 cfm) or 4% of the average sample rate (whichever is less), the leak check results are acceptable. If a higher leakage rate is obtained, the sampling run is invalid. **It is acceptable when using a valve tree as described in Appendix E of your ATM request to perform the post leak filter check of each filter set used during testing after testing has been completed; however, if any of the tubing within the valve tree system leaks the test run will be invalidated.**

- If a component change is made, a post-change (pre-use) leak check is optional, but highly recommended. If such leak checks are done, the post-test leak check procedures referenced above shall be used.

When using ASTM E2515-11 to conduct first hour PM sampling as required by section 60.534(d), these changes and modifications must be made:

1. To determine the first hour PM emissions as required by section 60.534(d), the manufacturer and approved test laboratory must measure the first hour of PM emissions for each test run by sampling with a third identical and independent sampling train operated concurrently for the first hour of PM paired train compliance testing. The manufacturer and approved test laboratory must report the test results from this third train separately as the first hour emissions. Filters must be recovered and weighed as a paired set.

All other requirements of ASTM E3053-18 and ASTM E2515-11 must be followed during the testing, and all requirements of 40 CFR part 60, Subpart AAA must be satisfied and described in your test report.

This approval is based on the understanding that the lowest heat output (Btu/hr) setting on the VcV 2.1.5 Series room heater available to the user will correspond to the lowest burn rate to be evaluated during certification testing and the test report will fully document that the certification testing was conducted as such. This is consistent with section 60.534(a)(1) of Subpart AAA, which states, "the burn rate for the low burn category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer."

This alternate test method approval REPLACES the Alternate Test Method request originally approved for this appliance model on January 4, 2016. As of the date of this letter, the January 4, 2016 alternative approval is no longer valid and may not be used for compliance testing purposes. A copy of this letter must be included in any certification test report where this alternative test method determination is utilized.

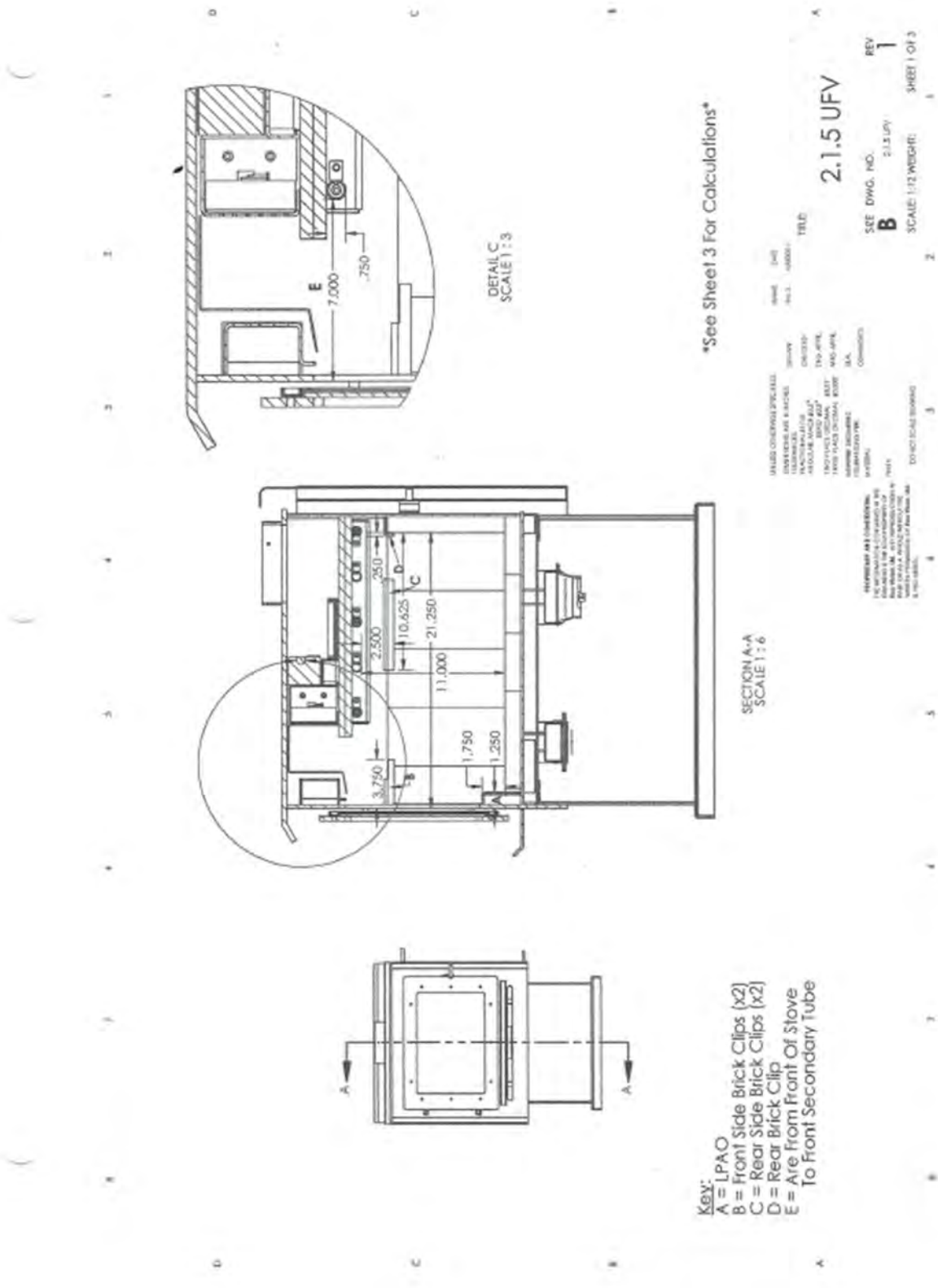
If you have additional questions regarding this approval, please contact Mike Toney of my staff at 919-541-5247 or *toney.mike@epa.gov.*

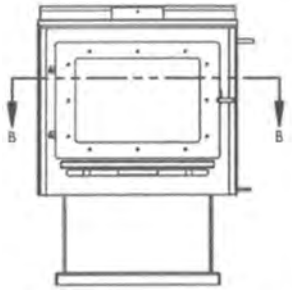
Sincerely,

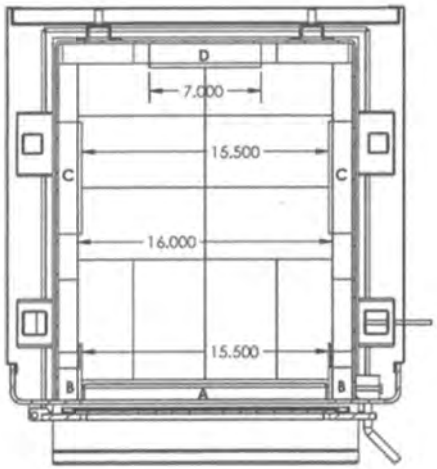
Steffan M. Johnson
Group Leader
Measurement Technology Group

cc: Shannon Banner – EPA/OAQPS/SPPD
James Hemby – EPA/OAQPS/AQAD
Rafael Sanchez – EPA/OECA
Bill Schrock - EPA/OAQPS/SPPD
Robert Scinta – EPA/OECA
Michael Toney – EPA/OAQPS/AQAD
Mark Turner – EPA/OAQPS/SPPD
Chet Wayland – EPA/OAQPS/AQAD

APPENDIX – DRAWINGS and DIAGRAMS







SECTION B-B
SCALE 1 : 6

Key:
A = LPAO
B = Front Side Brick Clips (x2)
C = Rear Side Brick Clips (x2)
D = Rear Brick Clip

See Sheet 3 For Calculations

UNLESS OTHERWISE SPECIFIED:
DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:

TITLE:
2.1.5 UFV

SIZE DWG. NO. REV
B 2.1.5 UFV 1

SCALE: 1:12 WEIGHT: SHEET 2 OF 3

2.1.5 UFV Calculations

21.250 (d) x 16.00 (w) x 11.00 (h) = 3740.00 cu. in.

E = 7.00 (d) x 16.00 (w) x 0.75 (h) = 84.00 cu. in.

Less:

A - 1.25 (d) x 16.00 (w) x 1.75 (h) = 35.00 cu. in.

B - (3.75(d) x 0.25 (w) x 4.00 (h))2 = 7.50 cu. in

C - (10.625 (d) x 0.25 (w) x 2.50 (h))2 = 13.281 cu. in.

D - 0.25 (d) x 7.00 (w) x 2.50 (h) = 4.375 cu. in.

3740.00 + 84.00 = 3824.00 cu. in.

35.00 + 7.50 + 13.281 + 4.375 = 63.156 cu. in.

3824.00 - 63.156 = 3760.844 cu. in

3760.844/1728= 2.176 cu. ft.

UFV = 2.176 cu. ft.

Key:
A = LPAO
B = Front Side Brick Clips (x2)
C = Rear Side Brick Clips (x2)
D = Rear Brick Clip
E = Area From Back Side Of Air Wash
To Front Secondary Tube

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF Eco Vision Ltd. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF Eco Vision Ltd. IS PROHIBITED.
DO NOT SCALE DRAWING

TITLE
2.1.5 UFV

SIZE DWG. NO. REV
B 2.1.5 UFV 1

SCALE: 1:12 WEIGHT: SHEET 3 OF 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Ken Morgan
Technical Services Director
OMNI-Test Laboratories, INC
Post Office Box 301367
Portland, Oregon, 97294

01/21/2025

Dear Mr. Morgan,

This letter is a modification of my original response letter dated December 13, 2024. This modification is made to include approval to use this alternative 40 CFR part 60, Subpart QQQQ - Standards of Performance for New Residential Hydronic Heaters and Forced-Air Furnaces (Subpart QQQQ). The approval to also use this alternative on central heaters under Subpart QQQQ should have been included in the original response letter. These letters are written in response to your emails and letter dated November 20, 2023, requesting that the Environmental Protection Agency approve for use an alternative test method (ATM) for demonstrating compliance with New Source Performance Standard (NSPS) Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA). Specifically, the filter weighing procedures as outlined in ASTM E2515-11 to determine compliance for wood heaters under 40 CFR Part 60. The Office of Air Quality Planning and Standards, as the delegated authority, must make the determination on any major alternatives to test methods and procedures required under 40 CFR parts 59, 60, 61, 63, and 65. Your proposed alternative test method and our approval decisions are discussed below.

Your letter outlines concerns with the gravimetric analysis of the pair of filters used to capture particulate during each compliance test. Specifically, you state that the method suggests that weighing filters and filter assemblies in pairs will reduce measurement error, but that the method provides direction inconsistent with achieving error reduction.

As detailed in your letter ASTM E2515-11 section 9.4.4 states:

> *"9.4.4 Desiccate the filters, filter gaskets, and the probe assemblies at 20 +/- 5.6°C (68 +/- 10°F) and ambient pressure for at least 24 h. Weigh each component at intervals of not less than 6 h until a constant weight is achieved. Record results to the nearest 0.1 mg. During each weighing, the period for which the components are exposed to the laboratory environment shall be less than 2 min. The filter gaskets can be weighed in sets to be used in each filter holder and kept in an identified container at all times except during sampling and weighing. The filter holder assembly after the front filter need not*

be desiccated or weighed."

As shown above, section 9.4.4 states that "…the filter gaskets may be weighed in pairs", however it does not say that you may do so for the filter tares.

In contrast, section 10.2.1 of ASTM E2515-11 states:

> *"10.2.1 Desiccate the filters and filter gaskets at 20 +/- 5.6°C (68 +/-10°F) and ambient pressure for at least 24 h. Weigh each component at intervals of at least 6 h until a constant weight is achieved. Report the results to the nearest 0.1 mg. Filters and filter gaskets may be weighed directly without a Petri dish. They may be weighed in pairs (front and back filters and front and back filter gaskets from same filter train) to reduce handling and weighing errors. During each weighing, the components shall not be exposed to the laboratory atmosphere for longer than 2 min. For the room air background sample filter and filter gasket, treat negative particulate catch weights as "zero" when determining total room air particulate weight in accordance with 10.2."*

Additionally, you point out that section 10.2.1 allows, during post-test analysis, the filters to be weighed in pairs. You also assert that not only does this section state that filters may be weighed in pairs, but it also expresses that it is advantageous to do in order to reduce handling and weighing errors.

Furthermore, during our recent discussions of this issue, you pointed out that since ASTM E2515-11 does not specify that filters may be weighed in pairs during pre-test processing, doing so would likely lead to concerns regarding whether proper procedures were being followed. Also,in response to our inquiry of whether ASTM E2515-11 could be followed as written, where one would weigh both filters independently during pre-test processing (clause 9.4.4) and in pairs during post-test processing (section 10.2.1), you point out that this defeats the intent of section 10.2.1 in that more measurements are being performed than necessary and this goes against the stated intent of reducing handling and weighing errors.

It is your opinion, given the language in ASTM E2515-11 discussed above, that the authors originally intended that both filter gaskets and filters should be weighed in pairs during both pre-test and post-test procedures in order to reduce such errors (as evidenced by the language in section 10.2.1). Based on this, you are asking for consideration and approval of an alternative test method that would allow pre-test processing (taring) of filters in pairs as is currently allowed for filter gaskets in section 9.4.4. As you state, you seek this alternative because the errors imposed by the extra weighing of independent filters can account for a very high degree of error on today's cleaner stoves where a ±0.1 mg of measured catch can mean ± 0.2 grams of emissions under ordinary conditions. In light of these circumstances, we agree that appropriate paired weighings must be done during both pre and post test weighings.

We have reviewed your request to perform the pre-test processing (taring) of filters in pairs as is currently allowed for filter gaskets in section 9.4.4 when conducting testing testing of wood heaters under Subpart AAA. Because of the similarities in the requirements, we are also approving this alternative for use on central heaters under Subpart QQQQ. This approval is contingent on the following conditions:

- All of the pieces of the filter and filter assemblies that are tared together during pre-test assessment must also be weighed together when the post-test gravimetric assessment is made and the results of these assessments must be recorded to the nearest 0.1 mg. Please note that this alternative method approval is valid until such time that Subpart AAA and QQQQ are revised or replaced to require a different certification method, and at such time, this alternative will be reconsidered and possibly withdrawn. A copy of this letter must be included in each certification test report where this alternative test method is utilized.

Since this alternative test method may be of interest to others performing testing as described in ASTM2515-11 on wood heaters subject to 40 CFR 60, Subpart AAA or central heaters subject to Subpart QQQQ, we believe it is reasonable to make it broadly applicable. Therefore, we will post this letter as ALT-154 on the EPA website at *https://www.epa.gov/emc/broadly-applicable-approved-alternative-test-methods* for use by other interested parties.

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: Shannon Banner, EPA/OAQPS/SPPD
Lessard, Patrick, EPA/OAQPS/SPPD
Rafael Sanchez, EPA/OECA
Robert Scinta, EPA/OECA
Michael Toney, EPA/OAQPS/AQAD
Mark Turner, EPA/OAQPS/SPPD
Richard Wayland, EPA/OAQPS/AQAD

Appendix B: Labels & Manuals

CAUTION: HOT WHILE IN OPERATION. DO NOT TOUCH. KEEP CHILDREN AND CLOTHING AWAY. CONTACT MAY CAUSE SKIN BURNS. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIAL FAR AWAY FROM THE APPLIANCE. SEE NAMEPLATE AND INSTRUCTIONS.

MISE EN GARDE: CHAUD EN FONCTIONNEMENT NE TOUCHEZ PAS, GARDEZ LES ENFANTS ET LES VÊTEMENTS À L'ÉCART. LE CONTACT PEUT CAUSER DES BRÛLURES DE LA PEAU. GARDER L'AMEUBLEMENT ET AUTRES COMBUSTIBLES MATÉRIEL LOIN DE L'APPAREIL. VOIR PLAQUE NOM ET INSTRUCTIONS.

PFS C US

Report Number: 22-282

UL 1482-2022
CAN/ULC-S627:2023
Mobile Home Approved

U.S. ENVIRONMENTAL PROTECTION AGENCY: Certified to comply with 2020 particulate emission standards using cord wood. Tested to ASTM E3053-17, Certified Emissions Value: 1.3 g/hr.

SERIAL / EN SÉRIE #

Model / Modèle CHINOOK VCV 2.1.5

PREVENT HOUSE FIRES

Install and use only in accordance with manufacturer's installation and operating instructions. Contact local building or fire officials about restrictions and installation inspections in your area.
Do not obstruct the space beneath heater.

Inspect and clean chimney frequently - Under Certain Conditions of Use, Creosote Buildup May Occur Rapidly. Do not connect this unit to a chimney serving another appliance. Do not use a grate or elevate fire. Build wood fire directly on hearth.

DANGER: Risk of electrical shock. Disconnect power supply before servicing.

Replace glass only with 3/16 in. Neo-Ceram available from your dealer.
Do not overfire - if heater or chimney connector glows, you are overfiring.
OPERATE ONLY WITH DOORS CLOSED

Do **NOT** operate before fully assembling components. **WARNING**: Only use approved fuel listed in owners manual.

Follow cleaning procedures in the manual carefully.

DO NOT OBSTRUCT THE SPACE BENEATH THE HEATER.

PRÉVENTION DES INCENDIES DE MAISON

Installer et n'utiliser qu'en conformité avec du fabricant installation et mode d'emploi. Contact local fonctionnaires de bâtiment ou d'incendie sur les restrictions et inspection des installations dans votre région.
Ne pas obstruer l'espace sous le chauffe-eau.

Inspecter et nettoyer la cheminée fréquemment - Sous Certain Conditions d'utilisation, l'accumulation de créosote peut se produire rapidement. Ne pas connecter cette unité à une cheminée desservant une autre appareil. N'utilisez pas de grille ni de feu surélevé. Faire un feu de bois directement sur foyer.

DANGER: Risque de choc électrique. Déconnecter l'alimentation fournir avant l'entretien. Remplacer la vitre seulement avec 3/16 po de Neo-Ceram disponible de votre revendeur.
Ne pas surchauffer - si le chauffage ou le connecteur de cheminée brille, vous êtes surfait.
FONCTIONNER UNIQUEMENT AVEC LES PORTES FERMÉES

Ne **PAS** utiliser avant d'assembler complètement les composants.
AVERTISSEMENT: N'utilisez que du carburant approuvé répertorié dans les propriétaires manuel.

Suivez les procédures de nettoyage du manuel attentivement.
Le poêle a des pieds amovibles. Ne jamais installer le poêle sans jambes attachées. Reportez-vous au manuel du propriétaire.
NE PAS OBSTRUER L'ESPACE SOUS LE RADIATEUR.

VENT SPECIFICATIONS:

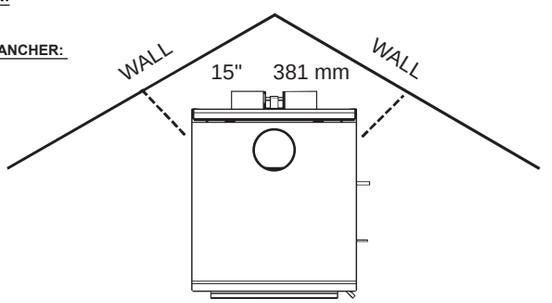
SINGLE WALL: 6 in (6 inches) (152 mm) diameter, minimum 24 MSG black or blued steel connector pipe, with a listed factory-built UL103HT* Class "A" chimney, suitable for use with solid fuels, or a masonry chimney, and the referenced clearances.
DOUBLE WALL: 6 inch (6 inches) (152 mm) diameter, Class "A" chimney, or a masonry chimney and the referenced clearances.

