

Equations and Sample Calculations – ASTM E2779 & E2515

Client Thelin
 Model: Providence
 Tracking #: 0034
 Run: 1

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

M_{Bdb} – Weight of test fuel burned during test run, dry basis, kg

M_{BSidb} – Weight of test fuel burned during test run segment i , dry basis, kg

BR – Average dry burn rate over full integrated test run, kg/hr

BR_{Si} – Average dry burn rate over test run segment i , 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 – Average particulate emissions for full integrated test run, g/hr

PM_F – Average particulate emission factor for full integrated test run, g/dry kg of fuel burned

M_{Bdb} – Weight of test fuel burned during test run, dry basis, kg
ASTM E2779 equation (1)

$$M_{Bdb} = (M_{Swb} - M_{Ewb})(100/(100 + FM))$$

Where,

- FM = average fuel moisture of test fuel, % dry basis
- M_{Swb} = weight of test fuel in hopper at start of test run, wet basis, kg
- M_{Ewb} = weight of test fuel in hopper at end of test run, wet basis, kg

Sample Calculation:

- FM = 2.54 %
- M_{Swb} = 14.2 lbs
- M_{Ewb} = 0.0 lbs
- 0.4536 = Conversion factor from lbs to kg

$$M_{Bdb} = [(14.2 \times 0.4536) - (0.0 \times 0.4536)] (100/(100 + 2.54))$$

$$M_{Bdb} = \mathbf{6.28 \text{ kg}}$$

M_{BSidb} – Weight of test fuel burned during test run segment i , dry basis, kg
ASTM E2779 equation (2)

$$M_{BSidb} = (M_{SSiwb} - M_{ESiwb})(100/(100 + FM))$$

Where,

M_{SSiwb} = weight of test fuel in hopper at start of test run segment i , wet basis, kg

M_{ESiwb} = weight of test fuel in hopper at end of test run segment i , wet basis, kg

Sample Calculation (from medium burn rate segment):

$$FM = 2.54 \%$$

$$M_{SSiwb} = 10.0 \text{ lbs}$$

$$M_{ESiwb} = 6.0 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{BSidb} = [(10.0 \times 0.4536) - (6.0 \times 0.4536)] (100/(100 + 2.54))$$

$$M_{BSidb} = 1.77 \text{ kg}$$

BR – Average dry burn rate over full integrated test run, kg/hr
ASTM E2779 equation (3)

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

Where,

θ = Total length of full integrated test run, min

Sample Calculation:

$$M_{Bdb} = 6.28 \quad \text{kg}$$
$$\theta = 360 \quad \text{min}$$

$$BR = \frac{60 \times 6.28}{360}$$

$$BR = \mathbf{1.05} \quad \text{kg/hr}$$

BR_{Si} – Average dry burn rate over test run segment *i*, kg/hr
ASTM E2779 equation (4)

$$BR_{Si} = \frac{60 M_{BSidb}}{\theta_{Si}}$$

Where,

$$\theta_{Si} = \text{Total length of test run segment } i, \text{ min}$$

Sample Calculation (from medium burn rate segment):

$$M_{BSidb} = 1.77 \text{ kg}$$

$$\theta = 120 \text{ min}$$

$$BR = \frac{60 \times 1.77}{120}$$

$$BR = \mathbf{0.88} \text{ kg/hr}$$

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

ASTM E2515 equations (9)

$$V_s = F_p \times K_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_s}{P_s \times M_s}}$$

Where:

- F_p = Adjustment factor for center of tunnel pitot tube placement, $F_p = \frac{V_{strav}}{V_{scent}}$, 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_2O ; (in Hg = in H_2O /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:

$$F_p = \frac{16.08}{17.85} = 0.901$$

$$V_s = 0.901 \times 85.49 \times 0.99 \times 0.260 \times \left(\frac{98.5 + 460}{29.91 + \frac{-0.19}{13.6}} \right)^{1/2} \times 28.78$$

$$V_s = \mathbf{15.95 \text{ ft/s}}$$

*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 M_s 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)

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

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, ft²
- 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 = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_{std} = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 15.95 \times 0.1963 \times \frac{528}{98.5 + 460} \times \frac{29.91 + \frac{-0.19}{13.6}}{29.92}$$

$$Q_{sd} = \mathbf{10435.3} \text{ dscf/hr}$$

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

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

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 ₂ O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train A:

$$V_{m(std)} = 17.64 \times 53.246 \times 0.999 \times \frac{\left(29.91 + \frac{2.19}{13.6} \right)}{\left(94.3 + 460 \right)}$$

$$V_{m(std)} = \mathbf{50.906} \text{ dscf}$$

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 52.515 \times 0.996 \times \frac{\left(29.91 + \frac{2.14}{13.6} \right)}{\left(93.4 + 460 \right)}$$

$$V_{m(std)} = \mathbf{50.129} \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 0.00 \times 0.992 \times \frac{\left(\underline{29.91} + \frac{0.00}{13.6} \right)}{\left(72.9 + 460 \right)}$$

$$V_{m(std)} = \mathbf{0.000} \text{ dscf}$$

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

$$m_n = m_p + m_f + m_g$$

Where:

- m_p = mass of particulate matter from probe, mg
- m_f = mass of particulate matter from filters, mg
- m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A (first hour):

$$m_n = 0.0 + 1.0 + 0.0$$
$$m_n = 1.0 \text{ mg}$$

Using equation for Train A (remainder):

$$m_n = 0.0 + 3.6 + 0.8$$
$$m_n = 4.4 \text{ mg}$$

Train A Aggregate = **5.4 mg**

Using equation for Train B:

$$m_n = 0.1 + 4.0 + 1.0$$
$$m_n = 5.1 \text{ mg}$$

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, 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:

$$C_s = 0.001 \times \frac{5.4}{50.91}$$

$$C_s = \mathbf{0.00011} \text{ g/dscf}$$

For Train B:

$$C_s = 0.001 \times \frac{5.1}{50.13}$$

$$C_s = \mathbf{0.00010} \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{0.00}$$

$$C_r = \mathbf{0.000000} \text{ g/dscf}$$

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

$$E_T = (\underline{0.000106} - 0.000000) \times \underline{10435.3} \times \underline{360} /60$$
$$E_T = \underline{6.64} \text{ g}$$

For Train B

$$E_T = (\underline{0.000102} - 0.000000) \times \underline{10435.3} \times \underline{360} /60$$
$$E_T = \underline{6.37} \text{ g}$$

Average

$$E = \underline{6.51} \text{ g}$$

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

$$7.5\% \text{ of the average} = \underline{0.49}$$

$$\text{Train A difference} = \underline{0.14}$$

$$\text{Train B difference} = \underline{0.14}$$

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, °R
 T_m = Absolute average dry gas meter temperature, °R
 T_{si} = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, °R
 T_s = Absolute average gas temperature in the dilution tunnel, °R

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

$$PR = \left(\frac{360 \times 0.128 \times 15.95 \times (94.3 + 460) \times (#### + 460)}{1 \times 53.246 \times 16.22 \times (98.5 + 460) \times (77.0 + 460)} \right) \times 100$$

$$PR = \underline{90} \%$$

PM_R – Average particulate emissions for full integrated test run, g/hr
ASTM E2779 equation (5)

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

$$E_T (\text{Dual train average}) = 6.51 \text{ g}$$

$$\theta = 360 \text{ min}$$

$$PM_R = 60 \times (6.51 / 360)$$

$$PM_R = \mathbf{1.08} \text{ g/hr}$$

PM_F – Average particulate emission factor for full integrated test run, g/dry kg of fuel burned
ASTM E2779 equation (6)

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

Where,

E_T = Total particulate emissions, grams

M_{Bdb} = Weight of test fuel burned during test run, dry basis, kg

Sample Calculation:

$$E_T \text{ (Dual train average)} = 6.51 \text{ g}$$

$$M_{Bdb} = 6.28 \text{ kg}$$

$$PM_F = 6.51 / 6.28)$$

$$PM_F = \mathbf{1.04} \text{ g/kg}$$

PELLET TEST DATA PACKET
ASTM E2779/E2515



Run 1 Data Summary

Client: Thelin
Model: Providence
Job #: 19-501
Tracking #: 0034
Test Date: 9/10/2019



Technician Signature

10/22/2019

Date

TEST RESULTS - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Burn Rate Summary	
High Burn Rate (dry kg/hr)	1.86
Medium Burn Rate (dry kg/hr)	0.88
Low Burn Rate (dry kg/hr)	0.88
Overall Burn Rate (dry kg/hr)	1.05

47.6% of High Burn Rate
 47.6% of High Burn Rate

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft ³)	0.000	53.246	52.515	8.754
Average Gas Velocity in Dilution Tunnel (ft/sec)	15.9			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10435.3			
Average Gas Meter Temperature (°F)	72.9	94.3	93.4	83.6
Total Sample Volume (dscf)	0.000	50.906	50.129	8.533
Average Tunnel Temperature (°F)	98.5			
Total Time of Test (min)	360			
Total Particulate Catch (mg)	0.0	5.4	5.1	1.0
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0001061	0.0001017	0.0001172
Total PM Emissions (g)	0.00	6.64	6.37	1.22
Particulate Emission Rate (g/hr)	0.00	1.11	1.06	1.22
Emissions Factor (g/kg)	-	1.06	1.01	0.66
Difference from Average Total Particulate Emissions (g)	-	0.14	0.14	-
Difference from Average Emissions Factor (g/kg)	-	0.02	0.02	-

Final Average Results	
Total Particulate Emissions (g)	6.51
Particulate Emission Rate (g/hr)	1.08
Emissions Factor (g/kg)	1.04
HHV Efficiency (%)	64.0%
LHV Efficiency (%)	68.4%
CO Emissions (g/min)	0.30

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	83	OK
Face Velocity	< 30 ft/min	13.2	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min: 72 / Max: 76	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	CHECK 10 MIN. INTERVAL PRO-RATES
Medium Burn Rate	< 50% of High	47.6%	OK

Overall Pellet Test Efficiency Results

Manufacturer: Thelin
Model: Providence
Date: 09/10/19
Run: 1
Control #: 19-501
Test Duration: 360
Output Category: Integrated

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	64.0%	68.4%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	64.3%	68.8%

Output Rate (kJ/h)	13,635	12,934	(Btu/h)
Burn Rate (kg/h)	1.05	2.31	(lb/h)
Input (kJ/h)	21,318	20,223	(Btu/h)

Test Load Weight (dry kg)	6.28	13.85	dry lb
MC wet (%)	2.48		
MC dry (%)	2.54		
Particulate (g)	6.51		
CO (g)	110		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.08	1.34
g/kg Dry Fuel	1.04	17.43
g/h	1.08	18.25
g/min	0.02	0.30
lb/MM Btu Output	0.18	3.11

Air/Fuel Ratio (A/F)	47.11
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VERSION:

2.2

12/14/2009

Max Burn Rate Segment Efficiency Results

Manufacturer: Thelin
Model: Providence
Date: 09/10/19
Run: 1
Control #: 19-501
Test Duration: 60
Output Category: Maximum

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	66.2%	70.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	66.5%	71.1%

