December 16, 2019

Lavington Pellet Limited Partnership
9900 School Road
Coldstream, B.C.,
V1B 3C7

Attention: **Jamie Colliss**
Re: **Air Emission Testing of November 19, 2019**
Permit 107369, ME1718-538

As requested our firm provided a series of air emission tests at your facility in Lavington BC.

Testing Parameters

- CF-12
  - Total Particulate Testing (including Condensable Organics) State of Oregon Method 7

Key Personnel

- Report Generation: Matt McCall
- Field Supervisor: Dan Lawrence
- Plant Contact: Jamie Colliss

All testing procedures were conducted in accordance with acceptable methodologies as listed in the latest revision of the BC Field Sampling Manual. A copy of the method and/or Sampling Manual are digitally available upon request. All lab analysis for back half condensable organic fractions was analyzed by EXOVA Laboratories in Surrey BC. A copy of their report can be found in the Appendix of this report.

Results are summarized immediately following this cover letter. Please note that all results are expressed on a dry basis and reference conditions of 20 deg C, 1 atm pressure.

If you have any questions or concerns please don't hesitate to contact us at your earliest convenience.

Sincerely,

MCCALL ENVIRONMENTAL

Matt McCall

Digitally signed by Matt McCall
DN: cn=Matt McCall, o=McCall Environmental, ou, email=matt@mccallenvironmental.net, c=CA
Date: 2019.12.16 12:10:23 -08'00'

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Summary of Test Results

CF12 November 19, 2019 Summary of Test Results 1-3

Particulate Results

Parameter	Test 1	Test 2	Test 3	Average	Permit
Start Time	8:35	9:55	11:10	N/A	
Stop Time	9:40	11:00	12:15	N/A	
Gas Temperature (°C)	32.8	31.1	31.4	31.8	
% Moisture	1.3	0.9	0.9	1.1	
Velocity (m/sec)	18.71	18.73	18.92	18.79	
ACFM	72292	72376	73107	72592	
Std. Dry Flow Rate (m^3/sec)	30.14	30.46	30.75	30.45	34.00
Oxygen in % (dry basis)	21.00	21.00	21.00	21.00	
Carbon Dioxide % (dry basis)	0.00	0.00	0.00	0.00	
Tot Part. Dry Basis ref. Cond. (mg/m^3)	7.57	8.65	9.31	8.51	10.00
Front Half Filterable Particulate (mg/m^3)	5.55	6.64	7.31	6.50	
Back Half Cond. Organics (mg/m3)	2.02	2.01	2.00	2.01	
Mass Emission Rate (kg/hr)	0.01	0.02	0.02	0.02	

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Pinnacle Pellet **19-Nov-19**

CF-12 Baghouse Stack **Permit Number: 107369**

Lavington BC

AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	89 ^{o}F	32 ^{o}C
Moisture Content (by volume):	1.06 %	
Average Stack Gas Velocity:	61.6 ft/sec	18.79 m/sec
Total Actual Gas Flow Rate:	72592 ACFM	
Dry Gas flow Rate at Reference Conditions:	64522 SCFM	30.45 m^3/sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.004 gr/ft^3	8.5 mg/m^3
Front Half Particulate	0.003 gr/ft^3	6.5 mg/m^3
Back Half Condensibles	0.001 gr/ft^3	2.0 mg/m^3
Mass Emission Rate	0.03 lbs/hr	0.02 kg/hr

SUMMARY OF AIR EMISSION TESTS

TEST 1:

Gas Temperature:	91 ^{o}F	33 ^{o}C
Moisture Content (by volume):	1.3 %	
Average Stack Gas Velocity:	61.4 ft/sec	18.7 m/sec
Total Actual Gas Flow Rate:	72292 ACFM	
Dry Gas flow Rate at Reference Conditions:	63873 SCFM	30.1 m^3/sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft^3	7.6 mg/m^3
Front Half Particulate	.002 gr/ft^3	5.5 mg/m^3
Back Half Condensibles	.001 gr/ft^3	2.0 mg/m^3
Mass Emission Rate	0.03 lbs/hr	0.01 kg/hr

TEST 2:

Gas Temperature:	88 ^{o}F	31 ^{o}C
Moisture Content (by volume):	.9 %	
Average Stack Gas Velocity:	61.5 ft/sec	18.7 m/sec
Total Actual Gas Flow Rate:	72376 ACFM	
Dry Gas flow Rate at Reference Conditions:	64546 SCFM	30.5 m^3/sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft^3	8.7 mg/m^3
Front Half Particulate	.003 gr/ft^3	6.6 mg/m^3
Back Half Condensibles	.001 gr/ft^3	2.0 mg/m^3
Mass Emission Rate	0.03 lbs/hr	0.02 kg/hr

TEST 3:

Gas Temperature:	89 ^{o}F	31 ^{o}C
Moisture Content (by volume):	.9 %	
Average Stack Gas Velocity:	62.1 ft/sec	18.9 m/sec
Total Actual Gas Flow Rate:	73107 ACFM	
Dry Gas flow Rate at Reference Conditions:	65146 SCFM	30.7 m^3/sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft^3	9.3 mg/m^3
Front Half Particulate	.003 gr/ft^3	7.3 mg/m^3
Back Half Condensibles	.001 gr/ft^3	2.0 mg/m^3
Mass Emission Rate	0.04 lbs/hr	0.02 kg/hr

DATA FOR TESTS 1 TO 3

Client:	**Pinnacle Pellet**		
Plant Location:	**Lavington BC**		
Process:	**CF-12 Baghouse Stack**		
Permit Number:	**107369**		
Job Number:	**ME1718-538**		
Pollution Control Permit:	**10.0**	**mg/m3**	34 **m3/sec**
Number of Tests:	**3**	**tests**	
Minutes per Point:	**2.5**	**minutes**	

	TEST 1	TEST 2	TEST 3
Filter Number:	17	18	19
Date of Test:	19-Nov-19	19-Nov-19	19-Nov-19
Start Time:	8:35	9:55	11:10
Stop Time:	9:40	11:00	12:15
On-line Sampling Time:	60	60	60
Testing Personnel:	DL/NB	DL/NB	DL/NB
Sampler Model:	1013	1013	1013
Barometric Pressure("Hg):	28.00	28.00	28.00
Static Pressure("H_2O):	-0.60	-0.60	-0.60
%CO_2:	0.0	0.0	0.0
%O_2:	21.0	21.0	21.0
%CO:	0.0	0.0	0.0
%N_2:	79.0	79.0	79.0
Diameter of Nozzle(inches):	0.180	0.180	0.180
Meter Factor:	1.0003	1.0003	1.0003
Type-S Pitot Tube Coefficient:	0.83300	0.83300	0.83300
Cross Sectional Area of Stack(ft^2):	19.63	19.63	19.63
Impinger Condensate(g):	8	6	6
Weight of Moisture in Silica Gel(g):	2.0	1.0	1.0
Weight of Filter Particulate(g):	0.0001	0.0001	0.0003
Weight of Probe Washings(g):	0.0054	0.0065	0.0070
Weight of Impinger Content Organic(g):	0.0020	0.0020	0.0020
Total Weight of Particulate(g):	0.0075	0.0086	0.0093

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Sampling Data for - *TEST 1*
Pinnacle Pellet
CF-12 Baghouse Stack
Lavington BC

19-Nov-19

SAMPLE POINT	VELOCITY HEAD ("H_2O)	ORIFICE PRESSURE ("H_2O)	DRY GAS METER		STACK GAS TEMP (^oF)	GAS SAMPLE VOLUME (ft^3)	ISOKINETICS
			TEMP IN (^oF)	TEMP OUT (^oF)			
A-12	1.16	1.47	46	46	85	0.00	1.01
A-11	1.20	1.53	53	47	86	1.54	1.00
A-10	1.20	1.53	53	47	86	3.10	1.00
A-9	1.15	1.47	55	48	89	4.66	1.03
A-8	1.10	1.41	57	49	88	6.23	1.02
A-7	1.10	1.41	59	52	87	7.77	1.03
A-6	1.20	1.54	60	54	90	9.32	1.01
A-5	1.10	1.41	62	55	91	10.92	1.04
A-4	1.10	1.42	63	56	92	12.50	1.00
A-3	1.00	1.30	65	60	91	14.02	1.02
A-2	0.95	1.23	66	61	90	15.50	1.05
A-1	0.80	1.04	68	63	92	17.00	1.00
B-12	1.15	1.50	68	64	93	18.31	0.98
B-11	1.20	1.56	67	66	94	19.85	1.01
B-10	1.15	1.50	65	67	94	21.47	0.99
B-9	1.20	1.58	74	71	93	23.02	1.01
B-8	1.20	1.58	76	71	93	24.65	1.02
B-7	1.15	1.51	76	75	94	26.30	0.98
B-6	1.15	1.51	78	75	94	27.87	1.03
B-5	1.10	1.44	79	75	92	29.51	1.01
B-4	1.00	1.31	79	77	94	31.10	1.04
B-3	1.00	1.35	82	79	91	32.65	1.03
B-2	0.95	1.28	81	81	92	34.20	1.06
B-1	0.75	1.01	81	81	92	35.75	1.00
						37.06	