SPÉCIFICATIONS DE VENTILATION:

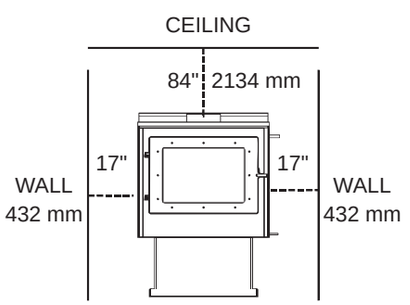
MUR SIMPLE: 6 po (6 po) (152 mm) de diamètre, Tuyau de raccordement en acier au moins 24 MSG noir ou bleui, avec une classe UL103HT * classée en usine, classée "A" cheminée, utilisable avec des combustibles solides, ou une maçonnerie cheminée, et les dégagements référencés.
DOUBLE MUR: 6 pouces (6 pouces) (152 mm) de diamètre, systèmes de ventilation à basse température "A" cheminée, ou une cheminée en maçonnerie et le espaces libres référencés.

FLOOR PROTECTION:
None Required

PROTECTION DE PLANCHER:
Aucun Requis



MIN CLEARANCES TO COMBUSTIBLE MATERIALS: Inches & (Millimeters)



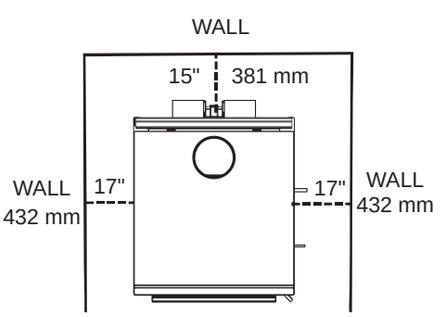
Front View Floor Installation

CAUTION: Hot Parts.

Do Not Operate Unit with Shield Removed.

A non combustible floor protector must be used if mounting the stove on the floor. See Clearances on this decal. Listed factory-built Class "A" chimney, or a masonry chimney. Maximum depth of Alcove shall be no more than 48 inches (1219mm) with a minimum height of 84.0 inches (2134mm) from floor to bottom of ceiling and the referenced clearances.
(**In Canada must comply with Standard CAN/ULC-S629-M87 for the 650°C Factory-built chimney.)

PETITS DÉGAGEMENTS AUX MATÉRIAUX COMBUSTIBLES: Pouces & (Millimètres)



Top View Floor Installation

ATTENTION: Pièces chaudes.

Ne pas utiliser l'unité avec le bouclier retiré.

Un protecteur de sol incombustible doit être utilsé si le poêle est monté sur le sol.
Voir les dégagements sur cet autocollant.
Cheminée de classe «A» construite en usine une cheminée de maçonnerie. La profondeur maximale de l'alcôve ne doit pas dépasser 1219 mm (48 po) avec un minimum de hauteur de 84,0 pouces (2134 mm) du plancher au plafond et des dégagements référencés.
(** Au Canada doit être conforme à la norme CAN / ULC-S629-M87 pour la cheminée de 650°C fabriquée en usine.)

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.

Ce poêle à bois a besoin d'une inspection et d'une réparation périodiques pour fonctionner correctement. Consultez le manuel du propriétaire pour plus d'informations. C'est contre le fédéral règlements pour faire fonctionner ce poêle à bois d'une manière incompatible avec instructions d'utilisation dans le manuel du propriétaire.

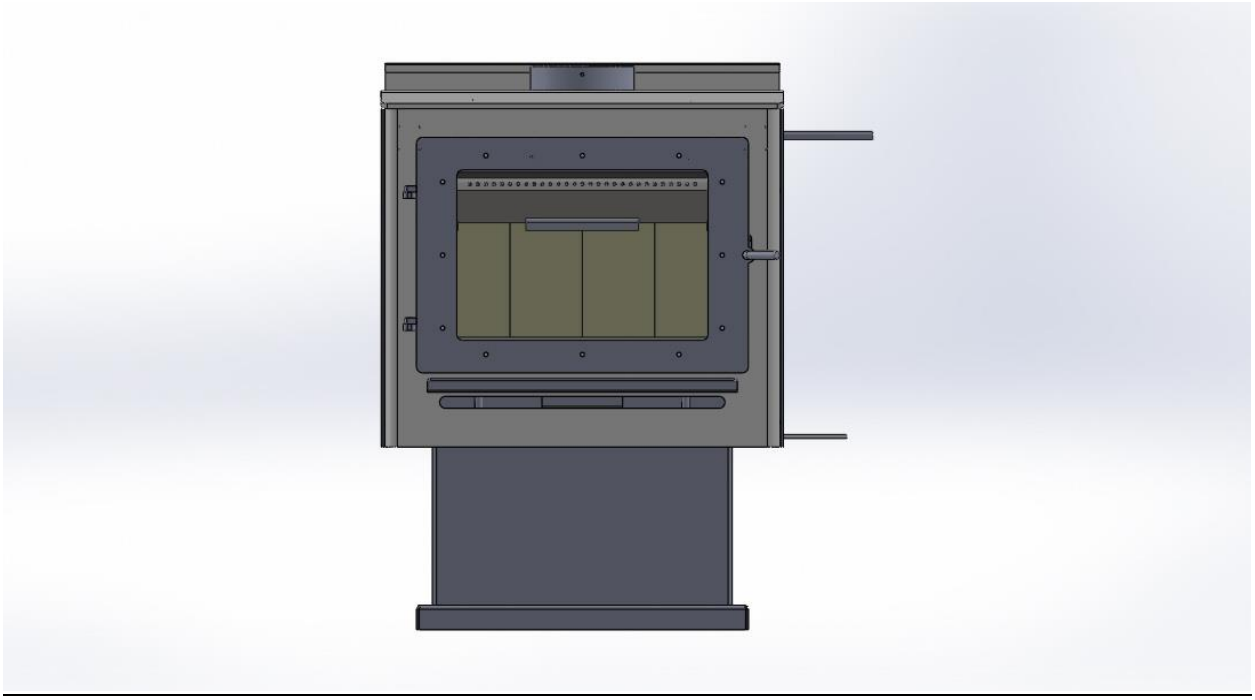
FLAME INNOVATION®

Manufactured by:
509 Fabrication, Inc.
dba Flame Innovation
6512 W. Seltice Way
Post Falls, ID 83854
509-993-3767
Info@509Fab.com

2025 2026 2027 2028 2029 2030 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER CETTE ÉTIQUETTE

FLAME INNOVATION



Model: Chinook

VCV 2.1.5

Chinook VCV 2.1.5 Wood Stove Installation and Operation Manual
EPA / UL/ CSA Mobile Home Approved in USA and Canada

UL 1482-2022 CAN/ULC-S627:2023 Project # 24-282

Manuel en français Disponible sur FlameInnovation.com en bas de la première page.

Chinook VCV 2.1.5 Wood Stove Installation and Operation Manual

EPA / UL/ CSA Mobile Home Approved in USA and Canada

Room Heater, Solid Fuel Type, Also for Use in Mobile Homes

This Stove needs to be installed with the correct stove pipe, as tested, and listed in this manual. Failure to do so will VOID the Warranty on this stove.

ASTM E 3053 Weighted Averages			
PM Emission Rate - g/h	1.29		
CO Emissions Rate - g/h (Arithmetic Average)	37.7		
CO Emissions Rate - g/min (Arithmetic Average)	0.6		
Overall Efficiency - CSA B415.1-10			
% HHV Basis	79%		
% LHV Basis	85%		
Heat Output Range - Btu/h	9800	to	36400

Manufactured By Flame Innovation
509 Fabrications, Inc.
dba: Flame Innovation
6512 W. Seltice Way
Post Falls, ID 83854

info@509Fab.com Proudly Made in the USA

Rev. 3.0 08/2025

Disclaimer: All Wood stoves burn differently in how they are controlled, Type and BTU content of wood used, capacity of the fire box etc.

CALIFORNIA PROPOSITION 65 WARNING: This product can expose you to chemicals including benzene, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information: www.P65Warnings.ca.gov

This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood

heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed.

CAUTION: This unit must be installed in accordance with these instructions and must comply with local building and fire codes. Failure to do so could result in a chimney or house fire. Keep children, furniture, fixtures, and all combustible materials away from any heating appliance. Refer to this owner's manual for all clearances to combustible materials.

SAVE THESE INSTRUCTIONS

ANY AND ALL SAFETY PRECAUTIONS MUST BE TAKEN AT ALL TIMES DURING OPERATION AND MAINTENANCE OF YOUR STOVE. Read this entire manual before you install and use your new room heater. If this heater is not properly installed, a structure fire may result. To reduce the risk of fire, follow the installation instructions. Failure to follow instructions may result in property damage, bodily injury, or even death.

CAUTION: Stove is heavy (480 lbs.) In addition, when handling any sheet metal products, be aware that there may be sharp edges or burrs on the edges of the metal. Although we make every effort to eliminate any sharp edges, please use caution when handling any metal parts. Remember to always allow the stove to completely cool down before performing any maintenance.

CAUTION: If you have any doubt concerning your ability to complete your installation in a professional-like manner after reading these instructions, you should obtain the services of an installer who is versed in all aspects as to the correct and safe installation. Do not use temporary, makeshift compromises during installation.

Precautionary Statements

509 Stoves highly recommends the use ***of Smoke Detectors and Carbon Monoxide*** detectors with any hearth product, including this unit. Follow all manufacturer's instructions when using smoke or Carbon Monoxide detectors. DO NOT INSTALL THIS STOVE IN A SLEEPING ROOM

CAUTION ***ONCE AGAIN PLEASE READ AND FOLLOW.*** If you have any doubt concerning your ability to complete your installation in a professional-like manner after reading these instructions, you should obtain the services of an installer who is versed in all aspects as to the correct and safe installation. Do not use temporary, makeshift compromises during installation.

WARNING: THINGS TO REMEMBER IN CASE OF A CHIMNEY FIRE: 1. CLOSE DRAFT CONTROL 2. CALL THE FIRE DEPARTMENT

BEFORE INSTALLATION OF YOUR APPLIANCE

HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPTHA, OR ENGINE OIL.

1. Check with the building inspector's office for compliance with local codes; a permit may be required, even though this is a recreational stove.
2. A 6" diameter flue is required for proper performance. Minimum Height of stack 8ft. (Will vary with the Elevation where the stove is installed, you may need more chimney)
3. Always connect this unit to a chimney and NEVER vent to another room or inside a building.
4. DO NOT connect to any duct work to which another appliance is connected, such as a furnace.
5. DO NOT connect this unit to a chimney flue serving another appliance.
6. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
7. The connector pipe and chimney should be inspected periodically and cleaned if necessary.
8. Remember the clearance distances when you place furniture or other objects within the area. DO NOT store wood, flammable liquids or other combustible materials too close to the unit.
9. Contact your local fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire. In the event of a chimney fire, turn air control to a closed position and CALL THE FIRE DEPARTMENT.
10. DO NOT tamper with the combustion air control beyond normal adjustment.
11. Once the required draw is obtained, operate only with door closed; open feed lid slowly when refueling.
12. Clean the stove glass before lighting the stove.
15. Visit our web site at FlameInnovation.com or call us at 509-993-3767 or 208-660-3109

ALWAYS PROVIDE A SOURCE OF FRESH AIR INTO THE ROOM WHERE THE UNIT IS INSTALLED. FAILURE TO DO SO MAY RESULT IN AIR STARVATION OF OTHER FUEL BURNING APPLIANCES AND THE POSSIBLE DEVELOPMENT OF HAZARDOUS CONDITIONS.

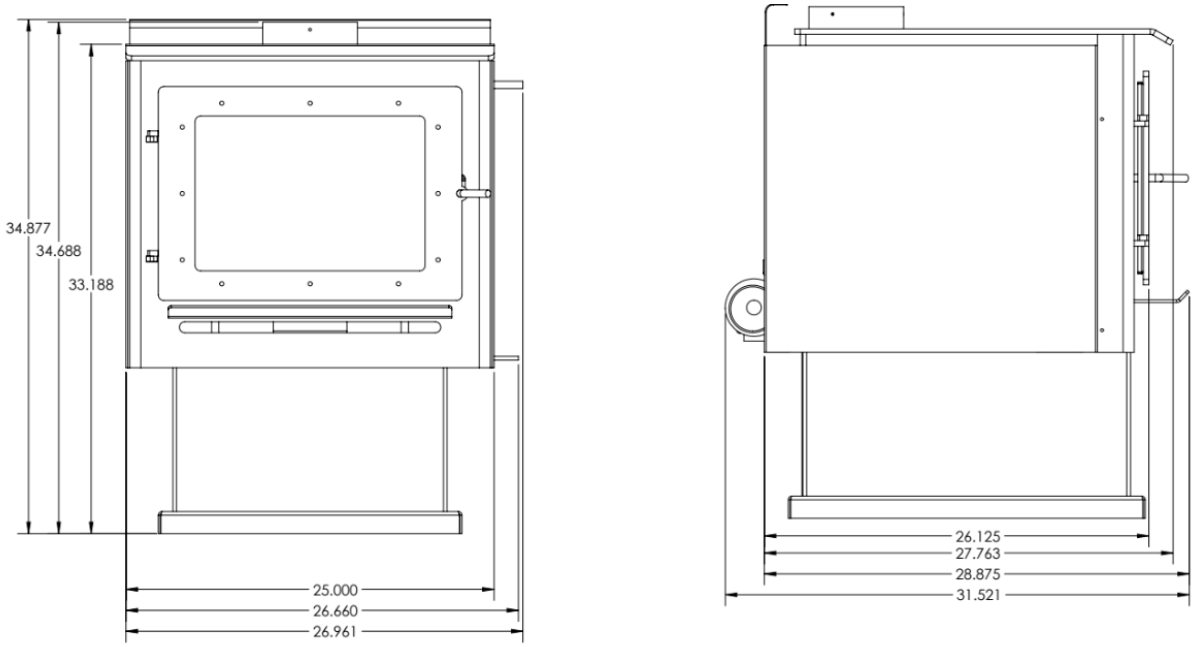
Note on Outside Air Hookup: We highly recommend outside combustion air. This involves connecting an aluminum flex pipe (usually three inches (4") in diameter from the air inlet opening located on the back of the stove and using an adapter through your floor or wall. The outside end of this pipe should be covered in some manner (i.e. with a screen) to keep it clear of foreign matter. Be sure to keep it above the snowdrift line and clear of leaves and other debris.

NOTE: INSTALL TAKING ALL PRECAUTIONS AND TEST YOUR CLEARANCE TO COMBUSTIBLES AFTER INSTALL TO MAKE SURE SURFACES AROUND THE STOVE DO NOT GET HOT!!!

FIRST FIRE/ VERY IMPORTANT

Remember to ventilate well. Allow the stove to cure, making several small fires before burning for long periods of time at high temperatures. Flat spots on the painted surface are normal. Shiny spots on the painted surface (before burning) are normal. SMALL FIRES OF 8 TO 10 INCHES IN DIAMETER.

1.Do not use a grate or elevate the fire inside the firebox.
2. Use only Dry (Seasoned) Wood in 16" to 18" Length and 6" wide at most.
3. When the stove is used for the first time, solvents in the paint will smoke off as the stove "cures."



INSTALLATION

THIS ROOM HEATER MUST BE CONNECTED TO:

1.) **A chimney complying with the requirements for Type-HT Chimneys in the Standard for Chimneys, Factory-Built, Residential Type and Building Heating Appliance, UL 103 or**
2.) **A code-approved masonry chimney with a flue liner.**
3.) **DO NOT INSTALL IN AN ALCOVE.**
4.) **DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATIONS.**
5.) **DO NOT INSTALL IN ANY FIREPLACE.**
6.) **Floor Protection R-2 Hearth Pad required for Mobile Home Installation.**

WARNING: DO NOT INSTALL IN A SLEEPING ROOM. IF INSTALLING IN A MOBILE HOME, THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL AND ROOF / CEILING MUST BE CHECKED AND MAINTAINED AND A HEARTH PAD MUST BE INSTALLED TO DISTRIBUTE THE WEIGHT. FRESH AIR MUST BE SUPPLIED TO THE BACK OF THE UNIT.

Canada: A Chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling. Where 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.

Floor Protection R2 Hearth Pad must be installed in a Mobile Home. 18" In Front and 8" Per side and Back. 48" x 48" 1219mm x 1219 mm

IMPROPER INSTALLATION: The manufacturer will not be held responsible for damage caused by the malfunction of a stove due to improper installation, CHIMNEY FIRES OR OVER-FIRING THE STOVE. It is very important to use only specified Components when installing Do not use makeshift methods or material which may compromise the installation. Improper Parts used can cause chimney fire and poor stove performance including exposure to carbon Monoxide. Flame Innovation will not be liable for consequential or indirect damage to property or persons resulting from the use of this product. Consult a professional installer if you have any questions.

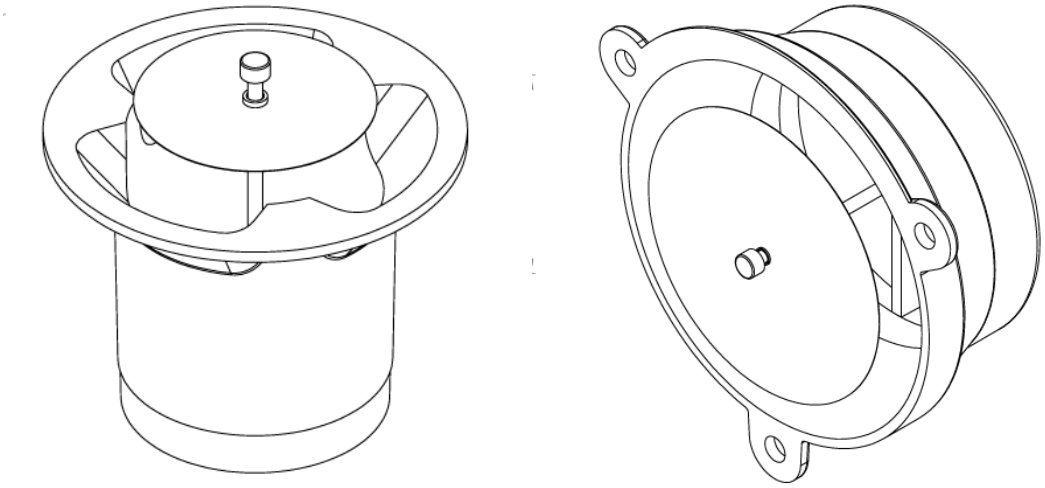
THIS ROOM HEATER MUST BE CONNECTED TO A CHIMNEY COMPLYING WITH THE REQUIREMENTS FOR TYPE-HT CHIMNEYS IN THE STANDARD FOR CHIMNEYS, FACTORY-BUILT, RESIDENTIAL TYPE AND BUILDING APPLIANCE, UL-103 OR A CODE-APPROVED MASONARY CHIMNEY WITH A FLUE LINER.