Output Rate (kJ/h)	25,032	23,746	(Btu/h)
Burn Rate (kg/h)	1.86	4.10	(lb/h)
Input (kJ/h)	37,832	35,888	(Btu/h)

Test Load Weight (dry kg)	1.86	4.10	dry lb
MC wet (%)	2.48		
MC dry (%)	2.54		
Particulate (g)	N/A		
CO (g)	13		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	N/A	0.54
g/kg Dry Fuel	N/A	7.26
g/h	N/A	13.49
g/min	N/A	0.22
lb/MM Btu Output	N/A	1.25

Air/Fuel Ratio (A/F)	30.24
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VERSION:

2.2

12/14/2009

Medium Burn Rate Segment Efficiency Results

Manufacturer: Thelin
Model: Providence
Date: 09/10/19
Run: 1
Control #: 19-501
Test Duration: 120
Output Category: Medium

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	64.4%	68.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	64.7%	69.2%

Output Rate (kJ/h)	11,595	10,999	(Btu/h)
Burn Rate (kg/h)	0.88	1.95	(lb/h)
Input (kJ/h)	18,015	17,089	(Btu/h)

Test Load Weight (dry kg)	1.77	3.90	dry lb
MC wet (%)	2.48		
MC dry (%)	2.54		
Particulate (g)	N/A		
CO (g)	32		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	N/A	1.40
g/kg Dry Fuel	N/A	18.29
g/h	N/A	16.19
g/min	N/A	0.27
lb/MM Btu Output	N/A	3.24

Air/Fuel Ratio (A/F)	49.52
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VERSION:

2.2

12/14/2009

Minimum Burn Rate Segment Efficiency Results

Manufacturer: Thelin
Model: Providence
Date: 09/10/19
Run: 1
Control #: 19-501
Test Duration: 180
Output Category: Minimum

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	61.2%	65.5%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	61.5%	65.8%

Output Rate (kJ/h)	11,028	10,461	(Btu/h)
Burn Rate (kg/h)	0.88	1.95	(lb/h)
Input (kJ/h)	18,015	17,089	(Btu/h)

Test Load Weight (dry kg)	2.65	5.85	dry lb
MC wet (%)	2.48		
MC dry (%)	2.54		
Particulate (g)	N/A		
CO (g)	64		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	N/A	1.94
g/kg Dry Fuel	N/A	24.18
g/h	N/A	21.40
g/min	N/A	0.36
lb/MM Btu Output	N/A	4.51

Air/Fuel Ratio (A/F)	55.61
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VERSION:

2.2

12/14/2009

DILUTION TUNNEL & MISC. DATA - ASTM E2779 / E2515

Client: Thelin
 Model: Providence
 Run #: 1
 Test Start Time: _____

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

High Burn End Time (min): 60
 Medium Burn End Time (min): 180
 Total Sampling Time (min): 360
 Recording Interval (min): 1

Meter Box γ Factor: 0.999 (A)
 Meter Box γ Factor: 0.996 (B)
 Meter Box γ Factor: 0.992 (Ambient)

Induced Draft Check (in. H₂O): 0
 Smoke Capture Check (%): 100%
 Date Flue Pipe Last Cleaned: _____

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.91	29.91	29.91
Relative Humidity (%)	34.0	42.0	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:		0.000	ft ³

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-10	in. Hg
(B)	0.000	cfm @	-10	in. Hg
(Ambient)		cfm @		in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H ₂ O)	Temp (°F)
1	0.048	87
2	0.058	87
3	0.062	87
4	0.046	87
5	0.052	87
6	0.068	87
7	0.062	87
8	0.048	87
Center	0.070	87

Dilution Tunnel H₂O: 2.00 percent
 Tunnel Diameter: 6 inches
 Pitot Tube Cp: 0.99 [unitless]
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Tunnel Area: 0.1963 ft²

V_{strav}: 16.08 ft/sec
 V_{scent}: 17.85 ft/sec
 F_p: 0.901 [ratio]

Initial Tunnel Flow: 176.6 scf/min

Static Pressure: -0.190 in. H₂O

TEST FUEL PROPERTIES

Default Fuel Values

Fuel Type:	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Actual Fuel Used Properties

Pellet Brand:	<u>Bear Mountain</u>
Pellet Fuel Grade:	<u>PFI Premium</u>
HHV (kJ/kg)	<u>20,357</u>
%C	<u>49.35</u>
%H	<u>6.14</u>
%O	<u>44.27</u>
%Ash	<u>0.24</u>
MC (%DB)	<u>2.54</u>

PELLET STOVE PREBURN DATA - ASTM E2779

Client: <u>Thelin</u>	Job #: <u>19-501</u>
Model: <u>Providence</u>	Tracking #: <u>0034</u>
Run #: <u>1</u>	Technician: <u>AK</u>
	Date: <u>9/10/2019</u>

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

Elapsed Time (min)	Scale Reading (lbs)	Weight Change (lbs)	Average:		
			-0.038	337	74
			Flue Draft (in H ₂ O)	Flue (°F)	Ambient (°F)
0	25.2	-	0.010	76	73
1	25.0	-0.2	0.013	83	73
2	25.0	0	0.003	99	73
3	25.0	0	0.000	121	73
4	25.0	0	-0.015	148	73
5	24.9	-0.1	-0.020	180	73
6	24.8	-0.1	-0.025	223	73
7	24.6	-0.2	-0.032	284	73
8	24.5	-0.1	-0.047	331	73
9	24.3	-0.2	-0.039	350	73
10	24.3	0	-0.050	365	74
11	24.2	-0.1	-0.048	370	74
12	24.2	0	-0.049	372	74
13	24.0	-0.2	-0.054	375	74
14	24.0	0	-0.039	375	74
15	23.9	-0.1	-0.042	376	74
16	23.8	-0.1	-0.043	380	74
17	23.8	0	-0.035	374	74
18	23.7	-0.1	-0.036	364	74
19	23.7	0	-0.042	370	74
20	23.6	-0.1	-0.046	370	74
21	23.5	-0.1	-0.054	372	74
22	23.5	0	-0.045	368	74
23	23.4	-0.1	-0.042	364	74
24	23.3	-0.1	-0.036	366	74
25	23.3	0	-0.033	365	74
26	23.2	-0.1	-0.045	365	74
27	23.2	0	-0.035	364	74
28	23.1	-0.1	-0.042	361	74
29	23.0	-0.1	-0.046	363	74
30	22.9	-0.1	-0.032	362	74
31	22.9	0	-0.034	364	74
32	22.7	-0.2	-0.036	356	74
33	22.9	0.2	-0.031	350	74
34	22.7	-0.2	-0.036	350	74
35	22.7	0	-0.044	353	74
36	22.6	-0.1	-0.046	358	75
37	22.4	-0.2	-0.057	367	74
38	22.4	0	-0.046	365	74
39	22.4	0	-0.033	365	75
40	22.3	-0.1	-0.041	363	74
41	22.3	0	-0.044	371	74
42	22.5	0.2	-0.047	371	75
43	22.1	-0.4	-0.033	368	75
44	22.0	-0.1	-0.054	369	75
45	22.0	0	-0.042	374	75
46	21.9	-0.1	-0.045	369	75

PELLET STOVE PREBURN DATA - ASTM E2779

Client: Thelin Job #: 19-501

Model: Providence Tracking #: 0034

Run #: 1 Technician: AK

Date: 9/10/2019

47	21.8	-0.1	-0.048	370	75
48	21.9	0.1	-0.051	368	75
49	21.6	-0.3	-0.033	372	75
50	21.6	0	-0.053	373	75
51	21.5	-0.1	-0.034	375	75
52	21.5	0	-0.044	375	75
53	21.2	-0.3	-0.056	371	75
54	21.2	0	-0.027	368	75
55	21.3	0.1	-0.035	361	75
56	21.2	-0.1	-0.044	355	75
57	21.2	0	-0.042	365	75
58	21.1	-0.1	-0.056	360	75
59	21.0	-0.1	-0.038	359	75
60	21.0	0	-0.042	353	75

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.070	0.01	77	-0.08		14.2		113	352	73	75
1	0.128	0.128	0.068	2.16	77	-2.3	90	14.1	-0.1	113	356	75	75
2	0.269	0.141	0.060	2.15	77	-2.42	106	14.1	0.0	113	357	76	75
3	0.414	0.145	0.064	2.13	77	-2.54	105	14.0	-0.1	113	362	77	75
4	0.556	0.142	0.077	2.13	77	-2.26	94	13.9	-0.1	113	365	77	75
5	0.698	0.142	0.063	2.12	77	0	104	13.8	-0.1	113	368	78	75
6	0.842	0.144	0.064	2.10	77	-0.32	104	13.8	0.0	113	370	78	75
7	0.983	0.141	0.071	2.09	77	-2.51	97	13.7	-0.1	113	374	78	75
8	1.128	0.145	0.063	2.10	77	-2.07	106	13.6	-0.1	113	369	79	75
9	1.267	0.139	0.068	2.07	78	-2.07	98	13.5	-0.1	114	375	79	75
10	1.411	0.144	0.070	2.09	78	-2.49	100	13.5	0.0	114	379	79	75
11	1.550	0.139	0.070	2.07	78	-1.71	96	13.3	-0.2	114	376	80	75
12	1.695	0.145	0.065	2.06	78	-1.85	104	13.3	0.0	114	378	80	75
13	1.835	0.140	0.063	2.04	78	-1.25	102	13.2	-0.1	114	375	80	75
14	1.978	0.143	0.062	2.06	79	-1.02	105	13.3	0.1	114	373	80	75
15	2.118	0.140	0.068	2.05	79	-2.13	98	13.1	-0.2	114	369	80	75
16	2.259	0.141	0.069	2.06	79	-2.62	98	13.1	0.0	114	372	81	75
17	2.402	0.143	0.065	2.05	80	-0.01	103	13.0	-0.1	115	368	81	75
18	2.546	0.144	0.070	2.26	80	-2.64	99	13.0	0.0	114	369	81	75
19	2.695	0.149	0.068	2.24	80	-2.62	104	12.9	-0.1	114	364	81	75
20	2.840	0.145	0.066	2.26	80	-0.69	103	12.8	-0.1	114	370	81	75
21	2.989	0.149	0.069	2.26	81	-2.65	103	12.7	-0.1	114	375	81	75
22	3.135	0.146	0.062	2.23	81	-2.65	107	12.6	-0.1	114	375	81	75
23	3.284	0.149	0.072	2.23	81	-1.86	101	12.6	0.0	114	366	81	75
24	3.430	0.146	0.066	2.22	82	-2.15	103	12.5	-0.1	114	377	81	75
25	3.578	0.148	0.069	2.23	82	-0.06	103	12.4	-0.1	115	377	81	75
26	3.725	0.147	0.063	2.25	82	-2.27	107	12.4	0.0	115	383	81	75
27	3.873	0.148	0.067	2.23	83	-2.43	104	12.3	-0.1	115	380	81	76
28	4.020	0.147	0.064	2.24	83	0	106	12.2	-0.1	115	383	81	76
29	4.168	0.148	0.070	2.24	83	-1.29	102	12.1	-0.1	115	380	81	75
30	4.315	0.147	0.067	2.23	84	-2.32	103	12.1	0.0	116	382	81	76
31	4.463	0.148	0.068	2.23	84	0	103	12.0	-0.1	115	376	80	76
32	4.611	0.148	0.067	2.23	84	0	104	11.9	-0.1	115	368	80	75

