



December 1, 2015

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

Attention: Andrew Meyer, Paul Pawlowski
Re: Air Emission Testing of November 11-12, 2015
Permit 107369, ME15-491

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

Testing Parameters

- CF-12
 - o Total Particulate Testing (including Condensable Organics) State of Oregon Method 7
- Dryer 1 (North & South Stacks)
 - o Simultaneous Testing of North and South Stacks: Total Particulate Testing (including Condensable Organics) State of Oregon Method 7
- Dryer 2 (North & South Stacks)
 - o Simultaneous Testing of North and South Stacks: Total Particulate Testing (including Condensable Organics) State of Oregon Method 7

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. Production Data provided by mill personnel is also included in the Appendices of this report.

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

Sincerely,

MCCALL ENVIRONMENTAL

Matt McCall

Summary of Test Results

CF-12 November 11, 2015 Summary of Tests 1-3

Gas Temperature:

Moisture Content (by volume):

Average Stack Gas Velocity:

Total Actual Gas Flow Rate:

Dry Gas flow Rate at Reference Conditions:

Total Particulate Concentration:

 Dry Basis Actual at Reference Conditions

 Front Half Particulate

 Back Half Condensibles

Mass Emission Rate

106 °F	41 °C
1.00 %	
56.6 ft/sec	17.25 m/sec
66657 ACFM	
58238 SCFM	27.48 m ³ /sec
0.002 gr/ft ³	4.9 mg/m ³
0.001 gr/ft ³	2.1 mg/m ³
0.001 gr/ft ³	2.8 mg/m ³
1.08 lbs/hr	0.48 kg/hr

Dryer 1 North Stack: November 12, 2015 Summary of Test Results 1-3

Gas Temperature:	98 °F	36 °C
Moisture Content (by volume):	5.44 %	
Average Stack Gas Velocity:	23.4 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	51504 ACFM	
Dry Gas flow Rate at Reference Conditions:	43830 SCFM	20.7 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	5.8 mg/m ³
Front Half Particulate	0.001 gr/ft ³	2.1 mg/m ³
Back Half Condensibles	0.002 gr/ft ³	3.7 mg/m ³
Mass Emission Rate	0.97 lbs/hr	0.43 kg/hr

Dryer 1 South Stack: November 12, 2015 Summary of Test Results 1-3

Gas Temperature:	96 °F	35 °C
Moisture Content (by volume):	5.25 %	
Average Stack Gas Velocity:	24.2 ft/sec	7.4 m/sec
Total Actual Gas Flow Rate:	53309 ACFM	
Dry Gas flow Rate at Reference Conditions:	45633 SCFM	21.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	7.0 mg/m ³
Front Half Particulate	0.001 gr/ft ³	3.2 mg/m ³
Back Half Condensibles	0.002 gr/ft ³	3.8 mg/m ³
Mass Emission Rate	1.21 lbs/hr	0.54 kg/hr

Average of Dryer 1 North & South

*Note North and South Stacks Conducted Simultaneously. Concentration and Volumetric Flow Rates Summarized Below For Reporting Purposes

	North Stack	South Stack		Avg/Combined
Volumetric Flow Rate m ³ /sec	20.7	21.5		42.2
Total Particulate Concentration mg/m ³	5.8	7.0		6.4
Mass Emission Rate Kg/hr	.43	.54		.97

Dryer 2 North Stack: November 12, 2015 Summary of Test Results 1-3

Gas Temperature:	107 °F	42 °C
Moisture Content (by volume):	6.76 %	
Average Stack Gas Velocity:	23.9 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52662 ACFM	
Dry Gas flow Rate at Reference Conditions:	43456 SCFM	20.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	6.7 mg/m ³
Front Half Particulate	0.001 gr/ft ³	3.4 mg/m ³
Back Half Condensibles	0.001 gr/ft ³	3.2 mg/m ³
Mass Emission Rate	1.09 lbs/hr	0.49 kg/hr

Dryer 2 South Stack: November 12, 2015 Summary of Test Results 1-3

Gas Temperature:	106 °F	41 °C
Moisture Content (by volume):	6.17 %	
Average Stack Gas Velocity:	23.8 ft/sec	7.2 m/sec
Total Actual Gas Flow Rate:	52304 ACFM	
Dry Gas flow Rate at Reference Conditions:	43506 SCFM	20.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	7.8 mg/m ³
Front Half Particulate	0.001 gr/ft ³	2.0 mg/m ³
Back Half Condensibles	0.003 gr/ft ³	5.7 mg/m ³
Mass Emission Rate	1.27 lbs/hr	0.57 kg/hr

Average of Dryer 2 North & South

*Note North and South Stacks Conducted Simultaneously. Concentration and Volumetric Flow Rates Summarized Below For Reporting Purposes

	North Stack	South Stack		Avg/Combined
Volumetric Flow Rate m ³ /sec	20.5	20.5		41.0
Total Particulate Concentration mg/m ³	6.7	7.8		7.25
Mass Emission Rate Kg/hr	.49	.57		1.06

Pinnacle Pellet
CF-12
Lavington BC

11-Nov-15

Permit Number: 107369

AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	1.00 %	
Average Stack Gas Velocity:	56.6 ft/sec	17.25 m/sec
Total Actual Gas Flow Rate:	66657 ACFM	
Dry Gas flow Rate at Reference Conditions:	58238 SCFM	27.48 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.002 gr/ft ³	4.9 mg/m ³
Front Half Particulate	0.001 gr/ft ³	2.1 mg/m ³
Back Half Condensibles	0.001 gr/ft ³	2.8 mg/m ³
Mass Emission Rate	1.06 lbs/hr	0.48 kg/hr

SUMMARY OF AIR EMISSION TESTS

TEST 1:

Gas Temperature:	111 ° F	44 ° C
Moisture Content (by volume):	.8 %	
Average Stack Gas Velocity:	56.8 ft/sec	17.3 m/sec
Total Actual Gas Flow Rate:	66917 ACFM	
Dry Gas flow Rate at Reference Conditions:	58015 SCFM	27.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	5.7 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.4 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.3 mg/m ³
Mass Emission Rate	1.25 lbs/hr	0.57 kg/hr

TEST 2:

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	1.1 %	
Average Stack Gas Velocity:	57.0 ft/sec	17.4 m/sec
Total Actual Gas Flow Rate:	67127 ACFM	
Dry Gas flow Rate at Reference Conditions:	58576 SCFM	27.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.3 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.5 mg/m ³
Back Half Condensibles	.002 gr/ft ³	3.7 mg/m ³
Mass Emission Rate	1.38 lbs/hr	0.62 kg/hr

TEST 3:

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	1.1 %	
Average Stack Gas Velocity:	56.0 ft/sec	17.1 m/sec
Total Actual Gas Flow Rate:	65926 ACFM	
Dry Gas flow Rate at Reference Conditions:	58123 SCFM	27.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft ³	2.6 mg/m ³
Front Half Particulate	.000 gr/ft ³	.3 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.3 mg/m ³
Mass Emission Rate	0.56 lbs/hr	0.25 kg/hr

DATA FOR TESTS 1 TO 3

Client: Pinnacle Pellet
Plant Location: Lavington BC
Process: CF-12
Permit Number: 107369
Job Number: ME15-491
Pollution Control Permit: 15.0 mg/m3
Number of Tests: 3 tests
Minutes per Point: 2.5 minutes

