Pacific Energy Fireplace Products Ltd.

Project # 22-861
Model: TN25 C
Type: Catalytic Wood Fired Heater
March 6, 2023
Revised: August 4, 2023

ASTM E2780 Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters
EPA Test Method 28R for Certification and Auditing of Wood Heaters

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Revision Summary

Date: March 6, 2023 – Original Issue

Date: June 27, 2023 – The following revisions were made per a request from EPA:

-Added clarifying language that the usable firebox volume and the total firebox volume are the same and there is no difference between the two, see page 12 and 13 of report.

-Updated drawings in Appendix D to demonstrate the catalyst probe is within 1” of the catalyst exit, added a note to the appliance description on page 12 stating that the catalyst probe complies with this requirement.

Date: August 4, 2023 – The following revisions were made per a request from EPA:

-Updated manufacturer’s instructions (in Appendix B) to include:

-Instructions for use of catalyst bypass, see page 252 of Non-CBI report

-Location of temperature sensor, see page 249 of Non-CBI report

-Instructions for operation on low air setting, see page 233 of Non-CBI report

-Added required federal warning, see page 233 of Non-CBI report

-Added information on how to exercise warranty rights, see page 261 of Non-CBI report

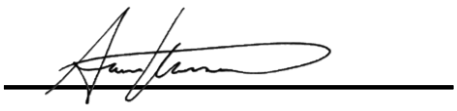
Contents

Affidavit

PFS-TECO was contracted by Pacific Energy Fireplace Products Ltd. (Pacific Energy) to provide testing services for the TN25 C Catalytic Wood-Fired Room Heater per EPA Method 28R, *Certification and Auditing of Wood Heaters*. All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory beginning on 1/17/2023 and ending on 1/23/2023. PFS-TECO's Portland Laboratory is located at 11785 SE Highway 212 – Suite 305, Clackamas, Oregon 97015. Testing procedures followed EPA Method 28R and ASTM E2780, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters*. 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 17025:2017 "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, Testing Supervisor

Introduction

Pacific Energy contracted with PFS-TECO to perform EPA certification testing on the TN25 C Wood-Fired Room Heater. All testing was performed at PFS-TECO's Portland Laboratory. All testing was performed by Aaron Kravitz.

Notes

- Prior to start of testing, 50 hours of conditioning was performed by the manufacturer at a medium burn setting in accordance with ASTM E2780.
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- A separate, independent, third filter train was utilized to determine 1st hour emissions for all test runs.
- A total of 5 test runs were completed. One test run in each of the 4 specified burn rate categories, as well as a fan confirmation test performed at a category 2 burn rate. All runs have been found to be appropriate, no anomalies occurred. See the Run Narrative section for further detail on each run.

Wood Heater Identification and Testing

- Appliance Tested: ***TN25 C***
- Serial Number: ***PFS Tracking Number 136***
- Manufacturer***: Pacific Energy***
- Catalyst: ***Yes***
- Heat exchange blower: ***Optional***
- Type: ***Wood Stove***
- Style: ***Free-Standing***
- Date Received: ***Tuesday, January 10, 2023***
- Testing Period – Start: ***Tuesday, January 17, 2023***
  Finish: ***Monday, January 23, 2023***
- Test Location: ***PFS Teco***
  11785 SE Hwy 212
  Clackamas, OR 97015
- Elevation: ***~131 Feet above sea level***
- Test Technician(s): ***Aaron Kravitz***
- Observers: ***None***

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Aaron Kravitz. All procedures used are directly from ASTM E2780 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
189	Mettler 3'x3' floor scale w/digital weight indicator
132	Digiweigh DWP-440 Platform Scale
53	APEX XC-60-ED Digital Emissions Sampling Box A
54	APEX XC-60-ED Digital Emissions Sampling Box B
203	APEX XC-50-DIR Digital Emissions Sampling Box C
55	Apex Ambient Air Sample Box
57	California Analytical ZRE CO2/CO/O2 IR ANALYZER
202	Digital Barometer
109A/B	Troemner 100mg/200mg Audit Weights
107	Sartorius Analytical Balance
097	10 lb audit weight
207	Dewalt Tape Measure
208	Digital Calipers
095	Anemometer
111	Microtector
115	Delmhorst Wood Moisture Meter
CC121798	Gas Analyzer Calibration Span Gas
CC139173	Gas Analyzer Calibration Mid Gas

Results

A total of 5 test runs where performed on the TN25 C. Run #4, a fan confirmation test was not used in any weighted average results calculations. The weighted average emissions rate for the 4 run test series was measured to be **1.1 g/hr** with a Higher Heating Value efficiency of **76%.** The average CO emission rate for the 4 tests was **1.3 g/min.** The Pacific Energy TN25 C Wood-Fired Room Heater meets the 2020 cribwood PM emission standard of ≤ 2.0 g/hr per CFR 40 part 60, §60.532 (b).

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

Summary Table

	Cat. 2 ≤1.00 kg/hr.	Cat. 2 0.80 - 1.25 kg/hr.	Cat. 3 1.25 - 1.90 kg/hr.	Cat. 4 Max Burn Rate	Fan Confirmation (Cat. 2)*
Date	1/18/2023	1/17/2023	1/19/2023	1/23/2023	1/20/2023
Run Number	2	1	3	5	4
Emission Rate (g/hr)	1.43	1.59	0.51	1.53	1.46
Burn Rate (kg/hr)	0.97	1.10	1.38	2.07	0.93
Heat Output (Btu/hr)	13,447	15,459	19,576	29,202	13,009
Overall Efficiency (% HHV)	74.9%	75.8%	76.4%	75.5%	75.4%
CO Emissions (g/MJ Output)	6.82	4.98	2.88	2.23	7.12
CO Emissions (g/kg Dry Fuel)	101.16	74.77	43.55	33.39	106.26
CO Emissions (g/min)	1.61	1.35	0.99	1.15	1.63
Emissions – 1st hr (g/hr)	5.16	5.21	1.31	3.26	5.98
Weighted particulate emission average of 4 test runs: 1.1 grams per hour.					
Weighted average HHV efficiency of 4 test runs: 75.8%.					

*Fan Confirmation test not included in weighted average calculations.

Test Run Narrative

Run 1

Run 1 was performed on 1/17/2023 as a category 2 test, per EPA Method 28R. The total test time was 280 minutes. The particulate emissions rate for the test was 1.59 g/hr, the burn rate was 1.10 kg/hr with an HHV efficiency of 75.8%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 2

Run 2 was performed on 1/18/2023 as a category 2 test, per EPA Method 28R. The total test time was 327 minutes. The particulate emissions rate for the test was 1.43 g/hr, the burn rate was 0.97 kg/hr with an HHV efficiency of 74.9%. All test results were appropriate and valid. There were no anomalies and all test criteria were met. This test meets the burn rate requirements described in EPA Method 28 Section 8.1.1.3.2 as a category 2 test with a burn rate of 1.00 kg/hr or less for wood stoves that cannot be operated at burn rates less than 0.8 kg/hr. This test was performed with the air control set to its lowest setting, it is not possible to operate the stove at a lower air setting. Therefore, this test will be used in lieu of a category 1 test.

Run 3

Run 3 was performed on 1/19/2023 as a category 3 test, per EPA Method 28R. The total test time was 221 minutes. The particulate emissions rate for the test was 0.51 g/hr, the burn rate was 1.38 kg/hr with an HHV efficiency of 76.4%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 4

Run 4 was performed on 1/20/2023 as a category 2 fan confirmation test, per EPA Method 28R. The total test time was 336 minutes. The particulate emissions rate for the test was 1.46 g/hr with a burn rate of 0.93 kg/hr. All test results were appropriate and valid. There were no anomalies and all test criteria were met. Since the particulate emissions rate is within 1.0 g/hr of the other category 2 test (run 1, 1.59 g/hr) the blower is determined not to have a significant impact on emissions performance and may therefore be approved as an optional accessory. This test run is not included in the weighted average calculations presented in the results summary.

Run 5

Run 5 was performed on 1/23/2023 as a category 4 test, per EPA Method 28R. The total test time was 153 minutes. The particulate emissions rate for the test was 1.53 g/hr, the burn rate was 2.07 kg/hr with an HHV efficiency of 75.5%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Test Conditions Summary

Testing conditions for all runs fell within allowable specifications of the ASTM 2780 and ASTM E2515. A summary of facility conditions, fuel burned, and run times is listed below.

Run	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	66	65.5	32.2	29	29.86	8.31	13.73	23.1	280
2	65	64	36.7	25.4	29.88	10.58	14.00	21.9	327
3	65	63.6	31.3	29.4	30.28	9.33	13.63	22.8	221
4	64	63.2	25.8	27.6	30.36	9.33	13.87	22.3	336
5	67	67	30.3	25.4	30.34	9.81	14.03	21.4	153

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	Air control fully closed	Air control fully closed, fan on low
Run 2	Air control fully closed	Air control fully closed, fan on low
Run 3	Air control open 0.55”	Air control open 0.55”, fan on medium
Run 4	Air control fully closed	Air control fully closed, fan off (fan confirmation)
Run 5	Air control fully open	Air control fully open, fan on high

Appliance Description

Model(s): TN25 C

Appliance Type: Freestanding Catalytic Wood-Fired Room Heater

Total/Usable Firebox Volume: 1.98 ft^3, The Total Volume and Usable Volume are the same value.

Air Introduction System: Primary combustion air enters the appliance through the air control opening located on the bottom front of the stove. Air is routed up the sides of the firebox, then down into the combustion chamber in front of the door glass. Secondary air brought in through a fixed opening on the bottom rear of the appliance and is routed up the back of the firebox and feed into a set of four identical secondary air tubes. Dimensions on all these features can be found in Appendix D.

Baffles: Combustion air is routed to the front of the stove with a C cast baffle that sits on top of the secondary air tubes, then back and through the catalytic combustor.

Catalytic Combustor: A 6" x 2" x 1" ceramic catalyst is located in the flue gas path. The stove is equipped with a temperature sensor that is monitoring combustor gas stream temperatures within 1 inch (2.5mm) downstream of the catalytic combustor surface

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

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

Fan: A variable speed convection fan is mounted to the rear of the appliance.

Appliance Dimensions

TN25 C Unit Dimensions

Height	Width	Depth
28 3/32"	21 5/8"	25 7/32"

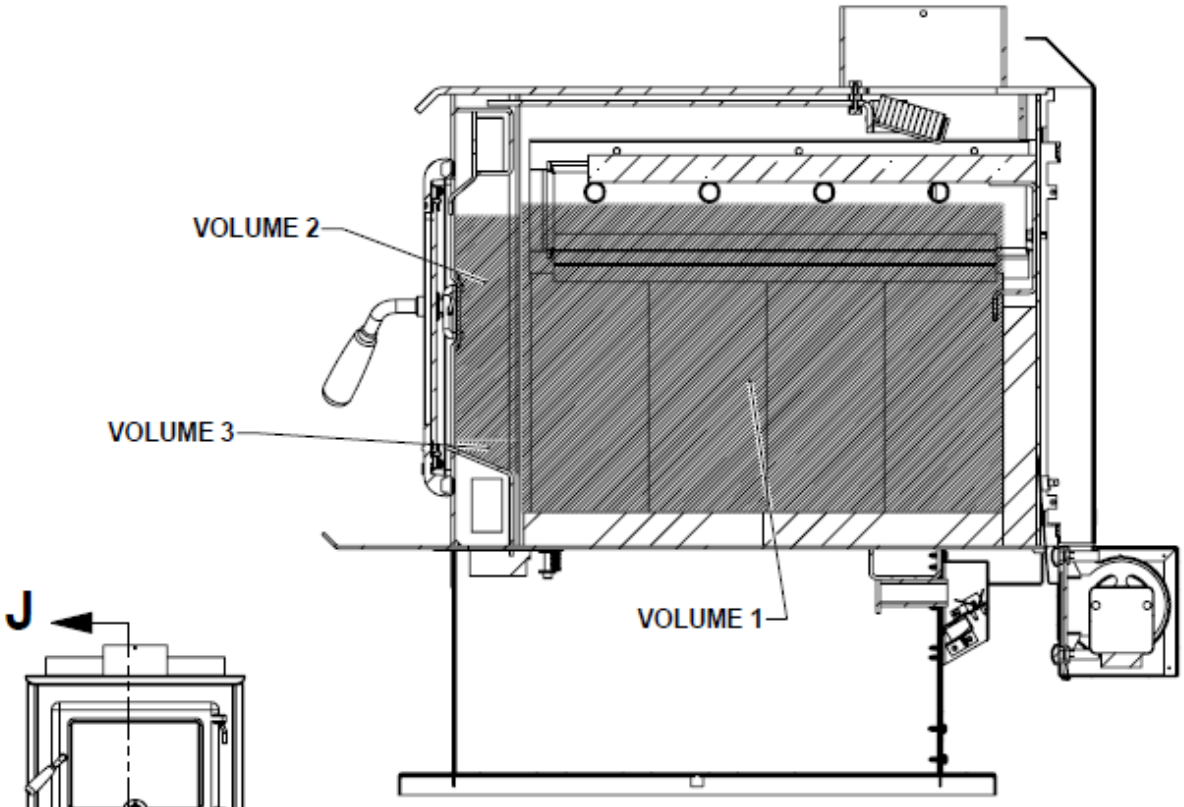
Appliance design drawings can be found in Appendix D submitted with the CBI copy of this report.

Firebox Volume Dimension

VOLUME: DEPTH X WIDTH X HEIGHT TN25C #11

VOLUME 1: 18 1/32 X 15 X 11 1/2 = 3110 25/64 INCH^3
VOLUME 2: 2 9/32 X 14 3/32 X 8 17/32 = 274 7/24 INCH^3
VOLUME 3: 2 9/32 X 14 3/32 X 31/32 = 31 11/75 INCH^3
USEABLE FIREBOX VOLUME = VOLUME1 + VOLUME2 + VOLUME 3
USEABLE FIREBOX VOLUME = 3110 25/64 + 274 7/24 + 31 11/75 = 3415 29/35 INCH^3

USEABLE FIREBOX VOLUME = 3415 29/35 INCH^3 / 12^3
USEABLE FIREBOX VOLUME = 1 42/43 FT^3 = 1.977 FT^3
TOTAL FIREBOX VOLUME = 1 42/43 FT^3 = 1.977 FT^3



SECTION J-J
SCALE 1 : 6

Appliance Front

Appliance Left

Appliance Right

Appliance Rear

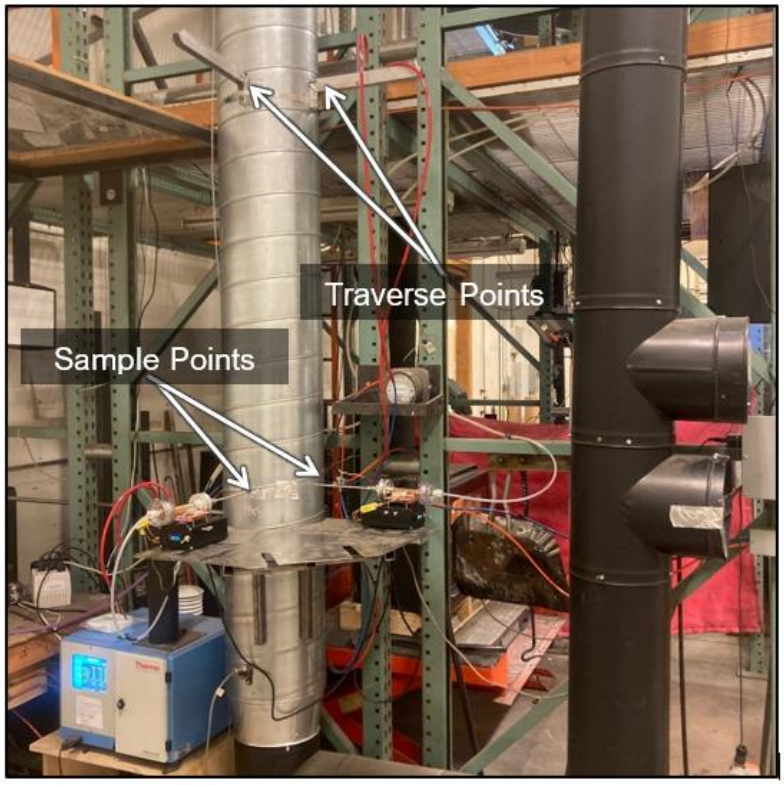
Test Fuel Properties

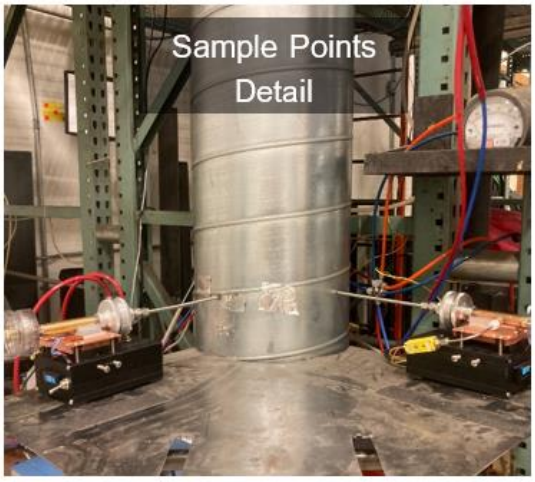
Test fuel used was Douglas Fir dimensional lumber, air-dried to the specified moisture content range. A typical fuel load is pictured below:

Typical Fuel Load

Sampling Locations and Descriptions

Sample ports are located 16.5 feet downstream from any disturbances and 3.5 feet upstream from any disturbances. Flow rate traverse data was collected 8 feet downstream from any disturbances and 4 feet upstream from any disturbances. (See below).





Sampling Methods

ASTM E2515 was used in collecting particulate samples. The dilution tunnel is 12 inches in diameter. All sampling conditions per ASTM E2515 were followed. No alternate procedures were used.

Analytical Methods Description

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

Calibration, Quality Control and Assurances

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

Appliance Sealing and Storage

Upon completion of testing, the appliance was secured with metal strapping and the seal below was applied, the appliance was then returned to the manufacturer's location at: 2975 Allenby Road Duncan, BC V9L 6V8, Canada for archival.

Sealing Label

ATTENTION:

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

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

REPORT #_____ DATE SEALED_____

MANUFACTURER_____ MODEL #_____

Sealed Unit

List of Appendices

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

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

Appendix B – Labels and Manuals

Appendix C –Equipment Calibration Records

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

EPA Method 28R Weighted Average Emissions

Client: Pacific Energy
Stove Model: TN25 C
Test Dates: Jan 17 - 23, 2023
Job Number: 22-861

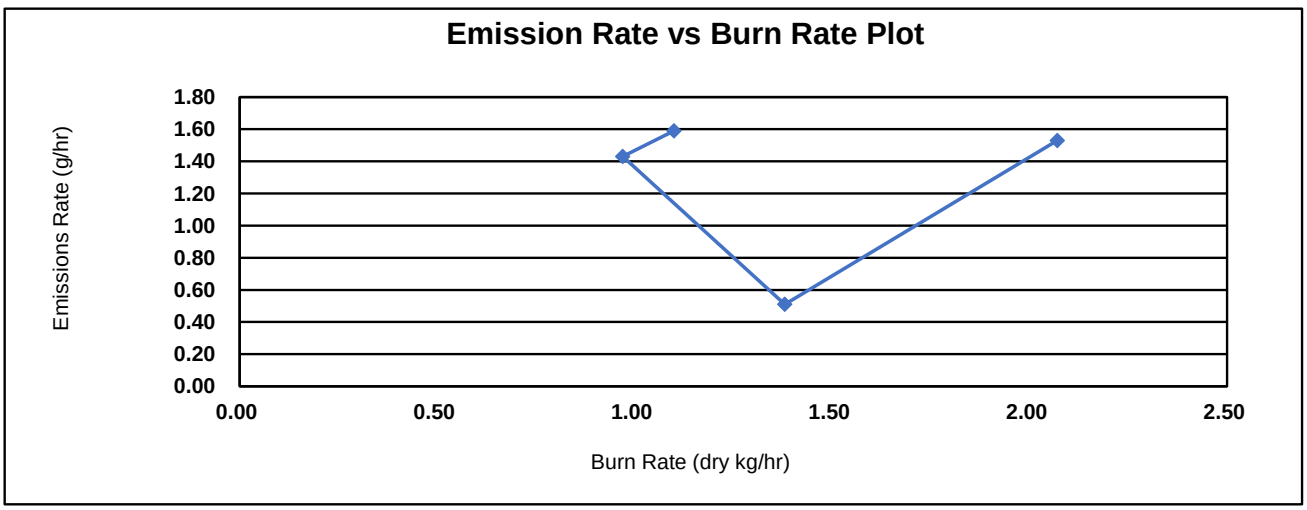
Signature/Date: 3/6/23

Weighted Average Particulate Emissions (g/hr):	**1.1**
Weighted Average HHV Efficiency (%):	**75.8%**
Weighted Average LHV Efficiency (%):	**81.9%**
Average CO Emissions (g/min):	**1.3**

Individual Run Summaries

Run Number:	1	Run Number:	2
Burn Rate (dry kg/hr):	1.10	Burn Rate (dry kg/hr):	0.97
Emissions Rate (g/hr):	1.59	Emissions Rate (g/hr):	1.43
HHV Efficiency (%):	75.8%	HHV Efficiency (%):	74.9%
LHV Efficiency (%):	81.9%	LHV Efficiency (%):	81.0%
Weighting Percentage (%):	23.86%	Weighting Percentage (%):	14.95%

Run Number:	3	Run Number:	5
Burn Rate (dry kg/hr):	1.38	Burn Rate (dry kg/hr):	2.07
Emissions Rate (g/hr):	0.51	Emissions Rate (g/hr):	1.53
HHV Efficiency (%):	76.4%	HHV Efficiency (%):	75.5%
LHV Efficiency (%):	82.5%	LHV Efficiency (%):	81.6%
Weighting Percentage (%):	39.21%	Weighting Percentage (%):	21.98%



WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 1 Data Summary

Client:	Pacific Energy
Model:	TN25 C
Job #:	22-861
Tracking #:	136
Test Date:	1/17/2023

Techician Signature

3/6/2023
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Burn Rate (kg/hr):	1.10

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	28.559	43.278	42.634	9.502
Average Gas Velocity in Dilution Tunnel (ft/sec)	6.6			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	17951.2			
Average Gas Meter Temperature (°F)	66.1	91.6	92.4	78.5
Total Sample Volume (dscf)	29.392	41.563	40.884	9.311
Average Tunnel Temperature (°F)	75.7			
Total Time of Test (min)	280			
Total Particulate Catch (mg)	0.0	3.8	3.5	2.7
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000919	0.0000856	0.0002900
Total PM Emissions (g)	0.00	7.70	7.17	5.21
Particulate Emission Rate (g/hr)	0.00	1.65	1.54	5.21
Emissions Factor (g/kg)	-	1.51	1.40	-
Difference from Average Total Particulate Emissions (g)	-	0.26	0.26	-
Difference from Average Total Particulate Emissions (%)	-	3.6%	3.6%	
Difference from Average Emissions Factor (g/kg)	-	0.05	0.05	-

Final Average Results	
Total Particulate Emissions (g)	7.44
Particulate Emission Rate (g/hr)	1.59
Emissions Factor (g/kg)	1.45
HHV Efficiency (%)	75.8%
LHV Efficiency (%)	81.9%
CO Emissions (g/min)	1.35

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	<90 °F	73.7	OK
Face Velocity	< 30 ft/min	8.7	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:65.5/Max:66.7	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	37.2	OK

B415.1 Efficiency Results

Manufacturer:	Pacific Energy
Model:	TN25 C
Date:	01/17/23
Run:	1
Control #:	22-861
Test Duration:	280
Output Category:	2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.8%	81.9%
Combustion Efficiency	94.7%	94.7%
Heat Transfer Efficiency	80.0%	86.5%

Output Rate (kJ/h)	16,296	15,459	**(Btu/h)**
Burn Rate (kg/h)	1.09	2.39	**(lb/h)**
Input (kJ/h)	21,505	20,400	**(Btu/h)**

Test Load Weight (dry kg)	5.07	11.17	**dry lb**
MC wet (%)	18.74		
MC dry (%)	23.06		
Particulate (g)	7.44		
CO (g)	379		
Test Duration (h)	4.67		

Emissions	**Particulate**	**CO**
g/MJ Output	0.10	4.98
g/kg Dry Fuel	1.47	74.77
g/h	1.59	81.16
g/min	0.03	1.35
lb/MM Btu Output	0.23	11.58

Air/Fuel Ratio (A/F)	11.79

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

WOODSTOVE FUEL DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	12.00	20.2			
2x4	12.00	20.4			
2x4	12.00	21.4			
2x4	12.00	23.2			
2x4	12.00	23.0			
2x4	12.00	20.9			
2x4	12.00	20.6			

Total Fuel Weight (lbs): 8.31
Average Moisture (%DB): 21.4

Firebox Volume (ft^3): 1.98
Total 2x4 Crib Weight, with spacers (lbs): 6.39
Total 4x4 Crib Weight, with spacers (lbs): 7.34
Total Wet Fuel Weight, with spacers (lbs): 13.73

Coal Bed Range (20-25%):
Min (lbs): 2.75
Max (lbs): 3.43

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
4x4	15.00	3.51	19.4	24.2	24.5	2.86
4x4	15.00	3.48	24.7	24.9	23.2	2.80
2x4	15.00	1.72	24.6	24.8	22.8	1.39
2x4	15.00	1.81	22.2	22.1	21.9	1.48
2x4	15.00	1.76	22.4	24.5	19.7	1.44

Total Dry Weight, no spacers (lbs): 9.97
Total Dry Weight, with spacers (lbs): 11.27

Spacer Moisture Readings (%DB)

8.2	9.5	15.5	8.7				
8.3	9.7	12.0	14.0				
12.1	10.2	8.5	12.2				
14.6	16.4	9.6	9.9				

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	28.5	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	6.94	OK
2x4 Fuel Mix	35 - 65 % of total weight	47%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	Pacific Energy	Job #:	22-861
Model:	TN25 C	Tracking #:	136
Run #:	1	Technician:	AK
Test Start Time:	12:15	Date:	1/17/2023

Total Sampling Time (min):	280	
Recording Interval (min):	1	
Meter Box γ Factor:	1.000	(A)
Meter Box γ Factor:	1.000	(B)
Meter Box γ Factor:	0.999	(C)
Meter Box γ Factor:	1.028	(Ambient)
Induced Draft Check (in. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	1/16/2023	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.86	29.86	29.86
Relative Humidity (%)	32.2	29.0	
Room Air Velocity (ft/min)	<50	<50	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:		28.559	ft^3

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-4	in. Hg
(B)	0.000	cfm @	-5	in. Hg
(C)	0.000	cfm @	-4	in. Hg
(Ambient)	0.000	cfm @	-8	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.008	85
2	0.010	85
3	0.012	85
4	0.012	85
5	0.012	85
6	0.006	85
7	0.008	80
8	0.012	80
9	0.012	80
10	0.012	80
11	0.010	80
12	0.006	80
Center	0.014	78

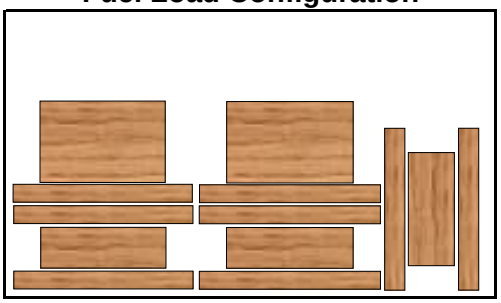
Static Pressure: -0.060 in. H_2O

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}:	6.67	ft/sec
V_{scent}:	7.92	ft/sec
F_p:	0.842	[ratio]
Initial Tunnel Flow:	299.4	scf/min

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Front



Firebox Back

Firebox Side View

Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	23.1

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	6.29	-0.087	517	495	438	701	480	526.3	511	68
1	6.15	-0.083	518	495	430	698	478	523.9	453	67
2	6.05	-0.082	518	495	422	688	476	519.7	417	68
3	5.96	-0.081	517	494	414	676	474	514.8	393	67
4	5.87	-0.077	515	492	405	661	471	508.9	377	67
5	5.79	-0.073	513	489	396	645	469	502.2	366	67
6	5.69	-0.076	509	486	388	628	466	495.4	359	67
7	5.60	-0.073	505	482	380	614	464	489.1	354	67
8	5.51	-0.073	502	479	374	601	461	483.3	349	67
9	5.41	-0.071	498	475	369	588	459	477.8	346	67
10	5.32	-0.070	495	471	366	577	456	473.2	342	67
11	5.23	-0.070	492	468	363	567	454	468.6	339	67
12	5.13	-0.070	490	465	360	558	452	465.0	337	67
13	5.04	-0.071	487	462	358	550	449	461.3	334	67
14	4.95	-0.068	485	460	356	543	447	458.2	332	67
15	4.86	-0.067	484	458	355	535	445	455.3	330	67
16	4.76	-0.069	482	456	355	530	442	453.0	330	67
17	4.66	-0.068	481	455	353	524	440	450.6	329	67
18	4.57	-0.068	480	453	353	521	438	448.9	329	67
19	4.46	-0.068	478	452	352	517	436	447.0	327	67
20	4.38	-0.066	477	451	352	516	433	445.9	325	67
21	4.30	-0.067	476	450	352	513	431	444.5	323	67
22	4.22	-0.065	475	450	351	512	429	443.4	321	67
23	4.14	-0.065	474	449	351	510	427	442.1	318	67
24	4.06	-0.067	473	448	351	508	424	440.8	317	67
25	3.98	-0.064	471	447	351	506	422	439.5	315	67
26	3.92	-0.064	470	446	351	504	420	438.2	312	67
27	3.84	-0.063	469	445	351	501	417	436.7	310	67
28	3.78	-0.062	469	444	351	500	415	435.6	309	67
29	3.72	-0.062	468	443	352	499	412	434.8	306	67
30	3.67	-0.063	467	442	353	499	410	434.2	304	67
31	3.64	-0.074	467	441	356	496	408	433.4	358	67
32	3.56	-0.062	466	441	360	495	406	433.6	333	67
33	3.52	-0.060	466	440	362	491	404	432.7	311	67
34	3.49	-0.059	465	440	361	486	403	430.8	296	67
35	3.47	-0.056	463	439	359	479	401	428.2	285	67
36	3.45	-0.056	461	438	356	471	400	425.1	277	67
37	3.43	-0.054	458	437	353	463	398	421.7	270	67
38	3.42	-0.055	455	435	349	454	396	417.8	263	67
39	3.41	-0.053	452	433	344	445	395	413.7	256	67
40	3.40	-0.051	448	431	339	435	393	409.2	251	67
41	3.40	-0.051	444	428	334	424	391	404.1	247	67
42	3.39	-0.051	440	424	328	415	389	399.4	243	67
43	3.38	-0.048	435	421	323	406	388	394.4	239	67
44	3.38	-0.048	431	416	317	396	386	389.2	236	67

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.37	-0.049	426	412	312	387	384	384.2	232	67
46	3.36	-0.047	421	407	307	378	382	379.0	230	67
47	3.35	-0.046	417	403	302	368	380	374.0	227	67
48	3.35	-0.046	412	398	297	360	379	369.0	224	67
49	3.34	-0.046	408	393	292	352	377	364.4	222	66
50	3.33	-0.044	403	388	288	343	375	359.4	219	66
51	3.32	-0.042	399	384	283	336	374	354.9	216	66
52	3.31	-0.043	394	379	279	329	372	350.6	214	66
53	3.31	-0.042	390	375	275	322	370	346.4	212	66
54	3.29	-0.042	386	371	272	316	369	342.6	210	66
55	3.29	-0.042	382	366	268	311	367	338.8	208	66
56	3.29	-0.040	378	362	264	305	366	335.1	205	66
57	3.27	-0.041	374	359	261	300	364	331.6	204	66
58	3.26	-0.040	371	355	258	295	362	328.0	202	66
59	3.26	-0.040	367	351	255	291	361	324.9	201	66
60	3.25	-0.039	364	347	252	286	359	321.7	199	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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		0.013	1.43	72	0.7		13.74		81	248	68	66
1	0.139	0.139	0.013	2.05	72	0.8	-	13.69	-0.05	88	261	68	66
2	0.283	0.144	0.013	2.07	72	0.8	-	13.55	-0.14	94	300	68	66
3	0.424	0.141	0.013	2.08	72	0.8	-	13.40	-0.15	89	314	68	66
4	0.567	0.143	0.013	2.09	72	0.8	-	13.26	-0.14	85	346	68	66
5	0.713	0.146	0.013	2.09	72	0.8	-	13.08	-0.18	85	395	68	66
6	0.854	0.141	0.014	2.10	72	0.8	-	12.99	-0.09	83	362	68	66
7	1.001	0.147	0.014	2.12	72	0.8	-	12.95	-0.04	81	323	68	66
8	1.142	0.141	0.014	2.12	72	0.8	-	12.91	-0.04	79	300	68	66
9	1.291	0.149	0.014	2.13	72	0.8	-	12.87	-0.04	79	284	68	66
10	1.433	0.142	0.014	2.14	73	0.8	97	12.83	-0.04	78	273	68	66
11	1.579	0.146	0.014	2.15	73	0.8	-	12.77	-0.06	78	270	68	66
12	1.723	0.144	0.014	2.14	73	0.8	-	12.70	-0.07	78	279	68	66
13	1.868	0.145	0.014	2.16	73	0.8	-	12.61	-0.09	78	290	68	66
14	2.016	0.148	0.013	2.16	73	0.8	-	12.46	-0.15	80	341	68	66
15	2.161	0.145	0.014	2.17	74	0.8	-	12.35	-0.11	79	326	68	66
16	2.309	0.148	0.014	2.18	74	0.8	-	12.27	-0.08	78	310	68	66
17	2.452	0.143	0.013	2.17	74	0.8	-	12.20	-0.07	78	309	68	66
18	2.602	0.150	0.013	2.18	74	0.9	-	12.11	-0.09	78	309	68	66
19	2.745	0.143	0.013	2.18	75	0.8	-	11.99	-0.12	79	328	68	66
20	2.896	0.151	0.013	2.19	75	0.9	99	11.83	-0.16	80	359	68	66
21	3.040	0.144	0.013	2.19	75	0.8	-	11.66	-0.17	81	386	67	66
22	3.191	0.151	0.014	2.22	76	0.8	-	11.54	-0.12	81	366	68	66
23	3.337	0.146	0.014	2.22	76	0.9	-	11.44	-0.10	80	347	68	66
24	3.487	0.150	0.014	2.22	76	0.9	-	11.37	-0.07	79	326	68	66
25	3.633	0.146	0.013	2.22	77	0.8	-	11.29	-0.08	79	313	68	66
26	3.784	0.151	0.014	2.23	77	0.8	-	11.22	-0.07	78	305	68	66
27	3.931	0.147	0.014	2.24	77	0.8	-	11.14	-0.08	78	302	68	66
28	4.081	0.150	0.014	2.24	78	0.8	-	11.05	-0.09	78	301	68	66
29	4.229	0.148	0.014	2.24	78	0.8	-	10.95	-0.10	78	303	68	66
30	4.379	0.150	0.013	2.24	78	0.9	102	10.84	-0.11	78	306	68	66
31	4.527	0.148	0.013	2.25	78	0.9	-	10.73	-0.11	78	313	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
32	4.678	0.151	0.014	2.25	79	0.9	-	10.62	-0.11	78	320	68	66
33	4.827	0.149	0.014	2.25	79	0.9	-	10.49	-0.13	79	328	68	66
34	4.977	0.150	0.014	2.26	79	0.8	-	10.38	-0.11	79	332	68	66
35	5.127	0.150	0.014	2.26	80	0.9	-	10.26	-0.12	79	334	68	66
36	5.278	0.151	0.014	2.26	80	0.9	-	10.15	-0.11	79	335	68	66
37	5.427	0.149	0.014	2.27	80	0.9	-	10.04	-0.11	79	335	68	66
38	5.579	0.152	0.014	2.28	81	0.9	-	9.92	-0.12	79	336	68	66
39	5.729	0.150	0.013	2.28	81	0.9	-	9.81	-0.11	79	334	68	66
40	5.881	0.152	0.014	2.28	81	0.8	100	9.70	-0.11	79	334	68	66
41	6.031	0.150	0.014	2.29	82	0.8	-	9.58	-0.12	79	339	68	66
42	6.184	0.153	0.014	2.28	82	0.9	-	9.45	-0.13	79	345	68	66
43	6.333	0.149	0.014	2.29	82	0.9	-	9.33	-0.12	80	348	68	66
44	6.487	0.154	0.014	2.31	83	0.9	-	9.21	-0.12	80	350	68	66
45	6.636	0.149	0.013	2.29	83	0.9	-	9.09	-0.12	80	350	68	66
46	6.789	0.153	0.014	2.30	83	0.9	-	8.97	-0.12	80	349	68	66
47	6.938	0.149	0.014	2.30	83	0.9	-	8.85	-0.12	80	348	68	66
48	7.093	0.155	0.013	2.30	84	0.9	-	8.74	-0.11	80	349	68	66
49	7.241	0.148	0.013	2.30	84	0.9	-	8.61	-0.13	80	352	68	66
50	7.396	0.155	0.014	2.29	84	0.9	99	8.46	-0.15	80	356	68	66
51	7.545	0.149	0.014	2.31	84	0.9	-	8.34	-0.12	80	356	68	66
52	7.702	0.157	0.013	2.30	85	0.9	-	8.22	-0.12	80	352	68	66
53	7.851	0.149	0.014	2.31	85	0.9	-	8.09	-0.13	80	347	68	66
54	8.007	0.156	0.013	2.32	85	0.9	-	7.99	-0.10	80	342	68	66
55	8.157	0.150	0.014	2.32	85	0.9	-	7.88	-0.11	80	339	68	66
56	8.312	0.155	0.013	2.32	86	0.9	-	7.78	-0.10	80	335	68	66
57	8.462	0.150	0.014	2.32	86	0.8	-	7.67	-0.11	80	333	68	66
58	8.616	0.154	0.014	2.33	86	0.9	-	7.57	-0.10	80	330	68	66
59	8.768	0.152	0.013	2.32	86	0.9	-	7.47	-0.10	80	329	68	66
60	8.922	0.154	0.013	2.32	87	0.9	101	7.36	-0.11	80	329	68	66
61	9.077	0.155	0.014	2.33	87	0.9	-	7.25	-0.11	80	331	68	66
62	9.229	0.152	0.013	2.33	87	0.9	-	7.14	-0.11	80	333	68	66
63	9.385	0.156	0.014	2.33	87	0.9	-	7.03	-0.11	80	336	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
64	9.535	0.150	0.013	2.33	88	0.9	-	6.91	-0.12	80	340	68	66
65	9.691	0.156	0.014	2.33	88	0.9	-	6.80	-0.11	80	342	68	66
66	9.841	0.150	0.013	2.33	88	0.9	-	6.68	-0.12	80	343	68	66
67	9.998	0.157	0.013	2.33	88	0.9	-	6.57	-0.11	80	343	68	66
68	10.150	0.152	0.014	2.34	88	0.9	-	6.46	-0.11	80	343	68	67
69	10.306	0.156	0.013	2.34	89	0.9	-	6.34	-0.12	80	341	68	66
70	10.458	0.152	0.013	2.35	89	0.9	103	6.24	-0.10	80	341	68	66
71	10.613	0.155	0.014	2.34	89	0.9	-	6.14	-0.10	80	338	68	66
72	10.766	0.153	0.014	2.34	89	0.9	-	6.03	-0.11	80	338	68	66
73	10.920	0.154	0.014	2.34	89	0.9	-	5.93	-0.10	80	336	68	67
74	11.076	0.156	0.014	2.35	90	0.9	-	5.83	-0.10	80	336	68	67
75	11.229	0.153	0.013	2.35	90	0.9	-	5.73	-0.10	80	333	68	66
76	11.385	0.156	0.014	2.35	90	0.9	-	5.63	-0.10	80	333	68	67
77	11.536	0.151	0.014	2.35	90	0.9	-	5.53	-0.10	80	331	68	66
78	11.693	0.157	0.014	2.34	90	0.9	-	5.44	-0.09	80	329	68	66
79	11.845	0.152	0.014	2.36	90	0.9	-	5.35	-0.09	80	328	68	66
80	12.003	0.158	0.013	2.35	91	0.9	103	5.26	-0.09	80	325	68	66
81	12.156	0.153	0.013	2.36	91	0.9	-	5.17	-0.09	80	322	68	67
82	12.311	0.155	0.014	2.35	91	0.9	-	5.09	-0.08	79	319	68	67
83	12.465	0.154	0.014	2.36	91	0.9	-	5.01	-0.08	79	316	68	67
84	12.621	0.156	0.014	2.36	91	0.9	-	4.93	-0.08	79	312	68	66
85	12.777	0.156	0.013	2.36	91	0.9	-	4.86	-0.07	79	308	68	67
86	12.931	0.154	0.013	2.36	91	0.9	-	4.79	-0.07	79	305	68	66
87	13.087	0.156	0.014	2.36	92	0.9	-	4.72	-0.07	79	302	68	66
88	13.238	0.151	0.013	2.35	92	0.9	-	4.66	-0.06	79	298	68	67
89	13.398	0.160	0.014	2.35	92	0.9	-	4.60	-0.06	78	293	68	67
90	13.550	0.152	0.013	2.36	92	0.9	103	4.54	-0.06	78	289	68	67
91	13.708	0.158	0.013	2.36	92	0.9	-	4.49	-0.05	78	285	68	67
92	13.860	0.152	0.013	2.36	92	0.9	-	4.44	-0.05	78	283	68	67
93	14.016	0.156	0.013	2.35	92	0.9	-	4.38	-0.06	78	280	68	67
94	14.173	0.157	0.014	2.36	92	0.9	-	4.33	-0.05	77	279	68	67
95	14.327	0.154	0.014	2.36	92	0.9	-	4.27	-0.06	77	278	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
96	14.484	0.157	0.013	2.37	93	0.9	-	4.22	-0.05	77	276	68	66
97	14.636	0.152	0.014	2.36	93	0.9	-	4.16	-0.06	77	274	68	67
98	14.796	0.160	0.013	2.37	93	0.9	-	4.11	-0.05	77	274	68	66
99	14.949	0.153	0.013	2.36	93	0.9	-	4.06	-0.05	77	274	68	66
100	15.107	0.158	0.014	2.37	93	0.9	101	4.00	-0.06	77	272	68	66
101	15.260	0.153	0.013	2.37	93	0.9	-	3.95	-0.05	77	271	68	66
102	15.416	0.156	0.013	2.36	93	0.9	-	3.89	-0.06	77	270	68	66
103	15.574	0.158	0.013	2.37	93	0.9	-	3.84	-0.05	77	269	68	66
104	15.728	0.154	0.014	2.37	93	0.9	-	3.79	-0.05	77	268	68	66
105	15.885	0.157	0.014	2.37	93	0.9	-	3.74	-0.05	76	267	68	66
106	16.037	0.152	0.013	2.37	94	0.9	-	3.68	-0.06	76	267	68	66
107	16.197	0.160	0.014	2.38	94	0.9	-	3.63	-0.05	76	266	68	66
108	16.351	0.154	0.014	2.38	94	0.9	-	3.58	-0.05	76	265	68	66
109	16.508	0.157	0.013	2.37	94	0.9	-	3.52	-0.06	76	264	68	66
110	16.663	0.155	0.014	2.37	94	0.9	99	3.47	-0.05	76	264	68	66
111	16.819	0.156	0.014	2.38	94	0.9	-	3.42	-0.05	76	264	68	66
112	16.977	0.158	0.014	2.37	94	0.8	-	3.37	-0.05	76	264	68	66
113	17.130	0.153	0.014	2.37	94	0.9	-	3.32	-0.05	76	263	68	66
114	17.289	0.159	0.013	2.37	94	0.9	-	3.27	-0.05	76	263	68	66
115	17.443	0.154	0.013	2.38	94	0.9	-	3.22	-0.05	76	262	68	66
116	17.602	0.159	0.014	2.37	94	0.9	-	3.18	-0.04	76	261	68	66
117	17.755	0.153	0.014	2.37	95	0.9	-	3.13	-0.05	76	261	68	66
118	17.912	0.157	0.014	2.37	95	0.9	-	3.08	-0.05	76	260	68	66
119	18.070	0.158	0.014	2.38	95	0.9	-	3.04	-0.04	76	259	68	66
120	18.226	0.156	0.014	2.39	95	0.9	100	3.00	-0.04	76	258	68	66
121	18.383	0.157	0.013	2.37	95	0.9	-	2.96	-0.04	76	257	68	66
122	18.536	0.153	0.014	2.37	95	0.9	-	2.92	-0.04	76	255	68	66
123	18.697	0.161	0.014	2.39	95	0.9	-	2.87	-0.05	76	254	68	66
124	18.851	0.154	0.014	2.39	95	0.9	-	2.84	-0.03	76	253	68	66
125	19.008	0.157	0.014	2.39	95	0.9	-	2.80	-0.04	76	253	68	66
126	19.164	0.156	0.014	2.38	95	0.9	-	2.75	-0.05	75	252	68	66
127	19.320	0.156	0.014	2.39	95	0.9	-	2.71	-0.04	76	251	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
128	19.479	0.159	0.014	2.38	95	0.9	-	2.68	-0.03	75	249	68	66
129	19.632	0.153	0.013	2.38	95	0.9	-	2.63	-0.05	75	248	68	66
130	19.791	0.159	0.014	2.38	95	0.9	100	2.59	-0.04	75	248	68	66
131	19.946	0.155	0.013	2.38	95	0.9	-	2.55	-0.04	75	247	68	66
132	20.104	0.158	0.014	2.38	95	0.9	-	2.50	-0.05	75	247	68	66
133	20.258	0.154	0.013	2.38	95	0.9	-	2.46	-0.04	75	247	68	66
134	20.416	0.158	0.013	2.38	95	0.9	-	2.43	-0.03	75	246	68	66
135	20.574	0.158	0.014	2.37	96	0.9	-	2.40	-0.03	75	244	68	66
136	20.727	0.153	0.013	2.38	96	0.9	-	2.35	-0.05	75	243	68	66
137	20.886	0.159	0.014	2.38	96	0.9	-	2.33	-0.02	75	242	68	66
138	21.040	0.154	0.014	2.37	96	0.9	-	2.29	-0.04	75	240	68	66
139	21.200	0.160	0.013	2.38	96	0.9	-	2.26	-0.03	75	238	68	66
140	21.353	0.153	0.013	2.37	96	0.9	101	2.23	-0.03	75	236	68	66
141	21.510	0.157	0.014	2.37	96	0.9	-	2.20	-0.03	74	234	68	66
142	21.669	0.159	0.014	2.38	96	0.9	-	2.18	-0.02	74	232	68	66
143	21.824	0.155	0.014	2.38	96	0.9	-	2.15	-0.03	74	230	68	66
144	21.982	0.158	0.014	2.38	96	0.9	-	2.14	-0.01	74	228	68	66
145	22.135	0.153	0.014	2.37	96	0.9	-	2.11	-0.03	74	227	68	66
146	22.295	0.160	0.014	2.38	96	0.9	-	2.09	-0.02	74	225	68	66
147	22.449	0.154	0.013	2.38	96	0.9	-	2.07	-0.02	74	223	68	66
148	22.607	0.158	0.014	2.38	96	0.9	-	2.05	-0.02	74	222	68	66
149	22.762	0.155	0.014	2.38	96	0.9	-	2.03	-0.02	74	220	68	66
150	22.919	0.157	0.014	2.38	96	0.9	101	2.01	-0.02	74	218	68	66
151	23.077	0.158	0.014	2.38	96	0.9	-	1.99	-0.02	74	216	68	66
152	23.230	0.153	0.014	2.37	96	0.9	-	1.98	-0.01	74	215	68	66
153	23.390	0.160	0.014	2.37	96	0.9	-	1.96	-0.02	74	214	68	66
154	23.544	0.154	0.014	2.37	96	0.9	-	1.94	-0.02	74	213	68	66
155	23.702	0.158	0.014	2.38	96	0.9	-	1.92	-0.02	74	211	68	66
156	23.856	0.154	0.014	2.38	96	0.9	-	1.90	-0.02	73	210	68	66
157	24.013	0.157	0.014	2.37	96	0.9	-	1.88	-0.02	73	209	68	66
158	24.172	0.159	0.014	2.37	96	0.9	-	1.86	-0.02	73	208	68	66
159	24.325	0.153	0.014	2.37	96	0.9	-	1.85	-0.01	73	207	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
160	24.484	0.159	0.014	2.38	96	0.9	99	1.83	-0.02	73	206	68	66
161	24.638	0.154	0.013	2.37	96	0.9	-	1.81	-0.02	73	204	68	66
162	24.798	0.160	0.014	2.38	96	1.0	-	1.79	-0.02	73	203	68	66
163	24.951	0.153	0.014	2.38	96	0.9	-	1.77	-0.02	73	203	68	66
164	25.109	0.158	0.014	2.37	96	0.9	-	1.76	-0.01	73	202	68	66
165	25.267	0.158	0.014	2.38	97	0.9	-	1.75	-0.01	73	201	68	66
166	25.422	0.155	0.014	2.39	97	0.9	-	1.73	-0.02	73	200	68	66
167	25.580	0.158	0.014	2.37	97	0.9	-	1.71	-0.02	73	199	68	66
168	25.733	0.153	0.014	2.37	97	0.9	-	1.69	-0.02	73	198	68	66
169	25.894	0.161	0.014	2.37	97	0.9	-	1.68	-0.01	73	198	68	66
170	26.048	0.154	0.014	2.39	97	0.9	99	1.66	-0.02	73	197	68	66
171	26.205	0.157	0.014	2.37	97	0.9	-	1.65	-0.01	73	197	68	66
172	26.362	0.157	0.014	2.37	97	0.9	-	1.63	-0.02	73	192	68	66
173	26.518	0.156	0.014	2.37	97	0.9	-	1.60	-0.03	73	210	68	66
174	26.676	0.158	0.014	2.38	97	0.9	-	1.58	-0.02	73	221	68	66
175	26.829	0.153	0.014	2.37	97	0.9	-	1.55	-0.03	73	228	68	66
176	26.989	0.160	0.014	2.37	97	0.9	-	1.53	-0.02	74	234	68	66
177	27.143	0.154	0.014	2.37	97	1.0	-	1.50	-0.03	74	237	68	66
178	27.300	0.157	0.014	2.37	97	0.9	-	1.48	-0.02	74	232	68	66
179	27.455	0.155	0.014	2.38	97	0.9	-	1.45	-0.03	74	237	68	66
180	27.613	0.158	0.014	2.37	97	1.0	99	1.43	-0.02	74	239	68	66
181	27.772	0.159	0.014	2.38	97	1.0	-	1.41	-0.02	74	242	67	66
182	27.924	0.152	0.014	2.38	97	0.9	-	1.38	-0.03	74	244	68	66
183	28.083	0.159	0.014	2.37	97	0.8	-	1.36	-0.02	74	236	68	66
184	28.238	0.155	0.014	2.37	97	0.9	-	1.33	-0.03	74	241	68	66
185	28.397	0.159	0.014	2.38	97	0.9	-	1.31	-0.02	74	244	68	66
186	28.551	0.154	0.014	2.38	97	0.9	-	1.28	-0.03	74	246	68	66
187	28.708	0.157	0.014	2.38	97	0.8	-	1.25	-0.03	74	247	68	66
188	28.867	0.159	0.014	2.38	97	0.9	-	1.23	-0.02	74	248	68	66
189	29.021	0.154	0.014	2.38	97	0.9	-	1.21	-0.02	74	242	68	66
190	29.179	0.158	0.014	2.38	97	0.9	99	1.19	-0.02	74	245	68	66
191	29.334	0.155	0.014	2.37	97	0.9	-	1.16	-0.03	74	247	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
192	29.493	0.159	0.014	2.37	97	0.9	-	1.14	-0.02	75	250	68	66
193	29.647	0.154	0.013	2.37	97	0.9	-	1.11	-0.03	75	250	68	66
194	29.804	0.157	0.014	2.37	97	0.9	-	1.09	-0.02	74	242	68	66
195	29.962	0.158	0.014	2.38	97	0.9	-	1.06	-0.03	74	246	68	66
196	30.118	0.156	0.014	2.38	97	0.9	-	1.04	-0.02	74	248	68	66
197	30.275	0.157	0.014	2.38	97	0.9	-	1.02	-0.02	75	250	68	66
198	30.429	0.154	0.014	2.37	97	0.9	-	1.00	-0.02	75	252	68	66
199	30.589	0.160	0.013	2.38	97	0.9	-	0.97	-0.03	75	252	68	66
200	30.743	0.154	0.014	2.38	97	0.9	99	0.95	-0.02	74	245	68	66
201	30.901	0.158	0.014	2.38	97	0.9	-	0.93	-0.02	75	248	68	66
202	31.057	0.156	0.014	2.38	97	0.9	-	0.90	-0.03	75	251	68	66
203	31.213	0.156	0.014	2.37	97	0.9	-	0.89	-0.01	75	253	68	66
204	31.372	0.159	0.013	2.38	97	0.9	-	0.86	-0.03	75	252	68	66
205	31.524	0.152	0.014	2.37	97	0.9	-	0.84	-0.02	74	244	68	66
206	31.685	0.161	0.014	2.37	97	0.9	-	0.81	-0.03	74	247	68	66
207	31.839	0.154	0.013	2.37	97	0.9	-	0.82	0.01	75	249	68	66
208	31.997	0.158	0.013	2.37	97	0.9	-	0.80	-0.02	75	251	68	66
209	32.151	0.154	0.014	2.37	97	0.9	-	0.79	-0.01	75	251	68	66
210	32.309	0.158	0.014	2.37	97	0.9	99	0.78	-0.01	75	252	68	66
211	32.468	0.159	0.013	2.38	97	0.9	-	0.77	-0.01	74	244	68	66
212	32.620	0.152	0.014	2.38	97	0.9	-	0.75	-0.02	74	247	68	66
213	32.780	0.160	0.013	2.37	97	0.9	-	0.72	-0.03	75	249	68	66
214	32.934	0.154	0.013	2.38	97	0.8	-	0.70	-0.02	75	250	68	66
215	33.093	0.159	0.013	2.38	97	0.9	-	0.70	0.00	75	250	68	66
216	33.248	0.155	0.013	2.38	97	0.9	-	0.69	-0.01	74	242	68	66
217	33.404	0.156	0.013	2.38	97	0.9	-	0.67	-0.02	75	245	68	66
218	33.563	0.159	0.014	2.38	97	0.9	-	0.65	-0.02	75	247	68	66
219	33.717	0.154	0.014	2.39	97	0.9	-	0.64	-0.01	74	247	68	66
220	33.876	0.159	0.014	2.38	97	0.9	99	0.63	-0.01	75	248	68	66
221	34.030	0.154	0.013	2.36	97	0.9	-	0.62	-0.01	75	247	68	66
222	34.189	0.159	0.014	2.37	97	0.9	-	0.60	-0.02	74	241	68	66
223	34.343	0.154	0.014	2.37	97	0.9	-	0.58	-0.02	74	243	68	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
224	34.500	0.157	0.013	2.37	97	0.9	-	0.57	-0.01	74	244	68	66
225	34.658	0.158	0.013	2.38	97	0.9	-	0.54	-0.03	75	245	68	66
226	34.814	0.156	0.014	2.37	97	0.9	-	0.53	-0.01	74	244	68	66
227	34.971	0.157	0.014	2.38	97	0.9	-	0.53	0.00	74	236	68	66
228	35.125	0.154	0.014	2.37	97	0.9	-	0.51	-0.02	74	240	68	66
229	35.286	0.161	0.013	2.39	97	0.9	-	0.49	-0.02	74	242	68	66
230	35.440	0.154	0.014	2.38	97	0.9	99	0.47	-0.02	74	242	68	66
231	35.597	0.157	0.014	2.38	97	0.9	-	0.45	-0.02	74	242	68	66
232	35.753	0.156	0.014	2.38	97	0.9	-	0.44	-0.01	74	241	68	66
233	35.910	0.157	0.014	2.38	97	0.9	-	0.42	-0.02	74	226	68	66
234	36.068	0.158	0.013	2.38	97	0.9	-	0.41	-0.01	73	217	68	66
235	36.221	0.153	0.014	2.38	97	0.9	-	0.40	-0.01	73	210	68	66
236	36.382	0.161	0.013	2.37	97	0.9	-	0.41	0.01	73	206	68	66
237	36.536	0.154	0.013	2.37	97	0.9	-	0.40	-0.01	73	203	68	66
238	36.694	0.158	0.014	2.37	97	0.9	-	0.39	-0.01	73	200	68	66
239	36.849	0.155	0.014	2.37	97	0.9	-	0.37	-0.02	73	198	68	66
240	37.007	0.158	0.014	2.38	97	0.8	99	0.37	0.00	73	196	68	66
241	37.166	0.159	0.013	2.38	97	0.9	-	0.35	-0.02	72	195	68	66
242	37.319	0.153	0.014	2.39	97	0.9	-	0.35	0.00	72	193	68	66
243	37.478	0.159	0.014	2.37	97	0.9	-	0.34	-0.01	72	186	68	66
244	37.633	0.155	0.014	2.38	97	0.9	-	0.33	-0.01	72	180	68	66
245	37.791	0.158	0.013	2.38	97	0.9	-	0.32	-0.01	72	177	68	66
246	37.946	0.155	0.014	2.38	97	0.9	-	0.30	-0.02	72	174	68	66
247	38.103	0.157	0.014	2.38	97	0.9	-	0.30	0.00	72	172	68	66
248	38.262	0.159	0.014	2.37	97	0.9	-	0.29	-0.01	71	171	68	66
249	38.415	0.153	0.014	2.38	97	0.9	-	0.28	-0.01	71	169	69	66
250	38.574	0.159	0.014	2.37	97	0.9	99	0.27	-0.01	71	168	69	66
251	38.729	0.155	0.014	2.38	97	0.8	-	0.26	-0.01	71	166	69	66
252	38.889	0.160	0.014	2.39	97	0.9	-	0.25	-0.01	71	166	69	66
253	39.043	0.154	0.014	2.39	97	0.9	-	0.24	-0.01	71	165	69	66
254	39.200	0.157	0.014	2.38	97	0.9	-	0.23	-0.01	71	164	69	66
255	39.359	0.159	0.014	2.38	97	0.9	-	0.22	-0.01	71	163	69	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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
256	39.513	0.154	0.014	2.38	97	0.9	-	0.21	-0.01	71	162	69	66
257	39.672	0.159	0.014	2.38	97	0.9	-	0.20	-0.01	71	162	69	66
258	39.826	0.154	0.014	2.36	97	0.9	-	0.19	-0.01	71	161	69	66
259	39.986	0.160	0.013	2.38	97	0.9	-	0.18	-0.01	71	160	69	66
260	40.140	0.154	0.014	2.38	97	0.9	99	0.17	-0.01	71	160	69	66
261	40.297	0.157	0.013	2.37	97	0.9	-	0.16	-0.01	71	159	69	66
262	40.456	0.159	0.014	2.37	97	0.9	-	0.15	-0.01	71	159	69	66
263	40.611	0.155	0.013	2.38	97	0.9	-	0.14	-0.01	71	159	69	66
264	40.769	0.158	0.013	2.38	97	0.9	-	0.13	-0.01	70	158	69	66
265	40.922	0.153	0.014	2.37	97	0.9	-	0.12	-0.01	71	158	69	66
266	41.083	0.161	0.014	2.37	97	0.9	-	0.12	0.00	70	157	69	66
267	41.237	0.154	0.014	2.39	97	0.9	-	0.11	-0.01	70	157	69	66
268	41.394	0.157	0.014	2.38	97	0.9	-	0.09	-0.02	70	157	69	66
269	41.552	0.158	0.014	2.37	97	0.9	-	0.08	-0.01	70	156	69	66
270	41.708	0.156	0.014	2.38	97	0.9	99	0.08	0.00	70	155	69	66
271	41.866	0.158	0.014	2.38	97	0.9	-	0.08	0.00	70	154	68	66
272	42.019	0.153	0.014	2.37	97	0.9	-	0.06	-0.02	70	154	68	66
273	42.181	0.162	0.013	2.38	97	0.9	-	0.06	0.00	70	154	68	66
274	42.335	0.154	0.014	2.38	97	0.9	-	0.05	-0.01	70	153	68	66
275	42.493	0.158	0.014	2.39	97	0.9	-	0.04	-0.01	70	152	68	66
276	42.649	0.156	0.014	2.38	97	0.9	-	0.03	-0.01	70	152	68	66
277	42.806	0.157	0.014	2.38	97	0.9	-	0.02	-0.01	70	151	68	66
278	42.964	0.158	0.014	2.38	97	0.9	-	0.01	-0.01	70	150	68	66
279	43.117	0.153	0.014	2.38	97	0.9	-	0.01	0.00	70	150	68	66
280	43.278	0.161	0.014	2.38	97	0.9	99	0.00	-0.01	70	149	68	66
Avg/Tot	43.278	0.155	0.014	2.34	91.6	0.9	100			75.7	257.3	67.8	66.1

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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		1.67	74	1.7		71	-0.056	4.69	1.276
1	0.145	0.145	2.24	73	1.8	-	72	-0.054	3.76	1.051
2	0.292	0.147	2.23	73	1.6	-	73	-0.060	2.14	0.663
3	0.437	0.145	2.24	73	1.4	-	73	-0.066	2.07	0.424
4	0.584	0.147	2.24	73	1.7	-	73	-0.072	3.66	0.345
5	0.730	0.146	2.24	73	1.3	-	73	-0.078	8.96	0.420
6	0.876	0.146	2.24	73	1.5	-	73	-0.065	11.70	0.364
7	1.023	0.147	2.24	73	1.7	-	73	-0.063	12.57	0.398
8	1.169	0.146	2.24	74	1.8	-	73	-0.061	7.74	0.576
9	1.318	0.149	2.25	74	1.5	-	73	-0.057	4.52	0.639
10	1.463	0.145	2.25	74	1.8	101	73	-0.056	3.50	0.664
11	1.612	0.149	2.25	74	1.6	-	73	-0.059	3.51	0.672
12	1.758	0.146	2.26	74	1.4	-	73	-0.056	4.58	0.633
13	1.907	0.149	2.26	74	1.9	-	73	-0.067	6.50	0.540
14	2.053	0.146	2.26	75	1.5	-	73	-0.068	8.64	0.485
15	2.202	0.149	2.25	75	1.8	-	73	-0.065	9.87	0.456
16	2.347	0.145	2.25	75	1.6	-	73	-0.065	13.72	0.853
17	2.497	0.150	2.26	75	1.5	-	73	-0.062	11.75	0.629
18	2.642	0.145	2.26	76	1.8	-	73	-0.065	8.22	0.704
19	2.792	0.150	2.26	76	1.7	-	73	-0.071	7.22	0.714
20	2.937	0.145	2.25	76	1.6	101	73	-0.075	8.91	0.589
21	3.087	0.150	2.26	76	1.7	-	73	-0.072	12.75	0.545
22	3.233	0.146	2.26	77	1.7	-	73	-0.072	15.30	0.755
23	3.383	0.150	2.26	77	1.8	-	73	-0.069	15.52	0.677
24	3.528	0.145	2.27	77	1.5	-	73	-0.066	13.08	0.595
25	3.678	0.150	2.26	78	1.7	-	73	-0.064	10.04	0.682
26	3.824	0.146	2.26	78	1.6	-	73	-0.063	8.19	0.851
27	3.975	0.151	2.26	78	1.8	-	73	-0.063	7.97	0.892
28	4.121	0.146	2.26	79	1.8	-	73	-0.065	8.72	0.782
29	4.272	0.151	2.27	79	1.8	-	73	-0.064	9.74	0.653
30	4.418	0.146	2.27	79	1.8	103	73	-0.066	10.97	0.619
31	4.570	0.152	2.27	80	1.6	-	73	-0.066	12.20	0.600

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.716	0.146	2.27	80	1.5	-	73	-0.067	13.12	0.535
33	4.868	0.152	2.27	80	1.8	-	73	-0.069	13.92	0.420
34	5.014	0.146	2.28	80	1.7	-	73	-0.070	14.76	0.411
35	5.166	0.152	2.28	81	1.5	-	73	-0.069	14.85	0.368
36	5.313	0.147	2.28	81	1.8	-	73	-0.069	14.55	0.307
37	5.465	0.152	2.28	81	1.6	-	73	-0.068	14.34	0.285
38	5.612	0.147	2.28	82	1.8	-	73	-0.068	14.15	0.304
39	5.764	0.152	2.29	82	1.8	-	73	-0.067	13.96	0.353
40	5.911	0.147	2.29	82	1.8	101	73	-0.069	13.60	0.398
41	6.063	0.152	2.29	83	1.5	-	73	-0.070	13.33	0.396
42	6.211	0.148	2.29	83	1.6	-	73	-0.070	13.92	0.439
43	6.363	0.152	2.29	83	1.5	-	73	-0.072	14.92	0.480
44	6.511	0.148	2.29	84	1.8	-	73	-0.070	15.05	0.450
45	6.663	0.152	2.29	84	1.7	-	73	-0.071	14.97	0.433
46	6.811	0.148	2.30	84	1.7	-	73	-0.070	14.63	0.413
47	6.963	0.152	2.30	84	1.4	-	73	-0.071	14.30	0.395
48	7.111	0.148	2.30	85	1.5	-	73	-0.071	14.16	0.397
49	7.263	0.152	2.30	85	1.5	-	73	-0.073	14.32	0.369
50	7.411	0.148	2.29	85	1.7	99	73	-0.068	14.61	0.365
51	7.564	0.153	2.30	85	1.8	-	73	-0.073	15.58	0.572
52	7.713	0.149	2.29	86	1.8	-	73	-0.071	15.76	0.751
53	7.864	0.151	2.29	86	1.6	-	73	-0.071	15.05	0.796
54	8.014	0.150	2.30	86	1.5	-	73	-0.072	14.28	0.773
55	8.166	0.152	2.30	86	1.8	-	73	-0.070	13.82	0.729
56	8.317	0.151	2.30	87	1.7	-	74	-0.069	13.56	0.673
57	8.468	0.151	2.30	87	1.5	-	74	-0.069	13.43	0.635
58	8.619	0.151	2.30	87	1.5	-	73	-0.067	13.22	0.630
59	8.770	0.151	2.31	87	1.5	-	73	-0.068	13.17	0.620
60	8.922	0.152	2.31	88	1.8	101	74	-0.067	13.30	0.592
61	9.071	0.149	2.31	88	1.8	-	74	-0.068	13.60	0.568
62	9.224	0.153	2.31	88	1.5	-	74	-0.068	14.02	0.571
63	9.373	0.149	2.30	88	1.7	-	74	-0.071	14.53	0.613

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.526	0.153	2.30	89	1.7	-	74	-0.070	14.91	0.657
65	9.675	0.149	2.31	89	1.5	-	74	-0.069	15.20	0.654
66	9.829	0.154	2.31	89	1.6	-	74	-0.074	15.39	0.598
67	9.978	0.149	2.31	89	1.7	-	74	-0.069	15.36	0.542
68	10.132	0.154	2.31	89	1.8	-	74	-0.070	15.15	0.527
69	10.282	0.150	2.31	90	1.7	-	74	-0.068	14.91	0.546
70	10.435	0.153	2.32	90	1.8	103	74	-0.070	14.69	0.559
71	10.584	0.149	2.31	90	1.8	-	74	-0.068	14.56	0.545
72	10.737	0.153	2.31	90	1.8	-	74	-0.071	14.39	0.548
73	10.887	0.150	2.31	90	1.6	-	74	-0.070	14.34	0.529
74	11.041	0.154	2.31	91	1.8	-	74	-0.070	14.38	0.514
75	11.192	0.151	2.32	91	1.5	-	74	-0.068	14.37	0.483
76	11.344	0.152	2.31	91	1.5	-	74	-0.070	14.18	0.485
77	11.497	0.153	2.32	91	1.5	-	74	-0.066	14.05	0.485
78	11.647	0.150	2.32	91	1.8	-	74	-0.067	13.96	0.480
79	11.800	0.153	2.31	91	1.7	-	74	-0.069	13.86	0.487
80	11.950	0.150	2.31	92	1.5	103	74	-0.066	13.74	0.477
81	12.104	0.154	2.31	92	1.8	-	74	-0.067	13.51	0.483
82	12.255	0.151	2.31	92	1.5	-	74	-0.064	13.20	0.527
83	12.409	0.154	2.32	92	1.7	-	74	-0.065	12.83	0.576
84	12.559	0.150	2.32	92	1.7	-	74	-0.066	12.48	0.589
85	12.714	0.155	2.32	92	1.8	-	74	-0.066	12.16	0.585
86	12.863	0.149	2.32	92	1.5	-	74	-0.063	11.96	0.575
87	13.017	0.154	2.32	93	1.8	-	74	-0.064	11.73	0.565
88	13.167	0.150	2.31	93	1.8	-	74	-0.062	11.43	0.571
89	13.321	0.154	2.31	93	1.7	-	74	-0.063	11.14	0.548
90	13.474	0.153	2.32	93	1.6	103	74	-0.059	10.81	0.544
91	13.626	0.152	2.32	93	1.7	-	74	-0.062	10.58	0.546
92	13.779	0.153	2.32	93	1.5	-	74	-0.059	10.41	0.556
93	13.929	0.150	2.32	93	1.6	-	74	-0.060	10.41	0.562
94	14.084	0.155	2.31	93	1.5	-	73	-0.059	10.56	0.521
95	14.234	0.150	2.32	94	1.5	-	73	-0.057	10.74	0.503

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.389	0.155	2.32	94	1.5	-	73	-0.058	10.78	0.513
97	14.540	0.151	2.33	94	1.6	-	73	-0.056	10.82	0.530
98	14.695	0.155	2.33	94	1.5	-	73	-0.056	10.87	0.530
99	14.845	0.150	2.33	94	1.8	-	73	-0.058	10.99	0.522
100	14.999	0.154	2.33	94	1.8	101	73	-0.058	11.06	0.501
101	15.150	0.151	2.32	94	1.8	-	73	-0.056	11.12	0.488
102	15.304	0.154	2.32	94	1.5	-	73	-0.058	11.15	0.492
103	15.457	0.153	2.33	94	1.6	-	73	-0.056	11.13	0.490
104	15.610	0.153	2.32	94	1.6	-	73	-0.055	11.15	0.509
105	15.763	0.153	2.33	94	1.6	-	73	-0.060	11.17	0.523
106	15.914	0.151	2.33	95	1.7	-	73	-0.058	11.22	0.523
107	16.068	0.154	2.32	95	1.8	-	73	-0.055	11.27	0.502
108	16.220	0.152	2.32	95	1.5	-	73	-0.055	11.34	0.493
109	16.375	0.155	2.33	95	1.6	-	73	-0.054	11.34	0.522
110	16.526	0.151	2.32	95	1.5	99	73	-0.053	11.32	0.553
111	16.680	0.154	2.33	95	1.7	-	73	-0.055	11.34	0.570
112	16.831	0.151	2.34	95	1.5	-	73	-0.057	11.25	0.572
113	16.985	0.154	2.32	95	1.5	-	73	-0.055	11.21	0.518
114	17.138	0.153	2.32	95	1.5	-	73	-0.055	11.16	0.516
115	17.291	0.153	2.33	95	1.6	-	73	-0.054	11.12	0.507
116	17.446	0.155	2.33	95	1.6	-	73	-0.051	11.01	0.503
117	17.596	0.150	2.33	95	1.8	-	73	-0.051	10.86	0.532
118	17.751	0.155	2.33	95	1.8	-	73	-0.052	10.69	0.563
119	17.901	0.150	2.33	95	1.7	-	73	-0.051	10.55	0.590
120	18.058	0.157	2.33	95	1.7	99	73	-0.052	10.53	0.580
121	18.208	0.150	2.32	96	1.8	-	73	-0.053	10.56	0.559
122	18.364	0.156	2.33	96	1.7	-	73	-0.054	10.52	0.589
123	18.514	0.150	2.33	96	1.8	-	73	-0.053	10.47	0.616
124	18.669	0.155	2.33	96	1.8	-	73	-0.052	10.41	0.655
125	18.821	0.152	2.33	96	1.7	-	73	-0.052	10.36	0.684
126	18.975	0.154	2.33	96	1.6	-	73	-0.053	10.38	0.688
127	19.129	0.154	2.33	96	1.5	-	73	-0.050	10.43	0.672

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.281	0.152	2.33	96	1.8	-	73	-0.053	10.43	0.673
129	19.436	0.155	2.34	96	1.5	-	73	-0.053	10.28	0.713
130	19.586	0.150	2.32	96	1.5	99	73	-0.051	9.84	0.876
131	19.742	0.156	2.32	96	1.8	-	73	-0.052	9.73	0.911
132	19.893	0.151	2.33	96	1.5	-	73	-0.050	9.83	0.878
133	20.049	0.156	2.33	96	1.7	-	73	-0.052	10.00	0.822
134	20.199	0.150	2.32	96	1.6	-	73	-0.052	10.17	0.744
135	20.354	0.155	2.33	96	1.5	-	73	-0.053	10.25	0.703
136	20.506	0.152	2.33	96	1.5	-	73	-0.049	10.20	0.696
137	20.661	0.155	2.33	96	1.6	-	72	-0.048	9.99	0.728
138	20.815	0.154	2.32	96	1.5	-	72	-0.049	9.80	0.764
139	20.966	0.151	2.33	96	1.7	-	72	-0.051	9.59	0.774
140	21.121	0.155	2.33	96	1.8	101	72	-0.051	9.38	0.804
141	21.272	0.151	2.32	96	1.5	-	72	-0.048	9.25	0.841
142	21.428	0.156	2.33	96	1.8	-	72	-0.046	9.15	0.863
143	21.579	0.151	2.32	96	1.7	-	72	-0.047	9.00	0.896
144	21.735	0.156	2.33	97	1.8	-	72	-0.046	8.67	0.960
145	21.885	0.150	2.33	97	1.5	-	72	-0.046	8.34	0.985
146	22.040	0.155	2.33	97	1.8	-	72	-0.047	8.16	1.010
147	22.193	0.153	2.33	97	1.7	-	72	-0.046	8.17	1.036
148	22.347	0.154	2.33	97	1.7	-	72	-0.044	8.20	1.058
149	22.502	0.155	2.33	97	1.5	-	72	-0.045	8.17	1.077
150	22.653	0.151	2.33	97	1.5	100	72	-0.044	8.20	1.081
151	22.808	0.155	2.34	97	1.8	-	72	-0.043	8.19	1.072
152	22.959	0.151	2.33	97	1.6	-	72	-0.044	8.20	1.062
153	23.116	0.157	2.33	97	1.7	-	72	-0.043	8.23	1.058
154	23.267	0.151	2.33	97	1.8	-	72	-0.042	8.29	1.044
155	23.422	0.155	2.34	97	1.7	-	72	-0.045	8.29	1.035
156	23.574	0.152	2.33	97	1.7	-	72	-0.041	8.33	1.025
157	23.728	0.154	2.33	97	1.5	-	72	-0.041	8.37	1.023
158	23.882	0.154	2.33	97	1.5	-	72	-0.040	8.40	1.011
159	24.035	0.153	2.33	97	1.6	-	72	-0.040	8.44	1.006

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	24.190	0.155	2.34	97	1.8	99	72	-0.042	8.39	1.019
161	24.341	0.151	2.34	97	1.7	-	72	-0.039	8.38	1.016
162	24.496	0.155	2.33	97	1.5	-	72	-0.039	8.37	1.010
163	24.648	0.152	2.33	97	1.5	-	72	-0.039	8.34	1.005
164	24.804	0.156	2.33	97	1.5	-	72	-0.040	8.34	1.009
165	24.956	0.152	2.33	97	1.7	-	72	-0.039	8.32	1.006
166	25.110	0.154	2.34	97	1.5	-	72	-0.041	8.31	0.993
167	25.262	0.152	2.32	97	1.8	-	72	-0.041	8.19	0.978
168	25.417	0.155	2.33	97	1.7	-	72	-0.036	8.12	0.971
169	25.571	0.154	2.33	97	1.6	-	72	-0.040	8.14	0.972
170	25.724	0.153	2.33	97	1.7	99	72	-0.042	8.14	0.960
171	25.878	0.154	2.34	97	1.7	-	72	-0.039	8.16	0.952
172	26.030	0.152	2.33	97	1.6	-	72	-0.038	8.13	0.971
173	26.186	0.156	2.33	97	1.5	-	72	-0.044	8.18	0.990
174	26.337	0.151	2.33	97	1.6	-	72	-0.045	8.28	1.014
175	26.494	0.157	2.33	97	1.7	-	72	-0.048	8.31	0.962
176	26.644	0.150	2.33	97	1.5	-	72	-0.047	8.34	0.921
177	26.799	0.155	2.33	97	1.5	-	72	-0.047	8.39	0.887
178	26.953	0.154	2.33	97	1.7	-	72	-0.048	8.42	0.852
179	27.107	0.154	2.33	97	1.8	-	72	-0.048	8.46	0.831
180	27.261	0.154	2.33	97	1.8	99	72	-0.047	8.42	0.845
181	27.412	0.151	2.33	97	1.8	-	72	-0.050	8.44	0.819
182	27.568	0.156	2.33	97	1.8	-	72	-0.047	8.46	0.806
183	27.720	0.152	2.33	98	1.8	-	72	-0.048	8.50	0.797
184	27.876	0.156	2.33	97	1.8	-	72	-0.050	8.49	0.789
185	28.028	0.152	2.34	97	1.5	-	72	-0.050	8.48	0.787
186	28.182	0.154	2.34	97	1.5	-	72	-0.050	8.48	0.783
187	28.334	0.152	2.33	97	1.7	-	72	-0.049	8.51	0.791
188	28.489	0.155	2.34	97	1.7	-	72	-0.046	8.57	0.766
189	28.643	0.154	2.34	97	1.8	-	72	-0.049	8.58	0.755
190	28.797	0.154	2.33	97	1.7	99	72	-0.051	8.57	0.746
191	28.950	0.153	2.34	98	1.5	-	72	-0.053	8.39	0.769