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	4.759	0.148	0.063	2.22	85	-2.36	107	11.9	0.0	115	376	80	75
34	4.907	0.148	0.071	2.24	85	-1.27	101	11.8	-0.1	115	376	80	75
35	5.054	0.147	0.064	2.22	85	-2.57	105	11.7	-0.1	115	376	80	76
36	5.203	0.149	0.072	2.23	85	-2.66	101	11.7	0.0	115	373	80	76
37	5.349	0.146	0.065	2.24	86	-0.15	104	11.6	-0.1	115	371	80	76
38	5.499	0.150	0.062	2.22	86	-2.52	109	11.5	-0.1	115	376	80	76
39	5.645	0.146	0.070	2.24	86	0	100	11.4	-0.1	115	375	79	76
40	5.795	0.150	0.067	2.21	87	-2.76	105	11.4	0.0	115	369	79	76
41	5.941	0.146	0.068	2.24	87	-0.66	101	11.3	-0.1	116	376	79	76
42	6.091	0.150	0.067	2.21	87	-0.62	105	11.2	-0.1	115	375	79	76
43	6.236	0.145	0.072	2.27	87	-0.91	98	11.2	0.0	115	363	79	76
44	6.387	0.151	0.062	2.23	88	-0.46	109	11.1	-0.1	115	362	79	76
45	6.532	0.145	0.075	2.23	88	0	95	11.1	0.0	115	364	79	76
46	6.683	0.151	0.067	2.23	88	0	105	11.0	-0.1	115	362	79	76
47	6.828	0.145	0.072	2.22	88	-2.61	97	10.9	-0.1	115	366	79	76
48	6.979	0.151	0.063	2.24	89	0	108	10.9	0.0	115	364	80	76
49	7.124	0.145	0.067	2.21	89	-2.41	101	10.8	-0.1	115	358	80	76
50	7.275	0.151	0.068	2.23	89	-2.07	104	10.6	-0.2	114	367	80	76
51	7.422	0.147	0.063	2.22	89	-0.07	105	10.6	0.0	115	368	80	76
52	7.573	0.151	0.068	2.25	90	-1.24	104	10.6	0.0	115	364	80	76
53	7.719	0.146	0.065	2.23	90	0	103	10.5	-0.1	115	364	80	76
54	7.869	0.150	0.068	2.23	90	0	103	10.5	0.0	115	357	80	76
55	8.016	0.147	0.071	2.24	90	-0.3	99	10.4	-0.1	115	355	80	75
56	8.166	0.150	0.064	2.20	91	0	106	10.4	0.0	115	361	80	75
57	8.313	0.147	0.065	2.24	91	0	103	10.3	-0.1	114	358	79	75
58	8.462	0.149	0.072	2.23	91	0	99	10.2	-0.1	114	362	79	75
59	8.606	0.144	0.071	2.13	91	0	97	10.1	-0.1	114	361	79	75
60	8.754	0.148	0.075	2.13	91	0	97	10.0	-0.1	114	366	79	75
61	8.899	0.145	0.062	2.16	92	0	104	10.0	0.0	108	353	78	75
62	9.047	0.148	0.062	2.21	92	-0.01	106	10.0	0.0	107	341	79	75
63	9.193	0.146	0.066	2.21	92	-0.13	101	9.9	-0.1	105	327	78	75
64	9.343	0.150	0.071	2.21	92	-2.46	100	9.9	0.0	104	314	78	75
65	9.489	0.146	0.062	2.21	92	-2.63	104	9.9	0.0	103	306	78	74

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	9.638	0.149	0.066	2.19	92	-1.24	103	9.7	-0.2	102	303	78	74
67	9.785	0.147	0.067	2.22	93	-2.55	100	9.8	0.1	101	302	77	74
68	9.934	0.149	0.064	2.20	93	-2.34	104	9.8	0.0	101	302	77	74
69	10.081	0.147	0.065	2.20	93	-0.31	102	9.7	-0.1	100	294	77	74
70	10.230	0.149	0.069	2.21	93	0	100	9.6	-0.1	100	291	77	74
71	10.378	0.148	0.064	2.21	93	0	103	9.5	-0.1	100	287	76	74
72	10.527	0.149	0.060	2.21	93	0	107	9.6	0.1	99	285	76	74
73	10.676	0.149	0.068	2.20	93	-0.09	101	9.6	0.0	99	280	76	74
74	10.823	0.147	0.064	2.19	93	-0.66	102	9.6	0.0	98	278	76	74
75	10.973	0.150	0.063	2.20	93	-2.34	105	9.5	-0.1	98	271	76	74
76	11.119	0.146	0.068	2.21	93	0	98	9.5	0.0	98	273	76	74
77	11.270	0.151	0.072	2.20	93	-0.02	99	9.6	0.1	98	277	76	74
78	11.416	0.146	0.068	2.21	94	0	98	9.4	-0.2	97	273	76	74
79	11.566	0.150	0.065	2.22	94	-0.9	103	9.4	0.0	97	270	76	74
80	11.712	0.146	0.063	2.20	94	-2.33	102	9.4	0.0	97	270	76	74
81	11.862	0.150	0.063	2.18	94	-1.78	105	9.3	-0.1	97	274	76	74
82	12.008	0.146	0.065	2.21	94	-2.22	100	9.3	0.0	97	275	76	74
83	12.159	0.151	0.068	2.19	94	0	102	9.2	-0.1	97	271	76	74
84	12.304	0.145	0.068	2.21	94	-2.57	97	9.2	0.0	96	267	75	74
85	12.455	0.151	0.062	2.21	94	0	106	9.1	-0.1	96	265	75	74
86	12.602	0.147	0.066	2.20	94	-2.42	100	9.1	0.0	97	262	75	74
87	12.753	0.151	0.072	2.19	95	-0.79	98	9.1	0.0	96	261	75	74
88	12.899	0.146	0.067	2.20	95	-0.57	99	9.1	0.0	96	263	75	74
89	13.050	0.151	0.070	2.21	95	0	100	9.0	-0.1	97	269	76	74
90	13.196	0.146	0.068	2.20	95	-1.29	98	9.0	0.0	97	272	76	74
91	13.347	0.151	0.071	2.19	95	-0.85	99	9.0	0.0	97	271	76	74
92	13.493	0.146	0.064	2.21	95	-1.18	101	8.9	-0.1	97	269	76	74
93	13.647	0.154	0.064	2.21	95	-0.88	107	8.9	0.0	97	269	76	74
94	13.793	0.146	0.066	2.22	95	-1.02	99	8.9	0.0	97	264	76	74
95	13.942	0.149	0.067	2.20	95	0	101	8.9	0.0	96	257	75	73
96	14.090	0.148	0.070	2.21	95	-0.33	98	8.8	-0.1	96	254	75	73
97	14.239	0.149	0.065	2.21	95	-0.52	102	8.8	0.0	96	253	75	73
98	14.386	0.147	0.061	2.20	95	-2.2	104	8.9	0.1	96	255	75	73

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	14.535	0.149	0.069	2.19	96	-2.68	99	8.6	-0.3	96	253	75	73
100	14.684	0.149	0.067	2.21	96	-2.44	101	8.7	0.1	96	252	75	73
101	14.832	0.148	0.068	2.19	96	-0.97	99	8.7	0.0	96	250	75	73
102	14.982	0.150	0.070	2.20	96	-1.21	99	8.6	-0.1	96	253	75	72
103	15.129	0.147	0.073	2.21	96	-1.1	95	8.6	0.0	96	253	75	72
104	15.279	0.150	0.070	2.21	96	-2.48	99	8.6	0.0	96	252	75	72
105	15.426	0.147	0.071	2.21	96	-0.83	96	8.5	-0.1	96	255	75	72
106	15.576	0.150	0.070	2.20	96	0	99	8.5	0.0	96	257	75	72
107	15.722	0.146	0.064	2.20	96	-2.3	101	8.5	0.0	96	255	75	72
108	15.872	0.150	0.067	2.24	96	-2.5	101	8.3	-0.2	96	262	75	72
109	16.018	0.146	0.057	2.20	96	-0.13	107	8.4	0.1	96	263	75	72
110	16.170	0.152	0.062	2.21	96	0	107	8.4	0.0	96	258	75	72
111	16.315	0.145	0.062	2.20	96	-2.07	102	8.3	-0.1	96	262	75	72
112	16.466	0.151	0.063	2.20	96	-1.7	105	8.2	-0.1	96	263	75	72
113	16.613	0.147	0.073	2.20	96	0	95	8.2	0.0	96	266	75	72
114	16.764	0.151	0.066	2.21	96	-2.43	103	8.2	0.0	96	263	75	72
115	16.910	0.146	0.070	2.18	96	-0.78	96	8.2	0.0	96	262	75	72
116	17.061	0.151	0.072	2.21	96	-2.6	98	8.2	0.0	96	257	75	72
117	17.207	0.146	0.072	2.21	96	0	95	8.0	-0.2	96	253	75	72
118	17.359	0.152	0.070	2.21	96	0	100	8.1	0.1	96	250	75	72
119	17.505	0.146	0.071	2.20	96	-1.26	96	8.1	0.0	96	259	75	72
120	17.654	0.149	0.063	2.21	96	-1.7	104	8.0	-0.1	96	266	75	72
121	17.801	0.147	0.062	2.20	96	-2.43	103	7.9	-0.1	96	272	75	72
122	17.951	0.150	0.061	2.21	96	-1.59	106	7.8	-0.1	97	274	75	72
123	18.098	0.147	0.066	2.21	96	0	100	7.9	0.1	97	272	75	72
124	18.247	0.149	0.074	2.20	96	0	96	7.8	-0.1	97	278	75	72
125	18.396	0.149	0.075	2.18	96	-0.9	95	7.8	0.0	97	275	75	72
126	18.546	0.150	0.062	2.19	96	-0.51	105	7.8	0.0	97	274	75	72
127	18.695	0.149	0.074	2.20	96	-2.22	96	7.7	-0.1	97	272	75	72
128	18.843	0.148	0.072	2.19	96	-2.41	96	7.7	0.0	97	270	75	72
129	18.993	0.150	0.071	2.19	96	-1.34	98	7.7	0.0	97	267	75	72
130	19.140	0.147	0.075	2.18	96	0	94	7.7	0.0	97	263	75	72
131	19.291	0.151	0.067	2.21	96	-1.78	102	7.7	0.0	97	261	75	72