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Sampling Data for - *TEST 2*
Pinnacle Pellet
CF-12 Baghouse Stack
Lavington BC

19-Nov-19

SAMPLE POINT	VELOCITY HEAD ("H_2O)	ORIFICE PRESSURE ("H_2O)	DRY GAS METER		STACK GAS TEMP (^oF)	GAS SAMPLE VOLUME (ft^3)	ISOKINETICS
			TEMP IN (^oF)	TEMP OUT (^oF)			
A-12	1.20	1.65	85	86	86	0.00	0.98
A-11	1.20	1.65	80	81	85	1.65	1.00
A-10	1.15	1.56	80	79	86	3.31	1.02
A-9	1.15	1.57	80	78	84	4.96	1.01
A-8	1.20	1.63	82	82	87	6.60	1.00
A-7	1.15	1.57	85	81	86	8.26	1.02
A-6	1.10	1.50	88	81	87	9.92	1.05
A-5	1.15	1.58	84	83	86	11.60	0.98
A-4	1.00	1.36	86	82	88	13.21	1.00
A-3	1.05	1.43	86	83	89	14.74	1.00
A-2	0.95	1.30	90	85	87	16.30	0.99
A-1	0.80	1.10	91	90	90	17.78	1.02
B-12	1.15	1.58	91	90	89	19.18	0.93
B-11	1.20	1.65	90	89	90	20.71	1.02
B-10	1.20	1.64	92	88	91	22.42	1.00
B-9	1.15	1.58	91	90	90	24.11	1.02
B-8	1.15	1.58	92	91	91	25.80	1.01
B-7	1.15	1.58	92	91	90	27.47	1.04
B-6	1.15	1.59	93	92	87	29.19	0.97
B-5	1.10	1.52	93	91	88	30.80	1.05
B-4	1.10	1.52	93	90	89	32.50	1.01
B-3	1.15	1.59	96	93	91	34.13	1.01
B-2	1.00	1.39	95	97	90	35.81	1.04
B-1	0.70	0.98	95	96	86	37.42	1.03
						38.76	

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Sampling Data for - *TEST 3*
Pinnacle Pellet
CF-12 Baghouse Stack
Lavington BC

19-Nov-19

SAMPLE POINT	VELOCITY HEAD ("H_2O)	ORIFICE PRESSURE ("H_2O)	DRY GAS METER		STACK GAS TEMP (^oF)	GAS SAMPLE VOLUME (ft^3)	ISOKINETICS
			TEMP IN (^oF)	TEMP OUT (^oF)			
A-12	1.25	1.72	90	89	87	0.00	0.99
A-11	1.2	1.64	87	86	88	1.71	1.00
A-10	1.2	1.65	86	87	85	3.39	0.99
A-9	1.15	1.58	86	85	86	5.06	1.00
A-8	1.1	1.52	86	84	86	6.70	1.02
A-7	1.15	1.58	85	85	87	8.34	1.01
A-6	1.15	1.58	85	85	88	10.00	1.00
A-5	1.2	1.64	85	86	88	11.63	1.00
A-4	1.2	1.64	85	85	89	13.30	0.98
A-3	1.1	1.51	85	85	90	14.93	1.03
A-2	1.1	1.50	85	85	88	16.57	1.02
A-1	0.75	1.02	85	85	90	18.20	0.98
B-12	1.20	1.64	86	86	87	19.50	0.98
B-11	1.20	1.65	86	87	87	21.15	0.95
B-10	1.15	1.58	89	88	88	22.74	1.01
B-9	1.15	1.58	89	89	89	24.41	1.03
B-8	1.11	1.51	89	89	90	26.10	1.01
B-7	1.10	1.51	89	89	91	27.74	1.03
B-6	1.15	1.57	90	90	92	29.39	1.07
B-5	1.15	1.57	90	92	93	31.15	0.94
B-4	1.20	1.65	91	91	92	32.70	1.00
B-3	1.15	1.58	91	90	90	34.39	1.07
B-2	0.95	1.32	92	93	86	36.15	0.98
B-1	0.75	1.04	93	92	87	37.63	0.96
						38.92	