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	29.102	0.152	2.33	98	1.7	-	72	-0.052	8.35	0.777
193	29.259	0.157	2.33	98	1.5	-	72	-0.050	8.31	0.773
194	29.410	0.151	2.33	98	1.8	-	72	-0.048	8.32	0.760
195	29.566	0.156	2.34	98	1.7	-	72	-0.049	8.33	0.749
196	29.717	0.151	2.34	98	1.5	-	72	-0.052	8.31	0.765
197	29.872	0.155	2.33	98	1.5	-	72	-0.050	8.30	0.772
198	30.025	0.153	2.34	98	1.5	-	72	-0.052	8.29	0.787
199	30.179	0.154	2.34	98	1.5	-	72	-0.048	8.29	0.797
200	30.334	0.155	2.33	98	1.6	99	72	-0.052	8.27	0.791
201	30.485	0.151	2.33	98	1.7	-	72	-0.053	8.12	0.811
202	30.641	0.156	2.34	98	1.5	-	72	-0.050	7.98	0.830
203	30.793	0.152	2.33	98	1.5	-	72	-0.053	7.96	0.829
204	30.949	0.156	2.33	98	1.7	-	72	-0.052	7.96	0.834
205	31.101	0.152	2.33	98	1.8	-	72	-0.050	7.86	0.827
206	31.255	0.154	2.33	98	1.6	-	72	-0.052	7.82	0.834
207	31.407	0.152	2.33	98	1.7	-	72	-0.049	7.70	0.860
208	31.562	0.155	2.33	98	1.6	-	72	-0.051	7.63	0.871
209	31.716	0.154	2.33	98	1.5	-	72	-0.050	7.66	0.870
210	31.870	0.154	2.33	98	1.8	99	72	-0.051	7.57	0.868
211	32.023	0.153	2.33	98	1.5	-	72	-0.051	7.42	0.873
212	32.175	0.152	2.33	98	1.8	-	72	-0.052	7.39	0.881
213	32.332	0.157	2.33	98	1.7	-	72	-0.051	7.32	0.892
214	32.483	0.151	2.34	98	1.7	-	72	-0.051	7.32	0.897
215	32.640	0.157	2.33	98	1.5	-	72	-0.052	7.32	0.892
216	32.790	0.150	2.33	98	1.8	-	72	-0.050	7.32	0.888
217	32.945	0.155	2.33	98	1.8	-	72	-0.051	7.30	0.901
218	33.099	0.154	2.33	98	1.7	-	72	-0.049	7.14	0.941
219	33.253	0.154	2.33	98	1.7	-	72	-0.051	6.98	0.964
220	33.408	0.155	2.33	98	1.5	99	72	-0.049	6.93	0.925
221	33.559	0.151	2.33	98	1.5	-	72	-0.048	6.87	0.906
222	33.714	0.155	2.33	98	1.7	-	72	-0.050	6.82	0.907
223	33.866	0.152	2.33	98	1.8	-	72	-0.051	6.88	0.920

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	34.023	0.157	2.33	98	1.7	-	72	-0.052	6.80	0.934
225	34.174	0.151	2.34	98	1.5	-	72	-0.050	6.83	0.943
226	34.329	0.155	2.34	98	1.5	-	72	-0.052	6.86	0.947
227	34.481	0.152	2.33	98	1.6	-	72	-0.048	6.87	0.956
228	34.636	0.155	2.33	98	1.5	-	72	-0.050	6.87	0.978
229	34.790	0.154	2.34	98	1.7	-	72	-0.048	6.85	1.000
230	34.944	0.154	2.34	98	1.6	99	72	-0.049	6.80	0.996
231	35.098	0.154	2.34	98	1.7	-	72	-0.051	6.76	0.989
232	35.250	0.152	2.33	98	1.7	-	72	-0.050	6.51	1.014
233	35.406	0.156	2.34	98	1.6	-	72	-0.044	6.35	1.042
234	35.558	0.152	2.33	98	1.6	-	72	-0.044	6.35	1.059
235	35.714	0.156	2.34	98	1.6	-	72	-0.042	6.37	1.082
236	35.865	0.151	2.34	98	1.8	-	72	-0.041	6.37	1.094
237	36.020	0.155	2.33	98	1.5	-	71	-0.043	6.35	1.123
238	36.174	0.154	2.33	98	1.8	-	71	-0.042	6.32	1.134
239	36.328	0.154	2.33	98	1.5	-	71	-0.040	6.34	1.151
240	36.483	0.155	2.34	98	1.8	99	71	-0.042	6.34	1.174
241	36.634	0.151	2.34	98	1.8	-	71	-0.043	6.36	1.195
242	36.790	0.156	2.33	98	1.7	-	71	-0.041	6.39	1.202
243	36.942	0.152	2.33	98	1.6	-	71	-0.037	6.40	1.202
244	37.098	0.156	2.33	98	1.5	-	71	-0.037	6.38	1.313
245	37.250	0.152	2.34	98	1.5	-	71	-0.034	6.64	1.464
246	37.405	0.155	2.33	98	1.5	-	71	-0.040	6.70	1.505
247	37.557	0.152	2.33	98	1.5	-	71	-0.034	6.74	1.520
248	37.712	0.155	2.34	98	1.8	-	71	-0.033	6.75	1.524
249	37.867	0.155	2.34	98	1.5	-	71	-0.032	6.76	1.531
250	38.019	0.152	2.33	98	1.6	98	71	-0.034	6.78	1.513
251	38.174	0.155	2.34	98	1.5	-	71	-0.032	6.75	1.494
252	38.326	0.152	2.34	98	1.7	-	71	-0.034	6.70	1.504
253	38.483	0.157	2.34	98	1.8	-	71	-0.033	6.72	1.508
254	38.634	0.151	2.34	98	1.5	-	71	-0.033	6.81	1.499
255	38.789	0.155	2.34	98	1.8	-	71	-0.031	6.89	1.504

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	38.941	0.152	2.34	98	1.8	-	71	-0.033	6.91	1.506
257	39.096	0.155	2.34	98	1.5	-	71	-0.033	6.92	1.529
258	39.250	0.154	2.34	98	1.5	-	71	-0.033	6.94	1.530
259	39.404	0.154	2.33	98	1.8	-	71	-0.032	6.96	1.557
260	39.558	0.154	2.34	98	1.6	99	71	-0.029	6.91	1.567
261	39.710	0.152	2.33	98	1.7	-	71	-0.034	6.81	1.596
262	39.866	0.156	2.33	98	1.5	-	71	-0.030	6.54	1.637
263	40.018	0.152	2.33	98	1.6	-	71	-0.029	6.35	1.704
264	40.174	0.156	2.34	98	1.5	-	71	-0.034	6.21	1.749
265	40.325	0.151	2.33	98	1.8	-	71	-0.030	6.10	1.770
266	40.480	0.155	2.33	98	1.8	-	71	-0.031	5.99	1.781
267	40.634	0.154	2.33	98	1.8	-	71	-0.030	6.02	1.796
268	40.788	0.154	2.33	98	1.8	-	71	-0.031	5.96	1.805
269	40.943	0.155	2.33	98	1.8	-	71	-0.031	5.86	1.773
270	41.094	0.151	2.34	98	1.8	98	70	-0.033	5.79	1.761
271	41.250	0.156	2.33	98	1.6	-	70	-0.027	5.76	1.768
272	41.402	0.152	2.33	98	1.7	-	70	-0.028	5.80	1.753
273	41.558	0.156	2.33	98	1.5	-	70	-0.031	5.76	1.752
274	41.710	0.152	2.34	98	1.7	-	70	-0.031	5.74	1.738
275	41.865	0.155	2.34	98	1.8	-	70	-0.029	5.73	1.729
276	42.017	0.152	2.33	98	1.5	-	70	-0.029	5.72	1.729
277	42.172	0.155	2.33	98	1.7	-	70	-0.029	5.74	1.713
278	42.326	0.154	2.33	98	1.5	-	70	-0.029	5.78	1.691
279	42.479	0.153	2.34	98	1.8	-	70	-0.029	5.80	1.678
280	42.634	0.155	2.34	98	1.8	99	70	-0.029	5.85	1.711
Avg/Tot	42.634	0.152	2.31	92.4	1.6	100	72.3	-0.053	9.49	0.848

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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		0.69	73	1.6		69
1	0.149	0.149	1.04	72	1.7	-	69
2	0.301	0.152	1.04	72	1.7	-	69
3	0.453	0.152	1.05	72	1.5	-	69
4	0.606	0.153	1.06	72	1.8	-	70
5	0.759	0.153	1.06	72	1.5	-	70
6	0.912	0.153	1.07	72	1.7	-	70
7	1.066	0.154	1.07	73	1.7	-	70
8	1.221	0.155	1.08	73	1.6	-	70
9	1.376	0.155	1.09	73	1.7	-	70
10	1.531	0.155	1.10	73	1.6	99	70
11	1.687	0.156	1.11	73	1.6	-	70
12	1.843	0.156	1.11	74	1.6	-	70
13	1.999	0.156	1.11	74	1.6	-	70
14	2.154	0.155	1.10	74	1.6	-	70
15	2.309	0.155	1.10	74	1.6	-	70
16	2.466	0.157	1.09	74	1.7	-	70
17	2.622	0.156	1.10	75	1.7	-	70
18	2.779	0.157	1.11	75	1.8	-	70
19	2.936	0.157	1.11	75	1.8	-	70
20	3.092	0.156	1.11	75	1.6	100	70
21	3.248	0.156	1.11	75	1.6	-	70
22	3.404	0.156	1.10	76	1.6	-	70
23	3.562	0.158	1.10	76	1.7	-	70
24	3.720	0.158	1.12	76	1.6	-	70
25	3.877	0.157	1.12	77	1.8	-	70
26	4.035	0.158	1.12	77	1.8	-	70
27	4.192	0.157	1.12	78	1.8	-	70
28	4.350	0.158	1.12	78	1.6	-	70
29	4.509	0.159	1.13	78	1.6	-	70
30	4.668	0.159	1.13	79	1.8	103	70
31	4.826	0.158	1.13	79	1.8	-	70

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

	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	4.985	0.159	1.12	79	1.7	-	70
33	5.145	0.160	1.13	80	1.7	-	70
34	5.304	0.159	1.14	80	1.6	-	70
35	5.463	0.159	1.14	80	1.6	-	70
36	5.623	0.160	1.13	81	1.6	-	70
37	5.784	0.161	1.15	81	1.7	-	71
38	5.944	0.160	1.15	81	1.6	-	71
39	6.103	0.159	1.14	81	1.6	-	71
40	6.264	0.161	1.15	82	1.7	101	71
41	6.425	0.161	1.15	82	1.8	-	71
42	6.585	0.160	1.14	82	1.7	-	71
43	6.746	0.161	1.15	82	1.7	-	71
44	6.908	0.162	1.16	83	1.8	-	71
45	7.068	0.160	1.15	83	1.8	-	71
46	7.230	0.162	1.15	83	1.6	-	71
47	7.392	0.162	1.16	83	1.8	-	71
48	7.553	0.161	1.15	84	1.8	-	71
49	7.715	0.162	1.16	84	1.8	-	71
50	7.877	0.162	1.16	84	1.8	100	71
51	8.039	0.162	1.15	84	1.6	-	71
52	8.201	0.162	1.17	84	1.8	-	71
53	8.363	0.162	1.16	84	1.8	-	71
54	8.526	0.163	1.16	84	1.7	-	71
55	8.688	0.162	1.17	85	1.7	-	71
56	8.850	0.162	1.16	84	1.8	-	71
57	9.013	0.163	1.17	84	1.7	-	71
58	9.176	0.163	1.17	85	1.7	-	71
59	9.338	0.162	1.16	85	1.6	-	71
60	9.502	0.164	1.17	85	1.7	103	71
Avg/Tot	9.502	0.158	1.12	78.5	1.7	101	70.2

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Stove ΔT: 37

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	360	344	251	282	358	319.0	351.1
1	358	342	248	278	357	316.4	304.0
2	355	339	243	274	356	313.1	355.1
3	352	335	238	270	355	309.8	379.4
4	348	331	232	273	353	307.2	456.6
5	345	327	226	283	351	306.1	571.1
6	342	322	219	299	350	306.4	491.4
7	339	318	214	315	349	307.0	431.8
8	337	314	209	324	348	306.3	402.3
9	334	310	205	329	347	304.7	379.6
10	331	307	201	330	345	302.6	369.3
11	328	303	197	327	344	299.7	367.8
12	325	299	193	322	342	296.4	395.8
13	321	296	190	322	341	294.0	407.5
14	319	292	187	324	339	292.2	486.6
15	317	288	184	333	338	291.9	462.8
16	316	285	182	343	337	292.6	444.8
17	315	282	180	352	336	293.2	442.2
18	314	280	178	357	335	292.9	444.1
19	314	277	176	362	335	292.6	479.2
20	313	275	175	369	334	293.0	534.6
21	313	273	174	383	333	294.9	582.8
22	313	271	174	398	332	297.6	552.0
23	315	271	174	412	331	300.4	522.7
24	316	271	174	423	330	302.8	497.0
25	317	271	174	429	329	304.0	489.1
26	317	271	173	431	329	304.2	501.0
27	317	270	173	429	328	303.4	503.1
28	317	269	172	429	327	302.8	493.9
29	316	268	171	427	327	302.0	486.0
30	316	267	171	428	326	301.8	487.8
31	317	266	171	431	326	302.2	493.4
32	318	265	171	434	325	302.7	499.5
33	320	264	172	441	325	304.2	510.6
34	323	263	173	447	324	305.9	515.5
35	325	263	173	455	324	308.0	518.1
36	327	264	174	460	323	309.8	525.2
37	330	265	175	467	322	311.7	530.7
38	332	266	176	471	322	313.4	532.4
39	334	268	177	475	321	314.9	530.3
40	335	270	178	479	321	316.7	534.3
41	337	272	179	482	321	318.1	548.9
42	338	275	180	488	320	320.1	555.7
43	340	276	181	494	320	322.0	563.7
44	341	278	182	498	319	323.8	575.6
45	343	281	183	503	319	325.6	577.0
46	344	283	184	508	318	327.6	579.8
47	346	285	186	512	318	329.3	582.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Stove ΔT: 37

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	348	288	187	515	317	330.9	585.4
49	349	290	189	518	317	332.7	607.1
50	351	292	192	522	317	334.9	613.2
51	353	296	197	526	316	337.5	606.5
52	356	299	203	527	316	340.1	604.5
53	359	304	209	529	315	343.2	594.2
54	363	308	215	529	315	345.9	584.5
55	366	312	221	527	315	347.9	581.0
56	369	316	226	524	314	349.8	561.4
57	373	319	230	522	314	351.5	559.0
58	376	321	234	519	314	352.7	557.0
59	379	323	237	515	313	353.4	554.4
60	382	325	240	513	313	354.7	563.0
61	385	326	243	510	313	355.5	566.6
62	389	327	246	510	313	356.8	575.7
63	392	328	249	510	313	358.3	574.1
64	396	329	252	513	312	360.3	593.4
65	400	330	255	515	312	362.3	606.7
66	404	332	258	516	312	364.2	613.0
67	407	334	261	519	312	366.5	603.5
68	411	336	264	521	311	368.6	604.7
69	414	339	267	525	311	371.0	599.3
70	417	341	270	526	311	373.0	594.7
71	419	344	273	527	311	374.6	602.6
72	421	346	275	529	311	376.4	601.8
73	424	348	278	529	311	377.8	603.6
74	426	350	280	527	311	378.6	612.4
75	428	352	282	528	310	380.0	599.2
76	429	354	284	527	310	380.9	597.6
77	431	356	287	528	310	382.2	607.0
78	432	358	289	527	310	383.1	609.9
79	433	360	291	525	310	383.6	600.9
80	434	361	292	523	310	384.1	600.5
81	435	363	295	522	310	384.7	602.1
82	435	364	297	517	310	384.5	598.0
83	436	366	299	515	310	385.0	585.2
84	436	367	300	511	310	384.6	575.5
85	436	368	302	507	309	384.3	559.6
86	436	369	304	502	309	384.0	546.1
87	435	370	306	498	309	383.6	535.8
88	435	370	308	493	309	382.8	520.6
89	434	371	308	487	309	381.9	504.3
90	434	371	309	481	309	380.7	497.7
91	433	372	309	475	309	379.4	485.0
92	432	372	309	469	309	378.1	483.0
93	430	372	309	463	309	376.7	480.8
94	429	372	308	457	309	375.0	480.1
95	427	372	307	452	309	373.5	474.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Stove ΔT: 37

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	426	372	306	447	309	372.0	474.3
97	424	372	305	442	309	370.4	472.5
98	423	372	304	438	309	368.9	471.3
99	422	371	304	434	308	367.8	469.2
100	420	371	304	431	308	366.9	461.2
101	419	371	304	428	308	366.1	461.3
102	418	371	304	427	308	365.4	457.3
103	417	371	304	424	308	364.7	457.9
104	416	371	305	422	308	364.4	455.1
105	415	371	305	420	308	363.7	454.5
106	415	371	306	417	308	363.2	450.2
107	414	371	307	416	308	363.2	446.2
108	414	371	307	414	308	362.6	444.5
109	414	371	308	412	308	362.5	439.0
110	413	371	309	411	308	362.6	438.5
111	413	371	311	409	308	362.5	439.3
112	413	371	312	407	309	362.4	442.1
113	413	372	313	406	309	362.4	449.9
114	413	372	313	405	309	362.3	445.1
115	412	372	313	404	309	362.0	443.5
116	412	373	313	403	309	361.9	439.4
117	411	372	312	402	310	361.5	437.9
118	411	372	311	401	310	361.0	436.6
119	410	372	310	401	310	360.6	436.9
120	409	371	310	400	310	360.1	437.9
121	409	371	309	399	311	359.6	433.6
122	408	370	309	397	311	359.0	432.9
123	408	370	309	396	311	358.7	427.9
124	407	369	308	394	312	358.1	427.1
125	407	369	308	393	312	357.6	420.4
126	407	368	308	390	313	357.1	424.4
127	406	368	308	389	313	356.7	422.7
128	406	367	308	388	313	356.3	420.1
129	405	367	307	386	313	355.8	413.9
130	405	367	307	384	314	355.4	415.9
131	404	368	307	383	314	355.2	423.7
132	404	368	307	379	314	354.6	415.5
133	403	370	308	378	315	354.6	408.9
134	402	370	309	376	315	354.5	408.8
135	402	372	309	375	316	354.7	413.5
136	401	373	310	373	316	354.5	406.5
137	400	374	310	372	317	354.4	407.7
138	400	375	310	370	317	354.5	414.4
139	399	376	310	368	318	354.3	411.1
140	398	377	311	366	318	354.1	408.2
141	398	378	311	363	319	353.8	405.3
142	397	379	310	362	320	353.4	395.0
143	396	380	309	360	320	353.0	392.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Stove ΔT: 37

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	395	380	308	356	321	352.1	389.2
145	395	380	307	353	321	351.2	392.4
146	394	379	307	350	322	350.2	379.5
147	392	378	306	347	323	349.1	374.5
148	391	377	305	343	324	347.9	371.9
149	390	376	303	339	324	346.6	370.9
150	389	375	302	336	325	345.4	360.6
151	388	374	301	332	326	344.1	361.8
152	386	372	300	329	327	342.9	354.4
153	385	371	299	326	328	341.8	355.5
154	384	370	298	322	328	340.4	358.3
155	383	369	297	320	329	339.6	345.4
156	382	368	297	316	330	338.5	345.8
157	381	367	296	314	331	337.6	344.7
158	380	366	295	311	331	336.6	338.6
159	379	365	294	308	332	335.5	332.9
160	378	364	293	305	333	334.6	332.8
161	377	364	293	303	333	334.0	327.8
162	376	363	292	301	334	333.3	326.2
163	375	362	292	300	335	332.7	327.2
164	374	362	292	297	335	332.0	328.6
165	373	361	291	295	336	331.3	332.0
166	373	361	291	294	336	330.8	326.7
167	372	360	291	291	337	330.2	328.2
168	371	360	290	290	338	329.7	319.6
169	370	359	290	288	338	329.0	322.7
170	369	359	290	286	339	328.4	323.6
171	368	359	289	285	339	327.9	318.6
172	367	358	289	283	340	327.3	331.2
173	366	358	288	282	340	326.8	333.7
174	365	357	289	282	340	326.7	338.1
175	364	357	289	282	341	326.5	340.7
176	364	357	289	283	341	326.7	343.2
177	363	357	290	282	342	326.7	347.5
178	363	357	291	283	342	327.1	344.7
179	363	357	291	283	342	327.4	346.5
180	363	357	292	284	342	327.7	347.4
181	363	357	293	285	343	328.3	351.7
182	364	358	294	286	343	328.9	353.2
183	364	358	295	287	344	329.5	351.0
184	365	358	296	288	344	330.2	352.5
185	365	359	297	288	345	330.8	352.0
186	366	359	298	289	345	331.4	361.4
187	366	360	299	290	346	332.2	359.3
188	367	360	300	291	346	332.8	358.7
189	368	361	301	292	347	333.6	353.7
190	369	361	302	291	347	334.0	358.4
191	369	362	302	291	348	334.5	358.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Stove ΔT: 37

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	370	362	303	292	349	335.1	360.6
193	370	363	303	293	350	335.7	357.9
194	371	363	304	294	350	336.2	355.6
195	371	363	304	295	351	337.0	355.0
196	372	364	305	295	352	337.5	356.9
197	373	364	305	296	353	338.0	363.3
198	373	364	305	297	354	338.4	364.1
199	373	364	305	297	354	338.8	360.6
200	374	364	305	298	355	339.1	362.1
201	374	364	305	298	356	339.4	361.4
202	375	364	305	298	357	339.7	364.3
203	375	364	304	299	358	340.0	362.5
204	375	364	304	299	359	340.2	361.0
205	375	364	304	299	360	340.4	357.4
206	375	364	304	300	360	340.5	359.4
207	376	364	303	299	361	340.6	358.1
208	376	363	303	299	362	340.6	354.8
209	376	363	303	299	363	340.7	354.2
210	376	362	303	299	364	340.7	354.2
211	376	362	302	298	365	340.4	351.3
212	376	361	301	297	366	340.2	354.7
213	375	361	300	297	367	340.0	352.9
214	375	360	299	297	368	339.9	353.6
215	375	360	299	296	369	339.8	349.9
216	375	359	298	296	370	339.4	344.8
217	374	359	298	296	371	339.5	346.3
218	374	358	297	294	372	338.9	349.2
219	374	357	296	295	373	338.9	350.6
220	374	356	295	294	374	338.5	346.9
221	374	355	294	294	375	338.2	346.2
222	373	355	293	293	376	337.9	338.7
223	373	354	293	291	377	337.4	340.2
224	373	352	291	291	377	337.0	342.8
225	372	351	290	291	378	336.6	342.0
226	372	350	289	290	379	336.1	339.5
227	372	349	289	289	379	335.6	338.7
228	371	349	288	287	380	334.9	338.5
229	371	347	287	287	381	334.5	337.3
230	370	346	286	287	381	334.1	336.7
231	370	345	285	286	382	333.6	337.4
232	369	344	285	285	382	333.1	337.1
233	369	343	284	284	383	332.5	330.1
234	368	342	283	283	383	331.9	325.2
235	367	341	282	281	384	331.1	321.1
236	367	340	281	279	384	330.1	319.9
237	366	339	279	276	385	329.0	315.2
238	365	338	278	275	385	328.0	310.8
239	364	336	276	273	385	326.8	314.9

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

Stove ΔT: 37

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	363	335	275	272	385	326.0	319.4
241	362	334	273	269	385	324.6	315.5
242	361	332	272	267	386	323.6	312.1
243	360	331	271	266	386	322.6	317.9
244	358	330	269	262	385	321.1	315.1
245	357	329	268	261	385	320.0	316.7
246	356	328	266	259	386	318.8	311.6
247	355	327	264	257	386	317.5	306.8
248	354	326	262	255	386	316.3	302.1
249	353	324	260	253	385	315.0	301.8
250	352	323	258	252	385	314.0	300.9
251	351	322	256	250	385	312.8	298.6
252	349	320	255	248	385	311.6	292.5
253	348	319	253	247	385	310.5	289.2
254	347	318	251	246	385	309.3	286.5
255	346	316	250	244	384	308.0	287.8
256	345	315	248	243	384	307.1	285.8
257	343	314	247	242	384	306.0	289.0
258	342	313	246	241	384	305.0	287.4
259	341	311	245	239	383	303.8	283.4
260	340	310	243	238	383	302.7	280.9
261	339	309	243	236	382	301.7	277.5
262	338	308	241	235	382	300.8	277.5
263	337	306	241	234	381	299.7	274.8
264	336	305	239	233	381	298.7	275.6
265	334	304	238	232	381	297.7	277.1
266	333	303	237	231	380	296.7	275.7
267	331	301	235	230	380	295.5	274.3
268	330	300	234	229	380	294.5	279.4
269	329	299	233	228	379	293.5	277.8
270	327	297	231	227	379	292.3	278.3
271	326	296	230	226	379	291.2	276.1
272	324	295	229	225	378	290.2	273.2
273	323	294	228	224	378	289.1	270.7
274	321	293	226	222	378	288.0	267.4
275	320	291	225	221	377	286.9	270.4
276	318	290	224	220	377	285.9	265.4
277	317	289	223	219	377	284.9	265.1
278	315	288	222	218	376	283.8	265.9
279	314	287	222	217	375	283.0	265.5
280	313	286	221	215	375	281.7	262.2
Average	372.6	338.9	267.1	359.6	339.5	335.5	414.9

LAB SAMPLE DATA - ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 1

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/17/2023

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G00425	246.6	250.0	3.4
	B	G00426	246.5	249.7	3.2
	C - 1st Hour	G00427	246.4	248.8	2.4
	Amb	G00428	247.5	247.5	0.0
Probes	**A**	16A	116379.8	116379.8	0.0
	B	16B	115860.4	115860.5	0.1
	C - 1st Hour	16C	114147.9	114147.9	0.0
O-rings	**A**	16A	3572.7	3573.1	0.4
	B	16B	3638.6	3638.8	0.2
	C - 1st Hour	16C	3601.8	3602.1	0.3

Placed in Dessicator on:	

Filters	**A**	249.5	1/20 8:38	250.2	1/23 15:41	250.0	1/25 14:10		
	B	249.3	1/20 8:38	249.7	1/23 15:41	249.7	1/25 14:11		
	C - 1st Hour	248.8	1/20 8:36	248.8	1/23 15:30				
	Amb	247.5	1/20 8:38	247.5	1/23 15:42				
Probes	**A**	116379.8	1/20 8:36	116379.8	1/23 15:30				
	B	115860.3	1/20 8:36	115860.5	1/23 15:31				
	C - 1st Hour	114147.9	1/20 8:36	114147.9	1/23 15:31				
O-Rings	**A**	3573.1	1/20 8:36	3573.1	1/23 15:31				
	B	3638.9	1/20 8:37	3638.8	1/23 15:31				
	C - 1st Hour	3601.9	1/20 8:37	3602.1	1/23 15:31				

Train A Aggregate, mg:	**3.8**
Train B Aggregate, mg:	**3.5**
Train C Aggregate, mg:	**2.7**
Ambient, mg:	**0.0**

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 1 Test Date: 1/17/23

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Fully Closed
Targeted Burn Category: I

Preburn Notes

Time	Notes
0:00 30:00 60:00	Set air to test setting, fan on low Broke down coals PB end @ 3.25 lb

Test Notes

Test Burn Start Time: 12:15 Test Fuel Loaded by: 45 seconds
Door Closed: 120 seconds Air Control Set at: 360 seconds
Other Loading Notes: Fan on low @ 0 sec

Time	Notes
	- None -

Test Burn End Time: 16:55

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.01 CO (%): 4.306
Mid Gas CO_2 (%): 10.09 CO (%): 2.53

Calibration Results:

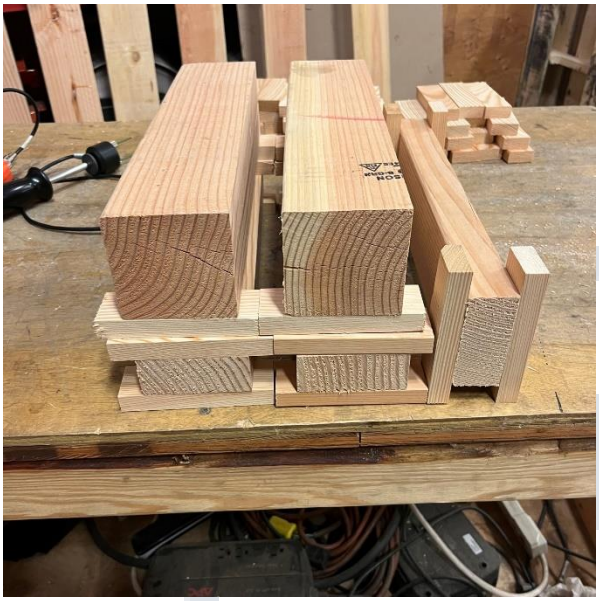
	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	8:34	8:38	8:36	1/18 11:26	1/18 11:23	1/18 11:24
CO_2	0.00	10.15	17.03	0.09	10.07	7.000
CO	0.000	2.572	4.307	0.012	2.443	4.311

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

Technician Signature:  Date: 3/6/23

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 1 Test Date: 1/17/23



Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: _____ Date: 3/6/23

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 2 Data Summary

Client:	Pacific Energy
Model:	TN25 C
Job #:	22-861
Tracking #:	136
Test Date:	1/18/2023

Technician Signature

3/6/2023
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Burn Rate (kg/hr):	0.97

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	26.351	50.619	49.674	9.492
Average Gas Velocity in Dilution Tunnel (ft/sec)	6.4			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	17407.0			
Average Gas Meter Temperature (°F)	64.8	91.2	92.1	76.9
Total Sample Volume (dscf)	27.204	48.673	47.688	9.333
Average Tunnel Temperature (°F)	74.4			
Total Time of Test (min)	327			
Total Particulate Catch (mg)	0.1	4.3	4.0	2.8
Particulate Concentration, dry-standard (g/dscf)	0.0000037	0.0000883	0.0000839	0.0003000
Total PM Emissions (g)	0.35	8.03	7.61	5.16
Particulate Emission Rate (g/hr)	0.06	1.47	1.40	5.16
Emissions Factor (g/kg)	-	1.53	1.45	-
Difference from Average Total Particulate Emissions (g)	-	0.21	0.21	-
Difference from Average Total Particulate Emissions (%)	-	2.7%	2.7%	
Difference from Average Emissions Factor (g/kg)	-	0.04	0.04	-

Final Average Results	
Total Particulate Emissions (g)	7.82
Particulate Emission Rate (g/hr)	1.43
Emissions Factor (g/kg)	1.49
HHV Efficiency (%)	74.9%
LHV Efficiency (%)	81.0%
CO Emissions (g/min)	1.61

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	<90 °F	72.2	OK
Face Velocity	< 30 ft/min	8.7	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:63.9/Max:65.7	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	32.9	OK

B415.1 Efficiency Results

Manufacturer:	Pacific Energy
Model:	TN25 C
Date:	01/18/23
Run:	2
Control #:	22-861
Test Duration:	327
Output Category:	2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	74.9%	81.0%
Combustion Efficiency	92.7%	92.7%
Heat Transfer Efficiency	80.8%	87.3%

Output Rate (kJ/h)	14,175	13,447	**(Btu/h)**
Burn Rate (kg/h)	0.96	2.11	**(lb/h)**
Input (kJ/h)	18,921	17,949	**(Btu/h)**

Test Load Weight (dry kg)	5.21	11.47	**dry lb**
MC wet (%)	17.99		
MC dry (%)	21.94		
Particulate (g)	7.82		
CO (g)	527		
Test Duration (h)	5.45		

Emissions	**Particulate**	**CO**
g/MJ Output	0.10	6.82
g/kg Dry Fuel	1.50	101.16
g/h	1.43	96.62
g/min	0.02	1.61
lb/MM Btu Output	0.24	15.84

Air/Fuel Ratio (A/F)	12.01

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

WOODSTOVE FUEL DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Preburn Fuel Information					
Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	12.00	20.9			
2x4	12.00	23.6			
2x4	12.00	21.4			
2x4	12.00	24.8			
2x4	12.00	22.5			
2x4	12.00	21.6			
2x4	12.00	23.1			
Total Fuel Weight (lbs):		10.58	Average Moisture (%DB):		22.6

Firebox Volume (ft^3):	1.98
Total 2x4 Crib Weight, with spacers (lbs):	5.53
Total 4x4 Crib Weight, with spacers (lbs):	8.47
Total Wet Fuel Weight, with spacers (lbs):	14.00

Coal Bed Range (20-25%):
Min (lbs): 2.80
Max (lbs): 3.50

Test Fuel Information						
Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
4x4	15.00	4.14	24.5	24.5	21.3	3.35
4x4	15.00	3.95	22.5	19.3	19.4	3.28
2x4	15.00	1.23	19.1	19.7	19.0	1.03
2x4	15.00	1.68	23.5	23.2	23.4	1.36
2x4	15.00	1.48	21.0	23.8	24.9	1.20
				Total Dry Weight, no spacers (lbs):		10.23
				Total Dry Weight, with spacers (lbs):		11.60

Spacer Moisture Readings (%DB)							
11.2	11.7	11.6	8.7				
9.5	12.4	12.2	8.3				
10.9	8.6	8.8	13.1				
12.4	8.9	10.3	10.5				

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	29.3	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	7.08	OK
2x4 Fuel Mix	35 - 65 % of total weight	40%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	Pacific Energy	Job #:	22-861
Model:	TN25 C	Tracking #:	136
Run #:	2	Technician:	AK
Test Start Time:	14:12	Date:	1/18/2023

Total Sampling Time (min):	327	
Recording Interval (min):	1	
Meter Box γ Factor:	1.000	(A)
Meter Box γ Factor:	1.000	(B)
Meter Box γ Factor:	0.999	(C)
Meter Box γ Factor:	1.028	(Ambient)
Induced Draft Check (in. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	1/16/2023	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.86	29.89	29.88
Relative Humidity (%)	36.7	25.4	
Room Air Velocity (ft/min)	<50	<50	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:		26.351	ft^3

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-4	in. Hg
(B)	0.000	cfm @	-4	in. Hg
(C)	0.000	cfm @	-5	in. Hg
(Ambient)	0.000	cfm @	-8	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.006	83
2	0.010	83
3	0.012	83
4	0.012	83
5	0.010	83
6	0.006	83
7	0.008	83
8	0.012	83
9	0.012	83
10	0.012	83
11	0.010	83
12	0.006	83
Center	0.014	83

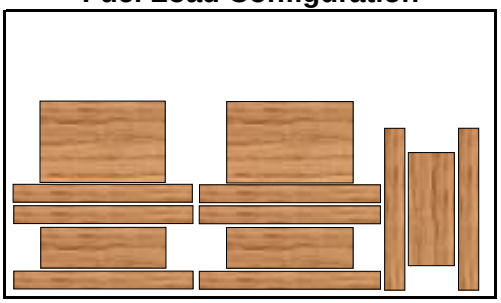
Static Pressure: -0.060 in. H_2O

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}:	6.56	ft/sec
V_{scent}:	7.96	ft/sec
F_p:	0.824	[ratio]
Initial Tunnel Flow:	293.9	scf/min

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Front



Firebox Back

Firebox Side View

Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	21.9

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Recording Interval (min): 1
Run Time (min): 72

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	5.96	-0.088	499	435	386	696	439	491.1	536	67
1	13.96	-0.084	505	441	393	701	441	496.0	465	67
2	5.69	-0.079	509	445	394	701	442	498.2	428	67
3	5.58	-0.079	513	449	393	692	443	497.9	401	66
4	5.48	-0.075	515	452	392	680	444	496.6	381	66
5	5.39	-0.074	517	454	390	666	445	494.1	365	66
6	5.30	-0.072	517	455	388	653	445	491.7	353	66
7	5.22	-0.069	517	456	386	640	445	488.6	343	66
8	5.13	-0.071	516	456	385	623	445	484.9	335	66
9	5.06	-0.066	514	456	383	608	445	481.2	330	66
10	4.97	-0.068	513	456	382	594	444	477.8	326	66
11	4.87	-0.068	511	456	380	583	443	474.8	322	66
12	4.79	-0.068	509	456	379	573	442	471.9	319	66
13	4.71	-0.065	508	456	378	563	441	469.0	316	66
14	4.63	-0.064	506	456	376	555	440	466.6	311	66
15	4.56	-0.064	504	456	376	547	438	464.1	306	66
16	4.51	-0.062	502	456	375	539	437	461.6	300	66
17	4.46	-0.062	500	455	374	531	435	458.8	293	66
18	4.41	-0.059	497	455	372	522	433	455.9	287	66
19	4.36	-0.058	495	454	371	513	431	452.7	281	66
20	4.33	-0.056	492	453	369	503	429	449.3	275	66
21	4.30	-0.056	489	452	367	494	427	445.7	269	66
22	4.27	-0.053	486	450	364	484	425	441.9	264	66
23	4.25	-0.052	483	448	362	475	423	438.2	259	66
24	4.23	-0.053	480	446	359	466	421	434.2	254	66
25	4.22	-0.051	476	444	356	457	418	430.2	249	66
26	4.20	-0.052	473	440	352	449	416	426.1	244	66
27	4.18	-0.050	469	437	349	439	414	421.7	240	66
28	4.16	-0.050	465	433	345	430	412	417.0	237	66
29	4.15	-0.047	460	430	341	421	411	412.6	233	66
30	4.14	-0.048	456	426	336	413	409	408.0	230	66
31	4.12	-0.045	452	422	332	405	407	403.5	228	66
32	4.11	-0.045	447	419	327	397	406	399.1	225	65
33	4.09	-0.046	443	415	322	389	404	394.4	222	65
34	4.08	-0.045	438	411	317	381	402	390.0	220	65
35	4.07	-0.043	433	407	313	374	401	385.7	217	65
36	4.05	-0.043	429	404	309	367	400	381.6	214	65
37	4.04	-0.042	424	400	305	360	398	377.7	212	65
38	4.03	-0.041	420	397	302	354	397	374.0	210	66
39	4.02	-0.042	416	393	298	349	396	370.4	207	65
40	4.01	-0.040	412	390	295	342	395	366.8	205	65
41	3.96	-0.053	408	387	292	337	394	363.6	239	65
42	3.96	-0.041	405	384	291	332	393	360.8	222	65
43	3.94	-0.041	402	382	289	325	392	357.9	211	65
44	3.94	-0.040	399	379	288	319	391	355.2	205	65

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Recording Interval (min): 1
Run Time (min): 72

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.92	-0.039	396	376	286	314	391	352.4	202	65
46	3.90	-0.039	393	374	284	309	390	349.7	198	65
47	3.89	-0.040	389	372	282	305	389	347.3	197	65
48	3.88	-0.038	387	369	279	301	388	344.8	195	65
49	3.87	-0.039	384	367	277	297	388	342.3	194	65
50	3.86	-0.037	381	364	275	293	387	339.8	192	65
51	3.85	-0.037	378	362	272	290	386	337.6	191	65
52	3.84	-0.033	375	360	270	286	386	335.4	185	65
53	3.83	-0.033	373	358	268	283	385	333.5	178	65
54	3.82	-0.031	370	357	267	280	385	331.5	173	65
55	3.81	-0.033	368	355	265	276	384	329.7	169	65
56	3.81	-0.029	366	354	263	274	384	328.1	167	65
57	3.79	-0.029	364	352	262	271	384	326.3	164	65
58	3.78	-0.029	362	350	260	268	384	324.6	162	65
59	11.53	-0.057	360	350	260	267	384	324.0	242	65
60	3.22	-0.033	358	349	260	264	384	323.0	212	65
61	3.20	-0.043	357	347	261	261	384	321.8	204	65
62	3.18	-0.040	355	346	260	258	384	320.3	207	65
63	3.17	-0.042	353	344	259	256	383	319.0	209	65
64	3.16	-0.043	351	342	258	254	383	317.5	212	65
65	3.14	-0.041	349	340	256	252	383	316.1	213	65
66	3.13	-0.041	348	338	255	251	382	314.7	207	65
67	3.12	-0.041	346	336	253	250	382	313.2	210	65
68	3.11	-0.043	344	334	251	249	381	311.9	211	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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		0.012	0.46	70	0.3		13.99		85	284	67	65
1	0.137	0.137	0.012	2.01	70	0.7	-	13.97	-0.02	90	261	67	65
2	0.281	0.144	0.013	2.04	70	0.7	-	13.84	-0.13	93	278	67	65
3	0.421	0.140	0.013	2.06	70	0.7	-	13.68	-0.16	90	296	67	65
4	0.565	0.144	0.013	2.06	70	0.8	-	13.56	-0.12	85	319	67	65
5	0.706	0.141	0.012	2.07	70	0.8	-	13.39	-0.17	84	362	67	65
6	0.849	0.143	0.013	2.09	70	0.8	-	13.26	-0.13	83	362	67	65
7	0.995	0.146	0.013	2.09	70	0.8	-	13.21	-0.05	80	318	66	65
8	1.135	0.140	0.013	2.10	70	0.8	-	13.15	-0.06	79	303	66	65
9	1.282	0.147	0.013	2.10	71	0.8	-	13.06	-0.09	79	298	66	65
10	1.423	0.141	0.013	2.12	71	0.8	100	12.98	-0.08	79	299	66	65
11	1.571	0.148	0.013	2.12	71	0.8	-	12.87	-0.11	79	309	66	65
12	1.713	0.142	0.013	2.13	71	0.8	-	12.75	-0.12	79	315	66	65
13	1.858	0.145	0.013	2.13	71	0.8	-	12.67	-0.08	78	301	66	65
14	2.004	0.146	0.013	2.15	72	0.8	-	12.57	-0.10	78	306	66	65
15	2.148	0.144	0.013	2.15	72	0.8	-	12.45	-0.12	79	316	67	65
16	2.297	0.149	0.013	2.16	72	0.8	-	12.32	-0.13	80	336	67	65
17	2.440	0.143	0.013	2.17	72	0.8	-	12.16	-0.16	81	363	67	65
18	2.589	0.149	0.013	2.17	73	0.8	-	12.01	-0.15	81	366	67	65
19	2.731	0.142	0.013	2.17	73	0.8	-	11.91	-0.10	80	340	66	65
20	2.881	0.150	0.013	2.18	73	0.8	100	11.82	-0.09	79	319	66	65
21	3.025	0.144	0.013	2.18	74	0.8	-	11.75	-0.07	78	302	66	65
22	3.175	0.150	0.013	2.20	74	0.9	-	11.67	-0.08	78	290	66	65
23	3.321	0.146	0.013	2.20	74	0.8	-	11.60	-0.07	78	282	66	65
24	3.472	0.151	0.013	2.22	75	0.8	-	11.53	-0.07	77	276	66	65
25	3.617	0.145	0.013	2.21	75	0.8	-	11.46	-0.07	77	273	66	65
26	3.767	0.150	0.013	2.22	75	0.8	-	11.39	-0.07	77	270	67	65
27	3.913	0.146	0.013	2.23	75	0.8	-	11.31	-0.08	77	268	66	65
28	4.063	0.150	0.013	2.23	76	0.8	-	11.22	-0.09	77	268	67	65
29	4.211	0.148	0.013	2.24	76	0.9	-	11.14	-0.08	77	268	67	65
30	4.361	0.150	0.013	2.23	77	0.9	100	11.07	-0.07	77	269	67	65
31	4.509	0.148	0.013	2.24	77	0.9	-	10.98	-0.09	77	271	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
32	4.658	0.149	0.013	2.25	77	0.8	-	10.89	-0.09	77	273	66	65
33	4.807	0.149	0.013	2.25	78	0.8	-	10.79	-0.10	77	276	66	65
34	4.957	0.150	0.013	2.24	78	0.9	-	10.69	-0.10	77	279	66	65
35	5.106	0.149	0.014	2.25	78	0.9	-	10.59	-0.10	76	283	66	65
36	5.257	0.151	0.013	2.26	79	0.8	-	10.48	-0.11	77	284	66	65
37	5.407	0.150	0.013	2.26	79	0.8	-	10.38	-0.10	77	284	67	65
38	5.557	0.150	0.013	2.26	79	0.9	-	10.26	-0.12	77	285	67	65
39	5.708	0.151	0.013	2.27	80	0.8	-	10.17	-0.09	77	285	67	65
40	5.859	0.151	0.013	2.27	80	0.9	101	10.07	-0.10	77	282	67	65
41	6.009	0.150	0.012	2.27	80	0.8	-	9.98	-0.09	77	279	67	65
42	6.161	0.152	0.012	2.28	81	0.8	-	9.90	-0.08	77	276	67	65
43	6.311	0.150	0.013	2.28	81	0.8	-	9.82	-0.08	77	276	66	65
44	6.464	0.153	0.013	2.29	81	0.9	-	9.75	-0.07	76	277	67	65
45	6.613	0.149	0.014	2.29	81	0.9	-	9.66	-0.09	76	279	66	65
46	6.767	0.154	0.013	2.29	82	0.9	-	9.57	-0.09	76	281	66	65
47	6.916	0.149	0.013	2.30	82	0.8	-	9.48	-0.09	76	285	67	65
48	7.070	0.154	0.013	2.30	82	0.9	-	9.38	-0.10	76	289	66	65
49	7.219	0.149	0.013	2.31	83	0.9	-	9.27	-0.11	77	295	66	65
50	7.373	0.154	0.013	2.30	83	0.8	101	9.16	-0.11	77	301	66	65
51	7.522	0.149	0.014	2.31	83	0.9	-	9.05	-0.11	77	304	66	65
52	7.678	0.156	0.013	2.30	83	0.9	-	8.94	-0.11	77	305	67	65
53	7.826	0.148	0.013	2.30	84	0.9	-	8.83	-0.11	77	305	66	65
54	7.982	0.156	0.013	2.31	84	0.9	-	8.71	-0.12	77	307	66	65
55	8.132	0.150	0.013	2.31	84	0.8	-	8.58	-0.13	77	309	66	65
56	8.288	0.156	0.013	2.32	84	0.9	-	8.47	-0.11	78	310	67	65
57	8.438	0.150	0.013	2.32	85	0.9	-	8.36	-0.11	77	309	66	65
58	8.593	0.155	0.013	2.32	85	0.9	-	8.25	-0.11	78	310	66	65
59	8.743	0.150	0.013	2.32	85	0.9	-	8.14	-0.11	78	309	67	65
60	8.897	0.154	0.013	2.33	85	0.8	102	8.03	-0.11	78	308	67	65
61	9.049	0.152	0.013	2.33	86	0.8	-	7.93	-0.10	78	307	67	65
62	9.203	0.154	0.013	2.33	86	0.9	-	7.82	-0.11	78	306	67	65
63	9.357	0.154	0.013	2.34	86	0.8	-	7.72	-0.10	77	304	66	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
64	9.510	0.153	0.013	2.33	86	0.9	-	7.63	-0.09	77	302	66	65
65	9.665	0.155	0.013	2.33	86	0.9	-	7.53	-0.10	77	302	66	65
66	9.816	0.151	0.013	2.34	87	0.9	-	7.43	-0.10	77	301	67	65
67	9.971	0.155	0.013	2.33	87	0.8	-	7.34	-0.09	77	301	66	65
68	10.122	0.151	0.013	2.33	87	0.9	-	7.23	-0.11	77	302	67	65
69	10.279	0.157	0.013	2.34	87	0.8	-	7.13	-0.10	77	303	66	65
70	10.430	0.151	0.013	2.34	88	0.9	102	7.04	-0.09	77	305	67	65
71	10.587	0.157	0.013	2.34	88	0.9	-	6.93	-0.11	77	306	67	65
72	10.739	0.152	0.013	2.34	88	0.9	-	6.84	-0.09	77	307	67	65
73	10.894	0.155	0.014	2.34	88	0.9	-	6.72	-0.12	77	309	66	65
74	11.047	0.153	0.013	2.34	88	0.9	-	6.62	-0.10	78	312	66	65
75	11.201	0.154	0.013	2.34	88	0.9	-	6.51	-0.11	78	313	67	65
76	11.357	0.156	0.013	2.35	89	0.9	-	6.41	-0.10	78	314	67	65
77	11.510	0.153	0.013	2.34	89	0.9	-	6.32	-0.09	78	314	67	65
78	11.667	0.157	0.013	2.36	89	0.8	-	6.22	-0.10	78	313	67	65
79	11.817	0.150	0.013	2.35	89	0.9	-	6.13	-0.09	78	311	67	65
80	11.975	0.158	0.013	2.35	89	0.9	102	6.04	-0.09	78	308	67	65
81	12.127	0.152	0.013	2.36	89	0.8	-	5.97	-0.07	77	304	66	65
82	12.285	0.158	0.013	2.35	90	0.9	-	5.89	-0.08	77	299	67	65
83	12.438	0.153	0.013	2.35	90	0.9	-	5.82	-0.07	77	294	67	65
84	12.593	0.155	0.013	2.36	90	0.9	-	5.76	-0.06	77	289	67	65
85	12.747	0.154	0.014	2.35	90	0.9	-	5.70	-0.06	77	282	67	65
86	12.902	0.155	0.013	2.36	90	0.9	-	5.63	-0.07	77	278	67	65
87	13.059	0.157	0.012	2.36	90	0.9	-	5.58	-0.05	77	274	67	65
88	13.213	0.154	0.013	2.37	90	0.8	-	5.51	-0.07	76	270	67	65
89	13.369	0.156	0.013	2.36	91	0.9	-	5.47	-0.04	76	266	67	65
90	13.521	0.152	0.013	2.37	91	0.9	102	5.42	-0.05	76	262	67	65
91	13.680	0.159	0.014	2.37	91	0.9	-	5.36	-0.06	76	258	67	65
92	13.833	0.153	0.014	2.36	91	0.9	-	5.32	-0.04	76	255	67	65
93	13.990	0.157	0.013	2.38	91	0.9	-	5.27	-0.05	75	252	67	65
94	14.143	0.153	0.013	2.37	91	0.9	-	5.22	-0.05	75	250	67	65
95	14.299	0.156	0.013	2.36	91	0.9	-	5.16	-0.06	75	248	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
96	14.456	0.157	0.013	2.37	92	0.9	-	5.12	-0.04	75	247	67	65
97	14.610	0.154	0.013	2.37	92	0.9	-	5.09	-0.03	75	245	67	65
98	14.767	0.157	0.013	2.37	92	0.9	-	5.03	-0.06	75	242	67	65
99	14.919	0.152	0.013	2.37	92	0.9	-	4.99	-0.04	75	241	67	65
100	15.079	0.160	0.013	2.37	92	0.8	102	4.94	-0.05	75	240	67	65
101	15.232	0.153	0.013	2.37	92	0.9	-	4.89	-0.05	75	238	67	65
102	15.390	0.158	0.013	2.38	92	0.9	-	4.85	-0.04	75	237	67	65
103	15.543	0.153	0.013	2.38	92	0.8	-	4.79	-0.06	74	238	67	65
104	15.699	0.156	0.013	2.37	92	0.9	-	4.76	-0.03	74	238	67	65
105	15.857	0.158	0.013	2.38	92	0.9	-	4.71	-0.05	74	237	67	65
106	16.011	0.154	0.013	2.37	93	0.9	-	4.66	-0.05	74	236	67	65
107	16.169	0.158	0.013	2.39	93	0.9	-	4.61	-0.05	74	236	67	65
108	16.321	0.152	0.013	2.37	93	0.9	-	4.57	-0.04	74	236	67	65
109	16.481	0.160	0.013	2.38	93	0.9	-	4.51	-0.06	74	235	67	65
110	16.635	0.154	0.014	2.38	93	0.9	100	4.47	-0.04	74	234	67	65
111	16.791	0.156	0.013	2.38	93	0.9	-	4.43	-0.04	74	234	67	65
112	16.947	0.156	0.013	2.37	93	0.9	-	4.38	-0.05	74	234	67	65
113	17.104	0.157	0.013	2.38	93	0.9	-	4.33	-0.05	74	234	67	65
114	17.262	0.158	0.013	2.39	93	0.9	-	4.28	-0.05	74	233	67	65
115	17.414	0.152	0.013	2.38	93	0.9	-	4.24	-0.04	74	232	67	65
116	17.573	0.159	0.013	2.38	93	0.9	-	4.19	-0.05	74	230	67	65
117	17.727	0.154	0.013	2.38	93	0.9	-	4.15	-0.04	74	229	67	65
118	17.886	0.159	0.013	2.39	94	0.9	-	4.11	-0.04	74	228	67	65
119	18.039	0.153	0.013	2.38	94	0.9	-	4.06	-0.05	74	227	67	65
120	18.196	0.157	0.013	2.38	94	0.9	100	4.02	-0.04	73	226	67	65
121	18.354	0.158	0.013	2.39	94	0.9	-	3.98	-0.04	73	225	67	65
122	18.509	0.155	0.014	2.39	94	0.9	-	3.93	-0.05	73	224	67	65
123	18.667	0.158	0.013	2.39	94	0.9	-	3.90	-0.03	73	223	67	65
124	18.820	0.153	0.013	2.39	94	0.9	-	3.87	-0.03	73	222	67	65
125	18.980	0.160	0.013	2.39	94	0.9	-	3.84	-0.03	73	221	67	65
126	19.134	0.154	0.013	2.38	94	0.9	-	3.78	-0.06	74	240	67	65
127	19.291	0.157	0.014	2.39	94	0.9	-	3.73	-0.05	74	254	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
128	19.447	0.156	0.013	2.38	94	0.8	-	3.67	-0.06	74	263	67	65
129	19.604	0.157	0.013	2.38	94	0.9	-	3.63	-0.04	74	256	67	65
130	19.762	0.158	0.013	2.40	94	0.9	102	3.59	-0.04	75	265	67	65
131	19.915	0.153	0.014	2.39	94	0.9	-	3.54	-0.05	75	271	67	65
132	20.075	0.160	0.013	2.39	94	0.9	-	3.49	-0.05	75	275	67	65
133	20.229	0.154	0.013	2.39	94	0.9	-	3.43	-0.06	75	279	67	65
134	20.387	0.158	0.013	2.39	95	0.9	-	3.39	-0.04	75	276	67	65
135	20.542	0.155	0.014	2.38	95	0.9	-	3.34	-0.05	75	275	67	65
136	20.699	0.157	0.013	2.37	95	0.9	-	3.29	-0.05	75	281	66	65
137	20.857	0.158	0.013	2.38	95	0.9	-	3.24	-0.05	76	286	66	65
138	21.010	0.153	0.014	2.38	95	0.9	-	3.20	-0.04	76	289	66	65
139	21.170	0.160	0.013	2.38	95	0.9	-	3.14	-0.06	76	291	66	65
140	21.324	0.154	0.013	2.38	95	0.9	102	3.10	-0.04	76	280	66	65
141	21.484	0.160	0.013	2.39	95	0.9	-	3.06	-0.04	76	286	66	65
142	21.637	0.153	0.013	2.38	95	0.9	-	3.01	-0.05	76	288	66	65
143	21.794	0.157	0.013	2.38	95	0.9	-	2.97	-0.04	76	290	66	65
144	21.953	0.159	0.013	2.39	95	0.9	-	2.93	-0.04	76	291	66	65
145	22.107	0.154	0.013	2.40	95	0.9	-	2.90	-0.03	76	284	66	65
146	22.266	0.159	0.013	2.39	95	0.9	-	2.85	-0.05	76	282	66	65
147	22.419	0.153	0.013	2.39	95	0.9	-	2.81	-0.04	76	285	66	65
148	22.579	0.160	0.013	2.39	95	0.9	-	2.77	-0.04	76	287	66	65
149	22.733	0.154	0.013	2.38	95	0.9	-	2.73	-0.04	76	288	66	65
150	22.891	0.158	0.013	2.39	95	0.9	102	2.69	-0.04	76	288	66	65
151	23.048	0.157	0.013	2.39	95	0.9	-	2.66	-0.03	76	276	67	65
152	23.204	0.156	0.013	2.37	95	0.9	-	2.62	-0.04	76	280	66	65
153	23.362	0.158	0.014	2.38	95	0.9	-	2.58	-0.04	76	282	67	65
154	23.515	0.153	0.014	2.38	95	0.9	-	2.54	-0.04	76	282	67	65
155	23.676	0.161	0.013	2.40	95	0.9	-	2.50	-0.04	76	282	67	65
156	23.830	0.154	0.013	2.39	95	0.9	-	2.48	-0.02	76	275	67	65
157	23.987	0.157	0.013	2.39	95	0.9	-	2.44	-0.04	76	273	67	65
158	24.143	0.156	0.013	2.38	95	0.9	-	2.42	-0.02	76	275	67	65
159	24.300	0.157	0.014	2.39	95	0.9	-	2.38	-0.04	76	275	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
160	24.459	0.159	0.013	2.39	95	0.9	102	2.36	-0.02	75	273	67	65
161	24.612	0.153	0.014	2.38	95	0.9	-	2.34	-0.02	75	272	67	65
162	24.772	0.160	0.014	2.39	95	0.9	-	2.32	-0.02	75	260	67	65
163	24.926	0.154	0.014	2.38	95	0.9	-	2.29	-0.03	75	262	67	65
164	25.084	0.158	0.014	2.39	95	0.9	-	2.28	-0.01	75	263	67	65
165	25.239	0.155	0.014	2.39	95	0.8	-	2.25	-0.03	75	263	67	65
166	25.397	0.158	0.014	2.39	95	0.9	-	2.23	-0.02	75	262	67	65
167	25.556	0.159	0.014	2.39	95	0.9	-	2.22	-0.01	75	256	67	65
168	25.708	0.152	0.014	2.40	95	0.9	-	2.19	-0.03	75	254	67	65
169	25.868	0.160	0.014	2.39	95	0.9	-	2.17	-0.02	75	256	67	65
170	26.023	0.155	0.014	2.39	95	0.9	100	2.16	-0.01	75	256	67	65
171	26.182	0.159	0.013	2.39	95	0.9	-	2.14	-0.02	75	256	67	65
172	26.336	0.154	0.014	2.39	95	0.9	-	2.12	-0.02	75	256	67	65
173	26.494	0.158	0.014	2.39	96	0.9	-	2.09	-0.03	74	246	67	66
174	26.652	0.158	0.013	2.39	96	0.9	-	2.07	-0.02	74	249	67	66
175	26.806	0.154	0.013	2.39	96	0.9	-	2.05	-0.02	75	251	67	66
176	26.965	0.159	0.014	2.39	96	0.9	-	2.03	-0.02	75	250	67	66
177	27.120	0.155	0.013	2.39	96	0.9	-	2.02	-0.01	75	251	67	65
178	27.280	0.160	0.014	2.40	96	0.9	-	2.01	-0.01	74	246	67	65
179	27.433	0.153	0.014	2.40	96	0.9	-	1.99	-0.02	74	243	67	65
180	27.591	0.158	0.014	2.38	96	0.9	98	1.97	-0.02	74	245	67	65
181	27.749	0.158	0.014	2.38	96	0.9	-	1.95	-0.02	74	246	67	65
182	27.904	0.155	0.014	2.39	96	0.9	-	1.93	-0.02	74	246	67	65
183	28.063	0.159	0.014	2.39	96	0.9	-	1.91	-0.02	74	247	67	65
184	28.217	0.154	0.013	2.39	96	0.9	-	1.89	-0.02	74	238	67	65
185	28.377	0.160	0.014	2.38	96	0.9	-	1.88	-0.01	74	241	67	65
186	28.531	0.154	0.014	2.39	96	0.8	-	1.86	-0.02	74	242	67	65
187	28.688	0.157	0.013	2.39	96	0.9	-	1.84	-0.02	74	242	67	65
188	28.847	0.159	0.013	2.39	96	0.9	-	1.82	-0.02	74	243	67	65
189	29.002	0.155	0.014	2.40	96	0.9	-	1.80	-0.02	74	238	67	65
190	29.161	0.159	0.013	2.39	96	0.9	100	1.80	0.00	73	236	67	65
191	29.314	0.153	0.014	2.39	96	0.9	-	1.78	-0.02	73	237	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
192	29.475	0.161	0.014	2.39	96	0.9	-	1.76	-0.02	73	239	67	65
193	29.629	0.154	0.013	2.40	96	0.9	-	1.75	-0.01	74	240	67	65
194	29.786	0.157	0.013	2.39	96	0.9	-	1.72	-0.03	74	240	67	65
195	29.944	0.158	0.013	2.39	96	0.9	-	1.71	-0.01	73	231	67	65
196	30.100	0.156	0.013	2.40	96	0.9	-	1.69	-0.02	73	233	67	65
197	30.258	0.158	0.014	2.40	96	0.9	-	1.68	-0.01	73	235	67	65
198	30.411	0.153	0.013	2.38	96	0.8	-	1.66	-0.02	73	236	67	65
199	30.572	0.161	0.013	2.39	96	0.8	-	1.64	-0.02	73	236	67	65
200	30.726	0.154	0.013	2.39	96	1.0	102	1.63	-0.01	73	231	67	65
201	30.884	0.158	0.014	2.38	96	0.9	-	1.62	-0.01	73	229	67	65
202	31.040	0.156	0.014	2.38	96	0.9	-	1.59	-0.03	73	231	67	65
203	31.196	0.156	0.014	2.38	96	0.9	-	1.58	-0.01	73	232	67	65
204	31.355	0.159	0.014	2.39	96	1.0	-	1.57	-0.01	73	233	67	65
205	31.508	0.153	0.014	2.38	96	0.9	-	1.55	-0.02	73	233	67	65
206	31.668	0.160	0.014	2.38	96	0.9	-	1.53	-0.02	73	225	67	65
207	31.822	0.154	0.014	2.38	96	0.9	-	1.52	-0.01	72	227	67	65
208	31.980	0.158	0.013	2.38	96	0.9	-	1.51	-0.01	72	229	67	65
209	32.135	0.155	0.014	2.38	96	0.9	-	1.48	-0.03	72	230	67	65
210	32.292	0.157	0.014	2.37	96	0.9	100	1.47	-0.01	73	230	67	65
211	32.451	0.159	0.014	2.39	96	0.9	-	1.47	0.00	73	226	67	65
212	32.604	0.153	0.014	2.37	96	0.9	-	1.45	-0.02	72	223	67	65
213	32.763	0.159	0.013	2.38	96	0.9	-	1.43	-0.02	72	224	67	65
214	32.917	0.154	0.013	2.39	96	0.9	-	1.40	-0.03	72	225	67	65
215	33.077	0.160	0.014	2.39	96	0.9	-	1.39	-0.01	73	226	67	65
216	33.231	0.154	0.014	2.38	96	0.9	-	1.37	-0.02	72	227	67	65
217	33.387	0.156	0.013	2.38	96	0.9	-	1.37	0.00	72	218	67	65
218	33.546	0.159	0.013	2.38	96	0.9	-	1.35	-0.02	72	221	67	65
219	33.700	0.154	0.013	2.39	96	0.9	-	1.33	-0.02	72	223	67	65
220	33.859	0.159	0.014	2.38	96	0.9	98	1.32	-0.01	72	223	67	65
221	34.013	0.154	0.014	2.37	96	0.9	-	1.30	-0.02	72	224	67	65
222	34.172	0.159	0.013	2.38	96	0.9	-	1.29	-0.01	72	219	67	65
223	34.326	0.154	0.013	2.38	96	0.8	-	1.27	-0.02	72	217	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
224	34.483	0.157	0.013	2.38	96	0.9	-	1.27	0.00	72	218	67	65
225	34.641	0.158	0.013	2.38	96	0.9	-	1.25	-0.02	72	219	67	65
226	34.797	0.156	0.014	2.38	96	0.8	-	1.23	-0.02	72	220	67	65
227	34.954	0.157	0.014	2.38	96	0.9	-	1.22	-0.01	72	220	67	65
228	35.107	0.153	0.014	2.37	96	0.9	-	1.20	-0.02	72	212	67	65
229	35.268	0.161	0.014	2.38	96	0.9	-	1.19	-0.01	72	214	67	65
230	35.422	0.154	0.014	2.39	96	0.9	98	1.19	0.00	72	216	67	65
231	35.579	0.157	0.014	2.38	96	0.9	-	1.17	-0.02	72	217	67	65
232	35.735	0.156	0.014	2.38	96	0.9	-	1.15	-0.02	72	217	67	65
233	35.892	0.157	0.014	2.38	96	0.9	-	1.14	-0.01	72	213	67	65
234	36.050	0.158	0.014	2.39	96	0.9	-	1.12	-0.02	72	211	67	65
235	36.203	0.153	0.014	2.38	96	0.9	-	1.11	-0.01	72	213	67	65
236	36.363	0.160	0.014	2.37	96	0.9	-	1.09	-0.02	72	214	67	65
237	36.517	0.154	0.014	2.38	96	0.9	-	1.08	-0.01	72	214	67	65
238	36.675	0.158	0.014	2.39	96	0.9	-	1.07	-0.01	72	215	67	65
239	36.830	0.155	0.014	2.38	96	0.9	-	1.06	-0.01	72	205	67	65
240	36.987	0.157	0.013	2.38	96	0.9	100	1.04	-0.02	72	208	67	65
241	37.146	0.159	0.013	2.38	96	0.9	-	1.02	-0.02	72	211	67	65
242	37.299	0.153	0.014	2.39	96	0.9	-	1.01	-0.01	72	213	67	65
243	37.458	0.159	0.014	2.37	96	0.9	-	0.99	-0.02	72	214	67	65
244	37.612	0.154	0.014	2.38	96	0.9	-	1.00	0.01	72	210	67	65
245	37.772	0.160	0.014	2.39	96	0.9	-	0.98	-0.02	72	207	67	65
246	37.925	0.153	0.013	2.39	96	0.9	-	0.96	-0.02	72	209	67	65
247	38.082	0.157	0.014	2.36	96	0.9	-	0.95	-0.01	72	211	67	65
248	38.241	0.159	0.014	2.38	96	0.9	-	0.93	-0.02	72	212	67	65
249	38.396	0.155	0.013	2.39	96	0.9	-	0.91	-0.02	72	212	67	65
250	38.554	0.158	0.014	2.39	96	0.9	100	0.91	0.00	72	202	67	65
251	38.707	0.153	0.014	2.37	96	0.9	-	0.90	-0.01	72	206	67	65
252	38.867	0.160	0.013	2.38	96	0.9	-	0.88	-0.02	72	209	67	65
253	39.021	0.154	0.014	2.39	96	0.8	-	0.87	-0.01	72	211	67	65
254	39.178	0.157	0.014	2.38	96	0.9	-	0.85	-0.02	72	211	67	65
255	39.335	0.157	0.013	2.37	96	0.9	-	0.85	0.00	72	207	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
256	39.491	0.156	0.014	2.38	96	0.8	-	0.83	-0.02	72	204	67	65
257	39.649	0.158	0.014	2.39	96	0.8	-	0.82	-0.01	72	206	67	64
258	39.802	0.153	0.014	2.38	96	0.9	-	0.81	-0.01	72	208	67	64
259	39.963	0.161	0.014	2.38	96	0.8	-	0.79	-0.02	72	209	67	64
260	40.117	0.154	0.014	2.38	96	0.9	98	0.78	-0.01	72	210	67	64
261	40.274	0.157	0.014	2.39	96	0.9	-	0.77	-0.01	72	200	67	64
262	40.430	0.156	0.014	2.38	96	0.9	-	0.75	-0.02	72	204	67	64
263	40.588	0.158	0.014	2.39	96	0.9	-	0.73	-0.02	72	207	67	64
264	40.746	0.158	0.014	2.39	96	0.9	-	0.73	0.00	72	208	67	64
265	40.899	0.153	0.014	2.39	96	0.9	-	0.71	-0.02	72	209	67	64
266	41.059	0.160	0.014	2.38	96	0.9	-	0.70	-0.01	72	204	67	65
267	41.214	0.155	0.013	2.39	96	0.9	-	0.69	-0.01	72	201	67	65
268	41.372	0.158	0.013	2.40	96	0.9	-	0.67	-0.02	72	203	67	65
269	41.527	0.155	0.014	2.39	96	0.9	-	0.66	-0.01	72	205	67	64
270	41.684	0.157	0.013	2.39	96	0.9	100	0.65	-0.01	72	206	67	65
271	41.843	0.159	0.014	2.39	96	0.9	-	0.63	-0.02	72	206	67	64
272	41.996	0.153	0.013	2.39	96	0.9	-	0.63	0.00	71	197	67	64
273	42.155	0.159	0.014	2.38	96	0.8	-	0.61	-0.02	71	201	67	64
274	42.310	0.155	0.014	2.39	96	0.9	-	0.60	-0.01	72	203	67	64
275	42.470	0.160	0.014	2.40	96	0.9	-	0.58	-0.02	72	204	67	64
276	42.624	0.154	0.014	2.40	96	0.9	-	0.57	-0.01	71	205	67	64
277	42.781	0.157	0.014	2.39	96	0.9	-	0.57	0.00	71	201	67	64
278	42.940	0.159	0.014	2.39	96	0.9	-	0.56	-0.01	71	198	67	64
279	43.094	0.154	0.014	2.39	96	0.8	-	0.54	-0.02	71	201	67	64
280	43.253	0.159	0.014	2.40	96	0.9	100	0.52	-0.02	71	202	67	64
281	43.407	0.154	0.014	2.39	96	0.9	-	0.50	-0.02	71	204	67	64
282	43.567	0.160	0.014	2.40	96	0.9	-	0.50	0.00	71	205	67	64
283	43.720	0.153	0.014	2.40	96	0.9	-	0.49	-0.01	71	195	67	64
284	43.878	0.158	0.014	2.38	96	0.9	-	0.48	-0.01	71	198	67	64
285	44.037	0.159	0.014	2.39	96	0.9	-	0.47	-0.01	71	200	66	64
286	44.192	0.155	0.014	2.39	96	0.8	-	0.45	-0.02	71	201	66	64
287	44.350	0.158	0.014	2.40	96	0.9	-	0.44	-0.01	71	202	66	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
288	44.504	0.154	0.014	2.40	96	0.9	-	0.44	0.00	71	199	66	64
289	44.664	0.160	0.014	2.38	96	0.9	-	0.42	-0.02	71	195	66	64
290	44.818	0.154	0.014	2.40	96	0.9	98	0.41	-0.01	71	197	66	64
291	44.976	0.158	0.014	2.39	96	0.8	-	0.40	-0.01	71	199	66	64
292	45.133	0.157	0.014	2.38	96	0.9	-	0.39	-0.01	71	200	66	64
293	45.289	0.156	0.014	2.38	96	0.9	-	0.38	-0.01	71	200	66	64
294	45.447	0.158	0.014	2.39	96	0.9	-	0.38	0.00	70	191	66	64
295	45.601	0.154	0.014	2.38	96	0.9	-	0.37	-0.01	71	194	66	64
296	45.762	0.161	0.014	2.39	96	0.9	-	0.36	-0.01	71	196	66	64
297	45.916	0.154	0.014	2.39	96	0.8	-	0.35	-0.01	71	198	66	64
298	46.073	0.157	0.014	2.39	96	0.9	-	0.34	-0.01	71	199	66	64
299	46.230	0.157	0.014	2.40	96	0.9	-	0.32	-0.02	71	195	66	64
300	46.386	0.156	0.014	2.38	96	0.8	98	0.31	-0.01	70	192	66	64
301	46.545	0.159	0.014	2.39	96	0.9	-	0.30	-0.01	71	195	66	64
302	46.698	0.153	0.014	2.39	96	0.8	-	0.29	-0.01	71	196	66	64
303	46.859	0.161	0.014	2.39	96	0.9	-	0.27	-0.02	71	197	66	64
304	47.014	0.155	0.014	2.39	96	0.9	-	0.26	-0.01	71	198	66	64
305	47.171	0.157	0.014	2.40	96	0.9	-	0.25	-0.01	71	190	66	64
306	47.327	0.156	0.014	2.39	96	0.9	-	0.24	-0.01	71	193	66	64
307	47.484	0.157	0.014	2.39	96	0.9	-	0.23	-0.01	71	194	66	64
308	47.643	0.159	0.014	2.40	96	0.9	-	0.21	-0.02	71	195	66	64
309	47.796	0.153	0.014	2.39	96	0.9	-	0.20	-0.01	71	196	66	64
310	47.956	0.160	0.014	2.39	96	0.9	98	0.18	-0.02	70	192	66	64
311	48.111	0.155	0.014	2.40	96	0.9	-	0.18	0.00	70	189	66	64
312	48.268	0.157	0.014	2.39	96	0.9	-	0.17	-0.01	70	191	66	64
313	48.424	0.156	0.013	2.39	96	0.9	-	0.16	-0.01	70	193	66	64
314	48.579	0.155	0.014	2.39	96	0.9	-	0.15	-0.01	70	193	66	64
315	48.741	0.162	0.014	2.40	96	0.9	-	0.14	-0.01	70	193	66	64
316	48.894	0.153	0.014	2.41	96	0.9	-	0.14	0.00	70	185	66	64
317	49.053	0.159	0.014	2.39	96	0.9	-	0.12	-0.02	70	187	66	64
318	49.208	0.155	0.014	2.39	96	0.9	-	0.11	-0.01	70	188	66	64
319	49.367	0.159	0.014	2.40	96	0.9	-	0.10	-0.01	70	190	66	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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
320	49.522	0.155	0.014	2.40	96	0.8	98	0.08	-0.02	70	190	66	64
321	49.679	0.157	0.014	2.39	96	0.9	-	0.08	0.00	70	191	66	64
322	49.838	0.159	0.014	2.40	96	0.9	-	0.07	-0.01	70	191	66	64
323	49.991	0.153	0.014	2.39	96	0.9	-	0.05	-0.02	70	191	66	64
324	50.151	0.160	0.014	2.38	96	0.9	-	0.04	-0.01	70	191	66	64
325	50.306	0.155	0.014	2.40	96	0.9	-	0.02	-0.02	70	191	66	64
326	50.465	0.159	0.014	2.40	96	0.8	-	0.01	-0.01	70	191	66	64
327	50.619	0.154	0.014	2.38	96	0.9	98	0.00	-0.01	70	191	66	64
Avg/Tot	50.619	0.155	0.013	2.35	91.2	0.9	100			74.4	247.4	66.5	64.8

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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		0.55	71	0.9		69	-0.057	4.11	0.786
1	0.142	0.142	2.21	71	1.8	-	71	-0.044	2.96	0.614
2	0.290	0.148	2.21	71	1.9	-	72	-0.058	2.08	0.416
3	0.434	0.144	2.21	71	1.4	-	72	-0.062	1.99	0.344
4	0.582	0.148	2.21	71	1.3	-	72	-0.068	3.52	0.333
5	0.727	0.145	2.21	71	1.9	-	72	-0.077	9.58	0.439
6	0.873	0.146	2.21	71	1.4	-	72	-0.065	12.51	0.367
7	1.018	0.145	2.21	71	1.9	-	72	-0.062	14.09	0.325
8	1.164	0.146	2.22	71	1.5	-	72	-0.060	9.65	0.644
9	1.310	0.146	2.22	71	1.6	-	72	-0.063	6.99	0.673
10	1.455	0.145	2.21	72	1.7	104	72	-0.062	7.61	0.593
11	1.602	0.147	2.21	72	1.5	-	72	-0.067	8.92	0.546
12	1.747	0.145	2.22	72	1.4	-	72	-0.064	10.73	0.498
13	1.895	0.148	2.22	72	1.4	-	72	-0.063	12.48	0.408
14	2.040	0.145	2.23	72	1.9	-	72	-0.065	11.65	0.622
15	2.189	0.149	2.23	73	1.8	-	72	-0.068	9.91	0.674
16	2.333	0.144	2.22	73	1.5	-	72	-0.072	10.83	0.567
17	2.482	0.149	2.23	73	1.4	-	72	-0.074	13.07	0.394
18	2.626	0.144	2.23	74	1.8	-	72	-0.070	16.12	0.418
19	2.775	0.149	2.23	74	1.4	-	72	-0.069	16.65	0.532
20	2.919	0.144	2.23	74	1.6	102	72	-0.064	14.32	0.810
21	3.068	0.149	2.22	74	1.5	-	72	-0.064	10.81	0.919
22	3.213	0.145	2.23	75	1.5	-	72	-0.061	8.77	0.966
23	3.363	0.150	2.23	75	1.6	-	72	-0.061	8.28	0.993
24	3.508	0.145	2.24	75	1.6	-	72	-0.059	8.59	0.948
25	3.657	0.149	2.24	76	1.4	-	72	-0.058	9.08	0.907
26	3.803	0.146	2.24	76	1.5	-	72	-0.057	9.65	0.856
27	3.952	0.149	2.25	76	1.5	-	72	-0.058	10.20	0.831
28	4.099	0.147	2.25	77	1.9	-	72	-0.058	10.57	0.829
29	4.248	0.149	2.26	77	1.8	-	72	-0.057	10.96	0.843
30	4.395	0.147	2.25	77	1.5	102	72	-0.059	11.36	0.842
31	4.545	0.150	2.26	78	1.5	-	72	-0.058	11.79	0.822