Filter Number:
Date of Test:
Start Time:
Stop Time:
On-line Sampling Time:
Testing Personnel:
Sampler Model:
Barometric Pressure("Hg):
Static Pressure("H₂O):
%CO₂:
%O₂:
%CO:
%N₂:
Diameter of Nozzle(inches):
Meter Factor:
Type-S Pitot Tube Coefficient:
Cross Sectional Area of Stack(ft²):
Impinger Condensate(g):
Weight of Moisture in Silica Gel(g):
Weight of Filter Particulate(g):
Weight of Probe Washings(g):
Weight of Impinger Content Organic(g):
Total Weight of Particulate(g):

TEST 1	TEST 2	TEST 3
1	2	3
11-Nov-15	11-Nov-15	11-Nov-15
11:15	12:36	1:55
12:23	1:43	3:05
60	60	60
DL/JP	DL/JP	DL/JP
1012	1012	1012
28.25	28.25	28.25
0.65	0.65	0.65
0.0	0.0	0.1
21.0	21.0	20.9
0.0	0.0	0.0
79.0	79.0	79.0
0.215	0.215	0.215
0.9979	0.9979	0.9979
0.80670	0.80670	0.80670
19.63	19.63	19.63
7	10	10
1.0	1.0	1.0
0.0001	0.0004	0.0003
0.0044	0.0030	0.0001
0.0030	0.0050	0.0030
0.0075	0.0084	0.0034



Pinnacle Pellet
CF-12
Pinnacle Pellet

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1: 1.031

Delta P:	0.967 "H₂O	Us avg:	56.82 ft/sec
Delta H:	1.585	ACFM:	66917 ft³/min
Tm avg:	540.8 °R	SDCFM:	58015 ft³/min
Ts avg:	571.3 °R	Vm std:	46.07 ft³
Bwo:	0.008	Vm corr:	49.77 ft³
Md:	28.84	Vm:	49.87 ft³
Ms:	28.75	MF:	0.9979
Pb:	28.25 "Hg	PCON:	5.75 mg/m³
Pm:	28.37 "Hg	ERAT:	0.57 kg/hr
Ps:	28.30 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2: 1.048

Delta P:	0.981 "H₂O	Us avg:	56.99 ft/sec
Delta H:	1.703	ACFM:	67127 ft³/min
Tm avg:	555.1 °R	SDCFM:	58576 ft³/min
Ts avg:	566.1 °R	Vm std:	47.31 ft³
Bwo:	0.011	Vm corr:	52.44 ft³
Md:	28.84	Vm:	52.55 ft³
Ms:	28.72	MF:	0.9979
Pb:	28.25 "Hg	PCON:	6.27 mg/m³
Pm:	28.38 "Hg	ERAT:	0.62 kg/hr
Ps:	28.30 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3: 1.044

Delta P:	0.956 "H₂O	Us avg:	55.97 ft/sec
Delta H:	1.681	ACFM:	65926 ft³/min
Tm avg:	556.9 °R	SDCFM:	58123 ft³/min
Ts avg:	560.2 °R	Vm std:	46.75 ft³
Bwo:	0.011	Vm corr:	51.99 ft³
Md:	28.85	Vm:	52.10 ft³
Ms:	28.73	MF:	0.9979
Pb:	28.25 "Hg	PCON:	2.57 mg/m³
Pm:	28.37 "Hg	ERAT:	0.25 kg/hr
Ps:	28.30 "Hg		

Pinnacle Pellet Lavington
Dryer 1 North Stack
Lavington, BC

12-Nov-15

Permit Number: 107369

AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	98 ° F	36 ° C
Moisture Content (by volume):	5.44 %	
Average Stack Gas Velocity:	23.4 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	51504 ACFM	
Dry Gas flow Rate at Reference Conditions:	43830 SCFM	20.7 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	5.8 mg/m ³
Front Half Particulate	0.001 gr/ft ³	2.1 mg/m ³
Back Half Condensibles	0.002 gr/ft ³	3.7 mg/m ³
Mass Emission Rate	0.95 lbs/hr	0.43 kg/hr

SUMMARY OF AIR EMISSION TESTS

TEST 1:

Gas Temperature:	96 ° F	35 ° C
Moisture Content (by volume):	5.5 %	
Average Stack Gas Velocity:	24.0 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52862 ACFM	
Dry Gas flow Rate at Reference Conditions:	45113 SCFM	21.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.6 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.6 mg/m ³
Back Half Condensibles	.002 gr/ft ³	4.0 mg/m ³
Mass Emission Rate	0.94 lbs/hr	0.43 kg/hr

TEST 2:

Gas Temperature:	98 ° F	37 ° C
Moisture Content (by volume):	5.7 %	
Average Stack Gas Velocity:	23.2 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	50941 ACFM	
Dry Gas flow Rate at Reference Conditions:	43186 SCFM	20.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.2 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.2 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.0 mg/m ³
Mass Emission Rate	0.69 lbs/hr	0.31 kg/hr

TEST 3:

Gas Temperature:	99 ° F	37 ° C
Moisture Content (by volume):	5.1 %	
Average Stack Gas Velocity:	23.0 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	50709 ACFM	
Dry Gas flow Rate at Reference Conditions:	43192 SCFM	20.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.6 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.4 mg/m ³
Back Half Condensibles	.002 gr/ft ³	5.2 mg/m ³
Mass Emission Rate	1.22 lbs/hr	0.56 kg/hr

DATA FOR TESTS 1 TO 3

Client: Pinnacle Pellet Lavington
Plant Location: Lavington, BC
Process: Dryer 1 North Stack
Permit Number: 107369
Job Number:
Pollution Control Permit: 15.0 mg/m3
Number of Tests: 3 tests
Minutes per Point: 2.5 minutes

	TEST 1	TEST 2	TEST 3
Filter Number:	U12	13	14
Date of Test:	12-Nov-15	12-Nov-15	12-Nov-15
Start Time:	10:50	12:36	2:13
Stop Time:	11:52	12:38	3:14
On-line Sampling Time:	60	60	60
Testing Personnel:	MM	MM	MM
Sampler Model:	1038	1038	1038
Barometric Pressure("Hg):	28.45	28.45	28.45
Static Pressure("H₂O):	-0.17	-0.17	-0.17
%CO₂:	0.0	0.0	0.1
%O₂:	21.0	21.0	20.9
%CO:	0.0	0.0	0.0
%N₂:	79.0	79.0	79.0
Diameter of Nozzle(inches):	0.300	0.300	0.300
Meter Factor:	0.9911	0.9911	0.9911
Type-S Pitot Tube Coefficient:	0.83365	0.83365	0.83365
Cross Sectional Area of Stack(ft²):	36.67	36.67	36.67
Impinger Condensate(g):	43	44	38
Weight of Moisture in Silica Gel(g):	1.0	1.0	1.0
Weight of Filter Particulate(g):	0.0001	0.0002	0.0002
Weight of Probe Washings(g):	0.0015	0.0020	0.0021
Weight of Impinger Content Organic(g):	0.0040	0.0020	0.0050
Total Weight of Particulate(g):	0.0056	0.0042	0.0073