1. Remove all parts from inside the stove body. Loose fire bricks must be placed correctly before installation. (See Brick Install Section.) check that the Baffle board is placed correctly and slides to the back of the stove wall with no gaps.)
2. Select the proper location for the stove. These appliances must not be installed any closer than the minimum clearance to combustibles. (See State and county regulations)
3. The stove must be installed on a non-combustible surface w/ 16" in front of the door
4. If non-combustible materials have been installed on the walls, obtain the minimum clearances from either the manufacturer of these materials or the local building inspector's office.
5. Install the stovepipe INSIDE the flue collar on the top of the stove, between the stove and the chimney. Attach mounting screws in holes provided in flue collar.
6. DO NOT use a grate to elevate the fire inside the firebox. **Build Fire directly on hearth.**
7. A minimum clearance between the stove pipe and combustible materials is required. Check with authorities having jurisdiction in your area with any questions. Double and triple wall pipes vary for clearances. Read the labels on the pipe.
8. Unless noted on several stove pipe manufacturers stove pipe, all the pipe sections ***MUST BE*** connected with the male (crimped) end toward the stove.
9. Fasten the stove pipe to the flue collar using three metal screws. Do the same at each additional joint to make the entire installation rigid.
10. Maintain the required 6" diameter flue for the entire installation according to local rules and regulations.
11. It is recommended that no more than two 90-degree bends be used in the stovepipe installation. More than two 90-degree bends may decrease the amount of draw, and possibly cause smoke spillage.
12. An inline damper is not required in this installation. Remove the damper plate in the chimney or secure it in the OPEN position. FAILURE TO FOLLOW THE MINIMUM CLEARANCE REQUIREMENTS MAY RESULT IN AN UNSAFE INSTALLATION.
13. ALWAYS Check for Leaks

VCV Installation

Remove the VCV's from the box inside the stove. Wrench Included.

The Primary VCV will be installed first. From the back of the stove reach under and slide the small end of the VCV up inside the provided round collar. Tighten the set screw even with the casting line marked with black marker on the VCV.
The secondary VCV will install the same way tightening the set screw.
Make sure both VCV's are level in appearance under the stove. DO NOT OVERTIGHTEN. BE CAREFULL NOT TO BEND THE RODS WHERE THE DISCS SLIDE UP AND DOWN AS YOU INSTALL THE VCV. DISC HEIGHTS ARE FACTORY SET

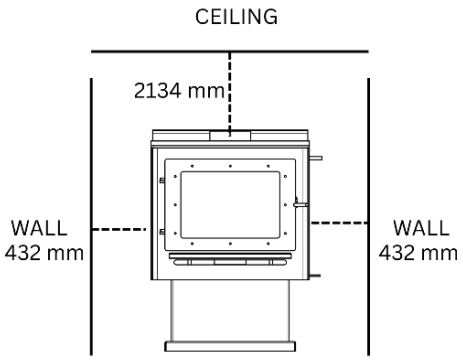


PRIMARY VCV ON THE LEFT / SECONDARY VCV ON THE RIGHT

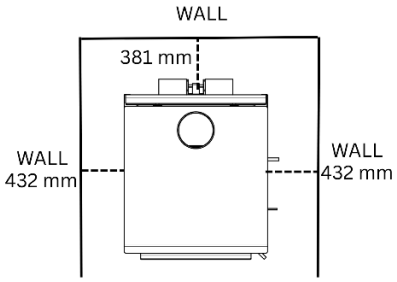
FRESH OUTSIDE COMBUSTION AIR IS HIGHLY RECOMMENDED. USE 4" FLEXIBLE ALUMINUM TUBE

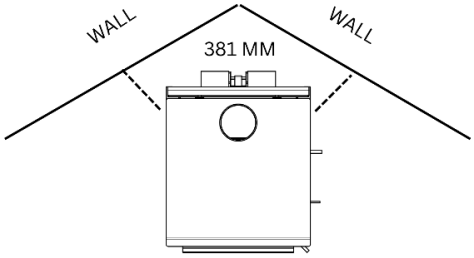
Catalyst Properties

Clearance To Combustibles Canada



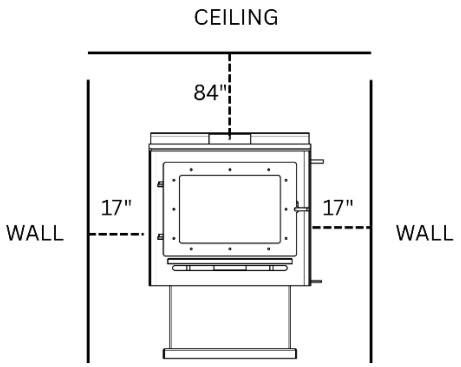
Floor to Ceiling 2134MM



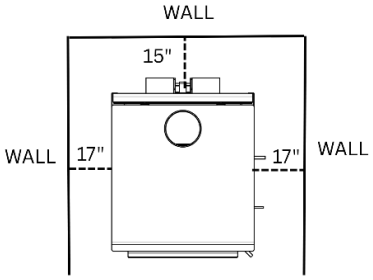


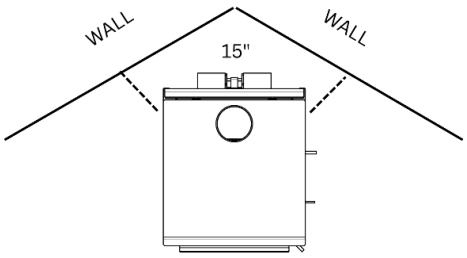
Corner Installation

Clearance To Combustibles USA



Floor to Ceiling 84”





Corner 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. Refer to Combustible Wall Chimney Connector Pass-Throughs.

MASONRY FIREPLACE

There are listed kits available to connect a stove to a masonry fi replace. The kit is an adapter that is installed at the location of the fi replace damper. The existing damper may have to be removed to allow installation.

Canada: **To comply with CSA B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment, any combustible covering beneath the appliance and/or within the area extending horizontally at least 450 mm (18 in) beyond the appliance on any side equipped with a door, and at least 200 mm (8 in) beyond the appliance on other sides, shall be protected by a continuous, durable, non-combustible pad that will provide ember protection. The 450 mm (18 in) ember protection required on any side with a door shall extend for the full width of the appliance plus the 200 mm (8 in) required on each side of the appliance without a door. Where an appliance is installed less than 200 mm (8 in) from a wall, the ember pad needs only extend to the base of the wall. An ember pad shall not be placed on top of a carpet unless the pad is structurally supported to prevent displacement and distortion.**

NOTE: Do not install the chimney directly at the outlet of the appliance. A chimney connector (flue pipe) is required unless the appliance is specifically approved for that type of installation.

- **If the stove is installed in a transportable building, the chimney must be removed.**
- **Completely seal all penetrations of the chimney with high temp sealant and fresh air holes to maintain continuity of the air barrier system.**
- **Make Sure all Baffles and Bricks are located in the correct position before final placement or any more moving of the stove.**
- **Installation An R-2 Hearth Pad is Required for Free-Standing**

Installation: An R-2 Hearth Pad is Required for Free-Standing Installation in a mobile Home in the US.

Type 2 – Traditional Hearth Pads

Fully non-combustible, with an R-value of **2.24 or 1.592** (R-value information), it provides protection well above the minimum requirements for Type 2 hearth pads (minimum requirement of R-value=1.0).

Your hearth pad is the layer of material that sits between your stove or fireplace and the floor or subfloor under it. Often made of natural stone tile, ceramic tile, thin set cement board and other building materials, the hearth pad protects the subfloor from the heat of the fire above it. Its R-value, or thermal resistance, tells you how well it insulates the subfloor. To find the R-value, you need to know what materials the hearth pad is made of and their relative R-values, K-values or C-values. These other two values measure thermal conductivity.

Look at the edge of the hearth pad, so you can see a cross-section of all its materials. If you have already installed the hearth pad, you might have to remove a decorative tile bevel or some other sort of edging to see the cross-section.

Measure the height in inches of each material used in the hearth pad. For example, if the hearth pad has a layer of cement board on the bottom, a layer of thin set in the middle and a layer of ceramic or stone tile on top, measure the height of each layer.

Consult an R-value chart to determine the R-value of each layer. Hearth manufacturers, insulation manufacturers and utility companies may have these charts on their websites or in their stores or offices.

Add the R-values of all the layers in the hearth pad to find the hearth pad's total R-value.

Measure the thickness of any layers of the hearth pad for which you know the K-value. You don't need to measure the layers for which you know the C-value.

Divide 1 by the K-value of the layer. Multiply the result by the thickness of the layer. This gives you its R-value. For example, if you have a 1/2-inch layer of a material with a K-value of 0.3, divide 1 by 0.3 to get 3.333, then multiply that by 0.5 to get an R-value of 1.667.

Divide 1 by the C-value of a layer. This gives you the R-value. For example, if you have a layer with a C-value of 1.15, divide 1 by 1.15 to get an R-value of 0.87.

Repeat these calculations for any remaining layers. Add the R-values together to get the total R-value for the hearth pad.

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 passthrough 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 fi t 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 does not penetrate chimney flue liner.

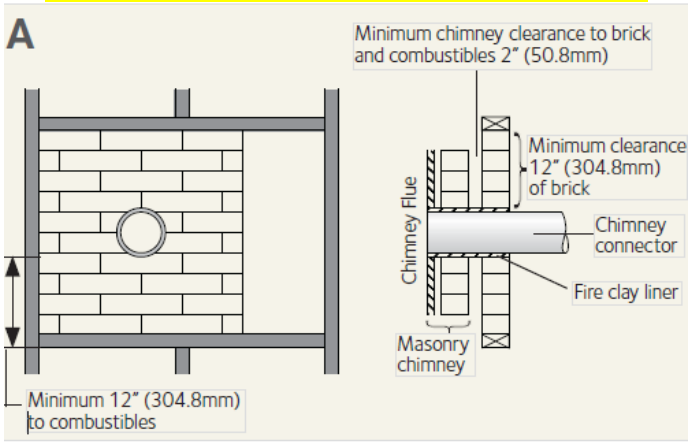
METHOD D.
2” (50.8 mm) Clearance to Combustible Wall Member: Start with a solid-pack listed factory-built chimney section at least 12” (304 mm) long, with insulation of 1” (25.4 mm) or more, and an inside diameter of 8” (2 inches [51 mm] larger than the 6” [152.4 mm] chimney connector). Use this as a pass-through for a minimum 24-gage single wall steel chimney connector. Keep solid-pack section concentric with

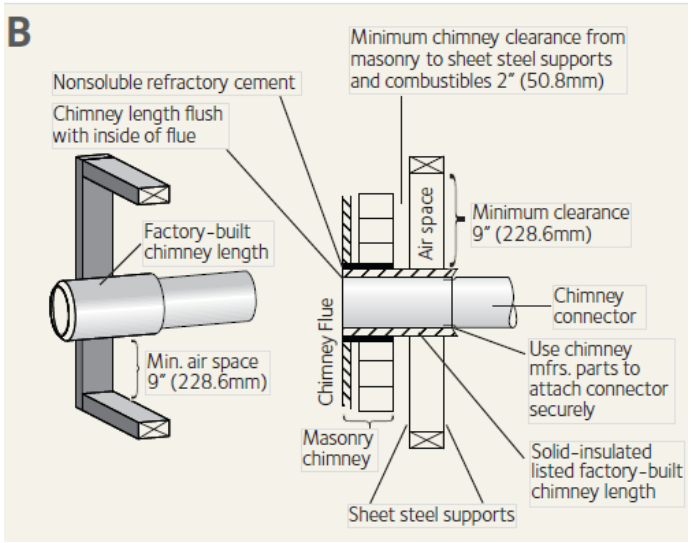
and spaced 1” (25.4 mm) off the chimney connector by way of sheet metal support plates at both ends of chimney section. Cover opening with and support chimney section on both sides with 24 ga minimum sheet metal supports. See that the supports are fastened securely to wall surfaces on all sides. Make sure fasteners used to secure chimney flue liner.

NOTES:

1. Connectors to a masonry chimney, excepting method B, shall extend in one continuous section through the wall pass-through
system and the chimney wall, but not past the inner flue liner face.

1. A chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling.
2. **THE VCV STOVE DOES NOT HAVE A REAR EXHAUST OUTLET, THEREFOR DO NOT INSTALL IN OR UP A BUILT IN FIREPLACE / HEARTH FIREPLACE. DO NOT MOUNT THE STOVE IN FRONT OF A BUILT IN FIREPLACE AND RUN THE CHIMNEY UP THROUGH THE OPENING AT GROUND LEVEL. ONLY INSTALL AS DESCRIBED ABOVE BY A THROUGH WALL PENETRATION TO THE CHIMNEY LINER.**





FLUE SYSTEM

CANADA
Chimney Must be Labeled CAN/ULC-S629 or Code Compliant Chimney or Single Wall Stainless Steel Chimney where Clearance to Combustibles is Met

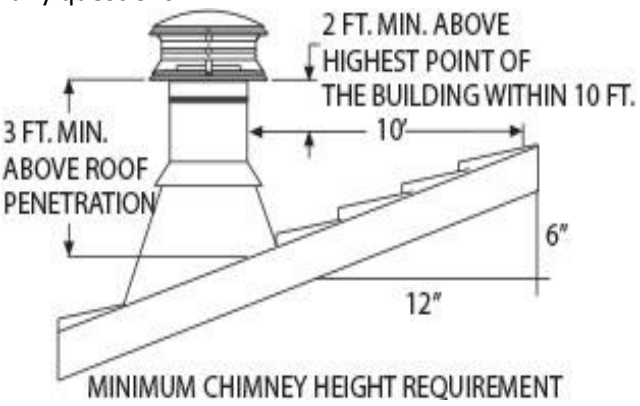
The VCV 2.1.5 Wood Stove is designed for use with a 6" Flue System either in single wall (Minimum 28 ga. Metal or Stainless Steel for 18" Clearance to combustibles) or Double Wall Chimney pipe or Class "A" 6" Pipe for 6" Clearance to combustibles around the pipe only, not the stove at any time. Read instructions on the labels of the non-single wall pipe.
(The black or non-painted connector pipe should be at least 28 ga. steel and a minimum of eighteen inches (18.0") from a combustible wall and eighteen inches (18.0") from ceiling.
It is permissible to use single wall pipe, BUT NOT RECOMMENDED and Class A pipe both if you follow your counties rules and regulations with no single wall pipe penetrating any surface without 18" Clearance to combustibles around it. It is recommended in this situation to convert to Double Wall or Class A pipe at the ceiling box transition. 8 ft or more chimney is best. If you need more draft, add a section of chimney pipe.
It is not permissible to connect this unit to a chimney that is servicing another unit.

Flue Size-The proper flue size is determined by measuring the inside diameter of the flue collar on the unit. This stove is equipped with a SIX-inch (6") TOP EXHAUST FLUE COLLAR. Therefore, the connector pipe should be six inches (6") and never less in diameter than the collar on the stove. Different manufacturers of stove pipe have different parts to adapt to stoves and their brand of stove pipe to accommodate 6" Pipe. This is necessary to accommodate pipe variation from different manufacturers and maintain a good seal. All Joints should be sealed and checked for leaks.

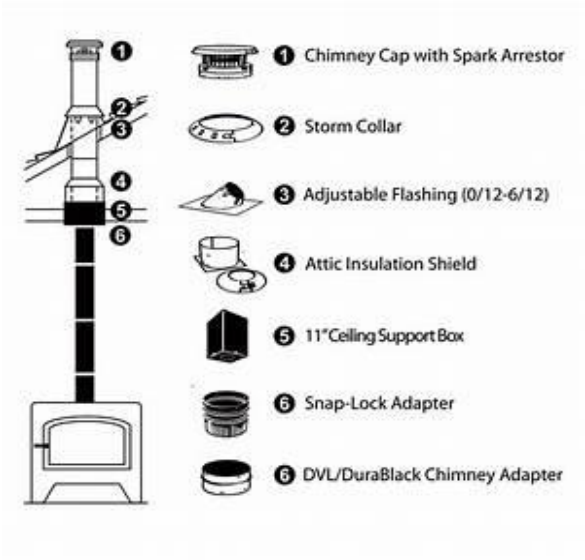
ALL CHIMNEY PIPES AFTER BURNING AND INSTALLING SHOULD BE CLEANED AND INSPECTED ON A REGULAR BASIS DEPENDING ON HOW MUCH YOU ARE BURNING.

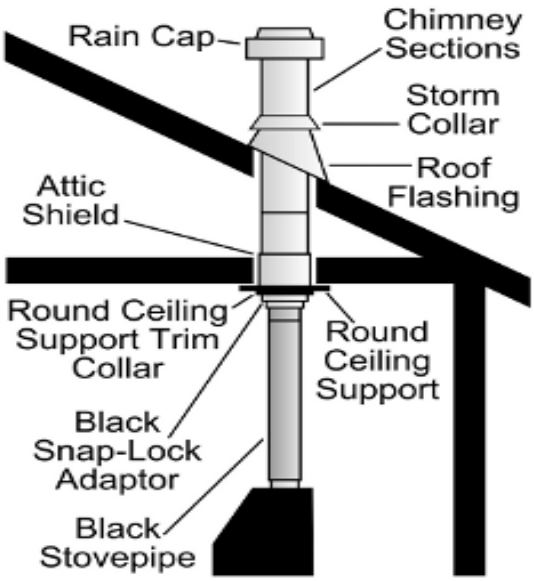
It is the consumer's responsibility to ensure the chimney system is safe and in good operating condition***. The manufacturer will not be held responsible for an accident attributed to a unit connected to a faulty chimney system. This stove carries a 5 warranty except for shipping damage, which must be reported with 5 days of receiving shipment to ensure replacement or repair from a warranty claim through the shipping company. THERE IS NO WARRANTY ON WEAR PARTS SUCH AS BURN TUBES, BAFFLE, BLANKET, PAINT, GLASS, BRICKS, ETC.***

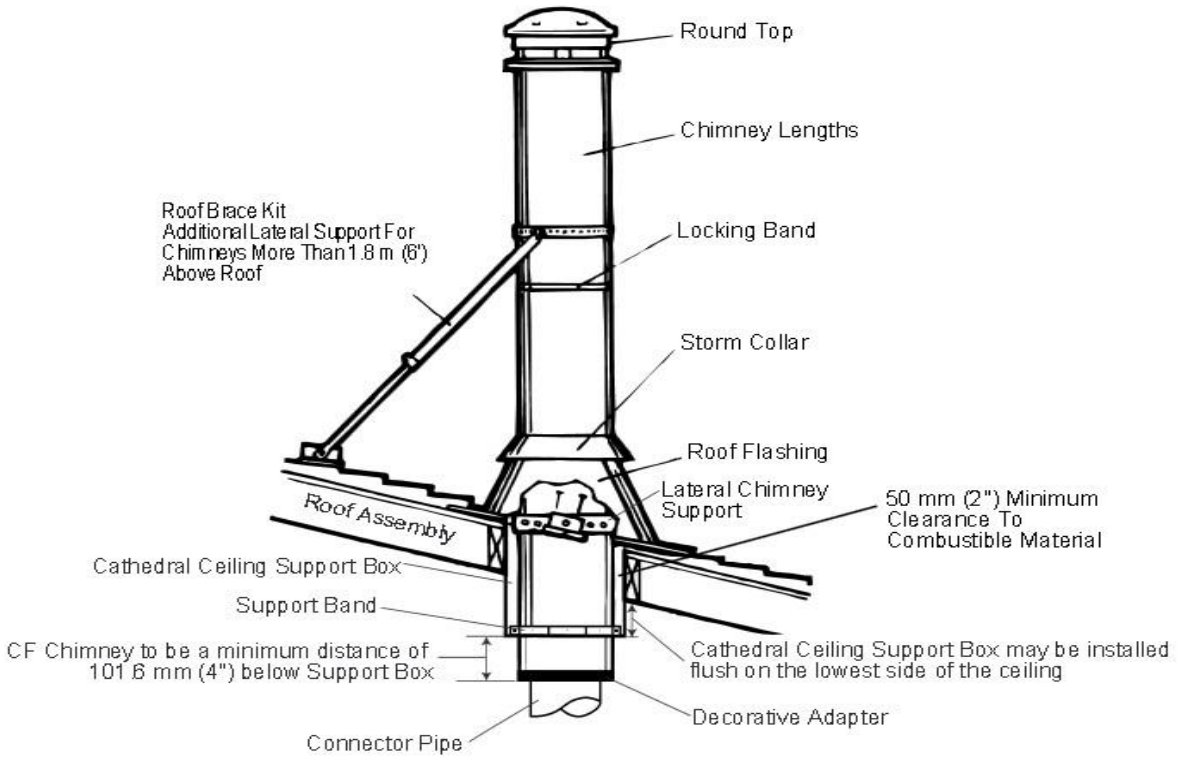
*_IMPROPER INSTALLATION_: The manufacturer will not be held responsible for damage caused by the malfunction of a stove due to improper installation, CHIMNEY FIRES OR OVER-FIRING THE STOVE. Do not use makeshift methods or material which may compromise the installation. 509 STOVES will not be liable for consequential or indirect damages to property or persons resulting from the use of this product. Consult a professional installer if you have any questions.