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	19.437	0.146	0.072	2.20	96	-0.57	95	7.6	-0.1	97	261	75	72
133	19.587	0.150	0.064	2.22	96	-2.5	104	7.6	0.0	97	263	75	72
134	19.733	0.146	0.061	2.19	96	-2.09	103	7.5	-0.1	96	265	75	72
135	19.884	0.151	0.073	2.20	96	-1.9	98	7.5	0.0	96	261	75	72
136	20.029	0.145	0.071	2.19	96	-1.73	95	7.5	0.0	96	259	75	72
137	20.181	0.152	0.073	2.20	96	0	98	7.4	-0.1	96	267	75	72
138	20.327	0.146	0.066	2.18	96	-0.49	99	7.4	0.0	96	265	75	72
139	20.479	0.152	0.064	2.20	96	-2.11	105	7.4	0.0	96	260	75	72
140	20.625	0.146	0.069	2.20	96	0	97	7.4	0.0	96	261	75	73
141	20.776	0.151	0.074	2.20	97	-0.62	97	7.3	-0.1	96	263	75	72
142	20.922	0.146	0.076	2.21	97	-2.56	92	7.3	0.0	96	260	75	72
143	21.073	0.151	0.070	2.16	97	-0.63	99	7.2	-0.1	96	259	75	72
144	21.219	0.146	0.071	2.20	97	0	95	7.2	0.0	96	252	75	72
145	21.369	0.150	0.071	2.21	97	0	98	7.2	0.0	96	255	75	72
146	21.515	0.146	0.065	2.20	97	-2.59	100	7.2	0.0	96	259	75	72
147	21.666	0.151	0.068	2.23	97	-2.34	101	7.1	-0.1	96	261	75	72
148	21.813	0.147	0.068	2.21	97	-0.86	98	7.1	0.0	96	259	75	72
149	21.962	0.149	0.062	2.20	97	0	104	6.9	-0.2	96	256	75	72
150	22.110	0.148	0.061	2.19	97	-2.58	104	7.0	0.1	96	261	75	72
151	22.260	0.150	0.066	2.20	97	-1.41	102	6.9	-0.1	96	265	75	72
152	22.409	0.149	0.062	2.20	97	-2.6	104	6.9	0.0	96	265	75	72
153	22.557	0.148	0.069	2.19	97	-2.62	98	6.9	0.0	97	270	75	72
154	22.706	0.149	0.063	2.20	97	-2.05	103	6.9	0.0	96	269	75	72
155	22.854	0.148	0.069	2.21	97	-2.53	98	6.8	-0.1	96	266	75	72
156	23.004	0.150	0.072	2.20	97	0	97	6.8	0.0	96	266	75	72
157	23.150	0.146	0.059	2.22	97	0	105	6.8	0.0	96	264	75	72
158	23.300	0.150	0.070	2.20	97	-0.72	99	6.7	-0.1	96	258	75	73
159	23.446	0.146	0.063	2.18	97	-2.08	101	6.7	0.0	96	260	75	73
160	23.597	0.151	0.070	2.20	97	-1.38	99	6.7	0.0	96	259	75	73
161	23.743	0.146	0.073	2.20	97	-2.15	94	6.6	-0.1	96	261	75	73
162	23.894	0.151	0.066	2.18	97	-2.57	102	6.5	-0.1	96	267	75	73
163	24.040	0.146	0.071	2.20	97	-0.2	95	6.6	0.1	96	269	75	73
164	24.192	0.152	0.069	2.20	97	-2.64	101	6.5	-0.1	96	268	75	73

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	24.338	0.146	0.070	2.20	97	-2.33	96	6.4	-0.1	96	263	75	73
166	24.489	0.151	0.070	2.18	97	0	99	6.5	0.1	95	260	75	73
167	24.635	0.146	0.070	2.20	97	-1.92	96	6.5	0.0	96	253	75	73
168	24.786	0.151	0.067	2.17	97	-2.5	102	6.4	-0.1	96	251	75	73
169	24.932	0.146	0.066	2.19	97	0	99	6.4	0.0	95	253	75	73
170	25.083	0.151	0.070	2.20	97	-2.15	99	6.4	0.0	95	259	75	73
171	25.229	0.146	0.062	2.20	97	0	102	6.3	-0.1	95	265	75	73
172	25.379	0.150	0.069	2.20	97	-2.02	99	6.3	0.0	95	263	75	73
173	25.526	0.147	0.069	2.19	97	-0.75	98	6.3	0.0	96	259	75	73
174	25.675	0.149	0.068	2.19	97	-0.13	99	6.2	-0.1	95	259	75	73
175	25.823	0.148	0.070	2.20	97	-2.62	97	6.2	0.0	95	256	75	73
176	25.973	0.150	0.071	2.20	97	-0.45	98	6.1	-0.1	96	259	75	72
177	26.122	0.149	0.068	2.20	97	-0.2	99	6.0	-0.1	95	256	75	72
178	26.270	0.148	0.072	2.19	97	-2.47	96	6.1	0.1	95	253	75	72
179	26.419	0.149	0.058	2.18	97	-0.98	108	6.1	0.0	95	257	75	72
180	26.566	0.147	0.067	2.20	97	-0.51	99	6.0	-0.1	96	263	75	72
181	26.717	0.151	0.063	2.20	97	-2.19	105	6.0	0.0	96	268	75	72
182	26.863	0.146	0.073	2.19	97	0	94	5.9	-0.1	96	267	75	72
183	27.013	0.150	0.068	2.22	97	-2.65	100	5.9	0.0	96	262	75	72
184	27.159	0.146	0.065	2.20	97	-1.6	100	5.9	0.0	95	261	75	72
185	27.310	0.151	0.073	2.20	97	-0.26	97	5.7	-0.2	96	261	75	72
186	27.456	0.146	0.061	2.20	97	-1.15	103	5.9	0.2	95	261	75	72
187	27.607	0.151	0.064	2.20	97	0	104	5.7	-0.2	95	255	75	72
188	27.753	0.146	0.066	2.18	97	-1.16	99	5.7	0.0	95	255	75	72
189	27.905	0.152	0.066	2.20	97	-1.32	103	5.8	0.1	95	256	75	72
190	28.050	0.145	0.071	2.18	97	0	95	5.7	-0.1	95	259	75	73
191	28.202	0.152	0.072	2.19	97	-0.51	99	5.6	-0.1	95	256	75	73
192	28.348	0.146	0.067	2.19	97	0	98	5.5	-0.1	95	258	75	73
193	28.499	0.151	0.062	2.20	97	-0.67	106	5.6	0.1	95	257	75	73
194	28.645	0.146	0.073	2.20	97	-2.21	94	5.6	0.0	95	255	75	73
195	28.795	0.150	0.067	2.19	97	-2.68	101	5.5	-0.1	95	253	75	73
196	28.941	0.146	0.065	2.20	97	-2.7	100	5.5	0.0	95	254	75	73
197	29.091	0.150	0.068	2.22	97	0	100	5.5	0.0	95	263	75	73

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	29.238	0.147	0.066	2.19	97	-1.31	100	5.4	-0.1	95	262	75	72
199	29.387	0.149	0.062	2.20	97	-0.58	104	5.3	-0.1	95	262	75	72
200	29.535	0.148	0.070	2.19	97	-2.62	97	5.4	0.1	95	260	75	72
201	29.684	0.149	0.061	2.19	97	-0.67	105	5.3	-0.1	95	266	75	72
202	29.833	0.149	0.066	2.19	97	-1.52	101	5.3	0.0	95	268	75	72
203	29.981	0.148	0.071	2.19	97	-1.06	97	5.2	-0.1	95	270	75	73
204	30.131	0.150	0.061	2.18	97	-2.34	106	5.2	0.0	95	271	75	73
205	30.278	0.147	0.058	2.18	97	0	106	5.2	0.0	95	264	75	72
206	30.428	0.150	0.070	2.19	97	-0.49	99	5.2	0.0	95	256	75	72
207	30.575	0.147	0.075	2.17	97	0	93	5.0	-0.2	95	261	75	72
208	30.725	0.150	0.061	2.20	97	0	106	5.1	0.1	95	267	75	72
209	30.871	0.146	0.062	2.20	97	-1.94	102	5.0	-0.1	95	263	75	72
210	31.021	0.150	0.069	2.20	97	0	99	4.9	-0.1	95	256	75	72
211	31.167	0.146	0.065	2.18	97	0	100	5.0	0.1	95	254	75	72
212	31.319	0.152	0.070	2.20	97	-1.88	100	5.0	0.0	95	259	75	72
213	31.464	0.145	0.062	2.19	97	0	101	4.9	-0.1	95	263	75	72
214	31.615	0.151	0.074	2.19	97	-1.07	97	4.9	0.0	95	259	75	72
215	31.761	0.146	0.067	2.19	98	-2.39	98	4.8	-0.1	95	264	75	72
216	31.913	0.152	0.072	2.21	97	-1.93	99	4.8	0.0	95	263	75	72
217	32.059	0.146	0.067	2.19	97	-1.95	98	4.7	-0.1	95	259	75	72
218	32.210	0.151	0.075	2.20	97	-1	96	4.8	0.1	95	255	74	72
219	32.356	0.146	0.066	2.20	97	-2.09	99	4.6	-0.2	94	251	74	72
220	32.507	0.151	0.065	2.17	97	-1.53	103	4.7	0.1	94	248	74	72
221	32.653	0.146	0.067	2.19	97	-2.49	98	4.5	-0.2	94	252	74	72
222	32.803	0.150	0.071	2.20	97	-0.02	98	4.6	0.1	94	246	74	72
223	32.949	0.146	0.067	2.20	97	-1.15	98	4.6	0.0	94	255	74	72
224	33.099	0.150	0.076	2.18	97	-0.89	95	4.5	-0.1	94	254	74	72
225	33.246	0.147	0.072	2.20	97	-2.62	95	4.5	0.0	94	259	74	72
226	33.395	0.149	0.073	2.20	97	-1.08	96	4.6	0.1	94	256	74	72
227	33.542	0.147	0.073	2.17	97	-2.29	95	4.5	-0.1	94	251	74	72
228	33.691	0.149	0.072	2.20	97	-2.4	97	4.4	-0.1	94	249	74	72
229	33.841	0.150	0.072	2.20	97	0	97	4.3	-0.1	94	256	74	72
230	33.988	0.147	0.069	2.20	97	-2.61	97	4.4	0.1	94	260	74	72