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Pinnacle Pellet
CF-12 Baghouse Stack
Pinnacle Pellet

Data for ***TEST 1***

OVERALL ISOKINETICS - TEST 1: 1.015

Delta P:	**1.082**	**"H_2O**	**Us avg:**	**61.38**	**ft/sec**
Delta H:	**1.412**		**ACFM:**	**72292**	**ft^3/min**
Tm avg:	**525.3**	**^oR**	**SDCFM:**	**63873**	**ft^3/min**
Ts avg:	**551.0**	**^oR**	**Vm std:**	**35.00**	**ft^3**
Bwo:	**0.013**		**Vm corr:**	**37.07**	**ft^3**
Md:	**28.84**		**Vm:**	**37.06**	**ft^3**
Ms:	**28.70**		**MF:**	**1.0003**	
Pb:	**28.00**	**"Hg**	**PCON:**	**7.57**	**mg/m^3**
Pm:	**28.10**	**"Hg**	**ERAT:**	**0.82**	**kg/hr**
Ps:	**27.96**	**"Hg**			

Data for ***TEST 2***

OVERALL ISOKINETICS - TEST 2: 1.008

Delta P:	**1.092**	**"H_2O**	**Us avg:**	**61.45**	**ft/sec**
Delta H:	**1.504**		**ACFM:**	**72376**	**ft^3/min**
Tm avg:	**547.9**	**^oR**	**SDCFM:**	**64546**	**ft^3/min**
Ts avg:	**548.0**	**^oR**	**Vm std:**	**35.10**	**ft^3**
Bwo:	**0.009**		**Vm corr:**	**38.77**	**ft^3**
Md:	**28.84**		**Vm:**	**38.76**	**ft^3**
Ms:	**28.74**		**MF:**	**1.0003**	
Pb:	**28.00**	**"Hg**	**PCON:**	**8.65**	**mg/m^3**
Pm:	**28.11**	**"Hg**	**ERAT:**	**0.95**	**kg/hr**
Ps:	**27.96**	**"Hg**			

Data for ***TEST 3***

OVERALL ISOKINETICS - TEST 3: 1.002

Delta P:	**1.113**	**"H_2O**	**Us avg:**	**62.07**	**ft/sec**
Delta H:	**1.533**		**ACFM:**	**73107**	**ft^3/min**
Tm avg:	**547.7**	**^oR**	**SDCFM:**	**65146**	**ft^3/min**
Ts avg:	**548.5**	**^oR**	**Vm std:**	**35.27**	**ft^3**
Bwo:	**0.009**		**Vm corr:**	**38.93**	**ft^3**
Md:	**28.84**		**Vm:**	**38.92**	**ft^3**
Ms:	**28.74**		**MF:**	**1.0003**	
Pb:	**28.00**	**"Hg**	**PCON:**	**9.31**	**mg/m^3**
Pm:	**28.11**	**"Hg**	**ERAT:**	**1.03**	**kg/hr**
Ps:	**27.96**	**"Hg**			

Air Emission Monitoring Procedure

Particulate Sampling (Napp-Baldwin Model 31 Sampler)

Particulate sampling and gas velocity measurements were conducted using a Napp-Baldwin Model 31 stack sampler in accordance with the methods specified in EPA Method 5 (See Figure 1).

The air discharge was sampled isokinetically at the centroid of a series of equal area segments across the duct or stack. The stack gas velocity and temperature were recorded during the sample collection period with a calibrated pitot tube and thermocouple mounted on the sampling probe. The sample was delivered from the probe to a cyclone and a filter holder containing a 110mm Type A glass fiber filter. The gas sample was then drawn in through a series of four glass impingers which condensed and absorbed the water from the gas. A leakless vacuum pump carried the sampled gas through a dry gas test meter where the volume, temperature, and pressure were measured; and finally through a flow indicating orifice which allowed for the rapid adjustment to isokinetic sampling rates.