MINIMUM CHIMNEY HEIGHT REQUIREMENT







Examples of single wall 6” to Double Wall or Class A 6” Insulated / Triple wall Chimney at ceiling. EVERY INSTALL IS DIFFERENT, THESE ARE SUGGESTIONS

Note: You must Maintain 18” From Ceiling with single wall Pipe and minimum 13” to 18” From walls with 1” Air Gap behind Non-Flammable wall boards.

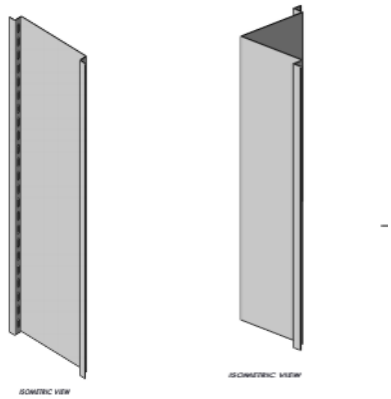
FLOOR AND WALL PROTECTION

1. You will not need any floor protection if your floor is constructed of a non-combustible material such as brick, metal, or concrete. If your floor is constructed with a combustible material such as hardwood, carpet, or linoleum, you must place protection between the stove and the combustible material. There are many floor and wall board manufacturers. The type of board you choose should be U.L. rated and listed Fiber Board or Masonite of some type. After examining the area you plan to place your stove and determining it requires a board, the next step is to select the proper size. The stove you choose will determine the size board that is required. The approved protector board should be large enough to provide a minimum of eight inches (8”) behind the unit, eight inches (8”) on either side and sixteen inches (16”) in the front where the door is located. This stove requires a minimum of 42.0” D x 34” W for floor protection.
2. **Installation on a Concrete Floor** An appliance mounted on a concrete floor does not require floor protection. Carpeting and any other combustible material must not cover the Floor Protector. If a combustible surface is applied to the concrete floor, a clearance must be maintained equivalent to the area reserved for the floor protector. Floor Protection Foot-Print Minimum Size 42.0” x 34”

Installation on a Combustible Floor If the appliance is to be installed on a combustible floor or a combustible floor covering, it must be installed on a 1" thick non-combustible millboard floor protector or a durable equivalent, with a "R" factor of no less than "2." The pad must be installed beneath the unit, extending 16" (U.S.) on the side equipped with a door, and 8" on all other sides. The pad must cover any horizontal chimney connector runs and extend 2" beyond each side.

Wall Protection (Cont'd)

In some areas local codes may require thirty-six inches (36") from a combustible, therefore it is especially important that you check with local officials. If you need to place your unit closer to a combustible wall, some protection will be necessary. If an approved wall board is used this will reduce your clearance by two thirds (2/3); however, a one inch (1") air space has to be between the board and the wall. If you have a ceiling flue hook-up, you will need protection from the floor to the ceiling if you do not meet the normal clearances. If you have a wall flue hook up, you will need wall protection at least twelve inches (12") above the wall thimble.



Examples of wall protection with 1" Air gap

Outside Air Connection

The stove can accept a 4-inch aluminum flex tube for outside air. Make sure when connecting the fresh air tube to the outside that you cover the end with a screen of some sort, but not a screen that would restrict air in-flow. Utilize a screen with wider openings ONLY.

WE WILL REPEAT: THE FIRST FIRE IS VERY IMPORTANT

Remember to ventilate well. Allow the stove to cure with several small fires before burning for long periods of time at high temperatures. Flat spots on the painted surface are normal. Shiny spots on the painted surface (before burning) are normal. SMALL FIRES OF 4 TO 5 INCHES IN DIAMETER.

1.Do not use a grate or elevate the fire inside the firebox.

2. Use only Dry (Seasoned) Wood in 16" to 18" or smaller lengths and 6" wide at most.

3. When the stove is used for the first time, solvents in the paint will smoke off as the stove "cures."

CLEAN AND INSPECT YOUR CHIMNEY REGULARILY AND WATCH OUTSIDE FREQUENTLY TO LOOK FOR SMOKE TO INSURE CORRECT DRAFT PLACEMENT FOR EFFECTIVE CLEAN EFFICIENT BURNING.

ALWAYS STORE YOUR LOGS/ WOOD IN A WELL-VENTILATED AREA AWAY FROM DIRECT MOISTURE.

WOOD/FUEL – Higher efficiency and lower emissions generally result when burning NATURAL SAWDUST LOGS. Cord wood must be dry and split. DO NOT OVERFIRE THE STOVE Use only dry, seasoned wood. Green wood, besides burning at only 60 percent of the fuel value of dry wood, deposits creosote on the inside of the stove and along the chimney. This can cause extreme danger of chimney fire.

To be called "seasoned," wood must be dried for a year. Regardless of whether the wood is green or seasoned, it should be stored in a ventilated, sheltered area to allow proper drying during the year. Wood should be stored beyond recommended clearances from combustibles.

DO NOT BURN: Logs with Additives, Treated Wood, Garbage, Solvents, Trash, Cardboard, Colored Paper, or Coal. (Spiders are ok)

NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR 'FRESHEN UP' A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IT IS IN USE.

BUILDING AND LIGHTING A FIRE

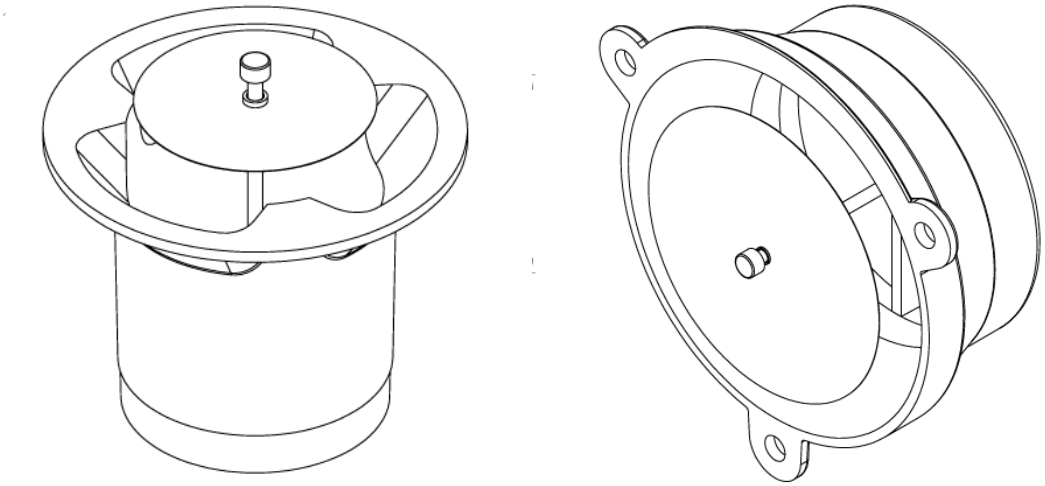
Before building a fire, make sure your fire box is clean, the door glass is clean, and only a small amount of ash is left on the brick floor. OPEN THE UPPER BYPASS CONTROL ON THE RIGHT SIDE OF THE STOVE.

To build your kindle fire, use smaller (4" TO 6" Split diameter) pieces of wood on the bottom layer against the brick running front to back, making sure you have space in between them and the stove side walls. At your second layer and up, cross your pieces leaving air gaps in between. The smallest kindling is placed on top. Light the fire from the top small kindling and let it burn down to the bigger pieces, making sure you have a good flame to your original start. AT THE END OF THIS PERIOD OF BURNING AND GETTING A GOOD FIRE GOING, CLOSE THE BYPASS CONTROL.

DO NOT OVER FILL THE FIREBOX ON THE INITIAL LOAD. THIS WILL ALLOW YOU TO BUILD A COAL BED FOR ADDING WOOD AT A LATER TIME.

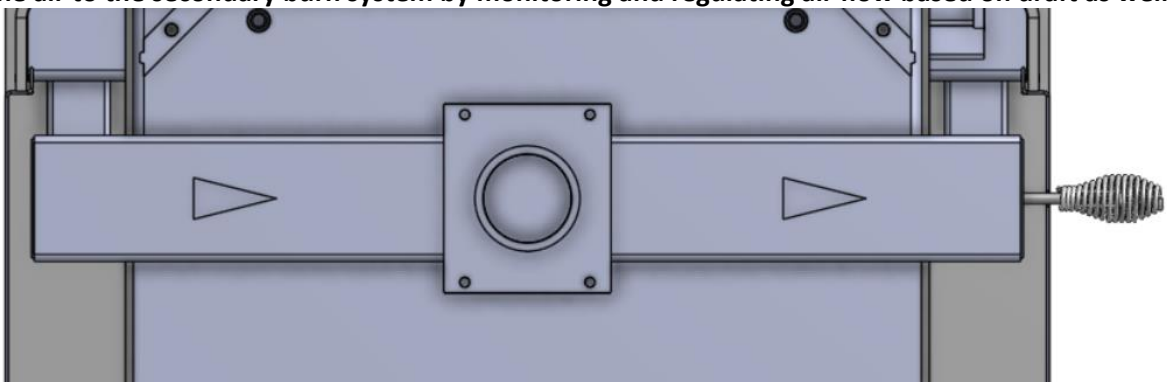
Always make sure to close the door immediately after starting the fire. A couple of times lighting the stove, you will figure out what works best for you. Different lengths of chimney, and types of chimneys used for configuration, elevation, and temperature play roles in how the fire will burn. Find your best damper control locations as you test your stove and learn how it operates the stove.

DRAFT / AIR CONTROLS / VCV'S

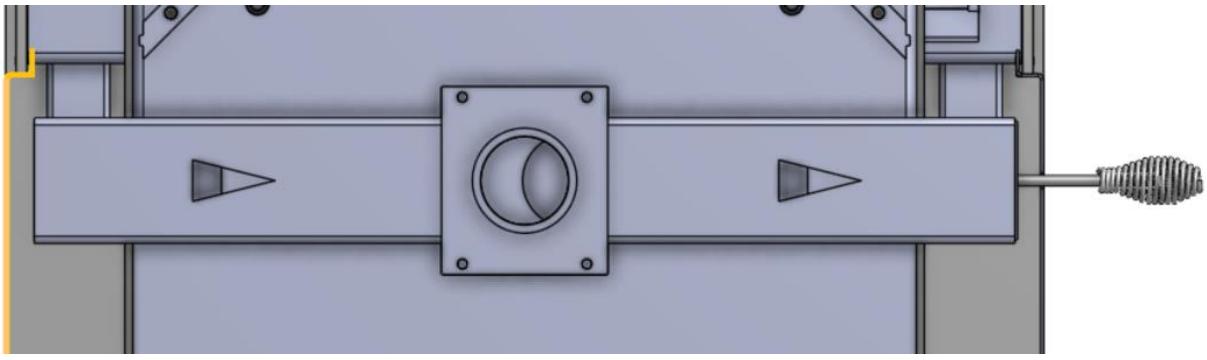


PRIMARY VCV ON THE LEFT / SECONDARY VCV ON THE RIGHT

The Primary and Secondary VCV's are mechanically operated by the draft of the stove. When the stove is on low setting, the primary disc will "Float" inside the chamber of the VCV and when draft becomes fast enough, it will close that air supply by going up further inside of the body of the VCV and will automatically drop when the door is open. The Secondary VCV will operate controlling the air to the secondary burn system by monitoring and regulating air flow based on draft as well.



Example Damper Shown Fully Closed (View Under Stove)



Example Damper Shown Partially Open (View Under Stove)

The Damper is located on the bottom right side of the stove. Sliding the damper all the way in will shut off all the air to the stove. Pulling out to the low position will let the stove burn on low and let the primary and secondary VCV's work in tandem. Pulling out to medium position will open up some of the triangles you see in the picture and also let the primary and secondary VCV's work in tandem to regulate the air flow into the stove. Pulling the damper all the way out to the high position will open all the air available to the stove fully opening the triangle air ports on the damper plate and only let the secondary VCV regulate what portion of air will enter the stove in the secondary burn chamber based on the draft volume of the chimney stack.

LOW: First mark on the damper slide rod even with the edge of the side shield of the stove.
MEDIUM: Second mark on the damper slide rod even with the side panel of the stove.
HIGH: Damper pulled all the way out to the stop position.

DAMPER OPERATION CAUTION **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.**

Use Gloves to adjust drafts when stove is hot, especially when the stove is in operation

Catalytic Stove / Off Season Burning

WOOD BURNING IN THE SHOULDER SEASON: There are a few things to consider if you choose to light a fire during the spring or fall seasons when the outside temperature is milder, perhaps 55°F to 70°F (13°C to 21°C). You may notice smoke spillage out of the loading door when it is opened during start up or reloading. This is caused by a lack of natural draft within the chimney system. The temperature difference between the chimney system and the outside air causes flue gasses to be drawn up and out of the chimney. Smaller temperature differences produce less draft in your chimney system than larger temperature differences. This air movement, referred to as Stack Effect, is also influenced by air density and moisture differences. To eliminate the smoke spillage, you may have to stoke the fire for longer than usual. Once the fire warms the chimney the draft will improve, and spillage will be reduced. When operating the appliance on a lower setting, the resultant lower flue temperatures can cause your chimney system to cool down. This also decreases natural draft and spillage may occur. General Rules for burning in the shoulder season: • Run your appliance on HIGH for 30 minutes after start up and reloading before gradually turning the damper down to the desired heat output setting. • The damper setting needs to be high enough to keep the catalytic combustor in the active red fired color. If you do not see red color, which does not mean the combustor is not firing, step outside and verify no smoke from the chimney. Repeat as required. • If your appliance is producing too much heat, try to reduce the volume of wood fuel loads rather than turning your damper down. It is good burning practice to build smaller, hotter fires on milder days in the spring and fall.

ICE - FORMATION AND PREVENTION Most of what you see coming from the chimney of a properly operating catalytic appliance is water vapor. In extremely cold weather, and with some exterior chimneys, this vapor may freeze in the chimney to the point of actually blocking the chimney and extinguishing the fire. In such weather, burn the appliance for 5 to 10 minutes with the damper set to HIGH to melt any possible ice build-up.

NOTE: VCV Catalyst Properties
2.54 x 13 x 2.16
Meatal Foil Monolith / Cell Dimension 50 CPSI/Stainless Steel Frame 403/304 14 ga. /Foil Type DIN1.4767, .002" FeCRAlloy foil/ Foil Height 2" Coated with Proprietary PGM/Washcoat U3. Airflow through 2.16" side
Catalyst Monitoring

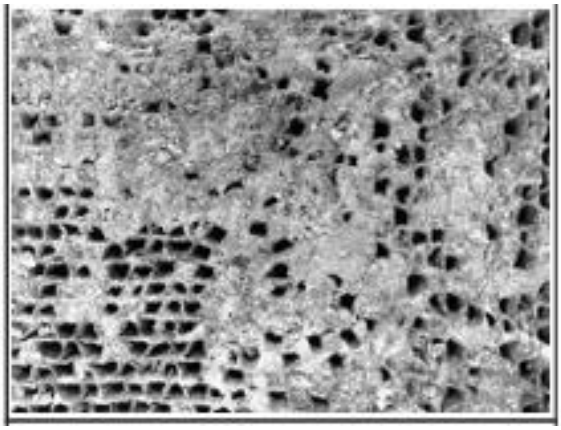
WARNING WARNING WARNING

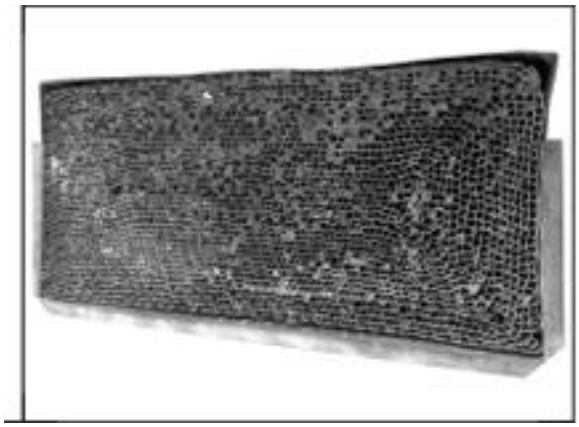
DO NOT USE THE APPLIANCE WITHOUT A COMBUSTOR It is important to periodically monitor the operation of the catalytic combustor to ensure that it is functioning properly. A non-functioning combustor will result in a loss of heating efficiency, and an increase in creosote and emissions. Following is a list of items that should be checked on a periodic basis: • Combustors should be visually inspected at least three times during the heating season to determine if physical degradation has occurred. Actual removal of the combustor is not recommended unless more detailed inspection is warranted because of decreased performance. Refer to "CATALYTIC COMBUSTOR TROUBLESHOOTING" on next page. Properly functioning combustors typically maintain temperatures in excess of 500°F and often reach temperatures in excess of 1000°F. If catalyst temperatures fall below 500°F, refer to next step and to "CATALYTIC COMBUSTOR, TESTING" below. • You can get an indication of whether the catalyst is working by comparing the amount of smoke leaving the chimney when the smoke is going through the combustor and catalyst light-off has been achieved, to the amount of smoke leaving the chimney when smoke is not routed through the combustor (bypass mode): - Light the appliance as per the lighting instructions (see "LIGHTING THE FIRE"). With smoke routed through the catalyst, go outside and observe the emissions leaving the chimney. - Open the bypass mechanism, wait approximately 15 minutes, and again observe the emissions leaving the chimney. Significantly more smoke will be seen when the exhaust is not routed through the combustor (bypass mode). Some smoke may be visible shortly after you start the fire and shortly after reloading the fire. Allow 20 to 30 minutes for the fire to stabilize before making observations.
CATALYTIC COMBUSTOR, TESTING Light the fire per the lighting instructions. After 1 hour of burning a well-established fire, position the DAMPER to a medium - low burn rate setting. A properly functioning combustor will have an active temperature greater than 500F. Repeat this procedure for at least 3 burn cycles. If, after several burn cycles, the COMBUSTOR will not indicate an ACTIVE / RED reading your combustor may require cleaning or replacement. If, after cleaning and reburning, your combustor is still not producing an ACTIVE/RED reading you should contact your dealer for a replacement combustor
CATALYTIC COMBUSTOR, CLEANING Under certain conditions, ash particles may become attached to the face of the combustor. These may be seen while the combustor is in the glowing stage, or when the fire is out. Any deposit on the visible face of the combustor should be removed. Wait until the fire is out and the appliance is cold before performing any cleaning. Brushing the combustor with a soft bristle paint brush will remove some deposits. Passing a vacuum cleaner wand or brush near the face of the combustor will

remove most deposits. (Hot ash in a vacuum cleaner bag will burn, may melt the vacuum or cause a house fire. Exercise caution and never clean the appliance when the appliance or ashes are hot.) Never scrape the combustor with any hard tool or brush. Never run pipe cleaner through the individual cells of the combustor. This is not needed and may do more harm than good. Limit cleaning to the face of the combustor. NOTE: Never remove a combustor without approved combustor gasket in hand as original gasket will fall apart when removed from appliance. Remember to re-install the CAT PROTECTOR (the perforated plate) in same position it was found. TIP: A hot fire will usually prove to be the best method of cleaning the combustor of deposits.