**Pinnacle Pellet Lavington
Dryer 1 North Stack
Pinnacle Pellet Lavington**

Data for TEST 1

OVERALL ISOKINETICS - TEST 1: 0.982

Delta P:	0.164 "H₂O	Us avg:	24.03 ft/sec
Delta H:	1.391	ACFM:	52862 ft³/min
Tm avg:	541.4 °R	SDCFM:	45113 ft³/min
Ts avg:	555.6 °R	Vm std:	35.50 ft³
Bwo:	0.055	Vm corr:	38.15 ft³
Md:	28.84	Vm:	38.49 ft³
Ms:	28.24	MF:	0.9911
Pb:	28.45 "Hg	PCON:	5.57 mg/m³
Pm:	28.55 "Hg	ERAT:	0.43 kg/hr
Ps:	28.44 "Hg		

Data for TEST 2

OVERALL ISOKINETICS - TEST 2: 1.009

Delta P:	0.152 "H₂O	Us avg:	23.15 ft/sec
Delta H:	1.263	ACFM:	50941 ft³/min
Tm avg:	535.1 °R	SDCFM:	43186 ft³/min
Ts avg:	558.2 °R	Vm std:	35.02 ft³
Bwo:	0.057	Vm corr:	37.21 ft³
Md:	28.84	Vm:	37.54 ft³
Ms:	28.22	MF:	0.9911
Pb:	28.45 "Hg	PCON:	4.23 mg/m³
Pm:	28.54 "Hg	ERAT:	0.31 kg/hr
Ps:	28.44 "Hg		

Data for TEST 3

OVERALL ISOKINETICS - TEST 3: 0.982

Delta P:	0.151 "H₂O	Us avg:	23.05 ft/sec
Delta H:	1.240	ACFM:	50709 ft³/min
Tm avg:	544.5 °R	SDCFM:	43192 ft³/min
Ts avg:	559.0 °R	Vm std:	34.05 ft³
Bwo:	0.051	Vm corr:	36.81 ft³
Md:	28.85	Vm:	37.14 ft³
Ms:	28.30	MF:	0.9911
Pb:	28.45 "Hg	PCON:	7.57 mg/m³
Pm:	28.54 "Hg	ERAT:	0.56 kg/hr
Ps:	28.44 "Hg		

Pinnacle Pellet Lavington
Dryer 1 South Stack
Lavington, BC

12-Nov-15

Permit Number: 107369

AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	96 ° F	35 ° C
Moisture Content (by volume):	5.25 %	
Average Stack Gas Velocity:	24.2 ft/sec	7.4 m/sec
Total Actual Gas Flow Rate:	53309 ACFM	
Dry Gas flow Rate at Reference Conditions:	45633 SCFM	21.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	7.0 mg/m ³
Front Half Particulate	0.001 gr/ft ³	3.2 mg/m ³
Back Half Condensibles	0.002 gr/ft ³	3.8 mg/m ³
Mass Emission Rate	1.20 lbs/hr	0.54 kg/hr

SUMMARY OF AIR EMISSION TESTS

TEST 1:

Gas Temperature:	95 ° F	35 ° C
Moisture Content (by volume):	5.5 %	
Average Stack Gas Velocity:	24.3 ft/sec	7.4 m/sec
Total Actual Gas Flow Rate:	53457 ACFM	
Dry Gas flow Rate at Reference Conditions:	45626 SCFM	21.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.005 gr/ft ³	11.1 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.4 mg/m ³
Back Half Condensibles	.003 gr/ft ³	6.7 mg/m ³
Mass Emission Rate	1.90 lbs/hr	0.86 kg/hr

TEST 2:

Gas Temperature:	95 ° F	35 ° C
Moisture Content (by volume):	5.0 %	
Average Stack Gas Velocity:	24.2 ft/sec	7.4 m/sec
Total Actual Gas Flow Rate:	53337 ACFM	
Dry Gas flow Rate at Reference Conditions:	45798 SCFM	21.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.8 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	0.83 lbs/hr	0.37 kg/hr

TEST 3:

Gas Temperature:	96 ° F	35 ° C
Moisture Content (by volume):	5.2 %	
Average Stack Gas Velocity:	24.1 ft/sec	7.4 m/sec
Total Actual Gas Flow Rate:	53134 ACFM	
Dry Gas flow Rate at Reference Conditions:	45473 SCFM	21.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.1 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.2 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.9 mg/m ³
Mass Emission Rate	0.87 lbs/hr	0.39 kg/hr

DATA FOR TESTS 1 TO 3

Client: Pinnacle Pellet Lavington
Plant Location: Lavington, BC
Process: Dryer 1 South Stack
Permit Number: 107369
Job Number:
Pollution Control Permit: 15.0 mg/m3
Number of Tests: 3 tests
Minutes per Point: 2.5 minutes

	TEST 1	TEST 2	TEST 3
Filter Number:	U9	10	11
Date of Test:	12-Nov-15	12-Nov-15	12-Nov-15
Start Time:	10:50	12:45	2:17
Stop Time:	11:52	1:45	3:18
On-line Sampling Time:	60	60	60
Testing Personnel:	MM	MM	MM
Sampler Model:	1039	1039	1039
Barometric Pressure("Hg):	28.45	28.45	28.45
Static Pressure("H₂O):	-0.12	-0.12	-0.12
%CO₂:	0.0	0.0	0.1
%O₂:	21.0	21.0	20.9
%CO:	0.0	0.0	0.0
%N₂:	79.0	79.0	79.0
Diameter of Nozzle(inches):	0.300	0.300	0.300
Meter Factor:	0.9874	0.9874	0.9874
Type-S Pitot Tube Coefficient:	0.83829	0.83829	0.83829
Cross Sectional Area of Stack(ft²):	36.67	36.67	36.67
Impinger Condensate(g):	45	40	42
Weight of Moisture in Silica Gel(g):	1.0	1.0	1.0
Weight of Filter Particulate(g):	0.0005	0.0001	0.0002
Weight of Probe Washings(g):	0.0041	0.0029	0.0021
Weight of Impinger Content Organic(g):	0.0070	0.0020	0.0030
Total Weight of Particulate(g):	0.0116	0.0050	0.0053



**Pinnacle Pellet Lavington
Dryer 1 South Stack
Pinnacle Pellet Lavington**

Data for TEST 1

OVERALL ISOKINETICS - TEST 1: 1.006

Delta P:	0.166 "H₂O	Us avg:	24.30 ft/sec
Delta H:	1.109	ACFM:	53457 ft³/min
Tm avg:	550.7 °R	SDCFM:	45626 ft³/min
Ts avg:	555.4 °R	Vm std:	36.85 ft³
Bwo:	0.055	Vm corr:	40.31 ft³
Md:	28.84	Vm:	40.82 ft³
Ms:	28.24	MF:	0.9874
Pb:	28.45 "Hg	PCON:	11.12 mg/m³
Pm:	28.53 "Hg	ERAT:	0.86 kg/hr
Ps:	28.44 "Hg		