At the end of each test, the probe interior, cyclone and connecting tubing from the probe to the filter housing were rinsed with distilled water and acetone. These washings were evaporated to dryness and the resulting solids were weighed. The weight of the cyclone flask and the filter was used together with the weight of solids in the washings to calculate the particulate concentration. The moisture content of the stack gas was determined from the quantity of water condensed in the impingers and absorbed in the silica gel.

O_2, CO_2, CO (where applicable)

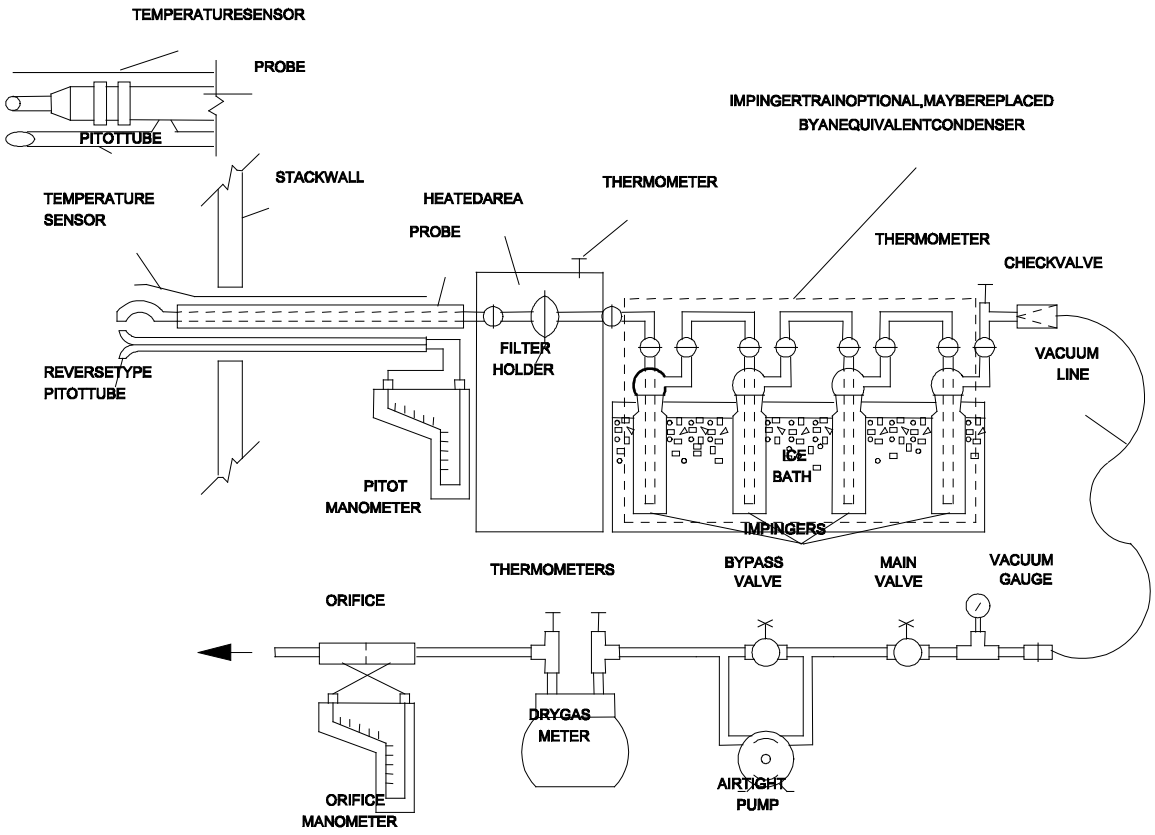
O_2, CO_2, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

NOx (where applicable)

NOx was found using and API Model 252 NOx analyzer that utilizes chemiluminescent technology. Stack gas was Samples were taken over a minimum period of three hours.

VOC's (where applicable)

Hydrocarbons were measured in accordance with EPA method 25A. Samples were drawn in one hour test runs using a total hydrocarbon analyzer that utilizes Flame Ionization Technology.



EPA Method 5 Diagram- Figure 1

CALCULATIONS

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used as long as they give equivalent results.

Nomenclature.