PROBLEM - CREOSOTE PLUGGING Possible Cause: Burning materials that produce a lot of char and fly-ash. Solution: Do not burn materials such as garbage, gift wrap, or cardboard. Possible Cause: Burning wet, pitchy woods or burning large loads of small diameter wood with the combustor in the operating temperature range. Solution: Burn dry, seasoned wood, don't engage the bypass until the temperatures are high enough to initiate light-off. Possible Cause: Combustor not functioning. If proper burning procedures have been followed to no avail, the combustor is not functioning. Solution: Replace the combustor with a genuine Flame Innovation combustor (failure to do so will void your warranty).

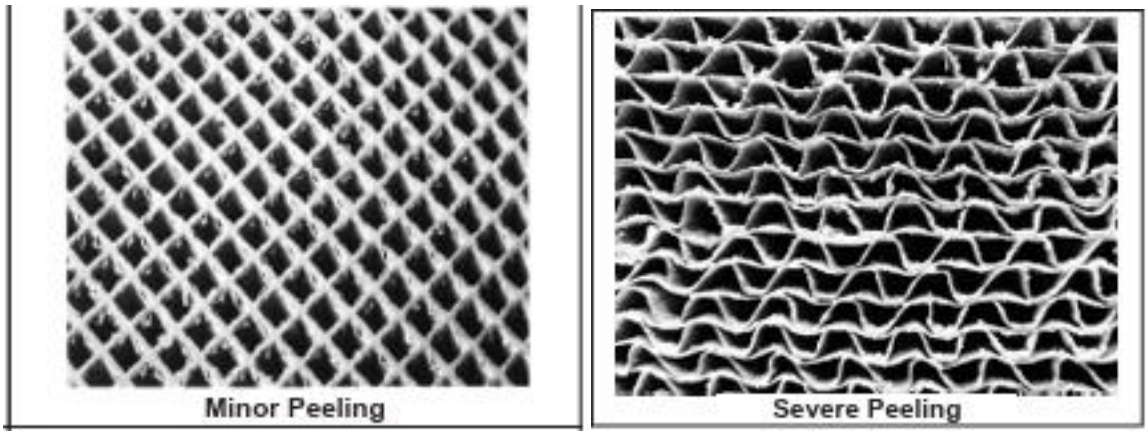
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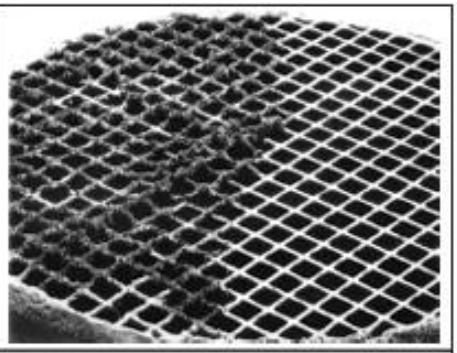
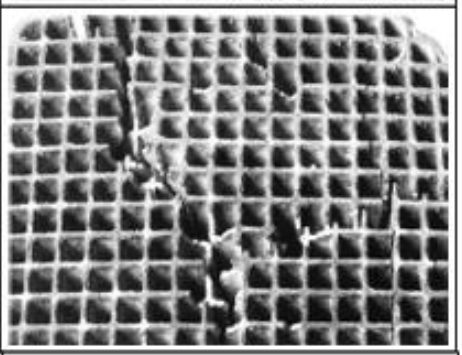
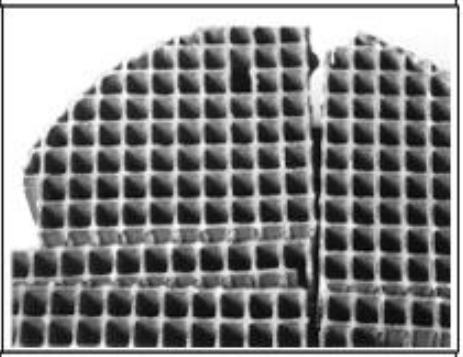
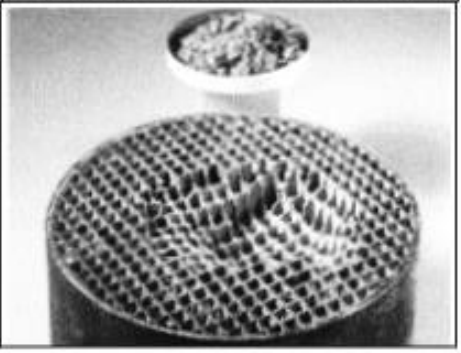
CREOSOTE PLUGGING

PROBLEM - CATALYST PEELING Possible Cause: Extreme temperatures (above 1800°F, or 1000°C.) at combustor surface can cause the catalysts to peel. Over firing and flame impingement on the combustor are primary causes. Minor peeling photo shows minor peeling that is normal and does not affect function. Severe peeling photo shows that are closed or plugged. Solution: Avoid extreme temperatures and flame impingement. If peeling is severe, remove and replace combustor.



PROBLEM - CATALYST DEACTIVATION Possible Cause: Burning large quantities of trash, pressure treated lumber, or painted woods. Solution: Burn quality woods available in your area. If you decide the catalyst has been deactivated, replace combustor with a genuine Flame Innovation combustor (failure to do so will void your warranty).

NOTE: NEXT SECTION SHOWS "ROUND COMBUSTORS" FOR EXAMPLES ONLY OF THE SURFACE AREA OF YOUR RECTANGULAR SHAPED COMBUSTOR.

PROBLEM - CATALYST MASKING (The catalyst is coated with a layer of fly-ash or soot which prevents catalytic activity) **Possible Cause:** Accumulation of fly-ash **Solution:** Brush cooled combustor with a soft-bristled brush or vacuum lightly at least once per burning season.	
PROBLEM - THERMAL CRACKING **Possible Cause:** Normal operation, as long as the combustor remains intact. **Solution:** If cracking causes large pieces to fall out, replace the combustor.	
PROBLEM - MECHANICAL CRACKING **Possible Cause:** Mishandling, abuse, or operating without a properly gasket sealed combustor. **Solution:** Handle with care **Possible Cause:** Distortion of holding collar. **Solution:** Combustor should be held firmly in its can. It should slide easily into and out of the holding collar of the stove. If severe cracking has resulted in loss of large chunks of combustor, replace combustor. Also replace any warped stove parts.	
PROBLEM - CRUMBLING **Possible Cause:** Air leaks **Solution:** Inspect door gasket. (see *MAINTENANCE*) **Possible Cause:** High draft **Solution:** Maintain draft to manufactured specifications.	

REFER TO “BUILDING A FIRE” AS YOU ARE READING THIS SECTION

1.Do not use a grate or elevate the fire inside the firebox.
2. Build the wood fire directly on the bricks inside the stove. The brick lined firebox should not be altered or overfilled. At least 2 pieces of wood must be lined side by side inside the stove and not too tightly to burn correctly. Build your kindling with smaller sizes as you

build up. Do not overfill the firebox on the initial fire of the day. Build your coal bed before filling your fire box with wood. It is best to use split wood, not round logs that are not split.

When the stove is used for the first time, solvents in the paint on the stove and stove pipe will smoke off as the stove "cures."

WOOD/FUEL – This heater is designed to burn Cordwood. Natural SAWDUST LOGS without additives can be burned in the stove ONLY ONE AT A TIME. Higher efficiency and lower emissions generally result when burning NATURAL SAWDUST LOGS, but these logs burn at a much higher temperature AND CAUTION MUST BE TAKEN.
Use only dry, seasoned wood. Green wood, besides burning at only 60 percent of the fuel value of dry wood, deposits creosote on the inside of the stove and along the chimney. This can cause extreme danger of chimney fire.
To be called "seasoned," wood must be dried for a year. Regardless of whether the wood is green or seasoned, it should be stored in a ventilated, sheltered area to allow proper drying during the year. Wood should be stored beyond recommended clearances from combustibles around heaters and flame.

DO NOT BURN: Treated Wood, Garbage, Solvents, Trash, Cardboard, Colored Paper or Coal.

NEVER USE LOGS THAT HAVE ADDITIVES IN THEM LIKE WAX, OILS, OR OTHER BINDING AGENTS. USE OF THESE TYPES OF LOGS CAN CAUSE A FIRE THAT IS OUT OF CONTROL VERY QUICKLY DUE TO THE ADDITIVES.

ALWAYS STORE YOUR WOOD IN A WELL-VENTILATED AREA AWAY FROM DIRECT MOISTURE.

GLASS CARE

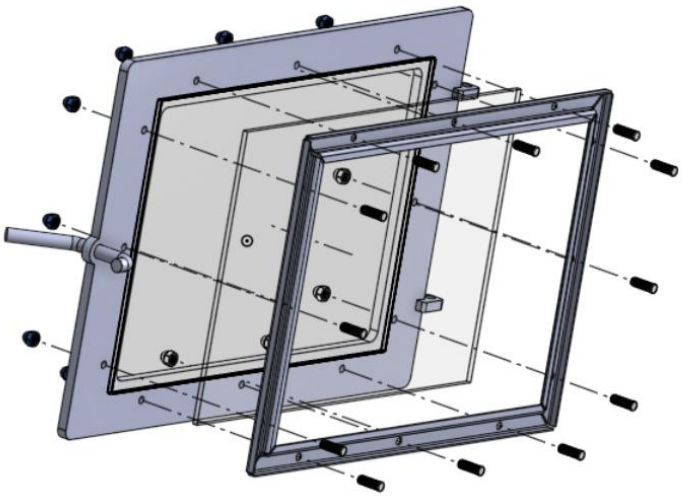
The following use and safety tips should be observed:
1. Inspect the glass regularly for cracks or breaks. Surface scratches are acceptable and normal, but if this glass becomes cracked in any area, the unit should be shut down and the window replaced with high-temperature Neo-Ceram glass. (6.50" x 10.00")
2. Do not slam the door or otherwise impact the glass on the front of the stove trying to force wood into the stove. When closing doors, make sure that foreign objects do not protrude and impact on the glass.
3. Do not clean the glass with materials which may scratch (or otherwise damage) the glass. Scratches on the glass can develop into cracks or breaks.
4. Never attempt to clean the glass while the unit is hot. If the deposit is not very heavy, normal glass cleaners are adequate with a plain, non-abrasive scouring pad. Heavier deposits may be removed with the use of a razor blade scraper.
5. NEVER put substances that can ignite explosively inside the unit, since even small explosions in confined areas can blow out the glass.
6. Inspect the glass seal periodically to ensure proper seal. If the gaskets become frayed or worn, replace them immediately. Contact your dealer or Customer Service at) 509-993-3767 for approved replacement parts.

7. Keeping your glass clean is essential to notice if you are burning the stove correctly. If the glass dirties and doesn't clean off during operations, it is a clear sign you are not burning correctly or a draft control is not open correctly, or you are burning too low.

Glass / Door Gasket Replacement

After extensive use, the sealing material which provides glass and door seal may need to be replaced if it does not sustain its resilience. Inspect the glass and door seal periodically to ensure proper seal. If the gaskets become frayed or worn, replace it immediately.
The following steps should be followed for replacement of the glass or door gasket:
1. Ensure that the appliance is not in operation and is thoroughly cooled.
2. Remove the acorn nuts and slide out the glass clip Brackets.
3. Lift glass out from glass clips.
4. Remove the old gasket and clean the glass.
5. Replace the new gasket, starting at the bottom of the glass and working along the edges. Be sure to center the gasket channel on the glass.
6. Trim the gasket to length and butt the ends together.
7. Replace the glass in the front, being sure not to overtighten the nuts, this will break the glass.

REPLACE GLASS ONLY WITH HIGH-TEMPERATURE NEO-CERAM OF THE PROPER SIZE AND THICKNESS. 3/16" x 11.25 x 16.375" You may order parts and options on our web site:FlameInnovation.com or by calling (509) 993-3767

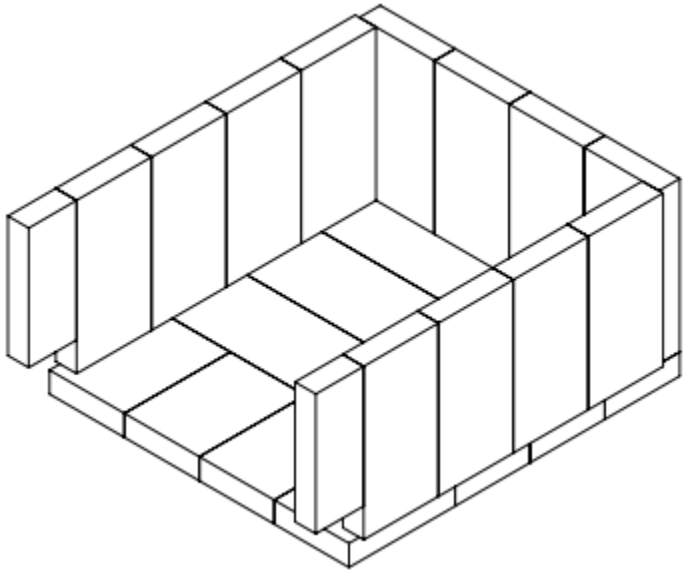


Door Gasket

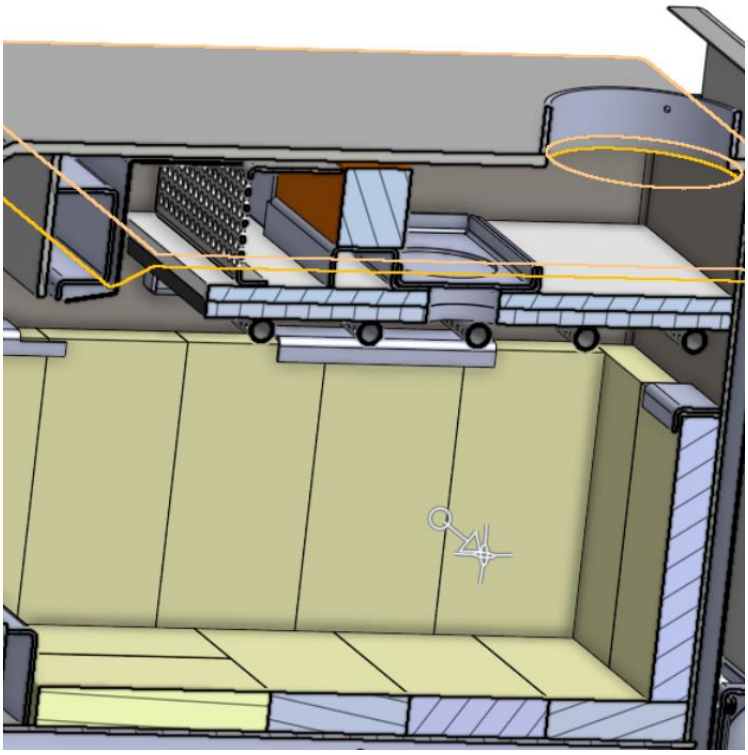
The door gasket is ¾" Rope Gasket. You will have to dig the gasket out of the channel and then clean all the old gasket cement out of the channel being careful not to bend the rope channels. Use only ¾" Fire Rope to replace the door gasket. You can find it on our website as well. Use high Temp Stove Gasket Sealer on all 3 sides of the channels to secure rope in place. Place a weight, like a big book, over the gasket overnight and then re-install door.
Note: A clean surface is crucial to your new gasket sealing properly. DO NOT Try and re-seal over old gasketing Cement.

BRICK CARE AND LAYOUT

Inspect your bricks each time you start a fire for correct placement, checking for broken or dislodged bricks. If broken or dislodged bricks are found, they need to be replaced in position or replaced entirely if damaged.

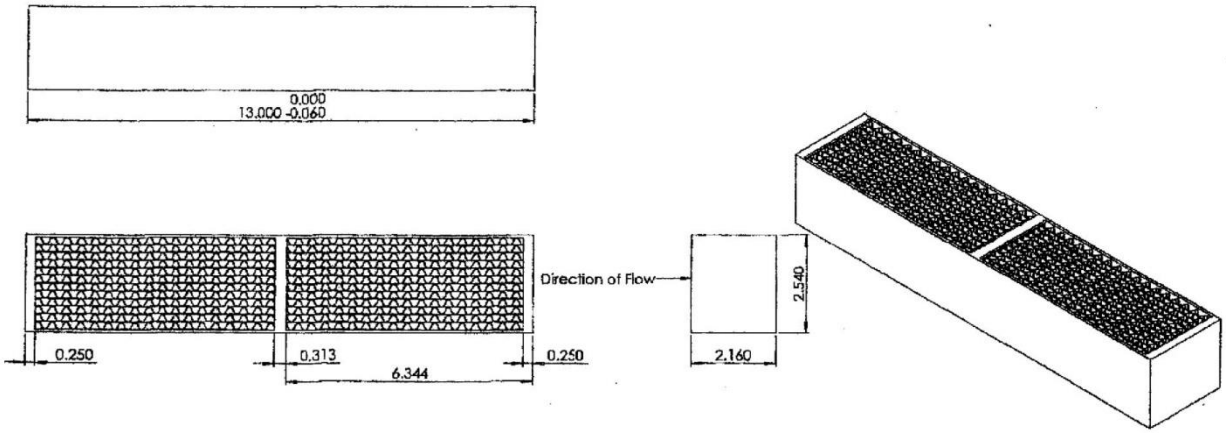


View: Open end is the Front of the stove. (Brick Retainers Not Shown).