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.691	0.146	2.26	78	1.4	-	72	-0.062	12.27	0.785
33	4.841	0.150	2.25	78	1.9	-	72	-0.063	12.77	0.751
34	4.987	0.146	2.26	79	1.5	-	72	-0.058	13.24	0.709
35	5.137	0.150	2.26	79	1.5	-	72	-0.060	13.61	0.629
36	5.284	0.147	2.26	79	1.5	-	72	-0.063	14.08	0.655
37	5.434	0.150	2.26	80	1.8	-	72	-0.062	13.99	0.892
38	5.581	0.147	2.26	80	1.6	-	72	-0.062	13.52	1.432
39	5.731	0.150	2.26	80	1.5	-	72	-0.060	13.11	1.608
40	5.879	0.148	2.26	81	1.5	102	72	-0.061	12.43	1.494
41	6.029	0.150	2.27	81	1.5	-	72	-0.060	11.59	1.400
42	6.177	0.148	2.27	81	1.8	-	72	-0.057	10.75	1.355
43	6.327	0.150	2.27	82	1.7	-	72	-0.061	10.20	1.330
44	6.476	0.149	2.28	82	1.7	-	72	-0.058	10.55	1.150
45	6.626	0.150	2.27	82	1.8	-	72	-0.060	11.17	0.965
46	6.774	0.148	2.28	83	1.8	-	72	-0.059	12.06	0.763
47	6.925	0.151	2.27	83	1.5	-	72	-0.061	12.83	0.627
48	7.073	0.148	2.28	83	1.8	-	72	-0.062	13.45	0.576
49	7.224	0.151	2.29	83	1.8	-	72	-0.066	14.11	0.530
50	7.371	0.147	2.27	84	1.6	102	72	-0.064	15.06	0.682
51	7.523	0.152	2.28	84	1.5	-	72	-0.061	15.95	1.105
52	7.671	0.148	2.28	84	1.4	-	72	-0.064	16.03	1.036
53	7.823	0.152	2.28	85	1.6	-	72	-0.063	15.64	1.005
54	7.971	0.148	2.28	85	1.5	-	72	-0.064	15.23	1.057
55	8.122	0.151	2.27	85	1.5	-	72	-0.065	15.21	1.079
56	8.270	0.148	2.27	85	1.8	-	72	-0.064	15.48	1.315
57	8.423	0.153	2.28	86	1.8	-	72	-0.066	15.65	1.393
58	8.571	0.148	2.29	86	1.6	-	72	-0.068	15.47	1.417
59	8.724	0.153	2.28	86	1.9	-	72	-0.067	15.52	1.349
60	8.872	0.148	2.28	86	1.6	102	72	-0.065	15.38	1.274
61	9.025	0.153	2.29	87	1.6	-	72	-0.064	15.21	1.242
62	9.173	0.148	2.29	87	1.4	-	72	-0.063	15.11	1.171
63	9.326	0.153	2.28	87	1.4	-	72	-0.064	14.88	1.122

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.475	0.149	2.29	87	1.9	-	72	-0.063	14.70	1.084
65	9.627	0.152	2.29	87	1.8	-	72	-0.065	14.54	1.087
66	9.775	0.148	2.29	88	1.9	-	72	-0.065	14.59	1.050
67	9.928	0.153	2.29	88	1.9	-	72	-0.064	14.64	1.024
68	10.077	0.149	2.29	88	1.5	-	72	-0.063	14.70	1.005
69	10.229	0.152	2.29	88	1.5	-	72	-0.061	14.74	1.033
70	10.379	0.150	2.29	89	1.8	102	72	-0.065	14.99	1.003
71	10.531	0.152	2.29	89	1.5	-	72	-0.064	15.38	0.946
72	10.682	0.151	2.30	89	1.5	-	72	-0.064	15.65	0.927
73	10.833	0.151	2.30	89	1.6	-	72	-0.066	15.67	0.987
74	10.985	0.152	2.29	89	1.8	-	72	-0.067	15.79	1.025
75	11.135	0.150	2.30	90	1.6	-	72	-0.068	16.00	1.161
76	11.287	0.152	2.30	90	1.7	-	72	-0.066	16.14	1.137
77	11.436	0.149	2.29	90	1.6	-	72	-0.067	16.15	1.107
78	11.590	0.154	2.30	90	1.9	-	72	-0.066	16.11	1.077
79	11.739	0.149	2.29	90	1.5	-	72	-0.065	16.02	1.009
80	11.892	0.153	2.29	90	1.8	102	72	-0.064	15.62	0.948
81	12.042	0.150	2.30	91	1.7	-	72	-0.064	15.08	0.922
82	12.196	0.154	2.30	91	1.5	-	72	-0.061	14.44	0.873
83	12.345	0.149	2.29	91	1.5	-	72	-0.062	13.78	0.770
84	12.499	0.154	2.30	91	1.6	-	72	-0.062	13.21	0.755
85	12.649	0.150	2.31	91	1.5	-	72	-0.058	12.78	0.791
86	12.801	0.152	2.30	91	1.6	-	72	-0.060	12.30	0.895
87	12.952	0.151	2.31	92	1.4	-	72	-0.055	11.96	0.911
88	13.104	0.152	2.30	92	1.6	-	72	-0.056	11.68	0.864
89	13.255	0.151	2.31	92	1.5	-	72	-0.059	11.41	0.853
90	13.408	0.153	2.30	92	1.7	102	72	-0.057	11.04	0.901
91	13.561	0.153	2.31	92	1.6	-	72	-0.057	10.70	0.956
92	13.712	0.151	2.31	92	1.5	-	72	-0.054	10.51	0.966
93	13.865	0.153	2.31	92	1.5	-	72	-0.055	10.47	0.981
94	14.015	0.150	2.31	92	1.4	-	72	-0.054	10.42	0.997
95	14.169	0.154	2.30	92	1.5	-	72	-0.056	10.51	0.976

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.318	0.149	2.30	93	1.9	-	72	-0.051	10.65	0.925
97	14.474	0.156	2.30	93	1.8	-	72	-0.054	10.60	0.928
98	14.624	0.150	2.31	93	1.9	-	72	-0.053	10.58	0.968
99	14.778	0.154	2.31	93	1.8	-	72	-0.051	10.65	0.975
100	14.928	0.150	2.31	93	1.9	102	72	-0.051	10.64	1.013
101	15.081	0.153	2.31	93	1.6	-	72	-0.051	10.65	1.042
102	15.232	0.151	2.31	93	1.6	-	72	-0.054	10.73	1.085
103	15.385	0.153	2.31	93	1.8	-	72	-0.054	10.72	1.073
104	15.538	0.153	2.30	93	1.5	-	72	-0.052	10.86	1.030
105	15.690	0.152	2.31	94	1.8	-	72	-0.050	10.99	0.993
106	15.843	0.153	2.31	94	1.5	-	72	-0.053	11.11	0.993
107	15.995	0.152	2.31	94	1.8	-	72	-0.047	11.16	0.988
108	16.148	0.153	2.31	94	1.5	-	72	-0.052	11.17	1.001
109	16.298	0.150	2.32	94	1.6	-	72	-0.051	11.31	1.005
110	16.452	0.154	2.31	94	1.5	100	72	-0.052	11.44	0.998
111	16.603	0.151	2.31	94	1.5	-	71	-0.053	11.51	1.011
112	16.758	0.155	2.31	94	1.5	-	71	-0.053	11.53	1.017
113	16.909	0.151	2.32	94	1.9	-	71	-0.052	11.53	1.019
114	17.063	0.154	2.32	94	1.5	-	71	-0.051	11.56	1.021
115	17.213	0.150	2.32	94	1.5	-	71	-0.047	11.68	0.981
116	17.367	0.154	2.31	94	1.6	-	71	-0.048	11.50	0.954
117	17.519	0.152	2.32	94	1.5	-	71	-0.045	10.92	1.010
118	17.672	0.153	2.31	95	1.7	-	71	-0.050	10.63	1.057
119	17.825	0.153	2.31	95	1.5	-	71	-0.052	10.49	1.087
120	17.977	0.152	2.32	95	1.8	100	71	-0.046	10.37	1.119
121	18.130	0.153	2.31	95	1.9	-	71	-0.047	10.26	1.127
122	18.281	0.151	2.32	95	1.9	-	71	-0.048	10.25	1.136
123	18.436	0.155	2.31	95	1.8	-	71	-0.047	10.18	1.156
124	18.587	0.151	2.31	95	1.7	-	71	-0.051	10.17	1.179
125	18.742	0.155	2.32	95	1.7	-	71	-0.044	10.14	1.190
126	18.893	0.151	2.32	95	1.7	-	71	-0.056	10.07	1.213
127	19.046	0.153	2.31	95	1.9	-	71	-0.055	10.11	1.169

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.198	0.152	2.32	95	1.8	-	71	-0.057	10.40	0.995
129	19.351	0.153	2.31	95	1.7	-	71	-0.054	10.76	0.820
130	19.504	0.153	2.31	95	1.5	102	71	-0.057	10.94	0.815
131	19.657	0.153	2.32	95	1.5	-	71	-0.056	11.02	0.710
132	19.811	0.154	2.32	95	1.7	-	71	-0.057	11.21	0.597
133	19.962	0.151	2.32	95	1.6	-	71	-0.061	11.34	0.525
134	20.116	0.154	2.32	95	1.5	-	71	-0.052	11.31	0.514
135	20.266	0.150	2.31	95	1.5	-	71	-0.057	11.15	0.556
136	20.422	0.156	2.31	95	1.6	-	71	-0.058	11.00	0.645
137	20.572	0.150	2.31	96	1.5	-	71	-0.059	11.12	0.595
138	20.727	0.155	2.31	96	1.8	-	71	-0.061	11.23	0.579
139	20.877	0.150	2.32	96	1.5	-	71	-0.063	11.19	0.580
140	21.032	0.155	2.32	96	1.8	102	71	-0.059	11.13	0.562
141	21.183	0.151	2.30	96	1.7	-	71	-0.058	11.07	0.633
142	21.337	0.154	2.32	96	1.5	-	71	-0.058	10.90	0.609
143	21.490	0.153	2.31	96	1.5	-	71	-0.062	10.84	0.562
144	21.642	0.152	2.31	96	1.7	-	71	-0.062	10.76	0.556
145	21.796	0.154	2.32	96	1.6	-	71	-0.053	10.67	0.552
146	21.947	0.151	2.32	96	1.6	-	71	-0.059	10.51	0.599
147	22.101	0.154	2.31	96	1.8	-	71	-0.060	10.46	0.684
148	22.252	0.151	2.31	96	1.7	-	71	-0.059	10.47	0.626
149	22.408	0.156	2.32	96	1.6	-	71	-0.055	10.46	0.596
150	22.558	0.150	2.31	96	1.7	102	71	-0.058	10.45	0.590
151	22.713	0.155	2.32	96	1.5	-	71	-0.056	10.41	0.588
152	22.864	0.151	2.32	96	1.8	-	71	-0.059	10.39	0.691
153	23.018	0.154	2.31	96	1.5	-	71	-0.058	10.18	0.713
154	23.171	0.153	2.32	96	1.5	-	72	-0.057	10.08	0.704
155	23.324	0.153	2.32	96	1.6	-	72	-0.056	10.02	0.717
156	23.478	0.154	2.32	96	1.7	-	72	-0.053	9.98	0.715
157	23.629	0.151	2.32	96	1.8	-	72	-0.054	10.00	0.686
158	23.783	0.154	2.32	96	1.5	-	72	-0.059	9.99	0.699
159	23.934	0.151	2.31	96	1.6	-	71	-0.058	9.86	0.693

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	24.090	0.156	2.31	96	1.7	102	71	-0.055	9.65	0.725
161	24.240	0.150	2.32	96	1.7	-	71	-0.058	9.15	0.830
162	24.396	0.156	2.32	96	1.6	-	71	-0.054	8.90	0.891
163	24.546	0.150	2.33	96	1.8	-	71	-0.053	8.71	0.971
164	24.701	0.155	2.32	96	1.8	-	71	-0.053	8.57	1.006
165	24.852	0.151	2.31	96	1.6	-	71	-0.054	8.52	1.024
166	25.006	0.154	2.31	96	1.5	-	71	-0.052	8.45	1.035
167	25.159	0.153	2.32	96	1.5	-	71	-0.047	8.42	1.024
168	25.312	0.153	2.32	96	1.6	-	71	-0.050	8.32	1.034
169	25.466	0.154	2.32	96	1.8	-	71	-0.052	8.14	1.130
170	25.617	0.151	2.32	96	1.5	100	71	-0.054	8.15	1.133
171	25.772	0.155	2.31	96	1.5	-	71	-0.053	8.23	1.119
172	25.923	0.151	2.32	96	1.7	-	71	-0.053	8.24	1.116
173	26.078	0.155	2.32	96	1.8	-	71	-0.049	8.20	1.126
174	26.230	0.152	2.32	96	1.6	-	71	-0.052	7.91	1.177
175	26.383	0.153	2.32	97	1.5	-	71	-0.053	7.66	1.234
176	26.535	0.152	2.32	97	1.5	-	71	-0.053	7.67	1.233
177	26.689	0.154	2.32	97	1.6	-	71	-0.051	7.67	1.221
178	26.843	0.154	2.32	97	1.5	-	71	-0.048	7.61	1.230
179	26.995	0.152	2.31	97	1.8	-	71	-0.055	7.58	1.229
180	27.149	0.154	2.32	97	1.5	98	71	-0.051	7.47	1.292
181	27.300	0.151	2.33	97	1.6	-	71	-0.048	7.45	1.311
182	27.455	0.155	2.31	97	1.9	-	71	-0.054	7.50	1.311
183	27.607	0.152	2.32	97	1.5	-	71	-0.050	7.57	1.299
184	27.762	0.155	2.32	97	1.8	-	71	-0.049	7.56	1.309
185	27.913	0.151	2.32	97	1.7	-	71	-0.051	7.54	1.325
186	28.068	0.155	2.33	97	1.7	-	71	-0.050	7.41	1.350
187	28.219	0.151	2.32	97	1.7	-	71	-0.050	7.38	1.353
188	28.373	0.154	2.31	97	1.5	-	71	-0.054	7.40	1.344
189	28.526	0.153	2.31	97	1.5	-	71	-0.046	7.39	1.343
190	28.679	0.153	2.32	97	1.5	100	71	-0.049	7.38	1.324
191	28.834	0.155	2.32	97	1.5	-	71	-0.049	7.25	1.415

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	28.984	0.150	2.32	97	1.8	-	71	-0.051	7.16	1.438
193	29.139	0.155	2.32	97	1.7	-	71	-0.050	7.19	1.427
194	29.290	0.151	2.32	97	1.8	-	71	-0.051	7.14	1.410
195	29.446	0.156	2.32	97	1.5	-	71	-0.053	7.10	1.378
196	29.597	0.151	2.32	97	1.8	-	71	-0.053	7.09	1.383
197	29.752	0.155	2.33	97	1.5	-	71	-0.049	6.93	1.422
198	29.903	0.151	2.33	97	1.7	-	71	-0.049	6.91	1.440
199	30.057	0.154	2.31	97	1.6	-	71	-0.048	6.96	1.442
200	30.210	0.153	2.31	97	1.8	101	71	-0.046	6.97	1.438
201	30.364	0.154	2.32	97	1.5	-	71	-0.044	6.98	1.418
202	30.518	0.154	2.32	97	1.8	-	71	-0.051	6.96	1.447
203	30.669	0.151	2.32	97	1.7	-	71	-0.048	6.94	1.468
204	30.824	0.155	2.32	97	1.8	-	71	-0.049	7.00	1.452
205	30.974	0.150	2.31	97	1.6	-	71	-0.049	6.95	1.434
206	31.130	0.156	2.32	97	1.5	-	71	-0.049	6.87	1.441
207	31.281	0.151	2.31	97	1.6	-	71	-0.050	6.85	1.471
208	31.437	0.156	2.32	97	1.5	-	71	-0.047	6.70	1.497
209	31.587	0.150	2.32	97	1.8	-	71	-0.049	6.78	1.502
210	31.742	0.155	2.32	97	1.6	100	71	-0.046	6.85	1.485
211	31.894	0.152	2.32	97	1.7	-	71	-0.044	6.82	1.506
212	32.048	0.154	2.32	97	1.6	-	71	-0.047	6.81	1.524
213	32.202	0.154	2.32	97	1.8	-	71	-0.047	6.75	1.565
214	32.354	0.152	2.32	97	1.7	-	71	-0.047	6.75	1.562
215	32.508	0.154	2.32	97	1.6	-	71	-0.044	6.87	1.487
216	32.659	0.151	2.31	97	1.6	-	71	-0.050	6.93	1.468
217	32.815	0.156	2.32	97	1.5	-	71	-0.048	6.95	1.440
218	32.966	0.151	2.32	97	1.7	-	71	-0.047	6.89	1.452
219	33.122	0.156	2.32	97	1.8	-	71	-0.045	6.76	1.472
220	33.272	0.150	2.32	97	1.8	98	71	-0.048	6.84	1.471
221	33.426	0.154	2.32	97	1.8	-	71	-0.048	6.85	1.489
222	33.578	0.152	2.32	97	1.8	-	71	-0.039	6.76	1.472
223	33.733	0.155	2.32	97	1.8	-	70	-0.048	6.54	1.441

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	33.887	0.154	2.32	97	1.8	-	70	-0.046	6.38	1.463
225	34.039	0.152	2.32	97	1.5	-	70	-0.043	6.35	1.429
226	34.193	0.154	2.33	97	1.5	-	70	-0.045	6.43	1.413
227	34.344	0.151	2.32	97	1.6	-	70	-0.046	6.51	1.402
228	34.500	0.156	2.32	97	1.7	-	70	-0.047	6.48	1.390
229	34.651	0.151	2.32	97	1.5	-	70	-0.048	6.47	1.401
230	34.807	0.156	2.32	97	1.5	98	70	-0.046	6.34	1.413
231	34.957	0.150	2.32	97	1.8	-	70	-0.046	6.39	1.387
232	35.111	0.154	2.32	97	1.5	-	70	-0.045	6.42	1.379
233	35.263	0.152	2.32	97	1.8	-	70	-0.040	6.48	1.371
234	35.418	0.155	2.32	97	1.8	-	70	-0.044	6.46	1.372
235	35.571	0.153	2.32	97	1.8	-	70	-0.043	6.47	1.368
236	35.724	0.153	2.32	97	1.5	-	70	-0.046	6.39	1.359
237	35.877	0.153	2.33	97	1.8	-	70	-0.043	6.42	1.370
238	36.028	0.151	2.32	97	1.5	-	70	-0.044	6.46	1.373
239	36.185	0.157	2.32	97	1.7	-	70	-0.045	6.47	1.381
240	36.336	0.151	2.32	97	1.7	99	70	-0.044	6.56	1.439
241	36.492	0.156	2.33	97	1.8	-	70	-0.042	6.31	1.494
242	36.642	0.150	2.32	97	1.5	-	70	-0.047	6.21	1.486
243	36.796	0.154	2.32	97	1.8	-	70	-0.046	6.22	1.474
244	36.948	0.152	2.32	97	1.5	-	70	-0.042	6.22	1.473
245	37.103	0.155	2.32	97	1.7	-	70	-0.044	6.18	1.467
246	37.256	0.153	2.32	97	1.7	-	70	-0.045	6.33	1.483
247	37.409	0.153	2.33	97	1.6	-	70	-0.046	6.11	1.447
248	37.563	0.154	2.32	97	1.5	-	70	-0.046	6.08	1.459
249	37.714	0.151	2.32	97	1.5	-	70	-0.044	6.10	1.469
250	37.870	0.156	2.32	97	1.8	100	70	-0.044	6.08	1.476
251	38.021	0.151	2.32	97	1.7	-	70	-0.044	6.17	1.488
252	38.177	0.156	2.33	97	1.7	-	70	-0.043	5.99	1.551
253	38.327	0.150	2.33	97	1.5	-	70	-0.043	5.91	1.510
254	38.482	0.155	2.33	97	1.6	-	70	-0.046	5.94	1.521
255	38.633	0.151	2.32	97	1.6	-	70	-0.035	5.98	1.522

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	38.788	0.155	2.32	97	1.7	-	70	-0.045	6.02	1.545
257	38.942	0.154	2.32	97	1.6	-	70	-0.045	6.15	1.570
258	39.094	0.152	2.33	97	1.8	-	70	-0.043	5.96	1.546
259	39.248	0.154	2.33	97	1.7	-	70	-0.043	5.96	1.540
260	39.399	0.151	2.32	97	1.5	98	70	-0.045	6.04	1.533
261	39.556	0.157	2.32	97	1.6	-	70	-0.042	6.09	1.511
262	39.707	0.151	2.33	97	1.6	-	70	-0.045	6.26	1.534
263	39.863	0.156	2.33	97	1.9	-	70	-0.043	6.05	1.566
264	40.013	0.150	2.32	97	1.6	-	70	-0.045	6.05	1.506
265	40.168	0.155	2.33	97	1.4	-	70	-0.043	6.09	1.490
266	40.320	0.152	2.33	97	1.6	-	70	-0.037	6.02	1.488
267	40.475	0.155	2.33	97	1.8	-	70	-0.045	5.96	1.466
268	40.628	0.153	2.33	97	1.4	-	70	-0.046	6.01	1.539
269	40.780	0.152	2.33	97	1.9	-	70	-0.043	5.76	1.529
270	40.935	0.155	2.33	97	1.6	100	70	-0.044	5.76	1.527
271	41.086	0.151	2.32	97	1.4	-	70	-0.045	5.73	1.519
272	41.242	0.156	2.33	97	1.9	-	70	-0.041	5.78	1.519
273	41.393	0.151	2.32	97	1.5	-	70	-0.043	5.88	1.542
274	41.549	0.156	2.33	97	1.6	-	70	-0.045	5.76	1.551
275	41.699	0.150	2.33	97	1.9	-	70	-0.041	5.69	1.528
276	41.854	0.155	2.33	97	1.4	-	70	-0.046	5.73	1.541
277	42.007	0.153	2.33	97	1.8	-	70	-0.037	5.69	1.592
278	42.161	0.154	2.33	97	1.5	-	70	-0.043	5.67	1.584
279	42.315	0.154	2.33	97	1.5	-	70	-0.045	5.77	1.645
280	42.466	0.151	2.34	97	1.6	99	70	-0.043	5.57	1.600
281	42.621	0.155	2.33	97	1.6	-	70	-0.044	5.60	1.594
282	42.772	0.151	2.32	97	1.6	-	70	-0.044	5.56	1.554
283	42.928	0.156	2.33	97	1.4	-	70	-0.041	5.54	1.521
284	43.079	0.151	2.32	97	1.9	-	70	-0.043	5.64	1.543
285	43.235	0.156	2.33	97	1.4	-	70	-0.043	5.48	1.540
286	43.385	0.150	2.33	97	1.5	-	70	-0.042	5.37	1.510
287	43.540	0.155	2.33	97	1.4	-	70	-0.043	5.41	1.514

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
288	43.693	0.153	2.32	97	1.7	-	70	-0.037	5.42	1.494
289	43.847	0.154	2.33	97	1.7	-	70	-0.045	5.42	1.473
290	44.001	0.154	2.33	97	1.7	98	70	-0.043	5.61	1.534
291	44.152	0.151	2.33	97	1.8	-	70	-0.043	5.34	1.482
292	44.307	0.155	2.33	97	1.9	-	70	-0.042	5.31	1.453
293	44.458	0.151	2.33	97	1.5	-	70	-0.042	5.36	1.424
294	44.614	0.156	2.33	97	1.5	-	70	-0.042	5.31	1.403
295	44.765	0.151	2.33	97	1.9	-	69	-0.040	5.49	1.412
296	44.920	0.155	2.34	97	1.9	-	70	-0.041	5.31	1.473
297	45.071	0.151	2.33	97	1.8	-	69	-0.041	5.26	1.495
298	45.225	0.154	2.33	97	1.9	-	69	-0.041	5.36	1.512
299	45.379	0.154	2.33	97	1.7	-	69	-0.037	5.42	1.514
300	45.533	0.154	2.33	97	1.4	98	69	-0.042	5.53	1.425
301	45.687	0.154	2.33	97	1.5	-	69	-0.043	5.67	1.468
302	45.838	0.151	2.33	97	1.5	-	69	-0.042	5.37	1.499
303	45.993	0.155	2.33	97	1.5	-	69	-0.043	5.23	1.523
304	46.144	0.151	2.33	97	1.5	-	69	-0.039	5.02	1.576
305	46.301	0.157	2.33	97	1.6	-	69	-0.040	4.94	1.618
306	46.452	0.151	2.33	97	1.4	-	69	-0.042	5.08	1.611
307	46.607	0.155	2.33	97	1.5	-	69	-0.041	5.10	1.496
308	46.758	0.151	2.33	97	1.9	-	69	-0.043	5.04	1.424
309	46.912	0.154	2.33	97	1.4	-	69	-0.038	5.14	1.425
310	47.066	0.154	2.33	97	1.4	98	69	-0.034	5.11	1.438
311	47.219	0.153	2.33	97	1.7	-	69	-0.039	5.01	1.456
312	47.374	0.155	2.33	97	1.8	-	69	-0.040	5.14	1.486
313	47.525	0.151	2.33	97	1.9	-	69	-0.040	4.88	1.421
314	47.677	0.152	2.33	97	1.8	-	69	-0.040	4.91	1.419
315	47.831	0.154	2.33	97	1.9	-	69	-0.043	4.96	1.430
316	47.987	0.156	2.33	97	1.4	-	69	-0.038	4.93	1.422
317	48.139	0.152	2.33	97	1.4	-	69	-0.041	5.01	1.380
318	48.293	0.154	2.33	97	1.5	-	69	-0.042	4.90	1.333
319	48.445	0.152	2.33	97	1.8	-	69	-0.040	4.78	1.326

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
320	48.599	0.154	2.33	97	1.8	98	69	-0.040	4.79	1.343
321	48.753	0.154	2.33	97	1.9	-	69	-0.041	4.80	1.359
322	48.906	0.153	2.33	97	1.7	-	69	-0.039	4.84	1.358
323	49.060	0.154	2.34	97	1.4	-	69	-0.040	4.82	1.366
324	49.212	0.152	2.34	97	1.7	-	69	-0.038	4.82	1.362
325	49.366	0.154	2.33	97	1.8	-	69	-0.040	4.78	1.369
326	49.518	0.152	2.33	97	1.7	-	69	-0.040	4.80	1.383
327	49.674	0.156	2.33	97	1.8	98	69	-0.040	4.85	1.405
Avg/Tot	49.674	0.152	2.30	92.1	1.6	100	71.0	-0.052	8.99	1.150

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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		0.27	71	1.4		68
1	0.152	0.152	1.05	70	1.6	-	68
2	0.304	0.152	1.06	70	1.7	-	68
3	0.456	0.152	1.06	70	1.6	-	68
4	0.608	0.152	1.07	70	1.6	-	68
5	0.760	0.152	1.07	70	1.6	-	68
6	0.913	0.153	1.08	70	1.7	-	68
7	1.066	0.153	1.08	71	1.6	-	68
8	1.220	0.154	1.09	71	1.7	-	68
9	1.374	0.154	1.09	71	1.8	-	68
10	1.528	0.154	1.09	71	1.6	102	68
11	1.682	0.154	1.09	72	1.7	-	69
12	1.838	0.156	1.09	72	1.8	-	69
13	1.994	0.156	1.10	72	1.6	-	69
14	2.150	0.156	1.10	72	1.8	-	69
15	2.306	0.156	1.11	72	1.6	-	69
16	2.462	0.156	1.11	73	1.7	-	69
17	2.618	0.156	1.11	73	1.8	-	69
18	2.774	0.156	1.10	73	1.6	-	69
19	2.929	0.155	1.10	73	1.6	-	69
20	3.086	0.157	1.10	74	1.8	101	69
21	3.244	0.158	1.11	74	1.8	-	69
22	3.401	0.157	1.12	74	1.6	-	69
23	3.558	0.157	1.12	75	1.7	-	69
24	3.715	0.157	1.12	75	1.6	-	69
25	3.871	0.156	1.11	76	1.6	-	69
26	4.029	0.158	1.11	76	1.7	-	69
27	4.187	0.158	1.12	76	1.6	-	69
28	4.346	0.159	1.13	77	1.7	-	69
29	4.503	0.157	1.13	77	1.7	-	69
30	4.661	0.158	1.11	77	1.6	102	69
31	4.821	0.160	1.13	78	1.7	-	69

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

	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	4.980	0.159	1.14	78	1.6	-	69
33	5.139	0.159	1.14	78	1.8	-	69
34	5.297	0.158	1.13	78	1.6	-	69
35	5.457	0.160	1.13	79	1.8	-	69
36	5.617	0.160	1.14	79	1.6	-	69
37	5.776	0.159	1.14	79	1.7	-	69
38	5.936	0.160	1.13	80	1.7	-	69
39	6.097	0.161	1.15	80	1.6	-	69
40	6.257	0.160	1.15	80	1.6	102	69
41	6.417	0.160	1.14	81	1.8	-	69
42	6.578	0.161	1.15	80	1.6	-	69
43	6.739	0.161	1.16	81	1.7	-	69
44	6.899	0.160	1.14	81	1.6	-	69
45	7.061	0.162	1.15	81	1.8	-	69
46	7.223	0.162	1.16	82	1.8	-	69
47	7.383	0.160	1.15	82	1.7	-	69
48	7.545	0.162	1.16	82	1.6	-	69
49	7.708	0.163	1.16	82	1.7	-	69
50	7.868	0.160	1.15	83	1.6	103	69
51	8.031	0.163	1.16	83	1.6	-	69
52	8.193	0.162	1.16	83	1.6	-	69
53	8.355	0.162	1.16	83	1.8	-	69
54	8.518	0.163	1.17	83	1.6	-	69
55	8.679	0.161	1.16	83	1.8	-	69
56	8.842	0.163	1.16	83	1.7	-	69
57	9.005	0.163	1.17	83	1.7	-	69
58	9.167	0.162	1.16	83	1.8	-	69
59	9.331	0.164	1.17	83	1.6	-	69
60	9.492	0.161	1.17	83	1.6	103	69
Avg/Tot	9.492	0.158	1.11	76.9	1.7	102	68.9

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	333	322	242	245	376	303.6	396.4
1	331	321	242	243	376	302.6	273.4
2	330	320	237	241	375	300.7	322.4
3	329	319	231	239	374	298.4	342.3
4	326	316	226	240	373	296.0	400.5
5	324	312	220	247	372	294.9	512.9
6	322	309	214	262	371	295.7	484.8
7	321	306	209	278	371	297.0	420.7
8	320	303	204	290	371	297.5	400.8
9	319	300	200	298	370	297.2	402.3
10	317	297	196	304	369	296.5	410.0
11	316	294	192	309	369	295.8	434.3
12	315	291	189	317	368	295.6	446.2
13	314	288	186	326	367	296.0	424.7
14	313	285	183	333	367	296.2	434.8
15	313	283	181	340	366	296.4	454.3
16	312	280	179	348	365	297.0	489.8
17	313	278	178	359	365	298.5	542.4
18	314	277	177	374	364	301.1	548.8
19	315	276	177	389	364	304.2	505.7
20	317	277	177	400	363	306.7	482.2
21	318	277	177	405	363	308.0	468.8
22	319	277	177	406	362	308.1	458.5
23	319	276	176	404	362	307.3	449.9
24	319	275	175	400	361	306.1	444.2
25	319	274	175	395	361	304.8	441.3
26	320	273	174	390	361	303.4	437.4
27	320	271	174	385	360	302.0	436.4
28	321	270	173	382	360	301.0	434.6
29	321	269	173	379	359	300.1	439.9
30	322	267	172	377	359	299.5	441.9
31	322	266	172	377	358	299.1	442.9
32	323	265	172	378	358	299.2	444.7
33	324	264	172	380	357	299.4	442.4
34	325	263	172	384	357	300.1	439.2
35	325	263	172	388	356	300.9	446.0
36	326	263	173	392	356	302.0	451.5
37	327	264	176	395	355	303.4	471.9
38	329	266	179	397	355	305.1	490.0
39	330	269	184	399	354	307.1	498.5
40	332	271	188	397	354	308.4	496.9
41	334	274	191	395	353	309.5	490.0
42	335	277	194	392	353	310.1	483.0
43	335	278	196	389	352	310.1	477.1
44	336	279	197	387	352	310.0	466.7
45	336	280	197	386	351	309.8	460.7
46	336	280	196	386	351	309.7	463.6
47	337	279	195	388	350	309.8	464.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	337	279	195	390	349	310.0	469.2
49	337	279	194	393	349	310.5	496.7
50	337	280	194	399	348	311.6	510.4
51	338	281	195	406	347	313.5	517.7
52	339	283	197	413	347	315.7	525.6
53	340	286	200	420	346	318.3	529.1
54	341	289	204	426	346	321.0	538.1
55	343	292	208	431	345	323.8	538.6
56	345	297	214	436	344	327.1	540.3
57	348	301	219	440	344	330.4	536.6
58	351	306	224	444	343	333.7	536.5
59	354	311	229	448	342	336.9	545.1
60	357	315	234	452	342	339.8	538.8
61	360	319	237	454	341	342.3	538.7
62	363	323	241	455	340	344.6	533.5
63	366	327	245	457	339	346.7	535.4
64	370	330	248	457	339	348.6	531.2
65	372	332	252	457	338	350.3	529.3
66	375	335	254	458	337	351.9	532.1
67	378	337	257	458	336	353.5	531.8
68	381	340	260	459	336	355.1	524.1
69	384	341	263	461	335	356.5	523.9
70	386	343	265	461	334	358.0	526.6
71	389	345	267	465	334	359.8	530.9
72	392	346	269	467	333	361.4	533.2
73	395	347	271	469	332	363.0	536.3
74	398	349	274	472	332	364.9	538.2
75	402	350	276	476	331	366.9	542.4
76	405	351	279	479	331	369.0	544.0
77	408	352	281	482	330	370.7	540.5
78	412	354	283	485	329	372.5	537.6
79	415	355	286	486	329	374.1	536.4
80	418	356	288	488	328	375.7	537.6
81	421	357	290	488	328	376.7	527.5
82	423	358	291	488	327	377.5	519.9
83	425	359	293	485	327	377.7	513.2
84	426	359	293	482	327	377.5	500.5
85	427	359	294	478	326	376.9	494.0
86	426	360	294	473	326	375.6	483.9
87	426	360	293	467	326	374.3	478.2
88	425	360	293	461	325	372.7	475.7
89	423	359	293	454	325	370.8	462.5
90	422	359	291	448	325	368.9	458.3
91	420	358	291	441	325	366.7	452.4
92	417	357	289	435	324	364.5	445.0
93	415	356	287	427	324	362.0	439.5
94	413	355	286	421	324	359.7	436.4
95	411	354	285	415	324	357.5	433.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	409	352	284	408	324	355.3	435.4
97	406	351	282	403	324	353.2	424.8
98	404	349	281	398	324	351.3	426.1
99	402	348	280	393	324	349.3	421.5
100	400	347	279	388	324	347.6	418.0
101	398	346	278	384	324	345.9	420.1
102	397	345	278	379	324	344.5	413.9
103	395	344	278	376	324	343.2	412.9
104	393	343	277	372	324	341.8	413.6
105	392	342	278	369	324	340.8	410.2
106	390	342	278	365	324	339.8	405.0
107	389	341	278	363	324	339.0	401.2
108	388	341	278	360	324	338.1	401.4
109	387	341	278	358	324	337.5	407.5
110	386	340	278	356	324	336.9	412.6
111	385	340	279	353	325	336.5	409.6
112	385	340	280	352	325	336.2	406.3
113	384	341	280	351	325	336.1	408.4
114	384	341	281	349	325	336.0	403.8
115	383	341	282	349	326	336.1	398.5
116	383	342	283	347	326	336.1	404.5
117	383	342	284	345	326	336.1	400.6
118	383	343	285	344	326	336.1	392.5
119	382	343	286	342	327	336.0	404.8
120	382	343	286	340	327	335.7	392.5
121	382	344	286	339	327	335.3	397.9
122	381	344	285	336	327	334.7	392.1
123	380	344	285	335	328	334.3	396.0
124	380	344	284	333	328	333.8	388.4
125	379	344	284	331	328	333.2	387.4
126	379	344	284	329	328	332.5	397.9
127	378	344	284	328	328	332.2	398.5
128	378	343	285	327	328	332.2	406.0
129	378	343	287	327	329	332.7	395.1
130	378	343	289	328	329	333.4	401.2
131	379	344	291	329	329	334.4	407.2
132	380	344	294	330	330	335.5	417.8
133	381	345	297	331	330	336.8	430.2
134	383	347	299	333	330	338.2	427.4
135	384	348	301	334	330	339.5	437.3
136	385	350	302	337	331	340.8	447.0
137	385	352	303	339	331	341.8	455.1
138	385	353	304	342	332	343.1	467.4
139	386	355	304	344	332	344.3	479.4
140	386	358	305	347	332	345.5	456.8
141	386	360	305	348	333	346.4	459.5
142	386	362	306	350	334	347.4	465.3
143	385	364	307	352	334	348.3	458.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	385	366	307	353	335	349.1	469.9
145	385	367	308	355	335	350.1	450.2
146	385	369	309	356	336	351.0	462.9
147	385	371	310	357	336	351.8	469.9
148	385	373	311	357	337	352.6	466.5
149	385	374	313	357	338	353.2	471.6
150	385	376	314	357	338	353.9	466.2
151	384	377	315	357	339	354.6	446.7
152	384	379	316	357	340	355.1	451.0
153	384	380	316	357	340	355.7	444.6
154	385	382	318	356	341	356.2	439.9
155	384	383	319	356	342	356.7	434.6
156	384	385	320	355	342	357.2	433.8
157	385	386	320	355	343	357.7	424.3
158	385	388	320	355	344	358.1	423.7
159	385	389	319	353	344	358.1	424.0
160	385	390	318	352	345	358.0	414.8
161	385	391	316	350	346	357.6	408.8
162	386	391	315	348	346	357.2	402.9
163	386	391	313	346	347	356.6	400.9
164	386	390	312	344	348	355.8	399.6
165	386	389	311	342	348	355.3	396.5
166	387	387	310	339	349	354.4	396.9
167	387	386	309	337	350	353.6	389.0
168	387	385	308	334	350	352.8	390.1
169	386	384	307	332	351	351.9	386.2
170	386	383	306	329	352	351.1	382.1
171	386	381	305	326	353	350.2	383.8
172	386	380	304	325	353	349.5	382.3
173	386	379	305	322	354	348.9	371.3
174	385	377	304	320	355	348.2	372.3
175	385	376	303	318	355	347.4	368.2
176	385	375	302	316	356	346.7	370.3
177	384	374	301	314	357	345.8	371.6
178	383	372	300	312	357	345.0	365.5
179	383	371	300	309	358	344.1	360.2
180	382	370	299	308	358	343.2	366.0
181	381	369	298	306	359	342.5	361.9
182	381	368	297	304	359	341.6	360.6
183	380	366	297	303	360	341.0	358.1
184	379	365	296	301	360	340.1	352.9
185	378	365	295	299	361	339.5	353.3
186	378	363	294	297	361	338.7	355.9
187	377	362	294	296	362	338.1	356.5
188	376	361	293	294	362	337.4	356.3
189	375	360	293	293	362	336.8	353.1
190	375	360	292	291	363	336.1	351.0
191	374	359	291	290	363	335.5	348.2

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	373	358	291	289	364	335.0	350.7
193	372	357	291	288	364	334.3	353.2
194	372	356	290	287	364	333.8	345.5
195	371	356	289	285	364	333.1	345.6
196	370	355	289	285	365	332.6	342.7
197	370	354	288	283	365	331.8	344.8
198	369	353	287	282	365	331.3	343.9
199	368	352	287	281	365	330.6	343.4
200	368	351	286	280	365	330.0	346.2
201	367	351	285	279	366	329.3	339.7
202	366	350	285	278	366	328.7	337.7
203	365	349	284	277	366	328.2	337.8
204	364	349	284	275	366	327.5	337.9
205	364	348	284	275	366	327.1	337.4
206	363	347	283	273	366	326.6	338.1
207	362	347	282	272	366	325.9	334.2
208	362	346	282	271	366	325.5	337.9
209	361	346	282	270	367	325.0	336.1
210	360	345	281	270	367	324.5	332.3
211	360	345	281	269	367	324.2	336.9
212	359	344	280	268	367	323.4	331.3
213	358	344	279	267	367	322.9	331.2
214	357	343	279	266	366	322.3	328.9
215	357	343	278	266	366	321.9	328.3
216	356	343	277	265	366	321.3	328.8
217	355	342	277	264	366	320.8	331.2
218	355	342	276	263	366	320.2	323.9
219	354	342	275	262	366	319.8	323.2
220	353	342	275	261	366	319.3	324.4
221	353	341	274	261	365	318.8	325.3
222	352	341	273	260	365	318.3	325.4
223	352	341	273	259	365	317.7	318.9
224	351	340	272	258	364	317.2	316.0
225	351	340	271	257	364	316.5	316.4
226	350	340	270	257	364	316.1	317.9
227	349	339	269	256	364	315.4	316.8
228	349	339	268	255	363	314.9	308.3
229	348	339	267	254	363	314.3	312.4
230	347	339	267	254	363	313.8	312.6
231	346	339	266	253	363	313.3	314.9
232	346	338	266	252	363	312.9	312.5
233	345	338	265	251	363	312.4	307.6
234	344	338	264	250	362	311.8	310.4
235	343	338	264	250	362	311.4	308.1
236	343	338	263	249	362	310.9	307.7
237	342	338	263	249	362	310.6	308.3
238	341	338	262	248	362	310.2	309.5
239	341	338	262	248	361	309.8	300.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	340	338	262	247	361	309.4	305.3
241	339	338	261	246	361	309.0	314.0
242	339	337	261	246	361	308.6	313.6
243	338	337	261	245	360	308.2	313.5
244	337	337	261	245	360	308.0	305.5
245	336	337	260	244	360	307.5	310.0
246	336	337	259	244	360	307.0	313.9
247	335	337	259	243	360	306.7	311.5
248	334	337	258	243	359	306.2	308.1
249	333	337	258	242	359	305.8	311.0
250	332	337	258	242	359	305.4	299.7
251	332	337	257	241	359	305.0	307.1
252	331	336	257	241	359	304.6	306.5
253	330	336	256	240	359	304.1	306.1
254	329	336	256	240	359	303.8	309.3
255	329	335	255	239	358	303.3	315.6
256	328	335	255	239	358	302.8	304.0
257	327	335	254	238	358	302.3	308.9
258	327	335	253	237	358	302.0	302.8
259	326	334	253	237	358	301.6	306.7
260	325	334	253	237	358	301.2	310.0
261	325	334	252	236	358	300.9	306.3
262	324	333	252	235	358	300.5	309.1
263	324	333	252	234	358	300.0	300.7
264	323	333	251	234	358	299.7	301.2
265	323	333	250	234	358	299.3	299.5
266	323	332	249	233	358	298.9	298.1
267	322	332	248	233	358	298.5	295.1
268	322	331	247	232	357	297.9	300.8
269	321	331	246	232	357	297.4	294.2
270	321	330	245	231	357	296.9	297.1
271	321	330	245	231	357	296.5	295.0
272	320	329	244	231	357	296.0	287.0
273	320	328	242	230	356	295.5	292.0
274	320	328	242	229	356	294.8	290.7
275	319	327	241	229	356	294.4	296.6
276	319	327	241	229	355	294.0	296.3
277	318	326	239	229	355	293.5	289.3
278	318	326	239	228	355	293.2	292.1
279	318	325	238	228	355	292.7	292.4
280	317	324	237	228	355	292.2	294.4
281	317	323	237	227	354	291.7	294.8
282	316	323	236	227	354	291.3	293.6
283	316	322	236	227	354	290.9	288.4
284	315	321	235	226	354	290.3	288.4
285	315	321	235	226	354	289.8	292.0
286	314	320	234	225	354	289.4	289.5
287	314	319	234	225	354	288.9	288.9

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

Stove ΔT: 33

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
288	313	318	233	225	354	288.4	287.4
289	312	318	233	224	354	288.0	281.1
290	311	317	232	223	353	287.4	286.1
291	311	316	232	223	353	287.1	290.8
292	310	315	232	223	353	286.6	286.8
293	309	315	231	222	353	286.1	286.8
294	309	314	232	222	353	285.8	280.5
295	308	313	231	221	353	285.2	282.5
296	307	313	230	220	353	284.7	284.5
297	307	312	230	220	353	284.2	283.2
298	306	311	230	219	353	283.9	282.2
299	306	311	230	219	353	283.5	283.4
300	306	310	230	219	353	283.2	278.9
301	305	310	229	218	352	282.9	276.7
302	305	309	229	218	352	282.6	279.7
303	305	308	229	217	352	282.4	279.3
304	304	308	229	217	352	282.0	284.2
305	304	307	229	217	352	281.7	273.9
306	303	307	228	216	352	281.2	275.9
307	303	306	228	216	352	280.8	275.7
308	302	306	227	215	351	280.3	276.2
309	301	305	227	215	351	280.0	274.9
310	301	305	227	214	351	279.6	272.4
311	300	305	226	214	351	279.2	271.3
312	300	305	226	213	350	278.8	272.3
313	299	305	226	213	350	278.3	273.6
314	298	304	225	212	350	277.8	273.4
315	297	304	225	212	349	277.4	273.0
316	297	304	224	212	349	276.9	264.7
317	296	304	223	211	348	276.3	265.2
318	295	304	222	210	348	275.8	265.2
319	294	303	222	210	347	275.2	265.2
320	294	303	221	209	347	274.5	267.0
321	293	302	220	209	346	273.9	263.7
322	292	302	220	208	345	273.4	263.3
323	291	301	219	208	345	272.8	262.9
324	290	301	219	207	344	272.3	261.2
325	290	301	219	206	344	271.7	262.3
326	289	301	218	206	343	271.2	263.3
327	288	300	218	205	342	270.7	263.0
Average	353.1	332.3	256.9	317.2	349.4	321.8	385.6

LAB SAMPLE DATA - ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 2

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/18/2023

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G00429	246.4	250.6	4.2
	B	G00430	246.1	249.7	3.6
	C - 1st Hour	G00431	246.8	249.2	2.4
	Amb	G00432	246.7	246.8	0.1
Probes	**A**	17A	116809.8	116809.8	0.0
	B	17B	117139.7	117139.8	0.1
	C - 1st Hour	17C	113140.9	113140.9	0.0
O-rings	**A**	17A	3613.0	3613.1	0.1
	B	17B	3569.5	3569.8	0.3
	C - 1st Hour	17C	3597.3	3597.7	0.4

Placed in Dessicator on:	

Filters	**A**	250.4	1/20 8:40	250.6	1/23 15:33				
	B	249.7	1/20 8:39	249.7	1/23 15:33				
	C - 1st Hour	249.1	1/20 8:39	249.2	1/23 15:32				
	Amb	247.0	1/20 8:39	246.8	1/23 15:38				
Probes	**A**	116809.8	1/20 8:39	116809.8	1/23 15:32				
	B	117139.8	1/20 8:39	117139.8	1/23 15:32				
	C - 1st Hour	113140.9	1/20 8:39	113140.9	1/23 15:32				
O-Rings	**A**	3613.6	1/20 8:39	3613.2	1/23 15:32	3613.1	1/25 14:12		
	B	3570.3	1/20 8:40	3569.9	1/23 15:33	3569.8	1/25 14:12		
	C - 1st Hour	3597.7	1/20 8:40	3597.7	1/23 15:33				

Train A Aggregate, mg:	**4.3**
Train B Aggregate, mg:	**4.0**
Train C Aggregate, mg:	**2.8**
Ambient, mg:	**0.1**

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 2 Test Date: 1/18/23

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Fully Closed
Targeted Burn Category: I

Preburn Notes

Time	Notes
0:00	Set air to test setting, fan on low
41:00	Broke down coals
57:00	Stirred coals, removed 0.4 lb
72:00	PB end @ 3.06 lb

Test Notes

Test Burn Start Time: 14:10 Test Fuel Loaded by: 35 seconds
Door Closed: 115 seconds Air Control Set at: 360 seconds
Other Loading Notes: Fan on low @ 0 sec

Time	Notes
	- None -

Test Burn End Time: 19:39

Flue Gas Concentration Measurement

Calibration Gas Values:
Span Gas CO_2 (%): 17.01 CO (%): 4.306
Mid Gas CO_2 (%): 10.09 CO (%): 2.53

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	11:26	11:23	11:24	1/19 11:39	1/19 11:40	1/19 11:41
CO_2	0.09	10.07	7.000	0.09	10.14	17.12
CO	0.012	2.443	4.311	0.018	2.532	4.329

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

Technician Signature:  Date: 3/6/23

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 2 Test Date: 1/18/23

Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: Date: 3/6/23

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 3 Data Summary

Client:	Pacific Energy
Model:	TN25 C
Job #:	22-861
Tracking #:	136
Test Date:	1/19/2023

Techician Signature

3/6/2023
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Burn Rate (kg/hr):	**1.38**

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	22.824	33.908	33.488	9.457
Average Gas Velocity in Dilution Tunnel (ft/sec)	6.4			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	17699.6			
Average Gas Meter Temperature (°F)	64.5	88.0	89.2	76.5
Total Sample Volume (dscf)	23.890	33.233	32.747	9.429
Average Tunnel Temperature (°F)	78.7			
Total Time of Test (min)	221			
Total Particulate Catch (mg)	0.0	0.9	1.0	0.7
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000271	0.0000305	0.0000742
Total PM Emissions (g)	0.00	1.77	1.99	1.31
Particulate Emission Rate (g/hr)	0.00	0.48	0.54	1.31
Emissions Factor (g/kg)	-	0.35	0.39	-
Difference from Average Total Particulate Emissions (g)	-	0.11	0.11	-
Difference from Average Total Particulate Emissions (%)	-	6.0%	6.0%	
Difference from Average Emissions Factor (g/kg)	-	0.02	0.02	-

Final Average Results	
Total Particulate Emissions (g)	1.88
Particulate Emission Rate (g/hr)	0.51
Emissions Factor (g/kg)	0.37
HHV Efficiency (%)	76.4%
LHV Efficiency (%)	82.5%
CO Emissions (g/min)	0.99

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	<90 °F	73.9	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:63.6/Max:65.2	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	66.6	OK

B415.1 Efficiency Results

Manufacturer:	Pacific Energy
Model:	TN25 C
Date:	01/19/23
Run:	3
Control #:	22-861
Test Duration:	221
Output Category:	3

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	76.4%	82.5%
Combustion Efficiency	97.0%	97.0%
Heat Transfer Efficiency	78.7%	85.1%

Output Rate (kJ/h)	20,637	19,576	**(Btu/h)**
Burn Rate (kg/h)	1.36	3.01	**(lb/h)**
Input (kJ/h)	27,020	25,631	**(Btu/h)**

Test Load Weight (dry kg)	5.02	11.07	**dry lb**
MC wet (%)	18.58		
MC dry (%)	22.83		
Particulate (g)	1.88		
CO (g)	219		
Test Duration (h)	3.68		

Emissions	**Particulate**	**CO**
g/MJ Output	0.02	2.88
g/kg Dry Fuel	0.37	43.55
g/h	0.51	59.40
g/min	0.01	0.99
lb/MM Btu Output	0.06	6.69

Air/Fuel Ratio (A/F)	11.09

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

WOODSTOVE FUEL DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	12.00	22.1			
2x4	12.00	24.6			
2x4	12.00	22.1			
2x4	12.00	23.3			
2x4	12.00	24.5			
2x4	12.00	24.8			
2x4	12.00	24.5			

Total Fuel Weight (lbs): 9.33
Average Moisture (%DB): 23.7

Firebox Volume (ft^3): 1.98
Total 2x4 Crib Weight, with spacers (lbs): 6.11
Total 4x4 Crib Weight, with spacers (lbs): 7.52
Total Wet Fuel Weight, with spacers (lbs): 13.63

Coal Bed Range (20-25%):
Min (lbs): 2.73
Max (lbs): 3.41

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
4x4	15.00	3.57	22.7	23.3	24.8	2.89
4x4	15.00	3.55	24.5	21.9	20.1	2.91
2x4	15.00	1.94	23.6	23.9	22.6	1.57
2x4	15.00	1.54	22.7	23.0	24.5	1.25
2x4	15.00	1.48	23.6	21.2	20.0	1.22

Total Dry Weight, no spacers (lbs): 9.83
Total Dry Weight, with spacers (lbs): 11.23

Spacer Moisture Readings (%DB)

8.9	9.7	12.0	12.1				
13.5	8.6	9.9	10.1				
10.1	13.2	12.0	13.1				
8.8	9.0	8.8	8.7				

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	28.1	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	6.89	OK
2x4 Fuel Mix	35 - 65 % of total weight	45%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	Pacific Energy	Job #:	22-861
Model:	TN25 C	Tracking #:	136
Run #:	3	Technician:	AK
Test Start Time:	12:59	Date:	1/19/2023

Total Sampling Time (min):	221	
Recording Interval (min):	1	
Meter Box γ Factor:	1.000	(A)
Meter Box γ Factor:	1.000	(B)
Meter Box γ Factor:	0.999	(C)
Meter Box γ Factor:	1.028	(Ambient)
Induced Draft Check (in. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	1/16/2023	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	30.26	30.29	30.28
Relative Humidity (%)	31.3	29.4	
Room Air Velocity (ft/min)	<50	<50	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:		22.824	ft^3

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-4	in. Hg
(B)	0.000	cfm @	-5	in. Hg
(C)	0.000	cfm @	-4	in. Hg
(Ambient)	0.000	cfm @	-8	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.006	91
2	0.008	91
3	0.012	91
4	0.012	91
5	0.010	91
6	0.008	91
7	0.008	91
8	0.010	91
9	0.012	91
10	0.012	91
11	0.012	91
12	0.006	91
Center	0.013	91

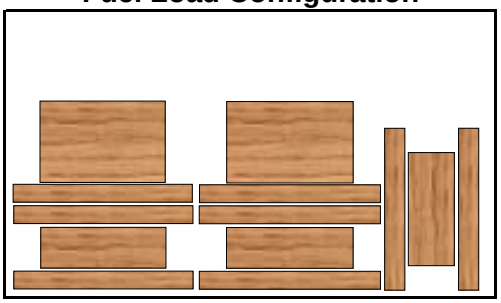
Static Pressure: -0.060 in. H_2O

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}:	6.57	ft/sec
V_{scent}:	7.68	ft/sec
F_p:	0.856	[ratio]
Initial Tunnel Flow:	294.1	scf/min

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Front



Firebox Back

Firebox Side View

Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	22.8

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	6.82	-0.093	467	460	331	652	473	476.6	526	65
1	6.66	-0.092	469	463	335	657	472	479.1	494	65
2	6.53	-0.088	472	465	337	659	471	480.5	470	65
3	6.41	-0.087	474	466	338	655	470	480.4	453	65
4	6.28	-0.087	476	467	338	649	469	479.6	441	65
5	6.15	-0.086	477	466	338	640	468	477.8	433	65
6	6.03	-0.085	478	466	338	633	467	476.2	429	65
7	5.89	-0.083	478	465	338	625	466	474.3	425	65
8	5.77	-0.084	479	464	339	617	465	472.6	424	65
9	5.65	-0.084	479	463	340	611	464	471.4	423	65
10	5.51	-0.083	480	462	341	607	463	470.5	422	65
11	5.38	-0.085	481	462	343	602	461	469.8	423	65
12	5.24	-0.083	482	462	345	601	460	469.7	423	65
13	5.11	-0.084	483	462	347	600	459	470.0	422	65
14	4.97	-0.083	484	462	350	600	458	470.7	422	65
15	4.82	-0.084	486	462	352	600	457	471.3	422	65
16	4.68	-0.083	487	464	354	600	456	472.2	440	65
17	4.54	-0.084	490	465	358	603	455	474.0	433	65
18	4.41	-0.081	492	467	360	604	454	475.3	429	65
19	4.28	-0.084	494	468	363	606	453	476.7	427	65
20	4.17	-0.084	496	471	364	608	452	478.0	424	65
21	4.05	-0.085	498	472	367	609	450	479.2	422	65
22	3.95	-0.082	500	474	368	612	449	480.5	419	65
23	3.86	-0.080	501	475	370	610	448	480.8	416	65
24	3.77	-0.081	503	477	371	610	447	481.4	412	65
25	3.70	-0.081	504	478	372	609	446	481.5	406	65
26	3.61	-0.078	505	479	373	606	445	481.4	402	65
27	3.54	-0.079	506	479	374	604	444	481.4	397	65
28	3.47	-0.078	507	480	375	600	443	480.8	392	65
29	3.41	-0.077	507	480	376	594	442	479.8	387	65
30	3.34	-0.075	507	481	377	588	442	479.0	381	65
31	4.17	-0.080	507	482	381	579	443	478.3	416	65
32	4.05	-0.084	508	483	383	569	444	477.1	400	65
33	3.94	-0.083	507	483	381	559	445	474.9	396	65
34	3.81	-0.081	506	482	379	552	445	472.6	396	65
35	3.70	-0.081	505	480	377	546	445	470.4	399	65
36	3.58	-0.081	504	479	376	544	445	469.6	403	65
37	3.47	-0.080	503	478	377	545	445	469.6	403	65
38	3.41	-0.077	504	477	379	547	445	470.2	393	65
39	3.35	-0.077	504	477	382	546	445	470.6	378	65
40	3.32	-0.072	504	477	384	540	445	470.0	366	65
41	3.28	-0.070	504	478	385	535	444	469.1	355	65
42	3.24	-0.070	502	479	385	526	443	466.9	347	65
43	3.22	-0.070	500	480	382	515	442	463.8	338	65
44	3.20	-0.066	497	480	379	503	441	460.2	330	65

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.18	-0.066	494	480	375	492	440	456.2	323	65
46	3.16	-0.065	491	479	370	480	439	451.7	318	65
47	3.14	-0.065	487	477	366	469	437	447.0	312	65
48	3.12	-0.063	483	474	361	457	436	442.0	308	65
49	3.10	-0.064	479	471	356	445	434	437.0	304	65
50	3.09	-0.062	474	467	351	435	432	432.0	300	65
51	3.07	-0.064	470	463	346	426	431	427.0	296	65
52	3.05	-0.060	466	459	341	415	429	421.8	292	65
53	3.04	-0.060	461	454	336	405	428	416.9	288	65
54	3.03	-0.061	457	449	332	396	426	412.0	284	65
55	3.01	-0.058	453	444	326	387	424	406.8	280	65
56	3.00	-0.059	448	439	319	379	422	401.7	277	65
57	2.99	-0.055	444	434	313	371	420	396.4	274	65
58	2.97	-0.057	439	428	307	362	419	391.0	271	65
59	2.97	-0.058	434	423	301	355	417	385.9	267	65
60	2.95	-0.057	429	417	295	348	415	381.0	265	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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		0.011	1.36	69	0.6		13.60		85	293	66	65
1	0.130	0.130	0.012	2.04	69	0.7	-	13.58	-0.02	93	288	66	65
2	0.267	0.137	0.011	2.07	69	0.7	-	13.49	-0.09	98	303	66	65
3	0.413	0.146	0.012	2.09	69	0.7	-	13.34	-0.15	91	318	66	65
4	0.553	0.140	0.012	2.09	69	0.8	-	13.19	-0.15	88	353	66	65
5	0.697	0.144	0.012	2.11	69	0.8	-	13.00	-0.19	88	407	66	65
6	0.839	0.142	0.013	2.11	70	0.7	-	12.85	-0.15	87	426	66	65
7	0.981	0.142	0.013	2.12	70	0.8	-	12.69	-0.16	87	434	66	65
8	1.127	0.146	0.012	2.14	70	0.8	-	12.54	-0.15	87	437	66	65
9	1.266	0.139	0.012	2.14	70	0.8	-	12.36	-0.18	88	448	66	65
10	1.413	0.147	0.012	2.15	70	0.8	101	12.20	-0.16	88	451	66	65
11	1.555	0.142	0.013	2.16	70	0.8	-	12.06	-0.14	88	449	67	65
12	1.702	0.147	0.013	2.16	71	0.8	-	11.90	-0.16	88	452	66	65
13	1.845	0.143	0.013	2.17	71	0.8	-	11.77	-0.13	88	446	66	65
14	1.989	0.144	0.012	2.18	71	0.8	-	11.63	-0.14	88	443	66	65
15	2.135	0.146	0.013	2.18	71	0.8	-	11.47	-0.16	88	445	66	65
16	2.280	0.145	0.013	2.19	72	0.8	-	11.31	-0.16	88	441	67	65
17	2.428	0.148	0.013	2.21	72	0.8	-	11.17	-0.14	87	431	66	65
18	2.571	0.143	0.013	2.20	72	0.8	-	11.04	-0.13	86	419	66	65
19	2.719	0.148	0.013	2.21	72	0.8	-	10.92	-0.12	86	410	66	65
20	2.862	0.143	0.012	2.21	73	0.8	101	10.79	-0.13	86	416	66	65
21	3.012	0.150	0.013	2.23	73	0.9	-	10.65	-0.14	86	413	66	65
22	3.156	0.144	0.013	2.22	73	0.8	-	10.51	-0.14	86	411	66	65
23	3.307	0.151	0.013	2.24	74	0.8	-	10.37	-0.14	85	412	66	65
24	3.452	0.145	0.013	2.25	74	0.9	-	10.22	-0.15	85	415	66	65
25	3.601	0.149	0.013	2.25	74	0.8	-	10.07	-0.15	85	417	66	65
26	3.747	0.146	0.013	2.26	75	0.8	-	9.92	-0.15	86	419	66	65
27	3.896	0.149	0.013	2.26	75	0.8	-	9.78	-0.14	86	422	66	65
28	4.043	0.147	0.012	2.26	75	0.9	-	9.62	-0.16	86	424	66	65
29	4.191	0.148	0.012	2.26	76	0.8	-	9.46	-0.16	86	428	66	65
30	4.339	0.148	0.012	2.27	76	0.8	103	9.31	-0.15	86	430	66	65
31	4.488	0.149	0.013	2.26	76	0.9	-	9.16	-0.15	86	432	66	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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
32	4.637	0.149	0.013	2.27	77	0.9	-	9.01	-0.15	86	434	66	65
33	4.786	0.149	0.013	2.28	77	0.9	-	8.86	-0.15	86	434	66	65
34	4.936	0.150	0.012	2.28	77	0.8	-	8.70	-0.16	86	435	66	65
35	5.084	0.148	0.012	2.29	78	0.9	-	8.55	-0.15	87	437	66	65
36	5.235	0.151	0.013	2.29	78	0.9	-	8.39	-0.16	87	439	66	65
37	5.383	0.148	0.013	2.30	78	0.9	-	8.25	-0.14	87	440	66	65
38	5.534	0.151	0.013	2.30	79	0.9	-	8.09	-0.16	87	440	66	65
39	5.682	0.148	0.012	2.30	79	0.9	-	7.94	-0.15	87	441	66	65
40	5.834	0.152	0.012	2.31	79	0.9	103	7.79	-0.15	87	440	66	65
41	5.983	0.149	0.013	2.30	80	0.9	-	7.64	-0.15	87	438	66	65
42	6.134	0.151	0.013	2.31	80	0.9	-	7.51	-0.13	86	436	66	65
43	6.284	0.150	0.013	2.31	80	0.9	-	7.36	-0.15	86	434	66	65
44	6.435	0.151	0.012	2.32	80	0.9	-	7.23	-0.13	86	431	66	65
45	6.585	0.150	0.013	2.31	81	0.9	-	7.10	-0.13	86	428	66	65
46	6.736	0.151	0.012	2.32	81	0.9	-	6.97	-0.13	86	425	66	65
47	6.887	0.151	0.013	2.32	81	0.9	-	6.84	-0.13	86	423	66	65
48	7.038	0.151	0.013	2.32	82	0.9	-	6.70	-0.14	86	422	66	65
49	7.191	0.153	0.013	2.32	82	0.8	-	6.57	-0.13	86	421	66	65
50	7.342	0.151	0.012	2.33	82	0.8	104	6.44	-0.13	86	421	66	65
51	7.495	0.153	0.013	2.34	82	0.9	-	6.32	-0.12	86	420	66	65
52	7.645	0.150	0.013	2.34	83	0.9	-	6.18	-0.14	86	420	66	65
53	7.799	0.154	0.012	2.33	83	0.9	-	6.05	-0.13	86	420	66	65
54	7.949	0.150	0.013	2.34	83	0.9	-	5.92	-0.13	86	420	66	65
55	8.103	0.154	0.013	2.34	83	0.8	-	5.79	-0.13	86	420	66	65
56	8.252	0.149	0.012	2.35	84	0.8	-	5.67	-0.12	86	414	67	65
57	8.406	0.154	0.013	2.34	84	0.9	-	5.55	-0.12	85	404	67	65
58	8.556	0.150	0.013	2.35	84	0.9	-	5.44	-0.11	84	396	67	65
59	8.711	0.155	0.013	2.35	84	0.8	-	5.35	-0.09	84	389	67	65
60	8.860	0.149	0.013	2.35	85	0.9	101	5.25	-0.10	84	382	67	65
61	9.017	0.157	0.013	2.35	85	0.9	-	5.16	-0.09	83	376	66	65
62	9.167	0.150	0.013	2.36	85	0.9	-	5.06	-0.10	83	372	66	65
63	9.322	0.155	0.012	2.35	85	0.8	-	4.97	-0.09	82	368	67	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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
64	9.473	0.151	0.013	2.35	86	0.9	-	4.88	-0.09	82	364	67	65
65	9.627	0.154	0.013	2.37	86	0.8	-	4.79	-0.09	82	361	67	65
66	9.778	0.151	0.013	2.36	86	0.8	-	4.71	-0.08	82	359	66	65
67	9.933	0.155	0.013	2.36	86	0.8	-	4.62	-0.09	82	356	66	65
68	10.085	0.152	0.013	2.36	86	0.8	-	4.54	-0.08	81	354	67	65
69	10.239	0.154	0.013	2.35	87	0.9	-	4.45	-0.09	81	351	67	65
70	10.394	0.155	0.012	2.37	87	0.9	102	4.37	-0.08	81	349	66	65
71	10.545	0.151	0.012	2.36	87	0.9	-	4.29	-0.08	81	347	66	65
72	10.701	0.156	0.012	2.38	87	0.9	-	4.21	-0.08	81	345	66	65
73	10.851	0.150	0.012	2.37	87	0.8	-	4.13	-0.08	81	343	66	65
74	11.008	0.157	0.013	2.38	88	0.9	-	4.05	-0.08	80	340	66	65
75	11.158	0.150	0.013	2.37	88	0.9	-	3.98	-0.07	80	338	67	65
76	11.316	0.158	0.013	2.38	88	0.9	-	3.90	-0.08	80	335	67	65
77	11.468	0.152	0.012	2.39	88	0.9	-	3.84	-0.06	80	333	66	65
78	11.625	0.157	0.012	2.38	88	0.8	-	3.77	-0.07	80	330	67	65
79	11.776	0.151	0.013	2.38	88	0.9	-	3.71	-0.06	80	327	67	65
80	11.931	0.155	0.012	2.38	89	0.9	104	3.65	-0.06	79	323	66	65
81	12.085	0.154	0.013	2.38	89	0.9	-	3.60	-0.05	79	319	66	65
82	12.239	0.154	0.012	2.38	89	0.9	-	3.54	-0.06	79	316	67	65
83	12.396	0.157	0.013	2.37	89	0.9	-	3.50	-0.04	79	311	67	65
84	12.548	0.152	0.013	2.39	89	0.9	-	3.45	-0.05	78	308	67	65
85	12.704	0.156	0.013	2.38	89	0.9	-	3.40	-0.05	78	305	67	65
86	12.855	0.151	0.013	2.38	89	0.9	-	3.35	-0.05	78	303	67	65
87	13.013	0.158	0.013	2.39	90	0.9	-	3.30	-0.05	78	301	67	65
88	13.165	0.152	0.012	2.39	90	0.9	-	3.26	-0.04	78	299	66	65
89	13.323	0.158	0.012	2.39	90	0.9	-	3.21	-0.05	78	298	67	65
90	13.475	0.152	0.013	2.39	90	0.9	102	3.16	-0.05	78	295	67	65
91	13.630	0.155	0.013	2.39	90	0.9	-	3.11	-0.05	77	294	67	65
92	13.785	0.155	0.013	2.39	90	0.9	-	3.07	-0.04	77	293	67	65
93	13.940	0.155	0.013	2.39	90	0.9	-	3.03	-0.04	77	291	66	65
94	14.098	0.158	0.013	2.40	90	0.9	-	2.97	-0.06	77	290	66	65
95	14.249	0.151	0.013	2.40	91	0.8	-	2.93	-0.04	77	295	66	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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
96	14.406	0.157	0.013	2.39	91	0.9	-	2.88	-0.05	77	301	66	65
97	14.558	0.152	0.013	2.39	91	0.9	-	2.83	-0.05	77	305	66	65
98	14.717	0.159	0.013	2.40	91	0.9	-	2.77	-0.06	77	307	66	65
99	14.870	0.153	0.013	2.40	91	0.9	-	2.72	-0.05	78	308	66	65
100	15.026	0.156	0.013	2.40	91	0.9	100	2.68	-0.04	77	308	66	65
101	15.179	0.153	0.013	2.40	91	0.9	-	2.63	-0.05	78	308	66	65
102	15.335	0.156	0.013	2.40	91	0.9	-	2.58	-0.05	78	308	66	65
103	15.492	0.157	0.013	2.41	91	0.9	-	2.54	-0.04	77	307	66	65
104	15.646	0.154	0.013	2.41	91	0.9	-	2.48	-0.06	77	306	66	65
105	15.802	0.156	0.013	2.41	92	0.9	-	2.44	-0.04	77	305	66	64
106	15.954	0.152	0.013	2.40	92	0.9	-	2.39	-0.05	77	305	66	65
107	16.114	0.160	0.012	2.41	92	0.9	-	2.35	-0.04	77	303	66	65
108	16.267	0.153	0.013	2.40	92	0.8	-	2.31	-0.04	77	302	66	65
109	16.424	0.157	0.013	2.41	92	0.9	-	2.27	-0.04	77	302	66	65
110	16.577	0.153	0.013	2.41	92	0.8	100	2.22	-0.05	77	303	66	65
111	16.733	0.156	0.013	2.40	92	0.8	-	2.19	-0.03	77	306	66	65
112	16.891	0.158	0.012	2.41	92	0.9	-	2.15	-0.04	77	307	66	65
113	17.044	0.153	0.012	2.41	92	0.9	-	2.11	-0.04	77	307	66	65
114	17.201	0.157	0.012	2.41	92	0.9	-	2.08	-0.03	77	307	66	64
115	17.353	0.152	0.013	2.40	92	0.9	-	2.04	-0.04	77	306	66	65
116	17.513	0.160	0.012	2.40	92	0.9	-	2.01	-0.03	77	306	66	64
117	17.666	0.153	0.013	2.41	92	0.9	-	1.97	-0.04	77	307	66	64
118	17.823	0.157	0.013	2.41	93	0.9	-	1.94	-0.03	77	308	66	65
119	17.977	0.154	0.013	2.41	93	0.9	-	1.91	-0.03	77	308	66	65
120	18.134	0.157	0.013	2.41	93	0.8	100	1.88	-0.03	77	309	66	64
121	18.292	0.158	0.013	2.41	93	0.8	-	1.85	-0.03	77	311	66	64
122	18.445	0.153	0.013	2.42	93	0.9	-	1.81	-0.04	77	311	66	65
123	18.603	0.158	0.013	2.42	93	0.9	-	1.79	-0.02	77	312	66	64
124	18.756	0.153	0.013	2.41	93	0.9	-	1.75	-0.04	78	313	66	65
125	18.915	0.159	0.012	2.41	93	0.9	-	1.72	-0.03	78	313	66	64
126	19.069	0.154	0.013	2.42	93	0.9	-	1.69	-0.03	78	314	66	64
127	19.225	0.156	0.013	2.42	93	0.9	-	1.67	-0.02	78	313	66	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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
128	19.381	0.156	0.013	2.42	93	0.9	-	1.63	-0.04	78	313	66	64
129	19.537	0.156	0.013	2.42	93	0.9	-	1.61	-0.02	78	313	66	65
130	19.695	0.158	0.013	2.41	93	0.9	100	1.58	-0.03	78	313	66	64
131	19.847	0.152	0.013	2.42	93	0.9	-	1.55	-0.03	78	312	66	64
132	20.006	0.159	0.013	2.41	93	0.9	-	1.52	-0.03	78	312	66	64
133	20.160	0.154	0.013	2.41	93	0.9	-	1.49	-0.03	78	312	66	65
134	20.319	0.159	0.013	2.42	93	0.9	-	1.46	-0.03	78	312	66	64
135	20.471	0.152	0.013	2.42	93	0.9	-	1.43	-0.03	78	311	66	65
136	20.628	0.157	0.013	2.41	93	0.9	-	1.41	-0.02	78	311	66	64
137	20.786	0.158	0.013	2.42	94	0.8	-	1.38	-0.03	78	311	66	64
138	20.941	0.155	0.013	2.42	94	0.9	-	1.36	-0.02	78	310	66	64
139	21.097	0.156	0.013	2.42	94	0.9	-	1.32	-0.04	78	310	66	65
140	21.250	0.153	0.013	2.42	94	0.9	99	1.30	-0.02	78	309	66	65
141	21.410	0.160	0.013	2.42	94	0.9	-	1.27	-0.03	78	307	66	64
142	21.564	0.154	0.012	2.42	94	0.9	-	1.24	-0.03	78	307	66	65
143	21.721	0.157	0.013	2.41	94	0.9	-	1.22	-0.02	78	306	66	65
144	21.876	0.155	0.013	2.42	94	0.9	-	1.20	-0.02	78	306	66	64
145	22.033	0.157	0.012	2.41	94	0.9	-	1.17	-0.03	77	306	66	64
146	22.191	0.158	0.012	2.43	94	0.9	-	1.15	-0.02	78	305	66	65
147	22.344	0.153	0.013	2.42	94	0.9	-	1.12	-0.03	77	305	66	64
148	22.502	0.158	0.013	2.41	94	0.9	-	1.12	0.00	77	294	66	65
149	22.657	0.155	0.013	2.42	94	0.9	-	1.10	-0.02	76	276	66	64
150	22.816	0.159	0.013	2.43	94	0.9	100	1.08	-0.02	76	265	66	64
151	22.969	0.153	0.013	2.42	94	0.9	-	1.07	-0.01	75	257	66	64
152	23.126	0.157	0.013	2.42	94	0.9	-	1.05	-0.02	75	252	66	64
153	23.284	0.158	0.013	2.42	94	0.9	-	1.03	-0.02	75	247	66	64
154	23.439	0.155	0.013	2.43	94	0.9	-	1.02	-0.01	74	244	66	64
155	23.597	0.158	0.013	2.42	94	0.9	-	1.00	-0.02	74	242	66	65
156	23.749	0.152	0.013	2.41	94	0.9	-	0.98	-0.02	74	240	66	64
157	23.910	0.161	0.013	2.42	94	0.9	-	0.97	-0.01	74	238	66	64
158	24.064	0.154	0.013	2.42	94	0.9	-	0.95	-0.02	74	236	66	64
159	24.221	0.157	0.013	2.43	94	0.8	-	0.93	-0.02	74	235	66	65