A_n = Cross-sectional area of nozzle, m^2 (ft^2).
B_{ws} = Water vapor in the gas stream, proportion by volume.
C_a = Acetone blank residue concentration, mg/g.
c_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf).
I = Percent of isokinetic sampling.
L_a = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.00057 m^3/min (0.02 cfm) or 4 percent of the average sampling rate, whichever is less.
L_i = Individual leakage rate observed during the leak check conducted prior to the "i^{th}" component change (i = l, 2, 3...n), m^3/min (cfm).
L_p = Leakage rate observed during the post-test leak check, m^3/min (cfm).
m_a = Mass of residue of acetone after evaporation, mg.
m_n = Total amount of particulate matter collected, mg.
M_w = Molecular weight of water, l8.0 g/g-mole (l8.0 lb/lb-mole).
P_{bar} = Barometric pressure at the sampling site, mm Hg (in. Hg).
P_s = Absolute stack gas pressure, mm Hg (in. Hg).
P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
R = Ideal gas constant, 0.06236 [(mmHg)(m^3)]/[(°K)(g-mole)] {2l.85 [(in. Hg)(ft^3)]/[(°R)(lb-mole)]}.
T_m = Absolute average DGM temperature (see Figure 5-2), °K (°R).
T_s = Absolute average stack gas temperature (see Figure 5-2), °K (°R).
T_{std} = Standard absolute temperature, 293°K (528°R).
V_a = Volume of acetone blank, ml.
V_{aw} = Volume of acetone used in wash, ml.
V_{lc} = Total volume liquid collected in impingers and silica gel (see Figure 5-3), ml.
V_m = Volume of gas sample as measured by dry gas meter, dcm (dcf).
$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).
$V_{w(std)}$ = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).
v_s = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec).
W_a = Weight of residue in acetone wash, mg.
Y = Dry gas meter calibration factor.
ΔH = Average pressure differential across the orifice meter (see Figure 5-2), mm H_20 (in. H_20).
ρ_a = Density of acetone, mg/ml (see label on bottle).
ρ_w = Density of water, 0.9982 g/ml (0.00220l lb/ml).
θ = Total sampling time, min.
θ_l = Sampling time interval, from the beginning of a run until the first component change, min.
θ_i = Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, min.
θ_p = Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, min.
l3.6 = Specific gravity of mercury.
60 = Sec/min.
l00 = Conversion to percent.

Average Dry Gas Meter Temperature and Average Orifice Pressure Drop.

Dry Gas Volume. Correct the sample volume measured by the dry gas meter to standard conditions (20°C, 760 mm Hg or 68°F, 29.92 in. Hg) by using Equation 5-l.

$$V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m} \right) \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{std}} \right] \qquad \text{Eq. 5-1}$$

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

where:

K_l = 0.3858 °K/mm Hg for metric units,

= l7.64 °R/in. Hg for English units.

NOTE: Equation 5-l can be used as written unless leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds L_a. If L_p or L_i exceeds L_a, Equation 5-l must be modified as follows:

(a) Case I. No component changes made during sampling run. In this case, replace V_m in Equation 5-l with the expression:

$$[V_m - (L_p - L_a)\,\theta]$$

(b) Case II. One or more component changes made during the sampling run. In this case, replace V_m in Equation 5-l by the expression:

$$\left[V_m - (L_1 - L_a)\theta_1 - \sum_{i=2}^{n} (L_i - L_a)\theta_i - (L_p - L_a)\theta_p \right]$$

and substitute only for those leakage rates (L_i or L_p) which exceed L_a.

Volume of Water Vapor.

$$V_{w(std)} = \frac{V_{lc}\,\rho_w\,R\,T_{std}}{M_w\,P_{std}} = K_2\,V_{lc} \qquad \text{Eq. 5-2}$$

where:

K_2 = 0.00l333 m^3/ml for metric units,

= 0.04707 ft^3/ml for English units.

Moisture Content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \qquad \text{Eq. 5-3}$$

Acetone Blank Concentration.

$$C_a = \frac{m_a}{V_a \rho_a} \qquad \text{Eq. 5-4}$$

Acetone Wash Blank.

$$W_a = C_a V_{aw} \rho_a \qquad \text{Eq. 5-5}$$

Total Particulate Weight. Determine the total particulate matter catch from the sum of the weights obtained from Containers l and 2 less the acetone blank (see Figure 5-3).