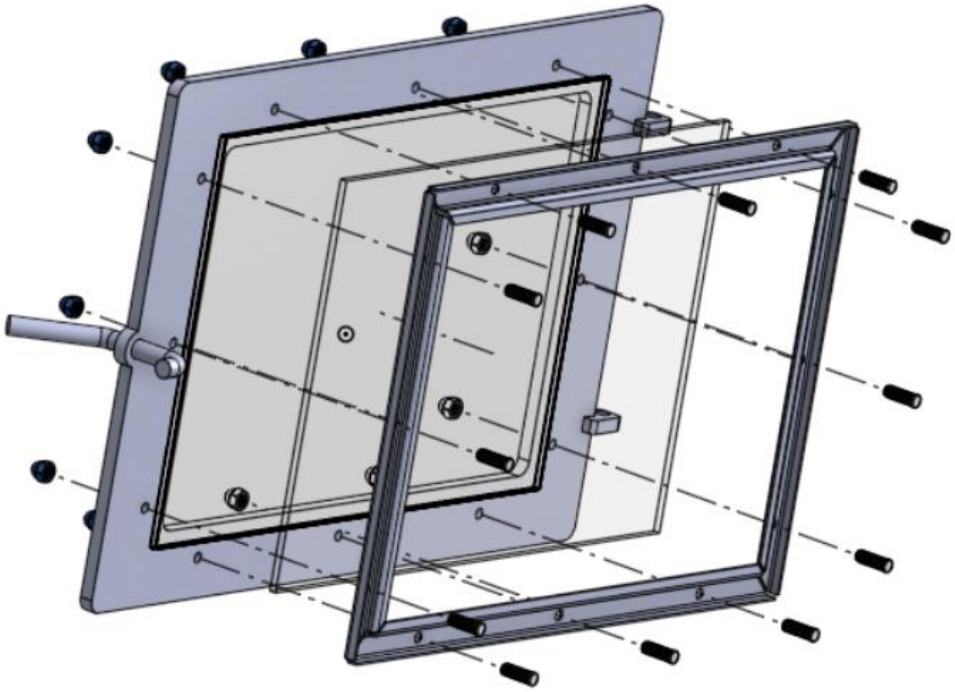


CAT PROTECTOR / CAT REMAOVAL / REPLACEMENT / GRAY BAFFLE BOARD KAO WOOL BLANKET PLACEMENT LOCATIONS AND INSTRUCTIONS

1. Remove 3 bolts in the air wash diverter located just above door opening, remove plate
2. Remove bolts on left and right side of Cat Protector
3. Remove Cat Protector and catalytic converter.
4. Slide out the baffle and blanket down through the secondary burn tubes.
5. When Installing the Catalyst back in the stove it must be installed with 2 full wraps of INTERRAM TAPE before putting the cat protector back on and re-lighting the stove.



WINDOW GLASS REPLACEMENT



Breakdown of glass replacement if needed. 3/16 Ceramic Glass Only. Glass Measurements are 11.25" x 16.375" / 285.75mm x 416mm. (See Door Gasket Replacement) Studs are welded in each glass retainer / Gasket piece individually. Glass wrapped with Stove Window Glass Channel tape ¾". Remove outer Acorn nuts to take out glass and brackets. Door Gasketing (3/4" Fire Rope) will need to be removed and all gasket cement will need to be scraped clean before new Fire rope can be replaced over the studded brackets holding in the stove glass if the gasket is damaged.

CREOSOTE

When Sawdust Logs or wood is burned slowly, it produces tar and other organic vapors. These combine with moisture to form creosote. Creosote vapors condense in the relatively cool chimney flue of a slow-burning fire – as a result, creosote residue accumulates on the lining of the flue. If ignited, this creosote makes an extremely hot fire. The chimney should be inspected on a regular basis during the heating season, to determine if a creosote build-up has accumulated. If it has, the creosote should be removed to reduce the risk of chimney fire**. Always Inspect the chimney for creosote buildup a minimum of twice monthly during burning season.**

CANADA

Establish a routine for the fuel, wood burner, and firing technique. Check daily for creosote build-up until experience shows how often you need to clean the flue pipe to be safe. Be aware that the hotter the fire, the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire.

WAYS TO PREVENT AND KEEP UNIT FREE OF CREOSOTE

1. Burn with the air control fully open for several minutes at numerous intervals throughout each day during the heating season, being careful not to over-fire the unit. This should remove the slight film of creosote that accumulates during low burn periods.
2. Burn the stove with the draft control fully open for approximately 20 minutes every time you apply fresh wood. This allows fuel in the stove to achieve the charcoal stage faster and burns the vapors which might otherwise be deposited within the system. Do not over fire the stove! If the stove is red or the chimney is red in color you have over-fired the stove.
3. IF YOU CHOOSE TO BURN DRY MANUFACTURED LOGS, BURN ONLY ONE AT A TIME.
4. Avoid burning wet logs or green and wet wood. Seasoned wood is wood that has been dried for at least one year.
5. A small, hot fire is preferable to a large, smoldering fire that can deposit creosote within the system.
6. Establish a routine for fuel, burning and firing technique. Check daily for creosote build-up until experience shows you how often you need to clean to be safe. Keep in mind that the hotter the fire, the less creosote is deposited, and weekly cleanings may be necessary in milder weather, although monthly cleanings may be enough in the coldest months. Contact your local authority for information on how to handle a chimney fire and have a clearly understood plan to handle a chimney fire.

ASH BUILDUP Regularly inspect the ash build-up in your unit and remove it as necessary. Ashes can be removed from the unit by shoveling out bottom of the stove bed. BEING CAREFUL NOT TO DAMAGE THE FIREBRICKS.

ALWAYS DISPOSE OF ASH CORRECTLY AS NOTED BELOW

Disposal of Ashes

Ashes should be placed in a metal container with a tight-fitting lid. The closed container of ashes should be placed on a con-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 been thoroughly cooled. **OTHER WASTE SHALL NOT BE PLACED IN THE CONTAINER.**

ASH VACUUM'S can be used for cleaning the stove. Caution: The ashes can be extremely hot!! Never remove red-hot ashes from the appliance; allow ashes to cool before cleaning. Ashes should be placed in a metal container with an airtight lid. The ashes should be placed

outside on a noncombustible surface and completely away from any combustible materials. The ashes should remain in the airtight container until they have completely cooled.

WARNING: THINGS TO REMEMBER IN CASE OF A CHIMNEY FIRE: 1. CLOSE DRAFT CONTROL 2. CALL THE FIRE DEPARTMENT

What can cause a poor draft?

There are several common factors that can contribute to poor draft:

A. Atmospheric Pressure and Air Supply. Atmospheric pressure affecting the draft from a chimney can be outside the home, inside the home, or both. Outside the home, a high-pressure (clear and cool) day generally creates a better draft in the chimney than a low-pressure (overcast and damp) day. Inside the home, household appliances, such as forced-air furnaces or clothes dryers, compete for air, often resulting in inadequate amounts of air available to fuel a fire and creating a condition known as negative pressure. Extreme conditions of negative pressure can cause the combustion by-products to be drawn from the chimney and into the house. This condition is commonly known as “down drafting.”

B. There are several factors that can affect the amount of air available in the home. Increased amounts of insulation, vinyl windows, extra caulking in various places and door seals can all keep heat in but may also make a home too airtight. If you are in doubt as to whether there is sufficient air in your home for your stove, refrain from using those appliances known to consume air when possible or open a door or a window to allow some air to enter the home.

C. Environmental Conditions: High trees, a low-lying house location (such as in a valley), tall buildings or structures surrounding your house and even windy conditions can cause poor draft or down drafting.

D. Cold Chimney Temperature. Avoid cold chimney temperatures by burning a hot fire for the first fifteen to thirty minutes after building a fire, being careful not to over-fire. If any part of the chimney or parts of the stove start to glow, you are over-firing the stove. Where possible, install a temperature gauge on the chimney so temperature drops can be seen.

E. Chimney Installation and Maintenance. Avoid using too many elbows or long horizontal runs. If in doubt, contact a chimney expert and/or chimney manufacturer for help. Clean your chimney, rain cap(s) and especially the spark arrester regularly, to prevent creosote build-up – which can significantly reduce chimney draw and possibly create a chimney fire.

Should I close or open the air control fully when shutting down the stove?

When shutting down the stove with a very small amount of fuel left, fully open the air control. This will allow chimney temperatures to remain as high as possible for as long as possible. Remember, cold chimney temperatures create creosote.

IF THERE IS SIGNIFICANT FUEL LEFT IN THE STOVE, IT IS BEST TO LEAVE THE DRAFT SETTING AT A LOWER RATE IF THE FIRE IS BURNING CONSISTENTLY AND EFFICIENTLY (NOT SMOKING OUTSIDE)

MAINTENANCE

RUN-AWAY OR CHIMNEY FIRE A CHIMNEY FIRE CAN PERMANENTLY DAMAGE YOUR CHIMNEY SYSTEM. THIS DAMAGE CAN ONLY BE REPAIRED BY REPLACING THE DAMAGED COMPONENT PARTS. CHIMNEY FIRE DAMAGE IS NOT COVERED BY THE LIMITED WARRANTY.

CAUSES:

1. Using incorrect fuel, or small pieces of fuel which would normally be used as kindling.
2. Leaving the door ajar too long and creating extreme temperatures as the air rushes in the open door. It is not recommended to leave the door open after lighting. The VCV's are designed to eliminate this function in the stove operation by injecting air immediately.
3. Improperly installed or worn gaskets.
4. Creosote buildup in the chimney.

SOLUTIONS:

1. Do not burn treated or processed wood, coal, charcoal, colored paper or cardboard.
2. Be careful not to over fire the appliance by leaving the door open too long after the initial start-up.
3. Replace worn, dried out (inflexible) gaskets.
4. Have your chimney cleaned regularly.

WHAT TO DO IF A RUN-AWAY OR CHIMNEY FIRE STARTS:

1. Close the draft fully (lowest position) by shutting off thermostat, and make sure firebox is closed tightly.
2. Call the local fire department.
3. Examine the chimney, attic and roof of the house, to see if any part has become hot enough to catch f ire. If necessary spray it with a fire extinguisher or water from a garden hose.
4. Do not operate the appliance again until you are certain the chimney has not been damaged.

CHIMNEY MAINTENANCE

The most efficient method to sweep the chimney is using a hard brush. Brush downwards so soot and creosote residues will come off the inner surface and fall to the bottom of the chimney where they can be removed easily. The chimney must be checked regularly and if creosote has accumulated, it must be removed without delay. Cleaning on a regular basis should be sufficient during the coldest months. ENSURE THE BYPASS DOOR IS OPEN AND BAFFLE AND BLANKET ARE REMOVED PRIOR TO CLEANING THE CHIMNEY SO THE SOOT AND CREOSOTE FALLS INTO THE FIREBOX. Chimney / Flue Inspection: 1. The chimney should be inspected regularly during the heating season. 2. If possible, the chimney should be dismantled and cleaned. 3. The chimney should be inspected for possible damage. 4. If it is in good condition, put the chimney back in place; otherwise, it must be replaced.

FIRE EXTINGUISHERS AND SMOKE DETECTORS All homes with a solid fuel burning appliance should have at least one fire extinguisher in a central location, known to all, and at least one smoke detector in the room containing the appliance. If the detector sounds an alarm, correct the cause but do not de-activate or relocate the smoke detector.

OPERATIONAL / INSPECTION / MAINTENANCE

IT IS VERY IMPORTANT TO KEEP ALL DOORS CLOSED DURING OPERATION UNLESS LOADING THE STOVE. The glass gasket and door gasket must be kept in good working order and seals inspected and maintained for a good seal.

Do not use substitute materials when changing gaskets, seals, or glass on the stove.
Do not slam the door closed or use the door as a pushing tool to shove fuel into the stove which would otherwise not fit.
Do not operate the stove with broken glass, or any broken seal, or dampers that do not function to close off the air supply to the stove.
Inspect bricks for wear or broken chunks when cleaning the stove and replace if necessary.

NOTE: This section is intended as an aid and does not supersede any local, state or like requirements. Check with officials or authorities having jurisdiction in your area.

SEE ACCESSORIES LIST. IT IS HIGHLY RECCOMMENDED TO TAKE OFF CHIMNEY CAP AND INSTALL A PLUG BEFORE BEING MOBILE IN YOUR STRUCTURE TO AVOID ASH BLOWING INSIDE THE STRUCTURE. IN A MOBILE BUILDING THE CHIMNEY MUST BE DISASSEMBLED.

Links to videos about this stove will be posted on our website.

NOTE:
Parts and accessories are also available on our web site: www.FlameInnovation.com

If you have any questions or problems, contact the Manufacturer or Dealer.

WARRANTY: Stove body is warrantied for a period of 10 years. No warranty on consumable parts such as inner bricks, burn tubes, catalytic converter, glass, baffle board, blanket, paint, etc. Shipping damage needs to be noted, and pictures sent at time of delivery to determine if you should accept the shipment or not and return stove shipment. WARRANTY CLAIMS MUST BE DIRECTED TO MAUFACTURER.

BURN AT OWNERS RISK. NOT RESPONSIBLE FOR ANY STOVE INSTALLATION

509 Fabrications, Inc.
Dba Flame Innovation
6512 W. Seltice Way
Post Falls, ID 83854
509-993-3767
208-660-3109
Info@509Fab.com

Appendix C: Calibrations

Established 1974

QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293
(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com

A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0182484A0912013i241204

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Digiweigh	DWP12i 300kg x 0.	82484A0912013i	#050	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
kg	0.01	QC033	12/4/24	12/28/23	12/2025

FUNCTIONAL CHECKS

SHIFT TEST	LINEARITY	REPEATABILITY	ENVIRONMENTAL CONDITIONS
Test Wt: 100 Tol: 0.05	Test Wt: HB44 Tol: HB44	Test Wt: 100 Tol: 0.01	☐ Good ☑ Fair ☐ Poor
As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	Temperature: 17.2°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
400	399.98	399.98	0.006
200	200.00	200.00	0.005
100	100.00	100.00	0.005
75	75.00	75.00	0.005
50	50.00	50.00	0.005
25	25.00	25.00	0.005

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	7/26/24	7/2026	20221688

Permanent Information Concerning this Equipment:
12 month calibration cycle. Scale calibrates in kg only.

Comments/Information Concerning this Calibration
12/04/2024: RH-37%

Report prepared/reviewed by: TLP **Date:** 12.04.2024 **Technician:** T.Peterson
Signature:

THIS CERTIFICATE SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE APPROVAL OF QUALITY CONTROL SERVICES, INC.

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. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	
Lab ID #:	129
Serial #:	
Calibration Date:	6/13/2025
Calibration Expiration:	12/13/2025
Barometric Pressure:	29.94 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Apex
Model:				
Lab ID#:	47	196	202	129c
Calibration Expiration Date:	6/4/2025	2/11/2025	6/17/2025	2/27/2026
Calibration γ Factor:	0.998			

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Caibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	107.399	60.166	125.330
Standard DGM Temperature (°F)	69.3	70.0	70.3
Standard DGM Pressure (in H_2O)	0.00	0.00	0.00
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	3.729	2.106	4.391
DGM Temperature (°F)	70.1	70.3	70.5
DGM Pressure (in H_2O)	1.69	1.09	4.25
Net Volume for Standard DGM (ft^3)	3.793	2.125	4.426
Net Volume for DGM (ft^3)	3.729	2.106	4.391

Dry Gas Meter γ Factor	1.012	1.005	0.996
γ Factor Deviation From Average	1.012	1.005	0.996

Average Gas Meter γ Factor: 1.004

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

www.Cal-Cert.com

Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #: 38860-203315-21 **Customer PO#:** 1126

Customer Name: PFS TECO

Customer Address: 11785 SE Highway 212, Suite 305

City: Clackamas **State:** OR **Zip:** 97015

Contact: Ethan Frederick

Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/24/2025 | Due: 01/31/2026 | Vendor: Fluke | Report #: EVL1027223
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	**Reference:**	ASME B40.100
Recommended Due Date:	February 27, 2026	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	69 °F
Type:	Pressure Transducer	**Humidity:**	32% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	129B
Capacity:	1 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 1.00 **Range Resolution:** 0.001 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± In H2O
0.000	0.00	0.00	0.00	0.00	0.00	0.01	0.0005
0.100	0.1059	0.1059	0.01	0.1019	0.00	0.01	0.0104
0.250	0.2575	0.2575	0.01	0.2545	0.00	0.01	0.0078
0.500	0.5012	0.5012	0.00	0.5047	0.00	0.01	0.0091
0.750	0.7511	0.7511	0.00	0.7435	-0.01	0.01	0.0198
1.000	1.0092	1.0092	0.01	0.9934	-0.01	0.01	0.0411
0.750	0.7546	0.7546	0.00	0.7446	-0.01	0.01	0.026
0.500	0.5054	0.5054	0.01	0.4943	-0.01	0.01	0.0288
0.250	0.2545	0.2545	0.00	0.2521	0.00	0.01	0.0062
0.100	0.0941	0.0941	-0.01	0.1009	0.00	0.01	0.0177
0.000	0.0000	0.0000	0.00	0.0000	0.00	0.01	0.0005

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Manufacturer: Red Lion **Type:** Pressure Transducer **Serial #:** Unknown

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.
Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.
All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-203315-21

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Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #:	38860-203316-21	**Customer PO#:** 1126	
Customer Name:	PFS TECO		
Customer Address:	11785 SE Highway 212, Suite 305		
City:	Clackamas	**State:** OR	**Zip:** 97015
Contact:	Ethan Frederick		
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015	

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/24/2025 | Due: 01/31/2026 | Vendor: Fluke | Report #: EVL1027223
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	**Reference:**	ASME B40.100
Recommended Due Date:	February 27, 2026	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	69 °F
Type:	Pressure Transducer	**Humidity:**	35% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	129C
Capacity:	5 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 5.00 **Range Resolution:** 0.01 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± In H2O
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005
0.50	0.4730	0.4730	-0.03	0.4903	-0.01	0.05	0.045
1.25	1.2178	1.2178	-0.03	1.2325	-0.02	0.05	0.038
2.50	2.4830	2.4830	-0.02	2.4763	-0.02	0.05	0.018
3.75	3.7075	3.7075	-0.04	3.7267	-0.02	0.05	0.05
5.00	4.9570	4.9570	-0.04	4.9676	-0.03	0.05	0.028
3.75	3.7411	3.7411	-0.01	3.7101	-0.04	0.05	0.08
2.50	2.4715	2.4715	-0.03	2.4686	-0.03	0.05	0.009
1.25	1.2346	1.2346	-0.02	1.2180	-0.03	0.05	0.043
0.50	0.4994	0.4994	0.00	0.4811	-0.02	0.05	0.047
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005

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Manufacturer: Red Lion **Type:** Pressure Transducer **Serial #:** Unknown

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.
Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.
All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

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Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203316-21

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Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	
Lab ID #:	130
Serial #:	
Calibration Date:	6/13/2025
Calibration Expiration:	12/13/2025
Barometric Pressure:	29.95 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Apex
Model:				
Lab ID#:	47	196	202	129c
Calibration Expiration Date:	6/4/2025	2/11/2025	6/17/2025	2/27/2026
Calibration γ Factor:	0.998			

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Caibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	67.836	90.653	121.304
Standard DGM Temperature (°F)	70.7	71.0	71.5
Standard DGM Pressure (in H_2O)	0.00	0.00	0.00
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	2.353	3.174	4.258
DGM Temperature (°F)	74.0	74.0	74.0
DGM Pressure (in H_2O)	1.77	0.95	4.09
Net Volume for Standard DGM (ft^3)	2.396	3.201	4.284
Net Volume for DGM (ft^3)	2.353	3.174	4.258