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	34.138	0.150	0.068	2.20	97	0	100	4.3	-0.1	94	262	74	72
232	34.285	0.147	0.068	2.18	97	-0.93	98	4.2	-0.1	94	259	74	72
233	34.435	0.150	0.072	2.20	97	-1.26	97	4.2	0.0	94	258	74	72
234	34.582	0.147	0.072	2.18	97	-1.07	95	4.2	0.0	94	258	74	72
235	34.732	0.150	0.061	2.18	97	-0.26	106	4.1	-0.1	94	260	74	72
236	34.878	0.146	0.063	2.21	97	-0.64	101	4.0	-0.1	94	260	74	72
237	35.028	0.150	0.070	2.19	97	0	99	4.0	0.0	94	260	74	72
238	35.173	0.145	0.062	2.18	97	-0.33	101	4.1	0.1	94	260	74	72
239	35.324	0.151	0.073	2.19	97	0	97	4.0	-0.1	94	264	74	72
240	35.470	0.146	0.066	2.20	97	-2.52	99	4.0	0.0	94	262	74	72
241	35.621	0.151	0.067	2.18	97	0	101	4.0	0.0	94	258	74	72
242	35.766	0.145	0.075	2.19	97	-2.35	92	4.0	0.0	94	259	74	72
243	35.917	0.151	0.062	2.18	97	-0.39	106	3.9	-0.1	94	252	74	72
244	36.063	0.146	0.069	2.20	97	-1.08	97	3.9	0.0	94	254	74	72
245	36.214	0.151	0.074	2.18	97	0	97	3.7	-0.2	94	265	74	72
246	36.360	0.146	0.063	2.21	97	-0.16	101	3.8	0.1	94	266	74	72
247	36.511	0.151	0.072	2.17	97	-2.65	98	3.8	0.0	94	265	74	72
248	36.656	0.145	0.063	2.19	97	-0.3	101	3.7	-0.1	94	262	74	72
249	36.807	0.151	0.067	2.19	97	-2.44	101	3.6	-0.1	94	260	74	72
250	36.953	0.146	0.067	2.19	97	-0.08	98	3.7	0.1	95	264	74	72
251	37.103	0.150	0.071	2.20	97	-2.44	98	3.6	-0.1	94	264	74	72
252	37.249	0.146	0.063	2.20	97	-2.27	101	3.6	0.0	94	267	74	72
253	37.398	0.149	0.067	2.17	97	-2.49	100	3.6	0.0	95	266	74	72
254	37.546	0.148	0.062	2.21	97	-1.67	103	3.4	-0.2	94	268	74	72
255	37.695	0.149	0.062	2.21	97	-0.25	104	3.5	0.1	95	268	74	72
256	37.842	0.147	0.064	2.21	97	-2.55	101	3.3	-0.2	95	271	74	72
257	37.990	0.148	0.072	2.19	97	-1.95	96	3.4	0.1	95	268	74	72
258	38.139	0.149	0.069	2.18	97	-0.23	99	3.4	0.0	95	263	74	72
259	38.287	0.148	0.061	2.20	97	0	104	3.3	-0.1	94	263	74	72
260	38.436	0.149	0.063	2.18	97	0	103	3.2	-0.1	94	264	74	72
261	38.584	0.148	0.070	2.18	97	-2.65	97	3.3	0.1	95	262	74	72
262	38.733	0.149	0.063	2.19	97	0	103	3.3	0.0	94	263	74	72
263	38.880	0.147	0.067	2.18	97	-0.78	99	3.0	-0.3	94	256	74	72

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	39.030	0.150	0.071	2.18	97	-2.56	98	3.2	0.2	94	262	74	72
265	39.176	0.146	0.069	2.19	97	-1.47	97	3.2	0.0	94	270	74	72
266	39.326	0.150	0.071	2.19	97	0	98	3.0	-0.2	95	268	74	72
267	39.472	0.146	0.068	2.21	97	-2.34	97	3.1	0.1	94	267	74	72
268	39.622	0.150	0.072	2.18	97	-2.03	97	3.1	0.0	94	262	74	72
269	39.768	0.146	0.075	2.18	97	-1.08	93	3.0	-0.1	94	263	74	72
270	39.919	0.151	0.071	2.19	97	0	99	3.0	0.0	94	262	74	72
271	40.064	0.145	0.068	2.21	97	-2.21	97	3.0	0.0	94	265	74	72
272	40.215	0.151	0.064	2.18	97	-1.23	104	2.9	-0.1	94	258	74	72
273	40.360	0.145	0.072	2.18	97	-0.76	94	2.9	0.0	94	256	74	72
274	40.512	0.152	0.062	2.18	97	-0.46	106	2.8	-0.1	94	254	74	72
275	40.657	0.145	0.067	2.20	97	-0.2	97	2.8	0.0	94	260	74	72
276	40.809	0.152	0.062	2.19	97	-0.74	106	2.7	-0.1	94	262	74	72
277	40.954	0.145	0.068	2.20	97	-0.63	97	2.8	0.1	94	259	74	72
278	41.105	0.151	0.068	2.19	97	-0.95	101	2.6	-0.2	94	258	74	72
279	41.251	0.146	0.066	2.17	97	-2.64	99	2.7	0.1	94	260	74	72
280	41.401	0.150	0.064	2.20	97	-0.1	103	2.7	0.0	94	259	74	72
281	41.547	0.146	0.072	2.17	97	-1.03	95	2.6	-0.1	94	263	74	72
282	41.697	0.150	0.069	2.18	97	-0.21	99	2.6	0.0	94	263	74	72
283	41.842	0.145	0.063	2.20	97	0	101	2.6	0.0	94	257	74	72
284	41.992	0.150	0.072	2.18	97	-0.24	97	2.4	-0.2	94	260	75	72
285	42.139	0.147	0.066	2.19	97	0	100	2.5	0.1	94	257	75	72
286	42.288	0.149	0.069	2.18	97	0	99	2.4	-0.1	94	258	74	72
287	42.435	0.147	0.062	2.18	97	-2.71	103	2.5	0.1	94	259	74	72
288	42.584	0.149	0.068	2.18	97	-2.58	99	2.4	-0.1	94	259	74	72
289	42.732	0.148	0.069	2.18	97	-0.31	98	2.4	0.0	94	256	74	72
290	42.881	0.149	0.070	2.19	97	-2.26	98	2.4	0.0	94	254	74	72
291	43.029	0.148	0.069	2.18	97	-1.24	98	2.3	-0.1	94	254	74	72
292	43.181	0.152	0.064	2.19	97	-2.37	105	2.2	-0.1	94	255	74	72
293	43.330	0.149	0.063	2.20	97	-1.31	103	2.3	0.1	94	259	74	72
294	43.477	0.147	0.066	2.21	97	-1.03	99	2.2	-0.1	93	255	74	72
295	43.627	0.150	0.068	2.19	97	0	100	2.1	-0.1	94	259	74	72
296	43.774	0.147	0.066	2.19	97	-1.04	100	2.2	0.1	94	258	74	72

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	43.924	0.150	0.070	2.19	97	-2.29	99	2.1	-0.1	94	260	74	72
298	44.069	0.145	0.070	2.19	97	0	95	2.1	0.0	94	259	74	72
299	44.219	0.150	0.071	2.19	97	-0.72	98	2.0	-0.1	94	256	74	72
300	44.365	0.146	0.071	2.16	97	0	95	2.0	0.0	94	268	74	72
301	44.516	0.151	0.062	2.20	97	-2.41	106	2.0	0.0	94	269	74	72
302	44.661	0.145	0.074	2.18	97	-2.07	93	1.9	-0.1	94	260	74	72
303	44.811	0.150	0.065	2.18	97	-0.4	102	1.9	0.0	94	261	74	72
304	44.956	0.145	0.071	2.18	97	0	95	1.9	0.0	94	262	74	72
305	45.108	0.152	0.067	2.18	97	-2.2	102	1.8	-0.1	94	261	74	72
306	45.253	0.145	0.067	2.19	97	-0.43	97	1.8	0.0	94	256	74	72
307	45.405	0.152	0.069	2.17	97	-1.75	101	1.7	-0.1	94	261	74	72
308	45.550	0.145	0.061	2.16	97	-1.2	102	1.8	0.1	94	263	74	72
309	45.701	0.151	0.063	2.18	97	0	105	1.7	-0.1	94	265	74	72
310	45.846	0.145	0.069	2.16	97	-2.25	96	1.7	0.0	94	263	74	72
311	45.997	0.151	0.062	2.17	97	-0.49	106	1.6	-0.1	94	262	74	72
312	46.143	0.146	0.068	2.19	97	-0.16	97	1.5	-0.1	94	264	74	72
313	46.293	0.150	0.067	2.19	97	0	101	1.6	0.1	94	265	74	72
314	46.439	0.146	0.070	2.19	97	-0.75	96	1.5	-0.1	94	269	74	72
315	46.588	0.149	0.073	2.19	97	-0.46	96	1.5	0.0	94	267	74	72
316	46.734	0.146	0.062	2.18	97	0	102	1.3	-0.2	94	275	74	72
317	46.884	0.150	0.068	2.20	97	-0.54	100	1.4	0.1	94	274	74	72
318	47.031	0.147	0.059	2.18	97	0	105	1.4	0.0	95	273	74	72
319	47.179	0.148	0.072	2.20	97	0	96	1.3	-0.1	95	270	74	72
320	47.327	0.148	0.062	2.19	97	-1.72	104	1.3	0.0	95	269	74	72
321	47.475	0.148	0.069	2.17	97	-2.43	98	1.2	-0.1	94	266	74	72
322	47.624	0.149	0.071	2.18	97	-1.84	97	1.2	0.0	95	267	74	72
323	47.772	0.148	0.071	2.17	97	0	97	1.2	0.0	95	267	74	72
324	47.921	0.149	0.065	2.18	97	-0.46	102	1.2	0.0	95	270	74	72
325	48.068	0.147	0.073	2.16	97	0	95	1.1	-0.1	95	266	74	72
326	48.218	0.150	0.067	2.16	97	-2.66	101	1.1	0.0	95	263	74	72
327	48.364	0.146	0.074	2.19	97	-0.01	93	1.1	0.0	95	264	74	72
328	48.514	0.150	0.067	2.18	97	-2.05	101	0.9	-0.2	94	257	74	72
329	48.660	0.146	0.072	2.18	97	-1.11	95	0.9	0.0	94	252	74	72

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
0	0.000		0.00	77	-1		76	0.000	3.46	0.02
1	0.129	0.129	2.16	77	-0.54	92	78	-0.040	3.08	0.00
2	0.265	0.136	2.14	77	-2.09	103	78	-0.040	4.78	0.00
3	0.409	0.144	2.12	77	-2.66	106	79	-0.050	3.91	0.00
4	0.551	0.142	2.14	77	-0.56	95	80	-0.050	4.14	0.04
5	0.695	0.144	2.12	77	-2.8	107	80	-0.040	5.05	0.00
6	0.834	0.139	2.12	77	-2.89	102	80	-0.050	4.76	0.00
7	0.978	0.144	2.12	77	-0.78	100	80	-0.040	4.47	0.00
8	1.118	0.140	2.11	77	-2.52	104	81	-0.040	4.54	0.04
9	1.262	0.144	2.13	77	-2.07	103	81	-0.050	3.44	0.00
10	1.402	0.140	2.11	77	-2.02	98	81	-0.040	5.73	0.01
11	1.544	0.142	2.12	78	-3.03	100	81	-0.060	4.16	0.03
12	1.686	0.142	2.10	78	-2.84	103	82	-0.050	3.74	0.03
13	1.826	0.140	2.11	78	-0.58	104	82	-0.030	5.08	0.00
14	1.971	0.145	2.10	78	-1.04	108	82	-0.050	3.23	0.03
15	2.109	0.138	2.11	79	-2.95	98	82	-0.030	3.86	0.01
16	2.253	0.144	2.09	79	-1.69	102	82	-0.040	3.56	0.02
17	2.393	0.140	2.11	79	-1.35	102	82	-0.040	4.19	0.01
18	2.536	0.143	2.10	80	-2.92	100	82	-0.040	3.91	0.04
19	2.676	0.140	2.09	80	-1.87	99	83	-0.040	3.68	0.01
20	2.818	0.142	2.09	80	-0.49	102	82	-0.050	3.44	0.02
21	2.959	0.141	2.08	80	-1.19	99	82	-0.040	4.68	0.01
22	3.100	0.141	2.07	81	-2.98	105	82	-0.050	4.03	0.02
23	3.244	0.144	2.09	81	-2.92	99	82	-0.050	4.69	0.01
24	3.383	0.139	2.08	81	-1.24	100	82	-0.050	3.36	0.06
25	3.526	0.143	2.08	82	-0.57	100	82	-0.040	5.22	0.03
26	3.665	0.139	2.09	82	-2.82	102	82	-0.050	4.38	0.04
27	3.809	0.144	2.09	82	-2.45	103	82	-0.030	4.66	0.03
28	3.949	0.140	2.08	83	-0.61	102	82	-0.040	4.18	0.06
29	4.091	0.142	2.09	83	-0.55	99	82	-0.040	5.08	0.02
30	4.232	0.141	2.07	83	-0.46	100	82	-0.040	4.04	0.03
31	4.373	0.141	2.07	84	-1.48	99	82	-0.040	4.59	0.00