Data for TEST 2

OVERALL ISOKINETICS - TEST 2: 0.997

Delta P:	0.166 "H₂O	Us avg:	24.24 ft/sec
Delta H:	1.080	ACFM:	53337 ft³/min
Tm avg:	539.3 °R	SDCFM:	45798 ft³/min
Ts avg:	555.3 °R	Vm std:	36.66 ft³
Bwo:	0.050	Vm corr:	39.27 ft³
Md:	28.84	Vm:	39.77 ft³
Ms:	28.30	MF:	0.9874
Pb:	28.45 "Hg	PCON:	4.82 mg/m³
Pm:	28.53 "Hg	ERAT:	0.37 kg/hr
Ps:	28.44 "Hg		

Data for TEST 3

OVERALL ISOKINETICS - TEST 3: 1.008

Delta P:	0.164 "H₂O	Us avg:	24.15 ft/sec
Delta H:	1.088	ACFM:	53134 ft³/min
Tm avg:	550.0 °R	SDCFM:	45473 ft³/min
Ts avg:	555.9 °R	Vm std:	36.79 ft³
Bwo:	0.052	Vm corr:	40.19 ft³
Md:	28.85	Vm:	40.70 ft³
Ms:	28.29	MF:	0.9874
Pb:	28.45 "Hg	PCON:	5.09 mg/m³
Pm:	28.53 "Hg	ERAT:	0.39 kg/hr
Ps:	28.44 "Hg		

Pinnacle Pellet Lavington
Dryer 2 North Stack
Lavington, BC

12-Nov-15

Permit Number: 107369

AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	107 ° F	42 ° C
Moisture Content (by volume):	6.76 %	
Average Stack Gas Velocity:	23.9 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52662 ACFM	
Dry Gas flow Rate at Reference Conditions:	43456 SCFM	20.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	6.7 mg/m ³
Front Half Particulate	0.001 gr/ft ³	3.4 mg/m ³
Back Half Condensibles	0.001 gr/ft ³	3.2 mg/m ³
Mass Emission Rate	1.09 lbs/hr	0.49 kg/hr

SUMMARY OF AIR EMISSION TESTS

TEST 1:

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	6.9 %	
Average Stack Gas Velocity:	23.9 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52588 ACFM	
Dry Gas flow Rate at Reference Conditions:	43449 SCFM	20.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.8 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.9 mg/m ³
Mass Emission Rate	1.27 lbs/hr	0.57 kg/hr

TEST 2:

Gas Temperature:	107 ° F	42 ° C
Moisture Content (by volume):	6.6 %	
Average Stack Gas Velocity:	24.0 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52888 ACFM	
Dry Gas flow Rate at Reference Conditions:	43707 SCFM	20.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.3 mg/m ³
Front Half Particulate	.001 gr/ft ³	3.4 mg/m ³
Back Half Condensibles	.002 gr/ft ³	3.9 mg/m ³
Mass Emission Rate	1.19 lbs/hr	0.54 kg/hr

TEST 3:

Gas Temperature:	108 ° F	42 ° C
Moisture Content (by volume):	6.8 %	
Average Stack Gas Velocity:	23.9 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52510 ACFM	
Dry Gas flow Rate at Reference Conditions:	43212 SCFM	20.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.0 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.0 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.9 mg/m ³
Mass Emission Rate	0.81 lbs/hr	0.37 kg/hr

DATA FOR TESTS 1 TO 3

Client: Pinnacle Pellet Lavington
Plant Location: Lavington, BC
Process: Dryer 2 North Stack
Permit Number: 107369
Job Number:
Pollution Control Permit: 15.0 mg/m3
Number of Tests: 3 tests
Minutes per Point: 2.5 minutes

	TEST 1	TEST 2	TEST 3
Filter Number:	7	8	9
Date of Test:	12-Nov-15	12-Nov-15	12-Nov-15
Start Time:	3:25	4:50	6:17
Stop Time:	4:30	5:55	7:17
On-line Sampling Time:	60	60	60
Testing Personnel:	MM	MM	MM
Sampler Model:	1012	1012	1012
Barometric Pressure("Hg):	28.45	28.45	28.45
Static Pressure("H₂O):	-0.20	-0.20	-0.20
%CO₂:	0.0	0.0	0.1
%O₂:	21.0	21.0	20.9
%CO:	0.0	0.0	0.0
%N₂:	79.0	79.0	79.0
Diameter of Nozzle(inches):	0.305	0.305	0.305
Meter Factor:	0.9979	0.9979	0.9979
Type-S Pitot Tube Coefficient:	0.83300	0.83300	0.83300
Cross Sectional Area of Stack(ft²):	36.67	36.67	36.67
Impinger Condensate(g):	56	54	55
Weight of Moisture in Silica Gel(g):	1.0	1.0	1.0
Weight of Filter Particulate(g):	0.0003	0.0012	0.0002
Weight of Probe Washings(g):	0.0047	0.0023	0.0019
Weight of Impinger Content Organic(g):	0.0030	0.0040	0.0030
Total Weight of Particulate(g):	0.0080	0.0075	0.0051



**Pinnacle Pellet Lavington
Dryer 2 North Stack
Pinnacle Pellet Lavington**

Data for TEST 1

OVERALL ISOKINETICS - TEST 1: 1.008

Delta P:	0.159 "H₂O	Us avg:	23.90 ft/sec
Delta H:	0.998	ACFM:	52588 ft³/min
Tm avg:	534.7 °R	SDCFM:	43449 ft³/min
Ts avg:	565.6 °R	Vm std:	36.33 ft³
Bwo:	0.069	Vm corr:	38.59 ft³
Md:	28.84	Vm:	38.67 ft³
Ms:	28.09	MF:	0.9979
Pb:	28.45 "Hg	PCON:	7.78 mg/m³
Pm:	28.52 "Hg	ERAT:	0.57 kg/hr
Ps:	28.44 "Hg		

Data for TEST 2

OVERALL ISOKINETICS - TEST 2: 1.007

Delta P:	0.161 "H₂O	Us avg:	24.04 ft/sec
Delta H:	1.025	ACFM:	52888 ft³/min
Tm avg:	549.2 °R	SDCFM:	43707 ft³/min
Ts avg:	567.0 °R	Vm std:	36.50 ft³
Bwo:	0.066	Vm corr:	39.83 ft³
Md:	28.84	Vm:	39.91 ft³
Ms:	28.12	MF:	0.9979
Pb:	28.45 "Hg	PCON:	7.26 mg/m³
Pm:	28.53 "Hg	ERAT:	0.54 kg/hr
Ps:	28.44 "Hg		

Data for TEST 3

OVERALL ISOKINETICS - TEST 3: 1.009

Delta P:	0.158 "H₂O	Us avg:	23.87 ft/sec
Delta H:	1.006	ACFM:	52510 ft³/min
Tm avg:	554.4 °R	SDCFM:	43212 ft³/min
Ts avg:	568.4 °R	Vm std:	36.18 ft³
Bwo:	0.068	Vm corr:	39.86 ft³
Md:	28.85	Vm:	39.94 ft³
Ms:	28.12	MF:	0.9979
Pb:	28.45 "Hg	PCON:	4.98 mg/m³
Pm:	28.52 "Hg	ERAT:	0.37 kg/hr
Ps:	28.44 "Hg		