Dry Gas Meter γ Factor	1.018	1.010	0.999
γ Factor Deviation From Average	1.018	1.010	0.999

Average Gas Meter γ Factor: 1.009

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Report and Certificate of Calibration

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Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #:	38860-203317-21	**Customer PO#:** 1126	
Customer Name:	PFS TECO		
Customer Address:	11785 SE Highway 212, Suite 305		
City:	Clackamas	**State:** OR	**Zip:** 97015
Contact:	Ethan Frederick		
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015	

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/24/2025 | Due: 01/31/2026 | Vendor: Fluke | Report #: EVL1027223
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	**Reference:**	ASME B40.100
Recommended Due Date:	February 27, 2026	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	69 °F
Type:	Pressure Transducer	**Humidity:**	33% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	130B
Capacity:	1 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 1.00 **Range Resolution:** 0.001 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± In H2O
0.000	0.00	0.00	0.00	0.00	0.00	0.01	0.0005
0.100	0.0982	0.0982	0.00	0.1012	0.00	0.01	0.0078
0.250	0.2523	0.2523	0.00	0.2554	0.01	0.01	0.008
0.500	0.5071	0.5071	0.01	0.5033	0.00	0.01	0.0099
0.750	0.7544	0.7544	0.00	0.7510	0.00	0.01	0.0089
1.000	0.9942	0.9942	-0.01	1.0026	0.00	0.01	0.0218
0.750	0.7548	0.7548	0.00	0.7517	0.00	0.01	0.0081
0.500	0.5044	0.5044	0.00	0.4925	-0.01	0.01	0.0309
0.250	0.2422	0.2422	-0.01	0.2540	0.00	0.01	0.0307
0.100	0.0978	0.0978	0.00	0.1019	0.00	0.01	0.0106
0.000	0.0000	0.0000	0.00	0.0000	0.00	0.01	0.0005

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Manufacturer: Red Lion **Type:** Pressure Transducer **Serial #:** Unknown

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.
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All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203317-21

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Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

www.Cal-Cert.com

Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #: 38860-203318-21 **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/24/2025 | Due: 01/31/2026 | Vendor: Fluke | Report #: EVL1027223
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	**Reference:**	ASME B40.100
Recommended Due Date:	February 27, 2026	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	68 °F
Type:	Pressure Transducer	**Humidity:**	36% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	130C
Capacity:	5 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 5.00 **Range Resolution:** 0.01 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± In H2O
0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.005
0.50	0.4838	0.4838	-0.02	0.4885	-0.01	0.05	0.013
1.25	1.2024	1.2024	-0.05	1.2281	-0.02	0.05	0.067
2.50	2.4684	2.4684	-0.03	2.4855	-0.01	0.05	0.044
3.75	3.7132	3.7132	-0.04	3.7348	-0.02	0.05	0.056
5.00	4.9555	4.9555	-0.04	4.9530	-0.05	0.05	0.01
3.75	3.7299	3.7299	-0.02	3.7069	-0.04	0.05	0.06
2.50	2.4683	2.4683	-0.03	2.4679	-0.03	0.05	0.006
1.25	1.2380	1.2380	-0.01	1.2357	-0.01	0.05	0.008
0.50	0.4920	0.4920	-0.01	0.4858	-0.01	0.05	0.017
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005

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Manufacturer: Red Lion **Type:** Pressure Transducer **Serial #:** Unknown

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
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Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-203318-21

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Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	
Lab ID #:	204
Serial #:	
Calibration Date:	6/15/2025
Calibration Expiration:	12/15/2025
Barometric Pressure:	30.00 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Apex
Model:				
Lab ID#:	47	196	202	129c
Calibration Expiration Date:	6/4/2025	2/11/2025	6/17/2025	2/27/2026
Calibration γ Factor:	0.998			

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Caibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	82.909	173.718	81.231
Standard DGM Temperature (°F)	70.0	70.4	71.7
Standard DGM Pressure (in H_2O)	0.00	0.00	0.00
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	2.930	6.178	2.942
DGM Temperature (°F)	72.0	78.0	86.0
DGM Pressure (in H_2O)	1.77	3.71	0.67
Net Volume for Standard DGM (ft^3)	2.928	6.135	2.869
Net Volume for DGM (ft^3)	2.930	6.178	2.942

Dry Gas Meter γ Factor	0.997	0.996	0.998
γ Factor Deviation From Average	0.997	0.996	0.998

Average Gas Meter γ Factor: 0.997

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

www.Cal-Cert.com

Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #: 38860-203321-21 **Customer PO#:** 1126

Customer Name: PFS TECO

Customer Address: 11785 SE Highway 212, Suite 305

City: Clackamas **State:** OR **Zip:** 97015

Contact: Ethan Frederick

Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/24/2025 | Due: 01/31/2026 | Vendor: Fluke | Report #: EVL1027223
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 26, 2025	**Reference:**	ASME B40.100
Recommended Due Date:	February 26, 2026	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	73 °F
Type:	Pressure Transducer	**Humidity:**	26% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	204B
Capacity:	1 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 1.00 **Range Resolution:** 0.001 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± In H2O
0.000	0.00	0.00	0.00	0.00	0.00	0.01	0.0005
0.100	0.1002	0.1002	0.00	0.0997	0.00	0.01	0.0014
0.250	0.2413	0.2413	-0.01	0.2510	0.00	0.01	0.0252
0.500	0.4951	0.4951	0.00	0.5037	0.00	0.01	0.0223
0.750	0.7482	0.7482	0.00	0.7516	0.00	0.01	0.0089
1.000	0.9973	0.9973	0.00	1.0020	0.00	0.01	0.0122
0.750	0.7535	0.7535	0.00	0.7424	-0.01	0.01	0.0289
0.500	0.5029	0.5029	0.00	0.5019	0.00	0.01	0.0027
0.250	0.2515	0.2515	0.00	0.2541	0.00	0.01	0.0067
0.100	0.1003	0.1003	0.00	0.1007	0.00	0.01	0.0011
0.000	0.0000	0.0000	0.00	0.0000	0.00	0.01	0.0005

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Manufacturer: Red Lion **Type:** Pressure Transducer **Serial #:** Unknown

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

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This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens **Date:** February 26, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203321-21

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Report and Certificate of Calibration

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Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #:	38860-203322-21	**Customer PO#:** 1126	
Customer Name:	PFS TECO		
Customer Address:	11785 SE Highway 212, Suite 305		
City:	Clackamas	**State:** OR	**Zip:** 97015
Contact:	Ethan Frederick		
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015	

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/24/2025 | Due: 01/31/2026 | Vendor: Fluke | Report #: EVL1027223
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 26, 2025	**Reference:**	ASME B40.100
Recommended Due Date:	February 26, 2026	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	74 °F
Type:	Pressure Transducer	**Humidity:**	29% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	204C
Capacity:	5 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 5.00 **Range Resolution:** 0.01 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± In H2O
0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.005
0.50	0.5011	0.5011	0.00	0.5040	0.00	0.05	0.009
1.25	1.2522	1.2522	0.00	1.2541	0.00	0.05	0.007
2.50	2.5116	2.5116	0.01	2.5097	0.01	0.05	0.008
3.75	3.7589	3.7589	0.01	3.7573	0.01	0.05	0.008
5.00	4.9905	4.9905	-0.01	4.9750	-0.03	0.05	0.041
3.75	3.7383	3.7383	-0.01	3.7527	0.00	0.05	0.038
2.50	2.4902	2.4902	-0.01	2.5049	0.00	0.05	0.038
1.25	1.2419	1.2419	-0.01	1.2591	0.01	0.05	0.045
0.50	0.4995	0.4995	0.00	0.5015	0.00	0.05	0.007
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005

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Manufacturer: Red Lion **Type:** Pressure Transducer **Serial #:** Unknown

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
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This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens **Date:** February 26, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203322-21

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Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-60
Lab ID #:	55
Serial #:	810016
Calibration Date:	8/11/2025
Calibration Expiration:	2/11/2026
Barometric Pressure:	30.02 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	
Model:	SK25Da	52II	DBX2	
Lab ID#:	47	196	202	
Calibration Expiration Date:	6/30/2026	2/11/2026	7/1/2026	
Calibration γ Factor:	0.998			

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Caibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	111.833	85.340	79.311
Standard DGM Temperature (°F)	76.7	76.9	77.1
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)	3.988	3.043	2.850
DGM Temperature (°F)	83.4	84.1	84.4
DGM Pressure (in H_2O)	0.00	0.00	0.00
Net Volume for Standard DGM (ft^3)	3.949	3.014	2.801
Net Volume for DGM (ft^3)	3.988	3.043	2.850

Dry Gas Meter γ Factor	1.001	1.002	0.994
γ Factor Deviation From Average	1.001	1.002	0.994

Average Gas Meter γ Factor: 0.999

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Report and Certificate of Calibration

CAL-CERT
CALIBRATION CERTIFICATION

Portland Laboratory
5777 SE International Way
Milwaukie, OR 97222
800-356-4662
503-654-9620

Anaheim Laboratory
120 S. Chaparral Ct Suite 110
Anaheim Hills, CA 92808
888-700-4100
714-696-5300

www.Cal-Cert.com

Report #:	41210-28785-3646	**Customer PO#:**	1131
Customer Name:	PFS TECO		
Customer Address:	11785 SE Highway 212, Suite 305		
City:	Clackamas	**State:** OR	**Zip:** 97015
Contact:	Ethan Frederick		
Service Address:	5777 SE International Way Milwaukie, OR 97222		

Calibration Standards

10-00391 | Thermo-Hygrometer | Comark | SN: 6217150001 | Cal: 04/09/2025 | Due: 04/30/2026 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 39951-30759-5013
LP-01158 | Electrical Meter | Keithley | SN: 1388607 | Cal: 07/24/2023 | Due: 07/31/2025 | Vendor: Techmaster Electronics | Report #: TSV-0-545118

Instrument Data

Calibration Date:	July 7, 2025	**Reference:**	Manufactures Tolerances
Recommended Due Date:	July 7, 2027	**Cal-Cert Procedure:**	CP-080
Calibration Frequency:	24 Months	**Indicating System:**	Digital
Manufacturer:	Delmhorst	**Temperature:**	81 °F
Type:	Resistivity Standard	**Humidity:**	40% RH
Model Number:	MCS-1	**Asset #:**	94
Serial #:	94	**Service Location:**	Cal-Cert Lab
Capacity:	120 Megaohms	**As Found:**	Pass
Tolerance:	1.00 % of indication	**As Left:**	Pass

Instrument Range: 120 Megaohms **Resolution:** 0.001 **Mode Verified:** Resistance

Standard Reading	UUT As Found	UUT Reading #1	Error	UUT Reading #2	Error
0.000	0.000	0.000	0.000	0.000	0.000
1.100	1.095	1.095	-0.005	1.095	-0.005
120.000	120.450	120.450	0.450	120.450	0.450
0.000	0.000	0.000	0.000	0.000	0.000

Expanded Uncertainty± 2.50 Megaohms

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

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Service Engineer:	Brent Enbysk	**Date:**	July 7, 2025
Quality Manager:	Tony Lewandowski	**Signature:**	

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DICK MUNNS COMPANY
LIQUID & GAS FLOW CALIBRATION

ISO 17025:2017
ACCREDITED LABORATORY

ilac-MRA

IAS ACCREDITED Calibration Laboratory

Cert# CL-122

CERTIFICATE OF CALIBRATION

CUSTOMER:	**PFS-TECO :** CLACKAMAS, OR	**CALIBRATION DATE:**	***07/01/2025***
PO NUMBER:	1130	**CALIBRATION DUE:**	*07/01/2026*
INST. MANUFACTURER:	DWYER	**PROCEDURE:**	T.O.33K6-4-1769-1
INST. DESCRIPTION:	VELOMETER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70°F
MODEL NUMBER:	471	**RECEIVED CONDITION:**	WITHIN MFG. SPECS.
SERIAL NUMBER:	**CP288559 ID# 095**	**LEFT CONDITION:**	WITHIN MFG. SPECS.
RATED ACCURACY:	SEE NOTES BELOW.	**AMBIENT CONDITIONS:**	763mm HGA 45% RH 72°F
UNCERTAINTY GIVEN:	± 0.69% RD ; k=2	**CERTIFICATE FILE #:**	**490265.2025**

NOTES: ± 3.0% FS (0-500 / 0-1500) ** ± 4.0% F.S. (0-5000) **± 5.0% F.S. (0-15000) ** ± 2 °F

Q.MANUAL IM 2.0 REV 2020.2 DATED 7-27-2020

DECISION RULE: SIMPLE ACCEPTANCE. MEASUREMENT UNCERTAINTIES NOT TAKEN INTO CONSIDERATION WHEN DETERMINING PASS/FAIL

UUT INDICATED FT/MIN	DM.STD. ACTUAL FT/MIN	UUT INDICATED DEG. F	DM STD. ACTUAL DEG. F
65	68	0 TO 200°F	0 TO 200°F
149	154	42.8	44.3
280	289	70.6	72.1
491	504	97.5	99.0
543	557		
1017	1044		
1495	1535		
528	552		
3242	3327		
4990	5130		
6986	7220		
14859	15348		

STANDARDS USED:		
A312 ± .02% RD -140 TO 1372 DEG °C TRACE# DMCA1328	**DUE**	**04/24/26**
A69 12INCH AIR FLOW 50 – 8000FPM +/- 0.69 % RD TRACE#1649766843,06290041521,1616396227	**DUE**	**03/31/26**

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). Unless otherwise directed by the customer, **Dick Munns uses a decision rule of Simple Acceptance as defined in ILAC G8 with a TUR of 1:1 or better.** Calibration has been performed according to the shown procedure. The use of IAS/ILAC logo indicates calibrations are in accordance to ISO/IEC 17025:2017.

Dick Munns Company · 11133 Winners Circle, Los Alamitos, CA 90720
Phone: 714-827-1215 · www.dickmunns.com

This Calibration Certificate shall not be reproduced except, in full, without approval by Dick Munns Company. The data shown applies only to the instrument being calibrated and under the stated conditions of calibration.

Issuing Date: 07/01/2025

Approved By:

Cal. Technician: A.V.

Calibrated at: ✓ Lab
___ On-Site (Customer's)

Certificate of Calibration

Certificate Number: 743892

JJ Calibrations, Inc.
7724 SE Aspen Summit Drive
Portland, OR 97266-9217
Phone 503.786.3005
FAX 503.786.2994

PFS TECO
11785 SE Hwy 212
Suite 305
Clackamas, OR 97015

0723.01
Calibration

PO: 1033
Order Date: 03/08/2021
Authorized By: N/A

Property #: 097
User: N/A
Department: N/A
Make: Unknown
Model: 10 Lbs.
Serial #: 097
Description: Mass
Procedure: DCN 500901
Accuracy: Raw Data

Calibrated on: 03/18/2021
*Recommended Due: 03/18/2026
Environment: 19 °C 41 % RH
* As Received: Other - See Remarks
* As Returned: Other - See Remarks
Action Taken: Calibrated
Technician: 126

Remarks: * Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit. Uncertainties include the effects of the unit.

Data is provided for your determination of acceptability. Received/returned without accessories.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
484A	Rice Lake	1kg-10kg (Class ASTM 1)	Mass Set,	05/28/2021	699197
503A	Rice Lake	1mg-200g (Class 0)	Mass Set,	09/11/2021	729241
550A	And (A&D) Co.	HP-30K	Balance 30 Kg	12/31/2021	739307
723A	Rice Lake	1mg-200g (Class 0)	Mass Set,	06/09/2021	723431

Measurement Data

Parameter / Measurement Description	Range	Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After								Accredited = ü
Mass								
Raw Data		g	4535.92370000	0.0000000	0.0000000	0.1785299	4536.1022299 g	3.5E-01 ü

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to either the SI or to National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2017, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless stated in the comments, certificates reflect the "Simple Acceptance Rule" as specified by JCGM 106:2012. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without written approval of JJ Calibrations.

Reviewer

3 Issued 03/25/2021 Rev # 15

Inspector

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A2LA ACCREDITED

CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0134307497250605

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	6/5/25	12/4/24	12/2025

FUNCTIONAL CHECKS

ECCENTRICITY

Test Wt:	Tol:
100	0.0003

As-Found: Pass: ☑ Fail: ☐

As-Left: Pass: ☑ Fail: ☐

LINEARITY

Test Wt:	Tol:
50 x 4	0.0002

As-Found: Pass: ☑ Fail: ☐

As-Left: Pass: ☑ Fail: ☐

STANDARD DEVIATION

Test Wt:	Tol:
100	0.0001

1. 100.0000	5. 100.0000	9. 99.9999
2. 99.9999	6. 100.0000	10. 99.9999
3. 99.9999	7. 99.9999	**Result**
4. 100.0000	8. 99.9999	0.00005

ENVIRONMENTAL CONDITIONS

☐ Good ☑ Fair ☐ Poor

Temperature: 22.6°C

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	199.9994	200.0000	0.00017
100	99.9998	100.0000	0.00016
50	49.9999	50.0001	0.00015
20	19.9999	19.9999	0.00015
0.1	0.1000	0.0999	0.00015
0.05	0.0500	0.0499	0.00015

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	Rice Lake	10 kg to 1 mg	D123	7/1/24	7/2025	20241353

Permanent Information Concerning this Equipment:

6 month calibration cycle

Comments/Info Concerning this Calibration:

6/25 - Cleaned, leveled, & adjusted span. RH = 49%

Report prepared/reviewed by: _____ **Date:** 6.5.25 **Technician:** D.Oudeans

Signature: D. Oud

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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. Results relate only to the item(s) tested. Unless otherwise noted, statements of conformity do not include measurement

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ACCREDITED
CERTIFICATE #1550.01

Report of Calibration

Firm: PFS-TECO
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 05/09/22
Purchase Order: 1067
Traceable Number: 20220682

Test Item: 200 mg and 100 mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner
Customer ID: Listed in Table

Material	Assumed Density	Range	Tolerance Class
Stainless Steel	7.95 g/cm^3	200 mg & 100 mg	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:
100 g to 1 mg Working Standards Were Calibrated: 07/02/21 Due: 07/31/22 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. 8.0 g/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: 05/09/22

Signature David S. Thompson

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ACCREDITED
CERTIFICATE #1550.01

Report of Calibration

Firm: PFS-TECO
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 05/09/22
Purchase Order: 1067
Traceable Number: 20220682

Test Item: 200 mg and 100 mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner
Customer ID: Listed in Table

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.93 to 21.94	760.7 to 760.8	47.8 to 47.9

Conventional Mass Value

Nominal Value	As Found Value (g)	As Found Correction* (mg)	As Left Value (g)	As Left Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
200 mg, 1000101395, #109-B	0.2000082	0.0082	0.2000082	0.0082	0.0014	0.010
100 mg, 1000126267, #109-A	0.1000065	0.0065	0.1000065	0.0065	0.0014	0.010

*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 ASTM Class 1 tolerances As Found.

Recalibration Due: The customer has requested a 5-year calibration cycle. The calibration due date for these weights is 05/09/27. The values listed above were found at the time of calibration. Any number of factors may cause these items to drift out of calibration before the calibration interval has expired.