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
32	4.516	0.143	2.08	84	-0.54	101	82	-0.040	3.21	0.04
33	4.657	0.141	2.06	84	-0.58	103	81	-0.050	3.79	0.02
34	4.801	0.144	2.09	85	-0.59	99	81	-0.050	4.77	0.05
35	4.939	0.138	2.08	85	-2.86	100	81	-0.050	3.76	0.03
36	5.084	0.145	2.06	85	-0.49	99	81	-0.050	3.87	0.03
37	5.224	0.140	2.08	85	-1.17	101	81	-0.040	4.03	0.02
38	5.367	0.143	2.06	86	-0.47	105	81	-0.040	3.55	0.03
39	5.509	0.142	2.09	86	-0.86	98	80	-0.040	4.61	0.05
40	5.649	0.140	2.08	86	-2.94	99	80	-0.040	3.99	0.01
41	5.792	0.143	2.07	87	-2.65	100	81	-0.050	3.45	0.02
42	5.933	0.141	2.08	87	-0.8	100	80	-0.040	5.20	0.00
43	6.078	0.145	2.10	87	-0.57	99	80	-0.050	3.95	0.04
44	6.217	0.139	2.08	87	-0.98	102	80	-0.040	2.73	0.07
45	6.362	0.145	2.07	88	-1.53	97	80	-0.040	4.03	0.00
46	6.501	0.139	2.07	88	-1.42	98	80	-0.040	3.28	0.03
47	6.645	0.144	2.06	88	-1.05	98	80	-0.040	3.64	0.02
48	6.787	0.142	2.07	88	-2.33	103	80	-0.040	4.12	0.02
49	6.930	0.143	2.08	89	-0.82	101	81	-0.020	3.31	0.04
50	7.072	0.142	2.08	89	-0.77	99	81	-0.040	3.99	0.02
51	7.213	0.141	2.08	89	-1.29	102	81	-0.050	4.48	0.03
52	7.356	0.143	2.07	89	-0.58	100	81	-0.050	3.61	0.03
53	7.497	0.141	2.08	89	-1.33	101	81	-0.040	3.09	0.03
54	7.642	0.145	2.08	90	-1.16	101	80	-0.050	4.11	0.02
55	7.782	0.140	2.07	90	-1.04	95	80	-0.050	2.41	0.09
56	7.927	0.145	2.07	90	-0.54	104	80	-0.040	4.29	0.00
57	8.067	0.140	2.05	90	-2.8	100	80	-0.030	3.98	0.01
58	8.212	0.145	2.06	90	-3.07	98	80	-0.040	3.55	0.03
59	8.352	0.140	2.07	91	-2.8	95	80	-0.040	4.18	0.00
60	8.498	0.146	2.17	91	-1.13	97	80	-0.050	3.62	0.03
61	8.643	0.145	2.17	91	-1.66	105	79	-0.050	4.77	0.03
62	8.790	0.147	2.19	91	-1.87	106	79	-0.050	4.24	0.04
63	8.935	0.145	2.14	91	-0.6	101	79	-0.040	2.91	0.09

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
64	9.102	0.167	2.17	91	-0.59	113	79	-0.040	2.13	0.06
65	9.349	0.247	2.16	91	-2.81	178	78	-0.040	1.98	0.06
66	9.496	0.147	2.16	92	-0.7	102	78	-0.040	2.03	0.06
67	9.641	0.145	2.16	92	-3.08	100	78	-0.050	3.12	0.00
68	9.787	0.146	2.16	92	-0.54	103	78	-0.040	3.15	0.01
69	9.933	0.146	2.16	92	-0.81	102	78	-0.040	2.73	0.04
70	10.079	0.146	2.17	92	-0.63	99	77	-0.030	2.44	0.02
71	10.225	0.146	2.17	92	-2.69	103	77	-0.040	2.30	0.06
72	10.371	0.146	2.15	92	-0.57	106	77	-0.040	2.04	0.06
73	10.517	0.146	2.15	92	-1.33	100	77	-0.040	2.59	0.03
74	10.663	0.146	2.16	92	-3.06	103	77	-0.030	2.15	0.05
75	10.809	0.146	2.17	93	-2.61	104	77	-0.020	2.61	0.01
76	10.955	0.146	2.16	93	-2.19	100	77	-0.030	1.80	0.03
77	11.101	0.146	2.16	93	-0.92	97	77	-0.040	3.08	0.01
78	11.246	0.145	2.16	93	-0.91	99	77	-0.040	3.13	0.02
79	11.393	0.147	2.16	93	-3.02	103	77	-0.040	2.04	0.09
80	11.538	0.145	2.15	93	-2.25	103	77	-0.030	2.26	0.04
81	11.685	0.147	2.15	93	-2.7	104	77	-0.040	2.38	0.03
82	11.830	0.145	2.16	93	-3.03	101	77	-0.050	3.44	0.02
83	11.977	0.147	2.17	93	-2.93	100	77	-0.020	2.72	0.01
84	12.122	0.145	2.16	94	-3.04	99	77	-0.030	2.26	0.06
85	12.270	0.148	2.15	94	-2.52	105	77	-0.030	2.07	0.02
86	12.415	0.145	2.16	94	-1.67	100	77	-0.030	2.11	0.07
87	12.563	0.148	2.16	94	-2.87	98	77	-0.030	2.11	0.05
88	12.708	0.145	2.17	94	-1.33	99	77	-0.030	2.40	0.04
89	12.856	0.148	2.17	94	-0.57	99	77	-0.050	2.63	0.03
90	13.000	0.144	2.16	94	-2.91	98	77	-0.030	3.39	0.01
91	13.148	0.148	2.17	94	-1.42	99	77	-0.020	2.75	0.02
92	13.293	0.145	2.17	94	-2.98	102	77	-0.040	2.42	0.03
93	13.441	0.148	2.17	94	-2.96	104	77	-0.040	2.28	0.06
94	13.585	0.144	2.15	94	-2.98	100	77	-0.040	2.67	0.01
95	13.733	0.148	2.17	94	-1.27	101	77	-0.030	1.66	0.07

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
96	13.878	0.145	2.15	94	-1.63	97	76	-0.030	1.77	0.05
97	14.026	0.148	2.16	95	-2.89	103	76	-0.030	1.95	0.04
98	14.170	0.144	2.15	95	-1.69	103	76	-0.030	2.07	0.02
99	14.318	0.148	2.14	95	-2.59	100	76	-0.020	2.10	0.05
100	14.463	0.145	2.17	95	-0.46	99	76	-0.030	2.10	0.01
101	14.611	0.148	2.15	95	-1.57	101	76	-0.030	2.02	0.03
102	14.756	0.145	2.18	95	-0.48	97	76	-0.040	2.30	0.02
103	14.904	0.148	2.17	95	-2.86	97	75	-0.030	2.37	0.02
104	15.049	0.145	2.18	95	-3.1	97	75	-0.030	2.41	0.02
105	15.197	0.148	2.18	95	-1.01	98	75	-0.030	2.04	0.07
106	15.342	0.145	2.16	95	-1.53	97	75	-0.030	2.70	0.04
107	15.490	0.148	2.17	95	-0.52	104	75	-0.030	2.60	0.01
108	15.635	0.145	2.17	95	-0.52	99	75	-0.040	2.09	0.05
109	15.783	0.148	2.18	95	-1.85	110	75	-0.040	3.06	0.02
110	15.928	0.145	2.17	95	-2.9	103	75	-0.020	2.62	0.04
111	16.076	0.148	2.18	95	-0.61	105	75	-0.030	2.22	0.01
112	16.220	0.144	2.17	95	-0.54	102	75	-0.030	2.90	0.02
113	16.369	0.149	2.17	95	-1.47	98	75	-0.040	2.66	0.04
114	16.514	0.145	2.16	95	-1.48	100	75	-0.040	2.68	0.03
115	16.662	0.148	2.17	95	-0.54	99	75	-0.030	2.16	0.04
116	16.807	0.145	2.16	95	-1.84	96	75	-0.030	2.53	0.02
117	16.955	0.148	2.16	95	-0.85	98	75	-0.030	1.76	0.08
118	17.100	0.145	2.17	95	-0.72	97	75	-0.020	1.40	0.07
119	17.248	0.148	2.17	95	-2.7	98	75	-0.020	1.94	0.06
120	17.393	0.145	2.16	95	-2.54	102	75	-0.030	3.14	0.02
121	17.541	0.148	2.17	95	-2.85	105	75	-0.040	3.68	0.02
122	17.686	0.145	2.17	95	-2.37	104	75	-0.040	3.34	0.05
123	17.834	0.148	2.16	95	-0.49	102	75	-0.040	2.70	0.05
124	17.979	0.145	2.16	95	-0.64	94	75	-0.040	2.71	0.01
125	18.127	0.148	2.16	95	-1.78	96	75	-0.040	3.36	0.00
126	18.272	0.145	2.16	95	-0.92	103	76	-0.030	2.58	0.04
127	18.420	0.148	2.15	95	-0.68	96	76	-0.030	2.51	0.01