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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
160	24.377	0.156	0.013	2.42	94	0.9	99	0.92	-0.01	74	234	66	64
161	24.533	0.156	0.013	2.43	94	0.9	-	0.90	-0.02	74	233	66	64
162	24.692	0.159	0.013	2.43	94	0.9	-	0.89	-0.01	74	232	66	65
163	24.845	0.153	0.013	2.42	94	0.9	-	0.87	-0.02	73	230	66	64
164	25.004	0.159	0.013	2.41	94	0.9	-	0.85	-0.02	73	229	66	64
165	25.158	0.154	0.013	2.41	94	0.9	-	0.83	-0.02	73	228	66	64
166	25.316	0.158	0.013	2.42	94	0.9	-	0.82	-0.01	73	227	66	64
167	25.470	0.154	0.013	2.41	94	0.9	-	0.81	-0.01	73	226	66	64
168	25.627	0.157	0.013	2.41	94	0.9	-	0.80	-0.01	73	224	66	64
169	25.785	0.158	0.013	2.41	94	0.9	-	0.77	-0.03	73	223	66	64
170	25.939	0.154	0.013	2.43	94	0.9	99	0.76	-0.01	73	223	66	64
171	26.097	0.158	0.013	2.41	95	0.8	-	0.75	-0.01	73	222	66	64
172	26.250	0.153	0.012	2.42	94	0.9	-	0.74	-0.01	73	221	66	64
173	26.410	0.160	0.013	2.42	95	0.9	-	0.72	-0.02	73	220	66	64
174	26.564	0.154	0.013	2.41	95	0.9	-	0.70	-0.02	73	219	66	65
175	26.721	0.157	0.013	2.42	95	0.8	-	0.69	-0.01	73	219	66	64
176	26.877	0.156	0.013	2.41	95	0.9	-	0.68	-0.01	72	218	66	64
177	27.033	0.156	0.013	2.40	95	0.9	-	0.66	-0.02	72	218	66	64
178	27.191	0.158	0.013	2.42	95	0.9	-	0.65	-0.01	72	217	66	64
179	27.344	0.153	0.013	2.42	95	0.9	-	0.64	-0.01	72	216	66	64
180	27.504	0.160	0.013	2.42	95	0.9	99	0.62	-0.02	72	216	66	64
181	27.658	0.154	0.013	2.41	95	0.9	-	0.60	-0.02	72	215	66	64
182	27.815	0.157	0.013	2.42	95	0.9	-	0.58	-0.02	72	217	66	64
183	27.970	0.155	0.013	2.41	95	0.9	-	0.57	-0.01	72	217	66	64
184	28.127	0.157	0.013	2.41	95	0.9	-	0.55	-0.02	72	217	66	64
185	28.285	0.158	0.013	2.41	95	0.9	-	0.54	-0.01	72	218	66	64
186	28.438	0.153	0.013	2.41	95	0.9	-	0.52	-0.02	72	217	66	64
187	28.597	0.159	0.013	2.41	95	0.9	-	0.51	-0.01	72	217	66	64
188	28.751	0.154	0.013	2.41	95	0.9	-	0.50	-0.01	72	217	66	64
189	28.910	0.159	0.013	2.41	95	0.8	-	0.48	-0.02	72	217	66	64
190	29.063	0.153	0.013	2.41	95	0.9	99	0.46	-0.02	72	216	66	64
191	29.220	0.157	0.013	2.41	95	0.9	-	0.45	-0.01	72	216	66	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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
192	29.377	0.157	0.013	2.41	95	0.9	-	0.43	-0.02	72	216	66	64
193	29.533	0.156	0.013	2.41	95	0.9	-	0.42	-0.01	72	216	66	64
194	29.690	0.157	0.013	2.40	95	0.9	-	0.40	-0.02	72	215	66	64
195	29.843	0.153	0.013	2.41	95	0.9	-	0.39	-0.01	72	215	66	64
196	30.003	0.160	0.013	2.41	95	0.9	-	0.38	-0.01	72	214	66	64
197	30.157	0.154	0.013	2.41	95	0.8	-	0.35	-0.03	72	214	66	64
198	30.314	0.157	0.013	2.42	95	0.9	-	0.34	-0.01	72	213	66	64
199	30.469	0.155	0.013	2.41	95	0.9	-	0.33	-0.01	72	213	66	64
200	30.626	0.157	0.013	2.40	95	0.9	99	0.32	-0.01	72	213	66	64
201	30.784	0.158	0.013	2.41	95	0.9	-	0.29	-0.03	72	213	66	64
202	30.937	0.153	0.013	2.41	95	0.9	-	0.29	0.00	72	212	66	64
203	31.095	0.158	0.013	2.42	95	0.9	-	0.27	-0.02	72	212	66	64
204	31.249	0.154	0.013	2.40	95	0.8	-	0.25	-0.02	72	212	66	64
205	31.408	0.159	0.013	2.41	95	0.9	-	0.24	-0.01	72	211	66	64
206	31.562	0.154	0.013	2.41	95	0.9	-	0.23	-0.01	72	211	66	64
207	31.719	0.157	0.013	2.41	95	0.9	-	0.21	-0.02	71	211	66	64
208	31.876	0.157	0.013	2.41	95	0.9	-	0.20	-0.01	71	211	66	64
209	32.031	0.155	0.013	2.42	95	0.9	-	0.18	-0.02	71	211	66	64
210	32.189	0.158	0.013	2.41	95	0.9	99	0.17	-0.01	71	210	66	64
211	32.342	0.153	0.013	2.41	95	0.8	-	0.15	-0.02	71	210	66	64
212	32.502	0.160	0.013	2.41	95	0.9	-	0.14	-0.01	71	211	66	64
213	32.656	0.154	0.013	2.41	95	0.9	-	0.12	-0.02	71	210	66	64
214	32.813	0.157	0.013	2.42	95	0.9	-	0.11	-0.01	71	210	66	64
215	32.968	0.155	0.013	2.41	95	0.9	-	0.10	-0.01	71	210	66	64
216	33.125	0.157	0.013	2.41	95	0.8	-	0.09	-0.01	71	210	66	64
217	33.283	0.158	0.013	2.41	95	0.9	-	0.07	-0.02	71	209	66	64
218	33.436	0.153	0.013	2.42	95	0.9	-	0.06	-0.01	71	209	66	64
219	33.595	0.159	0.013	2.41	95	0.8	-	0.04	-0.02	71	209	66	64
220	33.749	0.154	0.013	2.42	95	0.9	99	0.03	-0.01	71	208	66	64
221	33.908	0.159	0.013	2.42	95	0.9	99	0.00	-0.03	71	208	66	64
Avg/Tot	33.908	0.153	0.013	2.36	88.0	0.9	101			78.7	312.6	66.2	64.5

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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		1.64	70	1.7		69	-0.064	4.85	1.182
1	0.139	0.139	2.26	70	1.7	-	70	-0.057	3.45	0.906
2	0.288	0.149	2.26	70	1.3	-	71	-0.062	1.78	0.509
3	0.430	0.142	2.26	70	1.6	-	71	-0.071	1.64	0.360
4	0.578	0.148	2.26	70	1.5	-	71	-0.079	5.14	0.362
5	0.721	0.143	2.25	70	1.7	-	71	-0.085	8.98	0.327
6	0.870	0.149	2.26	70	1.8	-	71	-0.083	12.70	0.293
7	1.013	0.143	2.25	70	1.4	-	72	-0.085	14.13	0.269
8	1.162	0.149	2.26	71	1.8	-	72	-0.086	13.69	0.207
9	1.306	0.144	2.27	71	1.4	-	72	-0.087	13.32	0.185
10	1.453	0.147	2.27	71	1.4	105	72	-0.088	14.14	0.241
11	1.599	0.146	2.27	71	1.8	-	72	-0.086	15.15	0.209
12	1.745	0.146	2.27	71	1.6	-	72	-0.087	13.94	0.158
13	1.891	0.146	2.28	72	1.4	-	72	-0.087	13.75	0.134
14	2.036	0.145	2.27	72	1.7	-	73	-0.085	13.91	0.129
15	2.184	0.148	2.27	72	1.5	-	73	-0.085	13.22	0.122
16	2.329	0.145	2.28	72	1.7	-	73	-0.086	13.27	0.121
17	2.477	0.148	2.28	73	1.7	-	73	-0.084	15.05	0.162
18	2.623	0.146	2.29	73	1.9	-	73	-0.083	15.30	0.196
19	2.772	0.149	2.29	73	1.4	-	73	-0.083	14.18	0.229
20	2.917	0.145	2.29	74	1.7	104	73	-0.085	13.16	0.300
21	3.066	0.149	2.29	74	1.5	-	73	-0.082	12.32	0.321
22	3.211	0.145	2.29	74	1.4	-	73	-0.083	13.14	0.229
23	3.361	0.150	2.29	75	1.9	-	73	-0.084	14.10	0.182
24	3.506	0.145	2.29	75	1.8	-	73	-0.084	14.69	0.188
25	3.656	0.150	2.29	75	1.4	-	73	-0.082	15.21	0.189
26	3.801	0.145	2.29	76	1.6	-	73	-0.082	15.54	0.183
27	3.951	0.150	2.30	76	1.4	-	73	-0.085	15.81	0.180
28	4.096	0.145	2.30	76	1.5	-	73	-0.085	16.06	0.168
29	4.246	0.150	2.30	77	1.4	-	73	-0.084	16.29	0.180
30	4.392	0.146	2.30	77	1.7	104	73	-0.086	16.57	0.188
31	4.542	0.150	2.30	77	1.4	-	73	-0.085	16.81	0.214

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.688	0.146	2.29	78	1.4	-	74	-0.084	16.79	0.197
33	4.839	0.151	2.29	78	1.8	-	73	-0.086	16.66	0.167
34	4.985	0.146	2.29	78	1.8	-	74	-0.085	16.61	0.161
35	5.136	0.151	2.30	79	1.7	-	74	-0.085	16.69	0.167
36	5.282	0.146	2.30	79	1.8	-	74	-0.085	16.70	0.176
37	5.433	0.151	2.30	79	1.5	-	74	-0.086	16.84	0.208
38	5.580	0.147	2.30	80	1.7	-	74	-0.087	16.99	0.209
39	5.731	0.151	2.30	80	1.8	-	74	-0.086	16.92	0.218
40	5.877	0.146	2.30	80	1.5	104	74	-0.086	16.87	0.222
41	6.029	0.152	2.31	80	1.5	-	74	-0.087	16.88	0.230
42	6.175	0.146	2.30	81	1.7	-	74	-0.085	16.79	0.234
43	6.327	0.152	2.31	81	1.5	-	74	-0.085	16.54	0.211
44	6.474	0.147	2.31	82	1.8	-	74	-0.084	16.25	0.186
45	6.626	0.152	2.32	82	1.5	-	74	-0.085	16.05	0.178
46	6.774	0.148	2.32	82	1.5	-	74	-0.084	15.86	0.193
47	6.926	0.152	2.32	82	1.8	-	74	-0.084	15.73	0.193
48	7.073	0.147	2.32	83	1.5	-	74	-0.081	15.70	0.190
49	7.226	0.153	2.33	83	1.5	-	74	-0.084	15.73	0.174
50	7.373	0.147	2.32	83	1.8	104	74	-0.085	15.88	0.183
51	7.525	0.152	2.33	84	1.8	-	74	-0.082	16.05	0.198
52	7.673	0.148	2.32	84	1.5	-	74	-0.082	16.14	0.218
53	7.825	0.152	2.33	84	1.6	-	74	-0.083	16.16	0.240
54	7.974	0.149	2.33	84	1.7	-	74	-0.083	16.19	0.252
55	8.126	0.152	2.33	85	1.5	-	74	-0.084	16.16	0.262
56	8.274	0.148	2.33	85	1.5	-	74	-0.082	16.20	0.276
57	8.425	0.151	2.33	85	1.8	-	74	-0.080	16.31	0.308
58	8.574	0.149	2.34	85	1.8	-	74	-0.078	16.25	0.356
59	8.726	0.152	2.33	86	1.5	-	74	-0.077	15.73	0.309
60	8.875	0.149	2.33	86	1.5	102	74	-0.078	15.07	0.239
61	9.027	0.152	2.32	86	1.5	-	74	-0.076	14.55	0.213
62	9.177	0.150	2.33	86	1.5	-	74	-0.075	14.18	0.196
63	9.329	0.152	2.33	87	1.6	-	74	-0.074	14.02	0.186

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.480	0.151	2.34	87	1.8	-	74	-0.076	13.88	0.187
65	9.630	0.150	2.34	87	1.5	-	73	-0.076	13.85	0.185
66	9.782	0.152	2.33	87	1.6	-	73	-0.073	13.81	0.188
67	9.932	0.150	2.34	88	1.7	-	73	-0.075	13.76	0.183
68	10.084	0.152	2.34	88	1.8	-	73	-0.073	13.70	0.180
69	10.233	0.149	2.34	88	1.8	-	73	-0.072	13.68	0.186
70	10.386	0.153	2.34	88	1.7	102	73	-0.071	13.62	0.180
71	10.535	0.149	2.35	88	1.5	-	73	-0.074	13.59	0.169
72	10.688	0.153	2.34	89	1.7	-	73	-0.070	13.54	0.157
73	10.838	0.150	2.34	89	1.7	-	73	-0.072	13.42	0.150
74	10.992	0.154	2.35	89	1.8	-	73	-0.071	13.29	0.148
75	11.141	0.149	2.35	89	1.8	-	73	-0.071	13.18	0.151
76	11.295	0.154	2.35	89	1.7	-	73	-0.071	12.99	0.170
77	11.445	0.150	2.35	90	1.6	-	73	-0.071	12.90	0.187
78	11.598	0.153	2.35	90	1.5	-	73	-0.070	12.79	0.197
79	11.747	0.149	2.36	90	1.5	-	73	-0.068	12.50	0.210
80	11.900	0.153	2.35	90	1.7	103	73	-0.067	12.11	0.220
81	12.051	0.151	2.34	90	1.6	-	73	-0.066	11.74	0.238
82	12.204	0.153	2.35	90	1.8	-	73	-0.066	11.17	0.247
83	12.356	0.152	2.35	91	1.7	-	73	-0.066	10.82	0.270
84	12.508	0.152	2.35	91	1.8	-	73	-0.065	10.67	0.309
85	12.661	0.153	2.35	91	1.5	-	73	-0.063	10.60	0.339
86	12.811	0.150	2.35	91	1.8	-	72	-0.063	10.54	0.374
87	12.965	0.154	2.35	91	1.7	-	72	-0.066	10.48	0.412
88	13.114	0.149	2.35	91	1.8	-	72	-0.065	10.53	0.420
89	13.269	0.155	2.35	91	1.6	-	72	-0.065	10.55	0.421
90	13.419	0.150	2.36	92	1.8	101	72	-0.062	10.56	0.428
91	13.574	0.155	2.36	92	1.6	-	72	-0.061	10.53	0.439
92	13.724	0.150	2.36	92	1.5	-	72	-0.062	10.51	0.448
93	13.878	0.154	2.36	92	1.6	-	72	-0.062	10.54	0.443
94	14.028	0.150	2.36	92	1.6	-	72	-0.061	10.49	0.454
95	14.181	0.153	2.35	92	1.5	-	72	-0.064	10.48	0.473

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.333	0.152	2.36	92	1.5	-	72	-0.065	10.47	0.456
97	14.487	0.154	2.35	92	1.6	-	72	-0.066	10.35	0.456
98	14.639	0.152	2.36	92	1.5	-	72	-0.063	10.32	0.490
99	14.791	0.152	2.36	93	1.6	-	72	-0.067	10.32	0.477
100	14.944	0.153	2.36	93	1.7	99	72	-0.065	10.33	0.467
101	15.095	0.151	2.36	93	1.8	-	72	-0.065	10.29	0.474
102	15.249	0.154	2.35	93	1.5	-	72	-0.066	10.25	0.496
103	15.400	0.151	2.35	93	1.7	-	72	-0.065	10.27	0.494
104	15.555	0.155	2.36	93	1.8	-	72	-0.066	10.25	0.487
105	15.706	0.151	2.36	93	1.8	-	72	-0.064	10.22	0.489
106	15.860	0.154	2.37	93	1.5	-	72	-0.063	10.16	0.489
107	16.010	0.150	2.37	93	1.7	-	72	-0.064	10.06	0.507
108	16.164	0.154	2.36	93	1.8	-	72	-0.065	9.89	0.537
109	16.317	0.153	2.36	93	1.5	-	72	-0.063	9.77	0.553
110	16.470	0.153	2.37	93	1.6	99	72	-0.064	9.68	0.579
111	16.623	0.153	2.36	94	1.7	-	72	-0.066	9.53	0.551
112	16.775	0.152	2.37	94	1.8	-	72	-0.065	9.41	0.431
113	16.929	0.154	2.37	94	1.8	-	72	-0.063	9.34	0.402
114	17.079	0.150	2.36	94	1.8	-	72	-0.065	9.26	0.402
115	17.234	0.155	2.37	94	1.6	-	72	-0.063	9.26	0.398
116	17.385	0.151	2.36	94	1.6	-	72	-0.067	9.16	0.409
117	17.541	0.156	2.36	94	1.6	-	72	-0.063	9.04	0.440
118	17.691	0.150	2.37	94	1.6	-	72	-0.065	8.93	0.472
119	17.845	0.154	2.37	94	1.8	-	72	-0.065	8.81	0.499
120	17.997	0.152	2.37	94	1.8	99	72	-0.065	8.71	0.529
121	18.151	0.154	2.37	94	1.5	-	72	-0.064	8.70	0.534
122	18.304	0.153	2.36	94	1.7	-	72	-0.067	8.60	0.547
123	18.457	0.153	2.37	94	1.8	-	72	-0.065	8.49	0.526
124	18.611	0.154	2.38	94	1.5	-	72	-0.066	8.46	0.502
125	18.762	0.151	2.37	95	1.8	-	72	-0.066	8.47	0.482
126	18.916	0.154	2.36	95	1.8	-	72	-0.065	8.42	0.430
127	19.068	0.152	2.36	95	1.7	-	72	-0.065	8.46	0.405

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.223	0.155	2.37	95	1.8	-	72	-0.065	8.54	0.398
129	19.375	0.152	2.37	95	1.5	-	72	-0.066	8.57	0.407
130	19.529	0.154	2.37	95	1.6	99	72	-0.068	8.59	0.420
131	19.680	0.151	2.36	95	1.5	-	71	-0.064	8.56	0.435
132	19.834	0.154	2.36	95	1.6	-	71	-0.064	8.55	0.454
133	19.987	0.153	2.37	95	1.5	-	72	-0.064	8.50	0.477
134	20.140	0.153	2.36	95	1.7	-	72	-0.065	8.46	0.498
135	20.295	0.155	2.37	95	1.5	-	72	-0.065	8.44	0.510
136	20.445	0.150	2.36	95	1.7	-	71	-0.065	8.42	0.530
137	20.600	0.155	2.37	95	1.8	-	71	-0.067	8.37	0.543
138	20.751	0.151	2.36	95	1.8	-	71	-0.065	8.36	0.557
139	20.908	0.157	2.37	95	1.8	-	71	-0.062	8.26	0.583
140	21.059	0.151	2.37	95	1.5	99	71	-0.066	8.10	0.606
141	21.213	0.154	2.38	95	1.5	-	71	-0.064	7.87	0.612
142	21.365	0.152	2.37	95	1.6	-	71	-0.065	7.55	0.689
143	21.518	0.153	2.36	95	1.8	-	71	-0.065	7.38	0.781
144	21.672	0.154	2.36	95	1.6	-	71	-0.066	7.27	0.843
145	21.825	0.153	2.36	95	1.7	-	71	-0.063	7.24	0.865
146	21.980	0.155	2.37	95	1.8	-	71	-0.067	7.21	0.868
147	22.130	0.150	2.37	95	1.5	-	71	-0.061	7.24	0.871
148	22.286	0.156	2.37	95	1.5	-	71	-0.055	7.28	0.871
149	22.437	0.151	2.37	95	1.8	-	71	-0.057	7.40	0.858
150	22.593	0.156	2.37	95	1.5	99	71	-0.055	7.87	0.874
151	22.744	0.151	2.37	95	1.7	-	71	-0.054	8.01	0.892
152	22.899	0.155	2.38	95	1.8	-	71	-0.051	8.03	0.895
153	23.051	0.152	2.37	95	1.7	-	71	-0.054	8.07	0.902
154	23.204	0.153	2.37	95	1.5	-	71	-0.053	8.06	0.922
155	23.358	0.154	2.37	95	1.5	-	71	-0.053	8.05	0.946
156	23.512	0.154	2.37	96	1.6	-	71	-0.053	8.06	0.961
157	23.666	0.154	2.37	96	1.7	-	71	-0.053	8.04	0.971
158	23.817	0.151	2.37	96	1.7	-	71	-0.051	8.07	0.986
159	23.972	0.155	2.37	96	1.8	-	71	-0.051	8.07	1.007

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	24.124	0.152	2.37	96	1.9	99	71	-0.051	8.04	1.031
161	24.280	0.156	2.37	96	1.7	-	71	-0.051	8.04	1.049
162	24.431	0.151	2.37	96	1.7	-	71	-0.047	8.00	1.054
163	24.585	0.154	2.37	96	1.7	-	71	-0.051	7.98	1.045
164	24.737	0.152	2.36	96	1.5	-	71	-0.053	7.91	1.049
165	24.892	0.155	2.37	96	1.7	-	71	-0.051	7.90	1.064
166	25.046	0.154	2.37	96	1.5	-	71	-0.048	7.90	1.066
167	25.199	0.153	2.37	96	1.8	-	70	-0.049	7.79	1.047
168	25.353	0.154	2.37	96	1.7	-	70	-0.050	7.59	0.996
169	25.504	0.151	2.37	96	1.6	-	70	-0.049	7.52	0.986
170	25.659	0.155	2.37	96	1.8	99	70	-0.048	7.52	0.989
171	25.811	0.152	2.37	96	1.5	-	70	-0.050	7.57	0.984
172	25.967	0.156	2.37	96	1.5	-	70	-0.046	7.47	0.978
173	26.118	0.151	2.37	96	1.8	-	70	-0.045	7.37	0.989
174	26.273	0.155	2.38	96	1.7	-	70	-0.049	7.36	1.010
175	26.425	0.152	2.37	96	1.5	-	70	-0.048	7.33	1.023
176	26.580	0.155	2.37	96	1.7	-	70	-0.045	7.36	1.043
177	26.734	0.154	2.37	96	1.5	-	70	-0.047	7.32	1.053
178	26.886	0.152	2.38	96	1.5	-	70	-0.045	7.39	1.062
179	27.041	0.155	2.37	96	1.6	-	70	-0.051	7.40	1.070
180	27.192	0.151	2.37	96	1.6	99	70	-0.048	7.44	1.073
181	27.348	0.156	2.37	96	1.5	-	70	-0.047	7.41	1.085
182	27.500	0.152	2.37	96	1.5	-	70	-0.046	7.45	1.099
183	27.656	0.156	2.37	96	1.5	-	70	-0.048	7.46	1.116
184	27.806	0.150	2.37	96	1.8	-	70	-0.048	7.41	1.126
185	27.961	0.155	2.37	96	1.6	-	70	-0.046	7.31	1.161
186	28.114	0.153	2.37	96	1.5	-	70	-0.046	7.31	1.190
187	28.268	0.154	2.37	96	1.8	-	70	-0.047	7.27	1.200
188	28.423	0.155	2.37	96	1.6	-	70	-0.048	7.20	1.190
189	28.574	0.151	2.37	96	1.8	-	70	-0.046	7.22	1.196
190	28.729	0.155	2.37	96	1.5	99	70	-0.045	7.21	1.206
191	28.880	0.151	2.37	96	1.5	-	70	-0.048	7.22	1.212

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	29.037	0.157	2.37	96	1.8	-	70	-0.045	7.22	1.219
193	29.188	0.151	2.37	96	1.8	-	70	-0.049	7.22	1.230
194	29.343	0.155	2.38	96	1.5	-	70	-0.046	7.24	1.237
195	29.495	0.152	2.37	96	1.6	-	70	-0.049	7.15	1.256
196	29.649	0.154	2.37	96	1.6	-	70	-0.045	6.95	1.300
197	29.803	0.154	2.37	96	1.8	-	70	-0.046	6.88	1.313
198	29.957	0.154	2.37	96	1.5	-	70	-0.045	6.92	1.316
199	30.111	0.154	2.38	96	1.8	-	70	-0.046	6.95	1.319
200	30.263	0.152	2.37	96	1.8	99	69	-0.049	6.97	1.315
201	30.417	0.154	2.36	96	1.6	-	69	-0.046	6.96	1.315
202	30.569	0.152	2.37	96	1.5	-	69	-0.046	6.85	1.302
203	30.725	0.156	2.37	96	1.8	-	69	-0.046	6.78	1.310
204	30.877	0.152	2.38	96	1.5	-	69	-0.046	6.77	1.323
205	31.032	0.155	2.38	96	1.8	-	69	-0.049	6.74	1.327
206	31.183	0.151	2.37	96	1.8	-	69	-0.046	6.72	1.342
207	31.338	0.155	2.37	96	1.5	-	69	-0.049	6.68	1.341
208	31.492	0.154	2.37	96	1.5	-	69	-0.048	6.65	1.342
209	31.645	0.153	2.37	96	1.5	-	69	-0.046	6.67	1.356
210	31.799	0.154	2.38	96	1.7	99	69	-0.046	6.69	1.364
211	31.951	0.152	2.37	96	1.5	-	69	-0.046	6.64	1.375
212	32.107	0.156	2.37	96	1.7	-	69	-0.046	6.62	1.387
213	32.258	0.151	2.37	96	1.6	-	69	-0.045	6.60	1.419
214	32.415	0.157	2.38	96	1.8	-	69	-0.045	6.55	1.431
215	32.565	0.150	2.37	96	1.6	-	69	-0.046	6.43	1.429
216	32.720	0.155	2.37	96	1.6	-	69	-0.045	6.34	1.442
217	32.873	0.153	2.37	96	1.5	-	69	-0.045	6.28	1.454
218	33.027	0.154	2.38	96	1.8	-	69	-0.047	6.29	1.475
219	33.182	0.155	2.37	96	1.7	-	69	-0.046	6.16	1.519
220	33.333	0.151	2.37	96	1.8	99	69	-0.046	6.12	1.541
221	33.488	0.155	2.36	96	1.6	99	69	-0.044	6.21	1.541
Avg/Tot	33.488	0.152	2.34	89.2	1.6	101	71.6	-0.065	10.39	0.623

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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		0.68	70	1.6		68
1	0.151	0.151	1.05	69	1.7	-	68
2	0.302	0.151	1.06	69	1.6	-	68
3	0.453	0.151	1.06	70	1.6	-	68
4	0.605	0.152	1.06	70	1.6	-	68
5	0.757	0.152	1.07	70	1.6	-	68
6	0.910	0.153	1.08	70	1.7	-	68
7	1.062	0.152	1.08	70	1.6	-	68
8	1.215	0.153	1.09	71	1.7	-	68
9	1.368	0.153	1.09	71	1.6	-	69
10	1.522	0.154	1.09	71	1.7	104	69
11	1.677	0.155	1.09	71	1.8	-	69
12	1.831	0.154	1.09	71	1.6	-	69
13	1.987	0.156	1.10	71	1.6	-	69
14	2.142	0.155	1.11	72	1.8	-	69
15	2.298	0.156	1.12	72	1.8	-	69
16	2.453	0.155	1.12	72	1.8	-	69
17	2.609	0.156	1.12	72	1.7	-	69
18	2.765	0.156	1.12	73	1.8	-	69
19	2.920	0.155	1.11	73	1.6	-	69
20	3.076	0.156	1.11	73	1.6	103	69
21	3.232	0.156	1.11	73	1.6	-	69
22	3.389	0.157	1.12	73	1.7	-	69
23	3.546	0.157	1.13	74	1.8	-	69
24	3.702	0.156	1.13	74	1.7	-	70
25	3.859	0.157	1.13	75	1.8	-	70
26	4.015	0.156	1.12	75	1.7	-	70
27	4.172	0.157	1.12	76	1.6	-	70
28	4.330	0.158	1.13	76	1.6	-	70
29	4.488	0.158	1.14	76	1.6	-	70
30	4.646	0.158	1.14	77	1.8	104	70
31	4.803	0.157	1.13	77	1.7	-	70

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

	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	4.961	0.158	1.13	77	1.6	-	70
33	5.120	0.159	1.14	78	1.7	-	70
34	5.279	0.159	1.15	78	1.6	-	70
35	5.437	0.158	1.15	78	1.8	-	70
36	5.596	0.159	1.14	79	1.6	-	70
37	5.756	0.160	1.15	79	1.7	-	70
38	5.915	0.159	1.15	79	1.6	-	70
39	6.074	0.159	1.15	79	1.7	-	70
40	6.233	0.159	1.14	80	1.6	104	70
41	6.394	0.161	1.16	80	1.8	-	70
42	6.554	0.160	1.16	80	1.8	-	70
43	6.713	0.159	1.15	81	1.6	-	70
44	6.874	0.161	1.16	81	1.6	-	70
45	7.035	0.161	1.17	81	1.7	-	70
46	7.194	0.159	1.16	81	1.8	-	70
47	7.356	0.162	1.16	82	1.7	-	70
48	7.517	0.161	1.17	82	1.7	-	70
49	7.678	0.161	1.17	82	1.8	-	70
50	7.839	0.161	1.16	82	1.8	105	71
51	8.001	0.162	1.17	82	1.7	-	70
52	8.161	0.160	1.17	83	1.7	-	71
53	8.324	0.163	1.17	83	1.7	-	70
54	8.486	0.162	1.18	83	1.6	-	70
55	8.646	0.160	1.17	83	1.7	-	71
56	8.809	0.163	1.17	84	1.8	-	71
57	8.972	0.163	1.18	84	1.8	-	70
58	9.132	0.160	1.17	84	1.6	-	70
59	9.296	0.164	1.18	84	1.7	-	71
60	9.457	0.161	1.18	84	1.7	103	71
Avg/Tot	9.457	0.158	1.12	76.5	1.7	104	69.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Stove ΔT: 67

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	425	412	291	341	412	376.2	411.3
1	421	408	285	333	411	371.4	332.0
2	416	403	275	323	409	365.4	345.6
3	412	398	264	315	407	359.2	384.4
4	406	391	255	311	406	353.8	486.5
5	400	384	247	317	404	350.3	654.5
6	395	377	238	333	403	349.3	649.5
7	390	371	231	355	401	349.6	653.8
8	387	365	225	378	400	350.8	643.5
9	384	360	219	403	398	352.7	686.2
10	381	356	215	426	396	354.8	683.3
11	380	353	212	447	394	357.1	673.3
12	378	351	209	464	393	358.8	688.2
13	377	349	207	480	391	360.6	667.8
14	376	348	205	491	389	361.9	666.2
15	375	347	204	502	387	363.1	683.0
16	376	346	205	511	386	364.7	683.4
17	376	346	207	520	384	366.6	670.3
18	377	346	210	525	383	368.3	652.5
19	379	347	214	529	382	370.0	640.0
20	380	349	216	529	380	370.8	649.7
21	382	350	218	527	379	371.2	644.6
22	383	350	221	528	378	371.9	650.4
23	384	351	223	529	376	372.7	656.9
24	386	351	226	531	375	373.8	661.5
25	388	352	229	534	374	375.5	667.7
26	390	353	233	538	373	377.3	671.2
27	393	355	237	543	371	379.7	676.8
28	395	357	240	549	370	382.2	685.2
29	398	359	244	555	369	385.0	694.0
30	401	362	247	562	368	387.8	700.2
31	404	364	251	567	366	390.4	703.2
32	407	367	254	573	365	393.4	707.4
33	410	370	258	580	364	396.5	710.7
34	414	373	261	584	363	398.9	714.9
35	417	375	264	589	362	401.2	723.9
36	420	378	267	593	361	403.7	729.3
37	423	381	270	596	360	406.0	737.0
38	427	383	273	599	359	408.1	740.6
39	430	386	275	601	358	410.1	741.6
40	434	389	278	603	357	412.1	746.2
41	437	391	280	606	356	414.1	744.9
42	441	394	283	607	355	415.8	737.1
43	444	397	286	608	354	417.6	730.5
44	447	399	288	607	353	418.6	727.0
45	450	401	290	606	352	419.7	721.7
46	452	403	293	604	351	420.7	718.2
47	455	405	295	602	350	421.3	712.2

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Stove ΔT: 67

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	457	407	298	600	349	422.1	711.4
49	459	409	300	599	349	422.9	707.6
50	462	410	303	596	348	423.6	706.6
51	464	412	305	593	347	424.0	710.2
52	466	413	307	591	346	424.8	710.0
53	469	415	310	591	346	425.9	710.4
54	471	417	312	589	345	426.8	712.2
55	473	419	314	588	345	427.6	716.0
56	476	421	317	589	345	429.2	706.8
57	478	422	319	588	344	430.2	703.9
58	480	424	320	588	344	431.1	687.7
59	481	425	322	584	344	431.2	667.5
60	483	427	323	579	344	430.9	653.8
61	484	428	324	575	344	430.6	645.7
62	484	429	325	570	343	430.3	638.0
63	484	429	326	565	343	429.4	631.6
64	484	430	327	558	343	428.3	629.3
65	483	430	328	553	343	427.3	615.7
66	482	430	329	547	342	426.1	610.0
67	481	430	330	541	342	424.9	606.2
68	481	431	330	537	342	424.0	601.7
69	480	431	331	530	342	422.7	596.6
70	479	431	333	526	341	422.0	593.2
71	478	431	333	521	341	421.0	587.9
72	478	431	334	517	341	420.0	581.7
73	477	432	335	512	341	419.2	577.8
74	477	432	335	507	340	418.2	572.1
75	476	432	336	503	340	417.4	564.7
76	476	433	336	498	340	416.4	561.5
77	476	433	337	494	339	415.7	558.0
78	475	434	337	491	339	415.1	552.4
79	474	434	338	486	339	414.1	541.9
80	473	434	337	480	339	412.6	530.9
81	472	435	337	475	338	411.2	519.6
82	470	435	336	470	338	409.6	510.1
83	468	434	334	465	337	407.6	504.3
84	465	433	333	459	337	405.5	498.6
85	463	432	331	454	337	403.3	493.9
86	460	431	330	448	337	401.1	488.8
87	458	430	328	442	336	398.7	485.4
88	455	429	327	436	336	396.3	482.4
89	452	427	325	431	336	394.2	477.7
90	450	426	324	426	336	392.4	474.9
91	448	425	323	421	335	390.4	471.5
92	446	424	322	416	335	388.7	468.8
93	444	424	321	412	335	387.1	464.1
94	442	423	320	408	335	385.5	462.7
95	440	422	320	404	335	384.1	467.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Stove ΔT: 67

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	439	421	320	401	334	382.8	471.0
97	437	420	320	399	334	382.0	469.1
98	436	420	321	396	334	381.3	468.8
99	434	420	321	395	334	380.7	468.7
100	433	420	322	393	334	380.2	466.5
101	432	420	323	392	334	380.1	465.9
102	431	421	323	390	334	379.8	464.9
103	430	421	324	389	334	379.5	462.9
104	430	421	325	388	334	379.4	460.1
105	429	422	325	386	334	379.1	457.1
106	429	422	325	384	334	378.9	455.9
107	428	423	326	383	334	378.7	455.6
108	428	423	327	382	334	378.8	454.0
109	427	424	327	380	334	378.5	456.8
110	427	424	327	379	335	378.4	455.0
111	426	424	326	377	335	377.8	451.0
112	426	424	325	377	336	377.5	447.1
113	425	423	325	375	336	376.7	445.2
114	424	423	324	373	336	376.2	443.5
115	424	422	325	372	337	375.9	440.4
116	423	422	324	371	337	375.4	440.3
117	422	422	324	370	338	375.1	443.2
118	422	421	323	368	338	374.4	441.3
119	421	420	323	367	339	373.9	443.9
120	420	420	323	365	340	373.5	444.1
121	420	419	322	365	340	373.1	445.7
122	419	417	322	362	341	372.3	442.0
123	419	416	323	360	342	371.9	442.0
124	419	415	324	359	343	371.8	439.1
125	419	413	324	358	344	371.5	440.7
126	418	412	325	355	346	371.1	438.6
127	418	411	326	354	347	371.2	437.9
128	418	410	327	352	348	371.0	437.1
129	418	409	328	352	349	371.2	435.1
130	419	408	330	350	351	371.4	437.3
131	419	408	331	350	352	371.7	438.6
132	419	407	332	348	353	371.8	438.0
133	420	407	333	347	355	372.4	441.6
134	420	407	334	346	356	372.5	439.4
135	420	407	335	345	358	372.9	441.7
136	420	406	336	343	360	373.0	438.9
137	421	406	336	342	361	373.2	436.3
138	421	406	337	341	363	373.6	434.8
139	421	407	336	340	365	373.7	431.6
140	421	406	336	338	367	373.7	432.9
141	421	406	336	337	369	373.7	433.9
142	421	405	335	335	370	373.3	429.5
143	421	405	334	333	372	372.8	426.4

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Stove ΔT: 67

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	420	404	332	331	374	372.0	425.7
145	419	403	329	330	376	371.3	423.2
146	418	402	327	328	378	370.4	422.9
147	416	401	326	325	379	369.4	420.1
148	415	400	324	324	381	368.8	403.6
149	414	399	322	321	383	367.8	386.1
150	413	399	320	319	384	367.0	379.6
151	412	399	318	316	386	366.2	374.0
152	411	398	317	313	388	365.3	371.0
153	409	397	315	311	390	364.3	367.1
154	408	396	312	308	392	363.2	363.7
155	407	396	310	305	393	362.1	360.9
156	405	395	308	302	395	361.1	360.4
157	404	394	307	300	397	360.2	359.2
158	402	393	305	298	398	359.2	355.7
159	401	392	303	296	400	358.2	355.2
160	399	391	301	293	401	357.0	351.3
161	397	390	299	291	402	355.9	350.1
162	396	389	298	289	403	355.0	349.8
163	394	388	297	288	404	354.2	346.4
164	393	387	295	286	405	353.1	343.4
165	391	386	294	284	406	352.2	341.4
166	390	385	292	282	407	351.1	340.2
167	388	384	291	281	407	350.2	336.5
168	387	383	289	279	408	349.2	334.7
169	385	382	288	277	409	348.1	332.9
170	384	381	286	275	409	347.1	331.0
171	382	380	285	274	410	346.0	332.0
172	381	378	283	272	410	344.9	329.9
173	379	377	281	270	411	343.8	327.9
174	378	376	280	269	411	342.9	326.9
175	377	374	278	268	412	341.7	326.9
176	375	373	277	267	412	340.8	325.4
177	374	371	276	265	413	339.8	324.0
178	373	370	275	264	413	338.9	323.8
179	371	369	273	262	413	337.7	325.9
180	370	367	272	261	414	336.9	322.2
181	369	366	271	260	414	336.2	324.1
182	368	365	271	260	415	335.6	323.3
183	367	364	270	259	415	334.8	323.3
184	366	362	269	258	415	334.1	325.6
185	365	361	268	258	415	333.4	323.2
186	364	360	267	257	415	332.7	323.0
187	363	359	266	256	416	332.0	324.4
188	363	358	266	255	416	331.4	322.8
189	362	356	265	255	416	330.7	321.6
190	361	356	265	254	416	330.2	321.2
191	360	354	264	253	416	329.5	319.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

Stove ΔT: 67

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	359	354	264	252	416	328.9	319.5
193	358	353	263	252	416	328.3	320.1
194	358	352	263	251	416	327.6	316.6
195	357	351	262	250	415	326.9	318.6
196	356	350	262	250	415	326.4	316.1
197	355	349	261	249	415	325.8	315.2
198	354	348	261	248	415	325.2	316.5
199	354	347	261	247	415	324.6	313.6
200	353	346	260	246	415	323.9	314.8
201	352	345	260	245	414	323.3	314.8
202	351	345	259	245	414	322.7	312.6
203	350	344	258	244	414	321.9	311.7
204	350	343	257	243	413	321.2	310.6
205	349	342	256	243	413	320.6	308.0
206	348	341	255	242	413	319.8	309.5
207	347	341	254	241	412	319.0	309.6
208	346	340	254	241	412	318.4	310.5
209	345	340	253	240	411	317.8	310.8
210	344	339	252	239	411	317.1	311.2
211	344	338	251	239	410	316.4	309.4
212	343	337	250	239	409	315.6	308.8
213	342	337	250	238	409	315.0	309.8
214	341	336	249	238	408	314.5	309.1
215	340	335	249	238	407	313.8	307.4
216	339	335	248	237	407	313.0	306.8
217	338	334	247	237	406	312.4	307.4
218	338	333	247	236	405	311.7	307.3
219	337	333	246	236	404	311.0	307.0
220	336	332	246	235	403	310.3	308.7
221	335	331	246	235	402	309.6	307.4
Average	411.5	390.9	291.8	394.5	372.5	372.2	483.4

LAB SAMPLE DATA - ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 3

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/19/2023

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G00433	222.0	222.1	0.1
	B	G00434	223.5	224.0	0.5
	C - 1st Hour	G00435	223.6	223.8	0.2
	Amb	G00436	235.0	235.0	0.0
Probes	**A**	18A	117499.0	117499.0	0.0
	B	18B	117330.4	117330.5	0.1
	C - 1st Hour	18C	114335.1	114335.5	0.4
O-rings	**A**	18A	3602.7	3603.5	0.8
	B	18B	3546.3	3546.7	0.4
	C - 1st Hour	18C	3529.0	3529.1	0.1

Placed in Dessicator on:	

Filters	**A**	222.2	1/23 15:35	222.1	1/25 14:13				
	B	224.0	1/23 15:29	224.0	1/25 14:13				
	C - 1st Hour	223.7	1/23 15:28	223.8	1/25 14:13				
	Amb	235.0	1/23 15:37	235.0	1/25 14:13				
Probes	**A**	117499.0	1/23 15:29	117499.0	1/25 14:13				
	B	117330.4	1/23 15:29	117330.5	1/25 14:13				
	C - 1st Hour	114335.4	1/23 15:29	114335.5	1/25 14:13				
O-Rings	**A**	3603.6	1/23 15:28	3603.5	1/25 14:13				
	B	3546.9	1/23 15:36	3546.7	1/25 14:13				
	C - 1st Hour	3529.0	1/23 15:29	3529.1	1/25 14:14				

Train A Aggregate, mg:	**0.9**
Train B Aggregate, mg:	**1.0**
Train C Aggregate, mg:	**0.7**
Ambient, mg:	**0.0**

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 3 Test Date: 1/19/23

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Open 0.55”
Targeted Burn Category: III

Preburn Notes

Time	Notes
0:00	Set air to test setting, fan on medium
16:00	Broke down coals
31:00	Raked coals, +0.9 lb
60:00	PB end @ 2.95lb

Test Notes

Test Burn Start Time: 12:59 Test Fuel Loaded by: 40 seconds
Door Closed: 105 seconds Air Control Set at: 360 seconds
Other Loading Notes: Fan on medium @ 0 sec

Time	Notes
	- None -

Test Burn End Time: 16:40

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.01 CO (%): 4.306
Mid Gas CO_2 (%): 10.09 CO (%): 2.53

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	1/19 11:39	1/19 11:40	1/19 11:41	1/20 11:10	1/20 11:13	1/20 11:12
CO_2	0.09	10.14	17.12	0.05	10.14	17.17
CO	0.018	2.532	4.329	0.031	2.515	4.380

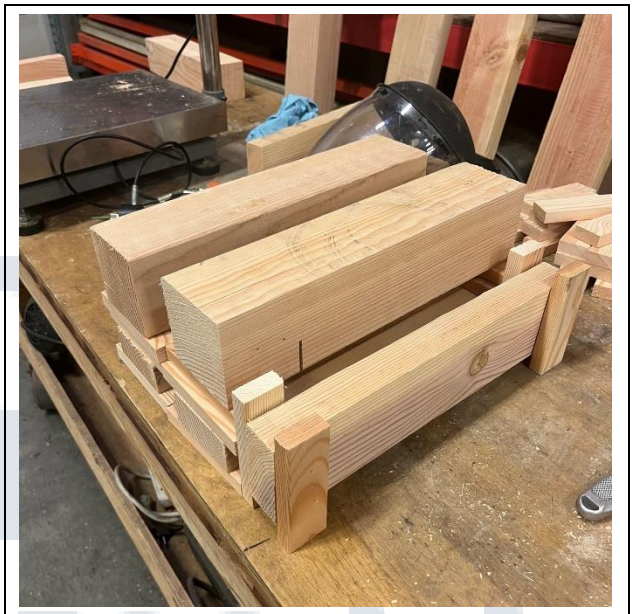
Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature:  Date: 3/6/23

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 3 Test Date: 1/19/23

Test Fuel Front/Side View



Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: _____ Date: 3/6/23

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 4 Data Summary

Client:	Pacific Energy
Model:	TN25 C
Job #:	22-861
Tracking #:	136
Test Date:	1/20/2023

Techician Signature

3/6/2023
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Burn Rate (kg/hr):	0.93

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	26.111	51.810	51.115	9.441
Average Gas Velocity in Dilution Tunnel (ft/sec)	6.4			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	17878.5			
Average Gas Meter Temperature (°F)	63.3	89.7	90.4	75.4
Total Sample Volume (dscf)	27.467	50.760	50.012	9.459
Average Tunnel Temperature (°F)	75.0			
Total Time of Test (min)	336			
Total Particulate Catch (mg)	0.1	4.1	4.5	3.2
Particulate Concentration, dry-standard (g/dscf)	0.0000036	0.0000808	0.0000900	0.0003383
Total PM Emissions (g)	0.36	7.72	8.64	5.98
Particulate Emission Rate (g/hr)	0.07	1.38	1.54	5.98
Emissions Factor (g/kg)	-	1.48	1.66	-
Difference from Average Total Particulate Emissions (g)	-	0.46	0.46	-
Difference from Average Total Particulate Emissions (%)	-	5.6%	5.6%	
Difference from Average Emissions Factor (g/kg)	-	0.09	0.09	-

Final Average Results	
Total Particulate Emissions (g)	8.18
Particulate Emission Rate (g/hr)	1.46
Emissions Factor (g/kg)	1.57
HHV Efficiency (%)	75.4%
LHV Efficiency (%)	81.5%
CO Emissions (g/min)	1.63

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	<90 °F	71.7	OK
Face Velocity	< 30 ft/min	14.5	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:62.2/Max:64.5	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	62.3	OK

B415.1 Efficiency Results

Manufacturer:	Pacific Energy
Model:	TN25 C
Date:	01/20/23
Run:	4
Control #:	22-861
Test Duration:	336
Output Category:	2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.4%	81.5%
Combustion Efficiency	92.3%	92.3%
Heat Transfer Efficiency	81.7%	88.3%

Output Rate (kJ/h)	13,713	13,009	**(Btu/h)**
Burn Rate (kg/h)	0.92	2.02	**(lb/h)**
Input (kJ/h)	18,192	17,257	**(Btu/h)**

Test Load Weight (dry kg)	5.14	11.33	**dry lb**
MC wet (%)	18.22		
MC dry (%)	22.29		
Particulate (g)	8.18		
CO (g)	546		
Test Duration (h)	5.60		

Emissions	**Particulate**	**CO**
g/MJ Output	0.11	7.12
g/kg Dry Fuel	1.59	106.26
g/h	1.46	97.58
g/min	0.02	1.63
lb/MM Btu Output	0.25	16.54

Air/Fuel Ratio (A/F)	10.37

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

WOODSTOVE FUEL DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	12.00	19.3			
2x4	12.00	20.6			
2x4	12.00	20.0			
2x4	12.00	23.0			
2x4	12.00	19.9			
2x4	12.00	20.5			
2x4	12.00	21.2			

Total Fuel Weight (lbs): 9.24
Average Moisture (%DB): 20.6

Firebox Volume (ft^3): 1.98
Total 2x4 Crib Weight, with spacers (lbs): 5.51
Total 4x4 Crib Weight, with spacers (lbs): 8.36
Total Wet Fuel Weight, with spacers (lbs): 13.87

Coal Bed Range (20-25%):
Min (lbs): 2.77
Max (lbs): 3.47

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
4x4	15.00	3.95	23.5	19.3	21.5	3.25
4x4	15.00	4.03	23.0	25.0	19.1	3.29
2x4	15.00	1.32	24.5	24.2	25.0	1.06
2x4	15.00	1.50	22.0	26.3	20.2	1.22
2x4	15.00	1.57	21.0	19.5	20.2	1.31

Total Dry Weight, no spacers (lbs): 10.13
Total Dry Weight, with spacers (lbs): 11.50

Spacer Moisture Readings (%DB)

12.8	9.7	9.0	12.2				
9.9	13.2	8.8	11.5				
10.0	11.1	9.9	8.7				
8.5	8.7	8.9	8.7				

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	29.0	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	7.02	OK
2x4 Fuel Mix	35 - 65 % of total weight	40%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	Pacific Energy	Job #:	22-861
Model:	TN25 C	Tracking #:	136
Run #:	4	Technician:	AK
Test Start Time:	12:33	Date:	1/20/2023

Total Sampling Time (min):	336	
Recording Interval (min):	1	
Meter Box γ Factor:	1.000	(A)
Meter Box γ Factor:	1.000	(B)
Meter Box γ Factor:	0.999	(C)
Meter Box γ Factor:	1.028	(Ambient)
Induced Draft Check (in. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	1/16/2023	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	30.35	30.36	30.36
Relative Humidity (%)	25.8	27.6	
Room Air Velocity (ft/min)	<50	<50	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:		26.111	ft^3

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-3	in. Hg
(B)	0.000	cfm @	-4	in. Hg
(C)	0.000	cfm @	-4	in. Hg
(Ambient)	0.000	cfm @	-8	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.006	91
2	0.008	91
3	0.012	91
4	0.012	91
5	0.010	91
6	0.008	91
7	0.008	91
8	0.010	91
9	0.012	91
10	0.012	91
11	0.012	91
12	0.006	91
Center	0.014	91

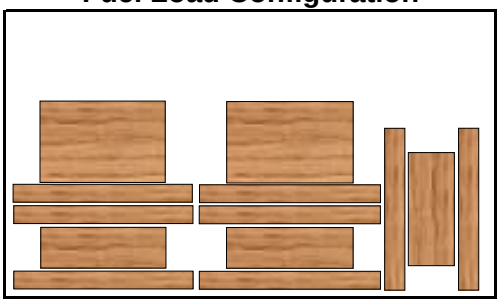
Static Pressure: -0.060 in. H_2O

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}:	6.56	ft/sec
V_{scent}:	7.95	ft/sec
F_p:	0.825	[ratio]
Initial Tunnel Flow:	294.5	scf/min

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Front



Firebox Back

Firebox Side View

Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	22.3

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	5.92	-0.088	512	484	575	781	478	565.9	472	65
1	5.83	-0.084	514	486	575	774	477	565.3	436	65
2	5.73	-0.084	516	488	574	764	476	563.6	410	65
3	5.65	-0.078	516	488	572	750	475	560.3	392	65
4	5.56	-0.078	515	488	569	735	474	556.2	377	65
5	5.47	-0.076	514	486	566	719	473	551.7	367	65
6	5.39	-0.075	512	484	563	704	472	547.1	358	65
7	5.31	-0.073	510	482	560	691	471	542.8	351	65
8	5.23	-0.073	508	480	557	677	470	538.4	344	65
9	5.16	-0.070	506	478	554	664	468	533.9	338	65
10	5.09	-0.072	504	475	552	652	467	529.9	333	65
11	5.01	-0.070	501	473	550	641	465	526.0	328	65
12	4.94	-0.070	499	471	548	630	463	522.3	325	65
13	4.85	-0.070	496	469	546	620	461	518.6	322	65
14	4.77	-0.070	494	467	545	612	459	515.4	320	65
15	4.69	-0.070	492	466	544	604	457	512.5	318	65
16	4.61	-0.071	490	464	543	597	455	509.9	316	65
17	4.52	-0.070	488	463	543	592	453	507.7	315	65
18	4.44	-0.068	486	462	542	587	451	505.5	313	65
19	4.36	-0.067	484	462	541	583	449	503.6	312	65
20	4.28	-0.068	482	461	541	578	447	501.8	310	64
21	4.20	-0.066	481	461	541	575	444	500.3	309	64
22	4.12	-0.064	479	460	540	573	442	499.0	308	65
23	4.04	-0.067	478	460	540	569	440	497.4	306	64
24	3.98	-0.065	477	460	540	567	438	496.3	304	64
25	3.92	-0.064	476	460	540	564	435	494.8	302	64
26	3.86	-0.065	474	459	540	561	433	493.3	299	64
27	3.81	-0.063	473	459	539	558	431	491.9	296	64
28	3.76	-0.064	471	459	539	555	428	490.3	292	64
29	3.71	-0.061	470	458	538	551	426	488.4	291	64
30	3.66	-0.061	468	457	537	548	424	486.6	289	64
31	3.63	-0.060	466	455	536	543	421	484.5	286	64
32	3.60	-0.061	464	453	535	540	419	482.3	282	64
33	3.56	-0.058	463	452	533	535	417	479.9	278	65
34	3.55	-0.057	461	450	531	530	415	477.4	274	64
35	3.52	-0.058	459	448	529	524	413	474.6	269	65
36	3.50	-0.056	457	446	526	518	412	471.5	265	65
37	3.49	-0.055	454	444	522	511	410	468.2	262	65
38	3.39	-0.059	451	441	519	503	408	464.6	324	65
39	3.37	-0.063	450	439	521	497	407	462.6	308	65
40	3.34	-0.057	448	437	522	490	406	460.4	291	64
41	3.32	-0.058	446	436	521	483	405	458.1	277	65
42	3.29	-0.058	444	434	521	478	404	455.9	272	64
43	3.27	-0.059	442	431	520	471	403	453.5	271	64
44	3.25	-0.058	440	429	519	465	403	451.2	271	64

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.22	-0.057	438	427	519	460	403	449.3	270	64
46	3.19	-0.055	436	425	519	456	404	447.6	268	64
47	3.18	-0.049	434	423	518	450	404	445.9	255	64
48	3.17	-0.048	433	421	518	446	405	444.4	241	64
49	3.16	-0.045	432	420	517	440	406	442.8	232	64
50	3.15	-0.045	430	418	515	436	408	441.3	224	64
51	3.13	-0.044	429	417	513	431	409	439.8	218	64
52	3.12	-0.044	428	416	511	425	411	438.2	213	64
53	3.11	-0.046	427	414	509	420	413	436.6	209	64
54	3.09	-0.042	425	413	507	415	415	435.0	206	64
55	3.09	-0.041	424	411	505	411	416	433.4	203	64
56	3.07	-0.039	422	410	503	406	418	431.8	201	64
57	3.06	-0.039	421	408	501	401	420	430.1	199	64
58	3.04	-0.040	419	406	499	398	421	428.6	197	64
59	3.03	-0.041	418	405	497	394	422	427.0	196	64
60	3.02	-0.038	416	403	495	390	423	425.4	194	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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		0.013	1.30	69	0.6		13.86		87	266	66	64
1	0.137	0.137	0.013	2.03	69	0.7	-	13.78	-0.08	93	281	67	64
2	0.280	0.143	0.014	2.04	69	0.7	-	13.67	-0.11	92	306	67	64
3	0.419	0.139	0.014	2.06	69	0.8	-	13.53	-0.14	87	322	67	64
4	0.561	0.142	0.014	2.07	69	0.8	-	13.37	-0.16	85	359	67	64
5	0.702	0.141	0.013	2.08	69	0.8	-	13.17	-0.20	85	402	67	64
6	0.844	0.142	0.013	2.09	69	0.8	-	13.09	-0.08	83	364	67	64
7	0.988	0.144	0.013	2.11	69	0.8	-	13.03	-0.06	81	338	67	64
8	1.126	0.138	0.014	2.12	69	0.8	-	12.92	-0.11	82	347	67	64
9	1.273	0.147	0.014	2.12	69	0.8	-	12.77	-0.15	82	362	68	64
10	1.414	0.141	0.014	2.13	69	0.8	98	12.66	-0.11	82	342	68	64
11	1.557	0.143	0.014	2.14	70	0.8	-	12.58	-0.08	80	320	68	64
12	1.701	0.144	0.014	2.14	70	0.8	-	12.50	-0.08	80	302	68	64
13	1.844	0.143	0.014	2.15	70	0.8	-	12.42	-0.08	79	290	68	64
14	1.991	0.147	0.014	2.17	70	0.8	-	12.34	-0.08	79	282	68	64
15	2.132	0.141	0.014	2.17	70	0.8	-	12.26	-0.08	79	278	68	64
16	2.279	0.147	0.014	2.17	71	0.8	-	12.18	-0.08	78	275	68	64
17	2.421	0.142	0.012	2.18	71	0.8	-	12.08	-0.10	78	280	68	64
18	2.570	0.149	0.014	2.18	71	0.8	-	11.96	-0.12	79	299	68	64
19	2.713	0.143	0.014	2.20	71	0.8	-	11.81	-0.15	79	317	68	64
20	2.859	0.146	0.014	2.20	72	0.9	97	11.68	-0.13	79	325	68	64
21	3.004	0.145	0.014	2.20	72	0.8	-	11.56	-0.12	79	323	68	64
22	3.150	0.146	0.014	2.21	72	0.9	-	11.46	-0.10	79	310	68	64
23	3.297	0.147	0.014	2.21	73	0.8	-	11.37	-0.09	79	302	68	64
24	3.443	0.146	0.014	2.22	73	0.8	-	11.28	-0.09	78	296	68	64
25	3.591	0.148	0.014	2.23	73	0.9	-	11.18	-0.10	78	290	68	64
26	3.736	0.145	0.014	2.24	74	0.8	-	11.11	-0.07	78	287	68	64
27	3.885	0.149	0.014	2.23	74	0.9	-	11.01	-0.10	78	286	68	64
28	4.029	0.144	0.014	2.24	74	0.8	-	10.93	-0.08	78	286	68	64
29	4.179	0.150	0.014	2.23	75	0.8	-	10.84	-0.09	77	286	68	64
30	4.324	0.145	0.014	2.25	75	0.8	98	10.73	-0.11	78	287	68	64
31	4.476	0.152	0.014	2.25	75	0.9	-	10.63	-0.10	77	289	68	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
32	4.620	0.144	0.014	2.26	76	0.8	-	10.53	-0.10	78	291	68	64
33	4.772	0.152	0.014	2.26	76	0.9	-	10.43	-0.10	78	294	68	64
34	4.918	0.146	0.014	2.28	76	0.9	-	10.32	-0.11	78	296	68	64
35	5.070	0.152	0.014	2.28	77	0.9	-	10.21	-0.11	78	296	68	64
36	5.216	0.146	0.014	2.28	77	0.8	-	10.10	-0.11	78	298	68	64
37	5.368	0.152	0.014	2.28	77	0.9	-	9.99	-0.11	78	299	68	64
38	5.515	0.147	0.014	2.29	78	0.9	-	9.89	-0.10	78	299	68	64
39	5.666	0.151	0.014	2.28	78	0.8	-	9.78	-0.11	78	300	68	64
40	5.813	0.147	0.014	2.29	78	0.9	99	9.67	-0.11	78	301	68	64
41	5.965	0.152	0.014	2.29	78	0.9	-	9.57	-0.10	78	302	68	64
42	6.113	0.148	0.014	2.30	79	0.9	-	9.45	-0.12	79	303	68	64
43	6.265	0.152	0.014	2.30	79	0.9	-	9.35	-0.10	79	305	68	64
44	6.413	0.148	0.014	2.30	80	0.9	-	9.24	-0.11	78	305	68	64
45	6.566	0.153	0.014	2.31	80	0.9	-	9.14	-0.10	79	305	68	64
46	6.714	0.148	0.014	2.31	80	0.9	-	9.02	-0.12	79	305	68	64
47	6.867	0.153	0.014	2.31	80	0.8	-	8.91	-0.11	79	303	68	64
48	7.015	0.148	0.014	2.32	81	0.9	-	8.81	-0.10	79	301	68	64
49	7.168	0.153	0.014	2.32	81	0.9	-	8.70	-0.11	79	300	68	64
50	7.316	0.148	0.014	2.32	81	0.9	99	8.60	-0.10	79	299	68	64
51	7.470	0.154	0.014	2.31	82	0.8	-	8.50	-0.10	79	298	68	64
52	7.618	0.148	0.014	2.31	82	0.9	-	8.40	-0.10	79	297	68	64
53	7.772	0.154	0.014	2.33	82	0.9	-	8.30	-0.10	79	295	68	64
54	7.920	0.148	0.014	2.32	82	0.9	-	8.20	-0.10	79	294	69	64
55	8.075	0.155	0.014	2.33	83	0.9	-	8.10	-0.10	79	293	69	64
56	8.223	0.148	0.014	2.32	83	0.9	-	8.01	-0.09	79	292	69	64
57	8.378	0.155	0.014	2.32	83	0.9	-	7.91	-0.10	79	290	69	64
58	8.527	0.149	0.014	2.33	83	0.9	-	7.83	-0.08	79	288	69	64
59	8.683	0.156	0.014	2.34	84	0.9	-	7.73	-0.10	79	288	69	64
60	8.832	0.149	0.014	2.34	84	0.9	100	7.64	-0.09	79	287	69	64
61	8.987	0.155	0.014	2.34	84	0.9	-	7.54	-0.10	79	288	69	64
62	9.137	0.150	0.014	2.35	84	0.9	-	7.46	-0.08	79	289	69	64
63	9.291	0.154	0.014	2.35	85	0.9	-	7.36	-0.10	79	289	69	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
64	9.441	0.150	0.014	2.34	85	0.9	-	7.27	-0.09	79	290	69	63
65	9.595	0.154	0.014	2.36	85	0.9	-	7.16	-0.11	79	292	69	64
66	9.747	0.152	0.014	2.35	85	0.9	-	7.06	-0.10	79	294	69	64
67	9.900	0.153	0.014	2.35	85	0.9	-	6.96	-0.10	80	295	69	64
68	10.054	0.154	0.014	2.35	86	0.9	-	6.86	-0.10	80	296	69	64
69	10.206	0.152	0.014	2.35	86	0.9	-	6.77	-0.09	80	307	69	64
70	10.360	0.154	0.014	2.36	86	0.9	100	6.68	-0.09	80	315	69	64
71	10.512	0.152	0.014	2.36	86	0.9	-	6.59	-0.09	81	319	69	64
72	10.666	0.154	0.014	2.36	86	0.9	-	6.49	-0.10	81	323	69	64
73	10.816	0.150	0.014	2.36	87	0.9	-	6.39	-0.10	81	324	69	64
74	10.972	0.156	0.014	2.36	87	0.9	-	6.30	-0.09	81	325	69	64
75	11.122	0.150	0.014	2.36	87	0.9	-	6.21	-0.09	81	326	69	64
76	11.279	0.157	0.014	2.36	87	0.9	-	6.12	-0.09	81	325	69	64
77	11.430	0.151	0.014	2.37	87	0.9	-	6.04	-0.08	81	324	69	64
78	11.586	0.156	0.014	2.36	87	0.9	-	5.96	-0.08	81	323	69	64
79	11.737	0.151	0.014	2.37	87	0.9	-	5.88	-0.08	81	320	69	64
80	11.891	0.154	0.014	2.36	88	0.9	100	5.80	-0.08	80	318	69	64
81	12.044	0.153	0.014	2.37	88	0.9	-	5.74	-0.06	80	315	69	64
82	12.198	0.154	0.014	2.36	88	0.9	-	5.66	-0.08	80	311	69	64
83	12.353	0.155	0.014	2.36	88	0.9	-	5.61	-0.05	80	307	69	64
84	12.506	0.153	0.014	2.37	88	0.9	-	5.54	-0.07	80	304	69	64
85	12.662	0.156	0.014	2.38	88	0.9	-	5.48	-0.06	80	301	69	64
86	12.812	0.150	0.014	2.38	89	0.9	-	5.42	-0.06	80	299	69	64
87	12.969	0.157	0.013	2.38	89	0.9	-	5.36	-0.06	80	297	69	64
88	13.119	0.150	0.014	2.37	89	0.9	-	5.30	-0.06	80	294	69	64
89	13.278	0.159	0.014	2.37	89	0.9	-	5.24	-0.06	80	291	69	64
90	13.429	0.151	0.014	2.38	89	0.9	100	5.18	-0.06	79	290	69	64
91	13.586	0.157	0.014	2.38	89	0.9	-	5.13	-0.05	79	288	69	64
92	13.737	0.151	0.014	2.38	89	0.9	-	5.07	-0.06	79	286	69	64
93	13.893	0.156	0.014	2.39	89	0.9	-	5.02	-0.05	79	284	69	65
94	14.046	0.153	0.014	2.38	90	0.9	-	4.96	-0.06	79	282	69	64
95	14.201	0.155	0.014	2.38	90	0.9	-	4.92	-0.04	78	280	69	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
96	14.358	0.157	0.014	2.38	90	0.8	-	4.86	-0.06	78	278	69	64
97	14.510	0.152	0.014	2.38	90	0.9	-	4.81	-0.05	78	276	69	64
98	14.666	0.156	0.014	2.38	90	0.9	-	4.76	-0.05	78	274	69	64
99	14.817	0.151	0.014	2.39	90	0.9	-	4.70	-0.06	78	273	69	64
100	14.976	0.159	0.014	2.38	90	0.9	100	4.66	-0.04	78	272	69	64
101	15.128	0.152	0.014	2.38	90	0.9	-	4.61	-0.05	78	270	69	64
102	15.285	0.157	0.014	2.39	90	0.9	-	4.55	-0.06	78	269	69	64
103	15.437	0.152	0.014	2.38	91	0.9	-	4.51	-0.04	78	268	69	64
104	15.593	0.156	0.014	2.38	91	0.9	-	4.46	-0.05	77	260	69	64
105	15.748	0.155	0.014	2.39	91	0.9	-	4.41	-0.05	77	253	69	64
106	15.903	0.155	0.014	2.39	91	0.9	-	4.36	-0.05	77	247	68	64
107	16.060	0.157	0.014	2.40	91	0.9	-	4.32	-0.04	77	244	68	64
108	16.211	0.151	0.014	2.39	91	0.9	-	4.27	-0.05	76	241	68	64
109	16.369	0.158	0.014	2.39	91	0.9	-	4.22	-0.05	76	239	68	64
110	16.521	0.152	0.014	2.39	91	0.9	100	4.18	-0.04	76	238	68	64
111	16.679	0.158	0.014	2.40	91	0.9	-	4.13	-0.05	76	237	68	64
112	16.832	0.153	0.014	2.40	91	0.9	-	4.10	-0.03	76	236	68	64
113	16.988	0.156	0.013	2.39	91	0.9	-	4.03	-0.07	76	234	68	64
114	17.141	0.153	0.014	2.39	91	0.9	-	3.99	-0.04	76	233	68	64
115	17.297	0.156	0.014	2.39	92	0.9	-	3.95	-0.04	76	233	68	63
116	17.454	0.157	0.013	2.40	92	0.9	-	3.90	-0.05	76	232	68	64
117	17.607	0.153	0.014	2.40	92	0.9	-	3.86	-0.04	76	232	68	64
118	17.764	0.157	0.014	2.39	92	0.9	-	3.81	-0.05	76	231	68	64
119	17.916	0.152	0.014	2.40	92	0.8	-	3.77	-0.04	76	230	68	64
120	18.075	0.159	0.014	2.39	92	0.9	100	3.73	-0.04	76	229	68	64
121	18.227	0.152	0.014	2.40	92	0.9	-	3.69	-0.04	76	229	68	64
122	18.385	0.158	0.014	2.40	92	0.9	-	3.64	-0.05	75	228	68	64
123	18.538	0.153	0.014	2.40	92	0.8	-	3.60	-0.04	75	228	68	64
124	18.694	0.156	0.014	2.40	92	0.9	-	3.56	-0.04	75	227	68	64
125	18.851	0.157	0.014	2.40	92	0.9	-	3.52	-0.04	75	226	68	64
126	19.005	0.154	0.014	2.40	92	0.9	-	3.47	-0.05	75	225	68	64
127	19.161	0.156	0.014	2.40	92	0.9	-	3.44	-0.03	75	225	68	64

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
128	19.313	0.152	0.014	2.40	93	0.9	-	3.40	-0.04	75	224	68	64
129	19.473	0.160	0.014	2.40	93	0.9	-	3.36	-0.04	75	223	68	64
130	19.626	0.153	0.014	2.40	93	0.9	100	3.32	-0.04	75	222	68	64
131	19.783	0.157	0.014	2.40	93	0.9	-	3.29	-0.03	75	221	68	64
132	19.936	0.153	0.014	2.41	93	0.9	-	3.25	-0.04	75	220	68	64
133	20.092	0.156	0.014	2.40	93	0.9	-	3.22	-0.03	75	217	68	64
134	20.249	0.157	0.014	2.40	93	0.9	-	3.19	-0.03	75	216	68	64
135	20.403	0.154	0.014	2.40	93	0.9	-	3.16	-0.03	75	215	68	64
136	20.560	0.157	0.014	2.41	93	0.9	-	3.14	-0.02	74	212	68	64
137	20.712	0.152	0.014	2.40	93	0.9	-	3.12	-0.02	75	211	68	64
138	20.872	0.160	0.014	2.40	93	0.9	-	3.10	-0.02	75	210	68	64
139	21.024	0.152	0.014	2.39	93	0.9	-	3.07	-0.03	75	209	68	64
140	21.182	0.158	0.014	2.42	93	0.9	100	3.05	-0.02	75	208	68	63
141	21.336	0.154	0.014	2.41	93	0.9	-	3.03	-0.02	75	207	68	63
142	21.491	0.155	0.014	2.41	93	0.9	-	3.01	-0.02	74	206	68	63
143	21.649	0.158	0.014	2.41	93	0.9	-	2.99	-0.02	74	205	68	63
144	21.803	0.154	0.014	2.40	93	0.9	-	2.97	-0.02	74	203	68	63
145	21.960	0.157	0.014	2.40	93	0.9	-	2.94	-0.03	74	203	68	64
146	22.112	0.152	0.014	2.40	93	0.8	-	2.92	-0.02	74	202	68	64
147	22.272	0.160	0.014	2.40	93	0.9	-	2.90	-0.02	74	201	68	63
148	22.425	0.153	0.014	2.40	93	0.9	-	2.89	-0.01	74	200	68	63
149	22.582	0.157	0.014	2.42	93	0.9	-	2.87	-0.02	74	199	68	64
150	22.736	0.154	0.014	2.40	93	0.8	100	2.84	-0.03	74	198	68	64
151	22.893	0.157	0.014	2.40	93	0.9	-	2.82	-0.02	74	197	68	64
152	23.050	0.157	0.014	2.40	93	0.9	-	2.80	-0.02	74	196	68	64
153	23.204	0.154	0.014	2.41	93	0.9	-	2.78	-0.02	74	195	68	64
154	23.362	0.158	0.014	2.41	93	0.9	-	2.76	-0.02	73	194	68	64
155	23.514	0.152	0.014	2.40	93	0.9	-	2.75	-0.01	73	193	68	64
156	23.674	0.160	0.014	2.40	93	0.9	-	2.73	-0.02	73	193	68	63
157	23.827	0.153	0.014	2.41	94	0.9	-	2.71	-0.02	73	192	68	64
158	23.983	0.156	0.014	2.41	94	0.9	-	2.69	-0.02	73	192	67	63
159	24.138	0.155	0.014	2.40	94	0.9	-	2.68	-0.01	73	191	68	63

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
160	24.294	0.156	0.014	2.41	94	0.9	100	2.66	-0.02	73	191	67	63
161	24.452	0.158	0.014	2.41	94	0.9	-	2.64	-0.02	73	190	67	63
162	24.605	0.153	0.014	2.42	94	0.9	-	2.62	-0.02	73	188	67	63
163	24.763	0.158	0.014	2.41	94	0.9	-	2.61	-0.01	73	188	67	63
164	24.916	0.153	0.014	2.39	94	0.9	-	2.59	-0.02	73	187	67	63
165	25.075	0.159	0.014	2.42	94	0.9	-	2.58	-0.01	73	187	67	63
166	25.229	0.154	0.014	2.42	94	0.9	-	2.57	-0.01	73	186	67	63
167	25.385	0.156	0.014	2.41	94	0.9	-	2.55	-0.02	73	185	67	64
168	25.541	0.156	0.014	2.41	94	0.9	-	2.53	-0.02	73	184	67	64
169	25.697	0.156	0.014	2.41	94	0.9	-	2.52	-0.01	73	185	67	63
170	25.855	0.158	0.014	2.42	94	0.9	100	2.51	-0.01	73	185	67	63
171	26.007	0.152	0.014	2.41	94	0.9	-	2.49	-0.02	73	185	67	63
172	26.165	0.158	0.014	2.41	94	0.9	-	2.48	-0.01	73	185	67	63
173	26.319	0.154	0.014	2.41	94	0.9	-	2.46	-0.02	73	185	67	63
174	26.478	0.159	0.014	2.41	94	0.9	-	2.44	-0.02	73	185	67	63
175	26.630	0.152	0.014	2.41	94	0.9	-	2.43	-0.01	73	185	67	63
176	26.787	0.157	0.014	2.41	94	0.9	-	2.41	-0.02	73	185	67	63
177	26.944	0.157	0.014	2.41	94	0.9	-	2.40	-0.01	73	184	67	63
178	27.099	0.155	0.014	2.42	94	0.8	-	2.38	-0.02	73	184	67	63
179	27.256	0.157	0.014	2.41	94	0.9	-	2.36	-0.02	73	183	67	63
180	27.409	0.153	0.014	2.41	94	0.9	100	2.35	-0.01	73	183	67	63
181	27.568	0.159	0.014	2.41	94	0.9	-	2.33	-0.02	72	182	67	63
182	27.722	0.154	0.014	2.41	94	0.9	-	2.32	-0.01	72	182	67	63
183	27.879	0.157	0.014	2.41	94	0.9	-	2.31	-0.01	72	182	67	63
184	28.033	0.154	0.014	2.40	94	0.9	-	2.29	-0.02	72	182	67	63
185	28.190	0.157	0.014	2.42	94	0.9	-	2.27	-0.02	72	181	67	63
186	28.347	0.157	0.014	2.40	94	0.9	-	2.26	-0.01	72	181	67	63
187	28.501	0.154	0.014	2.41	94	0.9	-	2.24	-0.02	72	180	67	63
188	28.659	0.158	0.014	2.41	94	0.9	-	2.23	-0.01	72	180	67	63
189	28.811	0.152	0.014	2.40	94	0.9	-	2.22	-0.01	72	180	67	63
190	28.970	0.159	0.014	2.40	94	0.9	100	2.20	-0.02	72	179	67	63
191	29.124	0.154	0.014	2.41	94	0.9	-	2.19	-0.01	72	179	67	63

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
192	29.280	0.156	0.014	2.41	94	0.9	-	2.17	-0.02	72	179	67	63
193	29.434	0.154	0.014	2.39	94	0.9	-	2.15	-0.02	72	178	67	63
194	29.591	0.157	0.014	2.40	94	0.9	-	2.14	-0.01	72	178	67	63
195	29.748	0.157	0.014	2.41	94	0.9	-	2.12	-0.02	72	177	67	63
196	29.901	0.153	0.014	2.40	94	0.9	-	2.11	-0.01	72	177	67	63
197	30.059	0.158	0.014	2.41	94	0.9	-	2.10	-0.01	72	177	67	63
198	30.212	0.153	0.014	2.41	94	0.9	-	2.08	-0.02	72	177	67	63
199	30.371	0.159	0.014	2.40	94	0.9	-	2.07	-0.01	72	177	67	63
200	30.524	0.153	0.014	2.41	94	0.9	99	2.05	-0.02	72	177	67	63
201	30.681	0.157	0.014	2.40	94	0.9	-	2.04	-0.01	72	176	67	63
202	30.836	0.155	0.014	2.41	94	0.9	-	2.03	-0.01	72	176	67	63
203	30.992	0.156	0.014	2.41	94	0.9	-	2.01	-0.02	72	176	67	63
204	31.150	0.158	0.014	2.41	94	0.9	-	2.00	-0.01	72	176	67	63
205	31.302	0.152	0.014	2.40	94	0.9	-	1.98	-0.02	72	175	67	63
206	31.460	0.158	0.014	2.40	94	0.9	-	1.96	-0.02	72	175	67	63
207	31.613	0.153	0.014	2.41	94	0.9	-	1.96	0.00	72	175	67	63
208	31.772	0.159	0.014	2.41	94	0.9	-	1.94	-0.02	72	175	67	63
209	31.925	0.153	0.014	2.40	94	0.9	-	1.92	-0.02	72	174	67	63
210	32.081	0.156	0.014	2.40	94	0.9	100	1.91	-0.01	72	174	67	63
211	32.238	0.157	0.014	2.40	94	0.9	-	1.90	-0.01	72	174	67	63
212	32.393	0.155	0.014	2.40	94	0.9	-	1.88	-0.02	72	174	67	63
213	32.550	0.157	0.014	2.40	94	0.9	-	1.87	-0.01	72	173	67	63
214	32.702	0.152	0.014	2.40	94	0.9	-	1.85	-0.02	72	173	67	63
215	32.860	0.158	0.014	2.39	94	0.9	-	1.84	-0.01	72	173	67	63
216	33.014	0.154	0.014	2.40	94	0.9	-	1.83	-0.01	72	172	67	63
217	33.172	0.158	0.014	2.41	94	0.9	-	1.81	-0.02	72	172	67	63
218	33.325	0.153	0.014	2.40	94	0.9	-	1.80	-0.01	72	172	67	63
219	33.481	0.156	0.014	2.40	94	0.9	-	1.79	-0.01	72	171	67	63
220	33.637	0.156	0.014	2.40	94	0.9	100	1.78	-0.01	72	171	67	63
221	33.792	0.155	0.014	2.39	94	0.9	-	1.77	-0.01	72	171	67	63
222	33.950	0.158	0.014	2.41	94	0.9	-	1.75	-0.02	71	171	67	63
223	34.102	0.152	0.014	2.39	94	0.9	-	1.74	-0.01	71	170	67	63