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 17025:2017 *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: 05/09/22

Signature David S. Thompson

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A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI01C101887029241204

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Mettler	IND570 - 1000lbx0.	C101887029	#190	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
lbs	0.02	QC033	12/4/24	12/28/23	12/2025

FUNCTIONAL CHECKS

SHIFT TEST	LINEARITY	REPEATABILITY	ENVIRONMENTAL CONDITIONS
Test Wt: 400 Tol: 0.10	Test Wt: HB44 Tol: HB44	Test Wt: 200 Tol: 0.04	☐ Good ☑ Fair ☐ Poor
As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	Temperature: 18.7°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	N/A	N/A	0.012
600	600.00	600.00	0.011
400	399.98	399.98	0.011
200	199.98	199.98	0.011
100	99.98	99.98	0.011
50	49.98	49.98	0.011

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	7/26/24	7/2026	20221688

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

12/04/2024: N/A due to overload at 1000lb. RH=35%

Report prepared/reviewed by: TLP **Date:** 12-04-2024 **Technician:** E.J. Yasko

Signature:

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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. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

Report and Certificate of Calibration

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A2LA ACCREDITED CERT #4986.01

Report #: 39356-1216144-4847 **Customer PO#:** 1128
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 5777 SE International Way Milwaukie, OR 97222

Calibration Standards

10-00027 | Gage Block Set | Mitutoyo | SN: 975536 | Cal: 03/28/2023 | Due: 03/31/2025 | Vendor: Cal-Cert | Report #: 28026-56355-5
10-00954 | Gage Block Set | Shars | SN: 120018 | Cal: 05/26/2023 | Due: 05/26/2025 | Vendor: American Gage | Report #: 109141
LP-01346 | Thermo-Hygrometer | Comark | SN: 06210350198 | Cal: 03/08/2024 | Due: 03/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 33563-67215-3616

Instrument Data

Calibration Date: March 5, 2025
Calibration Due Date: March 5, 2026
Calibration Frequency: 12 Months
Manufacturer: Craftsman
Type: Tape Measure
Model Number: CMHT37365
Serial #: Unknown
Capacity: 25.00 Feet

Reference: Manufacturer's Spec
Cal-Cert Procedure: CP-115
Indicating System: Scaling
Temperature: 66 °F
Humidity: 40% RH
Asset #: 209
Service Location: Cal-Cert Lab
As Found: Pass
As Left: Pass

Instrument Range: 25.000 Feet **Range Resolution:** 0.06250 Feet

Calibration Standard	As Found Reading	Verification Reading #1	Verification Reading #2
0.0000	0.0000	0.0000	0.0000
0.5000	0.5000	0.5000	0.5000
0.1000	0.1000	0.1000	0.1000
12.0000	12.0000	12.0000	12.0000
48.0000	48.0000	48.0000	48.0000
96.0000	96.0000	96.0000	96.0000
192.0000	192.0000	192.0000	192.0000

Expanded Uncertainty ± 0.07217 Feet

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.
Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.
All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

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Service Engineer: Justin Roye **Date:** March 5, 2025

Quality Manager: Tony Lewandowski **Signature:**

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Report and Certificate of Calibration

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Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #:	38860-206392-21	**Customer PO#:** 1126	
Customer Name:	PFS TECO		
Customer Address:	11785 SE Highway 212, Suite 305		
City:	Clackamas	**State:** OR	**Zip:** 97015
Contact:	Ethan Frederick		
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015	

Calibration Standards

14-00235 | Thermocouple Meter | Tegam | SN: T-276988 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 2400 °F | Report #: 36408-30865-3646
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 26, 2025	**Reference:**	Navair 17-20ST-95
Recommended Due Date:	February 26, 2026	**Cal-Cert Procedure:**	CP-013
Calibration Frequency:	12 Months	**Indicating System:**	Computer
Manufacturer:	National Instruments	**Temperature:**	70 °F
Type:	Data Logger	**Humidity:**	32% RH
Model Number:	NI 9213	**Asset #:**	216 Booth 2
Serial #:	1E286FA	**Service Location:**	Service Address
Resolution:	0.1 °F	**As Found:**	Pass
Capacity:	2,500 °F	**As Left:**	Pass
Tolerance:	± 2.0 °F		
Thermocouple Type:	K		

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Tunnel	0.00	0.00	0.00	0.00	0.00	0.436
	500.00	500.00	500.00	500.00	0.00	
	1000.00	999.90	999.90	999.90	-0.10	
	1500.00	1499.80	1499.80	1499.90	-0.15	
	2000.00	1999.70	1999.70	1999.80	-0.25	
	2400.00	2399.60	2399.60	2399.70	-0.35	

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Flue	0.00	-0.20	-0.20	-0.20	0.20	0.436
	500.00	499.80	499.80	499.90	-0.15	
	1000.00	999.80	999.80	999.80	-0.20	
	1500.00	1499.80	1499.80	1499.80	-0.20	
	2000.00	1999.50	1999.50	1999.50	-0.50	
	2400.00	2399.50	2399.50	2399.50	-0.50	

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Manufacturer: National Instruments **Type:** Data Logger **Serial #:** 1E286FA

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Filter A	0.00	0.00	0.00	0.00	0.00	0.436
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	999.90	999.90	999.90	-0.10	
	1500.00	1499.80	1499.80	1499.80	-0.20	
	2000.00	1999.80	1999.80	1999.80	-0.20	
	2400.00	2399.60	2399.60	2399.70	-0.35	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Back	0.00	-0.40	-0.40	-0.40	0.40	0.436
	500.00	499.50	499.50	499.50	-0.50	
	1000.00	999.60	999.60	999.50	-0.45	
	1500.00	1499.50	1499.50	1499.40	-0.55	
	2000.00	1999.20	1999.20	1999.30	-0.75	
	2400.00	2399.20	2399.20	2399.20	-0.80	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Catalyst	0.00	(0.60)	(0.60)	(0.60)	0.60	0.436
	500.00	499.40	499.40	499.40	-0.60	
	1000.00	999.40	999.40	999.40	-0.60	
	1500.00	1499.30	1499.30	1499.20	-0.75	
	2000.00	1999.10	1999.10	1999.10	-0.90	
	2400.00	2398.80	2398.80	2398.90	-1.15	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Meter A	0.00	-0.70	-0.70	-0.90	0.80	0.511
	500.00	499.20	499.20	499.10	-0.85	
	1000.00	999.20	999.20	999.20	-0.80	
	1500.00	1499.00	1499.00	1499.10	-0.95	
	2000.00	1999.00	1999.00	1998.90	-1.05	
	2400.00	2398.80	2398.80	2398.70	-1.25	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Left	0.00	-0.80	-0.80	-0.80	0.80	0.436
	500.00	499.10	499.10	499.10	-0.90	
	1000.00	999.20	999.20	999.10	-0.85	
	1500.00	1499.00	1499.00	1499.10	-0.95	
	2000.00	1998.90	1998.90	1998.90	-1.10	
	2400.00	2398.60	2398.60	2398.70	-1.35	

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Manufacturer: National Instruments **Type:** Data Logger **Serial #:** 1E286FA

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Right	0.00	-1.00	-1.00	-1.00	1.00	0.436
	500.00	499.00	499.00	498.90	-1.05	
	1000.00	999.00	999.00	999.00	-1.00	
	1500.00	1498.80	1498.80	1498.90	-1.15	
	2000.00	1998.70	1998.70	1998.80	-1.25	
	2400.00	2398.50	2398.50	2398.60	-1.45	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Filter B	0.00	0.00	0.00	0.00	0.00	0.511
	500.00	500.40	500.40	500.50	0.45	
	1000.00	1000.10	1000.10	1000.20	0.15	
	1500.00	1499.80	1499.80	1499.60	-0.30	
	2000.00	1999.30	1999.30	1999.20	-0.75	
	2400.00	2398.60	2398.60	2398.80	-1.30	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Top	0.00	-1.20	-1.20	-1.20	1.20	0.511
	500.00	498.80	498.80	498.70	-1.25	
	1000.00	998.80	998.80	998.80	-1.20	
	1500.00	1498.70	1498.70	1498.60	-1.35	
	2000.00	1998.60	1998.60	1998.40	-1.50	
	2400.00	2398.30	2398.30	2398.30	-1.70	

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.
Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.
All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens **Date:** February 26, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-206392-21

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Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

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Address 5777 SE International Way Milwaukie, OR 97222

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A2LA ACCREDITED CERT #4986.01

Report #: 38860-206392-21-B **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

14-00235 | Thermocouple Meter | Tegam | SN: T-276988 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 2400 °F | Report #: 36408-30865-3646
14-01349 | Thermo-Hygrometer | Comark | SN: 06210350162 | Cal: 08/23/2024 | Due: 08/31/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	**Reference:**	Navair 17-20ST-95
Recommended Due Date:	February 27, 2026	**Cal-Cert Procedure:**	CP-013
Calibration Frequency:	12 Months	**Indicating System:**	Computer
Manufacturer:	National Instruments	**Temperature:**	65 °F
Type:	Data Logger	**Humidity:**	40% RH
Model Number:	NI 9213	**Asset #:**	216 Booth 2
Serial #:	1E286FA	**Service Location:**	Service Address
Resolution:	0.1 °F	**As Found:**	Pass
Capacity:	2,400 °F	**As Left:**	Pass
Tolerance:	± 3.0 °F		
Thermocouple Type:	K		

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Bottom	0.00	-1.50	-1.50	-1.50	1.50	
	500.00	498.50	498.50	498.60	-1.45	
	1000.00	998.50	998.50	998.60	-1.45	
	1500.00	1498.40	1498.40	1498.40	-1.60	0.511
	2000.00	1998.20	1998.20	1998.00	-1.90	
	2400.00	2397.90	2397.90	2397.80	-2.15	
	0.00	-1.50	-1.50	-1.50	1.50	

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Meter B	0.00	-1.60	-1.60	-1.60	1.60	
	500.00	498.50	498.50	498.50	-1.50	
	1000.00	998.60	998.60	998.50	-1.45	
	1500.00	1498.40	1498.40	1498.30	-1.65	0.436
	2000.00	1998.10	1998.10	1998.00	-1.95	
	2400.00	2397.70	2397.70	2397.70	-2.30	
	0.00	-1.50	-1.50	-1.60	1.55	

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Manufacturer: National Instruments **Type:** Data Logger **Serial #:** 1E286FA

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Meter C	0.00	-1.70	-1.70	-1.70	1.70	0.436
	500.00	498.20	498.20	498.30	-1.75	
	1000.00	998.30	998.30	998.30	-1.70	
	1500.00	1498.20	1498.20	1498.10	-1.85	
	2000.00	1997.90	1997.90	1997.90	-2.10	
	2400.00	2397.50	2397.50	2397.60	-2.45	
	0.00	-1.70	-1.70	-1.70	1.70	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Filter C	0.00	-1.50	-1.50	-1.50	1.50	0.436
	500.80	498.50	498.50	498.50	-2.30	
	1000.40	998.50	998.50	998.40	-1.95	
	1500.00	1498.30	1498.30	1498.20	-1.75	
	1999.40	1998.00	1998.00	1998.00	-1.40	
	2399.10	2397.70	2397.70	2397.60	-1.45	
	0.00	-1.50	-1.50	-1.60	1.55	

	Thermocouple LOGGING FUNCTION					
Channel	**Calibration Standard**	**UUT As Found**	**UUT As Left Reading 1**	**UUT As Left Reading 2**	**As Left Error**	**Expanded Uncertainty±**
Ambient	0.00	(1.90)	(1.90)	(1.80)	1.85	0.576
	20.00	18.30	18.30	18.50	-1.60	
	40.00	38.40	38.40	38.60	-1.50	
	60.00	58.40	58.40	58.40	-1.60	
	80.00	78.50	78.50	78.60	-1.45	
	100.00	98.50	98.50	98.60	-1.45	
	0.00	(1.80)	(1.80)	(1.50)	1.65	

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.
Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.
All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-206392-21-B

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Edgetech Instruments

CERTIFICATE OF CALIBRATION

Customer: PFS-TECO
Date of Certificate Issue: 07/11/25

Certificate No.: 54129_07.25_DTII

11785 SE Highway 212, Suite 305; Clackamas, OR 97015

Procedure: PRM07-07-DewTrak II

Manufacturer: Edgetech Instruments

Cal Date: 07/11/25

Model: DewTrak II / D2

Due Date: 07/11/26

Description: Chilled Mirror Hygrometer

Cal Interval Months: 12

Serial No.: 54129 / 2A5910

SO/RMA No.: 17433

Asset/ID No.: Unknown 205

As-Found Condition: New Sensor

Calibration Method: Comparison

As-Left Condition: In Tolerance

Environmental Conditions: Temperature: 76.4 °F | Humidity: 53.9 % rh

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This certifies the above instrument meets or exceeds published measurements specifications and has been calibrated using standards traceable to the international system of units (SI) through the National Institute of Standard and Technology (NIST). The policies and procedures used at this facility are in full compliance with ISO/IEC 17025-2017(E) international standard. This certificate shall not be reproduced, except in full, without the written approval of the calibration laboratory of **Edgetech Instruments Inc.** The environment in which this instrument was calibrated is maintained within the operating specifications of the instrument and the standards. All calibration results relate to items calibrated only.

Note: The calibration results were analyzed and the pass or fail criteria are based on the accuracy specifications provided on this item report. The uncertainty of measurement is not factored in for pass or fail criteria and is only reported for customer analysis.

Standard Used:

Asset #	Make / Model	Due Date
285	ETI DewTrak II	10/24/25
292	ETI RH-Calibrator	12/09/25

ilac-MRA PJLA Calibration

Accreditation # 92175

Performed by: Dexter Ekeh
Dexter Ekeh, Calibration Technician

Verified by: Phil Schofield
Phil Schofield, Calibration Manager

Calibration Location: Edgetech Instruments at 399 River Rd., Hudson, MA 01749

399 River Road, Hudson, MA 01749 P: +1 978-310-7760 F: +1 978-310-7767
H2O@edgetechinstruments.com / www.edgetechinstruments.com

CERTIFICATE OF CALIBRATION

Customer: PFS-TECO **Certificate No.: 54129_07.25_DTII**
Date of Certificate Issue: 07/11/25

Decision rule 1 Measurement of uncertainty is not taken into account when stating conformity .When determining an "in-tolerance" or "out-of-tolerance" conditions on calibrations the measurement uncertainty will not be taken into account .When a measurement result is declared "in-tolerance", the measured value(s) shall fall within the appropriate specification limit and the uncertainty of the measured value shall be stated and provided

UUT Accuracy Specifications | FP/DP: +/- 0.2 °C

As Left Data: New Sensor

Test:	*Ref. °C*	*UUT °C*	*Dev. °C*	*U k=2 C*
Dew Point	**30.12**	**29.99**	**0.13**	**0.05**
Dew Point	**13.85**	**13.71**	**0.14**	**0.05**
Frost Point	**-10.00**	**-10.12**	**0.12**	**0.05**

Note: Compliance – The measurement results are within (or below) the specification limit when the measurement uncertainty is taken into account. For the above calibration point that it is not possible to state compliance using a 95 % coverage probability for the expanded uncertainty the measurement result is below the limit or within specification

End of Certificate **DT II_05_22_13_FP**



Compressed gas, n.o.s.
(Carbon Monoxide, Carbon Dioxide, Oxygen, Nitrogen)
UN1956

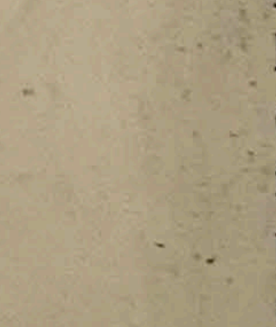
SPG 5P10162.5VM2
Part Number

Primary Standard, +/- 0.02% Absolute

2.500 % Carbon Monoxide	CAS:	630-08-0
10.00 % Carbon Dioxide	CAS:	124-38-9
10.00 % Oxygen	CAS:	7782-44-7
Balance Nitrogen	CAS:	7727-37-9

DANGER: CAUSES DAMAGE TO ORGANS THROUGH PROLONGED OR REPEATED EXPOSURE. CONTAINS GAS UNDER PRESSURE; MAY EXPLODE WHEN HEATED. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. MAY INCREASE RESPIRATION AND HEARTRATE. Use only with equipment of compatible materials of construction and rated for cylinder pressure. Protect from sunlight when ambient temperature exceeds 52C (125F). Use a back flow preventive device in the piping. Close valve after each use and when empty. Do not open valve until connected to equipment prepared for use. Obtain special instructions before use. Protect from sunlight. Store in a well-ventilated place. IF exposed or concerned: Get medical advice. Store locked up. Dispose of contents/container in accordance with container/supplier owner instructions. Do not handle until all safety precautions have been read and understood. Do not breathe gas. Wash hands throroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves, protective clothing, eye protection, and/or face protection. Read and follow the Safety Data Sheet (SDS) before use.

FIRST AID: IF ON SKIN: wash with plenty of water. IF INHALED: Remove person to fresh air and keep comfortable for breathing.IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing. IF exposed or concerned: Get medical advice.





WARNING: This product can expose you to Carbon Monoxide which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Lot No : 1-053-122
Serial Number: CC341544
SPG 5P10162.5VM2
Part Number
PO # 206493
Expires: 2-2024

NorLAB

To Order Call: 800-657-6672

In Emergency Call: 1-800-424-9300

NorLAB, Inc.
698 W Gowen Road
Boise, Idaho, 83705

IN CASE OF EMERGENCY: CALL 1-800-645-4633 SDS ID: P-18-0301-H DO NOT REMOVE THIS LABEL

Lot No. 70086426104
Cylinder No. DT0042934
Part No. NI CD17CO8E-AS
Volume: 99 ft3
Fill Date: 09/17/2024
Expiration Date: 09/26/2032

ProSpec
By Linde

Linde Gas & Equipment Inc.
5700 S. Alameda...
Los Angeles, ... 8

UN1956 Compressed gas, n.o.s. (Nitrogen, Oxygen)



EPA Protocol

Molar Concentration	Component	CAS
17.32 %	Carbon dioxide	124-38-9
4.35 %	Carbon monoxide	630-08-0
16.96 %	Oxygen	7782-44-7
Balance	Nitrogen	7727-37-9

Danger



CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. CAUSES DAMAGE TO ORGANS THROUGH PROLONGED OR REPEATED EXPOSURE. MAY INCREASE RESPIRATION AND HEART RATE. ASPHYXIATING EVEN WITH ADEQUATE OXYGEN.

TLV:

Carbon dioxide 5000 ppm
Carbon monoxide 25 ppm

Obtain special instructions before use; Do not handle until all safety precautions have been read and understood; Do not breathe gas/vapours; Wash exposed skin thoroughly after handling; Do not eat, drink or smoke when using this product; Wear protective gloves/protective clothing/eye protection/face protection; IF EXPOSED OR CONCERNED: Get medical advice/attention; Get medical advice/attention if you feel unwell; Store locked up; Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements; Use and store only outdoors or in a well-ventilated place; Use a back flow preventive device in the piping; Use only with equipment rated for cylinder pressure; Do not open valve until connected to equipment prepared for use; Close valve after each use and when empty. Protect from sunlight when ambient temperature exceeds 52°C (125°F); Avoid breathing gas, vapors; IF INHALED: Remove person to fresh air and keep comfortable for breathing. ; Call a POISON CENTER or doctor/physician.

FIRST AID

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

IF IN EYES: Immediately ... minutes.Hold the eyelids open and away from the eyeballs to ensure that all surfaces ...