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
128	18.564	0.144	2.17	95	-0.56	95	76	-0.040	2.23	0.08
129	18.713	0.149	2.16	95	-0.68	99	76	-0.030	2.14	0.04
130	18.858	0.145	2.15	95	-2.48	94	76	-0.040	1.93	0.09
131	19.007	0.149	2.17	95	-2.78	102	76	-0.020	2.10	0.03
132	19.151	0.144	2.17	95	-2.99	95	76	-0.030	2.29	0.04
133	19.299	0.148	2.16	95	-0.76	104	76	-0.030	2.47	0.07
134	19.444	0.145	2.17	95	-0.71	104	76	-0.030	2.51	0.00
135	19.592	0.148	2.17	95	-2.53	97	76	-0.040	2.83	0.03
136	19.737	0.145	2.18	95	-0.59	96	76	-0.040	1.84	0.06
137	19.885	0.148	2.17	95	-3.02	97	76	-0.040	2.33	0.05
138	20.029	0.144	2.15	96	-1.01	99	76	-0.030	2.89	0.03
139	20.178	0.149	2.15	96	-1.93	104	76	-0.040	2.02	0.07
140	20.322	0.144	2.16	96	-2.59	97	76	-0.050	1.99	0.04
141	20.471	0.149	2.15	96	-3.04	97	76	-0.040	2.45	0.00
142	20.615	0.144	2.15	96	-1.37	92	76	-0.040	2.43	0.01
143	20.764	0.149	2.15	96	-0.54	100	76	-0.040	1.86	0.05
144	20.908	0.144	2.15	96	-0.73	96	76	-0.020	2.28	0.03
145	21.057	0.149	2.15	96	-1.51	99	76	-0.020	1.50	0.08
146	21.201	0.144	2.17	96	-2.82	100	76	-0.040	2.42	0.05
147	21.349	0.148	2.16	96	-1.38	100	76	-0.030	2.56	0.04
148	21.494	0.145	2.17	96	-0.62	98	76	-0.030	2.53	0.01
149	21.642	0.148	2.16	96	-0.61	105	76	-0.040	1.90	0.06
150	21.786	0.144	2.15	96	-2.96	103	76	-0.040	2.33	0.03
151	21.935	0.149	2.15	96	-1.13	103	76	-0.030	2.82	0.02
152	22.079	0.144	2.16	96	-2.84	102	76	-0.040	2.83	0.05
153	22.228	0.149	2.15	96	-2.1	100	76	-0.040	2.43	0.03
154	22.372	0.144	2.16	96	-3.02	101	76	-0.040	3.31	0.01
155	22.521	0.149	2.16	96	-1.43	100	76	-0.030	2.33	0.07
156	22.665	0.144	2.16	96	-0.64	95	76	-0.040	2.21	0.04
157	22.814	0.149	2.15	96	-1.52	108	76	-0.030	2.31	0.07
158	22.958	0.144	2.16	96	-2.88	96	76	-0.030	2.15	0.02
159	23.106	0.148	2.15	96	-1.14	104	76	-0.030	1.64	0.07

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
160	23.250	0.144	2.16	96	-2.72	96	76	-0.040	2.37	0.05
161	23.399	0.149	2.16	96	-2.79	97	76	-0.030	2.17	0.08
162	23.543	0.144	2.15	96	-2.53	99	76	-0.050	2.69	0.01
163	23.692	0.149	2.17	96	-0.61	99	76	-0.030	2.94	0.04
164	23.836	0.144	2.16	96	-2.37	97	76	-0.020	2.61	0.05
165	23.985	0.149	2.16	96	-3.05	100	76	-0.030	2.45	0.03
166	24.129	0.144	2.15	96	-1.29	96	76	-0.040	1.86	0.03
167	24.278	0.149	2.15	96	-2.41	100	76	-0.030	1.83	0.06
168	24.422	0.144	2.16	96	-3.01	98	76	-0.030	1.36	0.07
169	24.571	0.149	2.15	96	-0.52	102	76	-0.040	1.98	0.07
170	24.715	0.144	2.15	96	-2.65	96	76	-0.040	2.45	0.03
171	24.863	0.148	2.15	96	-0.49	105	76	-0.030	2.96	0.02
172	25.007	0.144	2.15	96	-2.94	97	76	-0.050	2.80	0.03
173	25.156	0.149	2.14	96	-0.61	100	76	-0.040	2.36	0.02
174	25.300	0.144	2.15	96	-0.59	98	76	-0.040	1.85	0.10
175	25.449	0.149	2.15	96	-1.64	99	76	-0.030	2.24	0.05
176	25.593	0.144	2.16	96	-0.48	96	76	-0.030	1.86	0.04
177	25.742	0.149	2.17	96	-2.87	101	76	-0.040	2.50	0.04
178	25.886	0.144	2.16	96	-1.02	95	76	-0.040	1.73	0.08
179	26.035	0.149	2.16	96	-0.69	109	76	-0.020	2.16	0.01
180	26.179	0.144	2.14	96	-2.25	98	76	-0.030	2.73	0.01
181	26.328	0.149	2.15	96	-1.32	105	76	-0.050	2.78	0.04
182	26.472	0.144	2.15	96	-2.56	94	76	-0.030	3.01	0.04
183	26.621	0.149	2.16	96	-1.89	101	76	-0.030	2.34	0.05
184	26.765	0.144	2.17	96	-1	100	76	-0.030	1.95	0.06
185	26.914	0.149	2.16	96	-0.62	97	76	-0.040	2.14	0.04
186	27.058	0.144	2.16	96	-2.87	103	76	-0.030	2.51	0.06
187	27.207	0.149	2.17	96	-1.13	104	76	-0.020	2.30	0.02
188	27.351	0.144	2.17	96	-1.98	99	76	-0.030	1.68	0.07
189	27.499	0.148	2.16	96	-1.43	102	76	-0.030	2.02	0.05
190	27.643	0.144	2.16	96	-1.96	95	76	-0.030	2.39	0.01
191	27.792	0.149	2.15	96	-2.92	98	76	-0.030	2.54	0.03

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
192	27.936	0.144	2.15	96	-2.73	98	76	-0.020	2.08	0.04
193	28.084	0.148	2.14	96	-2.95	105	76	-0.030	2.53	0.02
194	28.228	0.144	2.15	96	-0.51	94	76	-0.040	2.14	0.05
195	28.377	0.149	2.16	96	-0.9	102	76	-0.030	1.86	0.06
196	28.521	0.144	2.16	96	-1.62	100	76	-0.030	2.00	0.05
197	28.670	0.149	2.16	96	-1.19	101	76	-0.020	2.47	0.04
198	28.814	0.144	2.15	96	-2.91	99	76	-0.040	3.13	0.04
199	28.963	0.149	2.15	96	-1.06	106	76	-0.040	2.27	0.03
200	29.107	0.144	2.15	96	-3.17	96	76	-0.030	2.45	0.05
201	29.255	0.148	2.16	96	-0.92	106	76	-0.040	2.24	0.04
202	29.399	0.144	2.16	96	-1.26	99	76	-0.040	3.07	0.02
203	29.548	0.149	2.17	96	-2.81	99	76	-0.040	2.67	0.02
204	29.692	0.144	2.16	96	-0.7	103	76	-0.040	2.80	0.03
205	29.841	0.149	2.16	96	-2.97	109	76	-0.020	2.81	0.02
206	29.985	0.144	2.16	96	-2.24	96	76	-0.040	1.55	0.09
207	30.134	0.149	2.15	96	-3.11	96	76	-0.040	1.64	0.07
208	30.278	0.144	2.15	96	-3.03	103	76	-0.030	2.91	0.02
209	30.427	0.149	2.17	96	-2.24	106	76	-0.040	2.84	0.01
210	30.571	0.144	2.16	96	-2.29	97	76	-0.030	2.07	0.06
211	30.720	0.149	2.16	96	-3	103	76	-0.030	1.65	0.04
212	30.864	0.144	2.15	96	-1.68	96	76	-0.030	1.88	0.06
213	31.013	0.149	2.15	96	-2.98	106	76	-0.030	2.95	0.02
214	31.157	0.144	2.15	96	-2.12	93	76	-0.030	2.61	0.05
215	31.306	0.149	2.16	96	-0.94	102	76	-0.040	2.02	0.06
216	31.450	0.144	2.17	96	-0.61	95	75	-0.030	2.78	0.06
217	31.599	0.149	2.16	96	-0.51	102	75	-0.010	2.18	0.06
218	31.743	0.144	2.18	96	-3.05	93	75	-0.030	1.95	0.05
219	31.892	0.149	2.16	96	-2.96	102	75	-0.040	1.65	0.08
220	32.036	0.144	2.16	96	-2.94	100	75	-0.020	1.92	0.04
221	32.185	0.149	2.16	96	-2.32	102	75	-0.020	1.74	0.06
222	32.329	0.144	2.15	96	-0.58	95	75	-0.030	2.30	0.04
223	32.478	0.149	2.16	96	-1.26	102	75	-0.030	1.87	0.07

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
224	32.622	0.144	2.17	96	-2.7	92	75	-0.040	3.23	0.00
225	32.771	0.149	2.16	96	-1.25	98	75	-0.030	2.29	0.04
226	32.915	0.144	2.16	96	-0.52	94	75	-0.040	2.58	0.05
227	33.063	0.148	2.16	96	-0.6	97	75	-0.040	2.01	0.04
228	33.208	0.145	2.15	96	-1.37	95	75	-0.030	1.67	0.05
229	33.356	0.148	2.15	96	-2.54	97	75	-0.030	1.80	0.06
230	33.501	0.145	2.15	96	-0.8	97	75	-0.030	3.05	0.05
231	33.649	0.148	2.15	96	-2.79	100	75	-0.030	2.51	0.02
232	33.793	0.144	2.15	96	-1.67	97	75	-0.030	2.33	0.04
233	33.941	0.148	2.15	96	-2.26	97	75	-0.030	2.08	0.06
234	34.086	0.145	2.15	96	-2.42	95	75	-0.030	2.21	0.03
235	34.234	0.148	2.16	96	-2.92	106	75	-0.020	2.23	0.06
236	34.379	0.145	2.17	96	-0.97	102	75	-0.040	2.36	0.02
237	34.527	0.148	2.17	96	-2.39	99	75	-0.030	2.30	0.09
238	34.672	0.145	2.16	96	-0.75	103	75	-0.050	2.35	0.05
239	34.820	0.148	2.15	96	-1.83	97	75	-0.040	2.34	0.06
240	34.965	0.145	2.17	96	-2.2	100	75	-0.030	2.78	0.04
241	35.112	0.147	2.16	96	-0.58	100	75	-0.030	2.01	0.04
242	35.257	0.145	2.16	96	-2.95	93	75	-0.040	1.91	0.06
243	35.405	0.148	2.16	96	-1.07	105	75	-0.040	2.15	0.05
244	35.550	0.145	2.16	96	-2.25	97	75	-0.020	1.45	0.09
245	35.698	0.148	2.16	96	-0.5	96	75	-0.020	2.42	0.05
246	35.843	0.145	2.16	96	-0.98	102	75	-0.040	3.31	0.01
247	35.991	0.148	2.15	96	-3.03	97	75	-0.040	2.73	0.02
248	36.136	0.145	2.16	96	-2.33	102	75	-0.020	2.35	0.06
249	36.284	0.148	2.15	96	-1.44	101	75	-0.040	2.07	0.06
250	36.429	0.145	2.16	96	-0.79	99	75	-0.040	2.11	0.05
251	36.576	0.147	2.15	96	-1.88	97	75	-0.030	2.74	0.01
252	36.722	0.146	2.16	96	-0.46	103	75	-0.020	2.47	0.07
253	36.869	0.147	2.17	96	-1.17	100	75	-0.040	2.76	0.04
254	37.014	0.145	2.16	96	-0.65	103	75	-0.040	2.50	0.04
255	37.162	0.148	2.15	96	-2.42	105	75	-0.040	2.64	0.03