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
224	34.260	0.158	0.014	2.40	94	0.9	-	1.73	-0.01	72	170	67	63
225	34.413	0.153	0.014	2.40	94	0.9	-	1.71	-0.02	72	170	67	63
226	34.572	0.159	0.014	2.40	94	0.9	-	1.70	-0.01	72	169	67	63
227	34.724	0.152	0.014	2.40	94	0.9	-	1.69	-0.01	72	169	67	63
228	34.880	0.156	0.014	2.39	94	0.9	-	1.67	-0.02	71	169	67	63
229	35.037	0.157	0.014	2.39	94	0.9	-	1.66	-0.01	71	169	67	63
230	35.191	0.154	0.014	2.38	94	0.9	99	1.65	-0.01	71	168	67	63
231	35.349	0.158	0.014	2.41	94	0.9	-	1.64	-0.01	71	168	67	63
232	35.501	0.152	0.014	2.40	94	0.9	-	1.62	-0.02	71	168	67	62
233	35.659	0.158	0.014	2.40	94	0.9	-	1.61	-0.01	71	168	66	62
234	35.813	0.154	0.014	2.39	94	0.9	-	1.60	-0.01	71	168	66	62
235	35.971	0.158	0.014	2.41	94	0.9	-	1.58	-0.02	71	168	66	62
236	36.123	0.152	0.014	2.40	94	0.9	-	1.57	-0.01	71	168	66	62
237	36.279	0.156	0.014	2.40	94	0.9	-	1.56	-0.01	71	168	66	62
238	36.436	0.157	0.014	2.39	94	0.9	-	1.55	-0.01	71	168	67	62
239	36.591	0.155	0.014	2.40	94	0.9	-	1.53	-0.02	71	168	66	62
240	36.748	0.157	0.014	2.41	94	0.9	100	1.52	-0.01	71	168	66	62
241	36.900	0.152	0.014	2.40	94	0.9	-	1.51	-0.01	71	168	66	62
242	37.059	0.159	0.014	2.40	94	0.9	-	1.50	-0.01	71	168	66	62
243	37.212	0.153	0.014	2.40	94	0.9	-	1.48	-0.02	71	168	66	62
244	37.370	0.158	0.013	2.40	94	0.9	-	1.48	0.00	71	168	66	62
245	37.523	0.153	0.014	2.40	94	0.9	-	1.46	-0.02	71	168	66	62
246	37.679	0.156	0.014	2.40	94	0.9	-	1.44	-0.02	71	167	66	62
247	37.836	0.157	0.014	2.38	94	0.9	-	1.42	-0.02	71	168	66	62
248	37.990	0.154	0.014	2.40	94	0.8	-	1.41	-0.01	71	174	66	63
249	38.148	0.158	0.014	2.41	94	0.9	-	1.39	-0.02	71	179	66	62
250	38.300	0.152	0.014	2.41	94	0.9	99	1.37	-0.02	71	183	66	63
251	38.458	0.158	0.014	2.40	94	0.9	-	1.36	-0.01	72	186	66	63
252	38.612	0.154	0.014	2.40	94	0.9	-	1.33	-0.03	72	188	66	63
253	38.770	0.158	0.014	2.40	94	0.9	-	1.32	-0.01	72	190	66	62
254	38.922	0.152	0.014	2.40	94	0.9	-	1.29	-0.03	72	191	66	62
255	39.078	0.156	0.014	2.38	94	0.9	-	1.28	-0.01	72	193	66	62

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
256	39.235	0.157	0.013	2.39	94	0.9	-	1.26	-0.02	72	194	66	62
257	39.506	0.271	0.014	2.39	94	0.9	-	1.24	-0.02	72	195	66	62
258	39.664	0.158	0.014	2.40	94	0.9	-	1.23	-0.01	72	195	66	62
259	39.816	0.152	0.013	2.41	94	0.8	-	1.21	-0.02	72	196	66	63
260	39.975	0.159	0.014	2.40	94	0.9	107	1.18	-0.03	73	196	66	63
261	40.128	0.153	0.014	2.40	94	0.9	-	1.17	-0.01	73	197	67	63
262	40.286	0.158	0.014	2.40	94	0.9	-	1.15	-0.02	73	197	66	63
263	40.439	0.153	0.014	2.41	94	0.9	-	1.14	-0.01	72	198	67	63
264	40.595	0.156	0.014	2.39	94	0.9	-	1.12	-0.02	72	199	67	63
265	40.752	0.157	0.014	2.41	94	0.9	-	1.11	-0.01	73	199	66	63
266	40.907	0.155	0.014	2.41	94	0.9	-	1.09	-0.02	73	199	66	63
267	41.064	0.157	0.014	2.40	94	0.8	-	1.07	-0.02	73	199	67	63
268	41.216	0.152	0.014	2.40	94	0.9	-	1.05	-0.02	73	199	67	63
269	41.375	0.159	0.013	2.40	94	0.9	-	1.04	-0.01	73	200	67	63
270	41.529	0.154	0.014	2.40	94	0.9	99	1.02	-0.02	73	200	67	63
271	41.686	0.157	0.014	2.41	94	0.9	-	1.00	-0.02	73	201	67	63
272	41.840	0.154	0.014	2.40	94	0.9	-	0.99	-0.01	73	201	67	63
273	41.996	0.156	0.014	2.40	94	0.9	-	0.97	-0.02	73	202	67	63
274	42.153	0.157	0.014	2.40	94	0.9	-	0.96	-0.01	73	202	67	63
275	42.307	0.154	0.014	2.40	94	0.9	-	0.93	-0.03	73	202	67	63
276	42.464	0.157	0.014	2.42	94	0.9	-	0.93	0.00	73	203	67	63
277	42.616	0.152	0.014	2.39	94	0.9	-	0.91	-0.02	73	203	67	63
278	42.776	0.160	0.013	2.41	94	0.9	-	0.89	-0.02	73	203	67	63
279	42.930	0.154	0.014	2.40	94	0.9	-	0.87	-0.02	73	204	67	63
280	43.086	0.156	0.014	2.40	94	0.9	100	0.86	-0.01	73	203	67	63
281	43.241	0.155	0.013	2.40	94	0.9	-	0.84	-0.02	73	204	67	62
282	43.397	0.156	0.014	2.40	95	0.9	-	0.82	-0.02	73	205	67	63
283	43.554	0.157	0.014	2.40	94	0.9	-	0.80	-0.02	73	205	67	62
284	43.708	0.154	0.014	2.40	94	0.9	-	0.79	-0.01	73	205	67	62
285	43.866	0.158	0.014	2.41	95	0.9	-	0.77	-0.02	73	204	67	62
286	44.018	0.152	0.013	2.41	95	0.9	-	0.76	-0.01	73	205	67	63
287	44.178	0.160	0.013	2.40	94	0.8	-	0.75	-0.01	73	205	67	63

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
288	44.331	0.153	0.014	2.40	95	0.9	-	0.73	-0.02	73	205	67	63
289	44.488	0.157	0.014	2.40	95	0.8	-	0.71	-0.02	73	205	67	63
290	44.642	0.154	0.014	2.40	95	0.9	100	0.70	-0.01	73	205	67	63
291	44.799	0.157	0.014	2.40	95	0.9	-	0.68	-0.02	73	205	67	63
292	44.957	0.158	0.014	2.41	95	0.9	-	0.66	-0.02	73	205	67	63
293	45.109	0.152	0.014	2.39	95	0.9	-	0.64	-0.02	73	205	67	63
294	45.267	0.158	0.013	2.40	95	0.9	-	0.63	-0.01	73	205	67	63
295	45.421	0.154	0.014	2.41	95	0.9	-	0.62	-0.01	73	205	67	63
296	45.580	0.159	0.014	2.40	95	0.9	-	0.59	-0.03	73	206	67	63
297	45.732	0.152	0.014	2.40	95	0.9	-	0.58	-0.01	73	206	67	62
298	45.889	0.157	0.014	2.41	95	0.9	-	0.56	-0.02	73	206	67	62
299	46.046	0.157	0.013	2.40	95	0.9	-	0.55	-0.01	73	206	67	62
300	46.201	0.155	0.014	2.40	95	0.9	100	0.53	-0.02	73	206	67	62
301	46.358	0.157	0.014	2.41	95	0.9	-	0.51	-0.02	73	206	67	62
302	46.511	0.153	0.014	2.40	95	0.9	-	0.49	-0.02	73	207	67	62
303	46.670	0.159	0.013	2.40	95	0.9	-	0.48	-0.01	73	206	67	63
304	46.823	0.153	0.014	2.40	95	0.9	-	0.47	-0.01	73	206	67	63
305	46.981	0.158	0.014	2.41	95	0.9	-	0.45	-0.02	73	206	67	63
306	47.135	0.154	0.014	2.41	95	0.9	-	0.44	-0.01	73	206	67	63
307	47.291	0.156	0.014	2.40	95	0.9	-	0.42	-0.02	73	206	67	63
308	47.449	0.158	0.014	2.41	95	0.9	-	0.41	-0.01	73	205	67	63
309	47.603	0.154	0.014	2.40	95	0.9	-	0.39	-0.02	73	205	67	63
310	47.760	0.157	0.014	2.39	95	0.9	100	0.38	-0.01	73	205	67	63
311	47.912	0.152	0.013	2.40	95	0.9	-	0.36	-0.02	73	205	67	63
312	48.072	0.160	0.014	2.40	95	0.9	-	0.35	-0.01	73	205	67	63
313	48.226	0.154	0.014	2.41	95	0.9	-	0.34	-0.01	73	205	67	63
314	48.383	0.157	0.014	2.41	95	0.9	-	0.32	-0.02	73	205	67	63
315	48.537	0.154	0.014	2.40	95	0.9	-	0.30	-0.02	73	205	67	62
316	48.694	0.157	0.014	2.40	95	0.9	-	0.29	-0.01	73	205	67	63
317	48.852	0.158	0.013	2.41	95	0.9	-	0.27	-0.02	73	205	67	62
318	49.004	0.152	0.015	2.41	95	0.9	-	0.25	-0.02	73	205	67	62
319	49.163	0.159	0.013	2.41	95	0.9	-	0.24	-0.01	73	204	67	63

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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
320	49.316	0.153	0.014	2.40	95	0.9	100	0.23	-0.01	73	204	67	63
321	49.475	0.159	0.014	2.39	95	0.9	-	0.22	-0.01	73	204	67	63
322	49.629	0.154	0.014	2.41	95	0.9	-	0.21	-0.01	73	203	67	63
323	49.785	0.156	0.014	2.41	95	0.9	-	0.19	-0.02	73	203	67	63
324	49.942	0.157	0.014	2.40	95	0.9	-	0.18	-0.01	73	203	67	63
325	50.097	0.155	0.014	2.41	95	0.9	-	0.16	-0.02	73	203	67	63
326	50.255	0.158	0.014	2.42	95	0.9	-	0.15	-0.01	73	202	67	63
327	50.407	0.152	0.014	2.41	95	0.9	-	0.14	-0.01	73	202	67	63
328	50.566	0.159	0.014	2.41	95	0.9	-	0.11	-0.03	73	202	67	63
329	50.720	0.154	0.014	2.41	95	0.9	-	0.10	-0.01	73	202	67	63
330	50.879	0.159	0.014	2.42	95	0.9	100	0.09	-0.01	73	202	67	62
331	51.032	0.153	0.014	2.41	95	0.9	-	0.07	-0.02	73	202	67	62
332	51.188	0.156	0.014	2.40	95	0.9	-	0.05	-0.02	73	202	67	62
333	51.346	0.158	0.013	2.41	95	0.9	-	0.05	0.00	73	202	67	63
334	51.501	0.155	0.013	2.41	95	0.9	-	0.03	-0.02	73	201	67	63
335	51.658	0.157	0.014	2.41	95	0.9	-	0.02	-0.01	73	200	67	63
336	51.810	0.152	0.013	2.40	95	0.9	101	0.00	-0.02	73	200	67	63
Avg/Tot	51.810	0.154	0.014	2.36	89.7	0.9	100			75.0	228.3	67.4	63.3

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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		1.59	69	1.4		68	-0.064	9.21	1.327
1	0.142	0.142	2.26	69	1.6	-	70	-0.058	4.89	0.814
2	0.290	0.148	2.25	69	1.5	-	70	-0.068	2.37	0.451
3	0.433	0.143	2.26	69	1.9	-	70	-0.074	3.66	0.465
4	0.581	0.148	2.26	69	1.7	-	70	-0.081	8.95	0.563
5	0.726	0.145	2.26	69	1.4	-	70	-0.085	12.79	0.434
6	0.872	0.146	2.26	70	1.7	-	70	-0.068	15.42	0.622
7	1.017	0.145	2.26	70	1.4	-	70	-0.070	13.50	0.921
8	1.163	0.146	2.26	70	1.9	-	70	-0.077	7.38	0.983
9	1.308	0.145	2.26	70	1.6	-	71	-0.077	7.37	0.706
10	1.453	0.145	2.27	70	1.8	102	71	-0.070	13.67	0.598
11	1.601	0.148	2.27	70	1.6	-	71	-0.069	15.10	1.187
12	1.745	0.144	2.27	71	1.8	-	71	-0.066	11.40	1.223
13	1.894	0.149	2.28	71	1.5	-	71	-0.066	8.08	1.449
14	2.039	0.145	2.28	71	1.5	-	71	-0.065	7.30	1.589
15	2.187	0.148	2.27	71	1.5	-	71	-0.065	7.66	1.657
16	2.331	0.144	2.28	71	1.6	-	71	-0.064	8.22	1.662
17	2.480	0.149	2.28	72	1.6	-	71	-0.067	8.77	1.568
18	2.624	0.144	2.28	72	1.5	-	71	-0.071	9.14	1.458
19	2.772	0.148	2.28	72	1.7	-	71	-0.072	12.65	1.106
20	2.916	0.144	2.28	73	1.7	100	71	-0.070	15.82	1.611
21	3.066	0.150	2.28	73	1.8	-	71	-0.070	16.47	1.793
22	3.211	0.145	2.28	73	1.5	-	71	-0.067	15.66	1.308
23	3.360	0.149	2.28	74	1.8	-	71	-0.065	13.51	1.403
24	3.505	0.145	2.29	74	1.5	-	71	-0.065	12.15	1.318
25	3.655	0.150	2.30	74	1.5	-	71	-0.065	12.02	1.105
26	3.801	0.146	2.29	74	1.8	-	71	-0.064	12.06	0.985
27	3.950	0.149	2.30	75	1.5	-	71	-0.065	12.36	0.811
28	4.097	0.147	2.30	75	1.5	-	71	-0.066	13.03	0.672
29	4.245	0.148	2.30	75	1.7	-	71	-0.065	13.82	0.606
30	4.392	0.147	2.30	76	1.7	100	71	-0.065	14.48	0.626
31	4.541	0.149	2.29	76	1.8	-	71	-0.067	14.84	0.684

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.688	0.147	2.31	76	1.6	-	71	-0.067	15.37	0.715
33	4.837	0.149	2.31	77	1.5	-	71	-0.066	15.93	0.676
34	4.984	0.147	2.31	77	1.6	-	71	-0.065	16.18	0.722
35	5.133	0.149	2.31	77	1.6	-	71	-0.068	16.11	0.882
36	5.281	0.148	2.31	78	1.5	-	71	-0.065	15.92	1.139
37	5.430	0.149	2.31	78	1.7	-	71	-0.065	15.85	1.336
38	5.578	0.148	2.31	78	1.8	-	71	-0.069	15.81	1.347
39	5.728	0.150	2.31	79	1.5	-	71	-0.064	15.67	1.381
40	5.876	0.148	2.32	79	1.7	100	71	-0.066	15.62	1.402
41	6.025	0.149	2.32	79	1.7	-	71	-0.065	15.59	1.496
42	6.174	0.149	2.32	80	1.5	-	71	-0.067	15.59	1.605
43	6.324	0.150	2.33	80	1.7	-	71	-0.068	15.78	1.580
44	6.472	0.148	2.32	80	1.8	-	71	-0.068	15.80	1.603
45	6.623	0.151	2.33	81	1.7	-	71	-0.065	15.75	1.692
46	6.771	0.148	2.32	81	1.6	-	71	-0.065	15.66	1.794
47	6.922	0.151	2.33	81	1.8	-	71	-0.068	15.54	1.727
48	7.071	0.149	2.33	81	1.6	-	71	-0.067	15.13	1.766
49	7.222	0.151	2.33	82	1.7	-	71	-0.067	14.79	1.811
50	7.370	0.148	2.33	82	1.7	100	71	-0.065	14.73	1.729
51	7.521	0.151	2.34	82	1.5	-	71	-0.068	14.75	1.676
52	7.669	0.148	2.33	83	1.7	-	71	-0.068	14.87	1.548
53	7.820	0.151	2.33	83	1.7	-	71	-0.066	14.63	1.515
54	7.969	0.149	2.34	83	1.5	-	71	-0.066	14.48	1.468
55	8.121	0.152	2.34	83	1.6	-	71	-0.065	14.50	1.498
56	8.269	0.148	2.33	84	1.7	-	71	-0.062	14.55	1.444
57	8.421	0.152	2.33	84	1.7	-	71	-0.064	14.32	1.385
58	8.570	0.149	2.34	84	1.8	-	71	-0.066	14.06	1.356
59	8.723	0.153	2.34	84	1.8	-	71	-0.063	13.98	1.337
60	8.871	0.148	2.34	85	1.8	100	71	-0.063	14.14	1.273
61	9.025	0.154	2.34	85	1.8	-	71	-0.065	14.33	1.288
62	9.173	0.148	2.34	85	1.5	-	71	-0.065	14.67	1.230
63	9.326	0.153	2.35	85	1.5	-	71	-0.064	15.24	1.169

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.475	0.149	2.35	86	1.8	-	71	-0.061	15.49	1.190
65	9.627	0.152	2.35	86	1.8	-	71	-0.064	15.61	1.315
66	9.775	0.148	2.34	86	1.5	-	71	-0.066	15.69	1.423
67	9.928	0.153	2.35	86	1.6	-	71	-0.064	15.93	1.549
68	10.078	0.150	2.36	86	1.8	-	71	-0.063	16.08	1.663
69	10.229	0.151	2.34	87	1.5	-	71	-0.069	16.07	1.701
70	10.380	0.151	2.35	87	1.5	100	72	-0.066	15.59	1.210
71	10.532	0.152	2.35	87	1.5	-	72	-0.068	14.94	0.787
72	10.684	0.152	2.35	87	1.5	-	72	-0.069	14.81	0.740
73	10.834	0.150	2.35	87	1.7	-	72	-0.070	15.10	0.774
74	10.987	0.153	2.35	88	1.7	-	72	-0.069	15.17	0.775
75	11.137	0.150	2.35	88	1.7	-	72	-0.069	15.02	0.755
76	11.289	0.152	2.35	88	1.6	-	72	-0.069	14.89	0.734
77	11.438	0.149	2.36	88	1.8	-	72	-0.067	14.72	0.697
78	11.592	0.154	2.35	88	1.6	-	72	-0.069	14.52	0.643
79	11.741	0.149	2.35	89	1.6	-	72	-0.068	14.27	0.575
80	11.895	0.154	2.35	89	1.8	100	72	-0.068	13.91	0.538
81	12.045	0.150	2.35	89	1.7	-	72	-0.068	13.32	0.552
82	12.199	0.154	2.36	89	1.6	-	72	-0.065	12.75	0.556
83	12.349	0.150	2.36	89	1.8	-	72	-0.065	12.17	0.590
84	12.502	0.153	2.36	89	1.5	-	72	-0.066	11.65	0.671
85	12.651	0.149	2.36	89	1.7	-	72	-0.066	11.31	0.763
86	12.805	0.154	2.36	90	1.7	-	72	-0.065	11.05	0.845
87	12.955	0.150	2.35	90	1.5	-	72	-0.065	10.93	0.900
88	13.109	0.154	2.36	90	1.5	-	72	-0.064	10.84	0.936
89	13.261	0.152	2.36	90	1.7	-	72	-0.063	10.72	0.958
90	13.412	0.151	2.35	90	1.5	100	72	-0.063	10.56	1.006
91	13.566	0.154	2.36	90	1.7	-	72	-0.062	10.52	1.016
92	13.716	0.150	2.36	90	1.5	-	72	-0.064	10.42	1.040
93	13.870	0.154	2.37	90	1.8	-	72	-0.062	10.35	1.061
94	14.019	0.149	2.36	90	1.8	-	72	-0.060	10.29	1.072
95	14.174	0.155	2.37	91	1.6	-	71	-0.059	10.26	1.061

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.324	0.150	2.36	91	1.8	-	71	-0.062	10.17	1.057
97	14.479	0.155	2.36	91	1.5	-	71	-0.060	10.10	1.051
98	14.629	0.150	2.36	91	1.6	-	71	-0.063	10.11	1.055
99	14.783	0.154	2.37	91	1.5	-	71	-0.058	10.13	1.040
100	14.933	0.150	2.37	91	1.8	100	71	-0.061	10.17	1.028
101	15.087	0.154	2.36	91	1.8	-	71	-0.061	10.16	1.022
102	15.238	0.151	2.37	91	1.8	-	71	-0.060	10.24	1.009
103	15.392	0.154	2.36	91	1.5	-	71	-0.056	10.31	1.005
104	15.545	0.153	2.36	92	1.7	-	71	-0.057	10.35	0.982
105	15.697	0.152	2.37	92	1.5	-	71	-0.058	10.76	1.125
106	15.850	0.153	2.37	92	1.8	-	71	-0.053	11.22	1.305
107	16.001	0.151	2.36	92	1.5	-	71	-0.052	11.24	1.326
108	16.155	0.154	2.36	92	1.8	-	71	-0.053	11.27	1.349
109	16.306	0.151	2.36	92	1.5	-	71	-0.052	11.29	1.324
110	16.461	0.155	2.37	92	1.6	100	71	-0.053	11.34	1.290
111	16.611	0.150	2.36	92	1.7	-	71	-0.052	11.43	1.283
112	16.766	0.155	2.37	92	1.5	-	71	-0.051	11.51	1.266
113	16.916	0.150	2.37	92	1.6	-	71	-0.053	11.65	1.237
114	17.070	0.154	2.36	92	1.7	-	71	-0.051	11.75	1.235
115	17.222	0.152	2.37	92	1.7	-	71	-0.050	11.76	1.224
116	17.375	0.153	2.36	93	1.7	-	71	-0.051	11.84	1.215
117	17.529	0.154	2.37	93	1.8	-	71	-0.050	12.04	1.199
118	17.680	0.151	2.37	93	1.5	-	71	-0.050	12.11	1.200
119	17.834	0.154	2.37	93	1.5	-	71	-0.050	12.13	1.190
120	17.985	0.151	2.36	93	1.6	100	71	-0.051	12.13	1.175
121	18.140	0.155	2.37	93	1.6	-	71	-0.047	12.22	1.162
122	18.291	0.151	2.37	93	1.7	-	71	-0.053	12.24	1.159
123	18.446	0.155	2.37	93	1.6	-	71	-0.049	12.28	1.142
124	18.597	0.151	2.37	93	1.5	-	71	-0.049	12.25	1.140
125	18.751	0.154	2.37	93	1.6	-	70	-0.049	12.18	1.162
126	18.902	0.151	2.37	93	1.6	-	70	-0.049	12.14	1.162
127	19.056	0.154	2.37	93	1.8	-	70	-0.051	12.00	1.124

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.209	0.153	2.37	93	1.7	-	70	-0.050	11.93	1.093
129	19.362	0.153	2.37	93	1.8	-	70	-0.048	11.77	1.078
130	19.516	0.154	2.37	93	1.7	100	70	-0.049	11.71	1.057
131	19.667	0.151	2.37	93	1.6	-	70	-0.048	11.54	1.073
132	19.821	0.154	2.37	93	1.7	-	70	-0.048	11.43	1.083
133	19.973	0.152	2.37	94	1.7	-	70	-0.048	11.20	1.081
134	20.128	0.155	2.37	94	1.6	-	70	-0.048	11.01	1.087
135	20.279	0.151	2.37	94	1.8	-	70	-0.047	10.68	1.146
136	20.434	0.155	2.38	94	1.5	-	70	-0.047	10.33	1.197
137	20.585	0.151	2.37	94	1.5	-	70	-0.047	10.18	1.179
138	20.738	0.153	2.36	94	1.5	-	70	-0.042	10.17	1.157
139	20.892	0.154	2.37	94	1.7	-	70	-0.044	10.23	1.172
140	21.045	0.153	2.37	94	1.7	100	70	-0.043	10.08	1.224
141	21.199	0.154	2.37	94	1.5	-	70	-0.045	9.90	1.272
142	21.350	0.151	2.37	94	1.6	-	70	-0.043	9.92	1.296
143	21.505	0.155	2.37	94	1.8	-	70	-0.045	10.02	1.343
144	21.655	0.150	2.37	94	1.5	-	70	-0.044	10.07	1.313
145	21.811	0.156	2.37	94	1.5	-	70	-0.044	10.10	1.272
146	21.962	0.151	2.37	94	1.6	-	70	-0.043	10.14	1.228
147	22.118	0.156	2.37	94	1.8	-	70	-0.043	10.22	1.216
148	22.268	0.150	2.37	94	1.5	-	70	-0.041	10.21	1.220
149	22.423	0.155	2.37	94	1.5	-	70	-0.042	10.17	1.205
150	22.575	0.152	2.38	94	1.5	100	70	-0.042	10.15	1.175
151	22.729	0.154	2.37	94	1.7	-	70	-0.042	10.17	1.198
152	22.883	0.154	2.37	94	1.5	-	70	-0.042	10.15	1.216
153	23.035	0.152	2.38	94	1.5	-	70	-0.042	10.14	1.234
154	23.190	0.155	2.37	94	1.8	-	70	-0.041	10.10	1.240
155	23.340	0.150	2.37	94	1.7	-	70	-0.044	10.04	1.273
156	23.497	0.157	2.37	94	1.6	-	70	-0.042	9.94	1.285
157	23.648	0.151	2.37	94	1.5	-	70	-0.042	9.93	1.287
158	23.803	0.155	2.38	94	1.5	-	70	-0.041	9.93	1.282
159	23.954	0.151	2.38	94	1.8	-	70	-0.040	9.86	1.255

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	24.108	0.154	2.37	94	1.8	100	70	-0.040	9.77	1.219
161	24.262	0.154	2.38	94	1.8	-	70	-0.041	9.77	1.243
162	24.415	0.153	2.38	94	1.7	-	70	-0.041	9.69	1.254
163	24.570	0.155	2.38	94	1.6	-	70	-0.039	9.56	1.249
164	24.721	0.151	2.38	94	1.8	-	70	-0.039	9.41	1.298
165	24.876	0.155	2.37	95	1.5	-	70	-0.039	9.36	1.379
166	25.027	0.151	2.37	95	1.6	-	70	-0.039	9.39	1.398
167	25.183	0.156	2.38	95	1.7	-	70	-0.038	9.50	1.249
168	25.334	0.151	2.37	95	1.6	-	69	-0.041	9.51	1.177
169	25.489	0.155	2.38	95	1.7	-	70	-0.039	9.50	1.170
170	25.640	0.151	2.38	95	1.5	100	69	-0.041	9.57	1.182
171	25.794	0.154	2.37	95	1.5	-	69	-0.039	9.66	1.165
172	25.948	0.154	2.37	95	1.5	-	69	-0.039	9.70	1.136
173	26.102	0.154	2.38	95	1.6	-	69	-0.038	9.73	1.116
174	26.256	0.154	2.38	95	1.7	-	69	-0.039	9.76	1.120
175	26.407	0.151	2.38	95	1.7	-	69	-0.036	9.80	1.119
176	26.562	0.155	2.38	95	1.8	-	69	-0.037	9.83	1.114
177	26.714	0.152	2.38	95	1.8	-	69	-0.039	9.84	1.108
178	26.870	0.156	2.38	95	1.5	-	69	-0.037	9.84	1.102
179	27.021	0.151	2.38	95	1.8	-	69	-0.039	9.93	1.099
180	27.176	0.155	2.38	95	1.7	100	69	-0.039	9.94	1.093
181	27.328	0.152	2.38	95	1.7	-	69	-0.039	9.95	1.113
182	27.482	0.154	2.38	95	1.7	-	69	-0.036	9.98	1.127
183	27.636	0.154	2.38	95	1.8	-	69	-0.037	9.96	1.115
184	27.789	0.153	2.37	95	1.5	-	69	-0.038	10.01	1.118
185	27.943	0.154	2.38	95	1.5	-	69	-0.039	9.96	1.109
186	28.095	0.152	2.38	95	1.5	-	69	-0.036	9.91	1.107
187	28.249	0.154	2.37	95	1.5	-	69	-0.037	9.89	1.116
188	28.401	0.152	2.37	95	1.8	-	69	-0.037	9.90	1.122
189	28.557	0.156	2.37	95	1.7	-	69	-0.036	9.91	1.127
190	28.708	0.151	2.38	95	1.6	99	69	-0.038	9.96	1.138
191	28.863	0.155	2.38	95	1.6	-	69	-0.038	9.99	1.147

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	29.014	0.151	2.37	95	1.6	-	69	-0.036	9.95	1.138
193	29.170	0.156	2.37	95	1.6	-	69	-0.036	9.83	1.098
194	29.323	0.153	2.38	95	1.5	-	69	-0.037	9.83	1.082
195	29.477	0.154	2.38	95	1.5	-	69	-0.038	9.86	1.082
196	29.630	0.153	2.37	95	1.6	-	69	-0.036	9.88	1.091
197	29.782	0.152	2.38	95	1.5	-	69	-0.035	9.87	1.101
198	29.937	0.155	2.38	95	1.6	-	69	-0.037	9.87	1.108
199	30.089	0.152	2.38	95	1.7	-	69	-0.034	9.88	1.123
200	30.245	0.156	2.38	95	1.7	100	69	-0.037	9.85	1.139
201	30.395	0.150	2.38	95	1.8	-	69	-0.036	9.92	1.149
202	30.550	0.155	2.38	95	1.5	-	69	-0.033	9.89	1.159
203	30.702	0.152	2.37	95	1.7	-	69	-0.036	9.98	1.159
204	30.857	0.155	2.37	95	1.7	-	69	-0.032	9.99	1.170
205	31.011	0.154	2.38	95	1.5	-	69	-0.036	10.01	1.166
206	31.163	0.152	2.38	95	1.5	-	69	-0.037	10.02	1.166
207	31.318	0.155	2.38	95	1.8	-	69	-0.037	10.02	1.168
208	31.469	0.151	2.37	95	1.7	-	69	-0.037	10.01	1.176
209	31.625	0.156	2.37	95	1.7	-	69	-0.035	9.94	1.173
210	31.776	0.151	2.38	95	1.5	99	69	-0.035	9.65	1.173
211	31.932	0.156	2.38	95	1.8	-	69	-0.035	9.51	1.165
212	32.083	0.151	2.38	95	1.5	-	69	-0.039	9.35	1.172
213	32.238	0.155	2.37	95	1.7	-	69	-0.036	9.32	1.175
214	32.391	0.153	2.38	95	1.5	-	69	-0.035	9.31	1.180
215	32.545	0.154	2.38	95	1.7	-	69	-0.036	9.35	1.172
216	32.699	0.154	2.38	95	1.7	-	69	-0.035	9.33	1.155
217	32.850	0.151	2.38	95	1.8	-	69	-0.035	9.22	1.112
218	33.006	0.156	2.38	95	1.8	-	69	-0.036	9.21	1.086
219	33.157	0.151	2.38	95	1.5	-	69	-0.036	9.25	1.090
220	33.313	0.156	2.38	95	1.5	100	69	-0.033	9.24	1.092
221	33.465	0.152	2.38	95	1.5	-	69	-0.035	9.31	1.097
222	33.620	0.155	2.38	95	1.7	-	69	-0.037	9.33	1.091
223	33.771	0.151	2.38	95	1.6	-	69	-0.035	9.24	1.087

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	33.925	0.154	2.38	95	1.7	-	69	-0.034	9.28	1.098
225	34.079	0.154	2.38	95	1.7	-	69	-0.034	9.33	1.107
226	34.233	0.154	2.38	95	1.7	-	69	-0.035	9.33	1.116
227	34.387	0.154	2.38	95	1.7	-	69	-0.034	9.18	1.111
228	34.539	0.152	2.38	95	1.8	-	69	-0.035	9.16	1.127
229	34.693	0.154	2.37	95	1.5	-	69	-0.032	9.14	1.142
230	34.845	0.152	2.37	95	1.6	99	69	-0.035	9.20	1.161
231	35.001	0.156	2.37	95	1.6	-	69	-0.033	9.25	1.170
232	35.153	0.152	2.38	95	1.6	-	69	-0.034	9.22	1.188
233	35.307	0.154	2.38	95	1.6	-	69	-0.032	9.16	1.199
234	35.459	0.152	2.37	95	1.5	-	69	-0.035	9.16	1.204
235	35.614	0.155	2.37	95	1.5	-	69	-0.034	9.17	1.219
236	35.768	0.154	2.38	95	1.7	-	69	-0.032	9.17	1.224
237	35.921	0.153	2.38	95	1.7	-	69	-0.034	9.12	1.254
238	36.075	0.154	2.38	95	1.6	-	69	-0.031	9.13	1.275
239	36.226	0.151	2.38	95	1.8	-	69	-0.033	9.10	1.278
240	36.383	0.157	2.38	95	1.6	100	69	-0.034	9.11	1.292
241	36.534	0.151	2.38	95	1.5	-	68	-0.035	9.13	1.305
242	36.690	0.156	2.38	95	1.7	-	69	-0.034	9.12	1.317
243	36.840	0.150	2.38	95	1.6	-	68	-0.031	9.14	1.319
244	36.995	0.155	2.37	95	1.8	-	68	-0.034	9.16	1.333
245	37.147	0.152	2.38	95	1.7	-	68	-0.032	9.13	1.336
246	37.302	0.155	2.37	95	1.5	-	68	-0.034	9.11	1.341
247	37.456	0.154	2.38	95	1.6	-	68	-0.033	9.12	1.360
248	37.608	0.152	2.38	95	1.5	-	68	-0.039	9.15	1.365
249	37.763	0.155	2.38	95	1.5	-	68	-0.039	9.15	1.361
250	37.914	0.151	2.37	95	1.5	99	69	-0.039	9.32	1.308
251	38.071	0.157	2.38	95	1.5	-	69	-0.037	9.40	1.258
252	38.222	0.151	2.37	95	1.5	-	69	-0.040	9.38	1.248
253	38.377	0.155	2.38	95	1.6	-	69	-0.040	9.41	1.234
254	38.528	0.151	2.38	95	1.7	-	68	-0.039	9.41	1.238
255	38.683	0.155	2.37	95	1.5	-	68	-0.044	9.40	1.235

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	38.836	0.153	2.37	95	1.5	-	68	-0.039	9.43	1.224
257	38.990	0.154	2.38	95	1.6	-	69	-0.040	9.56	1.089
258	39.145	0.155	2.38	95	1.8	-	69	-0.040	9.48	1.071
259	39.296	0.151	2.39	95	1.5	-	69	-0.040	9.45	1.082
260	39.451	0.155	2.37	95	1.8	100	69	-0.040	9.36	1.100
261	39.603	0.152	2.37	95	1.8	-	69	-0.042	9.34	1.111
262	39.759	0.156	2.38	95	1.5	-	69	-0.041	9.31	1.120
263	39.911	0.152	2.38	95	1.6	-	69	-0.042	9.19	1.127
264	40.065	0.154	2.38	95	1.6	-	69	-0.042	9.15	1.139
265	40.217	0.152	2.38	95	1.5	-	69	-0.040	9.12	1.158
266	40.372	0.155	2.38	95	1.7	-	69	-0.041	9.07	1.158
267	40.526	0.154	2.38	95	1.7	-	69	-0.043	9.04	1.165
268	40.679	0.153	2.39	95	1.5	-	69	-0.040	8.96	1.176
269	40.833	0.154	2.38	95	1.6	-	69	-0.042	8.91	1.193
270	40.984	0.151	2.38	95	1.5	99	69	-0.045	8.84	1.208
271	41.140	0.156	2.38	95	1.8	-	69	-0.042	8.76	1.242
272	41.292	0.152	2.38	95	1.5	-	69	-0.043	8.71	1.262
273	41.448	0.156	2.38	95	1.5	-	69	-0.043	8.67	1.272
274	41.598	0.150	2.38	95	1.5	-	69	-0.044	8.64	1.270
275	41.753	0.155	2.38	95	1.6	-	69	-0.043	8.58	1.287
276	41.905	0.152	2.37	95	1.8	-	69	-0.042	8.60	1.291
277	42.060	0.155	2.37	95	1.7	-	69	-0.044	8.62	1.293
278	42.214	0.154	2.37	95	1.6	-	69	-0.041	8.60	1.296
279	42.366	0.152	2.39	95	1.5	-	69	-0.043	8.63	1.294
280	42.521	0.155	2.39	95	1.5	100	69	-0.043	8.63	1.300
281	42.672	0.151	2.37	95	1.8	-	69	-0.044	8.59	1.300
282	42.828	0.156	2.37	95	1.5	-	69	-0.045	8.61	1.319
283	42.979	0.151	2.37	95	1.5	-	69	-0.043	8.56	1.315
284	43.135	0.156	2.38	95	1.5	-	69	-0.044	8.59	1.314
285	43.286	0.151	2.38	95	1.5	-	69	-0.045	8.58	1.328
286	43.441	0.155	2.37	95	1.5	-	69	-0.043	8.60	1.334
287	43.594	0.153	2.38	95	1.6	-	69	-0.042	8.59	1.339

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
288	43.748	0.154	2.38	95	1.6	-	69	-0.042	8.59	1.351
289	43.903	0.155	2.38	95	1.5	-	69	-0.044	8.61	1.364
290	44.053	0.150	2.38	95	1.8	99	69	-0.044	8.63	1.388
291	44.209	0.156	2.38	95	1.5	-	69	-0.043	8.61	1.394
292	44.360	0.151	2.38	95	1.5	-	69	-0.044	8.57	1.386
293	44.517	0.157	2.38	95	1.6	-	69	-0.044	8.58	1.392
294	44.668	0.151	2.38	95	1.5	-	69	-0.042	8.55	1.394
295	44.823	0.155	2.38	95	1.5	-	69	-0.042	8.50	1.405
296	44.974	0.151	2.37	95	1.6	-	69	-0.046	8.47	1.418
297	45.129	0.155	2.38	95	1.7	-	69	-0.044	8.46	1.428
298	45.283	0.154	2.38	95	1.8	-	69	-0.047	8.45	1.431
299	45.436	0.153	2.38	95	1.5	-	69	-0.047	8.40	1.444
300	45.590	0.154	2.38	95	1.8	100	69	-0.046	8.38	1.460
301	45.742	0.152	2.38	95	1.5	-	69	-0.043	8.34	1.468
302	45.897	0.155	2.38	95	1.5	-	69	-0.044	8.28	1.480
303	46.049	0.152	2.38	95	1.5	-	69	-0.045	8.25	1.495
304	46.205	0.156	2.37	95	1.5	-	69	-0.045	8.23	1.513
305	46.356	0.151	2.38	95	1.8	-	69	-0.043	8.05	1.503
306	46.511	0.155	2.39	95	1.5	-	69	-0.042	7.86	1.497
307	46.662	0.151	2.37	95	1.7	-	69	-0.045	7.80	1.507
308	46.817	0.155	2.37	95	1.7	-	69	-0.045	7.76	1.515
309	46.971	0.154	2.38	95	1.8	-	69	-0.043	7.73	1.543
310	47.124	0.153	2.38	95	1.8	100	69	-0.046	7.73	1.544
311	47.278	0.154	2.38	95	1.5	-	69	-0.047	7.72	1.552
312	47.430	0.152	2.37	95	1.8	-	69	-0.046	7.66	1.556
313	47.586	0.156	2.38	95	1.8	-	69	-0.044	7.68	1.571
314	47.737	0.151	2.38	95	1.8	-	69	-0.042	7.64	1.586
315	47.894	0.157	2.38	95	1.8	-	69	-0.043	7.65	1.569
316	48.044	0.150	2.38	95	1.6	-	69	-0.043	7.61	1.578
317	48.199	0.155	2.38	95	1.7	-	69	-0.044	7.60	1.588
318	48.352	0.153	2.38	95	1.7	-	69	-0.044	7.51	1.598
319	48.506	0.154	2.38	95	1.7	-	69	-0.042	7.44	1.566

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
320	48.661	0.155	2.39	95	1.5	100	69	-0.042	7.38	1.576
321	48.812	0.151	2.38	95	1.7	-	69	-0.046	7.36	1.588
322	48.967	0.155	2.38	95	1.8	-	69	-0.043	7.30	1.600
323	49.118	0.151	2.38	95	1.6	-	69	-0.045	7.39	1.552
324	49.275	0.157	2.38	95	1.8	-	69	-0.047	7.41	1.508
325	49.426	0.151	2.38	95	1.5	-	69	-0.043	7.47	1.494
326	49.581	0.155	2.38	95	1.6	-	69	-0.044	7.51	1.499
327	49.733	0.152	2.38	95	1.8	-	69	-0.044	7.62	1.510
328	49.887	0.154	2.38	95	1.8	-	69	-0.044	7.65	1.536
329	50.041	0.154	2.38	95	1.5	-	69	-0.044	7.63	1.546
330	50.195	0.154	2.37	95	1.5	100	69	-0.044	7.59	1.569
331	50.349	0.154	2.38	95	1.5	-	69	-0.046	7.59	1.604
332	50.501	0.152	2.38	95	1.6	-	69	-0.045	7.21	1.488
333	50.656	0.155	2.38	95	1.7	-	69	-0.042	7.01	1.449
334	50.808	0.152	2.38	95	1.8	-	69	-0.042	6.90	1.473
335	50.964	0.156	2.38	95	1.8	-	69	-0.043	6.82	1.507
336	51.115	0.151	2.39	95	1.5	101	69	-0.043	6.74	1.531
Avg/Tot	51.115	0.152	2.36	90.4	1.6	100	69.8	-0.049	10.52	1.217

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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	0.001		0.66	69	1.6		67
1	0.152	0.151	1.05	68	1.7	-	67
2	0.303	0.151	1.05	68	1.6	-	67
3	0.455	0.152	1.06	69	1.7	-	67
4	0.607	0.152	1.06	69	1.6	-	67
5	0.759	0.152	1.07	69	1.6	-	67
6	0.911	0.152	1.08	69	1.6	-	67
7	1.063	0.152	1.08	69	1.6	-	67
8	1.216	0.153	1.09	70	1.6	-	67
9	1.369	0.153	1.09	70	1.8	-	67
10	1.522	0.153	1.09	70	1.8	100	67
11	1.676	0.154	1.10	70	1.7	-	67
12	1.830	0.154	1.09	70	1.6	-	67
13	1.984	0.154	1.09	71	1.8	-	67
14	2.140	0.156	1.09	71	1.6	-	67
15	2.295	0.155	1.10	71	1.6	-	68
16	2.451	0.156	1.11	71	1.6	-	68
17	2.606	0.155	1.12	71	1.8	-	68
18	2.762	0.156	1.12	72	1.6	-	68
19	2.918	0.156	1.12	72	1.7	-	68
20	3.073	0.155	1.11	72	1.6	100	68
21	3.228	0.155	1.11	72	1.6	-	68
22	3.384	0.156	1.10	72	1.6	-	68
23	3.540	0.156	1.11	73	1.7	-	68
24	3.697	0.157	1.12	73	1.8	-	68
25	3.854	0.157	1.13	73	1.8	-	68
26	4.010	0.156	1.13	74	1.6	-	68
27	4.167	0.157	1.12	75	1.8	-	68
28	4.323	0.156	1.12	75	1.6	-	68
29	4.480	0.157	1.11	75	1.6	-	68
30	4.638	0.158	1.13	75	1.8	100	68
31	4.796	0.158	1.14	76	1.6	-	68

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

	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	4.954	0.158	1.14	76	1.6	-	68
33	5.111	0.157	1.13	77	1.7	-	68
34	5.269	0.158	1.13	77	1.6	-	68
35	5.428	0.159	1.14	77	1.8	-	68
36	5.587	0.159	1.15	78	1.6	-	68
37	5.745	0.158	1.15	78	1.8	-	68
38	5.903	0.158	1.13	78	1.7	-	68
39	6.063	0.160	1.15	78	1.8	-	68
40	6.223	0.160	1.16	79	1.7	100	68
41	6.382	0.159	1.15	79	1.7	-	68
42	6.541	0.159	1.14	79	1.7	-	68
43	6.702	0.161	1.16	79	1.7	-	68
44	6.862	0.160	1.16	80	1.7	-	68
45	7.021	0.159	1.15	80	1.8	-	68
46	7.182	0.161	1.16	80	1.6	-	68
47	7.343	0.161	1.17	80	1.8	-	68
48	7.503	0.160	1.16	81	1.8	-	68
49	7.664	0.161	1.16	81	1.8	-	68
50	7.826	0.162	1.17	81	1.8	101	68
51	7.986	0.160	1.17	82	1.7	-	68
52	8.147	0.161	1.17	81	1.6	-	68
53	8.309	0.162	1.18	82	1.8	-	68
54	8.470	0.161	1.17	82	1.7	-	68
55	8.632	0.162	1.17	82	1.8	-	68
56	8.794	0.162	1.18	83	1.6	-	68
57	8.955	0.161	1.17	82	1.8	-	68
58	9.118	0.163	1.17	82	1.7	-	68
59	9.281	0.163	1.18	82	1.7	-	68
60	9.442	0.161	1.17	82	1.8	102	69
Avg/Tot	9.441	0.157	1.12	75.4	1.7	100	67.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	414	401	492	385	424	423.4	452.4
1	413	400	487	380	426	421.2	388.0
2	412	399	477	375	426	417.8	453.8
3	410	396	467	371	427	414.0	491.8
4	406	393	457	372	427	411.1	616.1
5	403	388	448	384	427	410.1	703.5
6	400	384	439	403	429	411.2	588.5
7	398	381	431	420	429	411.6	559.3
8	395	377	423	432	429	411.0	597.9
9	392	373	416	442	428	410.3	615.2
10	390	369	409	455	428	410.1	588.9
11	387	366	403	466	428	410.0	569.2
12	385	362	397	474	428	409.3	558.9
13	382	359	391	477	427	407.4	562.9
14	380	356	386	477	426	404.9	568.0
15	377	352	380	476	426	402.1	569.9
16	374	349	376	473	425	399.1	565.3
17	371	345	371	469	423	395.9	566.0
18	368	342	367	468	422	393.3	584.2
19	365	339	363	469	421	391.3	612.6
20	362	336	360	475	419	390.5	636.6
21	360	335	359	483	418	390.8	617.2
22	359	334	359	491	417	391.7	597.1
23	359	334	359	496	415	392.5	595.8
24	358	334	359	499	414	392.8	586.7
25	358	334	359	501	413	392.8	581.0
26	357	334	358	502	411	392.3	580.3
27	357	334	357	502	410	391.8	578.3
28	356	333	355	503	408	391.1	575.9
29	356	332	353	505	406	390.5	578.4
30	356	331	352	508	405	390.2	567.8
31	357	330	351	510	403	390.1	567.0
32	357	328	350	515	402	390.3	573.1
33	358	328	349	519	400	390.8	573.6
34	359	327	350	525	398	391.7	580.5
35	360	328	352	530	397	393.1	582.5
36	361	328	354	535	395	394.7	587.7
37	362	329	358	540	393	396.6	590.3
38	364	331	362	545	392	398.5	594.9
39	365	332	366	548	390	400.3	598.5
40	367	333	370	551	389	401.9	603.3
41	369	334	374	553	387	403.3	607.3
42	371	336	378	555	386	405.0	614.1
43	373	337	382	556	384	406.1	615.0
44	375	338	385	557	383	407.5	616.5
45	377	339	389	557	381	408.7	616.3
46	380	340	393	557	380	410.0	612.8
47	383	342	396	558	378	411.4	611.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	385	343	400	558	377	412.5	608.5
49	387	345	403	557	375	413.4	607.6
50	389	347	405	556	374	414.4	609.9
51	391	349	408	555	373	414.9	608.3
52	392	351	409	554	372	415.6	603.1
53	394	353	411	553	370	416.0	608.7
54	395	355	413	551	369	416.4	604.0
55	395	356	415	550	368	416.8	599.7
56	396	358	416	549	367	417.1	605.9
57	397	360	418	546	365	417.1	596.6
58	397	361	419	544	364	417.0	595.3
59	398	363	421	542	363	417.2	593.2
60	398	364	422	540	362	417.1	589.0
61	399	366	424	539	360	417.5	591.0
62	399	367	425	538	359	417.5	587.0
63	400	368	426	539	358	418.0	588.0
64	400	369	427	539	357	418.6	591.3
65	401	371	429	541	356	419.4	592.5
66	402	372	430	543	355	420.3	600.3
67	403	373	431	545	353	421.2	605.1
68	404	374	433	548	352	422.4	608.8
69	406	375	435	551	351	423.6	623.9
70	407	376	437	554	350	424.9	627.6
71	409	377	440	558	349	426.4	625.4
72	411	377	443	560	348	427.7	629.4
73	413	378	446	561	346	428.9	632.3
74	415	379	449	563	345	430.3	627.7
75	418	381	452	565	344	431.7	628.3
76	420	382	454	567	342	433.1	631.6
77	422	384	457	568	341	434.5	628.4
78	424	385	460	569	340	435.6	623.1
79	426	386	462	570	339	436.6	618.8
80	427	387	465	570	338	437.3	613.9
81	428	388	468	568	337	437.6	612.3
82	429	389	470	566	336	438.0	605.3
83	430	389	472	562	335	437.6	600.6
84	430	390	473	559	334	437.2	597.9
85	430	390	475	554	333	436.3	592.4
86	430	390	476	549	332	435.4	585.3
87	430	390	477	543	331	434.3	584.2
88	429	390	478	538	330	433.2	584.3
89	429	390	479	533	329	431.9	576.4
90	428	389	479	526	329	430.2	579.0
91	427	389	479	521	328	428.7	575.7
92	426	389	479	514	328	427.0	575.1
93	425	389	478	509	327	425.6	567.7
94	424	388	478	503	327	423.8	566.1
95	423	388	477	497	326	422.2	557.4

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	422	387	476	493	326	420.7	554.5
97	421	387	476	487	325	419.2	555.4
98	419	387	475	482	325	417.7	547.8
99	418	387	474	478	325	416.3	548.6
100	416	387	474	474	324	414.9	537.2
101	415	386	473	470	324	413.6	532.7
102	414	386	473	466	324	412.5	532.0
103	413	386	472	462	324	411.4	531.8
104	412	386	472	458	324	410.3	521.6
105	411	386	471	455	324	409.5	514.4
106	411	386	471	452	324	408.7	520.1
107	410	386	470	449	325	408.0	515.5
108	409	386	470	446	325	407.3	510.6
109	408	387	470	444	325	406.7	506.1
110	408	387	469	442	326	406.2	501.6
111	407	387	469	440	326	405.7	501.7
112	406	388	468	438	327	405.2	498.4
113	405	388	468	436	327	404.7	491.4
114	404	388	467	435	328	404.4	492.1
115	403	389	467	433	328	404.0	484.3
116	402	389	466	432	329	403.7	483.9
117	402	390	467	431	329	403.6	486.6
118	401	391	467	430	330	403.5	483.7
119	400	391	467	429	330	403.5	482.3
120	400	392	467	428	331	403.6	479.5
121	399	392	468	428	331	403.6	479.9
122	399	393	469	427	332	403.8	479.0
123	399	394	469	426	332	404.0	477.1
124	399	394	470	426	332	404.4	479.7
125	399	395	471	426	333	404.6	478.5
126	399	396	472	425	333	405.0	479.3
127	399	397	473	425	334	405.3	481.1
128	399	397	473	425	334	405.6	473.4
129	399	398	474	424	334	405.7	472.6
130	399	398	475	424	335	405.9	474.0
131	399	398	475	423	335	406.0	478.1
132	399	399	475	422	336	405.9	460.2
133	399	399	475	421	336	405.9	466.5
134	398	399	475	420	336	405.4	468.5
135	398	398	474	418	336	404.9	463.7
136	398	397	472	417	337	404.0	471.4
137	397	396	470	415	337	402.9	465.9
138	396	395	468	413	337	401.8	455.9
139	395	394	465	411	338	400.5	455.2
140	394	392	462	409	338	399.1	451.3
141	393	391	459	407	338	397.6	452.9
142	392	389	457	405	338	396.2	460.8
143	391	388	455	403	339	394.9	442.5

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	390	386	453	400	339	393.6	440.8
145	389	385	451	398	340	392.5	442.9
146	388	384	450	396	340	391.5	438.7
147	388	382	449	393	340	390.6	438.4
148	388	381	448	391	341	389.9	445.6
149	387	380	448	389	342	389.1	438.0
150	387	380	447	386	342	388.4	444.5
151	387	378	447	384	343	387.7	447.4
152	386	378	446	382	343	386.9	447.3
153	386	377	445	380	344	386.3	436.3
154	386	376	444	378	344	385.6	425.1
155	385	375	443	377	345	385.0	429.6
156	385	374	443	375	346	384.3	419.2
157	384	373	441	373	347	383.6	411.0
158	384	373	440	371	347	383.0	426.5
159	383	372	440	369	348	382.4	435.2
160	382	371	439	367	349	381.6	429.1
161	381	370	438	365	350	380.9	431.5
162	380	369	437	364	351	380.2	434.2
163	379	368	436	362	352	379.4	429.1
164	378	368	435	360	353	378.5	429.4
165	377	366	433	359	353	377.7	432.2
166	376	365	432	357	354	376.9	429.1
167	374	365	431	355	355	376.0	418.8
168	373	364	430	354	356	375.2	425.0
169	372	363	429	351	357	374.3	423.8
170	371	362	428	350	358	373.7	419.5
171	369	361	427	348	359	372.9	422.7
172	368	361	426	347	359	372.3	419.2
173	368	360	426	346	360	371.7	409.8
174	367	359	425	344	361	371.0	423.9
175	366	358	424	343	362	370.6	414.7
176	365	358	424	342	362	370.1	403.4
177	364	357	423	340	363	369.6	411.6
178	364	357	423	339	364	369.2	402.1
179	363	356	422	338	365	368.8	406.8
180	363	355	422	337	365	368.4	404.4
181	362	355	422	336	366	368.1	397.7
182	362	354	422	335	367	367.8	405.0
183	361	354	421	334	367	367.5	404.2
184	361	353	421	333	368	367.2	391.8
185	361	353	421	332	369	367.1	394.8
186	360	353	421	331	369	366.9	394.6
187	360	352	421	331	370	366.7	391.1
188	360	352	420	330	371	366.5	397.1
189	360	352	420	329	371	366.2	393.6
190	360	351	420	328	372	366.1	395.3
191	359	351	420	327	373	365.9	392.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	359	351	420	326	373	365.9	393.3
193	359	350	420	325	374	365.6	393.9
194	359	350	420	325	374	365.5	393.2
195	359	350	419	324	375	365.4	390.6
196	359	349	419	323	376	365.3	389.2
197	359	349	419	323	377	365.2	387.8
198	359	349	419	322	377	365.1	388.7
199	359	348	419	321	378	364.9	389.2
200	359	348	419	320	378	364.9	386.9
201	359	348	419	320	379	364.9	384.0
202	359	348	418	320	379	364.8	383.6
203	359	347	418	319	380	364.8	382.8
204	360	347	418	319	381	364.7	384.1
205	360	347	418	318	381	364.7	382.8
206	360	346	418	317	382	364.8	383.9
207	360	346	418	317	382	364.8	379.0
208	361	346	418	317	383	364.8	381.2
209	361	346	418	316	383	364.9	380.1
210	361	346	418	316	384	365.0	377.5
211	362	345	418	316	384	365.0	374.8
212	362	345	418	315	385	364.9	373.9
213	362	345	418	315	385	364.8	373.4
214	362	345	418	314	386	364.7	373.8
215	362	345	418	313	386	364.7	372.7
216	362	344	418	313	387	364.6	371.8
217	362	344	418	312	387	364.4	372.0
218	362	344	417	311	387	364.3	369.9
219	362	344	417	310	388	364.1	365.7
220	362	343	417	310	388	363.9	368.8
221	362	343	417	309	388	363.8	369.8
222	362	343	417	308	389	363.6	366.2
223	362	342	416	308	389	363.4	366.4
224	362	342	416	307	389	363.2	365.9
225	362	342	416	307	389	363.1	364.9
226	362	342	416	306	390	362.9	364.9
227	362	342	416	305	390	362.8	366.3
228	362	341	415	305	390	362.6	364.5
229	361	341	415	305	390	362.4	363.4
230	361	341	415	304	390	362.0	363.6
231	361	340	414	303	391	361.9	363.7
232	361	340	414	303	391	361.7	364.8
233	361	340	414	303	391	361.5	364.1
234	361	340	414	302	391	361.4	364.0
235	361	339	413	301	391	361.0	366.0
236	360	339	413	301	391	360.9	363.9
237	360	339	413	301	391	360.7	365.1
238	360	338	413	301	391	360.6	365.8
239	360	338	413	301	391	360.4	364.4

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	360	338	412	300	391	360.2	368.5
241	360	337	412	300	391	360.0	366.9
242	360	337	412	300	391	359.9	366.1
243	360	337	412	300	391	359.7	365.9
244	360	336	411	299	391	359.5	366.3
245	359	336	411	299	391	359.3	366.9
246	359	336	411	299	391	359.1	367.4
247	359	336	411	298	391	358.9	366.6
248	359	335	411	299	390	358.7	360.4
249	359	335	411	298	390	358.5	361.6
250	359	335	411	299	390	358.6	359.5
251	359	335	411	299	390	358.6	357.7
252	359	335	411	299	390	358.7	359.7
253	359	334	412	300	389	358.9	358.5
254	360	334	412	300	389	359.1	357.4
255	360	334	413	301	389	359.4	361.6
256	360	335	413	301	389	359.6	361.6
257	360	335	414	301	389	359.9	358.2
258	361	335	415	302	389	360.3	356.6
259	361	335	415	303	389	360.7	358.7
260	362	336	416	304	389	361.2	360.1
261	362	336	416	304	389	361.6	360.1
262	362	337	417	305	390	362.0	361.1
263	362	337	417	306	390	362.4	365.4
264	363	338	418	307	390	363.0	362.3
265	363	338	418	308	390	363.3	363.6
266	363	339	418	309	390	363.6	365.8
267	363	339	418	309	390	363.9	369.0
268	363	339	418	310	391	364.3	369.5
269	363	340	418	311	391	364.5	367.6
270	364	340	418	312	391	364.8	363.7
271	364	340	418	312	391	365.1	366.6
272	364	340	419	313	391	365.3	367.2
273	364	341	419	313	391	365.6	366.3
274	364	341	419	314	391	365.8	371.8
275	364	341	419	315	391	366.0	369.6
276	364	342	419	315	391	366.1	370.0
277	364	342	419	316	391	366.2	374.5
278	364	342	418	316	392	366.3	371.0
279	364	342	418	316	392	366.4	367.7
280	363	342	418	317	392	366.5	368.8
281	363	343	418	317	392	366.6	372.5
282	364	343	418	318	392	366.7	373.1
283	363	343	418	318	392	366.7	375.6
284	363	344	418	318	392	366.9	371.5
285	363	344	418	318	392	366.9	369.7
286	363	344	418	319	392	367.1	371.5
287	363	344	418	319	392	367.3	372.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: 62

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
288	363	344	419	319	392	367.5	371.4
289	363	345	419	320	392	367.7	375.7
290	363	345	419	320	392	367.9	380.4
291	363	345	419	320	393	367.9	383.0
292	362	346	420	320	393	368.1	381.5
293	363	346	420	320	393	368.3	382.2
294	362	346	420	320	393	368.4	387.3
295	362	347	421	320	393	368.6	381.8
296	362	347	421	320	393	368.6	378.9
297	362	347	421	321	394	368.8	378.5
298	361	348	421	321	394	368.8	378.6
299	361	348	421	321	394	368.9	390.0
300	361	348	421	321	394	369.0	386.1
301	361	348	421	321	394	369.0	382.9
302	361	349	421	321	394	369.2	386.0
303	361	349	421	321	394	369.2	388.6
304	361	349	422	321	394	369.3	386.2
305	361	349	422	321	394	369.3	382.4
306	360	349	422	321	393	369.2	380.7
307	360	350	422	321	393	369.1	379.3
308	360	350	421	321	393	368.9	383.5
309	359	350	421	321	393	368.7	384.5
310	359	350	421	320	393	368.5	382.5
311	358	350	420	320	393	368.3	380.1
312	358	350	420	320	393	367.9	380.6
313	357	349	420	319	393	367.7	384.2
314	357	349	419	319	392	367.3	378.3
315	356	349	419	318	392	366.9	378.5
316	356	349	419	318	392	366.7	374.6
317	355	349	419	317	392	366.3	377.7
318	355	349	418	317	391	366.0	377.8
319	355	348	418	317	391	365.7	378.1
320	354	348	418	316	391	365.5	372.7
321	354	348	418	316	390	365.1	372.7
322	353	348	418	316	390	365.0	370.6
323	352	348	418	315	390	364.7	377.4
324	352	348	419	315	390	364.5	376.4
325	351	348	419	314	389	364.2	377.3
326	350	348	419	314	389	363.9	375.6
327	350	348	419	313	389	363.7	371.9
328	350	347	419	313	388	363.5	373.9
329	349	347	420	313	388	363.2	372.5
330	348	347	420	312	388	363.0	375.7
331	348	347	420	312	387	362.8	370.4
332	348	347	420	311	387	362.6	371.1
333	348	347	419	311	387	362.2	374.7
334	347	346	419	311	386	362.0	375.2
335	347	346	419	310	386	361.6	371.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

Stove ΔT: **62**

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
336	346	346	418	310	386	361.2	372.4
Average	377.4	358.6	426.5	394.7	373.2	386.1	458.6

LAB SAMPLE DATA - ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 4

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/20/2023

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G00437	244.3	248.4	4.1
	B	G00438	247.0	250.9	3.9
	C - 1st Hour	G00439	233.9	236.5	2.6
	Amb	G00440	246.8	246.9	0.1
Probes	**A**	19A	117026.3	117026.3	0.0
	B	19B	117012.1	117012.2	0.1
	C - 1st Hour	19C	114229.9	114229.9	0.0
O-rings	**A**	19A	3586.4	3586.4	0.0
	B	19B	3633.7	3634.2	0.5
	C - 1st Hour	19C	3615.7	3616.3	0.6

Placed in Dessicator on:	

Filters	**A**	248.6	1/25 14:20	248.4	1/27 13:16				
	B	250.8	1/25 14:20	250.9	1/27 13:15				
	C - 1st Hour	236.5	1/25 14:21	236.5	1/27 13:15				
	Amb	247.0	1/25 14:19	246.9	1/27 13:15				
Probes	**A**	117026.4	1/25 14:20	117026.3	1/27 13:16				
	B	117012.3	1/25 14:20	117012.2	1/27 13:15				
	C - 1st Hour	114229.9	1/25 14:20	114229.9	1/27 13:15				
O-Rings	**A**	3586.3	1/25 14:20	3586.4	1/27 13:15				
	B	3634.1	1/25 14:20	3634.2	1/27 13:16				
	C - 1st Hour	3616.5	1/25 14:20	3616.3	1/27 13:46				

Train A Aggregate, mg:	**4.1**
Train B Aggregate, mg:	**4.5**
Train C Aggregate, mg:	**3.2**
Ambient, mg:	**0.1**

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 4 Test Date: 1/20/23

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Fully closed
Targeted Burn Category: II – Fan confirmation

Preburn Notes

Time	Notes
0:00 37:00 60:00	Set air to test setting, fan off Broke down coals PB end @ 3.02lb

Test Notes

Test Burn Start Time: 12:33 Test Fuel Loaded by: 50 seconds
Door Closed: 115 seconds Air Control Set at: 360 seconds
Other Loading Notes: Fan off

Time	Notes
	- None -

Test Burn End Time: 18:09

Flue Gas Concentration Measurement

Calibration Gas Values:
Span Gas CO_2 (%): 17.01 CO (%): 4.306
Mid Gas CO_2 (%): 10.09 CO (%): 2.53

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	1/20 11:10	1/20 11:13	1/20 11:12	1/23 10:31	1/23 10:34	1/23 10:33
CO_2	0.05	10.14	17.17	0.17	10.20	17.19
CO	0.031	2.515	4.380	0.025	2.553	4.328

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

Technician Signature:  Date: 3/6/23

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 4 Test Date: 1/20/23

Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: Date: 3/6/23

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 5 Data Summary

Client:	Pacific Energy
Model:	TN25 C
Job #:	22-861
Tracking #:	136
Test Date:	1/23/2023

Technician Signature

3/6/2023
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Burn Rate (kg/hr):	2.07

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	16.582	23.126	22.884	9.261
Average Gas Velocity in Dilution Tunnel (ft/sec)	6.6			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	17716.2			
Average Gas Meter Temperature (°F)	67.3	86.8	87.6	77.6
Total Sample Volume (dscf)	17.299	22.757	22.486	9.233
Average Tunnel Temperature (°F)	90.6			
Total Time of Test (min)	153			
Total Particulate Catch (mg)	0.0	2.0	1.9	1.7
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000879	0.0000845	0.0001841
Total PM Emissions (g)	0.00	3.97	3.82	3.26
Particulate Emission Rate (g/hr)	0.00	1.56	1.50	3.26
Emissions Factor (g/kg)	-	0.75	0.72	-
Difference from Average Total Particulate Emissions (g)	-	0.08	0.08	-
Difference from Average Total Particulate Emissions (%)	-	2.0%	2.0%	
Difference from Average Emissions Factor (g/kg)	-	0.01	0.01	-

Final Average Results	
Total Particulate Emissions (g)	3.89
Particulate Emission Rate (g/hr)	1.53
Emissions Factor (g/kg)	0.74
HHV Efficiency (%)	75.5%
LHV Efficiency (%)	81.6%
CO Emissions (g/min)	1.15

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	<90 °F	80.2	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:65.5/Max:68.6	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	52.8	OK

B415.1 Efficiency Results

Manufacturer:	Pacific Energy
Model:	TN25 C
Date:	01/23/23
Run:	5
Control #:	22-861
Test Duration:	153
Output Category:	4

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.5%	81.6%
Combustion Efficiency	97.7%	97.7%
Heat Transfer Efficiency	77.3%	83.5%

Output Rate (kJ/h)	30,784	29,202	**(Btu/h)**
Burn Rate (kg/h)	2.06	4.54	**(lb/h)**
Input (kJ/h)	40,796	38,699	**(Btu/h)**

Test Load Weight (dry kg)	5.25	11.57	**dry lb**
MC wet (%)	17.62		
MC dry (%)	21.39		
Particulate (g)	3.89		
CO (g)	175		
Test Duration (h)	2.55		

Emissions	**Particulate**	**CO**
g/MJ Output	0.05	2.23
g/kg Dry Fuel	0.74	33.39
g/h	1.53	68.77
g/min	0.03	1.15
lb/MM Btu Output	0.12	5.19

Air/Fuel Ratio (A/F)	10.41

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

WOODSTOVE FUEL DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	12.00	24.5			
2x4	12.00	23.5			
2x4	12.00	24.9			
2x4	12.00	23.9			
2x4	12.00	21.4			
2x4	12.00	24.5			
2x4	12.00	19.7			

Total Fuel Weight (lbs): 9.81
Average Moisture (%DB): 23.2

Firebox Volume (ft^3): 1.98
Total 2x4 Crib Weight, with spacers (lbs): 5.93
Total 4x4 Crib Weight, with spacers (lbs): 8.10
Total Wet Fuel Weight, with spacers (lbs): 14.03

Coal Bed Range (20-25%):
Min (lbs): 2.81
Max (lbs): 3.51

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
4x4	15.00	4.21	22.4	20.1	20.2	3.48
4x4	15.00	3.51	20.9	24.7	24.9	2.84
2x4	15.00	1.57	20.7	20.9	19.0	1.31
2x4	15.00	1.63	21.6	19.3	23.0	1.34
2x4	15.00	1.57	22.7	19.9	20.6	1.30

Total Dry Weight, no spacers (lbs): 10.27
Total Dry Weight, with spacers (lbs): 11.66

Spacer Moisture Readings (%DB)

8.4	12.0	11.7	9.5				
8.9	9.9	8.7	12.2				
10.5	14.1	8.9	13.5				
12.0	9.9	8.9	8.7				

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	29.4	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	7.10	OK
2x4 Fuel Mix	35 - 65 % of total weight	42%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	Pacific Energy	Job #:	22-861
Model:	TN25 C	Tracking #:	136
Run #:	5	Technician:	AK
Test Start Time:	12:20	Date:	1/23/2023

Total Sampling Time (min):	153	
Recording Interval (min):	1	
Meter Box γ Factor:	1.000	(A)
Meter Box γ Factor:	1.000	(B)
Meter Box γ Factor:	0.999	(C)
Meter Box γ Factor:	1.028	(Ambient)

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	30.33	30.34	30.34
Relative Humidity (%)	30.3	25.4	
Room Air Velocity (ft/min)	<50	<50	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:		16.582	ft^3

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	1/16/2023

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-5	in. Hg
(B)	0.000	cfm @	-5	in. Hg
(C)	0.000	cfm @	-5	in. Hg
(Ambient)	0.000	cfm @	-9	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.008	93
2	0.014	93
3	0.014	93
4	0.014	93
5	0.010	93
6	0.008	93
7	0.008	92
8	0.012	92
9	0.012	92
10	0.014	92
11	0.012	92
12	0.006	92
Center	0.014	91

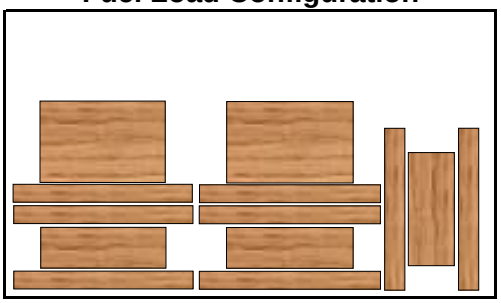
Static Pressure: -0.070 in. H_2O

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}:	7.00	ft/sec
V_{scent}:	7.96	ft/sec
F_p:	0.880	[ratio]
Initial Tunnel Flow:	313.2	scf/min

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Front



Firebox Back

Firebox Side View

Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	21.4

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	11.90	-0.072	560	548	495	506	510	523.9	382	67
1	11.82	-0.075	558	545	455	477	511	509.1	364	66
2	11.70	-0.078	552	539	422	454	513	496.0	367	66
3	11.51	-0.087	545	532	394	436	514	484.0	393	66
4	11.31	-0.091	536	523	371	427	515	474.4	429	66
5	11.08	-0.091	528	514	352	427	516	467.4	458	66
6	10.85	-0.094	520	507	338	436	516	463.4	480	66
7	10.62	-0.095	515	500	326	452	516	461.7	497	66
8	10.38	-0.095	510	495	317	471	515	461.6	507	66
9	10.16	-0.095	506	491	310	490	514	462.2	514	66
10	9.93	-0.095	503	488	304	508	512	463.0	519	66
11	9.70	-0.096	501	485	299	526	511	464.3	523	66
12	9.48	-0.097	499	483	296	541	508	465.3	526	66
13	9.24	-0.098	497	481	293	556	506	466.7	529	66
14	9.02	-0.096	495	480	292	568	503	467.8	533	66
15	8.79	-0.098	494	480	293	580	500	469.4	536	66
16	8.56	-0.098	494	479	294	590	498	470.9	537	66
17	8.32	-0.099	493	480	296	600	495	472.8	538	66
18	8.10	-0.099	493	480	298	609	492	474.4	540	66
19	7.87	-0.099	493	481	301	618	489	476.5	542	66
20	7.64	-0.099	493	481	304	625	487	478.0	543	67
21	7.43	-0.099	494	482	308	631	484	479.8	544	66
22	7.20	-0.097	495	483	312	639	482	482.1	545	66
23	6.97	-0.101	497	484	316	643	479	483.8	547	66
24	6.76	-0.099	498	486	321	648	477	485.8	547	66
25	6.55	-0.099	499	488	324	654	475	488.0	546	66
26	6.34	-0.098	501	490	329	659	473	490.1	546	66
27	6.14	-0.099	502	492	334	664	471	492.5	548	67
28	5.92	-0.099	504	494	339	669	469	495.0	549	66
29	5.72	-0.097	506	497	343	675	468	497.8	551	66
30	5.53	-0.100	509	500	349	679	467	500.6	551	67
31	5.33	-0.097	511	503	354	684	465	503.4	550	67
32	5.15	-0.096	514	506	359	686	464	505.8	549	67
33	4.96	-0.098	516	510	363	688	464	508.1	547	67
34	4.78	-0.097	519	513	368	688	463	510.3	545	67
35	4.60	-0.099	522	516	372	688	463	512.0	543	67
36	4.43	-0.096	524	519	376	689	462	514.1	542	67
37	4.27	-0.098	527	523	380	689	462	516.1	539	67
38	4.12	-0.095	530	526	384	687	462	517.6	534	67
39	3.99	-0.093	533	529	387	683	462	519.1	527	67
40	3.88	-0.091	537	533	390	679	463	520.2	517	67
41	3.79	-0.091	539	536	394	672	463	521.0	505	67
42	3.72	-0.089	542	540	402	663	465	522.3	493	67
43	3.68	-0.086	544	543	408	646	467	521.5	471	67
44	3.65	-0.084	545	545	407	628	468	518.5	455	67

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Recording Interval (min): 1
Run Time (min): 60

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.61	-0.082	544	547	403	606	468	513.7	440	67
46	3.57	-0.080	543	547	397	586	469	508.2	429	67
47	3.53	-0.079	540	546	390	565	469	502.0	419	67
48	3.51	-0.079	538	544	383	545	470	495.9	411	67
49	3.47	-0.078	535	541	377	527	470	490.0	403	67
50	3.44	-0.075	533	536	372	508	470	483.8	396	66
51	3.41	-0.073	530	532	366	492	471	478.1	390	67
52	3.38	-0.075	528	527	360	477	471	472.4	383	66
53	3.37	-0.074	524	521	354	462	470	466.4	377	66
54	3.34	-0.072	520	516	347	449	470	460.6	371	67
55	3.32	-0.073	516	511	341	437	469	454.8	365	67
56	3.31	-0.068	511	506	333	425	469	448.8	361	66
57	3.29	-0.070	506	501	327	414	468	443.2	356	66
58	3.27	-0.071	500	495	322	403	468	437.6	352	67
59	3.25	-0.068	495	489	316	393	467	432.0	347	66
60	3.23	-0.068	490	484	311	383	466	426.7	343	66

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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		0.012	1.36	70	0.6		14.05		89	340	68	67
1	0.133	0.133	0.012	2.06	70	0.7	-	14.01	-0.04	95	324	68	66
2	0.272	0.139	0.012	2.10	70	0.7	-	13.92	-0.09	91	330	68	67
3	0.414	0.142	0.013	2.11	70	0.8	-	13.80	-0.12	89	352	68	67
4	0.559	0.145	0.012	2.12	70	0.7	-	13.65	-0.15	88	378	68	67
5	0.699	0.140	0.012	2.13	70	0.8	-	13.50	-0.15	89	407	68	67
6	0.844	0.145	0.013	2.13	70	0.8	-	13.34	-0.16	89	427	68	67
7	0.985	0.141	0.012	2.15	70	0.7	-	13.18	-0.16	90	438	68	66
8	1.133	0.148	0.012	2.15	70	0.8	-	13.03	-0.15	90	444	68	67
9	1.275	0.142	0.012	2.17	70	0.8	-	12.89	-0.14	91	448	68	67
10	1.419	0.144	0.012	2.17	71	0.8	98	12.75	-0.14	91	452	68	67
11	1.564	0.145	0.012	2.19	71	0.8	-	12.59	-0.16	92	457	68	67
12	1.708	0.144	0.012	2.19	71	0.8	-	12.41	-0.18	92	467	68	67
13	1.856	0.148	0.012	2.20	71	0.8	-	12.22	-0.19	93	478	68	67
14	1.999	0.143	0.013	2.21	72	0.8	-	12.03	-0.19	94	488	68	67
15	2.147	0.148	0.012	2.21	72	0.8	-	11.83	-0.20	95	498	68	67
16	2.289	0.142	0.012	2.21	72	0.8	-	11.62	-0.21	96	508	68	67
17	2.439	0.150	0.012	2.22	72	0.8	-	11.41	-0.21	96	517	68	67
18	2.583	0.144	0.012	2.23	73	0.8	-	11.19	-0.22	97	523	68	67
19	2.733	0.150	0.012	2.23	73	0.8	-	10.98	-0.21	98	530	68	67
20	2.877	0.144	0.012	2.24	73	0.8	101	10.76	-0.22	99	534	68	67
21	3.026	0.149	0.012	2.25	74	0.8	-	10.54	-0.22	99	539	68	67
22	3.171	0.145	0.012	2.24	74	0.9	-	10.30	-0.24	100	544	68	67
23	3.319	0.148	0.012	2.24	74	0.8	-	10.07	-0.23	101	547	68	67
24	3.466	0.147	0.012	2.25	75	0.8	-	9.83	-0.24	101	550	68	67
25	3.613	0.147	0.012	2.25	75	0.9	-	9.60	-0.23	102	551	68	67
26	3.762	0.149	0.012	2.25	75	0.8	-	9.35	-0.25	102	550	69	67
27	3.908	0.146	0.012	2.24	76	0.9	-	9.12	-0.23	103	551	69	67
28	4.058	0.150	0.012	2.25	76	0.9	-	8.89	-0.23	103	552	69	67
29	4.205	0.147	0.012	2.26	77	0.9	-	8.67	-0.22	103	552	69	67
30	4.355	0.150	0.012	2.25	77	0.9	102	8.45	-0.22	103	552	69	67
31	4.500	0.145	0.012	2.25	77	0.9	-	8.22	-0.23	103	552	69	67