Pinnacle Pellet Lavington
Dryer 2 South Stack
Lavington, BC

12-Nov-15

Permit Number: 107369

AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	6.17 %	
Average Stack Gas Velocity:	23.8 ft/sec	7.2 m/sec
Total Actual Gas Flow Rate:	52304 ACFM	
Dry Gas flow Rate at Reference Conditions:	43506 SCFM	20.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft ³	7.8 mg/m ³
Front Half Particulate	0.001 gr/ft ³	2.0 mg/m ³
Back Half Condensibles	0.003 gr/ft ³	5.7 mg/m ³
Mass Emission Rate	1.27 lbs/hr	0.57 kg/hr

SUMMARY OF AIR EMISSION TESTS

TEST 1:

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	6.5 %	
Average Stack Gas Velocity:	23.6 ft/sec	7.2 m/sec
Total Actual Gas Flow Rate:	51944 ACFM	
Dry Gas flow Rate at Reference Conditions:	43115 SCFM	20.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.8 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.7 mg/m ³
Back Half Condensibles	.002 gr/ft ³	4.1 mg/m ³
Mass Emission Rate	1.10 lbs/hr	0.50 kg/hr

TEST 2:

Gas Temperature:	105 ° F	41 ° C
Moisture Content (by volume):	5.8 %	
Average Stack Gas Velocity:	23.7 ft/sec	7.2 m/sec
Total Actual Gas Flow Rate:	52248 ACFM	
Dry Gas flow Rate at Reference Conditions:	43706 SCFM	20.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.2 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.1 mg/m ³
Back Half Condensibles	.003 gr/ft ³	6.1 mg/m ³
Mass Emission Rate	1.34 lbs/hr	0.61 kg/hr

TEST 3:

Gas Temperature:	108 ° F	42 ° C
Moisture Content (by volume):	6.2 %	
Average Stack Gas Velocity:	24.0 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	52718 ACFM	
Dry Gas flow Rate at Reference Conditions:	43697 SCFM	20.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.3 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.2 mg/m ³
Back Half Condensibles	.003 gr/ft ³	7.1 mg/m ³
Mass Emission Rate	1.37 lbs/hr	0.62 kg/hr

DATA FOR TESTS 1 TO 3

Client: Pinnacle Pellet Lavington
Plant Location: Lavington, BC
Process: Dryer 2 South Stack
Permit Number: 107369
Job Number:
Pollution Control Permit: 15.0 mg/m3
Number of Tests: 3 tests
Minutes per Point: 2.5 minutes

	TEST 1	TEST 2	TEST 3
Filter Number:	8	11	12
Date of Test:	12-Nov-15	12-Nov-15	12-Nov-15
Start Time:	3:30	4:50	6:12
Stop Time:	4:30	5:56	7:18
On-line Sampling Time:	60	60	60
Testing Personnel:	DL	DL	DL
Sampler Model:	1013	1013	1013
Barometric Pressure("Hg):	28.45	28.45	28.45
Static Pressure("H₂O):	-0.15	-0.15	-0.15
%CO₂:	0.0	0.0	0.1
%O₂:	21.0	21.0	20.9
%CO:	0.0	0.0	0.0
%N₂:	79.0	79.0	79.0
Diameter of Nozzle(inches):	0.300	0.300	0.300
Meter Factor:	0.9915	0.9915	0.9915
Type-S Pitot Tube Coefficient:	0.83300	0.83300	0.83300
Cross Sectional Area of Stack(ft²):	36.67	36.67	36.67
Impinger Condensate(g):	50	45	48
Weight of Moisture in Silica Gel(g):	1.0	1.0	1.0
Weight of Filter Particulate(g):	0.0012	0.0001	0.0001
Weight of Probe Washings(g):	0.0015	0.0020	0.0011
Weight of Impinger Content Organic(g):	0.0040	0.0060	0.0070
Total Weight of Particulate(g):	0.0067	0.0081	0.0082



Pinnacle Pellet Lavington
Dryer 2 South Stack
Pinnacle Pellet Lavington

Data for *TEST 1*

OVERALL ISOKINETICS - TEST 1: 1.006

Delta P:	0.156 "H ₂ O	Us avg:	23.61 ft/sec
Delta H:	1.285	ACFM:	51944 ft ³ /min
Tm avg:	536.0 °R	SDCFM:	43115 ft ³ /min
Ts avg:	565.6 °R	Vm std:	34.79 ft ³
Bwo:	0.065	Vm corr:	37.02 ft ³
Md:	28.84	Vm:	37.34 ft ³
Ms:	28.14	MF:	0.9915
Pb:	28.45 "Hg	PCON:	6.80 mg/m ³
Pm:	28.54 "Hg	ERAT:	0.50 kg/hr
Ps:	28.44 "Hg		

Data for *TEST 2*

OVERALL ISOKINETICS - TEST 2: 0.997

Delta P:	0.158 "H ₂ O	Us avg:	23.75 ft/sec
Delta H:	1.353	ACFM:	52248 ft ³ /min
Tm avg:	557.9 °R	SDCFM:	43706 ft ³ /min
Ts avg:	565.0 °R	Vm std:	35.00 ft ³
Bwo:	0.058	Vm corr:	38.76 ft ³
Md:	28.84	Vm:	39.09 ft ³
Ms:	28.21	MF:	0.9915
Pb:	28.45 "Hg	PCON:	8.17 mg/m ³
Pm:	28.55 "Hg	ERAT:	0.61 kg/hr
Ps:	28.44 "Hg		

Data for *TEST 3*

OVERALL ISOKINETICS - TEST 3: 0.991

Delta P:	0.160 "H ₂ O	Us avg:	23.96 ft/sec
Delta H:	1.389	ACFM:	52718 ft ³ /min
Tm avg:	564.0 °R	SDCFM:	43697 ft ³ /min
Ts avg:	567.8 °R	Vm std:	34.71 ft ³
Bwo:	0.062	Vm corr:	38.86 ft ³
Md:	28.85	Vm:	39.19 ft ³
Ms:	28.18	MF:	0.9915
Pb:	28.45 "Hg	PCON:	8.34 mg/m ³
Pm:	28.55 "Hg	ERAT:	0.62 kg/hr
Ps:	28.44 "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 was 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.

O₂, CO₂, CO (where applicable)