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
256	37.307	0.145	2.16	96	-0.48	101	75	-0.030	2.50	0.07
257	37.454	0.147	2.14	96	-1.68	97	75	-0.030	2.65	0.01
258	37.599	0.145	2.14	96	-2.94	97	75	-0.020	2.26	0.06
259	37.746	0.147	2.16	96	-2.34	105	75	-0.050	1.88	0.05
260	37.892	0.146	2.15	96	-1.12	103	75	-0.040	2.21	0.02
261	38.039	0.147	2.16	96	-2.56	98	75	-0.040	2.40	0.05
262	38.184	0.145	2.17	96	-0.55	102	75	-0.040	2.45	0.01
263	38.331	0.147	2.15	96	-1.06	100	75	-0.040	2.02	0.07
264	38.477	0.146	2.16	96	-1.41	97	75	-0.050	1.71	0.07
265	38.624	0.147	2.16	96	-0.54	99	75	-0.040	2.82	0.04
266	38.770	0.146	2.16	96	-3	97	75	-0.030	3.28	0.01
267	38.916	0.146	2.15	96	-0.52	99	75	-0.040	2.13	0.04
268	39.062	0.146	2.16	96	-2.42	96	75	-0.050	2.13	0.08
269	39.209	0.147	2.15	96	-3.07	95	75	-0.020	2.04	0.03
270	39.355	0.146	2.15	96	-1.22	97	75	-0.030	2.33	0.04
271	39.502	0.147	2.15	96	-0.63	99	75	-0.030	2.25	0.04
272	39.648	0.146	2.16	96	-3.05	102	75	-0.030	2.68	0.03
273	39.794	0.146	2.16	96	-2.96	96	75	-0.040	1.56	0.09
274	39.941	0.147	2.15	96	-2.97	104	75	-0.020	1.95	0.06
275	40.087	0.146	2.15	96	-0.76	100	75	-0.040	2.07	0.03
276	40.233	0.146	2.15	96	-2.98	103	75	-0.020	2.88	0.01
277	40.379	0.146	2.15	96	-0.46	99	75	-0.030	2.45	0.03
278	40.526	0.147	2.15	96	-0.54	99	75	-0.030	2.08	0.04
279	40.671	0.145	2.15	96	-2.68	100	75	-0.030	2.21	0.03
280	40.818	0.147	2.14	96	-2.03	103	75	-0.030	2.30	0.02
281	40.964	0.146	2.15	96	-3.03	96	75	-0.040	2.43	0.04
282	41.111	0.147	2.16	96	-0.65	99	75	-0.030	2.47	0.02
283	41.256	0.145	2.16	96	-1.3	102	75	-0.030	1.38	0.02
284	41.403	0.147	2.14	96	-2.97	97	75	-0.030	0.43	0.02
285	41.548	0.145	2.15	96	-2.88	100	75	-0.030	2.06	0.02
286	41.695	0.147	2.14	96	-2.35	99	75	-0.040	2.03	0.05
287	41.840	0.145	2.15	96	-0.95	103	75	-0.030	2.11	0.04

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
288	41.988	0.148	2.15	96	-1.16	100	75	-0.050	2.21	0.04
289	42.132	0.144	2.14	96	-2.72	97	75	-0.030	1.79	0.04
290	42.280	0.148	2.15	96	-1.08	99	75	-0.040	1.68	0.06
291	42.425	0.145	2.16	96	-2.16	97	75	-0.030	1.85	0.04
292	42.574	0.149	2.14	96	-1.6	104	75	-0.030	2.03	0.01
293	42.719	0.145	2.15	96	-2.98	102	75	-0.020	2.28	0.01
294	42.866	0.147	2.15	96	-0.66	101	75	-0.030	1.99	0.04
295	43.011	0.145	2.15	96	-0.57	98	75	-0.030	1.91	0.04
296	43.159	0.148	2.16	96	-1	102	75	-0.030	2.28	0.03
297	43.304	0.145	2.15	96	-2.23	97	75	-0.030	1.94	0.05
298	43.452	0.148	2.16	96	-0.95	99	75	-0.040	2.44	0.05
299	43.597	0.145	2.16	96	-2.35	96	75	-0.030	2.04	0.03
300	43.745	0.148	2.16	96	-0.55	98	75	-0.030	2.06	0.04
301	43.889	0.144	2.17	96	-0.91	102	75	-0.030	2.87	0.04
302	44.037	0.148	2.16	96	-0.61	96	75	-0.050	2.09	0.04
303	44.182	0.145	2.16	95	-0.96	101	75	-0.040	1.45	0.06
304	44.330	0.148	2.15	96	-2.78	98	75	-0.040	1.98	0.04
305	44.474	0.144	2.15	96	-0.49	98	75	-0.030	2.30	0.00
306	44.622	0.148	2.14	96	-0.74	101	75	-0.030	1.85	0.06
307	44.766	0.144	2.14	96	-2.99	97	75	-0.020	1.92	0.05
308	44.914	0.148	2.15	96	-0.63	106	75	-0.040	2.38	0.04
309	45.059	0.145	2.17	96	-0.56	102	75	-0.050	2.36	0.03
310	45.207	0.148	2.16	96	-3.07	99	75	-0.030	1.97	0.07
311	45.351	0.144	2.16	96	-0.44	102	75	-0.040	2.03	0.05
312	45.500	0.149	2.15	96	-2.05	101	75	-0.030	1.86	0.02
313	45.644	0.144	2.16	96	-0.66	98	75	-0.030	2.04	0.04
314	45.792	0.148	2.15	96	-0.54	99	75	-0.030	2.20	0.03
315	45.936	0.144	2.15	96	-1.94	94	75	-0.030	2.34	0.06
316	46.085	0.149	2.15	96	-1.36	106	75	-0.060	2.43	0.05
317	46.229	0.144	2.15	96	-1.98	97	75	-0.040	2.78	0.03
318	46.378	0.149	2.16	96	-0.43	108	75	-0.040	2.03	0.03
319	46.522	0.144	2.16	96	-0.99	95	75	-0.030	2.43	0.03

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
320	46.670	0.148	2.16	95	-2.39	105	75	-0.040	1.61	0.04
321	46.814	0.144	2.15	95	-3.07	97	75	-0.040	2.05	0.03
322	46.963	0.149	2.13	96	-2.97	99	75	-0.040	1.97	0.03
323	47.106	0.143	2.14	95	-0.72	95	75	-0.030	2.07	0.03
324	47.255	0.149	2.15	96	-0.55	103	75	-0.030	2.23	0.04
325	47.398	0.143	2.15	96	-1.92	93	75	-0.030	2.22	0.01
326	47.547	0.149	2.15	96	-1.56	102	75	-0.040	1.66	0.04
327	47.691	0.144	2.12	96	-0.84	93	75	-0.040	1.70	0.04
328	47.839	0.148	2.14	96	-2.16	101	75	-0.020	2.01	0.04
329	47.983	0.144	2.15	96	-0.61	95	75	-0.030	1.20	0.07
330	48.132	0.149	2.15	96	-2.76	99	75	-0.040	1.29	0.06
331	48.276	0.144	2.15	96	-2.52	95	75	-0.030	1.25	0.04
332	48.424	0.148	2.15	96	-1.23	100	75	-0.040	1.31	0.05
333	48.568	0.144	2.15	96	-0.67	97	75	-0.030	2.00	0.05
334	48.717	0.149	2.15	96	-3.06	105	75	-0.030	1.51	0.03
335	48.860	0.143	2.14	96	-2.07	106	75	-0.040	1.89	0.05
336	49.009	0.149	2.15	96	-1.18	103	75	-0.040	2.96	0.00
337	49.152	0.143	2.14	96	-2.98	97	75	-0.040	1.93	0.05
338	49.301	0.149	2.15	96	-0.52	105	75	-0.030	2.33	0.03
339	49.444	0.143	2.16	96	-0.5	97	75	-0.040	2.73	0.02
340	49.593	0.149	2.15	96	-1.08	102	75	-0.020	2.79	0.03
341	49.737	0.144	2.15	96	-0.57	99	75	-0.040	2.45	0.06
342	49.885	0.148	2.15	96	-2.96	100	75	-0.040	1.89	0.08
343	50.028	0.143	2.15	96	-0.62	94	75	-0.030	2.06	0.05
344	50.177	0.149	2.15	96	-2.71	106	75	-0.030	1.90	0.06
345	50.321	0.144	2.14	96	-2.64	92	75	-0.040	1.48	0.04
346	50.469	0.148	2.15	96	-2.89	102	75	-0.030	1.65	0.06
347	50.613	0.144	2.15	96	-1.33	97	75	-0.020	1.46	0.03
348	50.761	0.148	2.15	96	-2.74	101	75	-0.030	1.22	0.07
349	50.905	0.144	2.15	96	-0.86	95	75	-0.040	1.42	0.05
350	51.054	0.149	2.16	96	-0.73	100	75	-0.030	2.56	0.03
351	51.198	0.144	2.14	96	-0.52	100	75	-0.040	2.23	0.04

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
352	51.346	0.148	2.15	96	-2.79	101	75	-0.030	1.55	0.07
353	51.490	0.144	2.15	96	-2.38	99	75	-0.030	2.11	0.02
354	51.639	0.149	2.15	96	-2.9	99	75	-0.010	1.43	0.07
355	51.783	0.144	2.15	96	-1.57	98	75	-0.040	1.62	0.07
356	51.931	0.148	2.15	96	-3.08	99	75	-0.030	1.72	0.06
357	52.075	0.144	2.16	96	-2.21	93	75	-0.030	1.91	0.05
358	52.223	0.148	2.14	96	-3.11	99	75	-0.030	1.04	0.09
359	52.367	0.144	2.13	96	-2.69	95	75	-0.040	1.52	0.04
360	52.515	0.148	2.14	96	-2.74	104	75	-0.030	2.01	0.02
Avg/Tot	52.515	0.146	2.14	93	-1.72	100			2.56	0.04

LAB SAMPLE DATA - ASTM E2515

Client: Thelin
 Model: Providence
 Run #: 1

Job #: 19-501
 Tracking #: 0034
 Technician: AK
 Date: 9/10/2019

	Sample ID	Tare, mg	Total, mg	Final, mg	Catch, mg
Train A Filters - First Hour	3588	115.9	115.9	116.9	1.0
Train A Filters - Remainder	3589	123.5	245.4	249.0	3.6
	3590	121.9			
Train A Probe	9A	116714.2	116714.2	116714.2	0.0
Train A O-Rings	9A	3581.2	3581.2	3582.0	0.8
Train B Filters	3591	115.5	231.5	235.5	4.0
	3592	116.0			
Train B Probe	9B	117919.8	117919.8	117919.9	0.1
Train B O-Rings	9B	3524.1	3524.1	3525.1	1.0
Background Filter			0.0	0.0	

**Placed in
Dessicator on:**

Train A Filters - First Hour	116.8	9/13 10:24	116.9	9/20 10:54		
Train A Filters - Remainder	248.8	9/13 10:24	249.0	9/20 10:55		
Train A Probe	116714.1	9/13 10:23	116714.2	9/20 10:53		
Train A O-Rings	3582.1	9/13 10:23	3582.0	9/20 10:55		
Train B Filters	235.4	9/13 10:25	235.5	9/20 10:54		
Train B Probe	117919.8	9/13 10:24	117919.9	9/20 10:53		
Train B O-Rings	3525.1	9/13 10:24	3525.1	9/20 10:56		
Background Filter						

1st hour Sub-Total, mg:	1.0
Remainder Sub-Total, mg:	4.4
Train 1 Aggregate, mg:	5.4
Train 2 Aggregate, mg:	5.1
Ambient Aggregate, mg:	0.0