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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
32	4.651	0.151	0.012	2.26	78	0.9	-	8.01	-0.21	103	552	69	67
33	4.796	0.145	0.012	2.26	78	0.9	-	7.80	-0.21	103	553	69	67
34	4.947	0.151	0.011	2.25	78	0.9	-	7.60	-0.20	103	550	69	68
35	5.091	0.144	0.012	2.25	79	0.9	-	7.42	-0.18	103	545	69	68
36	5.243	0.152	0.012	2.25	79	1.0	-	7.24	-0.18	103	540	69	68
37	5.388	0.145	0.012	2.25	79	0.9	-	7.06	-0.18	103	536	69	67
38	5.540	0.152	0.012	2.26	80	0.9	-	6.88	-0.18	102	531	69	68
39	5.685	0.145	0.012	2.26	80	0.9	-	6.71	-0.17	102	529	69	68
40	5.838	0.153	0.012	2.26	80	1.0	102	6.55	-0.16	102	526	69	68
41	5.984	0.146	0.012	2.27	81	1.0	-	6.38	-0.17	102	524	69	68
42	6.136	0.152	0.012	2.27	81	0.9	-	6.21	-0.17	101	521	69	68
43	6.282	0.146	0.012	2.26	81	0.9	-	6.05	-0.16	101	518	69	68
44	6.434	0.152	0.012	2.26	82	0.9	-	5.89	-0.16	101	517	69	68
45	6.581	0.147	0.012	2.27	82	1.0	-	5.73	-0.16	101	516	69	68
46	6.733	0.152	0.012	2.27	82	1.0	-	5.58	-0.15	100	515	69	68
47	6.880	0.147	0.012	2.27	83	0.9	-	5.41	-0.17	100	514	69	68
48	7.033	0.153	0.012	2.28	83	0.9	-	5.26	-0.15	100	513	69	68
49	7.180	0.147	0.012	2.28	83	1.0	-	5.11	-0.15	100	512	69	68
50	7.333	0.153	0.011	2.29	84	1.0	104	4.95	-0.16	100	510	69	68
51	7.480	0.147	0.012	2.28	84	1.0	-	4.80	-0.15	100	511	69	68
52	7.633	0.153	0.012	2.28	84	1.0	-	4.64	-0.16	100	511	69	68
53	7.780	0.147	0.012	2.29	84	1.0	-	4.48	-0.16	100	511	69	68
54	7.933	0.153	0.012	2.28	85	0.9	-	4.33	-0.15	100	511	69	68
55	8.081	0.148	0.012	2.29	85	1.0	-	4.18	-0.15	100	509	70	68
56	8.235	0.154	0.012	2.29	85	1.0	-	4.05	-0.13	99	506	69	68
57	8.382	0.147	0.012	2.28	86	0.9	-	3.91	-0.14	99	502	69	68
58	8.536	0.154	0.012	2.30	86	1.0	-	3.77	-0.14	99	498	70	68
59	8.683	0.147	0.012	2.29	86	1.0	-	3.65	-0.12	99	494	70	68
60	8.837	0.154	0.012	2.29	86	1.0	104	3.53	-0.12	98	490	70	68
61	8.985	0.148	0.012	2.29	86	1.0	-	3.41	-0.12	98	485	70	68
62	9.139	0.154	0.012	2.29	87	1.0	-	3.30	-0.11	98	481	70	68
63	9.287	0.148	0.012	2.31	87	0.9	-	3.18	-0.12	98	478	70	69

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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
64	9.442	0.155	0.012	2.30	87	1.0	-	3.08	-0.10	97	475	70	68
65	9.591	0.149	0.012	2.30	87	0.9	-	2.97	-0.11	97	472	70	68
66	9.745	0.154	0.012	2.31	88	0.9	-	2.86	-0.11	97	468	70	68
67	9.894	0.149	0.012	2.31	88	1.0	-	2.77	-0.09	96	464	70	68
68	10.048	0.154	0.012	2.30	88	0.9	-	2.68	-0.09	96	459	70	68
69	10.198	0.150	0.012	2.32	88	1.0	-	2.60	-0.08	95	454	69	68
70	10.352	0.154	0.012	2.31	88	0.9	102	2.53	-0.07	95	447	69	68
71	10.502	0.150	0.012	2.32	89	1.0	-	2.46	-0.07	94	441	69	68
72	10.655	0.153	0.012	2.32	89	0.9	-	2.39	-0.07	94	435	70	68
73	10.806	0.151	0.012	2.32	89	0.9	-	2.34	-0.05	93	428	69	68
74	10.959	0.153	0.012	2.32	89	1.0	-	2.28	-0.06	93	423	69	68
75	11.110	0.151	0.012	2.31	90	0.9	-	2.22	-0.06	92	417	69	68
76	11.263	0.153	0.012	2.32	90	1.0	-	2.17	-0.05	92	412	69	68
77	11.417	0.154	0.012	2.32	90	1.0	-	2.12	-0.05	91	408	69	68
78	11.568	0.151	0.012	2.32	90	1.0	-	2.07	-0.05	91	404	69	68
79	11.722	0.154	0.012	2.32	90	1.0	-	2.04	-0.03	91	400	69	68
80	11.874	0.152	0.013	2.33	90	1.0	100	1.99	-0.05	90	395	69	68
81	12.028	0.154	0.012	2.34	91	1.0	-	1.95	-0.04	90	392	69	68
82	12.177	0.149	0.012	2.32	91	1.0	-	1.89	-0.06	90	389	69	68
83	12.333	0.156	0.012	2.33	91	1.0	-	1.85	-0.04	89	386	69	68
84	12.482	0.149	0.012	2.33	91	1.0	-	1.81	-0.04	89	383	70	68
85	12.639	0.157	0.012	2.33	91	1.0	-	1.77	-0.04	89	380	69	68
86	12.789	0.150	0.012	2.33	92	1.0	-	1.74	-0.03	88	377	69	68
87	12.945	0.156	0.012	2.34	92	1.0	-	1.70	-0.04	88	374	70	68
88	13.096	0.151	0.013	2.35	92	0.9	-	1.66	-0.04	88	371	70	68
89	13.251	0.155	0.012	2.34	92	1.0	-	1.62	-0.04	87	369	70	68
90	13.402	0.151	0.013	2.34	92	0.9	98	1.59	-0.03	87	366	70	68
91	13.556	0.154	0.013	2.34	92	1.0	-	1.56	-0.03	87	363	69	68
92	13.709	0.153	0.012	2.34	92	1.0	-	1.53	-0.03	87	359	70	68
93	13.863	0.154	0.012	2.35	92	0.9	-	1.51	-0.02	86	355	70	68
94	14.018	0.155	0.013	2.35	93	1.0	-	1.49	-0.02	86	352	70	68
95	14.170	0.152	0.013	2.35	93	1.0	-	1.46	-0.03	86	349	70	68

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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
96	14.326	0.156	0.013	2.35	93	1.0	-	1.43	-0.03	86	346	70	68
97	14.476	0.150	0.013	2.35	93	1.0	-	1.41	-0.02	85	344	70	67
98	14.633	0.157	0.013	2.35	93	1.0	-	1.38	-0.03	85	343	70	68
99	14.783	0.150	0.013	2.34	93	1.0	-	1.35	-0.03	85	341	69	68
100	14.941	0.158	0.013	2.35	93	1.0	98	1.33	-0.02	85	340	69	68
101	15.092	0.151	0.013	2.34	94	1.0	-	1.30	-0.03	84	338	70	68
102	15.249	0.157	0.013	2.36	94	1.0	-	1.27	-0.03	84	337	70	68
103	15.399	0.150	0.012	2.36	94	0.9	-	1.25	-0.02	84	335	69	68
104	15.555	0.156	0.013	2.35	94	1.0	-	1.22	-0.03	84	334	69	68
105	15.707	0.152	0.012	2.34	94	1.0	-	1.19	-0.03	84	333	69	68
106	15.862	0.155	0.012	2.35	94	1.0	-	1.17	-0.02	84	331	69	68
107	16.017	0.155	0.013	2.36	94	1.0	-	1.15	-0.02	84	330	69	67
108	16.170	0.153	0.013	2.36	94	1.0	-	1.12	-0.03	83	327	69	68
109	16.326	0.156	0.012	2.37	94	1.0	-	1.09	-0.03	83	326	69	68
110	16.477	0.151	0.012	2.35	95	1.0	99	1.05	-0.04	83	324	69	66
111	16.633	0.156	0.012	2.35	95	1.0	-	1.03	-0.02	84	323	68	66
112	16.785	0.152	0.012	2.35	95	1.0	-	1.01	-0.02	83	321	69	66
113	16.943	0.158	0.013	2.36	95	0.9	-	1.00	-0.01	83	319	69	66
114	17.095	0.152	0.013	2.36	95	0.9	-	0.97	-0.03	83	317	69	67
115	17.250	0.155	0.013	2.35	95	1.0	-	0.95	-0.02	82	316	69	67
116	17.403	0.153	0.013	2.36	95	0.9	-	0.93	-0.02	82	315	69	67
117	17.558	0.155	0.013	2.35	95	1.0	-	0.90	-0.03	82	314	69	67
118	17.713	0.155	0.013	2.36	95	1.0	-	0.88	-0.02	82	313	69	67
119	17.866	0.153	0.013	2.36	95	1.0	-	0.86	-0.02	82	312	69	67
120	18.023	0.157	0.013	2.35	95	1.0	100	0.83	-0.03	82	311	69	67
121	18.174	0.151	0.013	2.35	95	1.0	-	0.82	-0.01	82	311	69	67
122	18.331	0.157	0.013	2.36	95	1.0	-	0.79	-0.03	82	310	69	67
123	18.483	0.152	0.013	2.37	95	1.0	-	0.77	-0.02	82	310	69	67
124	18.641	0.158	0.013	2.36	95	1.0	-	0.74	-0.03	82	310	69	67
125	18.793	0.152	0.012	2.37	96	1.0	-	0.72	-0.02	82	309	69	67
126	18.949	0.156	0.013	2.35	96	1.0	-	0.70	-0.02	82	309	69	67
127	19.102	0.153	0.013	2.36	96	0.9	-	0.67	-0.03	82	309	69	67

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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
128	19.257	0.155	0.013	2.36	96	1.0	-	0.64	-0.03	82	309	69	67
129	19.413	0.156	0.013	2.36	96	1.0	-	0.62	-0.02	82	309	69	67
130	19.567	0.154	0.013	2.36	96	1.0	97	0.59	-0.03	81	309	69	67
131	19.723	0.156	0.013	2.37	96	1.0	-	0.56	-0.03	82	308	69	67
132	19.874	0.151	0.013	2.36	96	1.0	-	0.54	-0.02	81	307	69	67
133	20.031	0.157	0.013	2.34	96	1.0	-	0.52	-0.02	81	307	69	67
134	20.184	0.153	0.013	2.35	96	0.9	-	0.49	-0.03	81	306	69	67
135	20.342	0.158	0.013	2.35	96	1.0	-	0.46	-0.03	81	306	69	67
136	20.494	0.152	0.013	2.37	96	1.0	-	0.44	-0.02	81	305	69	67
137	20.649	0.155	0.013	2.35	96	1.0	-	0.41	-0.03	81	305	69	67
138	20.803	0.154	0.013	2.35	96	1.0	-	0.39	-0.02	81	305	69	67
139	20.958	0.155	0.013	2.35	96	1.0	-	0.36	-0.03	81	305	69	67
140	21.115	0.157	0.013	2.36	96	1.0	97	0.34	-0.02	81	305	69	67
141	21.268	0.153	0.013	2.36	96	1.0	-	0.31	-0.03	81	305	69	67
142	21.424	0.156	0.013	2.36	96	1.0	-	0.28	-0.03	81	305	69	67
143	21.575	0.151	0.013	2.36	96	1.0	-	0.26	-0.02	81	305	69	67
144	21.734	0.159	0.013	2.35	96	1.0	-	0.23	-0.03	81	306	69	67
145	21.886	0.152	0.013	2.36	96	1.0	-	0.20	-0.03	81	306	69	67
146	22.044	0.158	0.013	2.36	97	1.0	-	0.18	-0.02	81	306	69	67
147	22.195	0.151	0.013	2.35	96	1.0	-	0.15	-0.03	81	307	69	67
148	22.351	0.156	0.013	2.35	97	1.0	-	0.12	-0.03	81	307	69	67
149	22.505	0.154	0.013	2.36	97	1.0	-	0.10	-0.02	81	307	69	67
150	22.660	0.155	0.013	2.36	97	1.0	97	0.07	-0.03	81	307	69	67
151	22.817	0.157	0.013	2.36	97	1.0	-	0.05	-0.02	81	307	69	67
152	22.968	0.151	0.013	2.36	97	1.0	-	0.02	-0.03	81	307	69	67
153	23.126	0.158	0.013	2.36	97	1.0	97	0.00	-0.02	81	307	69	67
Avg/Tot	23.126	0.151	0.012	2.29	86.8	0.9	100			90.6	410.2	69.0	67.3

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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		1.63	70	1.7		71	-0.068	6.01	0.696
1	0.148	0.148	2.28	70	1.5	-	73	-0.066	4.65	0.631
2	0.293	0.145	2.28	70	1.4	-	73	-0.073	2.75	0.493
3	0.442	0.149	2.28	70	1.4	-	73	-0.077	5.50	0.468
4	0.586	0.144	2.27	70	1.9	-	73	-0.082	8.98	0.358
5	0.734	0.148	2.27	71	1.9	-	74	-0.086	10.92	0.251
6	0.878	0.144	2.28	71	1.8	-	74	-0.085	12.33	0.204
7	1.026	0.148	2.27	71	1.8	-	74	-0.088	13.36	0.119
8	1.169	0.143	2.28	71	1.4	-	74	-0.086	12.86	0.125
9	1.318	0.149	2.28	71	1.8	-	74	-0.086	12.50	0.123
10	1.463	0.145	2.28	71	1.8	102	75	-0.087	12.15	0.132
11	1.613	0.150	2.28	72	1.5	-	75	-0.087	12.18	0.128
12	1.757	0.144	2.28	72	1.5	-	75	-0.090	12.96	0.115
13	1.906	0.149	2.29	72	1.5	-	75	-0.093	14.30	0.127
14	2.052	0.146	2.29	72	1.8	-	76	-0.092	15.30	0.134
15	2.201	0.149	2.29	72	1.8	-	76	-0.094	15.72	0.145
16	2.346	0.145	2.29	73	1.8	-	76	-0.096	16.20	0.179
17	2.494	0.148	2.30	73	1.5	-	76	-0.095	16.72	0.226
18	2.640	0.146	2.29	73	1.5	-	76	-0.096	17.09	0.227
19	2.788	0.148	2.30	74	1.8	-	77	-0.097	17.31	0.224
20	2.935	0.147	2.30	74	1.6	103	77	-0.098	17.66	0.296
21	3.083	0.148	2.29	74	1.6	-	77	-0.097	17.88	0.409
22	3.230	0.147	2.29	75	1.6	-	77	-0.097	18.22	0.521
23	3.377	0.147	2.29	75	1.8	-	78	-0.098	18.71	0.735
24	3.525	0.148	2.29	75	1.5	-	78	-0.099	18.97	0.871
25	3.671	0.146	2.28	76	1.7	-	78	-0.099	19.14	0.933
26	3.820	0.149	2.28	76	1.5	-	78	-0.099	19.08	0.958
27	3.966	0.146	2.27	76	1.7	-	78	-0.097	19.10	1.060
28	4.115	0.149	2.28	77	1.7	-	78	-0.097	19.13	1.107
29	4.261	0.146	2.28	77	1.6	-	79	-0.098	19.11	1.067
30	4.410	0.149	2.28	78	1.8	103	79	-0.098	19.07	0.978
31	4.556	0.146	2.28	78	1.6	-	79	-0.098	19.06	0.888

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.705	0.149	2.28	78	1.6	-	79	-0.099	18.94	0.836
33	4.851	0.146	2.27	78	1.6	-	79	-0.097	18.83	0.759
34	5.001	0.150	2.28	79	1.6	-	79	-0.097	18.73	0.590
35	5.146	0.145	2.27	79	1.7	-	79	-0.096	18.36	0.413
36	5.295	0.149	2.26	80	1.8	-	79	-0.095	17.83	0.280
37	5.440	0.145	2.27	80	1.8	-	80	-0.095	17.43	0.213
38	5.590	0.150	2.27	80	1.8	-	80	-0.094	17.19	0.184
39	5.736	0.146	2.27	81	1.6	-	80	-0.095	17.04	0.175
40	5.886	0.150	2.27	81	1.6	103	80	-0.094	16.86	0.172
41	6.031	0.145	2.26	81	1.8	-	80	-0.096	16.66	0.168
42	6.181	0.150	2.27	82	1.7	-	80	-0.093	16.47	0.159
43	6.326	0.145	2.27	82	1.8	-	80	-0.093	16.48	0.148
44	6.476	0.150	2.27	82	1.6	-	80	-0.094	16.45	0.131
45	6.622	0.146	2.27	83	1.6	-	80	-0.094	16.45	0.147
46	6.772	0.150	2.26	83	1.7	-	80	-0.093	16.42	0.154
47	6.918	0.146	2.26	83	1.7	-	80	-0.094	16.31	0.151
48	7.068	0.150	2.26	84	1.6	-	80	-0.092	16.28	0.146
49	7.214	0.146	2.27	84	1.8	-	80	-0.092	16.31	0.155
50	7.365	0.151	2.26	84	1.6	104	80	-0.095	16.32	0.225
51	7.511	0.146	2.27	84	1.7	-	80	-0.093	16.32	0.298
52	7.662	0.151	2.27	85	1.8	-	80	-0.094	16.49	0.249
53	7.808	0.146	2.26	85	1.8	-	80	-0.092	16.61	0.262
54	7.959	0.151	2.27	85	1.6	-	80	-0.093	16.55	0.298
55	8.106	0.147	2.27	86	1.6	-	80	-0.092	16.50	0.280
56	8.257	0.151	2.27	86	1.7	-	80	-0.092	16.32	0.252
57	8.403	0.146	2.26	86	1.8	-	80	-0.092	16.01	0.204
58	8.554	0.151	2.27	86	1.8	-	80	-0.090	15.83	0.168
59	8.701	0.147	2.27	87	1.7	-	80	-0.093	15.64	0.149
60	8.852	0.151	2.27	87	1.6	104	80	-0.089	15.45	0.134
61	8.999	0.147	2.27	87	1.7	-	80	-0.090	15.12	0.125
62	9.150	0.151	2.27	88	1.8	-	80	-0.088	14.64	0.109
63	9.297	0.147	2.27	88	1.8	-	80	-0.088	14.38	0.118

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.448	0.151	2.27	88	1.6	-	80	-0.087	14.30	0.131
65	9.595	0.147	2.27	88	1.6	-	80	-0.089	14.23	0.124
66	9.747	0.152	2.28	89	1.6	-	80	-0.085	14.05	0.105
67	9.894	0.147	2.28	89	1.6	-	80	-0.085	13.80	0.098
68	10.047	0.153	2.28	89	1.7	-	80	-0.085	13.48	0.090
69	10.194	0.147	2.28	89	1.6	-	80	-0.085	13.06	0.079
70	10.346	0.152	2.28	89	1.6	102	80	-0.084	12.37	0.063
71	10.493	0.147	2.28	90	1.8	-	80	-0.083	11.56	0.059
72	10.645	0.152	2.29	90	1.7	-	80	-0.083	10.94	0.063
73	10.793	0.148	2.29	90	1.6	-	80	-0.081	10.58	0.066
74	10.945	0.152	2.29	90	1.6	-	79	-0.081	10.27	0.080
75	11.092	0.147	2.28	91	1.7	-	79	-0.081	10.03	0.094
76	11.245	0.153	2.28	91	1.7	-	79	-0.079	9.81	0.110
77	11.393	0.148	2.29	91	1.8	-	79	-0.080	9.64	0.127
78	11.545	0.152	2.29	91	1.9	-	79	-0.082	9.38	0.137
79	11.693	0.148	2.30	91	1.7	-	79	-0.076	9.07	0.150
80	11.844	0.151	2.29	91	1.8	99	79	-0.077	8.91	0.177
81	11.992	0.148	2.29	92	1.8	-	79	-0.076	8.85	0.197
82	12.144	0.152	2.30	92	1.7	-	79	-0.075	8.85	0.204
83	12.293	0.149	2.29	92	1.7	-	78	-0.077	8.89	0.216
84	12.445	0.152	2.29	92	1.7	-	78	-0.077	8.90	0.230
85	12.594	0.149	2.29	92	1.8	-	78	-0.075	8.66	0.184
86	12.745	0.151	2.29	92	1.7	-	78	-0.074	8.64	0.184
87	12.896	0.151	2.29	93	1.6	-	78	-0.072	8.68	0.211
88	13.047	0.151	2.29	93	1.8	-	78	-0.072	8.66	0.231
89	13.198	0.151	2.30	93	1.8	-	78	-0.076	8.56	0.240
90	13.348	0.150	2.30	93	1.8	97	78	-0.072	8.55	0.258
91	13.499	0.151	2.30	93	1.6	-	78	-0.073	8.34	0.272
92	13.649	0.150	2.30	93	1.8	-	78	-0.073	7.92	0.364
93	13.801	0.152	2.30	93	1.7	-	78	-0.070	7.64	0.450
94	13.950	0.149	2.30	94	1.7	-	78	-0.071	7.49	0.548
95	14.102	0.152	2.30	94	1.8	-	77	-0.072	7.43	0.594

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.251	0.149	2.30	94	1.8	-	77	-0.071	7.46	0.594
97	14.404	0.153	2.30	94	1.8	-	77	-0.070	7.60	0.580
98	14.553	0.149	2.29	94	1.7	-	77	-0.068	7.71	0.556
99	14.707	0.154	2.30	94	1.8	-	77	-0.068	7.81	0.532
100	14.855	0.148	2.30	94	1.6	97	77	-0.069	7.87	0.517
101	15.009	0.154	2.30	94	1.7	-	77	-0.068	7.92	0.516
102	15.157	0.148	2.30	95	1.7	-	77	-0.066	7.79	0.509
103	15.311	0.154	2.31	95	1.7	-	77	-0.069	7.78	0.516
104	15.460	0.149	2.31	95	1.7	-	77	-0.065	7.77	0.525
105	15.612	0.152	2.30	95	1.7	-	77	-0.065	7.82	0.533
106	15.761	0.149	2.31	95	1.7	-	77	-0.065	7.62	0.562
107	15.914	0.153	2.31	95	1.7	-	76	-0.065	7.51	0.579
108	16.063	0.149	2.29	95	1.7	-	76	-0.068	7.33	0.618
109	16.216	0.153	2.31	95	1.6	-	76	-0.066	7.22	0.648
110	16.367	0.151	2.31	96	1.7	99	76	-0.066	7.16	0.666
111	16.519	0.152	2.31	96	1.8	-	76	-0.065	7.10	0.662
112	16.671	0.152	2.31	96	1.7	-	76	-0.063	6.90	0.689
113	16.822	0.151	2.31	96	1.7	-	76	-0.066	6.77	0.726
114	16.974	0.152	2.31	96	1.8	-	76	-0.064	6.82	0.736
115	17.123	0.149	2.31	96	1.7	-	76	-0.063	6.74	0.760
116	17.276	0.153	2.31	96	1.8	-	76	-0.064	6.80	0.720
117	17.425	0.149	2.30	96	1.8	-	76	-0.065	6.90	0.692
118	17.579	0.154	2.30	96	1.7	-	76	-0.062	6.99	0.692
119	17.728	0.149	2.30	96	1.7	-	76	-0.066	7.00	0.698
120	17.883	0.155	2.31	96	1.7	99	75	-0.063	7.00	0.696
121	18.031	0.148	2.31	96	1.7	-	75	-0.064	7.00	0.705
122	18.186	0.155	2.31	96	1.7	-	75	-0.066	7.00	0.713
123	18.335	0.149	2.31	96	1.7	-	75	-0.064	7.07	0.713
124	18.487	0.152	2.31	96	1.7	-	75	-0.066	7.13	0.713
125	18.637	0.150	2.31	96	1.7	-	75	-0.063	7.15	0.706
126	18.790	0.153	2.31	96	1.8	-	75	-0.065	7.11	0.699
127	18.940	0.150	2.31	97	1.7	-	75	-0.065	7.11	0.698

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.093	0.153	2.31	97	1.6	-	75	-0.063	7.28	0.685
129	19.245	0.152	2.31	97	1.8	-	75	-0.062	7.34	0.693
130	19.396	0.151	2.31	97	1.7	96	75	-0.063	7.34	0.688
131	19.549	0.153	2.31	97	1.7	-	75	-0.064	7.32	0.648
132	19.699	0.150	2.32	97	1.7	-	75	-0.061	7.29	0.588
133	19.851	0.152	2.31	97	1.7	-	75	-0.063	7.28	0.593
134	20.001	0.150	2.31	97	1.8	-	75	-0.065	7.24	0.600
135	20.155	0.154	2.30	97	1.7	-	75	-0.065	7.29	0.591
136	20.305	0.150	2.31	97	1.7	-	75	-0.062	7.36	0.578
137	20.459	0.154	2.31	97	1.7	-	75	-0.062	7.37	0.565
138	20.608	0.149	2.31	97	1.7	-	75	-0.065	7.38	0.559
139	20.762	0.154	2.31	97	1.7	-	75	-0.061	7.45	0.548
140	20.912	0.150	2.31	97	1.7	96	75	-0.061	7.53	0.536
141	21.065	0.153	2.31	97	1.7	-	75	-0.061	7.54	0.525
142	21.215	0.150	2.32	97	1.7	-	75	-0.062	7.45	0.506
143	21.367	0.152	2.31	97	1.7	-	75	-0.062	7.48	0.498
144	21.518	0.151	2.31	97	1.7	-	74	-0.062	7.52	0.491
145	21.671	0.153	2.31	97	1.7	-	74	-0.065	7.59	0.477
146	21.823	0.152	2.31	97	1.7	-	74	-0.066	7.63	0.468
147	21.974	0.151	2.31	97	1.7	-	74	-0.061	7.73	0.446
148	22.127	0.153	2.31	97	1.7	-	74	-0.062	7.78	0.433
149	22.277	0.150	2.32	97	1.7	-	74	-0.061	7.83	0.421
150	22.430	0.153	2.32	97	1.7	96	74	-0.063	7.82	0.423
151	22.580	0.150	2.31	97	1.7	-	74	-0.064	7.66	0.430
152	22.734	0.154	2.31	97	1.8	-	74	-0.064	7.54	0.446
153	22.884	0.150	2.31	98	1.7	96	74	-0.062	7.54	0.440
Avg/Tot	22.884	0.150	2.29	87.6	1.7	100	77.1	-0.079	11.33	0.411

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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	0.001		0.69	71	1.7		70
1	0.152	0.151	1.06	71	1.6	-	70
2	0.302	0.150	1.05	70	1.7	-	70
3	0.453	0.151	1.05	70	1.7	-	70
4	0.603	0.150	1.05	71	1.8	-	70
5	0.754	0.151	1.06	71	1.6	-	70
6	0.906	0.152	1.06	71	1.8	-	70
7	1.058	0.152	1.07	71	1.8	-	70
8	1.210	0.152	1.07	71	1.6	-	70
9	1.363	0.153	1.08	72	1.8	-	71
10	1.516	0.153	1.08	72	1.8	101	71
11	1.669	0.153	1.09	72	1.6	-	71
12	1.823	0.154	1.09	72	1.8	-	71
13	1.977	0.154	1.09	73	1.6	-	71
14	2.131	0.154	1.09	73	1.6	-	71
15	2.285	0.154	1.09	73	1.8	-	71
16	2.440	0.155	1.10	73	1.7	-	71
17	2.595	0.155	1.10	74	1.8	-	71
18	2.749	0.154	1.10	74	1.6	-	72
19	2.904	0.155	1.11	74	1.7	-	72
20	3.059	0.155	1.11	74	1.8	103	72
21	3.213	0.154	1.11	74	1.6	-	72
22	3.368	0.155	1.11	75	1.8	-	72
23	3.523	0.155	1.11	75	1.6	-	72
24	3.677	0.154	1.10	75	1.6	-	72
25	3.831	0.154	1.10	75	1.8	-	72
26	3.985	0.154	1.09	76	1.6	-	73
27	4.140	0.155	1.09	76	1.7	-	73
28	4.294	0.154	1.08	76	1.8	-	73
29	4.449	0.155	1.09	76	1.8	-	73
30	4.603	0.154	1.09	77	1.7	103	73
31	4.758	0.155	1.09	77	1.7	-	73

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

	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	4.912	0.154	1.09	78	1.7	-	73
33	5.066	0.154	1.09	79	1.7	-	73
34	5.221	0.155	1.10	79	1.8	-	74
35	5.375	0.154	1.10	79	1.8	-	74
36	5.529	0.154	1.10	80	1.8	-	74
37	5.684	0.155	1.10	80	1.9	-	74
38	5.838	0.154	1.10	80	1.8	-	74
39	5.992	0.154	1.10	80	1.9	-	74
40	6.146	0.154	1.10	81	1.8	102	74
41	6.301	0.155	1.09	81	1.8	-	74
42	6.456	0.155	1.09	81	1.7	-	74
43	6.611	0.155	1.09	82	1.9	-	74
44	6.767	0.156	1.10	82	1.8	-	74
45	6.922	0.155	1.10	82	1.8	-	75
46	7.078	0.156	1.10	82	1.8	-	75
47	7.234	0.156	1.11	83	1.9	-	75
48	7.389	0.155	1.11	83	1.8	-	75
49	7.544	0.155	1.11	83	1.8	-	75
50	7.699	0.155	1.10	84	1.9	104	75
51	7.855	0.156	1.09	84	1.9	-	75
52	8.012	0.157	1.10	84	1.9	-	75
53	8.168	0.156	1.10	84	1.8	-	75
54	8.324	0.156	1.11	85	1.9	-	75
55	8.480	0.156	1.11	85	1.9	-	75
56	8.637	0.157	1.11	85	1.9	-	75
57	8.792	0.155	1.11	85	1.9	-	75
58	8.948	0.156	1.10	86	1.9	-	75
59	9.105	0.157	1.10	86	1.7	-	75
60	9.262	0.157	1.10	86	1.9	104	75
Avg/Tot	9.261	0.154	1.09	77.6	1.8	103	72.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Stove ΔT: 53

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	484	478	306	375	466	421.7	434.1
1	479	472	302	365	466	416.8	379.3
2	474	467	290	354	465	410.2	423.9
3	468	460	277	347	464	403.2	473.2
4	461	452	263	346	464	397.4	526.4
5	455	444	251	352	463	392.8	636.8
6	449	436	239	365	462	390.0	647.0
7	443	428	229	379	460	387.9	649.1
8	439	421	221	395	459	386.7	644.6
9	434	414	214	410	457	385.7	645.0
10	430	408	208	423	455	384.8	667.9
11	427	403	203	434	454	384.2	683.0
12	423	399	200	447	452	384.3	708.6
13	421	397	199	461	450	385.6	729.4
14	420	396	200	477	448	388.1	756.0
15	419	395	202	494	446	391.3	772.9
16	420	396	205	512	444	395.3	804.3
17	421	397	208	530	442	399.8	824.0
18	424	398	212	549	440	404.5	827.2
19	426	400	216	566	438	409.3	851.4
20	429	402	220	582	436	413.9	856.2
21	433	405	224	596	435	418.6	868.6
22	437	408	228	611	433	423.4	883.7
23	442	411	232	623	431	428.0	879.4
24	448	415	237	635	429	432.7	889.2
25	454	419	241	646	428	437.4	891.3
26	460	423	245	656	427	442.2	902.1
27	467	428	250	663	425	446.6	903.1
28	474	432	255	669	424	450.6	901.0
29	481	436	259	675	423	454.8	898.5
30	488	440	264	679	422	458.6	904.8
31	494	445	268	683	421	462.2	902.2
32	501	449	272	686	420	465.5	902.9
33	507	453	277	688	420	468.9	911.3
34	513	458	281	690	419	472.0	897.0
35	518	462	285	689	419	474.5	886.6
36	523	465	289	688	419	476.8	875.6
37	528	469	293	684	419	478.4	873.3
38	532	472	296	681	419	479.9	866.4
39	536	475	299	675	419	480.8	856.7
40	539	478	302	671	420	481.9	853.2
41	543	481	305	665	420	482.7	850.9
42	545	484	308	661	420	483.5	853.4
43	548	486	310	657	421	484.4	846.6
44	550	489	312	651	422	484.7	856.6
45	552	492	315	647	422	485.6	839.8
46	554	495	318	644	423	486.8	838.4
47	556	498	321	640	423	487.6	845.3

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Stove ΔT: 53

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	558	501	324	636	424	488.6	846.3
49	560	504	327	633	425	489.7	843.8
50	562	507	330	629	426	490.8	853.6
51	563	510	332	627	426	491.6	851.0
52	565	514	334	626	427	493.0	855.2
53	566	517	336	625	427	494.3	853.8
54	567	521	338	625	428	495.8	846.7
55	568	525	340	624	429	497.2	853.7
56	570	528	341	624	430	498.6	833.3
57	571	532	344	623	430	500.0	824.5
58	572	536	346	621	431	501.1	817.9
59	574	538	348	619	432	502.1	802.8
60	575	541	350	615	432	502.6	803.0
61	576	543	352	611	433	503.2	778.9
62	578	546	355	607	434	503.7	765.9
63	579	547	356	601	435	503.6	755.8
64	580	548	358	597	436	503.7	748.8
65	580	549	361	592	437	503.9	741.2
66	581	550	364	587	438	503.9	734.0
67	582	551	367	582	439	504.0	724.7
68	582	551	369	576	440	503.8	708.1
69	583	552	371	569	441	503.1	703.4
70	583	552	372	561	443	502.1	689.2
71	582	551	373	553	444	500.6	669.4
72	580	550	373	544	445	498.4	648.0
73	578	548	372	535	446	495.6	632.2
74	575	546	370	525	447	492.6	615.6
75	572	543	368	516	449	489.3	603.0
76	568	539	367	506	450	485.9	598.8
77	564	536	365	496	451	482.4	587.4
78	559	532	364	487	453	478.8	570.7
79	555	528	363	478	454	475.5	563.1
80	550	525	362	468	455	472.1	554.1
81	546	521	362	459	456	468.8	546.2
82	541	518	361	451	458	465.5	538.6
83	536	514	360	444	459	462.6	530.0
84	531	512	359	436	460	459.3	517.8
85	526	509	356	429	461	456.1	511.8
86	522	506	352	422	461	452.5	510.3
87	518	503	349	415	462	449.2	505.0
88	513	500	345	409	463	446.0	499.2
89	509	497	342	404	464	442.9	493.7
90	505	494	338	398	465	439.8	486.5
91	501	490	335	393	465	436.7	483.7
92	497	487	331	388	466	433.5	486.3
93	493	483	327	382	466	430.2	496.6
94	489	480	323	377	467	426.9	492.1
95	485	476	320	371	467	423.7	494.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Stove ΔT: 53

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	481	472	317	366	468	420.5	490.3
97	477	468	314	361	468	417.6	490.9
98	474	464	312	356	469	414.8	492.5
99	470	460	310	351	469	412.2	482.2
100	467	457	309	347	469	409.7	481.2
101	465	453	307	343	470	407.5	472.2
102	462	450	307	340	470	405.5	472.2
103	459	447	306	337	470	403.7	478.5
104	457	444	305	334	470	401.9	467.7
105	455	441	304	330	471	400.1	467.3
106	453	438	303	328	471	398.7	459.7
107	451	436	303	325	471	397.1	449.4
108	449	434	302	323	471	395.7	438.9
109	447	431	301	321	472	394.6	437.0
110	445	429	299	318	472	392.8	430.3
111	444	427	298	316	472	391.3	421.2
112	442	425	297	313	472	389.6	417.6
113	440	422	296	310	472	388.0	421.8
114	438	420	295	307	471	386.3	416.7
115	436	418	294	306	471	384.9	407.7
116	434	416	292	303	471	383.1	403.4
117	433	414	292	300	470	381.6	398.1
118	431	412	290	298	469	380.0	401.8
119	429	410	289	297	469	378.7	410.0
120	428	408	288	295	468	377.2	396.1
121	426	406	287	293	467	375.8	393.5
122	424	405	286	292	466	374.7	388.5
123	423	403	286	290	465	373.3	386.1
124	422	402	286	289	464	372.4	381.3
125	420	400	286	288	463	371.3	380.3
126	419	399	286	287	463	370.5	380.9
127	417	398	286	286	462	369.7	383.9
128	416	397	286	284	461	368.8	383.0
129	415	396	286	283	460	368.0	381.5
130	414	395	287	283	459	367.6	379.0
131	413	394	287	282	459	366.9	376.2
132	412	393	288	281	458	366.4	376.3
133	411	393	288	280	457	365.7	373.7
134	410	392	288	280	456	365.3	373.3
135	410	392	288	279	456	364.9	371.8
136	409	391	289	278	455	364.5	370.0
137	408	391	289	277	455	364.1	369.1
138	408	391	290	276	455	363.9	369.7
139	407	390	291	276	455	363.8	370.4
140	407	390	291	276	455	363.8	371.4
141	407	390	292	275	455	363.8	370.5
142	406	391	293	275	455	363.9	370.2
143	406	391	294	275	455	364.3	371.5

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

Stove ΔT: **53**

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	406	391	295	275	456	364.4	373.5
145	406	391	297	274	456	364.8	371.8
146	406	391	298	274	457	365.1	372.0
147	407	391	299	274	457	365.5	373.1
148	407	391	301	274	457	366.2	374.5
149	408	391	303	274	458	366.7	374.5
150	409	392	305	274	458	367.4	376.0
151	409	392	306	275	458	368.0	374.3
152	410	392	307	275	459	368.5	375.9
153	410	393	308	275	459	369.0	376.0
Average	482.4	455.7	301.1	452.3	449.4	428.2	603.9

LAB SAMPLE DATA - ASTM E2515

Client: Pacific Energy
Model: TN25 C
Run #: 5

Job #: 22-861
Tracking #: 136
Technician: AK
Date: 1/23/2023

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G00441	246.5	248.2	1.7
	B	G00442	222.2	223.9	1.7
	C - 1st Hour	G00443	222.6	224.2	1.6
	Amb	G00444	223.2	223.2	0.0
Probes	**A**	20A	115627.0	115627.0	0.0
	B	20B	115966.7	115966.8	0.1
	C - 1st Hour	20C	113775.9	113775.9	0.0
O-rings	**A**	20A	3559.6	3559.9	0.3
	B	20B	3615.5	3615.6	0.1
	C - 1st Hour	20C	3611.1	3611.2	0.1

Placed in Dessicator on:	

Filters	**A**	248.1	1/25 14:14	248.2	1/27 13:17				
	B	224.0	1/25 14:14	223.9	1/27 13:17				
	C - 1st Hour	224.3	1/25 14:14	224.2	1/27 13:17				
	Amb	223.3	1/25 14:14	223.2	1/27 13:17				
Probes	**A**	115627.1	1/25 14:15	115627.0	1/27 13:17				
	B	115966.8	1/25 14:15	115966.8	1/27 13:17				
	C - 1st Hour	113775.9	1/25 14:15	113775.9	1/27 13:17				
O-Rings	**A**	3559.9	1/25 14:15	3559.9	1/27 13:18				
	B	3615.6	1/25 14:15	3615.6	1/27 13:18				
	C - 1st Hour	3611.2	1/25 14:15	3611.2	1/27 13:18				

Train A Aggregate, mg:	**2.0**
Train B Aggregate, mg:	**1.9**
Train C Aggregate, mg:	**1.7**
Ambient, mg:	**0.0**

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 5 Test Date: 1/23/23

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Fully open
Targeted Burn Category: IV

Preburn Notes

Time	Notes
0:00 41:00 60:00	Set air to test setting, fan on high Stirred coals PB end @ 3.23lb

Test Notes

Test Burn Start Time: 12:20 Test Fuel Loaded by: 35 seconds
Door Closed: 45 seconds Air Control Set at: 0 seconds
Other Loading Notes: Fan on high @ 0 sec

Time	Notes
	- None -

Test Burn End Time: 14:53

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.01 CO (%): 4.306
Mid Gas CO_2 (%): 10.09 CO (%): 2.53

Calibration Results:

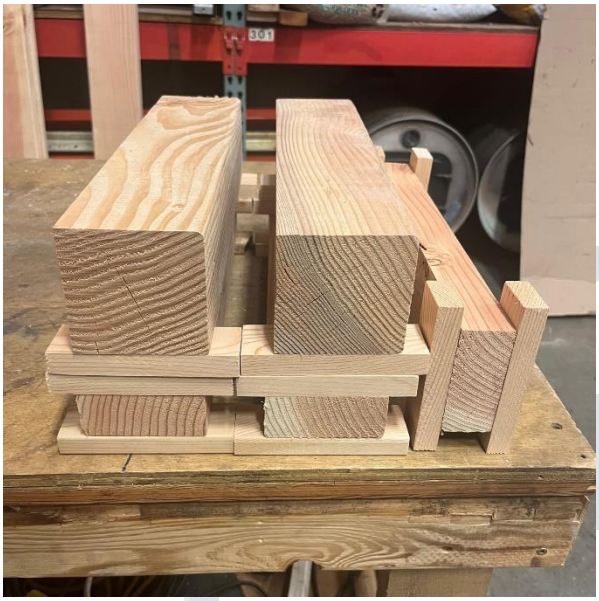
	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	10:31	10:34	10:33	15:15	15:18	15:17
CO_2	0.17	10.20	17.19	0.11	10.18	17.11
CO	0.025	2.553	4.328	0.015	2.561	4.309

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

Technician Signature:  Date: 3/6/23

ASTM E2780 Wood Heater Run Sheets

Client: Pacific Energy Job Number: 22-861 Tracking #: 136
Model: TN20-LE2 Run Number: 5 Test Date: 1/23/23



Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: Date: 3/6/23

ASTM E2515 - Glass Filter Pairs

Sample	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
G00397	247.2	247.1	—	—	SB	22-791	#1-Ample
G00398	247.5	247.4	—	—	SB	↓	↓
G00399	247.1	246.9	—	—	SB	22-791	#2-Ample
G00400	245.8	245.8	—	—	SB	↓	↓
G00401	246.4	246.3	—	—	SB	22-791	#3-Ample
G00402	247.1	247.2	—	—	SB	↓	↓
G00403	246.7	246.7	—	—	SB	22-791	#4-Ample
G00404	246.2	246.1	—	—	SB	↓	↓
G00405	246.8	246.6	—	—	SB	22-791	#5-Ample
G00406	246.4	246.2	—	—	SB	↓	↓
G00407	246.2	246.4	—	—	SB	22-791	#6-Ample
G00408	246.5	246.3	—	—	SB	↓	↓
G00409	247.1	246.9	—	—	SB	IA-445R1	#1
G00410	246.2	246.2	—	—	SB	IA-445R1	#1
G00411	247.2	247.5	247.3	—	SB	↓	↓
G00412	246.3	246.3	—	—	SB	↓	↓
G00413	247.0	247.0	—	—	SB	22-791	#7-Ample
G00414	246.0	246.1	—	—	SB	22-791	#7-Ample

Weight 1 Date/Time:
11/4 - 13:00
Weight 2 Date/Time:
11/7 - 8:30
Weight 3 Date/Time:
11/8 - 12:00
Weight 4 Date/Time:

Sample	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
G00415	245.5	245.7*	245.7	—	SB	22-791	#1 DF
G00416	246.5	246.5	—	—	SB	↓	↓
G00417	246.2	246.2	—	—	SB	22-791	#2 DF
G00418	246.9	246.9	—	—	SB	↓	↓
G00419	247.2	247.2	—	—	SB	22-791	#3 DF
G00420	246.7	246.8	—	—	SB	↓	↓
G00421	246.8	246.8	—	—	SB	23-102	#1
G00422	245.6	245.4	—	—	SB		
G00423	246.4	246.5	—	—	SB		
G00424	247.6	247.7	—	—	SB	↓	↓
G00425	246.6	246.6	—	—	SB	22-861	#1
G00426	246.4	246.5	—	—	SB		
G00427	246.3	246.4	—	—	SB		
G00428	247.4	247.5	—	—	SB		
G00429	246.5	246.4	—	—	SB		#2
G00430	246.3	246.1	—	—	SB		
G00431	246.6	246.8	—	—	SB		
G00432	246.7	246.7	—	—	SB		

Weight 1 Date/Time:
11/14 13:00
Weight 2 Date/Time:
11/18 - 12:00
Weight 3 Date/Time:
Weight 4 Date/Time:

ASTM E2515 - Glass Filter Pairs

Sample	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
G00433	221.9	222.0	-	-	✗	22-861	#3
G00434	223.4	223.5	-	-	↓	↓	↓
G00435	223.4	223.6	-	-	↓	↓	↓
G00436	234.9	235.0	-	-	↓	↓	↓
G00437	244.1	244.3	-	-	↓	22-861	#4
G00438	247.1	247.0	-	-	↓	↓	↓
G00439	233.9	233.9	-	-	↓	↓	↓
G00440	246.7	246.8	-	-	↓	↓	↓
G00441	246.4	246.5	-	-	↓	22-861	#5
G00442	~~222.1~~ 222.1	222.2	-	-	↓	↓	↓
G00443	222.7	222.6	-	-	↓	↓	↓
G00444	223.3	223.2	-	-	↓	↓	↓
G00445	223.2	223.2	-	-	↓	22-741	A1 #1 - Increased CB
G00446	221.0	220.9	-	-	↓	↓	↓
G00447	222.9	222.8	-	-	↓	22-791	A1 #2 - Increased CB
G00448	221.7	221.7	-	-	↓	↓	↓
G00449	220.2	220.1	-	-	↓	22-741	A1 #3 - Increased CB
G00450	220.6	220.5	-	-	↓	↓	↓

Weight 1 Date/Time:
1/13/23
Weight 2 Date/Time:
1/18/23
Weight 3 Date/Time:
Weight 4 Date/Time:

Sample	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
G00451	223.6	223.6	—	—	JB	23-10A	#1
G00452	221.7	221.5	—	—	JB	↓	↓
G00453	221.1	221.1	—	—	JB	23-10A	#2
G00454	221.1	221.0	—	—	JB	↓	↓
G00455	221.2	221.1	—	—	JB	23-10A	#3
G00456	224.3	224.3	—	—	JB	↓	↓
G00457	222.4	222.3	—	—	JB	22-843	#1
G00458	224.7	224.9	—	—	JB	↓	↓
G00459	223.3	223.2	—	—	JB	↓	↓
G00460	223.4	223.6	—	—	JB	↓	↓
G00461	218.8	218.9	—	—	JB	22-843	#2
G00462	220.9	221.0	—	—	JB	↓	↓
G00463	222.3	222.3	—	—	JB	↓	↓
G00464	223.2	223.1	—	—	JB	↓	↓
G00465	223.4	223.6	—	—	JB	22-843	#3
G00466	221.3	221.2	—	—	JB	↓	↓
G00467	222.6	222.6	—	—	JB	↓	↓
G00468	223.3	223.3	—	—	JB	↓	↓

Weight 1 Date/Time:
1/26/23 - 15:30
Weight 2 Date/Time:
1/30/23 - 9:20
Weight 3 Date/Time:
Weight 4 Date/Time:

ASTM E2515 - Probe Samples 11-20

Date:	12/12/22	12/14/22					
Time:	14:40	14:30					
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
11A	116864.8	116864.8	-	-	A	22-835	#1
11B	117338.8	117338.7	-	-	A		
11C	116185.1	116185.0	-	-	A		
12A	116704.9	116704.8	-	-	A	22-835	#2
12B	117771.0	117771.0	-	-	A		
12C	117171.1	117171.1	-	-	A		
13A	117314.1	117314.#3	-	-	A	22-835	#3
13B	116940.6	116940.6	-	-	A		
13C	115649.7	115649.8	-	-	A		
14A	116632.8	116632.9	-	-	A	22-835	#4
14B	116618.87	116618.6	-	-	A		
14C	116530.4	116530.3	-	-	A		
15A	117239.1	117239.3	-	-	A	22-835	#5
15B	116752.0	116752.0	-	-	A		
15C	116847.4	116847.4	-	-	A		

Date:	12/12/22	12/14/22					
Time:	14:45	14:30					
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
16A	116379.6	116379.8	-	-	A	22-861	#1
16B	115860.2	115860.4	-	-	A		
16C	114147.0	114147.9	-	-	A		
17A	116809.6	116809.8	-	-	A	22-861	#2
17B	117139.5	117139.7	-	-	A		
17C	113140.8	113140.9	-	-	A		
18A	117498.8	117499.0	-	-	A	22-861	#3
18B	117330.2	117330.4	-	-	A		
18C	114335.3	114335.1	-	-	N		
19A	117026.5	117026.3	-	-	A	22-861	#4
19B	117012.3	117012.1	-	-	A		
19C	114230.1	114229.9	-	-	A		
20A	115627.2	115627.0	-	-	A	22-861	#5
20B	115966.9	115966.7	-	-	A		
20C	113776.0	113775.9	-	-	N		

ASTM E2515 - O-Ring Samples 11-20

Date:	12/12/22	12/14/22					
Time:	14:20	14:40					
	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
11A	3424.1	3424.2	-	-	A		
11B	4234.5	4234.3	-	-	A		
11C	3589.5	3589.3	-	-	A		
12A	3586.8	3586.6	-	-	A		
12B	3551.6	3551.4	-	-	A		
12C	3617.7	3617.5	-	-	A		
13A	3596.8	3596.6	-	-	A		
13B	3643.3	3643.1	-	-	A		
13C	4410.0	4409.8	-	-	A		
14A	3367.3	3367.1	-	-	A		
14B	3342.3	3342.1	-	-	A		
14C	3446.7	3446.7	-	-	A		
15A	3570.7	3570.6	-	-	A		
15B	3571.9	3571.8	-	-	A		
15C	3397.7	3397.5	-	-	A		

Date:	12/12/22	12/14/22					
Time:	14:30	14:40					
	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
16A	3573.0	3572.9	-	-	A	22-861	#1
16B	3638.7	3638.7	-	-	A		
16C	3601.9	3601.8	-	-	A		
17A	3613.2	3613.0	-	-	A	22-861	#2
17B	3576.6	3569.5	-	-	A		
17C	3597.3	3597.3	-	-	A		
18A	3602.8	3602.7	-	-	A	22-861	#3
18B	3546.4	3546.3	-	-	A		
18C	3529.1	3529.0	-	-	A		
19A	3586.3	3586.4	-	-	A	22-861	#4
19B	3633.7	3633.7	-	-	A		
19C	3615.7	3615.7	-	-	A		
20A	3559.5	3559.6	-	-	A	22-861	#5
20B	3615.0	3615.1	-	-	A		
20C	3611.0	3611.1	-	-	A		

LAB SAMPLE DATA - ASTM E2515

Client: SBI
Model: 1.7R
Run #: 6

Job #: 22-835
Tracking #: 135
Technician: AK
Date: 12/21/2022

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	H0131	188.4	191.5	3.1
	B	H0132	188.1	191.3	3.2
	C - 1st Hour	H0133	188.0	190.7	2.7
	Amb	H0151	89.6	89.7	0.1
Probes	**A**	16A	116379.8	116379.8	0.0
	B	16B	115860.4	115860.4	0.0
	C - 1st Hour	16C	114147.9	114147.9	0.0
O-rings	**A**	16A	3572.9	3572.7	0.0*
	B	16B	3638.7	3638.6	0.0*
	C - 1st Hour	16C	3601.8	3601.8	0.0

#VALUE!

Placed in Dessicator on:	12/25/2022

Filters	**A**	191.6	12/31 12:01	191.5	1/3 9:44			
	B	191.2	12/31 12:01	191.3	1/3 9:44			
	C - 1st Hour	190.6	12/31 12:01	190.7	1/3 9:44			
	Amb	89.7	12/31 12:13	89.7	1/3 9:44			
Probes	**A**	116379.9	12/31 12:08	116379.8	1/3 9:44			
	B	115860.5	12/31 12:08	115860.4	1/3 9:44			
	C - 1st Hour	114148.0	12/31 12:08	114147.9	1/3 9:44			
O-Rings	**A**	3572.9	12/31 12:01	3572.6	1/3 9:45	3572.7	1/4 10:32	
	B	3638.6	12/31 12:01	3638.6	1/3 9:45			
	C - 1st Hour	3601.9	12/31 12:01	3601.8	1/3 9:45			

Train A Aggregate, mg:	**3.1**
Train B Aggregate, mg:	**3.2**
Train C Aggregate, mg:	**2.7**
Ambient Aggregate, mg:	**0.1**

NOTE: Due to a record keeping error, probes and O-rings 16A, 16B, and 16C were neither cleaned nor re-tared prior to use on Run 1 of the test series described in this report. Shown on this page is their analysis following their most recent use prior to Run 1.

As the weighing procedure for tare and final analysis is identical, the final weights shown here are valid for use as tare weights per ASTM E2515, and are used as such for Run 1.

Pre-Conditioning Data

Client:	Pacific Energy	Job #:	22-861
Model:	TN25 C	Tracking #:	136
Date(s):	11/28/22 - 12/21/22	Technician:	AK

Elapsed Time (hrs)	Flue (°F)	Catalyst Exit (°F)	Notes: Indicate initial air setting and any changes in in setting during conditioning, as well as weight and average moisture content of all fuel additions.
0	540	918	+14.3 lb, 20.9% DB, air medium
1	265	401	
2	370	725	
3	294	588	
4	250	375	
5	228	342	
6	517	918	+13.6 lb, 20.6% DB, air medium
7	264	428	
8	374	775	
9	297	770	
10	232	644	
11	549	988	+13.9 lb, 20.8% DB, air medium
12	252	466	
13	309	621	
14	301	602	
15	250	450	
16	222	400	
17	504	837	+12.6 lb, 20.9% DB, air medium
18	270	435	
19	381	775	
20	317	615	
21	260	505	
22	503	914	+13.9 lb, 20.9% DB, air medium
23	301	448	
24	429	777	
25	299	628	
26	201	520	
27	181	399	
28	536	943	+13.3 lb, 20.4% DB, air medium
29	239	383	
30	314	738	
31	192	567	
32	158	421	
33	567	1021	+13.1 lb, 20.9% DB, air medium
34	285	513	
35	372	670	
36	265	477	
37	198	356	
38	549	991	+13.6 lb, 20.8% DB, air medium
39	289	442	
40	394	743	
41	333	640	
42	291	524	
43	280	504	
44	559	966	+13.4 lb, 20.7% DB, air medium
45	272	462	
46	330	763	
47	192	604	
48	165	419	
49	533	959	+13.5 lb, 19.5% DB, air medium
50	281	478	

Signature/Date:  3/6/2023

Sample Calculations – ASTM E2780 & E2515

Client:	Pacific Energy
Model:	TN25 C
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_{Sdb} – Weight of test fuel spacers, dry basis, kg

M_{Cdb}– Weight of test fuel crib, excluding nails and spacers, dry basis, kg

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft^3

M_{FTAdb} - Total weight of fuel crib excluding nails, dry basis, kg

BR – Dry burn rate, kg/hr

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_R – Particulate emissions for test run, g/hr

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

M_{Sdb} – Weight of test fuel spacers, dry basis, kg
ASTM E2780 equation (1)

$$M_{Sdb} = (M_{Swb})(100/(100 + FM_S))$$

Where,

FM_S = average fuel moisture of test fuel spacers, % dry basis

M_{Swb} = weight of test fuel spacers, wet basis, kg

Sample Calculation:

FM_S = 10.6 %

M_{Swb} = 1.5 lbs

0.4536 = Conversion factor from lbs to kg

M_{Sdb} = [(1.5 x 0.4536) (100/(100 + 10.6)

M_{Sdb} = **0.62** kg

M_{Cdb}– Weight of test fuel crib, excluding nails and spacers, dry basis, kg
ASTM E2780 equation (2)

$$M_{Cdb} = \Sigma[(M_{CPnwb})(100/(100 + FM_{CPn}))]$$

Where,

M_{CPnwb} = weight of each test fuel piece n in fuel crib, excluding nails and spacers, wet basis, kg

FM_{CPn} = Average fuel moisture of test fuel n in fuel crib, % dry basis

Sample Calculation (test fuel piece 1):

MC_{Pnwb} = 4.14

FM_{CPn} = 23.4

= 4.1 (100/(100+ 23.4)

= 3.4 lbs

Total dry crib weight, excluding spacers = 10.23 lbs

M_{Cdb} = **4.64** kg

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft^3
ASTM E2780 equation (3)

$$D_{Cdb} = M_{Cdb}/V_C$$

Where,

V_C = Volume of fuel crib, ft^3

Sample calculation:

V_C = 603.8 in^3

1728 = conversion from in^3 to ft^3

D_{Cdb} = 10.23 / 603.8 * 1728

= **29.28** lbs/ft^3

M_{FTAdb} - Total weight of fuel crib excluding nails, dry basis, kg
ASTM E2780 equation (4)

$$M_{FTAdb} = M_{Sdb} + M_{Cdb}$$

Sample calculation:

$$M_{FTAdb} = 0.62 + 4.64$$

$$= \mathbf{5.26} \text{ kg}$$

BR – dry burn rate, kg/hr
ASTM E2780 equation (5)

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

Where,

θ = Total length of test run, min

Sample Calculation:

M_{Bdb} = 5.26 kg
θ = 327 min

$$BR = \frac{60 \times 5.26}{327}$$

BR = **0.97** kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec
ASTM E2515 equations (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:

$$Fp = \frac{6.56}{7.96} = 0.824$$

$$V_s = 0.824 \times 85.49 \times 0.99 \times 0.116 \times \left(\frac{74.4 + 460}{\left(29.88 + \frac{-0.06}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **6.37** 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:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 6.37 \times 0.7854 \times \frac{528}{74.4 + 460} \times \frac{29.88 + \frac{-0.06}{13.6}}{29.92}$$

Q_{sd} = **17407.0** dscf/hr

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

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

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:

$$V_{m(std)} = 17.64 \times 50.619 \times 1 \times \frac{\left(29.88 + \frac{2.35}{13.6}\right)}{(91.2 + 460)}$$

$V_{m(std)}$ = **48.673** dscf

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 49.674 \times 1 \times \frac{\left(29.88 + \frac{2.30}{13.6}\right)}{(92.1 + 460)}$$

$V_{m(std)}$ = **47.688** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 26.35 \times 1.028 \times \frac{\left(29.875 + \frac{0.00}{13.6}\right)}{(64.8 + 460)}$$

$V_{m(std)}$ = **27.204** 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 = 0.0 + 4.2 + 0.1

m_n = **4.3** mg

Using equation for Train B:

m_n = 0.1 + 3.6 + 0.3

m_n = **4** 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:

$$C_s = 0.001 \times \frac{4.3}{48.67}$$

C_s = **0.00009** g/dscf

For Train B

$$C_s = 0.001 \times \frac{4.0}{47.69}$$

C_s = **0.00008** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.1}{27.20}$$

C_r = **0.000004** 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 = (0.000088 - 0.000004) x 17407.0 x 327 /60

E_T = **8.03** g

For Train B

E_T = (0.000084 - 0.000004) x 17407.0 x 327 /60

E_T = **7.61** g

Average

E = **7.82** g

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-min interval of Train 1):

$$PR = \left(\frac{327 \times 1.423 \times 6.37 \times (79.0 + 460) \times (91.2 + 460)}{10 \times 50.619 \times 6.29 \times (74.4 + 460) \times (70.8 + 460)} \right) \times 100$$

PR = **97** %

PM_R – Particulate emissions for test run, g/hr
ASTM E2780 equation (6)

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

E_T (Dual train average) = 7.82 g

θ = 327 min

$PM_R = 60 \times (7.82 / 327)$

PM_R = **1.43** g/hr

PM_F – Particulate emission factor for test run, g/dry kg of fuel burned
ASTM E2780 equation (7)

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

Sample Calculation:

E_T (Dual train average) = 7.82 g

M_{Bdb} = 5.26 kg

PM_F = 7.82 / 5.26

PM_F = **1.49** 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: Pacific Energy
Model: TN25 C
Date: 01/18/23
Run: 2
Control #: 22-861
Test Duration: 327 min

	HHV	LHV
Eff	74.92%	80.97%
Comb Eff	92.74%	92.74%
HT Eff	80.78%	87.31%
Output	14,175	kJ/h
Burn Rate	0.96	kg/h
Grams CO	527	g
Input	18,921	kJ/h
MC wet	17.99	

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
$CO_{2\text{-ult}}$ 19.64
F_0
1.062

Overall Heating Efficiency: 74.92%
Combustion Efficiency: 92.74%
Heat Transfer Efficiency: 80.78%

Heat Output: 13,447 Btu/h 14,175 kJ/h
Heat Input: 17,949 Btu/h 18,921 kJ/h

Burn Duration: 5.45 h

Burn Rate: 2.11 lb/h 0.955 kg/h

Stack Temp: 247.3 Deg. F 119.6 Deg. C

Air Fue
Dry Molecular W
Dry Moles Exhaus
Air Fuel Ratio

Averages	1.15	8.99	1.15	20.27	10.71	119.69	18.21	89.5%	80.6%	72.2%	12.63	1.81
INPUT DATA			Oxygen Calculation			Input Data		Combust Eff	Heat Transfer	Net Eff	Air Fuel	Wet Wt Now
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)	%	%	%	Ratio	Wt
0	6.35	0.79	4.11	301.5%	20.62	16.12	140.2	18.3	87.5%	70.4%	61.7%	23.6	6.35
1	6.34	0.61	2.96	450.4%	20.70	17.44	127.2	18.3	87.0%	66.6%	58.0%	32.4	6.34
2	6.28	0.42	2.08	686.7%	20.78	18.49	136.8	18.4	88.2%	55.4%	48.8%	46.5	6.28
3	6.21	0.34	1.99	742.3%	20.79	18.63	146.6	18.3	89.9%	50.9%	45.8%	50.0	6.21
4	6.15	0.33	3.52	409.3%	20.69	16.99	159.5	18.3	94.0%	64.3%	60.5%	30.4	6.15
5	6.08	0.44	9.58	96.1%	20.28	10.48	183.3	18.2	96.6%	77.4%	74.8%	11.8	6.08
6	6.02	0.37	12.51	52.5%	20.09	7.39	183.2	18.3	97.8%	79.9%	78.1%	9.2	6.02
7	5.99	0.33	14.09	36.3%	19.99	5.74	158.8	18.2	98.2%	82.1%	80.6%	8.2	5.99
8	5.97	0.64	9.65	90.8%	20.26	10.29	150.6	18.3	95.0%	79.8%	75.8%	11.4	5.97
9	5.93	0.67	6.99	156.2%	20.43	13.10	147.9	18.3	93.1%	76.9%	71.6%	15.2	5.93
10	5.89	0.59	7.61	139.3%	20.40	12.49	148.5	18.2	94.4%	77.8%	73.4%	14.3	5.89
11	5.84	0.55	8.92	107.5%	20.31	11.12	154.1	18.2	95.5%	78.9%	75.3%	12.4	5.84
12	5.78	0.50	10.73	75.0%	20.20	9.22	157.3	18.2	96.5%	80.2%	77.4%	10.5	5.78
13	5.75	0.41	12.48	52.5%	20.09	7.41	149.2	18.2	97.5%	81.8%	79.8%	9.2	5.75
14	5.70	0.62	11.65	60.0%	20.13	8.17	152.2	18.2	95.9%	81.1%	77.8%	9.6	5.70
15	5.65	0.67	9.91	85.6%	20.24	10.00	158.0	18.3	94.9%	79.5%	75.4%	11.1	5.65
16	5.59	0.57	10.83	72.4%	20.19	9.08	169.0	18.3	96.0%	79.5%	76.3%	10.3	5.59
17	5.52	0.39	13.07	45.9%	20.05	6.79	183.7	18.3	97.7%	80.2%	78.3%	8.8	5.52
18	5.45	0.42	16.12	18.8%	19.85	3.52	185.4	18.3	97.9%	81.5%	79.8%	7.2	5.45
19	5.40	0.53	16.65	14.3%	19.81	2.89	171.0	18.2	97.4%	82.4%	80.3%	6.9	5.40
20	5.36	0.81	14.32	29.9%	19.94	5.22	159.2	18.2	95.6%	82.0%	78.4%	7.8	5.36
21	5.33	0.92	10.81	67.5%	20.17	8.89	150.0	18.2	93.6%	80.6%	75.5%	10.0	5.33
22	5.29	0.97	8.77	101.7%	20.30	11.04	143.3	18.2	92.0%	79.4%	73.0%	12.0	5.29
23	5.26	0.99	8.28	111.8%	20.33	11.55	139.0	18.2	91.4%	79.2%	72.4%	12.5	5.26
24	5.23	0.95	8.59	105.9%	20.31	11.25	135.6	18.3	92.0%	79.8%	73.4%	12.2	5.23
25	5.20	0.91	9.08	96.6%	20.28	10.74	133.7	18.3	92.7%	80.4%	74.5%	11.7	5.20
26	5.17	0.86	9.65	87.0%	20.25	10.17	132.4	18.3	93.4%	81.0%	75.7%	11.1	5.17
27	5.13	0.83	10.20	78.1%	20.21	9.60	131.2	18.3	93.9%	81.5%	76.5%	10.6	5.13
28	5.09	0.83	10.57	72.4%	20.19	9.21	131.1	18.2	94.1%	81.7%	76.9%	10.3	5.09
29	5.05	0.84	10.96	66.4%	20.16	8.78	131.1	18.3	94.2%	82.0%	77.2%	9.9	5.05
30	5.02	0.84	11.36	60.9%	20.13	8.35	131.7	18.3	94.4%	82.2%	77.5%	9.6	5.02
31	4.98	0.82	11.79	55.7%	20.11	7.91	132.5	18.3	94.7%	82.3%	78.0%	9.3	4.98
32	4.94	0.79	12.27	50.5%	20.08	7.42	133.7	18.3	95.1%	82.5%	78.5%	9.0	4.94
33	4.90	0.75	12.77	45.2%	20.05	6.90	135.3	18.2	95.5%	82.7%	78.9%	8.7	4.90
34	4.85	0.71	13.24	40.8%	20.02	6.43	137.2	18.2	95.8%	82.8%	79.3%	8.4	4.85
35	4.80	0.63	13.61	38.0%	20.00	6.08	139.3	18.2	96.4%	82.8%	79.8%	8.3	4.80
36	4.75	0.66	14.08	33.3%	19.97	5.56	139.8	18.2	96.4%	83.0%	80.0%	8.0	4.75
37	4.71	0.89	13.99	32.0%	19.96	5.52	140.2	18.2	95.1%	82.8%	78.7%	7.9	4.71

el Ratio (A/F)	
Weight (M_d)	29.87
st Gas (N_r):	419.15
o (A/F)	12.01

%HC 0.88

Combustion Efficiency: 92.74%
Total Input (kJ): 103,120 97,805 (Btu)
Total Output (kJ): 77,256 73,274 (Btu)
Efficiency: 74.92%
Total CO (g): 526.56

Moisture of Wood (wet basis): 17.9925
Initial Dry Weight Wt_{do} (kg): 5.21
Moisture Content Dry 21.94

Load Weight (kg): **6.35**

Fuel Heating	**HHV**	**LHV**		**HHV**
Value in kj/kg - CV:	**19,810**	**18,329**	Btu/lb	**8522.5**

71.48	**1.59**	**69.42**	**103163**	**4.06**	**6.87**	**2.74**	**19810.00**	**17.99**	**79.15**	**21.00**	**2.53**	**8.40**	**0.15**	**0.25**	**34.93**
% Wet	**Dry Wt.**	**% Dry**		**Fuel Properties**				**Mw**	**Mass Balance**					**kg Wood per**	
Consumed	**Now**	**Comsumed**	**Total**	**Carbon**	**Hydrogen**	**Oxygen**	**Calorific**	**Moisture**	**(moles/100 mole dry flue gas)**					**100 mole dfp**	
x	**Wt_{dn}**	**y**	**Input**	**/12= [a]**	**/1= [b]**	**/16= [c]**	**Value**	**Fuel Burnt**	**[h]**	**[u]**	**[w]**	**[j]**	**[k]**	**Nk**	**CO_2**
0.00	5.21	0.00	0	4.06	6.87	2.74	19810.00	17.99	78.99	20.95	1.23	4.04	0.09	0.12	33.65
0.14	5.20	0.14	627	4.06	6.87	2.74	19810.00	17.99	78.99	20.95	0.89	2.95	0.06	0.09	33.22
1.07	5.15	1.07	1069	4.06	6.87	2.74	19810.00	17.99	79.02	20.96	0.62	2.08	0.03	0.06	33.60
2.22	5.09	2.22	1032	4.06	6.87	2.74	19810.00	17.99	79.04	20.97	0.58	1.95	0.02	0.06	34.49
3.07	5.05	3.07	1069	4.06	6.87	2.74	19810.00	17.99	79.15	20.99	0.96	3.24	0.02	0.10	37.08
4.29	4.98	4.29	1106	4.06	6.87	2.74	19810.00	17.99	79.50	21.09	2.48	8.42	0.05	0.25	38.84
5.22	4.93	5.22	663	4.06	6.87	2.74	19810.00	17.99	79.73	21.15	3.18	10.85	0.04	0.32	39.52
5.58	4.92	5.58	405	4.06	6.87	2.74	19810.00	17.99	79.85	21.18	3.56	12.15	0.04	0.35	39.79
6.00	4.89	6.00	553	4.06	6.87	2.74	19810.00	17.99	79.42	21.07	2.55	8.62	0.08	0.25	37.97
6.65	4.86	6.65	627	4.06	6.87	2.74	19810.00	17.99	79.23	21.02	1.91	6.40	0.08	0.19	36.86
7.22	4.83	7.22	700	4.06	6.87	2.74	19810.00	17.99	79.31	21.04	2.04	6.87	0.07	0.20	37.56
8.01	4.79	8.01	848	4.06	6.87	2.74	19810.00	17.99	79.41	21.06	2.35	7.94	0.06	0.23	38.21
8.86	4.74	8.86	737	4.06	6.87	2.74	19810.00	17.99	79.55	21.10	2.78	9.43	0.06	0.28	38.80
9.44	4.71	9.44	663	4.06	6.87	2.74	19810.00	17.99	79.71	21.14	3.18	10.84	0.05	0.32	39.37
10.15	4.68	10.15	811	4.06	6.87	2.74	19810.00	17.99	79.56	21.10	3.04	10.29	0.08	0.30	38.50
11.01	4.63	11.01	921	4.06	6.87	2.74	19810.00	17.99	79.42	21.07	2.63	8.86	0.08	0.26	37.92
11.94	4.58	11.94	1069	4.06	6.87	2.74	19810.00	17.99	79.53	21.10	2.82	9.56	0.07	0.28	38.55
13.08	4.52	13.08	1143	4.06	6.87	2.74	19810.00	17.99	79.75	21.15	3.33	11.33	0.05	0.33	39.48
14.15	4.47	14.15	921	4.06	6.87	2.74	19810.00	17.99	79.94	21.20	4.08	13.92	0.06	0.41	39.65
14.87	4.43	14.87	700	4.06	6.87	2.74	19810.00	17.99	79.93	21.20	4.25	14.45	0.07	0.42	39.38
15.51	4.40	15.51	590	4.06	6.87	2.74	19810.00	17.99	79.65	21.13	3.75	12.67	0.11	0.37	38.35
16.01	4.37	16.01	553	4.06	6.87	2.74	19810.00	17.99	79.38	21.05	2.92	9.78	0.12	0.29	37.24
16.58	4.34	16.58	553	4.06	6.87	2.74	19810.00	17.99	79.22	21.01	2.43	8.09	0.12	0.24	36.30
17.08	4.32	17.08	516	4.06	6.87	2.74	19810.00	17.99	79.18	21.00	2.32	7.70	0.13	0.23	35.95
17.58	4.29	17.58	516	4.06	6.87	2.74	19810.00	17.99	79.22	21.01	2.38	7.93	0.12	0.24	36.30
18.08	4.26	18.08	516	4.06	6.87	2.74	19810.00	17.99	79.27	21.03	2.49	8.32	0.11	0.25	36.69
18.58	4.24	18.58	553	4.06	6.87	2.74	19810.00	17.99	79.33	21.04	2.61	8.76	0.11	0.26	37.10
19.16	4.21	19.16	627	4.06	6.87	2.74	19810.00	17.99	79.37	21.05	2.74	9.21	0.11	0.27	37.38
19.80	4.17	19.80	627	4.06	6.87	2.74	19810.00	17.99	79.40	21.06	2.83	9.52	0.11	0.28	37.49
20.37	4.15	20.37	553	4.06	6.87	2.74	19810.00	17.99	79.42	21.07	2.93	9.86	0.11	0.29	37.55
20.87	4.12	20.87	590	4.06	6.87	2.74	19810.00	17.99	79.44	21.07	3.03	10.20	0.11	0.30	37.66
21.52	4.09	21.52	663	4.06	6.87	2.74	19810.00	17.99	79.48	21.08	3.13	10.54	0.11	0.31	37.83
22.16	4.05	22.16	700	4.06	6.87	2.74	19810.00	17.99	79.53	21.10	3.24	10.92	0.10	0.32	38.06
22.87	4.01	22.87	737	4.06	6.87	2.74	19810.00	17.99	79.58	21.11	3.35	11.33	0.10	0.33	38.27
23.59	3.98	23.59	737	4.06	6.87	2.74	19810.00	17.99	79.63	21.12	3.46	11.69	0.09	0.34	38.48
24.30	3.94	24.30	774	4.06	6.87	2.74	19810.00	17.99	79.69	21.14	3.53	11.95	0.08	0.35	38.79
25.09	3.90	25.09	774	4.06	6.87	2.74	19810.00	17.99	79.71	21.14	3.65	12.37	0.09	0.36	38.77
25.80	3.86	25.80	811	4.06	6.87	2.74	19810.00	17.99	79.60	21.11	3.70	12.45	0.12	0.37	38.06