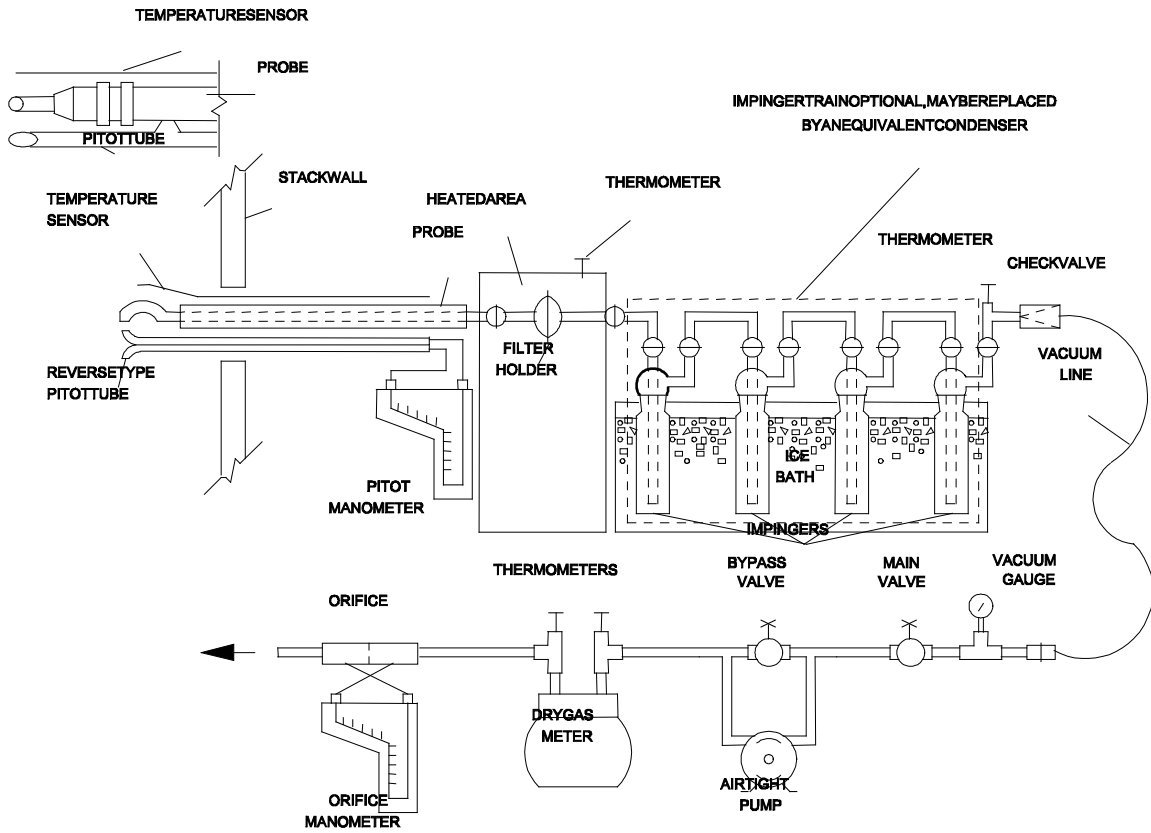
O₂, CO₂, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

NO_x (where applicable)

NO_x was found using and API Model 252 NO_x 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 ($i = 1, 2, 3...n$), 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, $18.0 g/g\text{-mole}$ ($18.0 lb/lb\text{-mole}$).
 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, $0.06236 \frac{[(mmHg)(m^3)]}{[(^{\circ}K)(g\text{-mole})]}$
 $\{21.85 \frac{[(in. Hg)(ft^3)]}{[(^{\circ}R)(lb\text{-mole})]}\}$.
 T_m = Absolute average DGM temperature (see Figure 5-2), $^{\circ}K$ ($^{\circ}R$).
 T_s = Absolute average stack gas temperature (see Figure 5-2), $^{\circ}K$ ($^{\circ}R$).
 T_{std} = Standard absolute temperature, $293^{\circ}K$ ($528^{\circ}R$).
 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), $mm H_2O$ ($in. H_2O$).
 ρ_a = Density of acetone, mg/ml (see label on bottle).
 ρ_w = Density of water, $0.9982 g/ml$ ($0.002201 lb/ml$).
 θ = Total sampling time, min .
 θ_1 = 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 .
 13.6 = Specific gravity of mercury.
 60 = Sec/min .
 100 = 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 5-1.

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

$$= K_1 V_m Y \frac{P_{\text{bar}} + \left(\frac{\Delta H}{13.6} \right)}{T_m}$$
Eq. 5-1

where:

$$K_1 = 0.3858 \text{ } ^\circ\text{K/mm Hg for metric units,}$$

$$= 17.64 \text{ } ^\circ\text{R/in. Hg for English units.}$$

NOTE: Equation 5-1 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 5-1 must be modified as follows:

(a) Case I. No component changes made during sampling run. In this case, replace V_m in Equation 5-1 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 5-1 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.

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

where:

$$K_2 = 0.001333 \text{ m}^3/\text{ml for metric units,}$$

$$= 0.04707 \text{ ft}^3/\text{ml for English units.}$$

Moisture Content.

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

Acetone Blank Concentration.

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

Acetone Wash Blank.

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

Total Particulate Weight. Determine the total particulate matter catch from the sum of the weights obtained from Containers 1 and 2 less the acetone blank (see Figure 5-3).

Particulate Concentration.

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

Conversion Factors:

<u>From</u>	<u>To</u>	<u>Multiply by</u>
scf	m ³	0.02832
g/ft ³	gr/ft ³	15.43
g/ft ³	lb/ft ³	2.205 x 10 ⁻³
g/ft ³	g/m ³	35.31

Isokinetic Variation.**Calculation from Raw Data.**

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

where:

$K_3 = 0.003454 [(\text{mm Hg})(\text{m}^3)]/[(\text{ml})(^\circ\text{K})]$ for metric units,

= $0.002669 [(\text{in. Hg})(\text{ft}^3)]/[(\text{ml})(^\circ\text{R})]$ for English units.

Calculation from Intermediate Values.

$$I = \frac{100 T_s V_{m(\text{std})} P_{\text{std}}}{60 T_{\text{std}} v_s \theta A_n P_s (1 - B_{\text{ws}})}$$

$$= \frac{K_4 T_s V_{m(\text{std})}}{P_s v_s A_n \theta (1 - B_{\text{ws}})}$$
Eq.5-8

where:

$K_4 = 4.320$ for metric units,

$= 0.09450$ for English units.

Acceptable Results. If 90 percent $\leq I \leq 110$ 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.

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

Average Stack Gas Dry Volumetric Flow Rate.

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

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).

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

- 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),

$$= P_{\text{bar}} + P_g$$

- 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, $^{\circ}\text{C}$ ($^{\circ}\text{F}$).
- T_s = Absolute stack temperature, $^{\circ}\text{K}$ ($^{\circ}\text{R}$).

Calibration Certificate for S-Type Pitot Tube

Date: Jan 7/15 *Barometric Pressure ("Hg):* 29.9
Pitot I.D.: **107** *Wind Tunnel Temperature (° F):* 66.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
11.72	0.03161	0.04242	0.85459
26.28	0.15880	0.22190	0.83748
42.45	0.41433	0.57741	0.83863
58.04	0.77446	1.06033	0.84609
82.87	1.57900	2.18794	0.84102
98.54	2.23250	3.15269	0.83309

Average= 0.84182

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

Date: Jan 7/15 *Barometric Pressure ("Hg):* 30.05
Pitot I.D.: **126** *Wind Tunnel Temperature (° F):* 70.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
18.00	0.07434	0.09688	0.86723
20.50	0.09642	0.13255	0.84437
37.39	0.32060	0.45527	0.83077
57.44	0.75665	1.05584	0.83807
84.53	1.63871	2.26076	0.84287
103.68	2.46546	3.36693	0.84716

Average= 0.84508

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

Date: Jan 9/15 *Barometric Pressure ("Hg):* 30.01
Pitot I.D.: **128** *Wind Tunnel Temperature (° F):* 70.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂ O)</i>	<i>S-Type Pitot ("H₂ O)</i>	<i>Pitot Factor</i>
11.36	0.02955	0.04275	0.82305
26.90	0.16569	0.24741	0.81017
40.09	0.36809	0.52994	0.82508
60.68	0.84333	1.18797	0.83412
80.87	1.49781	2.10805	0.83449
100.21	2.29978	3.31383	0.82473

Average= 0.82527

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

Date: Jan 7/15 *Barometric Pressure ("Hg):* 30.05
Pitot I.D.: **140** *Wind Tunnel Temperature (^o F):* 70.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
13.96	0.04470	0.05733	0.87412
19.79	0.08982	0.12082	0.85361
42.36	0.41144	0.58576	0.82971
59.59	0.81441	1.17118	0.82555
80.40	1.48260	2.12088	0.82773
101.66	2.37016	3.46311	0.81901

Average= 0.83829

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

<i>Date:</i>	Jan 7/15	<i>Barometric Pressure ("Hg):</i>	29.74
<i>Pitot I.D.:</i>	148	<i>Wind Tunnel Temperature (° F):</i>	70.0
<i>Nozzle:</i>	0.250		

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
13.70	0.04262	0.06065	0.82988
19.15	0.08321	0.11798	0.83141
41.62	0.39311	0.56173	0.82819
63.14	0.90476	1.26630	0.83683
81.31	1.50057	2.07940	0.84100
99.41	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.