Particulate Concentration.

$$C_s = (0.001 g/mg)(m_n / V_{m(std)}) \qquad \text{Eq. 5-6}$$

Conversion Factors:

From	To	Multiply by
scf	m^3	0.02832
g/ft^3	gr/ft^3	l5.43
g/ft^3	lb/ft^3	2.205×10^{-3}
g/ft^3	g/m^3	35.3l

Isokinetic Variation.

Calculation from Raw Data.

$$I = \frac{100 T_s \left[K_3 V_{1c} + (V_m Y / T_m)(P_{bar} + \Delta H/13.6)\right]}{60\theta V_s P_s A_n} \qquad \text{Eq. 5-7}$$

where:

K_3 = 0.003454 [(mm Hg)(m^3)]/[(ml)(°K)] for metric units,

= 0.002669 [(in. Hg)(ft^3)]/[(ml)(°R)] for English units.

Calculation from Intermediate Values.

$$I = \frac{100\, T_s\, V_{m(std)}\, P_{std}}{60\, T_{std}\, v_s\, \theta\, A_n\, P_s\, (1 - B_{ws})} = \frac{K_4\, T_s\, V_{m(std)}}{P_s\, v_s\, A_n\, \theta (1 - B_{ws})} \qquad \text{Eq.5-8}$$

where:

K_4 = 4.320 for metric units,

= 0.09450 for English units.

Acceptable Results. If 90 percent ≤ I ≤ ll0 percent, the results are acceptable. If the PM results are low in comparison to the standard, and "I" is over 110 percent or less than 90 percent, the Administrator may opt to accept the results. Citation 4 in the Bibliography may be used to make acceptability judgments. If "I" is judged to unacceptable, reject the results, and repeat the test.

Average Stack Gas Velocity.

$$v_s = K_p\, C_p\, (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s(avg)}}{P_s\, M_s}}$$

Average Stack Gas Dry Volumetric Flow Rate.

$$Q_{sd} = 3{,}600 (1 - B_{ws})\, v_s\, A\, \frac{T_{std}}{T_{s(avg)}}\, \frac{P_s}{P_{std}}$$

where:

A	=	Cross-sectional area of stack, m^2 (ft^2).
B_{ws}	=	Water vapor in the gas stream (from Method 5 or Reference Method 4), proportion by volume.
C_p	=	Pitot tube coefficient, dimensionless.
K_p	=	Pitot tube constant,
M_d	=	Molecular weight of stack gas, dry basis (see Section 3.6), g/gmole (lb/lb-mole).
M_s	=	Molecular weight of stack gas, wet basis, g/g-mole (lb/lb-mole).

$$= M_d (1 - B_{ws}) + 18.0\, B_{ws} \qquad \text{Eq. 2-5}$$

P_{bar}	=	Barometric pressure at measurement site, mm Hg (in. Hg).
P_g	=	Stack static pressure, mm Hg (in. Hg).
P_s	=	Absolute stack pressure, mm Hg (in. Hg),

$$= P_{bar} + P_g$$

P_{std}	=	Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
Q_{sd}	=	Dry volumetric stack gas flow rate corrected to standard conditions, dsm^3/hr (dscf/hr).
t_s	=	Stack temperature, □C (□F).
T_s	=	Absolute stack temperature, □K (□R).

Calibration Certificate for S-Type Pitot Tube

Date: Jan 15/19

Barometric Pressure ("Hg): 28.25

Pitot I.D.: **148**

Wind Tunnel Temperature (^{O}F): 71.0

Nozzle: 0.250

Wind Velocity (ft/sec)	*Ref.Pitot ("H_2O)*	*S-Type Pitot ("H_2O)*	*Pitot Factor*
14.07	0.04262	0.06065	0.82988
19.66	0.08321	0.11798	0.83141
42.74	0.39311	0.56173	0.82819
64.84	0.90476	1.26630	0.83683
83.51	1.50057	2.07940	0.84100
102.10	2.24318	3.18588	0.83072

Average= 0.83300

Note: The new pitot tip should be installed so that the serial number engraved is aligned directly into the gas stream.