Moisture Content M_{Cwb}: 17.99246

Dry kg : 5.21
CA: 49
HY: 7
OX: 43.9

LHV
7885.2

51.51	**5.20**	**0.68**	**346.27**	**33.17**	**12.19**	**392.84**	**4012.12**	**3032.69**	**2952.33**	**2918.92**	**3833.19**	**3533.97**	**291.36**	**46746.32**	**46928.81**
Moles per kg of Dry Wood					**Moisture**	**Stack Temp**	**Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent**						**Room Temp**		
O_2	**CO**	**HC**	**N_2**	**H_2O**	**Present**	**K**	**CO_2**	**O_2**	**CO**	**N_2**	**CH_4**	**H_2O**	**K**	**CO_2**	**O_2**
132.04	6.44	0.73	647.13	33.07	12.19	413.37	4848.46	3652.68	3552.91	3513.33	4658.94	4251.92	291.43	163.14	482.29
196.08	6.90	0.69	887.97	33.14	12.19	400.32	4308.77	3255.22	3168.55	3132.78	4120.34	3792.65	291.43	143.13	638.29
298.45	6.72	0.50	1275.71	33.52	12.19	409.98	4703.67	3546.09	3449.84	3411.29	4514.35	4128.78	291.54	158.03	1058.35
323.18	5.97	0.35	1371.45	33.82	12.19	419.76	5112.26	3846.10	3739.74	3698.36	4924.05	4475.10	291.48	176.34	1242.98
178.85	3.50	0.22	832.92	34.08	12.19	432.65	5654.41	4242.36	4122.19	4077.18	5471.68	4931.85	291.43	209.69	758.73
42.51	1.78	0.19	322.43	34.14	12.19	456.48	6667.83	4977.66	4830.49	4779.03	6507.19	5777.30	291.37	258.98	211.61
23.35	1.16	0.13	251.81	34.26	12.19	456.37	6658.86	4970.96	4823.99	4772.60	6498.43	5769.53	291.48	263.17	116.08
16.20	0.92	0.11	225.51	34.31	12.19	431.98	5628.47	4223.55	4104.07	4059.22	5445.16	4910.22	291.37	223.94	68.44
40.46	2.53	0.30	312.43	33.91	12.19	423.71	5279.13	3968.35	3857.80	3815.28	5092.00	4616.11	291.43	200.47	160.56
69.07	3.55	0.41	417.61	33.71	12.19	421.09	5170.01	3888.49	3780.70	3738.91	4982.00	4524.03	291.43	190.56	268.58
61.60	2.93	0.33	391.21	33.87	12.19	421.65	5195.32	3907.11	3798.70	3756.74	5007.31	4545.54	291.37	195.14	240.68
47.62	2.34	0.26	340.09	33.99	12.19	427.21	5427.82	4077.12	3962.80	3919.28	5241.97	4741.53	291.37	207.40	194.16
33.36	1.80	0.21	287.76	34.10	12.19	430.48	5567.52	4179.19	4061.31	4016.85	5383.16	4859.16	291.32	216.03	139.42
23.39	1.29	0.15	251.58	34.22	12.19	422.32	5225.29	3929.13	3819.98	3777.81	5037.31	4570.96	291.32	205.74	91.90
26.98	2.06	0.26	262.88	34.01	12.19	425.37	5353.10	4022.62	3910.23	3867.20	5166.27	4678.75	291.32	206.10	108.55
38.26	2.58	0.31	303.98	33.89	12.19	431.15	5591.32	4196.36	4077.82	4033.22	5407.69	4878.87	291.43	212.01	160.57
32.33	2.02	0.24	283.20	34.04	12.19	442.15	6055.55	4534.19	4403.50	4355.89	5879.85	5267.70	291.43	233.45	146.58
20.51	1.19	0.14	240.98	34.24	12.19	456.87	6680.25	4986.41	4838.85	4787.33	6520.45	5787.26	291.48	263.74	102.28
8.67	1.03	0.14	196.68	34.25	12.19	458.54	6753.71	5039.54	4889.99	4838.02	6595.89	5848.29	291.43	267.77	43.70
6.83	1.26	0.17	189.03	34.18	12.19	444.15	6142.44	4597.37	4464.39	4416.21	5968.36	5340.38	291.37	241.90	31.39
13.98	2.17	0.29	213.37	33.94	12.19	432.32	5642.50	4233.77	4113.93	4068.99	5459.38	4921.99	291.37	216.38	59.20
30.64	3.17	0.41	273.38	33.70	12.19	423.15	5258.01	3952.98	3842.99	3800.61	5070.50	4598.44	291.37	195.78	121.10
45.71	4.00	0.51	327.90	33.50	12.19	416.43	4977.60	3747.55	3644.60	3604.12	4788.30	4361.47	291.37	180.71	171.30
50.14	4.31	0.55	343.72	33.43	12.19	412.15	4799.84	3617.03	3518.48	3479.24	4610.04	4210.80	291.37	172.57	181.35
47.52	4.01	0.51	334.74	33.51	12.19	408.76	4655.17	3510.49	3415.44	3377.22	4465.68	4087.68	291.48	168.98	166.83
43.38	3.66	0.46	320.11	33.59	12.19	406.87	4579.14	3454.60	3361.42	3323.73	4389.59	4023.14	291.43	167.99	149.88
39.10	3.29	0.42	305.01	33.69	12.19	405.59	4526.35	3415.71	3323.81	3286.49	4336.92	3978.20	291.43	167.95	133.54
35.20	3.05	0.39	290.98	33.75	12.19	404.32	4471.48	3375.19	3284.61	3247.68	4282.41	3931.34	291.48	167.14	118.79
32.68	2.94	0.38	281.77	33.77	12.19	404.21	4471.12	3375.08	3284.54	3247.60	4281.71	3931.27	291.37	167.64	110.29
30.09	2.89	0.37	272.13	33.78	12.19	404.21	4466.90	3371.81	3281.34	3244.44	4277.84	3927.44	291.48	167.74	101.44
27.67	2.79	0.36	263.28	33.80	12.19	404.82	4494.23	3392.04	3300.92	3263.83	4304.90	3950.84	291.43	169.25	93.85
25.37	2.64	0.34	255.04	33.84	12.19	405.65	4528.64	3417.40	3325.44	3288.11	4339.21	3980.15	291.43	171.32	86.70
23.00	2.43	0.32	246.69	33.89	12.19	406.87	4579.14	3454.60	3361.42	3323.73	4389.59	4023.14	291.43	174.28	79.46
20.66	2.25	0.29	238.40	33.93	12.19	408.48	4647.89	3505.29	3410.46	3372.28	4458.06	4081.74	291.37	177.87	72.43
18.68	2.06	0.27	231.46	33.98	12.19	410.32	4723.82	3561.15	3464.46	3425.75	4533.96	4146.26	291.37	181.78	66.53
17.33	1.79	0.23	227.17	34.06	12.19	412.43	4811.37	3625.50	3526.67	3487.34	4621.59	4220.58	291.37	186.61	62.85
15.30	1.80	0.24	219.46	34.05	12.19	412.98	4836.54	3644.08	3544.64	3505.14	4646.62	4242.06	291.32	187.52	55.77
15.01	2.43	0.33	216.48	33.86	12.19	413.32	4850.38	3654.25	3554.47	3514.86	4660.49	4253.80	291.32	184.59	54.84

SUMS					AVERAGE	SUMS						
487518.74	317328.30	198010.89	516998.24	189916.29	5498.32	25841.72	7462.73	18378.99	77321.35	7485.33	526.56	38.48
Energy Losses (kJ/kg of Dry Fuel)					Total							
Flue Gas Constituent					Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CO	N_2	CH_4	H_2O Comb	H_2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
1844.91	2273.58	649.83	1594.67	587.76	7596.20	0.00	0	0.00	0	0	0.00	0.00
1975.21	2781.81	617.66	1582.88	582.17	8321.15	263.17	81	181.95	363	81	6.11	0.35
1923.82	4351.81	446.30	1612.47	586.26	10137.05	546.92	127	420.42	522	127	10.15	0.43
1711.42	5072.11	313.37	1638.50	590.48	10745.20	559.74	104	455.52	472	104	8.71	0.29
1006.15	3395.96	199.80	1666.37	596.05	7832.75	422.60	64	358.38	646	64	5.29	0.19
512.45	1540.91	171.38	1698.36	606.36	5000.04	279.07	38	241.45	827	38	2.78	0.17
333.62	1201.81	117.82	1704.03	606.26	4342.80	145.43	15	130.53	518	15	1.09	0.07
263.51	915.38	96.48	1676.91	595.79	3840.45	78.59	7	71.32	327	7	0.53	0.04
726.73	1192.00	272.34	1647.73	592.20	4792.04	133.73	28	106.16	419	28	1.98	0.14
1017.27	1561.40	363.39	1634.73	591.08	5627.02	177.97	43	134.79	449	43	3.14	0.21
838.94	1469.69	292.99	1643.09	591.34	5271.87	186.35	40	146.79	514	40	2.90	0.19
671.00	1332.93	236.60	1655.87	593.73	4891.68	209.31	38	170.93	638	38	2.80	0.18
517.10	1155.88	187.09	1665.27	595.17	4475.96	166.54	26	140.66	571	26	1.88	0.12
369.35	950.41	134.36	1661.16	591.65	4004.56	134.10	17	117.43	529	17	1.21	0.08
589.65	1016.62	229.36	1654.52	592.97	4397.77	180.00	33	146.86	631	33	2.36	0.17
740.55	1226.02	281.63	1655.63	595.41	4871.82	226.59	47	179.62	695	47	3.36	0.23
580.27	1233.58	217.12	1675.92	600.15	4687.06	252.88	42	210.41	816	42	3.05	0.21
342.68	1153.67	126.02	1703.73	606.48	4298.60	247.91	27	221.27	895	27	1.92	0.13
296.06	951.56	121.92	1706.28	607.22	3994.52	185.79	19	166.62	736	19	1.34	0.10
361.67	834.80	154.51	1685.29	601.03	3910.59	138.23	18	120.22	562	18	1.25	0.10
622.96	868.21	263.12	1659.12	595.93	4284.92	127.55	26	101.49	462	26	1.81	0.14
907.90	1039.02	368.92	1636.65	591.99	4861.35	135.66	35	100.43	417	35	2.47	0.18
1146.10	1181.81	455.80	1619.26	589.10	5344.08	149.13	44	104.91	404	44	3.12	0.23
1235.10	1195.88	490.08	1610.51	587.26	5472.75	142.54	44	98.07	373	44	3.14	0.23
1147.35	1130.50	454.01	1610.27	585.76	5263.70	137.10	41	95.80	379	41	2.92	0.21
1048.88	1063.97	415.19	1612.26	584.98	5043.15	131.35	38	93.59	385	38	2.67	0.19
942.36	1002.40	372.89	1615.29	584.43	4818.85	134.48	36	98.13	418	36	2.57	0.19
872.13	945.01	346.55	1616.53	583.86	4650.00	147.07	38	108.89	479	38	2.70	0.20
842.24	915.09	336.56	1617.59	583.86	4573.27	144.64	37	107.71	482	37	2.61	0.19
826.92	882.90	333.32	1617.81	583.81	4513.93	125.97	32	93.90	427	32	2.26	0.17
798.86	859.29	324.00	1619.60	584.09	4448.95	132.43	33	99.33	457	33	2.33	0.17
755.19	838.59	307.40	1622.37	584.45	4366.03	146.21	35	110.97	517	35	2.47	0.18
697.26	819.92	284.40	1626.30	584.98	4266.60	150.82	34	116.45	549	34	2.41	0.18
644.36	803.94	263.65	1630.52	585.69	4178.44	155.47	33	122.02	582	33	2.34	0.18
590.38	792.93	241.90	1635.05	586.48	4095.04	152.37	31	121.71	585	31	2.15	0.16
513.78	792.22	208.93	1641.13	587.38	3992.90	156.00	28	128.05	618	28	1.96	0.15
516.76	769.24	213.20	1641.40	587.64	3971.54	155.16	28	126.94	619	28	1.97	0.15
695.16	760.90	294.83	1633.00	587.79	4211.11	172.36	40	132.25	638	40	2.78	0.22

CERTIFIED FOR CANADA AND U.S.A. - MODEL / MODÈLE: TN25 C ■
LISTED ROOM HEATER, SOLID FUEL TYPE.
ALSO FOR USE IN MOBILE HOMES
TESTED TO/ ÉPROUVÉ SELON: CAN/ULC S627-00 AND IN THE USA CONFORMS TO UL 1482-2022

Intertek
ETL#4001507

DO NOT REMOVE THIS LABEL

SN-

- INSTALL AND USE IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.
- CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS, INSTALLATION PERMIT AND INSPECTION IN YOUR AREA.
- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
- USE 6 INCH / 150MM DIAMETER MINIMUM 24 MSG BLACK OR LISTED CONNECTOR.
- CAN BE CONNECTED TO A LINED MASONRY CHIMNEY SUITABLE FOR USE WITH SOLID FUELS.
- DO NOT OBSTRUCT THE SPACE BENEATH THE HEATER.
- SEE LOCAL BUILDING CODE AND MANUFACTURER'S INSTRUCTIONS FOR PRECAUTIONS REQUIRED WHEN PASSING A CHIMNEY THROUGH A COMBUSTIBLE WALL OR CEILING.
- DO NOT PASS A CHIMNEY CONNECTOR THROUGH A COMBUSTIBLE WALL OR CEILING.
- MINIMUM CLEARANCE BETWEEN SINGLE WALL CHIMNEY CONNECTOR AND COMBUSTIBLE MATERIALS-18INCHES/455MM. CLEARANCE MAY BE REDUCED BY THE USE OF LISTED PIPE SHIELDS, WALL PROTECTORS OR OTHER MEANS APPROVED BY LOCAL BUILDING OR FIRE OFFICIALS.
- COMPONENTS REQUIRED FOR MOBILE HOME AND ALCOVE INSTALLATION: OUTSIDE AIR KIT.
  BOTH CHIMNEY SYSTEM AND CONNECTOR MUST BE LISTED TO:
  IN CANADA - ULC S-641 LISTED CONNECTOR AND ULC-S-629 LISTED CHIMNEY
  IN USA - UL-103 HT LISTED CONNECTOR AND CHIMNEY
- USE COMPONENTS SPECIFIED IN PACIFIC ENERGY INSTALLATION INSTRUCTIONS.
- OPTIONAL COMPONENT - BLOWER(TRNO.19BLOWA), FAN ELECTRICAL RATING: 115V, 60HZ, 0.5 AMP.
- CAUTION: RISK OF EXCESSIVE TEMPERATURES - KEEP ASH DUMP CLOSED DURING FIRING OF THE HEATER. • DO NOT ROUTE POWER CORD BENEATH HEATER.
- OPERATE ONLY WITH FEED DOOR CLOSED. OPEN TO FEED FIRE ONLY.
- KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIALS WELL AWAY FROM HEATER.
- REPLACE GLASS ONLY WITH CERAMIC GLASS.
  HORIZONTAL CONNECTOR NOT PERMITTED IN MOBILE HOMES
- ✞ AS TESTED - PIPE SHIELD MAY BE REQUIRED BY LOCAL AUTHORITIES.
- * ALCOVE SIZE : DEPTH - 3 FT. / .91 M MAX., HEIGHT 7 FT. / 2.1 M MIN., WIDTH 38 IN. / .97 M MIN. COMBUSTIBLE FLOOR MUST BE PROTECTED BY A CONTINUOUS NON-COMBUSTIBLE MATERIAL EXTENDED TO THE FRONT, SIDES AND BACK AS INDICATED.
- FOR USE WITH SOLID WOOD FUEL ONLY. STOVE DESIGNED TO BURN CORDWOOD ONLY. BURNING OTHER MATERIALS MAY CAUSE DAMAGE TO STOVE OR HOME AND MAY MAKE THE CATALYST IN THE COMBUSTOR INACTIVE.
- 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 INCONSISTANT WITH THE OPERATING INSTRUCTIONS IN THE OWNER'S MANUAL
  • THE COMBUSTOR IS FRAGILE, HANDLE CAREFULLY • COMBUSTOR: PART #CC801

HOT WHILE IN OPERATION. DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS.// CHAUD LORSQU'EN OPÉRATION. NE PAS TOUCHER, TENEZ LES ENFANTS ET LES VÊTEMENTS BIEN À L'ÉCART. LE CONTACT PEUT CAUSER DES BRÛLURES À LA PEAU. CONSULTEZ LA PLAQUE CE CONSTRUCTEUR ET LES INSTRUCTIONS.

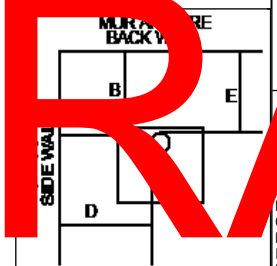
U.S. ENVIRONMENTAL PROTECTION AGENCY.
Certified to comply with 2020 crib wood particulate emission standards, using test Method 28R // Certifié conforme aux normes sur les émissions de particules de 2020.

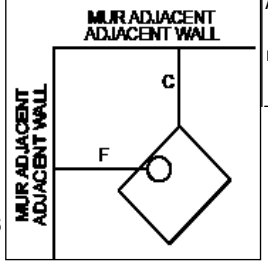
1.1 g/hr

080223

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS/ DÉGAGEMENTS MINIMALES AUX MATÉRIAUX COMBUSTIBLES

A. SIDEWALL TO UNIT/ MUR DE CÔTE / APPAREIL
B. BACKWALL TO UNIT/ MUR DE FOND / APPAREIL
C. CORNER TO UNIT/ COIN / APPAREIL
D. SIDEWALL TO CONNECTOR/ MUR DE CÔTE / RACCORD
E. BACKWALL TO CONNECTOR/ MUR DE FOND / RACCORD
F. CORNER TO CONNECTOR/





RESIDENTIAL INSTALLATION USING SINGLE WALL CONNECTOR/ INSTALLATION RÉSIDENTIELLE UTILISANT UN RACCORD DE MUR SIMPLE

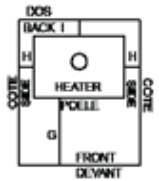
A.	12 IN. / 305 MM
B.	✞12 IN. / 305 MM
C.	8 IN. / 203 MM
D.	19.5 IN. / 495 MM
E.	✞15.25 IN. / 381 MM
F.	16 IN. / 432 MM

RESIDENTIAL CLOSE CLEARANCE INSTALLATION USING DOUBLE WALL CONNECTOR/ INSTALLATION RÉSIDENTIELLE AVEC DÉGAGEMENT MINIMAL, UTILISANT UN RACCORD DE MUR DOUBLE

A.	8 IN. / 203 MM
B.	5 IN. / 127 MM
	3 IN. / 76 MM
	15.5 IN. / 394 MM
	8.25 IN. / 210 MM
F.	11 IN. / 279 MM

	ALCOVE INSTALLATION USING DOUBLE WALL CONNECTOR/ INSTALLATION EN ALCÔVE UTILISANT UN RACCORD DE MUR DOUBLE	MOBILE HOME INSTALLATION USING DOUBLE WALL CONNECTOR/ INSTALLATION EN MAISON MOBILE UTILISANT UN RACCORD DE MUR DOUBLE
A.	8 IN. / 203 MM	8 IN. / 203 MM
B.	5 IN. / 127 MM	5 IN. / 127 MM
C.	N/A	3 IN. / 76 MM
D.	15.5 IN. / 394 MM	15.5 IN. / 394 MM
E.	8.25 IN. / 210 MM	8.25 IN. / 210 MM
F.	N/A	11 IN. / 279 MM

IN CANADA	G.	18 INCHES / 457 MM
AU CANADA	H.	8 INCHES / 200 MM
	I.	8 INCHES / 200 MM
IN U.S.A.	G.	16 INCHES / 405 MM
	H.	3.5 INCHES / 89 MM
	I.	0 INCHES / 0 MM



(Type 1 floor protector - approved to UL1618) Minimum 20GA steel

- INSTALLEZ ET UTILISEZ SELON LES INSTRUCTIONS D'INSTALLATION ET D'OPÉRATION FOURNI AVEC L'APPAREIL..
- CONTACTEZ LES OFFICIELS DE LA CONSTRUCTION OU DE SERVICE D'INCENDIE POUR DES INFORMATIONS QUANT AUX RESTRICTIONS. PERMIS D'INSTALLATION ET INSPECTIONS DANS VOTRE RÉGION.
- NE RELIEZ PAS CET APPAREIL À UN CONDUIT DE CHEMINÉE DESSERVANT DÉJÀ UN AUTRE APPAREIL
- UTILISER UN TUYAU DE RACCORDEMENT DE 6 PO (150 MM) DIAM., HOMOLOGUÉ OU NOIR 24 MSG (MIN.)
- PEUT ÊTRE CONNECTÉ À UNE CHEMINÉE DE MAÇONNERIE GAINÉ PRÊTE À L'EMPLOI AVEC DES COMBUSTIBLES SOLIDES.
- N'OBSTRUEZ PAS L'ESPACE SOUS LE CAISSON DU POÊLE
- CONSULTEZ LE CODE LOCAL DE CONSTRUCTION ET LES INSTRUCTIONS DU FABRICANT QUANT AUX PRÉCAUTIONS À PRENDRE LORSQUE VOUS FAITES PASSER UNE CHEMINÉE À TRAVERS D'UN MUR OU D'UN PLAFOND COMPOSÉS DE MATÉRIAUX COMBUSTIBLES.
- LE TUYAU DE RACCORDEMENT DE CHEMINÉE NE DOIT PAS TRAVERSER UN MUR OU PLAFOND EN MATÉRIAUX COMBUSTIBLES.
- DÉGAGEMENT MINIMAL ENTRE UN RACCORDEMENT DE CHEMINÉE À SIMPLE PAROIS ET UN MUR ET TOUT MATÉRIEL COMBUSTIBLE - 18 POUCES / 455 mm. CE DÉGAGEMENT PEUT ÊTRE RÉDUIT EN UTILISANT DES PROTECTEURS DE TUYAUX CLASSÉS, PROTECTEURS DE MUR OU AUTRES MOYENS APPROUVÉS PAR LES OFFICIELS DE LA CONSTRUCTION OU DU SERVICE D'INCENDIE DE VOTRE RÉGION.

CONNECTEUR HORIZONTAL NON PERMIS DANS MAISONS MOBILES
S R ATION EN MAISON MOBILE OU EN ALCÔVE: PRISE D'AIR EXTÉRIEUR ET L'UN DES RACCO S SUIVANTS: EN COMBINAISON AVEC L'UN DES SYSTÈMES DE CHEMINÉE COMPATIBLES SUIVANTS
CANADA-TUYAU DE CCORDEMENT HOMOLOGUÉ ULC S-641 ET CHEMINÉE HOMOLOGUÉE ULC S-629.
ÉTATS-UNIS - TUYA E RACCORDEMENT ET CHEMINÉE HOMOLOGUÉS UL-103HT.
OSANTS OPTIONNE VENTILATEUR (WODC.BLOW), ALIMENTATION ÉLECTRIQUE DU VENTILATEUR : 115 V, 60 HZ, 0.5 AMP. LE CORDON D'ALI TATION ÉLECTRIQUE NE DOIT PAS ÊTRE PLACÉ SOUS LE POÊLE.
LE FIL ÉLECTRIQUE NE PAS ÊTRE PLACÉ SOUS LE POÊLE

- ATTENTION: RISQUE DE PÉRATURES EXCESSIVES - GARDES LE TIROIR DE CENDRES FERMÉ PENDANT L'ALLUMAGE DU POÊLE.
- OPÉREZ SEULEMENT LO UE LA PORTE D'ALIMENTATION EST FERMÉE. • OUVREZ SEULEMENT POUR ALIMENTER LE FEU.
- GARDEZ LES MEUBLES UTRES MATÉRIAUX COMBUSTIBLES BIEN ÉLOIGNÉS DU POÊLE.
- REMPLACES LA VITRE AVEC UNIQUEMENT DE LA VITRE CÉRAMIQUE.

CONNECTEUR HORIZONTAL NON PERMIS DANS MAISONS MOBILES
✞ TEL QUE TESTÉ: UN ISOLANT THERMIQUE POUR TUYAU PEUT ÊTRE EXIGÉ PAR LES AUTORITÉS LOCALES. * DIMENSIONS D'ALCÔVE EN MATÉRIAUX COMBUSTIBLES: PROFONDEUR MAX.: 3 PIEDS (0,91 M), HAUTEUR MIN.: 7 PIEDS (2,1 M), LARGEUR MIN.: 43 PO (1,09 M).
LE PLANCHER COMBUSTIBLE DOIT ÊTRE PROTÉGÉ PAR UN MATÉRIEL NON-COMBUSTIBLE TOUT D'UNE PIÈCE QUI DOIT S'ÉTENDRE DE PAR LE DEVANT, LES COTÉS ET L'ARRIÈRE TEL QU'INDIQUÉ.
. POUR UTILISATION AVEC BOIS SOLIDE SEULEMENT. LE POELE CONÇU POUR BRÛLER BOIS DE CORDE SEULEMENT. LA COMBUSTION D'AUTRES MATÉRIELS PEUT.
CET APPRAREIL DE CHAUFFAGE AU BOIS DOIT FAIRE L'OBJETD'ENTRETIENS ET D'INSPECTIONS PÉRIODIQUES POUR UN FONCTIONNEMENT ADÉQUAT. CONSULTEZ LE MANUEL D'UTILISATION POUR PLUS D'INFORMATION.

CAUTION

MANUFACTURED BY/ FABRIQUÉ PAR:
PACIFIC ENERGY FIREPLACE PRODUCTS LTD.
2975 ALLENBY RD., DUNCAN, BC V9L 6V8

PACIFIC ENERGY

DATE OF MANUFACTURE/ DATE DE MANUFACTURE

J	F	M	A	M	J	J	A	S	O	N	D
		2023		2024		2025		2026		2027	

MADE IN CANADA/ FABRIQUÉ AU CANADA

IMPORTANT:
THESE INSTRUCTIONS ARE TO REMAIN WITH THE HOMEOWNER
SAVE THESE INSTRUCTIONS

TRUE NORTH

INSTALLATION AND OPERATING INSTRUCTIONS

SERIAL #

SAFETY NOTICE:

If this stove is not properly installed, a house fire may result. For your safety, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.

TESTED and LISTED to ULC S627 / UL 1482
Meets the U.S. Environmental Protection Agency's May 2020 Cribwood Particulate Emission Standards

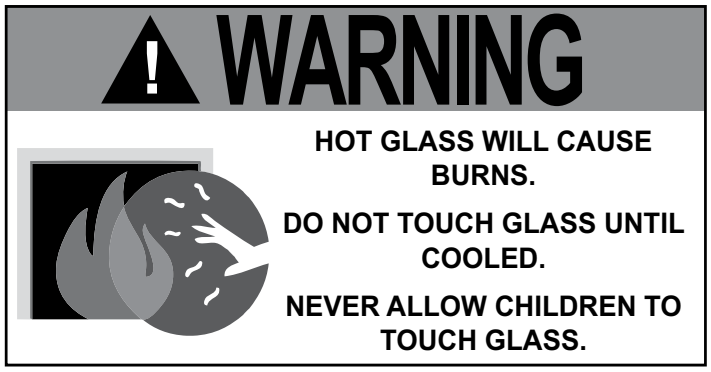
ETL LISTED c US Intertek

We endorse NFI NATIONAL FIREPLACE INSTITUTE A CERTIFICATION AGENCY

Wood Energy Technical Training www.wettinc.ca

MODEL: TN25C
SERIES: A

Contents



PLEASE SAVE THESE INSTRUCTIONS

This manual describes the installation and operation of the True North, TN20 Series B Freestanding wood heater. This heater meets the 2020 U.S. Environmental Protection Agency's crib wood emission limits for wood heaters sold after May 15, 2015. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 13,150 to 28,350 Btu/hr.

NOTE: WE STRONGLY RECOMMEND THAT SMOKE AND CARBON MONOXIDE DETECTORS BE INSTALLED IN THE AREA WHERE THE HEATER IS TO BE INSTALLED.
If smoke detectors have been previously installed, you may notice that they are operating more frequently. This may be due to curing of stove paint or fumes caused by accidentally leaving the fire door open. Do not disconnect the detectors.

SAFETY NOTICE: If this stove is not properly installed, a house fire may result. For your safety, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in you area.
Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury, or even death.

Specifications

Efficiency and BTU Output

EPA Certified Emissions	1.1 grams per hour
LHV Tested Efficiency 1	75%
HHV Tested Efficiency 2	76%
EPA BTU Output 3	13,500 to 29,200 btu/hr
Peak BTU/Hr Output 4	29,200
Maximum Wood Length	20 inches
Ideal Wood Length	18 inches
Fuel	Seasoned Cord wood

1 Weighted Average Lower Heating Value (LHV) efficiency as tested using CSA B415 Performance testing of solid-fuel-burning heating appliances. LHV assumes the moisture is already in a vapour state so there is no loss of energy

2 Weighted Average Higher Heating Value (HHV) efficiency as tested using CSA B415 Performance testing of solid-fuel-burning heating appliances. HHV includes the energy required to vaporize the water in the fuel

3 The range of BTU outputs is based on efficiency using CSA B415 Performance testing of solid-fuel-burning heating appliances and burn rates from the low and high EPA tests using Douglas Fir dimensional lumber.

4 The Peak BTU/hr is based on efficiency using CSA B415 Performance testing of solid-fuel-burning heating appliances, the Maximum one hour High burn rate from the High Burn EPA test and the BTU content of cord wood (8600 btu/lb).

Experience will give you the right settings for proper combustion and efficient burning for the wood you are using. Remember the correct air inlet setting is affected by variables such as type of wood, outside temperature, chimney size and weather conditions. With practice, you will become proficient in operating your heater and will obtain the performance for which it was designed.

Safety and Maintenance

WARNING: Never use chemicals or any other volatile liquid to start a fire. Do not burn garbage, or flammable fluids such as gasoline, naptha, or engine oil.

WARNING: ONLY USE MATERIALS SUPPLIED BY MANUFACTURER WHEN DOING MAINTENANCE OR REPLACEMENTS.

1. Burn only dry and well seasoned cord wood. The denser or heavier the wood when dry, the greater its heat value. This is why hardwoods are generally preferred. Green or wet wood will cause a rapid buildup of creosote. If you feel it is necessary to burn wet or unseasoned wood, do so only with the air inlet set open enough to maintain a good strong fire and fairly high chimney temperatures. Do not attempt to burn overnight using green wood or wet wood. Wet wood can cause up to 25% drop in heater output, as well as contributing significantly to creosote buildup.

2. Remove ashes frequently. Embers can roll out the door and create a fire hazard. Maintain a 1"(25mm) minimum ash base.

3. If glass becomes darkened through slow burning or poor wood, it can readily be cleaned with fireplace glass cleaner when stove is cold. Never scrape with an object that might scratch the glass. The type and amount of deposit on the glass is a good indication of the flue pipe and chimney buildup. A light brown dusty deposit that is easily wiped off usually indicates good combustion and dry, well-seasoned wood and therefore relatively clean pipes and chimney. On the other hand, a black greasy deposit that is difficult to remove is a result of wet and green wood and too slow a burning rate. This heavy deposit is building up at least as quickly in the chimney.

4. DOOR GASKETS - The gasket used for the True North (5/8"(16mm) medium density fiberglass rope) requires only light pressure to seal. This will prolong seal life. It is important that the door seal be maintained in good condition. Periodically inspect seals and replace if necessary. Follow instructions included in the Gasket kit obtainable from your nearest True North dealer.

5. DOOR GLASS - Do not slam loading door or otherwise impact glass. When closing door, make sure that no logs protrude to impact the glass. If the glass gets cracked or broken, it must be replaced before using the stove. Replacement glass can be obtained from your dealer. Use 9-1/4"(235mm) x 13-1/4"(337mm) x 5 mm. Ceramic glass only. Do not substitute with any other type.

- -To remove broken glass, undo the four retaining screws and remove clamps, noting position for re-assembly. Remove all particles of glass. Be careful as they are very sharp. Install new glass complete with gasket. Replace clamps and screws.

CAUTION:

- do not overtighten, tighten screws very carefully
- do not clean glass when hot
- do not use abrasive cleaners on glass

6. The area where boost combustion air enters the firebox must be kept clear of excessive ash buildup which will block air flow. This area is at the front of the firebox.

7. Do not store wood within heater installation clearances, or within the space required for fuel loading and ash removal. Keep the area around the heater clean and free of loose combustibles, furniture, newspapers, etc.

8. Establish a routine for the fuel, wood burning and Lighting techniques. Check daily for creosote buildup in the firebox, until you are experienced and are operating the stove cleanly and safely.

9. Be aware that the hotter the fire, the less creosote is deposited. More frequent chimney cleaning may be necessary in mild weather or when burning "wet" or unseasoned wood.

10. Instruct all members of your family on the safe operation of the heater. Ensure they have enough knowledge of the entire system if they are expected to operate it. Stress the section on chimney fires and the importance of following the steps outlined "In Case of Chimney Fire".

Maintenance Checks

Check the following parts for damage such as cracks, excessive corrosion, burned out sections and excessive warping:

Weekly:

- Firebrick - Visual, for cracking.
- Door Gasket - sagging, placement, damage.

Monthly

- Brick rail tabs and brick rails.
- Back side of airwash chamber.
- Boost tube cover.
- Top baffle board.
- Baffle Tubes.

As Needed

- It is recommended that the chimney be inspected a minimum of every 2 months and cleaned as needed a minimum of 2 times a year.

When Cleaning the Chimney System:

- Top heat shield and mounting bolt.
- Brick Rails.
- Manifold.

- Replace the baffle tubes if they show signs of cracking or breakage.

- Please contact your Dealer for replacement parts if you experience any of the damage listed above. Continuing to operate your stove with broken parts may accelerate damage to other parts and will void your warranty

Blower:

- The blower should be cleaned out a minimum every six months by using a vacuum on the grill openings in the back and bottom of the blower casing to remove any dust and debris.

Chimney Smoke and Creosote Formation

When wood is burned slowly, it produces tar and other organic vapours, which combine with expelled moisture to form creosote. The creosote vapours condense in the relatively cool chimney flue of a slow burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney connector and chimney should be inspected periodically (at least once every two months) during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated (3 mm. or more), it should be removed to reduce the risk of a chimney fire.

1. Highest smoke densities and emissions occur when a large amount of wood is added to a bed of hot coals and the air inlet is closed. The heated wood generates smoke, but without ample air, the smoke cannot burn. Smoke-free, clean burning requires small fuel loads, two or three logs at a time or 1/4 to 1/2 of fuel load and leaving the air inlet relatively wide open, especially during the first 10 to 30 minutes after each loading, when most of the smoke generating reactions are occurring. After 30 minutes or so, the air inlet can be turned down substantially without excessive smoke generation. Wood coals create very little creosote-producing smoke.

2. The cooler the surface over which the wood smoke is passing, the more creosote will be condensed. Wet or green wood contributes significantly to creosote formation as the excess moisture that is boiled off cools the fire, making it difficult for the tars and gases to ignite, thus creating dense smoke and poor combustion. This moisture-laden smoke cools the chimney, compounding the problem by offering the smoke the ideal place to condense.

In summary, a certain amount of creosote is inevitable. Regular inspection and cleaning is the solution. The use of dry, seasoned wood and ample combustion air will help to minimize annoying smoke emissions and creosote buildup.

Chimney Fires

The dangerous side effect of excessive creosote buildup is a chimney fire. This causes much higher than normal temperatures in the chimney and on its exterior surfaces. Temperatures inside the chimney can exceed 2000°F (1100°C). Ignition of nearby or touching combustible material is more likely during a chimney fire. Proper clearances are critical to prevent damage during such a fire.

Chimney fires are easy to detect; they usually involve one or more of the following:

- Flames and sparks shooting out of the top of the chimney
- A roaring sound
- Vibration of the chimney

To Avoid a Chimney Fire

1. Burn wood cleanly. Do not burn wet wood or turn down the unit too quickly after loading.

2. Do not let creosote build up to a point where a chimney fire is possible.

3. Do not have fires in the heater that may ignite chimney fires. These are excessively hot fires, such as when burning household trash, cardboard, Christmas tree limbs, or even ordinary fuel wood; (e.g. with a full load on a hot bed of coals and with the air inlet wide open for more time than is needed to completely char a fresh fuel load.)

4. The Chimney and connector pipe should be inspected /cleaned periodically.

In the event of a Chimney Fire

Have a fire extinguisher handy. Contact your local. municipal or state/provincial fire authority for further information on how to handle a chimney fire. It is most important that you have a clearly understood plan on how to handle a chimney fire.

5. Close down the air inlet on the stove.

6. Call the local fire department.

7. Prepare to evacuate to ensure everyone's safety. Have a well understood plan of action for evacuation. Have a place outside where everyone is to meet.

8. After the chimney fire is out, the chimney must be cleaned and checked for stress and cracks before starting another fire. Also check combustibles around the chimney and the roof. The services of a competent or certified installer, (certified by the Wood Energy Technical Training program (WETT) - in Canada, National Fireplace Institute (NFI) - in U.S.A., are strongly recommended.

Operation

CAUTION: Hot while in operation. Keep children, clothing and furniture away. Contact may cause skin burns.

WARNING: Always keep loading door closed when burning. This heater is not designed for open door burning.

WARNING: No alteration or modification of the combustion air control assembly is permitted. Any tampering will void warranty and could be very hazardous.

WARNING: Do not use grates or andirons to elevate the fuel. Burn directly on the fire bricks. Replace broken or missing bricks. Failure to do so may create a hazardous condition.

WARNING: 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 in use.

Your True North heater is designed for maximum overall efficiency at a moderate firing rate. Over firing the appliance will shorten the life of the product. Failure to rectify an over firing condition can be hazardous and may void the manufacturer's warranty. Too slow a burn may contribute to creosote buildup and lowers combustion efficiency.

Wood Selection

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

Wood should be properly air dried (seasoned) for six months or more. Wet or damp wood will cause the fire to smoulder and produce large amounts of smoke and creosote. Wet wood also produces very little heat and tends to go out often. Wood should be stored under cover away from open flame or heat sources.

DO NOT BURN:

• Salt water wood *	• Treated wood
• Wet or green wood	• Coal/charcoal
• Garbage*	• Solvents
• Lawn clippings/yard waste	• Unseasoned wood
• Railroad ties	• Manure or animal remains
• Materials containing rubber, including tires	• Materials containing plastic
• Waste petroleum products, paints or paint thinners, or asphalt products	• Materials containing asbestos
• Construction or demolition debris	• Paper products, cardboard, plywood, or particleboard.

*** These materials contain chlorides which will rapidly destroy metal surfaces and void warranty.**

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

The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater.

Do not burn anything but cordwood. Other fuels, e.g. lump charcoal, can produce large amounts of carbon monoxide, a tasteless, odourless gas that can kill. Under no circumstances should you attempt to barbecue in this heater.

How to Test Your Wood

Add a large piece of wood to the stove when it has a good large bed of coals. It is dry if it is burning on more than one side within one minute. It is damp if it turns black and lights within three minutes. If it sizzles, hisses and blackens without igniting in five minutes it is soaked and should not be burned.

Lighting a Fire

Remove the retaining clip on the front of the baffle before lighting for the first time.

1. Move air control lever to the left-most position (maximum firing rate) and open door.

2. Place crumpled newspaper in the centre of the heater and crisscross with several pieces of dry kindling. Add a few small pieces of dry wood on top.

3. Ignite the paper and leave the door ajar approximately 1/2"(13mm) - 1"(25mm) until the wood kindling is fully engulfed in flame. DO NOT LEAVE UNATTENDED.

4. After the kindling is fully engulfed add a few small logs. Close door.

5. Begin normal operation after a good coal base exists and wood has charred.

Normal Operation

WARNING: This wood heater need periodic inspection and repair for proper operation. 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 the operating instructions in this manual.

1. Set air control to a desired setting. If smoke pours down across the glass (waterfall effect) this indicates you have shut the control down too soon or you are using too low a setting. The wide range control panel makes finding the desired setting for your application easy. As every home's heating needs vary (i.e.. insulation, windows, climate, etc.) the proper setting can only be found by trial and error and should be noted for future burns.

2. To refuel, adjust air control to high, and give the fire time to brighten. Open the door slowly, this will prevent back puffing.

3. Use wood of different shape, diameter and length (up to 18" (457mm)). Load your wood and try to place the logs so that the air can flow between them. Always use dry wood.

4. Do not load fuel to a height or in such a manner that would be hazardous when opening the door.

5. For extended or overnight burns, un-split logs are preferred. Remember to char the wood completely on maximum setting before adjusting air control for overnight burn/low burn. (see step 1 concerning "waterfall effect")

Restarting After Extended or Overnight Burns

1. Open door and rake hot embers towards the front of the heater. Add a couple of dry, split logs on top of embers, close door.

2. Adjust air control to high (control lever to the left) and in just a few minutes, logs should begin burning.

3. After wood has charred, reset air control to desired setting.

4. To achieve maximum firing rate, set air control lever to the left-most position. Do not use this setting other than for starting or preheating fresh fuel loads.

DO NOT OVER FIRE THIS HEATER: Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to the heater and chimney.

Proper Draft

1. Draft is the force that pulls air into the appliance and up through the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors.

2. Too much draft may cause excessive temperatures in the appliance. An uncontrollable burn or a glowing red stove part or chimney indicates excessive draft.

3. Inadequate draft may cause back puffing into the room and plugging of the chimney. Smoke leaking into the room through appliance and chimney connector joints indicates inadequate draft.

Curing of the Paint Finish

To achieve the best finish, the paint on your stove must be baked on. Follow the Paint Curing instructions. When burning your stove for the first 2-3 times it is very important that the room be well ventilated. Open all windows and doors. Smoke and fumes caused by the curing process may cause discomfort to some individuals.

Ash Removal

Caution: Ashes are to be removed only when the heater is cold. Whenever ashes get 3"(76mm) to 4"(102mm) deep in your firebox, and when fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1" (25 mm) deep on the firebox bottom to help maintain a hot charcoal bed.

Disposal of Ashes

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed outside on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in closed container until all cinders have thoroughly cooled. Other waste should not be placed in this container.

Heat Output

Experience will give you the right settings for proper combustion and efficient burning. Remember that the correct air inlet setting is affected by variables such as type of wood, outside temperature, chimney size and weather conditions. With practice, you will become proficient in operating your heater and will obtain the performance for which it was designed.

Stove Dimensions

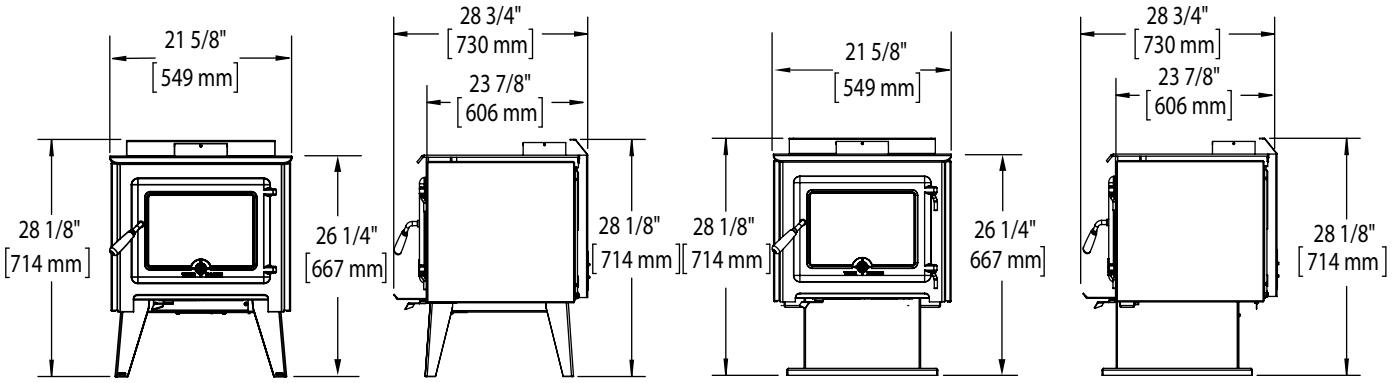


Figure 1: TN20B Dimensions.

Residential Installation

Warning: Under no circumstances is this heater to be installed in a makeshift or "temporary" manner. It may be fired only after the following conditions have been met.

- **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**
- **DO NOT INSTALL IN A SLEEPING ROOM.**
- **THIS ROOM HEATER MUST BE CONNECTED TO:**
  1. **A CHIMNEY LISTED TO: UL 103HT (USA) or ULC-S629 (CANADA) or**
  2. **A CODE APPROVED MASONRY CHIMNEY WITH A LISTED FLUE LINER.**
- DO NOT ATTEMPT TO CONNECT THIS HEATER TO ANY AIR DISTRIBUTION DUCT.
- The services of competent installer are strongly recommended.
- Outside combustion air or fresh air into the room may be required in your area, consult local building codes (see Combustion Air section).

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

Wood Energy Technical Training
www.wettinc.ca

Crate Removal

1. Carefully remove wood top and supports.

2. Remove plastic cover.

3. Remove all screws holding the Legs or Pedestal, to the Pallet.

Residential Clearances

- **BOTH CHIMNEY SYSTEM AND CONNECTOR MUST BE 6"(150mm) DIAMETER AND LISTED TO:**
  CANADA - CONNECTOR - LISTED to ULC S-641 and CHIMNEY LISTED to ULC-S-629
  USA - CONNECTOR AND CHIMNEY LISTED to UL-103 HT

1. Residential Clearances to Combustible surfaces and materials;

   This heater may be installed using a single-wall connector (smoke pipe) as per local and National fire and Installation codes. see Single wall Connector in figue 2. Clearances may be reduced with various heat shielding or insulating materials. Consult local and national fire codes and authorities for approval

   For close clearances, use a listed double-wall connector, See (Figure 2). "Double Wall Connector

Mobile Home installation see "Mobile Home Installation"(Figure 8).

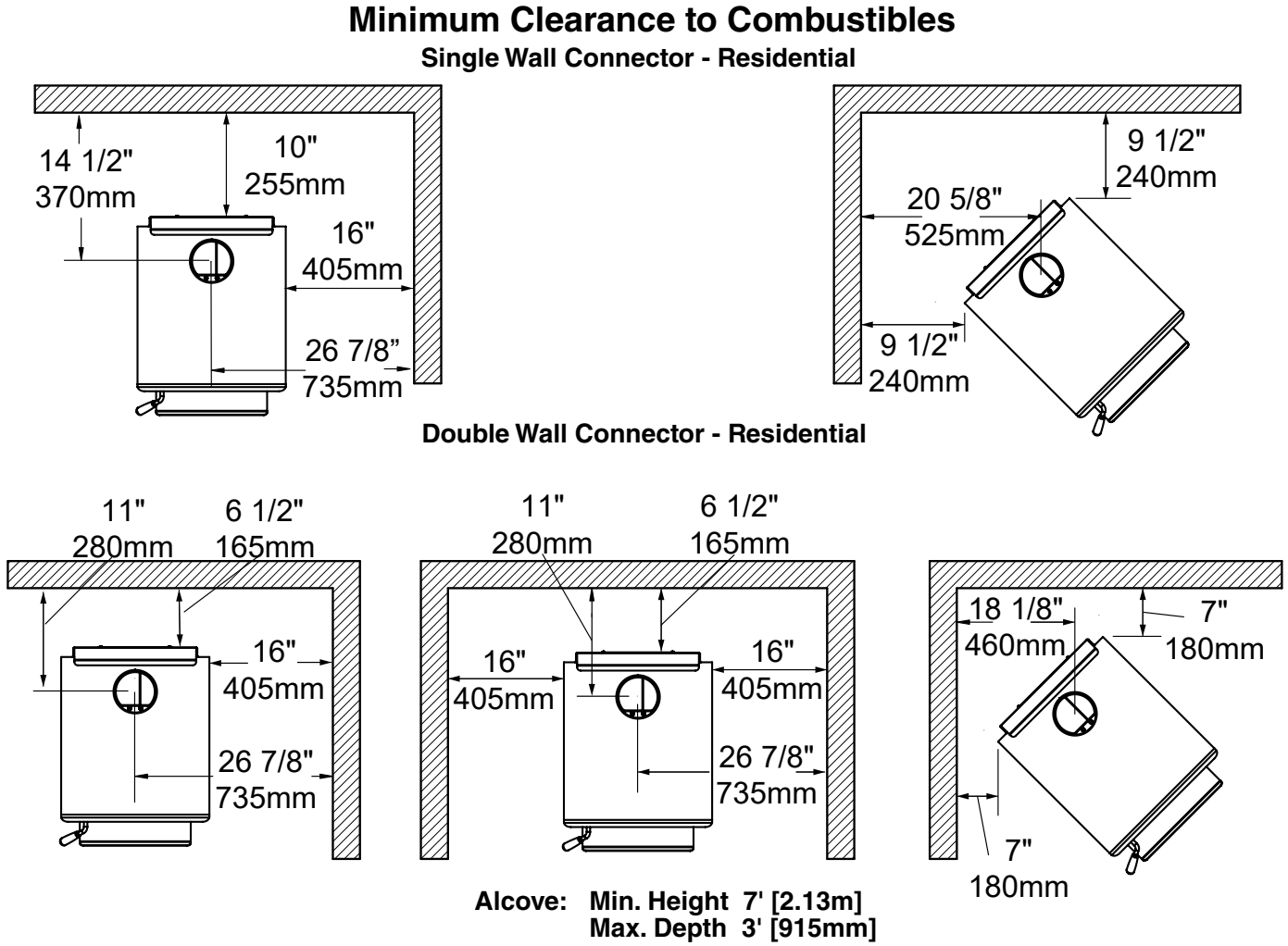


Figure 2: TN25 C clearances.

Ember Protection

The stove may be installed on a combustible floor, provided ember protection (UL 1618 type 1)made from a non-combustible material (a minimum K value of 23.7 btu/ft h ° F) the equivelent of 20 Gauge steel or tile is used.

This protection must extend as follows:

In Canada: 18" (457 mm)from the loading door on the firing side and 8" (203 mm) from the sides. See Figure 3, below.

In USA: 16" (406 mm) to the front of the firebox and 8" (203 mm) from the sides of the fuel loading door opening. See Figure 4, below. This protection is also required under a horizontal chimney connector and 2" (51 mm) beyond each side of it.

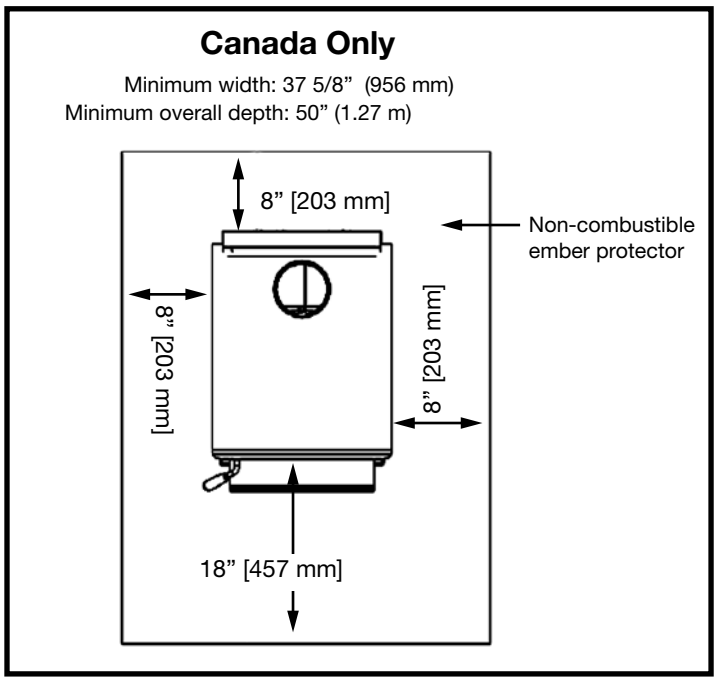


Figure 3: TN20B Floor protector Canada.

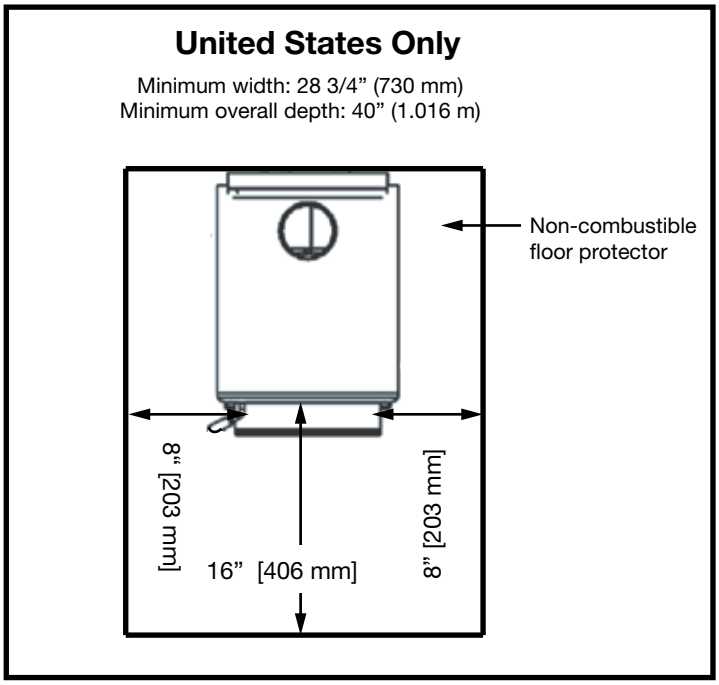


Figure 4: TN20B Floor protector U.S..

Securing Bracket Installation:

These will be needed to anchor the stove in a mobile home instalation and are recomended when installing combustion air to prevent movement of the unit and seperation of the combustion air intake.

1. The hold down backets are provided in a bag with the unit. Insert the brackets by sliding them through the slots in the rear legs. Then lag the bracket to the floor or hearth pad.

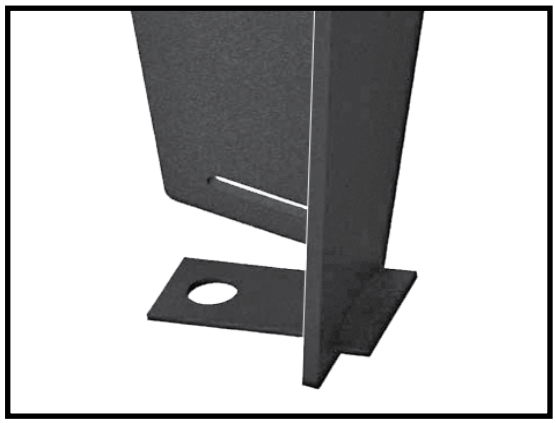


Figure 5: Securing bracket.

Procedure:

Follow the chimney manufacturer's instructions, The installation instructions included below are just general steps.

1. Position stove and floor protection (with hole for combustion air if required) in accordance with the clearances as stated on the label and in Figure 7 on page 16.

2. Mark the position for the hole in the ceiling and roof by using a string and plumb-bob.

3. Check that the intended location will not interfere with floor joists, ceiling joists or rafters before proceeding further.

   - Cut a hole in the ceiling and roof to suit the chimney system and frame in the sides.

   - Install roof or ceiling support as required in the installation.

   - Install the roof flashing, be sure to secure the flashing and seal with the appropriate sealant as per instructions

   - Assemble the chimney sections so the finished length is resting on the support and protruding through the roof. Install the radiation shield. Avoid having chimney joints between ceiling and roof.

   - Install the storm collar and required chimney sections to achieve a safe height. Attach rain cap and check system for leaks.

4. If double-wall connector pipe is to be connected between the stove and the listed insulated chimney,
   - Use listed double-wall connector and install all components to the connector pipe manufacturer's installation requirements.

5. If smoke pipe is being used to connect between the stove and the listed insulated chimney,
   - As short and straight as possible, use 6"(150mm) diameter, minimum 24 gauge black pipe, that is clean and in new condition.
     Install the smoke pipe (chimney connector), crimped edge of the pipe down and inside the stove's collar. This will carry any liquid creosote or condensation back into the stove. Use holes provided in stove collar to secure pipe with three screws.

   - Install the remaining lengths of pipe, one on top of the other to the finished height of the listed insulated chimney adapter and secure to each other. A slip-section will make attaching the smoke pipe to the chimney system adapter easier. secure with 3 screws at each joint.

   - The Smoke pipe/chimney connector shall not pass through an attic, roof space, closet or similar concealed space, or a floor, or ceiling. Where passage through a wall, or partition of combustible material is desired, the installation shall conform to CAN/CSA-B365, INSTALLATION CODE FOR SOLID-FUEL-BURNING APPLIANCES AND EQUIPMENT or NFPA 211 STANDARD FOR CHIMNEYS, FIREPLACES AND SOLID FUEL BURNING APPLIANCES

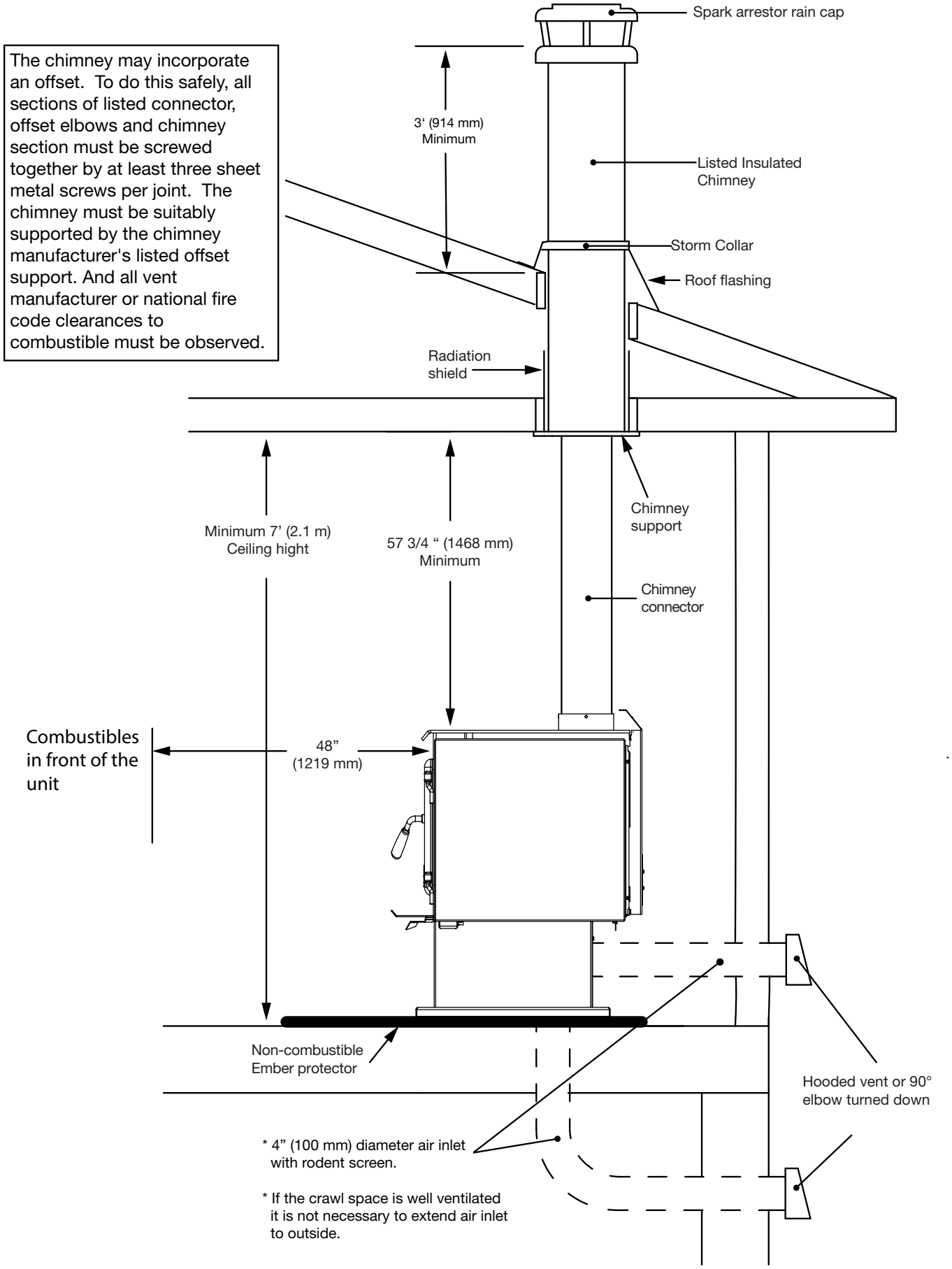


Figure 6: Mobile home or typical home installation.

Connecting to a masonry chimney

Ensure that the chimney is in good condition and meets local building codes. Your stove may work better if the chimney is fully lined with a stainless steel liner, this is because the liner will retain heat and promote draft. The chimney flue or liner should be the same size as the stove outlet for optimal performance. Reducing or increasing the flue size may adversely affect stove performance. Chimney flue exit is to be 3 feet (1 m.) above the roof and two feet (0.6 m.) above highest projection within 10 feet (3 m.). The installation must meet all local codes. Do not connect this unit to a chimney flue serving another appliance. Minimum system height is 12 feet (3.0 m.) (measured from top of appliance).

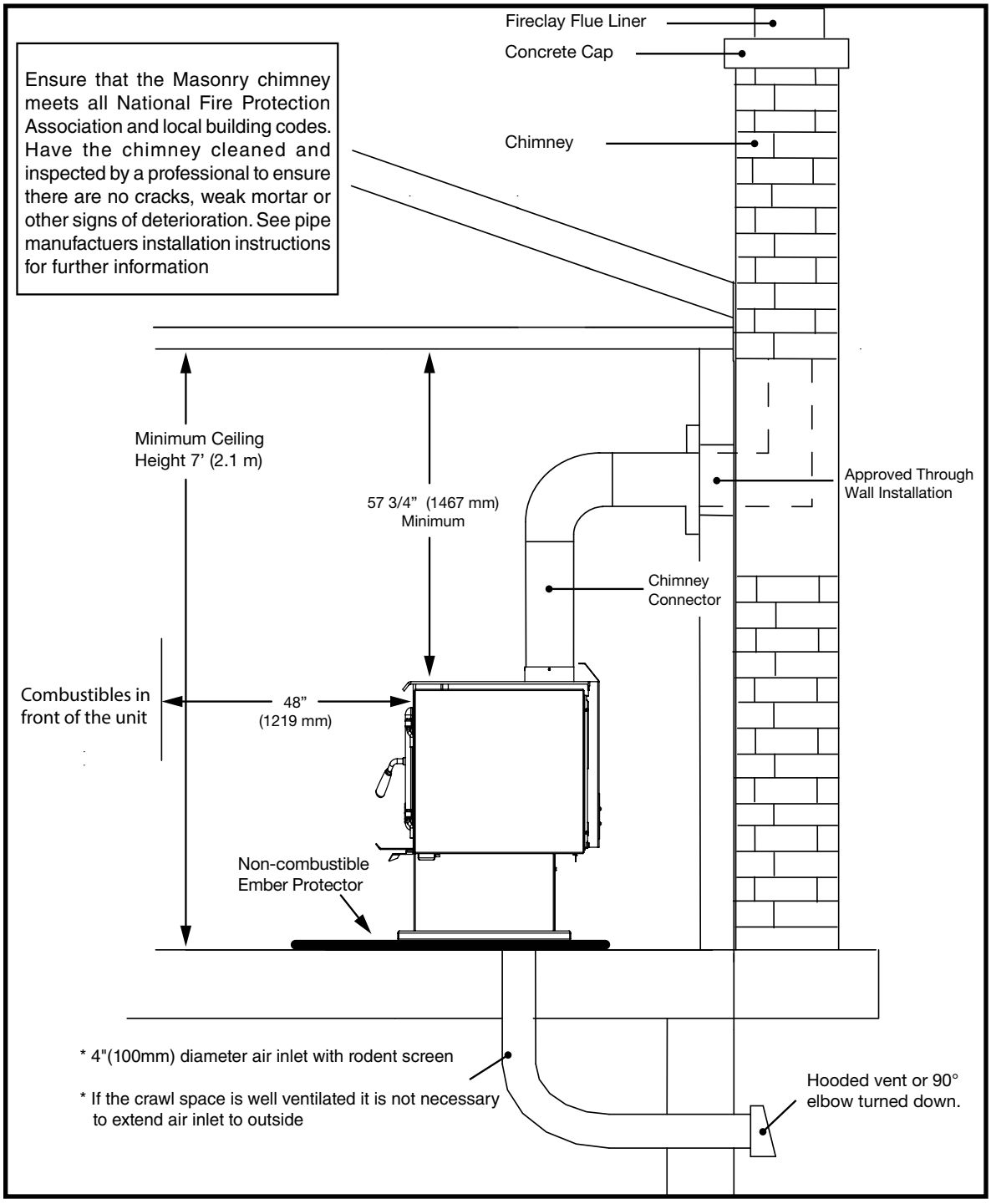


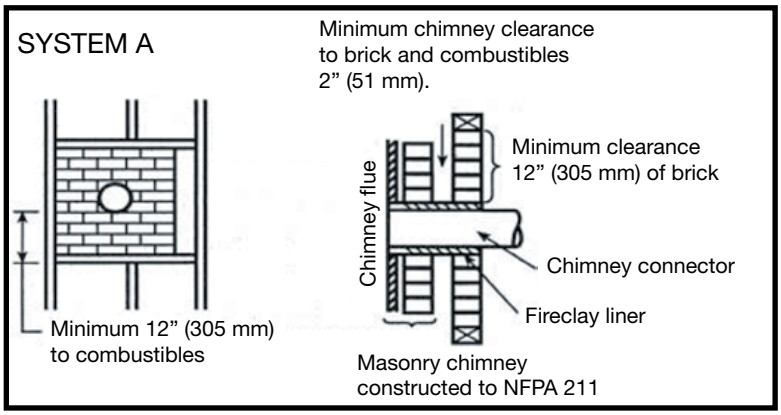
Figure 7: Venting to a masonry chimney.

Through Wall Installations
(as per NFPA 211-2013)

ATTENTION: VAPOUR BARRIER MUST BE MAINTAINED WHEREVER CHIMNEY OR OTHER COMPONENTS PENETRATE TO THE EXTERIOR OF THE STRUCTURE. SEE LOCAL BUILDING CODES FOR PROPER AND APPROVED METHODS OF MAINTAINING VAPOUR BARRIER.

System A. Minimum 3.5 in. (90 mm) thick brick masonry wall framed into combustible wall with a minimum of 12 in. (305 mm) brick separation from clay liner to combustibles. Fireclay liner (ASTM C 315, Standard Specifications for Clay Fire Linings, or equivalent), minimum 5/8 in. (16 mm) wall thickness, shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

Clearance 12 in. (305mm)

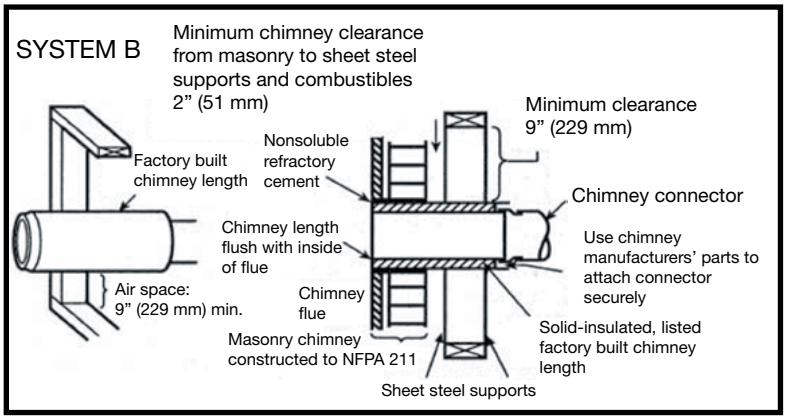


System B. Solid-Insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1 in. (25.4 mm) or more of insulation with a minimum 9 in. (229 mm) air space between the outer wall of the chimney length and combustibles.

The inner end of the chimney length shall be flush with the inside of the masonry chimney flue and shall be sealed to the flue and to the brick masonry penetration with non-water-soluble refractory cement. Supports shall be securely fastened to wall surfaces on all sides.

Fasteners between supports and the chimney length shall not penetrate the chimney liner.

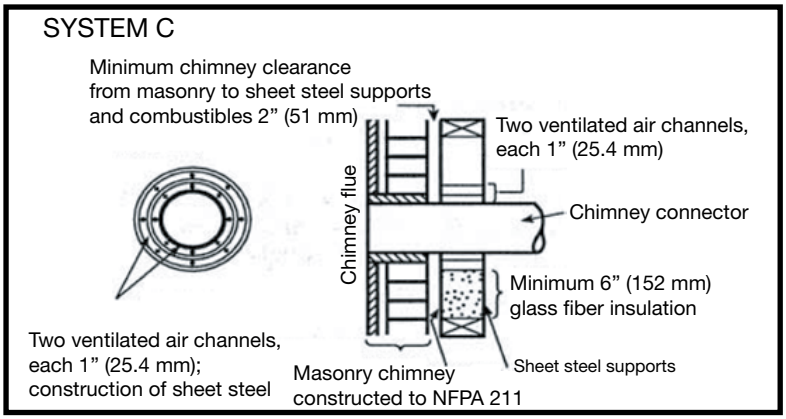
Clearance 9 in. (229mm)



System C. Sheet steel chimney connector, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness, with a ventilated thimble, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness, having two 1 in. (25.4 mm) air channels, separated from combustibles by a minimum of 6 in. (152 mm) of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gauge [0.024 in. (0.61 mm))] in thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 6 in. (152mm)

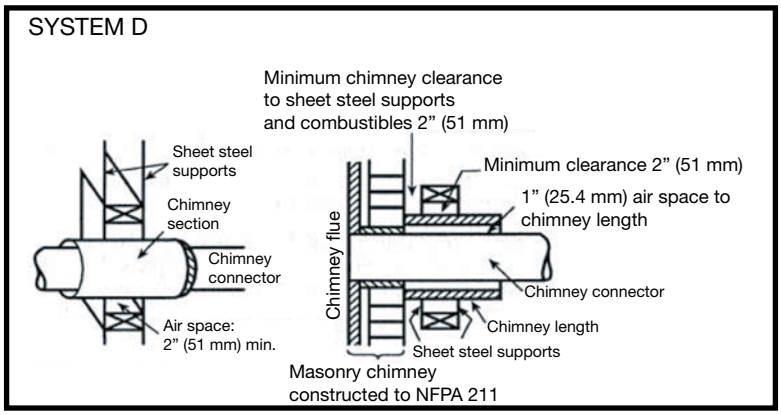


System D. Solid-Insulated, listed factory-built chimney length with an inside diameter 2 in. (51 mm) larger than the chimney connector and having 1 in. (25.4mm) or more of insulation, serving as a pass-through for a single-wall sheet steel chimney connector of minimum 24 gauge [0.024 in. (0.61 mm)] thickness, with a minimum 2 in. (51 mm) air space between the outer wall of chimney section and combustibles.

Minimum length of chimney section shall be 12 in. (305 mm). Chimney section concentric with and spaced 1 in. (25.4 mm) away from connector by means of sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports of minimum 24 gauge [0.024 in. (0.61 mm)] thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 2 in. (51mm)



Mobile Home Installation

Warning: Under no circumstances is this heater to be installed in a makeshift or "temporary" manner. It may be fired only after the following conditions have been met.

- **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**

- **DO NOT INSTALL IN A SLEEPING ROOM.**

THIS HEATER MUST BE INSTALLED WITH LISTED DOUBLE-WALL CONNECTOR. BOTH CHIMNEY SYSTEM AND CONNECTOR MUST BE 6"(150mm) DIAMETER AND LISTED TO:
IN CANADA - ULC S-641 LISTED CONNECTOR AND ULC-S-629 LISTED CHIMNEY,
IN USA - UL-103 HT LISTED CONNECTOR AND CHIMNEY

- Outside combustion air supply must be used for Mobile Home instalations see page 20

Mobile Home Clearances

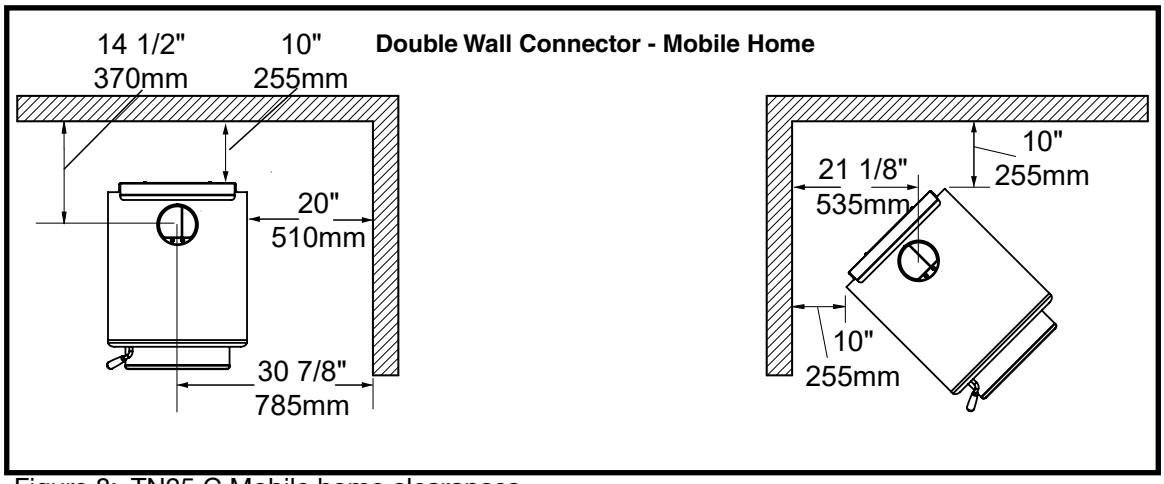


Figure 8: TN25 C Mobile home clearances.

Installation

Minimum chimney height from top of unit is 12' (3.66 m) or as per chimney manufacturers roof clearances whichever is greater.

NOTE: Longer chimney lengths and different pitch flashings may be used. Install all components to the connector or chimney manufacturer's installation requirements. Consult your chimney supplier for installation advice.

Procedure:

Follow Chimney Manufacturer's Installation Instructions for installatiion or removal of the chimney.

WARNING: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL AND CEILING/ROOF MUST BE MAINTAINED.

Note: See "Combustion Air" on page 20.

- Attach stove to floor using two 1/4" x 1" or longer lag screws.
  If installing a leg model, insert anchor tabs into slot on bottom of two rear legs and secure to floor with 1/4" x 1" or longer lag screws (Figure 5).

- If installing the Optional Blower Kit the unit must be grounded to the mobile home.

Combustion Air

Combustion air can be supplied to the stove in one of two ways. Consult your local building code or CAN/CSA-B365, or NFPA 211

Pedestal Model

1. Direct outside air supply - (Necessary for mobile home installation, optional for residential installation.)

   - To draw outside air through the floor; leave the knockout or square cover plate in the rear of the pedestal in place. Use an approved 4"(100mm) inlet vent cap. Cut or drill a 4"(102mm) diameter or larger hole in the floor anywhere inside the perimeter of the pedestal base. Cover the hole with a 20GA wire mesh minimum, rodent screen and staple/nail in place. This hole must get its air from a ventilated crawl space or be extended with duct to the outdoors (see Figure 6 on page 15 or Figure 7 on page 16

   - To draw air from behind the stove. Cut or drill a corresponding hole in the closest exterior wall. Install an approved 4"(102mm) inlet vent cap. Attach the outside air adapter (OAIR.1B) to the back of the pedestal. Connect the adapter to the inlet vent cap using 4"(100mm) flexible or rigid metal venting. . Provide water protection as required.

2. Room air supply - Remove the knockout or cover plate from the rear of the pedestal enclosure. The stove will now draw its air from the room through this opening and into the firebox intake

Leg Model

1. Direct outside air supply - (Necessary for mobile home installation, optional for residential installation.)

   - To draw outside air through the floor; Cut or drill a 4"(102mm) diameter or larger hole in the floor under the stove. Attach the outside air adapter (OAIR.1B) to the underside of the stove. Connect the adapter to the hole using 4"(102mm) fexible or rigid metal venting. Cover the hole with a 20GA wire mesh minimum, rodent screen and staple/nail in place. This hole must get its air from a ventilated crawl space or be extended with duct to the outdoors (see Figure 6 on page 15 or Figure 7 on page 16. if extended use an approved 4"(102mm) inlet vent cap

   - To draw air from behind the stove. Cut or drill a corresponding hole in the closest exterior wall. Install an approved 4"(102mm) inlet vent cap. Attach the outside air adapter (OAIR.1B) to the underside of the stove. Connect the adapter to the inlet vent cap using 4"(102mm) flexible or rigid metal venting. Provide water protection as required.

2. Room air supply - The stove will draw its air from the room through the opening in the bottom

Note:

The use of outside combustion air for installation requires the unit to be secured to the structure to prevent dislodging of the air duct. (See: Securing Bracket Installation page 13)

The living space around the heater must be well ventilated with good air circulation. Anything that may cause a negative pressure can cause gases or fumes to be pulled into the living area. During extremely cold weather, and especially when burning at very slow rates, the upper parts of the exposed chimney may ice up, partially blocking the flue gases. If blockage occurs, flue gases may enter living space.

This unit is **not** designed to be operated with the firing door open. In addition to the obvious hazard of sparks landing on combustibles, an open fire door will cause the heater to draw air from the living space and possibly cause suffocation in an air tight home.

Baffle Board / Tube Installation

The Chimney connector pipe should be disconnected from the wood stove to clean and inspect the chimney. Only if this is not possible should you remove Baffle Board.

DO NOT OPERATE WITH BAFFLE BOARD INSULATION OR TUBES REMOVED.

Removal

1. Lift the baffle board and bend the retaining clip on the right side of the front baffle tube up then disengage the tab from the hole in the tube.

2. Slide the tube to the right to disengage the left end of the tube from the baffle airbox and remove the tube from the unit. Repeat the first two steps with the remaining baffle tubes.

3. Grasp the front edge of the left half of the baffle board and tilt up at the back. Guide the board down and through the door opening.

4. Grasp the right half of the baffle board and slide it over to the left and tilt the back of the board up and guide it down and through the door opening.

5. Reverse the process to replace the baffle assembly.

Installation

1. Insert one half of baffle board above the two back baffle tubes inside the firebox, slide over to the right and allow to rest on the baffle air assembly.

2. Ensure that the second half is inserted to allow the two cuts in the baffle boards to overlap. Insert the other half of the baffle board and allow to rest on the left side baffle air assembly.

3. With the holes facing forward and the notch to the left side, insert a baffle tube into the hole in the baffle air channel on the right at an angle and then raise and insert into the opposite hole on the left side baffle air assembly until the tube sits tight to the tab in the hole.

4. Place the retaining clip tab into the hole in the baffle tube on the right side and bend it back over the tube to secure it in place.

5. Repeat steps #3 & #4 with the remaining baffle tube.

6. Slide the baffle board halves together and then separate slightly to ensure there are no gaps on either side of the baffle board.

7. Push baffle board tight against the rear of the firebox.

Control Motor Removal & Installation

There are two Motor Control Assemlbies located underneath the unit at the back. The Motor Control Assemblies are named #1(Left) and #2(Right) if standing and facing the back of the unit.