CALIBRATION CERTIFICATE
DRY GAS METER

DATE: July 9/19

CONSOLE MANUF.: NAPP/MILLENNIUM MODEL 32

CONSOLE I.D.: MU 1013

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	70.0	70.0	70.0
P=Pres. Differential at WTM ("Hg)	0.0589	0.1251	0.2134
Pb= Atmospheric Pressure ("Hg)	28.05	28.05	28.05
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.7390	0.7390	0.7390
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	84.0	78.0	88.0
To= Dry Test Meter Outlet Temp. (oF.)	83.0	77.0	87.0
Ri= Initial Dry Test volume (ft3)	0.00	0.00	0.00
Rf= Final Dry Test Volume (ft3)	4.92	4.85	4.92
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	27.9911	27.9249	27.8366
Pd= Pb + (^H/13.59) "Hg	28.1236	28.1972	28.2708
Tw= Ta +460 (oR.)	530.0	530.0	530.0
Td= [(Ti + To)/2] + 460 (oR.)	543.5	537.5	547.5
Bw= Pv/Pb ("Hg)	0.0263	0.0263	0.0263
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0020	1.0003	0.9986

Y (MEAN)(WTMF) = 1.0003

N.R. MCCALL & ASSOCIATES LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 9/19

CONSOLE I.D. MU 1013

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.05	28.05	28.05
Y=gas meter factor	1.0020	1.0020	1.0003
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	1.76	2.68	3.3
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.352704	0.537072	0.660198
To=meter outlet Temp (oF)	92	93	94
Tm=meter out temp. (oR)	552	553	554
Pm=Pb + ^H	28.086792	28.1235835	28.1603753
SQRT(Tm/Pm*H/Md)	0.5824407	0.82390185	1.00932152
Ko=orifice const.	0.6055621	0.65186406	0.65410079

Ko MEAN = 0.6371756

Ko*4*144= 367.01317

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 9/19

CONSOLE I.D. MU 1013

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.05	28.05	28.05
Y=gas meter factor	1.0003	0.9986	0.9986
Delta H=	2	2.5	3
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	3.83	4.3	4.73
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.7662298	0.858796	0.9446756
To=meter outlet Temp (oF)	95	96	96
Tm=meter out temp. (oR)	555	556	556
Pm=Pb + ^H	28.197167	28.2339588	28.2707506
SQRT(Tm/Pm*H/Md)	1.1657542	1.30367625	1.4271762
Ko=orifice const.	0.6572825	0.65874944	0.66191939

Ko MEAN = 0.6593171

Ko*4*144= 379.76665

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

i. Average hourly dryer exit gas temperature during testing;
41.9 °C

ii. Average hourly dryer ODt for the biomass dryer system for the previous month;
25.8 ODT/hr

iii. 90th percentile hourly ODt throughput for the biomass dryers (Section 4.3);
31.6 ODT/hr

iv. Average hourly throughput ODt for the biomass dryer system during stack testing;
22.6 ODT/hr

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W: www.exova.com

Exova

Analytical Report

Bill To:	McCall Environmental	Project ID:	Pinnacle Pellet	Lot ID:	**1313836**
	6733 Buchanan Road	Project Name:	CF-12	Control Number:	C0066916
	Coldstream, BC, Canada	Project Location:	Lavington, BC	Date Received:	Nov 16, 2018
	V1B 3C5	LSD:		Date Reported:	Nov 21, 2018
Attn:	Accounts Payable	P.O.:		Report Number:	2348978
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1313836-1	1313836-2	1313836-3
Sample Date	Nov 13, 2018	Nov 13, 2018	Nov 13, 2018
Sample Time	NA	NA	NA
Sample Location			
Sample Description	CF-12 Test 1	CF-12 Test 2	CF-12 Test 3
Matrix	Water	Water	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Oil and Grease	Total	mg/sample	<2	<2	<2	2
Volume	Sample volume	mL	310	320	320	
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes	

Approved by:

Matthew Norman, BSc, PChem
Operations Chemist

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

This is to verify that

Matthew McCall

has successfully completed

a course of study in

Source Testing for Particulates

(35 hours)

Endorsed by
The B.C. Ministry of Environment

Dated at Burnaby, British Columbia, Canada
December 14, 1990

DEAN

REGISTRAR

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

North Carolina State University

Environmental Programs

This certificate awarded to

Danny Lawrence

for satisfactory completion of course and examination for

SI: 414 Quality Assurance for Source Emission Measurements

Inez F. VanArsdall
Manager

Christine E. Murphy
Registrar

May 22, 2000
Date Completed

3.5 CEUs

Awarded under EPA Assistance Agreement CT - 825724

Environmental Programs
Industrial Extension Service
College of Engineering
North Carolina State University