1. Remove the motor cover by undoing the three screws located at the sides and in the back. Figure 9

2. Remove the Control Board Cover from the Control Board Assembly located to the left of the Motor Control Assemblies by undoing the single screw on the left side of the Control Board Assembly.Figure 10

3. Unplug the wires for the Motor Control Assembly that you are removing from the Control Board. Figure 12

4. Remove the two screws securing the Motor Control Assembly to the Control box and lower the Motor Control Assembly being careful not to damage the gasket. Figure 11

5. Reverse the previous steps to reinstall the new Motor Control Assembly.

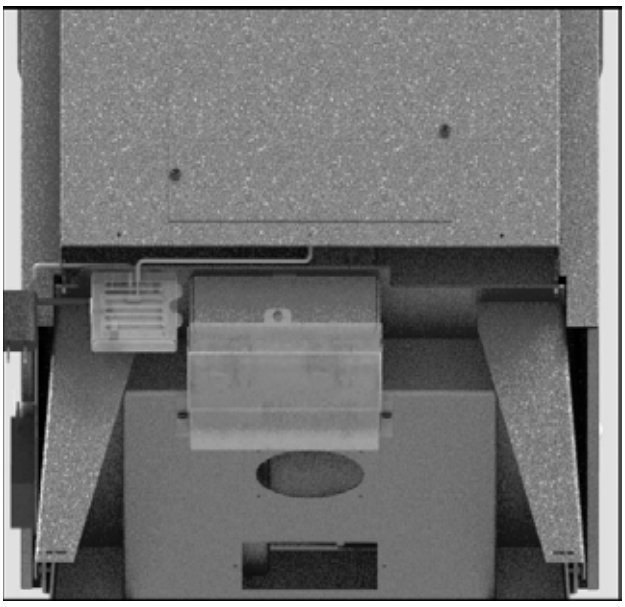


Figure 9: Motor Control cover.

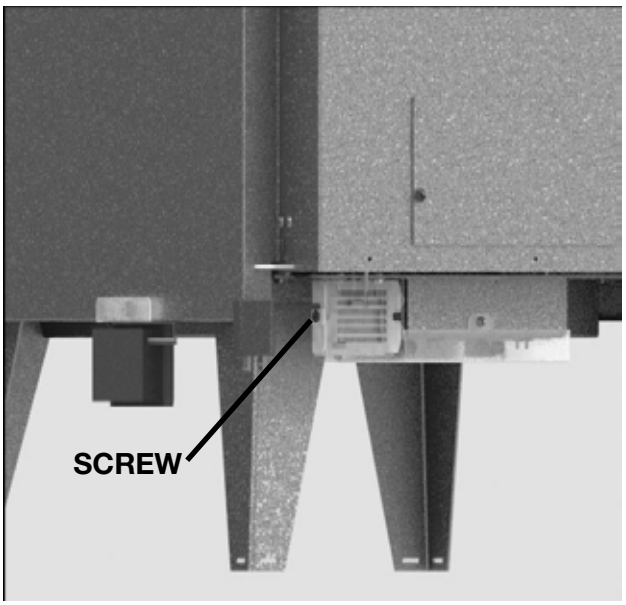


Figure 10: Control Board cover

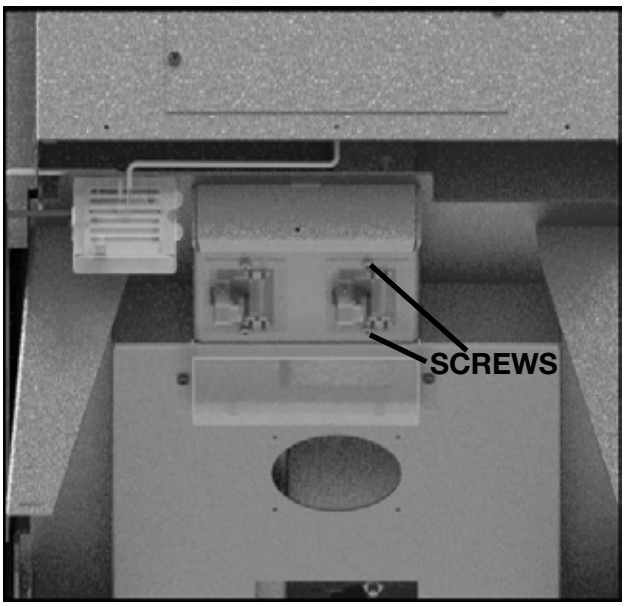


Figure 11: Motor Control assemblies

Control Board Removal & Installation

The Control Board Assembly is located to the left of the Motor Control Assembly, underneath the unit at the back.

1. Remove the Control Board Cover from the Control Board Assembly by undoing the single screw on the left side of the Control Board Assembly.Figure 10

2. Unplug the wires from the Motor Control Assemblies, located on the right edge of the Control Board. Note the placement for connecting the wires wehn installing the new Control Board Assembly. Figure 12

3. Using a small screwdriver, loosen the screws securing the Flue Thermocouple wires to the socket near the top of the Control Board. Then separate the connector for the Firebox Thermocouple just above the Control Board. Note the placement for connecting the wires when installing the new Control Board Assembly. Figure 12

4. Unplug the wires from the Battery Box, located on the left side of the Control Board. Note the placement for connecting the wires wehn installing the new Control Board Assembly. Figure 12

5. Unplug the wires from the Power Adapter, located on the side of the Control Board. Note the placement for connecting the wires wehn installing the new Control Board Assembly. Figure 12

6. Remove the two nuts and bolts at the top of the Control Board Assembly securing the assembly to the unit. Figure 12

7. Reverse step 1-6 to reinstall the new Control Board Assembly.

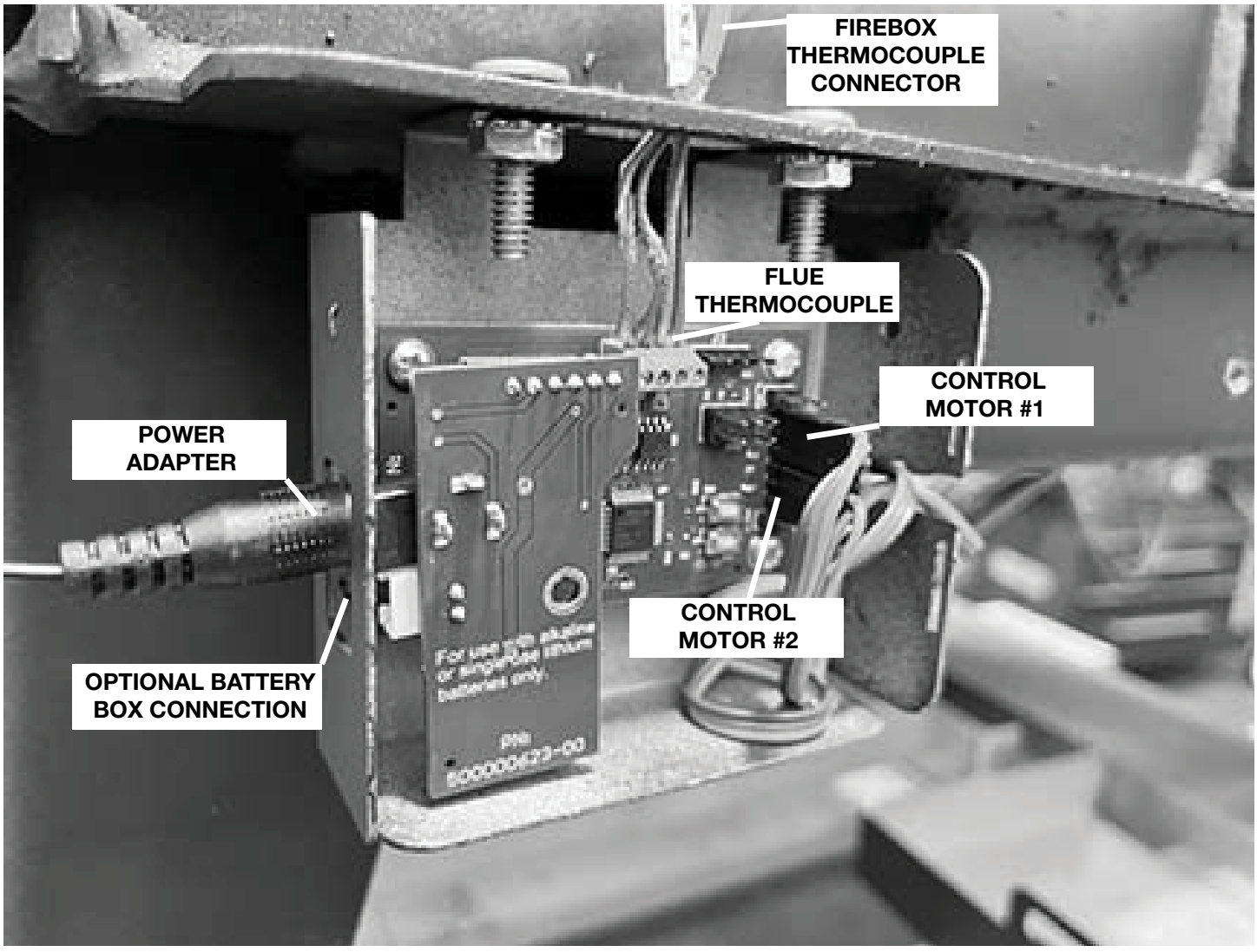


Figure 12: Control Board with connections.

Initial Battery Box Installation & Changing Batteries

Initial Battery Box Installation

Your unit comes with the Battery Box Assembly inside the firebox.

1. Remove the Battery Box from inside the unit.

2. Remove the Control Board Cover from the Control Board Assembly by undoing the single screw on the left side of the Control Board Assembly. (The Control Board Assembly is located to the left of the Motor Control Assembly, underneath the unit at the back.)

3. Connect the plug from the Battery Box to the connection on the left side of the Control Board. See "Figure 12" on page 23 (Left side is "your left" and determined when standing facing the back of the unit.)

4. Engage the magnet on the Battery Box Assembly under the right, side panel and against the right, firebox side. Figure 13 (Right is "your right" and determined when standing facing the front of the unit.)

Changing the Batteries

The Battery Box Assembly is located on the right side of the unit, below the side panel, if standing, facing the front of the unit. The Battery Box Assembly is secured to the firebox with a magnet and can be easily lowered and held to change the batteries. **Note: Be careful not to pull on the wires connecting the Battery Box to the Control Board.**

1. Carefully lower the Battery Box so the battery cover is facing up.

2. Remove the battery cover by releasing the catch at the end and lifitng the cover off.

3. Remove the old batteries and replace them with the new ones.

4. Replace the battery cover and re-engage the magnet to the firebox side again.

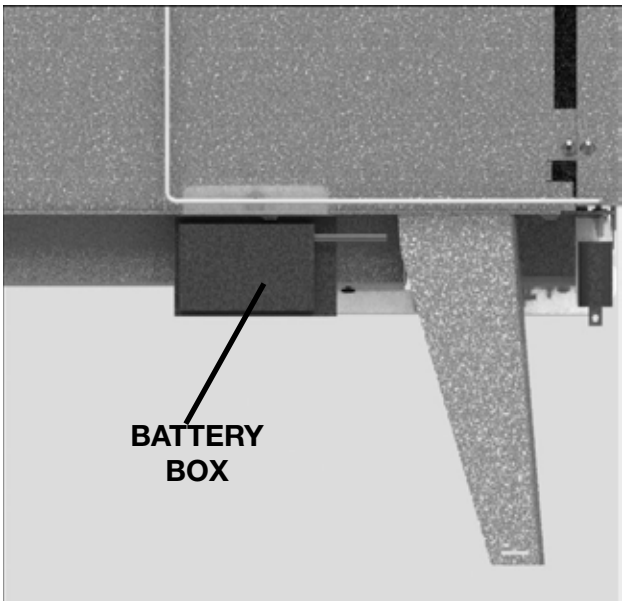


Figure 13: Battery Box

Thermocouple Replacement

The unit has two thermocouples, one located in the Flue and the other is located in the right side of the fire-box behind the right side panel. ("right side" is your right and determined when standing facing the front of the unit.)

Flue Thermocouple

1. Remove the rear shield air deflector by undoing the three screws securing it to the rear shield.

2. Bend the securing tab on the thermocouple mounting bracket up approximately 45˚.

3. Rotate the thermocouple clock-wise to disengage it from the mounting bracket then pull it out of the flue collar.

4. Remove the Control Board Cover from the Control Board Assembly by undoing the single screw on the left side of the Control Board Assembly. See "Figure 10" on page 22 (The Control Board Assembly is located to the left of the Motor Control Assembly, underneath the unit at the back.)

5. Using a small screwdriver, loosen the screws securing the Thermocouple wires to the socket near the top of the Control Board. See "Figure 12" on page 23. Note the placement for connecting the wires when installing the new Control Board Assembly.

6. Reverse steps 1-5 to reinstall the new Thermocouple.

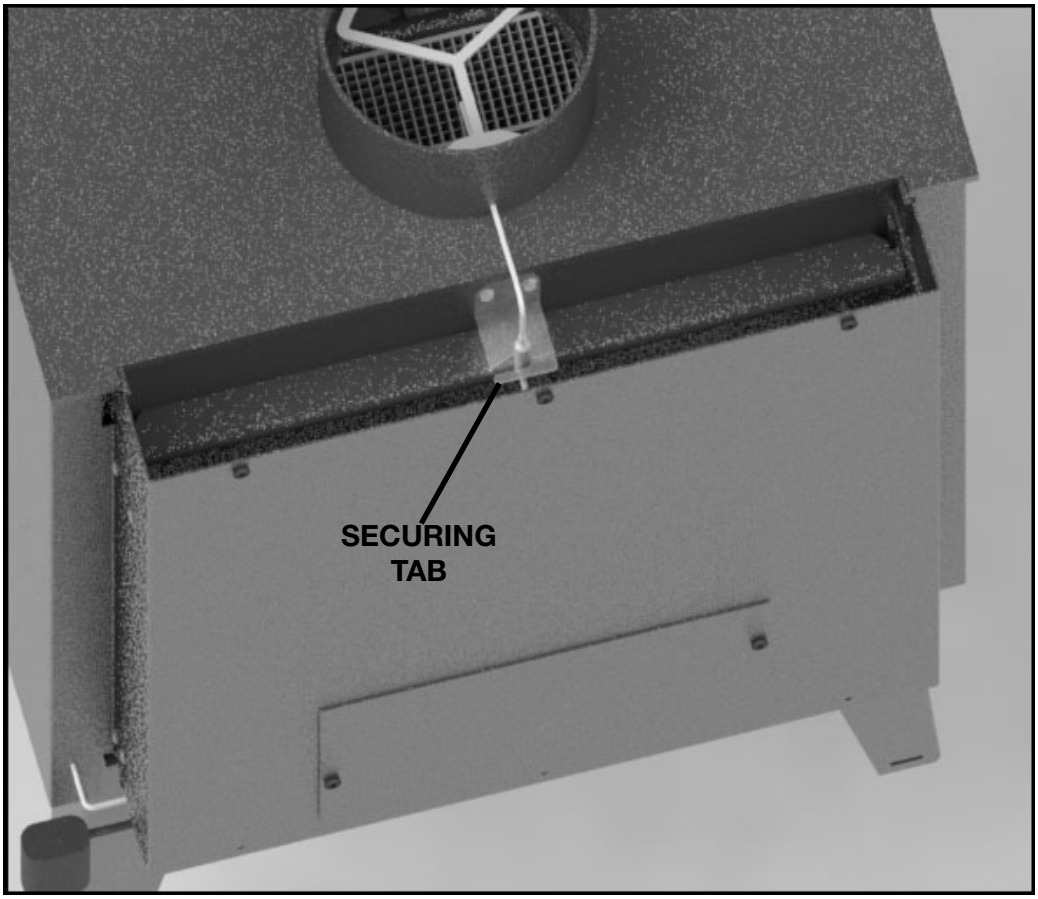


Figure 14: Flue Thermocouple

Firebox Thermocouple

1. Remove the right side panel by undoing the two screws in the back edge of the panel and disengaging the panel from the bolts in the front. ("right side" is your right and determined when standing facing the front of the unit.)

2. Bend the securing tab on the thermocouple mounting bracket up approximately 45˚. Figure 15

3. Rotate the thermocouple clock-wise to disengage it from the mounting bracket then pull it out of the fire-box side. Figure 15

4. Remove the Control Board Cover from the Control Board Assembly by undoing the single screw on the left side of the Control Board Assembly. (The Control Board Assembly is located to the left of the Motor Control Assembly, underneath the unit at the back.) See "Figure 10" on page 22

5. Using a small screwdriver, loosen the screws securing the Thermocouple wires to the socket near the top of the Control Board. See "Figure 12" on page 23. Note the placement for connecting the wires when installing the new Control Board Assembly.

6. Reverse steps 1-5 to reinstall the new Thermocouple.

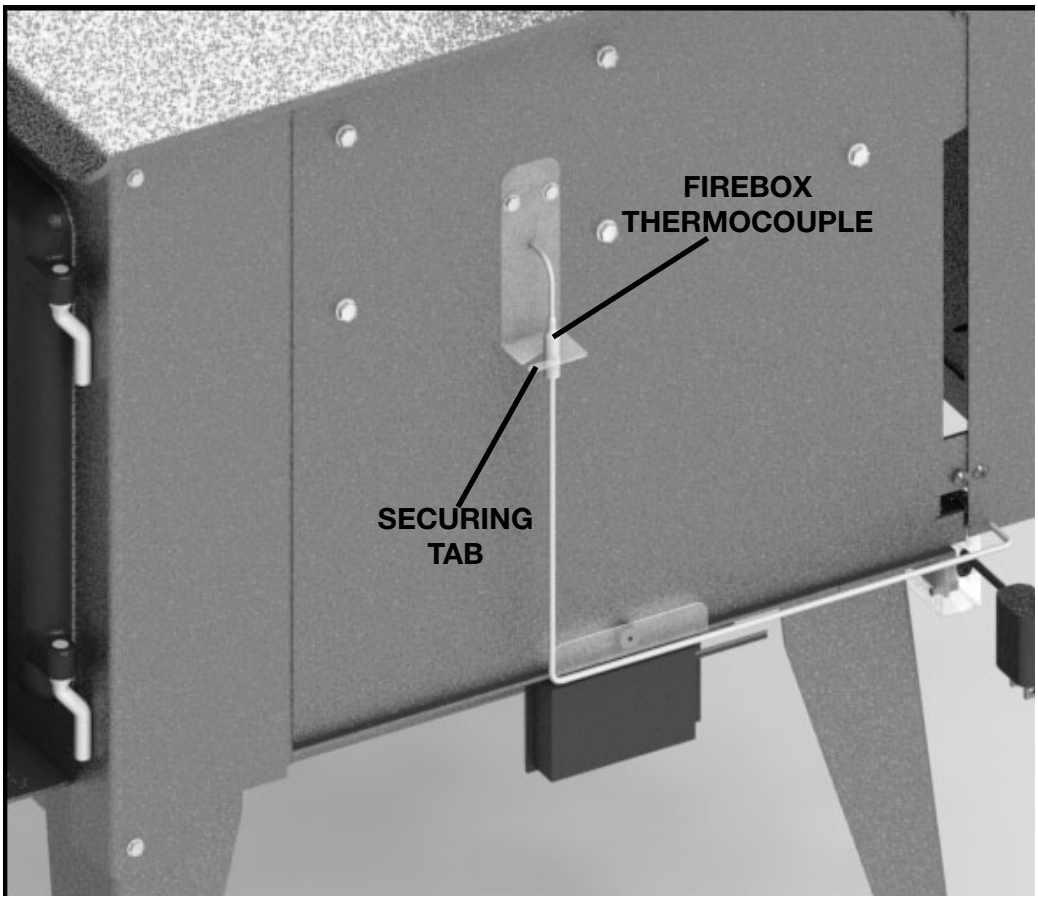


Figure 15: Firebox Thermocouple

Catalyst Monitoring

WARNING

DO NOT USE THIS APPLIANCE WITHOUT A COMBUSTOR

WARNING: "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."

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.**
- **This catalytic heater is equipped with a temperature probe to monitor catalyst operation. Properly functioning combustors typically maintain temperatures in excess of 500°F (indicated by the thermometer needle in the active zone), and often reach temperatures in excess of 1000°F.**

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.

TIP: A hot fire will usually prove to be the best method of cleaning the combustor of deposits

CATALYTIC COMBUSTOR, TROUBLESHOOTING

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 - 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 position without the thermostat needle in the active zone. Solution: Burn dry, seasoned wood, don't engage the bypass until the temperatures are high enough to initiate light-off (indicated by the thermostat needle in the active zone).
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 Blaze King combustor (failure to do so will void your warranty).


CREOSOTE PLUGGING

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.


FLYASH MASKING


SOOT MASKING

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.


MECHANICAL CRACKING

This appliance comes equipped with a Combustor Monitor to maintain the fire in the most efficient manner tailored to your specific needs and installation configuration.
You can readily monitor combustion efficiency by noting the temperature indicated on the thermometer.
Seated directly above the catalytic element, the thermometer accurately reports combustion activity. Secondary combustion takes place at temperatures between 500°F (260°C) and 1200°F (260°C - 649°C).

The primary air quadrant should remain at the fully open setting, (to the Left), at least until the monitor registers 500°F (260°C). Maintain that temperature for 15-20 minutes before adjusting the primary air quadrant to Medium Low - Medium High settings. The optimum temperature range for most efficient combustion is between 500°F and 800° (260°C -371°C). Chimney draft should be in the .05 - 1.0 w.c. range. This is the ideal condition for combustion.

Catalyst Removal & Installation

DO NOT OPERATE WITH BAFFLE BOARD INSULATION , CATALYST OR TUBES REMOVED.

The Catalyst comes packaged inside the unit and needs to be installed before lighting the unit.

Installation

1. Remove the baffle board retaining clip

2. Lift the baffle board and bend the retaining clip on the right side of the front baffle tube up then disengage the tab from the hole in the tube.

3. Slide the tube to the right to disengage the left end of the tube from the baffle airbox and remove the tube from the unit. Repeat the first two steps with the second baffle tube.

4. Grasp the front edge of the left half of the baffle board and tilt up at the back. Guide the board down and through the door opening.

5. Grasp the right half of the baffle board and slide it over to the left and tilt the back of the board up and guide it down and through the door opening.

6. Place the catalyst in back up against the firebox top and slide it towards the front of the unit then lower it into the holding platform.

Removal

1. Lift the baffle board and bend the retaining clip on the right side of the front baffle tube up then disengage the tab from the hole in the tube.

2. Slide the tube to the right to disengage the left end of the tube from the baffle airbox and remove the tube from the unit. Repeat the first two steps with the second baffle tube.

3. Grasp the front edge of the left half of the baffle board and tilt up at the back. Guide the board down and through the door opening.

4. Grasp the right half of the baffle board and slide it over to the left and tilt the back of the board up and guide it down and through the door opening.

5. Reach up then push the combustor up and out of the holding platform until it is against the firebox top.

6. Slide the combustor towards the back of the unit and drop it down to remove it.

7. Reverse these steps to reinstall the combustor, the baffle boards and baffle tubes.

Optional Blower

The optional blower kit (kit #TRNO.19BLOWA) is equipped with a three prong power cord and may be installed at any time. Route power supply cord away from heater.

Electrical rating: 115V, 60Hz, 0.5 amps.

Blower Installation

1. Remove the two screws and cover plate from the rear shield on the stove (Figure 17).

2. Place the blower into the opening in the rear shield with the blower outlet pointing up (Figure 18). Attach by using the screws provided with the Blower Kit,

3. Tighten the screws.

Blower Operation

Proper blower speed matched with air control setting will ensure peak performance from your stove. Operate as follows:

- Except on "High" setting, wait 30 minutes before turning on blower to desired setting.

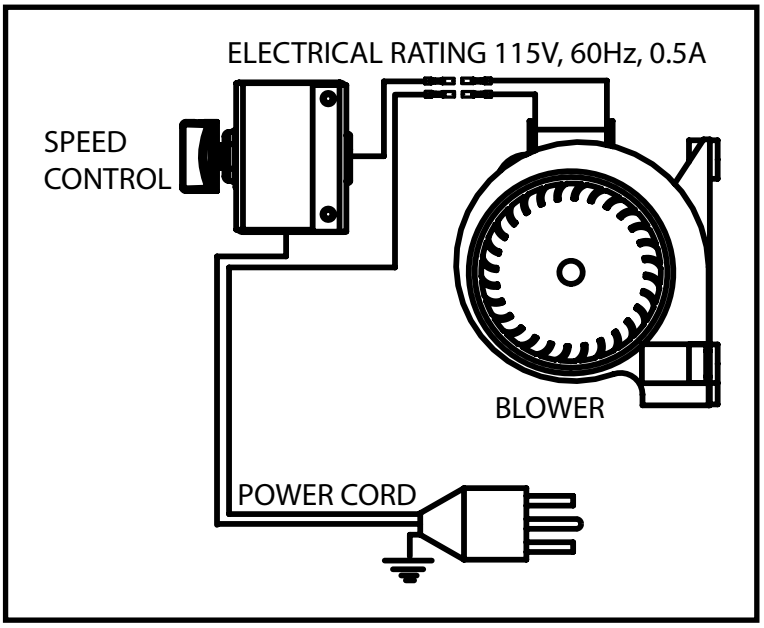


Figure 16: Blower Wiring Diagram.

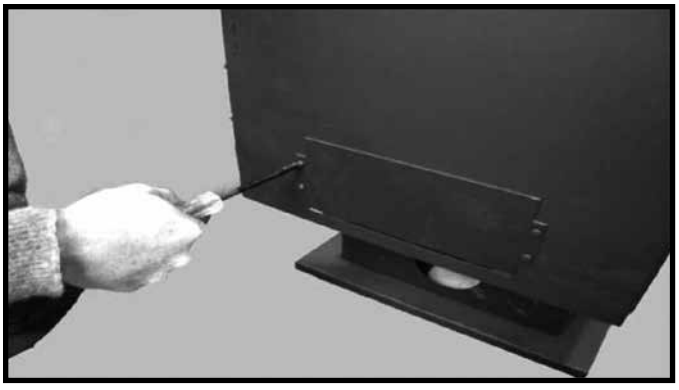


Figure 17: Remove the cover plate.


Figure 18: Installing the blower.

Electrical Supply

For your protection against shock hazard, use only a properly grounded outlet that will accept a three-pronged plug. Do not cut or remove the grounding prong. Do not route power cord under unit. Power cord must be routed to avoid contact with any hot or sharp surfaces.

Consult local codes or, in the absence of local codes, with the current CSA C22.2 Canadian Electrical Code and in the USA with the National Electrical Code, ANSI/NFPA 70 (latest edition).

Firebrick Installation

The package contains 20 full-size firebricks. With the insert in its final position, install the firebricks as follows:

1. Place the first brick up under the rear brick rail (Figure 19) and slide it to either the far left or far right.

2. Place 3 more bricks up under the rear brick rail to complete the rear brick placement (Figure 20).

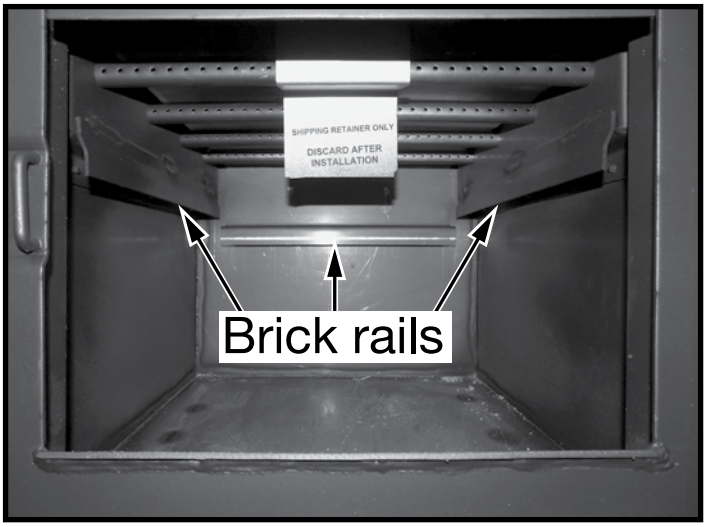


Figure 19: Firebox and brick rails.

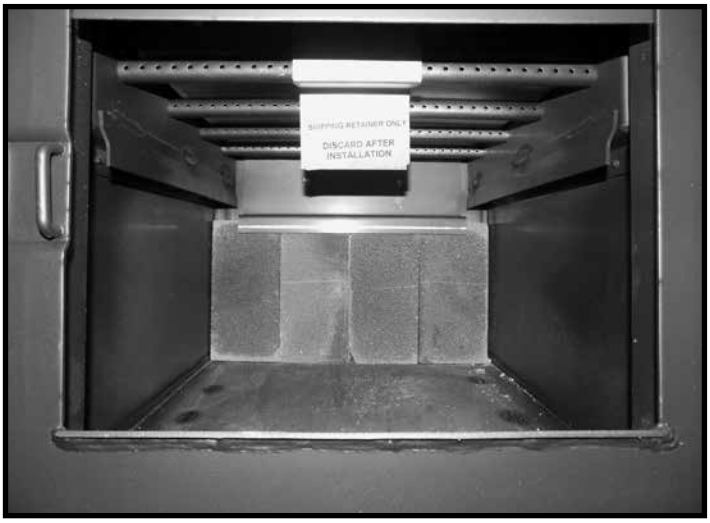


Figure 20: Bricks against rear wall.jpg

3. Place the floor bricks as shown in Figure 21.

4. On both the right and left sides, place the first side wall brick under the Brick Retainer and on top of the floor bricks and slide it all the way to the back, so that it is up against the rear wall bricks.

5. Using the same method, place three more bricks along one of the side walls. (Figure 15)

6. Repeat the side wall brick installation on the opposite side to complete the firebrick installation.

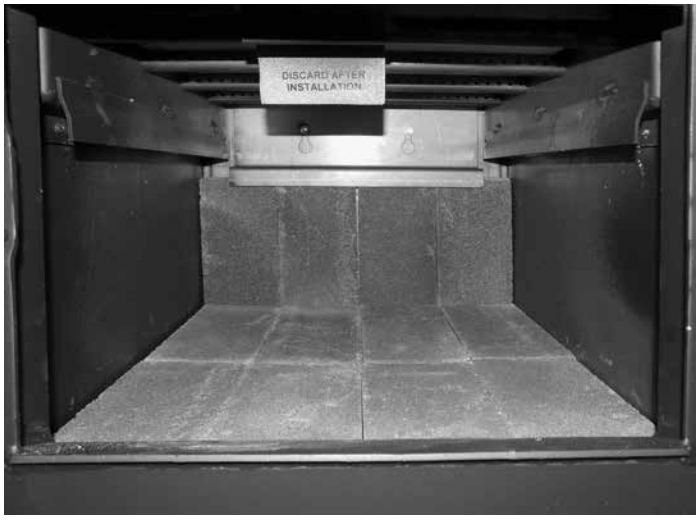


Figure 21: Floor bricks laying lengthwise.jpg

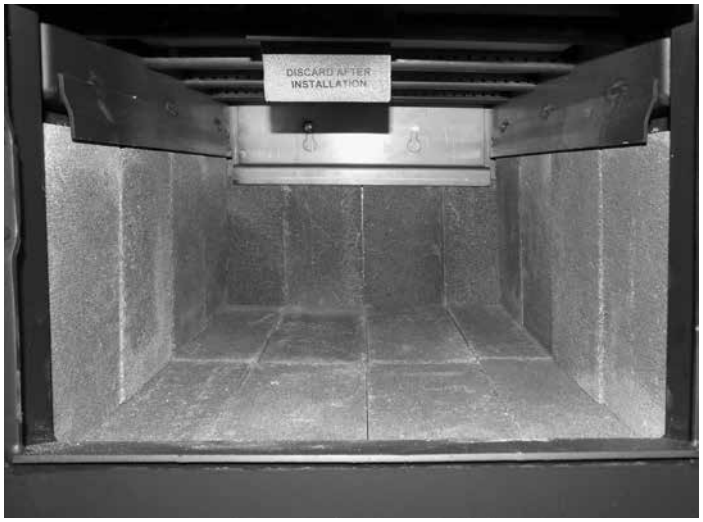


Figure 22: Remaining side wall bricks installation.jpg

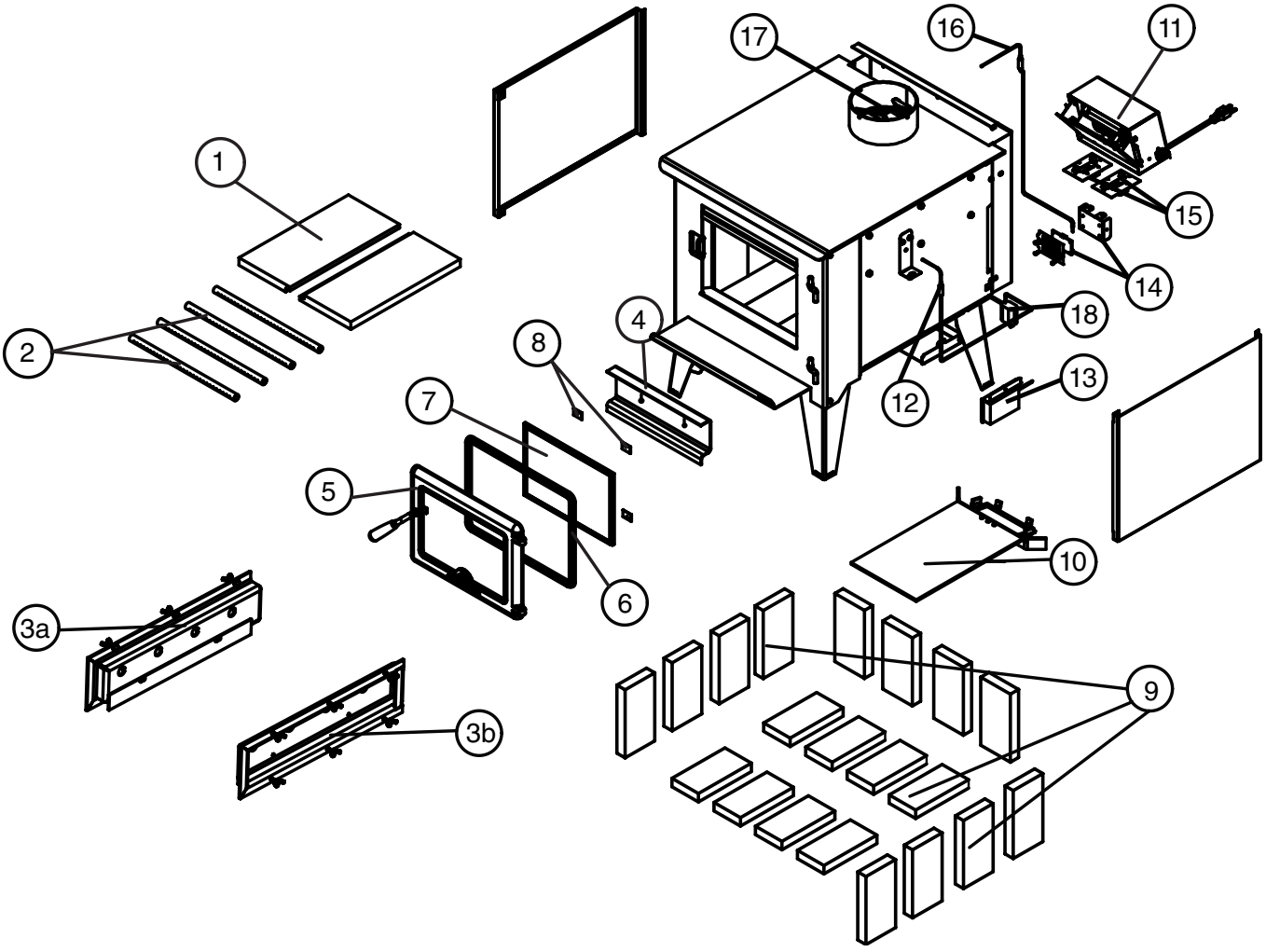
Troubleshooting

Problem	Cause	Cure
Glass is Dirty	1. Wood is wet	- Use dry wood
	2. Turning down air control or damper too soon	- Do not turn down until a) there is a good bed of coals b) the wood is charred
	3. Draft too low	- Improper chimney height and / or diameter - Chimney plugged or restricted, check flue - Provide outside air for combustion
	4. Door gasket leakage	- Replace gasket - Check latch
Excessive Creosote Buildup - See 1, 2, 3, above.		
Low Heat Output	1. Wood is wet 2. Fire too small 3. Draft too low	- Use dry wood - Build a larger fire - Chimney plugged or restricted, inspect and clean
Won't Burn Overnight	1. Air control is set too high 2. Not enough wood 3. Draft too high	- Set control lower - Unsplit wood is preferred for overnight burns - Excessive chimney height and/or diameter, see "Proper Draft" on page 10.
Stove Won't Burn	1. Combustion air supply blocked	- Check outside air supply for obstruction - Check that room air cover is removed
	2. Draft too low	- Chimney plugged or restricted, inspect and clean - Chimney oversized or otherwise unsuitable, consult Dealer

Replacement Parts

(WHEN ORDERING, INCLUDE PART NUMBER WITH DESCRIPTION)

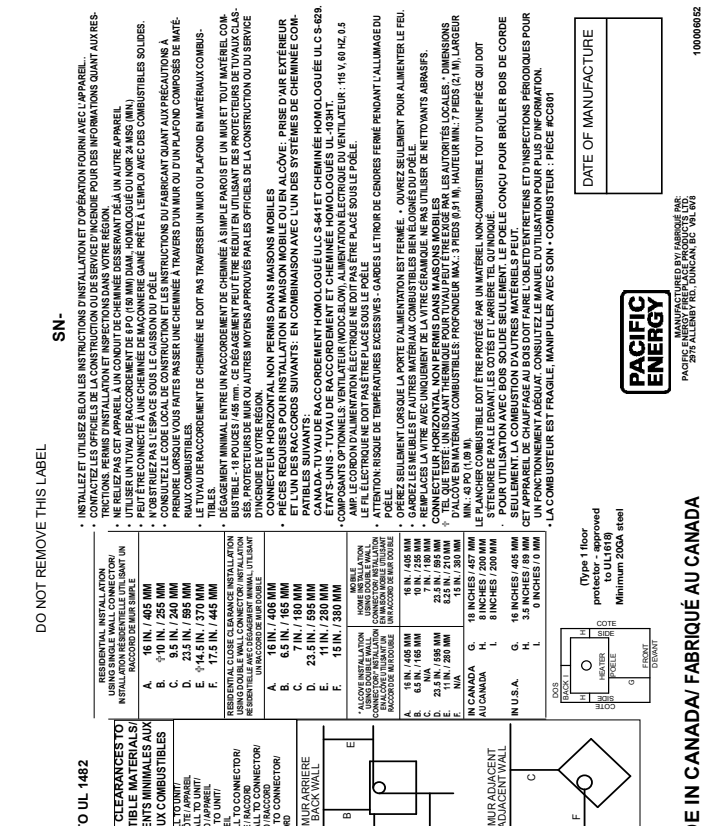
ITEM	DESCRIPTION	PART NO.
1	Baffle Board (2pcs.)	80000619
2	Baffle Tube Set (4pcs.)	80000615
3a	Baffle Air Box, Left (c/w gasket/screws)	80002140
3b	Baffle Air Box, Right (c/w gasket/screws)	80002141
3c	Baffle Air Box, Gasket with Screws (1 side)	80002138
4	Rear Brick Rail	80002143
5	Door Casting Assy - No Glass (c/w Handle)	80000621
6	Door and Glass Gasket	80000600
7	Replacement Glass (c/w clamps/gasket)	80000616
8	4 pc Glass Clamp set (c/w screws)	80000617
9	Firebrick Set 9” x 4 1/2” x 1 1/4” (20 pcs.)	80000620
10	Flame Shield (c/w hardware)	80002831
11	Optional Fan	31140001
11a	Blower	80000905
11b	Fan Speed Control	80000908
11c	Speed Control Knob	80001509
12	Firebox Thermocouple	80002836
13	Battery Box assembly	80002833
14	Control Board assembly	80002835
15	Motor Control assemblies	80002834
16	Flue Thermocouple	80002837
17	Flue Protector	80002832
18	Wall Adapter 12V	80002838



Rating Label

Rating label location

The Rating label is located on the lower portion of the rear cover.



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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

Revision to Report #: 26398-201251-5 to correct serial number. Date: 2/20/23

Report #: 26398-201251-5-01 **Customer PO#:** 1079

Customer Name: PFS TECO

Customer Address: 11785 SE Highway 212

City: Clackamas **State:** OR **Zip:** 97015

Contact: Ethan Frederick

Service Address: 5777 SE International Way Milwaukie, OR 97222

Calibration Standards

10-00515 | Steel Rule | SPI | SN: 00515 | Cal: 06/01/2022 | Due: 05/31/2023 | Vendor: Cal-Cert | Range: 24 Inches | Report #: 24589-30769-3616
LP-01346 | Thermo-Hygrometer | Comark | SN: 06210350198 | Cal: 02/07/2022 | Due: 02/28/2023 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 22748-67215-3486

Instrument Data

Calibration Date:	October 21, 2022	**Reference:**	Manufacturer's Spec
Calibration Due Date:	October 21, 2023	**Cal-Cert Procedure:**	CP-115
Calibration Frequency:	12 Months	**Indicating System:**	Scaling
Manufacturer:	Starrett	**Temperature:**	69 °F
Type:	Tape Measure	**Humidity:**	3% RH
Model Number:	Exact	**Asset #:**	207
Serial #:	138054-2203-00002249	**Service Location:**	Cal-Cert Lab
Capacity:	192.00 Inches	**As Found:**	Pass
		As Left:	Pass

Instrument Range: 192.000 Inches **Range Resolution:** 0.031 Inches

Calibration Standard	As Found Reading	Verification Reading #1	Verification Reading #2
24.000	24.000	24.000	24.000
48.000	48.000	48.000	48.000
96.000	96.000	96.000	96.000
120.000	120.000	120.000	120.000
144.000	144.000	144.000	144.000
168.000	168.000	168.000	168.000
192.000	192.000	192.000	192.000

Expanded Uncertainty ± 0.03580 Inches

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.

Service Engineer: Cameron Walling **Date:** October 21, 2022

Technical Manager: Marshall Doyle **Signature:** 

Dimensional Measurement CF-115-01

Revision 7 **7/25/2017**

Established 1974

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A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI01A05026221214

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Rice Lake	IQ+350-2Ax1000x(	A05026	#132	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
lbs	0.1	QC033	12/14/22	6/9/22	12/2023

FUNCTIONAL CHECKS

SHIFT TEST	LINEARITY	REPEATABILITY	ENVIRONMENTAL CONDITIONS
Test Wt: 250 Tol: 0.3	Test Wt: HB44 Tol: HB44	Test Wt: 50 Tol: 0.1	☐ Good ☑ Fair ☐ Poor
As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	Temperature: 17.1°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	1000.2	1000.2	0.05
500	500.2	500.2	0.05
300	300.1	300.1	0.05
200	200.1	200.1	0.05
100	100.0	100.0	0.05
50	50.0	50.0	0.05

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	7/18/22	7/2024	20221688

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

12/22 RH= 43%.

Report prepared/reviewed by: JC **Date:** 12/14/22 **Technician:** J. Colacchio

Signature:

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy.

Emissions Sampling System Thermocouple Calibration Check

Calibration based on NIST Monograph 175 per ASTM E2515-11
All thermocouples are type "K"

Date: 2/3/2023 Sampling System ID Numbers: 53/54

Performed By: Sebastian Button Calibration Instrument ID Number: 165

Reference Temperature (F)	Acceptable Error (F)	Thermocouple Location						
		FB Left	FB Right	FB Back	FB Top	FB Bottom	Catalyst Exit	Flue
0	± 4.0	-2.3	-2.2	0.4	-2.8	-2.8	-0.2	1.0
200	± 4.0	197.9	197.7	200.2	197.1	196.8	199.3	200.8
400	± 4.0	397.9	397.2	400.0	396.2	396.8	399.3	400.7
600	± 4.5	598.1	597.2	600.1	596.7	597.2	599.4	600.8
800	± 6.0	798.4	797.1	800.3	796.7	797.5	799.4	801.0

Reference Temperature (F)	Acceptable Error (F)	Thermocouple Location							
		Ambient	Filter A	Filter B	Filter C	Meter A	Meter B	Meter C	Dilution Tunnel
0	± 4.0	0.0	1.1	0.0	-3.0	-1.0	-2.1	-0.7	2.0
200	± 4.0	199.4	200.5	198.3	197.2	198.8	197.7	199.1	201.7
400	± 4.0	399.5	400.4	398.2	397.3	398.6	397.4	398.7	401.8
600	± 4.5	599.5	600.5	598.6	598.0	598.3	597.3	598.3	601.7
800	± 6.0	-	800.5	798.6	798.2	798.3	797.3	797.9	801.7

Technician Signature: Sebastian Button Date: 2/3/2023

REVISION HISTORY

Version Number	Issue Date	Summary of Changes
Version 1.0	20-Sep-22	Initial release into the BMS

DOCUMENT APPROVAL

Version Number	Approval Date	Approved by
Version 1.0	20-Sep-22	John Steinert

Pressure Gauge Calibration Work Sheet

Gauge Manufacturer:	Apex
Maximum Range (inH_2O):	1
Instrument ID #:	203 (dP)
Calibration Date:	2/3/2023
Calibration Expiration:	2/3/2024
Barometric Pressure:	29.85 in. Hg

Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	475-00-FM
Instrument ID#:	76
Calibration Expiration Date:	8/5/2023

Calibration Point (inH_2O)	Reference Gauge Reading (inH2O)	Pressure Gauge Reading (inH2O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 0.2	0.11	0.10	0.01	1.0%
0.2 - 0.4	0.26	0.25	0.01	1.0%
0.4 - 0.6	0.58	0.58	0	0.0%
0.6 - 0.8	0.72	0.71	0.01	1.0%
0.8 - 1.0	0.85	0.84	0.01	1.0%

Acceptable tolerance is 4%

Technican Signature: _____ Date: 2/3/2023

Uncertainty is 0.4 inH_2O, based on minumum uncertainity ration of 4:1 between standard reference meter and unit under test.

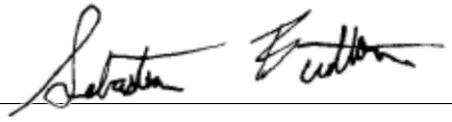
Pressure Gauge Calibration Work Sheet

Gauge Manufacturer:	Apex
Maximum Range (inH_2O):	1
Instrument ID #:	053 (dP)
Calibration Date:	2/3/2023
Calibration Expiration:	2/3/2024
Barometric Pressure:	29.85 in. Hg

Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	475-00-FM
Instrument ID#:	76
Calibration Expiration Date:	8/5/2023

Calibration Point (inH_2O)	Reference Gauge Reading (inH2O)	Pressure Gauge Reading (inH2O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 0.2	0.16	0.15	0.01	1.0%
0.2 - 0.4	0.32	0.31	0.01	1.0%
0.4 - 0.6	0.52	0.50	0.02	2.0%
0.6 - 0.8	0.73	0.70	0.03	3.0%
0.8 - 1.0	0.93	0.91	0.02	2.0%

Acceptable tolerance is 4%

Technican Signature:  Date: 2/3/2023

Uncertainty is 0.4 inH_2O, based on minumum uncertainity ration of 4:1 between standard reference meter and unit under test.

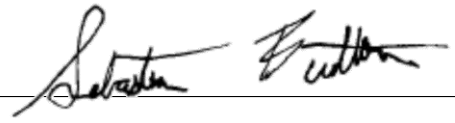
Pressure Gauge Calibration Work Sheet

Gauge Manufacturer:	Apex
Maximum Range (inH_2O):	5
Instrument ID #:	203 (dH)
Calibration Date:	2/3/2023
Calibration Expiration:	2/3/2024
Barometric Pressure:	29.85 in. Hg

Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	477AV-1
Instrument ID#:	174
Calibration Expiration Date:	3/29/2023

Calibration Point (inH_2O)	Reference Gauge Reading (inH2O)	Pressure Gauge Reading (inH2O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 1.0	0.62	0.60	0.02	0.4%
1.0 - 2.0	1.53	1.49	0.04	0.8%
2.0 - 3.0	2.12	2.08	0.04	0.8%
3.0 - 4.0	3.64	3.55	0.09	1.8%
4.0 - 5.0	4.35	4.28	0.07	1.4%

Acceptable tolerance is 4%

Technican Signature:  Date: 2/3/2023

Uncertainty is 0.4 inH_2O, based on minumum uncertainity ration of 4:1 between standard reference meter and unit under test.

Pressure Gauge Calibration Work Sheet

Gauge Manufacturer:	Apex
Maximum Range (inH_2O):	5
Instrument ID #:	054 (dH)
Calibration Date:	2/3/2023
Calibration Expiration:	2/3/2024
Barometric Pressure:	29.85 in. Hg

Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	477AV-1
Instrument ID#:	174
Calibration Expiration Date:	3/29/2023

Calibration Point (inH_2O)	Reference Gauge Reading (inH2O)	Pressure Gauge Reading (inH2O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 1.0	0.94	0.91	0.03	0.6%
1.0 - 2.0	1.67	1.64	0.03	0.6%
2.0 - 3.0	2.89	2.84	0.05	1.0%
3.0 - 4.0	3.46	3.40	0.06	1.2%
4.0 - 5.0	4.12	4.05	0.07	1.4%

Acceptable tolerance is 4%

Technican Signature: _____ Date: 2/3/2023

Uncertainty is 0.4 inH_2O, based on minumum uncertainity ration of 4:1 between standard reference meter and unit under test.

Pressure Gauge Calibration Work Sheet

Gauge Manufacturer:	Apex
Maximum Range (inH_2O):	5
Instrument ID #:	053 (dH)
Calibration Date:	2/3/2023
Calibration Expiration:	2/3/2024
Barometric Pressure:	29.85 in. Hg

Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	477AV-1
Instrument ID#:	174
Calibration Expiration Date:	3/29/2023

Calibration Point (inH_2O)	Reference Gauge Reading (inH2O)	Pressure Gauge Reading (inH2O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 1.0	0.68	0.64	0.04	0.8%
1.0 - 2.0	1.53	1.51	0.02	0.4%
2.0 - 3.0	2.47	2.43	0.04	0.8%
3.0 - 4.0	3.16	3.12	0.04	0.8%
4.0 - 5.0	4.18	4.07	0.11	2.2%

Acceptable tolerance is 4%

Technican Signature: _____ Date: 2/3/2023

Uncertainty is 0.4 inH_2O, based on minumum uncertainity ration of 4:1 between standard reference meter and unit under test.

Dry Gas Meter Calibration

DUT	
Manufacturer:	APEX
Model:	XC-50-DIR
Lab ID #:	203
Serial #:	A2204292
Calibration Date:	1/26/2023
Calibration Expiration:	7/26/2023
Barometric Pressure:	30.50 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	475
Lab ID#:	47	196	202	174
Calibration Expiration Date:	3/30/2023	11/29/2023	4/16/2023	3/29/2023
Calibration γ Factor:	0.9978			

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)	230.939	193.894	200.071
Standard DGM Temperature (°F)	66.0	66.0	66.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	8.610	7.251	7.491
DGM Temperature (°F)	92.0	92.0	91.0
DGM Pressure (in H_2O)	2.56	1.30	0.8
Net Volume for Standard DGM (ft^3)	8.156	6.847	7.065
Net Volume for DGM (ft^3)	8.610	7.251	7.491

Dry Gas Meter γ Factor	0.986	0.986	0.984
γ Factor Deviation From Average	0.986	0.986	0.984

Average Gas Meter γ Factor: 0.985

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Dry Gas Meter Calibration

DUT	
Manufacturer:	APEX
Model:	Apex-AK-600
Lab ID #:	55
Serial #:	810016
Calibration Date:	1/27/2023
Calibration Expiration:	7/27/2023
Barometric Pressure:	30.15 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	475
Lab ID#:	47	196	202	174
Calibration Expiration Date:	3/30/2023	11/29/2023	4/16/2023	3/29/2023
Calibration γ Factor:	0.9978			

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)	155.374	168.471	375.274
Standard DGM Temperature (°F)	65.0	66.0	67.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.505	5.830	13.012
DGM Temperature (°F)	73.0	74.0	75.0
DGM Pressure (in H_2O)	0.50	0.50	0.5
Net Volume for Standard DGM (ft^3)	5.487	5.949	13.253
Net Volume for DGM (ft^3)	5.505	5.830	13.012

Dry Gas Meter γ Factor	1.008	1.032	1.030
γ Factor Deviation From Average	1.008	1.032	1.030

Average Gas Meter γ Factor: 1.024

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Technician

Dry Gas Meter Calibration

DUT	
Manufacturer:	APEX
Model:	XC-60
Lab ID #:	54
Serial #:	1902133
Calibration Date:	1/26/2023
Calibration Expiration:	7/26/2023
Barometric Pressure:	30.49 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	475
Lab ID#:	47	196	202	174
Calibration Expiration Date:	3/30/2023	11/29/2023	4/16/2023	3/29/2023
Calibration γ Factor:	0.9978			

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)	160.750	154.658	151.064
Standard DGM Temperature (°F)	64.0	65.0	66.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.962	5.736	5.621
DGM Temperature (°F)	97.0	96.0	97.0
DGM Pressure (in H_2O)	3.00	2.00	1.0
Net Volume for Standard DGM (ft^3)	5.677	5.462	5.335
Net Volume for DGM (ft^3)	5.962	5.736	5.621

Dry Gas Meter γ Factor	1.003	1.001	1.000
γ Factor Deviation From Average	1.003	1.001	1.000

Average Gas Meter γ Factor: 1.001

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Technician:

Dry Gas Meter Calibration

DUT	
Manufacturer:	APEX
Model:	XC-60
Lab ID #:	53
Serial #:	1902130
Calibration Date:	1/26/2023
Calibration Expiration:	7/26/2023
Barometric Pressure:	30.51 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fluke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	475
Lab ID#:	47	196	202	174
Calibration Expiration Date:	3/30/2023	11/29/2023	4/16/2023	3/29/2023
Calibration γ Factor:	0.9978			

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)	149.049	145.786	156.580
Standard DGM Temperature (°F)	64.0	64.0	64.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.425	5.311	5.765
DGM Temperature (°F)	89.0	92.0	94.0
DGM Pressure (in H_2O)	2.00	3.50	1.2
Net Volume for Standard DGM (ft^3)	5.264	5.148	5.530
Net Volume for DGM (ft^3)	5.425	5.311	5.765

Dry Gas Meter γ Factor	1.009	1.010	1.009
γ Factor Deviation From Average	1.009	1.010	1.009

Average Gas Meter γ Factor: 1.010

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Technician:

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 #: 26398-201253-5 **Customer PO#:** 1079
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 5777 SE International Way Milwaukie, OR 97222

Calibration Standards

LP-00397 | Gage Block Set | Mitutoyo | SN: 509020 | Cal: 11/25/2020 | Due: 11/30/2022 | Vendor: BHD Test and Measurement | Report #: 112520A
LP-01346 | Thermo-Hygrometer | Comark | SN: 06210350198 | Cal: 02/07/2022 | Due: 02/28/2023 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 22748-67215-3486

Instrument Data

Calibration Date:	October 21, 2022	**Reference:**	ASME B89.1.14 2018
Calibration Due Date:	October 21, 2023	**Cal-Cert Procedure:**	CP-008
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Mitutoyo	**Temperature:**	69 °F
Type:	Digital Caliper	**Humidity:**	38% RH
Model Number:	CD-P6"S	**Asset #:**	208
Serial #:	B22159310	**Service Location:**	Cal-Cert Lab
Capacity:	6 Inches	**As Found:**	PASS
Resolution:	0.0005 Inches	**As Left:**	PASS

Instrument Range: 6.0000 Inches **Range Resolution:** 0.0005 Inches

Outside Jaws / Linearity

Calibration Standard Inches	As Found Inches	As Left Reading 1 Inches	As Left Reading 2 Inches	Tolerance ± Inches
0.0000	0.0000	0.0000	0.0000	0.0000
0.0500	0.0500	0.0500	0.0500	0.0010
0.3000	0.3000	0.3000	0.3000	0.0010
0.6000	0.6005	0.6005	0.6005	0.0010
1.2000	1.2000	1.2000	1.2000	0.0010
2.4000	2.4005	2.4005	2.4005	0.0010
3.5000	3.5000	3.5000	3.5000	0.0010
5.0000	5.0005	5.0005	5.0005	0.0010
6.0000	6.0005	6.0005	6.0005	0.0010

Expanded Uncertainty ± 0.00036 Inches

Verifications (for information only)

	Target	Measured	Tolerance ±
Resolution Check	0.1005	0.10050	N/A
Depth	1.000	1.00000	N/A
Step	1.000	1.00000	N/A
Inside Jaws	1.000	1.00000	N/A

Inspections

Jaws Parallel	Acceptable

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.

Service Engineer: Cameron Walling **Date:** October 21, 2022

Technical Manager: Marshall Doyle **Signature:**

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

ACCREDITED
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

CERTIFICATE OF CALIBRATION

CUSTOMER:	**PFS-TECO :** CLACKAMAS, OR	**CALIBRATION DATE:**	05/03/2022
PO NUMBER:	1071	**CALIBRATION DUE:**	05/03/2023
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 51% RH 72°F
UNCERTAINTY GIVEN:	± 0.43% RD ; k=2	**CERTIFICATE FILE #:**	490265.2021

NOTES: ± 3% FS (0-500 / 0-1500) *** ± 4% F.S. (0-5000) ***± 5% F.S. (0-15000) *** ± 2 °F

Q.MANUAL IM 2.0 REV 2020.2 DATED 7-27-2020 ** DECISION RULE : NO PFA%**

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
129	133	45.1	44.2
260	266	71.7	70.9
498	509	99.3	98.5
526	534		
1039	1058		
1484	1517		
523	534		
3076	3151		
4998	5127		
6752	6907		
14679	15068		

STANDARDS USED:		
A24: HART SCIENTIFIC TEMP. STANDARD | ± 0.024 F | TRACE# 1617259390	DUE	04/12/2023
A800: FLOW-DYNE SONIC NOZZLE SYSTEM | 0 – 1086 CFM ± 0.46% RD. | TRACE# 1329407628, 89576, 152043238	DUE	12/10/2022

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) and the Unit Under Test (UUT) is a minimum of 4:1, unless otherwise noted. 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

Issuing Date: 05/03/2022 Approved By: [signature] Cal. Technician: D.C

Calibrated at: ✓ Lab ___ On-Site (Customer's)

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: DIRI0134307497221214

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Sartorius	ENTRIS224-1S	34307497	#107	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
g	0.0001	QC012	12/14/22	6/9/22	12/2023

FUNCTIONAL CHECKS

ECCENTRICITY
Test Wt: 100 Tol: 0.0003
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

LINEARITY
Test Wt: 50 x 4 Tol: 0.0002
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

STANDARD DEVIATION
Test Wt: 100 Tol: 0.0001

1.	100.0002	5.	1000.0003	9.	1000.0003
2.	1000.0001	6.	1000.0002	10.	1000.0002
3.	1000.0002	7.	1000.0002	Result	
4.	1000.0002	8.	1000.0003	284.60499	

ENVIRONMENTAL CONDITIONS
☐ Good ☑ Fair ☐ Poor
Temperature: 20.6°C

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	200.0009	200.0004	569.20999
100	100.0005	100.0002	569.20999
50	50.0004	50.0001	569.20999
20	20.0003	20.0000	569.20999
1	1.0001	1.0000	569.20999
0.1	0.1001	0.1000	569.20999

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	Rice Lake	20 kg to 1mg	2831W	3/1/22	3/2023	20220382

Permanent Information Concerning this Equipment:
6 month calibration cycle
1/22 Extra checkpoint to encapsulate user range 0.05g.
AF= 0.0500g A/L= 0.0500

Comments/Info Concerning this Calibration:
12/22 RH= 45%. Adjusted span.

Report prepared/reviewed by: JC **Date:** 12/14/22 **Technician:** J. Colacchio

Signature:

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation and readability of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

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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

Established 1974

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A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI01C101887027221214

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Mettler	IND570 - 1000lbx0	C101887027	#189	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
lbs	0.02	QC033	12/14/22	1/27/22	12/2023

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: 16.7°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	1000.84	1000.02	0.012
600	600.32	600.00	0.011
400	400.10	400.00	0.011
200	200.00	199.98	0.011
100	100.00	99.98	0.011
50	50.00	50.00	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	7/18/22	7/2024	20221688

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

12/14 As-Found Failed Linearity. Performed 3 point Linearity adjustment. As-Left Passed Linearity. Adjusted span.

Report prepared/reviewed by: JC **Date:** 12/14/22 **Technician:** J. Colacchio **Signature:**

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy.

Aquatech Scientific Instruments LLC

680 Heacock Rd, Suite 204A, Yardley, PA. 19067
web: www.digitalbarograph.com email: sales@digitalbarograph.com
PHONE: 215-428-9400 FAX: 267-790-0404

PRESSURE CALIBRATION TEST REPORT

PREPARED FOR	MODEL	SERIAL #	SB #	DATE	TEMP
SEBASTIAN BUTTON	**DBX2**	**118222**	**X1177**	**4/16/2022**	**68**

PRESSURE WHEN SET	INIT OFFSET
997.5	**-1.2**

118222

DRUCK DPI-740	TEST UNIT	CORRECTION	ADJUSTMENT	ZONE	RANGE
1080.0	**1080.2**	-0.2	**-0.20**	***ZONE 11***	**>1075**
1060.0	**1060.1**	-0.1	**-0.10**	***ZONE 10***	**1070**
1040.0	**1040.1**	-0.1	**-0.10**	***ZONE 9***	**1050**
1020.0	**1020.1**	-0.1	**-0.10**	***ZONE 8***	**1030**
1000.0	**1000.1**	-0.1	**-0.10**	***ZONE 7***	**1010**
980.0	**980.1**	-0.1	**-0.10**	***ZONE 6***	**990**
960.0	**960.1**	-0.1	**-0.10**	***ZONE 5***	**970**
940.0	**940.0**	0.0	**0.00**	***ZONE 4***	**950**
920.0	**920.0**	0.0	**0.00**	***ZONE 3***	**930**
900.0	**900.0**	0.0	**0.00**	***ZONE 2***	**910**
880.0	**880.0**	0.0	**0.00**	***ZONE 1***	**890**
860.0	**860.0**	0.0	**0.00**	***ZONE 0***	**<865**

Values represent actual (mb) data of test unit, prior to unit adjustment (calibration)
Pressure standard used is a NIST traceable instrument GE Druck DPI-740 S/N 74003994
Pressure standard used is rated at +/-0.15hPa (mb) of true pressure.
GE Druck DPI-740 S/N 74003994 Calibration Due Date: May 31st, 2022

NOTE: Calibration Due Date of test unit: 1 YEAR FROM TEST DATE

Model 1430 Microtector® Electronic Point Gage

Installation and Operating Instructions

Model 1430 Microtector® Portable Electronic Point Gage combines modern, solid-state integrated circuit electronics with a time-proven point gage manometer to provide fast, accurate pressure measurements.

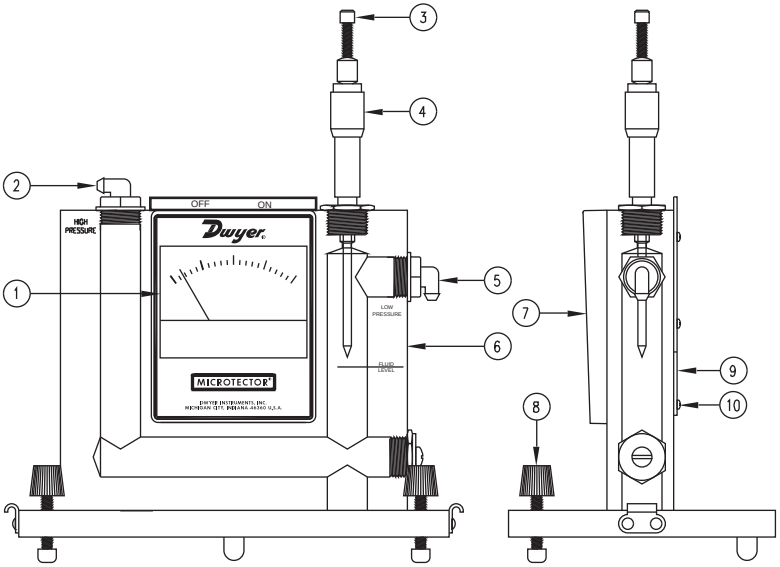
SPECIFICATIONS AND FEATURES

- Accurate and repeatable to ± .00025 inches water column
- Pressure range: 0 - 2″ w.c., positive, negative, or differential pressures
- Non-toxic and inexpensive gage fluid consists of distilled water mixed with a small amount of fluorescein green color concentrate
- Convenient, portable, lightweight and self-contained, the unit requires no external power connections and is operated by a 1.5 volt penlight cell
- A.C. detector current eliminates point plating, fouling and erosion
- Micrometers are manufactured in accordance with ASME B89.1.13-2001, and are traceable to a standard at the National Institute of Standards and Technology
- Three-point mounting, dual leveling adjustment, and circular level vial assure rapid setup
- Durablock® precision-machined acrylic plastic gage body
- Sensitive 0 - 50 microamp D.C. meter acts as a detector and also indicates battery and probe condition
- Heavy 2″ thick steel base plate provides steady mounting
- Top-quality glass epoxy circuit board and solid-state, integrated circuit electronics
- Electronic enclosure of tough, molded styrene acrylonitrile provides maximum protection to components yet allows easy access to battery compartment
- Rugged sheet steel cover and carrying case protects the entire unit when not in use
- Accessories included are (2) 3-foot lengths Tygon® tubing, (2) 1/8″ pipe thread adapters and 3/4 oz. bottle of fluorescein green color concentrate with wetting agent

Maximum pressure: 100 psig with optional pipe thread connections.

Tygon® is a registered trademark of Saint-Gobain Corporation

DWYER INSTRUMENTS, INC.
P.O. BOX 373
MICHIGAN CITY, INDIANA 46361,U.S.A
Phone: 219/879-8000
Fax: 219/872-9057
www.dwyer-inst.com
e-mail: info@dwyer-inst.com



Microtector® Gage

Precision Pressure Measurement

The Microtector® Gage combines the time-proven principles of the Hook Gage type manometer and modern solid-state integrated circuit electronics. It provides an inexpensive means of achieving accuracy and repeatability within ± .00025 inches water column throughout its 0 to 2 inches w.c. range. It is truly a new standard in precision measuring devices.

Principles of Operation

A pressure to be measured is applied to the manometer fluid which is displaced in each leg of the manometer by an amount equal to 1/2 the applied pressure. A micrometer mounted point is then lowered until it contacts the manometer gage fluid. The instant of contact is detected by completion of a low-power A.C. circuit. Current for this circuit is supplied by a 1.5 volt penlight cell feeding two semiconductor amplifiers which act as a free-running multivibrator operating at a frequency of approximately two kilohertz. Completion of the A.C. circuit activates a bridge rectifier which provides the signal for indication on a sensitive (0 to 50 microamps) D.C. microammeter.

On indication of contact, the operator stops lowering the point and reads the micrometer which indicates one half the applied pressure. By interpolating eight divisions (each being .000125″ w.c.) between .001 micrometer graduations, a total accuracy of .00025 can easily be achieved. The micrometer complies with Federal Specification GGG-C-105A and is traceable to a master at the NIST.

Locating and Opening

Stand the Microtector® Gage and case on a firm flat level surface. Remove cover by releasing the latches and lifting it straight up. If it is necessary to move the gage without case, handle only the base plate or clear acrylic block. (**CAUTION:** Do not handle gage by grasping meter-electronic package housing Item 7 on drawing.)

Fluid Level

Level the gage by adjusting the two front leveling screws (Item 8 on drawing) until the bubble in the spirit level is centered in the small circle. After leveling the gage, open both rapid shut-off valve tube connectors (Items 2 and 5). Back off the micrometer (Item 4), if necessary, to make sure that the point is not immersed in the gage fluid. The fluid level in the gage should now coincide with the mark on the right hand bore (Item 6) plus or minus approximately 1/32 inch. If the level of fluid is too high, fluid can be removed with an eye dropper pipette or carefully poured out of the right connection (Item 5).

If the level is too low, remove the top left rapid shut-off valve tube connector (Item 2) and add distilled water pre-mixed with the proper amount of green concentrate. (See maintenance instructions for proportions. After correcting the fluid level, re-install the rapid shut-off connectors and, with these in the open position, re-level the Microtector® Gage. The gage is now ready to be zeroed.

Zeroing

Turn the Micrometer barrel (Item 4) until its lower end just coincides with the zero mark on the scale and the zero on the barrel scale coincides with the vertical line on the internal scale. Note that the internal scale is graduated every .025″ from 0 to 1.00 inch and the barrel scale is graduated in one thousandths from 0 to .025″. Turn the meter circuit switch at the top of gage to the “on” position. While holding the barrel at the zero position (and with gage level), raise or lower the point by turning the knurled knob (Item 3) until the point is above, but near, the fluid.

Check to be sure that the meter registers zero. Watch the meter, hold the barrel, and lower the point slowly by turning the top knurled knob. As the knob is turned, the point will contact the fluid and the meter pointer will move from zero to some upscale position.

After making contact, turn the point out of the fluid by turning the micrometer barrel counterclockwise to a reading of .010 or more. Again, watch the meter and, this time, lower the point by turning the micrometer barrel. The point position where the meter pointer begins to move up scale is the zero position. This position should correspond to the zero reading on the micrometer. Adjust the point in relation to the micrometer barrel by turning the top knob while holding the barrel steady. Repeat lowering the point, watching the meter for contact, and adjusting the point until the zero position and zero reading exactly coincide. The gage is now zeroed and should not be moved.

An alternative method of zeroing and reading can be used wherein, instead of zeroing the gage completely, a zero correction reading is taken and recorded, then subtracted from the final reading. Comparable results can be obtained with either method.

Positive Pressure Measurement

With the fluid at its proper level, a pressure of 2.0″ water column maximum can be measured. Positive pressure should be applied to the top left connection (Item 2) with the micrometer zeroed as described above. This will permit a simple direct reading to be taken.

After an unknown pressure has been applied at the top left connection, the fluid level will drop in the left bore and rise over the point in the right bore. Note that the indicating meter point has moved upscale because the point is immersed in the fluid. Turn the micrometer counter-clockwise until the point leaves the fluid as indicated by the meter pointer dropping to zero on its scale. Then slowly turn the micrometer down until its point just touches the fluid surface, causing movement of the meter pointer. Withdraw the point and repeat several times, noting each time the micrometer reading where the meter pointer begins. The average of these readings multiplied by two is the pressure applied to the gage. (Avg. reading x 2 = pressure applied in inches w.c. The degree of uncertainty for the operator is indicated by the difference in these readings.

When the readings are complete, the pressure should be removed and the zero setting of Microtector® Gage rechecked. Any change in the zero position will indicate inaccurate readings. Should this happen, the zero-set and pressure measurement procedure should be repeated.

Negative Pressure or Vacuum Measurement

Zero the gage. Connect the source of vacuum or negative pressure to the right-side gage connection (Item 5) and proceed as described under Positive Pressure Measurement section. Remember that the pressure measured in this way is negative.

Differential Pressure Measurement

Differential pressures may be measured by connecting the higher (more positive) pressure to the left connection (Item 2) and the lower pressure to the right connection (Item 5).

Storage

Turn meter circuit switch to "off" position and withdraw the point well clear of fluid (by turning micrometer clockwise) when gage is not in use. This will conserve the batteries and minimize build-up of oxides, etc., on the point. Keep the unit covered and in an area free of strong solvent fumes.

Maintenance

When the meter reading becomes reduced or the pointer movement gets sluggish (with the circuit on and the point in fluid), the following should be done:

(1) Remove the point (by unscrewing) and clean the tip lightly using fine crocus cloth. Wipe off all grit and dirt with a clean rag; reassemble and recheck meter operation.

(2) If the meter operation continues to be sluggish, replace the size AA, 1.5 volt battery. (Replace the battery at least once a year to avoid deterioration of battery and damage to gage. Leakproof alkaline battery is recommended.)

To replace the battery, remove center screw (Item 10) located in the back of the electronic enclosure. Cover (Item 9) will come off, exposing the battery. Pull the old battery out and push a new battery into the battery holder with the positive (center) terminal to the right (to the end marked with + on the holder).

If the fluid becomes contaminated and requires replacement: empty old fluid from gage; flush out with clear water and replace with distilled water and A-126 fluorescein green color concentrate mixed with 3/4 oz. concentrate to each quart of water.

CAUTION:

1. Do not substitute other gage fluids, as proper gage operation depends on use of the specified gage fluid to provide proper surface tension, wetting ability and electrolyte capability with unity specific gravity.

If the gage bore is very dirty, a mild soap solution may be used to aid in cleaning prior to flushing with clear water.

2. Do not clean with liquid soaps, special solvent, de-greasers, aromatic hydrocarbons, etc. Such cleaners and solvents may contain chlorine, fluorine, acetone and related compounds that will permanently damage the gage and prevent proper operation.

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J-2000

owner's manual

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INSTRUMENT CO.

WHEN ACCURACY IS THE POINT.™

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an Air Liquide company

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11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E04NI61E15A0574	Reference Number:	48-402546580-1
Cylinder Number:	CC121798	Cylinder Volume:	143.7 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2016 PSIG
PGVP Number:	B32022	Valve Outlet:	590
Gas Code:	CO,CO2,O2,BALN	Certification Date:	Sep 23, 2022

Expiration Date: Sep 23, 2030

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	4.250 %	4.306 %	G1	+/- 0.6% NIST Traceable	09/23/2022
CARBON DIOXIDE	17.00 %	17.01 %	G1	+/- 0.6% NIST Traceable	09/23/2022
OXYGEN	17.00 %	17.11 %	G1	+/- 0.7% NIST Traceable	09/23/2022
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061520	CC354777	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	98051002	SG9150866BAL	12.05 % OXYGEN/NITROGEN	+/- 0.7%	Dec 14, 2023
NTRM	08061402	CC267714	1.959 %W CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jul 02, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Sep 16, 2022
SIEMENS 6E CO HIGH	NDIR	Sep 06, 2022
SIEMENS OXYMAT 6	PARAMAGNETIC	Sep 12, 2022

Triad Data Available Upon Request

Approved for Release

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Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PXPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD ROAD
TUALATIN OR 97062-9547

Certificate Issuance Date: 10/16/2019
Praxair Order Number: 71120745
Part Number: NI CD10CO33E-AS
Customer PO Number: 79106732

Fill Date: 10/08/2019
Lot Number: 70086928102
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/16/2027	NIST Traceable
Cylinder Number:	CC139173	Expanded Uncertainty
10.09 %	Carbon dioxide	± 0.4 %
2.53 %	Carbon monoxide	± 0.6 %
10.48 %	Oxygen	± 0.4 %
Balance	Nitrogen	

Certification Information:

Certification Date: 10/16/2019 Term: 96 Months Expiration Date: 10/16/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. **Component:** Carbon dioxide

Requested Concentration: 10 %
Certified Concentration: 10.09 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 09/18/2019

First Analysis Data:						Date	10/16/2019
Z:	0	R:	14	C:	10.09	Conc:	10.09
R:	14	Z:	0	C:	10.1	Conc:	10.1
Z:	0	C:	10.1	R:	14.01	Conc:	10.1
UOM:	%				Mean Test Assay:		10.09 %

Reference Standard: Type / Cylinder #: GMIS / CC164230
Concentration / Uncertainty: 14.00 % ±0.265%
Expiration Date: 04/16/2027
Traceable to: SRM # / Sample # / Cylinder #: SRM 1675b / 6-F-51 / CAL014538
SRM Concentration / Uncertainty: 13.963% / ±0.034%
SRM Expiration Date: 05/16/2022

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%				Mean Test Assay:		%

2. **Component:** Carbon monoxide

Requested Concentration: 2.5 %
Certified Concentration: 2.53 %
Instrument Used: Horiba VIA-510 S/N UB9UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 09/19/2019

First Analysis Data:						Date	10/16/2019
Z:	0	R:	5	C:	2.53	Conc:	2.53
R:	5	Z:	0	C:	2.53	Conc:	2.53
Z:	0	C:	2.54	R:	5.01	Conc:	2.54
UOM:	%				Mean Test Assay:		2.53 %

Reference Standard: Type / Cylinder #: GMIS / CC242633
Concentration / Uncertainty: 5.00 % ±0.543%
Expiration Date: 04/03/2025
Traceable to: SRM # / Sample # / Cylinder #: SRM 2642a / 51-D-23 / FF23106
SRM Concentration / Uncertainty: 7.859% / ±0.039%
SRM Expiration Date: 07/15/2019

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%				Mean Test Assay:		%

3. **Component:** Oxygen

Requested Concentration: 10.5 %
Certified Concentration: 10.48 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 09/18/2019

First Analysis Data:						Date	10/16/2019
Z:	0	R:	9.88	C:	10.49	Conc:	10.48
R:	9.88	Z:	0	C:	10.49	Conc:	10.48
Z:	0	C:	10.5	R:	9.89	Conc:	10.49
UOM:	%				Mean Test Assay:		10.48 %

Reference Standard: Type / Cylinder #: NTRM / DT0010384
Concentration / Uncertainty: 9.875 % ±0.4%
Expiration Date: 11/18/2022
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 170701 / NTRM DT0010384
SRM Concentration / Uncertainty: 9.875% / ±0.040%
SRM Expiration Date: 11/18/2022

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%				Mean Test Assay:		%

Analyzed By: Jose Vasquez

Certified By: Jenna Lockman