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

Date: Jan 7/15 *Barometric Pressure ("Hg):* 29.78
Pitot I.D.: **152** *Wind Tunnel Temperature (^o F):* 64.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
13.28	0.04053	0.05797	0.82785
24.59	0.13902	0.20424	0.81678
57.01	0.74719	1.03491	0.84120
80.85	1.50254	2.11524	0.83439
100.28	2.31163	3.24400	0.83571
130.09	3.89031	5.48834	0.83350

Average= 0.83157

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

Date: Jan 8/15 *Barometric Pressure ("Hg):* 29.78
Pitot I.D.: **200** *Wind Tunnel Temperature (^o F):* 70.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
17.53	0.06982	0.10114	0.82249
41.78	0.39667	0.56684	0.82817
50.67	0.58346	0.81271	0.83883
60.32	0.82699	1.14880	0.83997
86.08	1.68407	2.38761	0.83144
101.99	2.36401	3.27573	0.84102

Average= 0.83365

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

<i>Date:</i>	Jan 8/15	<i>Barometric Pressure ("Hg):</i>	29.78
<i>Pitot I.D.:</i>	271	<i>Wind Tunnel Temperature (^o F):</i>	70.0
<i>Nozzle:</i>	0.250		

<i>Wind Velocity (ft/sec)</i>	<i>Ref. Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
12.09	0.03322	0.04750	0.82791
19.82	0.08927	0.12920	0.82292
40.74	0.37718	0.53379	0.83219
63.09	0.90465	1.24591	0.84359
81.80	1.52066	2.09085	0.84428
102.88	2.40539	3.30056	0.84515

Average= 0.83601

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

Calibrating Technician Signature:

Calibration Certificate for S-Type Pitot Tube

Date: Jan 7/15 *Barometric Pressure ("Hg):* 29.9
Pitot I.D.: **151** *Wind Tunnel Temperature (° F):* 66.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
12.79	0.03761	0.05454	0.82212
24.92	0.14279	0.21005	0.81625
67.01	1.03247	1.39509	0.85168
84.54	1.64317	2.24046	0.84783
111.45	2.85599	3.84337	0.85341
129.35	3.84685	5.20987	0.85070

Average= 0.84033

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

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: July 14/15

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1038

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)	0.0699	0.1361	0.1876
Pb= Atmospheric Pressure ("Hg)	29.90	29.90	29.90
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.)	85.0	81.0	86.0
To= Dry Test Meter Outlet Temp. (oF.)	84.0	78.0	85.0
Ri= Initial Dry Test volume (ft3)	88.45	82.47	94.00
Rf= Final Dry Test Volume (ft3)	93.44	87.42	98.93
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	29.8301	29.7639	29.7124
Pd= Pb + (^H/13.59) "Hg	29.9736	30.0472	30.1208
Tw= Ta +460 (oR.)	530.0	530.0	530.0
Td= [(Ti + To)/2] + 460 (oR.)	544.5	539.5	545.5
Bw= Pv/Pb ("Hg)	0.0247	0.0247	0.0247
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	0.9914	0.9856	0.9964
Y (MEAN)(WTMF) =	0.9911		

MCCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: July 14/15

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-980

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)	0.0920	0.1619	0.2244
Pb= Atmospheric Pressure ("Hg)	29.90	29.90	29.90
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.)	88.0	86.0	89.0
To= Dry Test Meter Outlet Temp. (oF.)	87.0	86.0	88.0
Ri= Initial Dry Test volume (ft3)	27.05	21.35	32.33
Rf= Final Dry Test Volume (ft3)	32.05	26.29	37.30
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	29.8080	29.7381	29.6756
Pd= Pb + (^H/13.59) "Hg	29.9736	30.0472	30.1208
Tw= Ta +460 (oR.)	530.0	530.0	530.0
Td= [(Ti + To)/2] + 460 (oR.)	547.5	546.0	548.5
Bw= Pv/Pb ("Hg)	0.0247	0.0247	0.0247
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	0.9941	0.9986	0.9926
Y (MEAN)(WTMF) =	0.9951		

N.R. MCCALL & ASSOCIATES LTD.

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 14-Jul-15
 CONSOLE MANUF.: NAPP MODEL 31
 CONSOLE I.D.: C-1021

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)	0.0725	0.1156	0.2675
Pb= Atmospheric Pressure ("Hg)	29.90	29.90	29.90
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.)	72.0	73.0	74.0
To= Dry Test Meter Outlet Temp. (oF.)	72.0	73.5	76.9
Ri= Initial Dry Test volume (ft3)	28.24	36.78	47.79
Rf= Final Dry Test Volume (ft3)	32.95	41.67	52.81
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	29.8275	29.7844	29.6325
Pd= Pb + (^H/13.59) "Hg	29.9736	30.0472	30.1208
Tw= Ta +460 (oR.)	530.0	530.0	530.0
Td= [(Ti + To)/2] + 460 (oR.)	532.0	533.3	535.5
Bw= Pv/Pb ("Hg)	0.0247	0.0247	0.0247
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	1.0261	0.9868	0.9579
Y (MEAN)(WTMF) =	0.9903		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: July 14/15

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1039

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)	0.0957	0.1656	0.2465
Pb= Atmospheric Pressure ("Hg)	29.90	29.90	29.90
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.)	82.0	78.0	80.0
To= Dry Test Meter Outlet Temp. (oF.)	78.0	75.0	76.0
Ri= Initial Dry Test volume (ft3)	26.80	21.55	32.08
Rf= Final Dry Test Volume (ft3)	31.77	26.45	36.98
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	29.8043	29.7344	29.6535
Pd= Pb + (^H/13.59) "Hg	29.9736	30.0472	30.1208
Tw= Ta +460 (oR.)	530.0	530.0	530.0
Td= [(Ti + To)/2] + 460 (oR.)	540.0	536.5	538.0
Bw= Pv/Pb ("Hg)	0.0247	0.0247	0.0247
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	0.9863	0.9891	0.9868
Y (MEAN)(WTMF) =	0.9874		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: Jan 8/15

CONSOLE MANUF.: Apex Instruments

CONSOLE I.D.:

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	59.0	59.0	59.0
P=Pres. Differential at WTM ("Hg)	0.0736	0.1325	0.1913
Pb= Atmospheric Pressure ("Hg)	29.80	29.80	29.80
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.50320	0.50320	0.50320
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	60.0	59.0	61.0
To= Dry Test Meter Outlet Temp. (oF.)	60.0	59.0	61.0
Ri= Initial Dry Test volume (ft3)	65.11	58.14	70.40
Rf= Final Dry Test Volume (ft3)	69.89	63.13	75.62
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	29.7264	29.6675	29.6087
Pd= Pb + (^H/13.59) "Hg	29.8736	29.9472	30.0208
Tw= Ta +460 (oR.)	519.0	519.0	519.0
Td= [(Ti + To)/2] + 460 (oR.)	520.0	519.0	521.0
Bw= Pv/Pb ("Hg)	0.0169	0.0169	0.0169
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	1.0173	0.9683	0.9251
Y (MEAN)(WTMF) =	0.9702		

MCCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 14/15

CONSOLE I.D. C-1038

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9914	0.9914	0.9856
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	1.4	3.4	6.2
Rf=final gas meter vol.	3.26	6.05	9.44
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.3688008	0.525442	0.6386688
Tm=meter out temp. (oF)	85	86	86
Tm=meter out temp. (oR.)	545	546	546
$P_m=P_b + \Delta H$	29.936792	29.973584	30.010375
$SQRT(T_m/P_m \cdot H/M_d)$	0.5605687	0.7930037	0.9706317
Ko=orifice const.	0.6579047	0.6625971	0.6579929

Ko MEAN = 0.6594983

$Ko^4 \cdot 144 = 379.87099$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 14/15

CONSOLE I.D. C-1038

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9856	0.9964	0.9964
Delta H=	2	2.5	3
Ri=int. gas meter vol.	9.6	13.4	17.7
Rf=final gas meter vol.	13.24	17.55	22.22
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.7175168	0.827012	0.9007456
Tm=meter out temp. (oF)	87	87	88
Tm=meter out temp. (oR.)	547	547	548
$P_m=P_b + \Delta H$	30.047167	30.083959	30.120751
$SQRT(T_m/P_m \cdot H/M_d)$	1.1211278	1.2526923	1.3726703
Ko=orifice const.	0.6399955	0.6601877	0.6561995

Ko MEAN = 0.6521276

$Ko^4 \cdot 144 = 375.62547$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 14/15

CONSOLE I.D. C-1039

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9863	0.9863	0.9892
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	37.4	40.2	43.5
Rf=final gas meter vol.	39.66	43.31	47.29
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.4458076	0.6134786	0.7498136
Tm=meter out temp. (oF)	82	83	84
Tm=meter out temp. (oR.)	542	543	544
$P_m=P_b + \Delta H$	29.936792	29.973584	30.010375
$SQRT(T_m/P_m \cdot H/M_d)$	0.5590237	0.7908221	0.9688524
Ko=orifice const.	0.7974752	0.7757479	0.7739194

Ko MEAN = 0.7823808

$K_o^4 \cdot 144 = 450.65136$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 14/15

CONSOLE I.D. C-1039

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9892	0.9868	0.9868
Delta H=	2	2.5	3
Ri=int. gas meter vol.	47.4	51.9	56.9
Rf=final gas meter vol.	51.73	56.77	62.28
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.8566472	0.9611432	1.0617968
Tm=meter out temp. (oF)	85	86	87
Tm=meter out temp. (oR.)	545	546	547
$P_m=P_b + \Delta H$	30.047167	30.083959	30.120751
$SQRT(T_m/P_m \cdot H/M_d)$	1.1190764	1.2515467	1.3714173
Ko=orifice const.	0.7654949	0.7679643	0.7742332

Ko MEAN = 0.7692308

$Ko^4 \cdot 144 = 443.07692$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 15-Jul-15

CONSOLE I.D. C-1021

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9903	0.9903	0.9903
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	74.6	77.62	80.5
Rf=final gas meter vol.	76.45	80.31	83.63
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.366411	0.5327814	0.6199278
To=meter outlet Temp (oF)	55	56	58
Tm=meter out temp. (oR)	515	516	518
Pm=Pb + ^H	29.936792	29.973584	30.010375
SQRT(Tm/Pm*H/Md)	0.5449219	0.7709101	0.9454162
Ko=orifice const.	0.6724102	0.691107	0.6557195

Ko MEAN = 0.6730789

Ko*4*144= 387.69344

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature: _____

ORIFICE METER CALIBRATION

DATE: 15-Jul-15

CONSOLE I.D. C-1021

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9903	0.9903	0.9903
Delta H=	2	2.5	3
Ri=int. gas meter vol.	84.7	94.8	1.36
Rf=final gas meter vol.	88.43	98.9	5.84
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \Delta T (FT^3 / MIN)$	0.7387638	0.812046	0.8873088
To=meter outlet Temp (oF)	59	62	63
Tm=meter out temp. (oR)	519	522	523
$P_m = P_b + \Delta H$	30.047167	30.083959	30.120751
$SQRT(T_m / P_m * H / M_d)$	1.0920566	1.2237311	1.3409939
Ko=orifice const.	0.6764886	0.663582	0.6616799

Ko MEAN = 0.6672502

$K_o^4 * 144 = 384.33611$

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 14/15

CONSOLE I.D. C-980

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9941	0.9941	0.9986
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	37.7	40.2	43.4
Rf=final gas meter vol.	39.87	43.26	47.14
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.4314394	0.6083892	0.7469528
To=meter outlet Temp (oF)	87	89	89
Tm=meter out temp. (oR)	547	549	549
Pm=Pb + ^H	29.936792	29.9735835	30.0103753
SQRT(Tm/Pm*H/Md)	0.5615964	0.79517932	0.97329463
Ko=orifice const.	0.7682375	0.76509686	0.76744777

Ko MEAN = 0.7669274

Ko*4*144= 441.75018

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 14/15

CONSOLE I.D. C-980

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	29.9	29.9	29.9
Y=gas meter factor	0.9986	0.9926	0.9926
Delta H=	2	2.5	3
Ri=int. gas meter vol.	47.4	51.8	56.7
Rf=final gas meter vol.	51.61	56.45	61.79
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.8408212	0.923118	1.0104668
Tm=meter out temp. (oF)	90	91	91
Tm=meter out temp. (oR.)	550	551	551
$P_m=P_b + \Delta H$	30.047167	30.083959	30.120751
$SQRT(T_m/P_m \cdot H/M_d)$	1.124198	1.2572642	1.3764225
Ko=orifice const.	0.7479298	0.7342275	0.7341254

Ko MEAN = 0.7387609

$K_o^4 \cdot 144 = 425.52629$

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

LPLP Production			Sept make up	#REF!		
			Nov Bud	10,864		
Date	Total MT	MT/hr	mt/hr/ pell	Sub Total	Running Ave	
10/31/2015	613	25.5	3.6	613	613	
11/1/2015	601	25.1	3.6	1214	607	
11/2/2015	461	19.2	2.7	1675	558	
11/3/2015	555	23.1	3.3	2230	558	
11/4/2015	648	27.0	3.9	2878	576	
11/5/2015	676	28.2	4.0	3554	592	
11/6/2015	694	28.9	4.1	4248	607	4248
11/7/2015	760	31.7	4.5	5008	626	
11/8/2015	699	29.1	4.2	5707	634	
11/9/2015	592	24.7	3.5	6299	630	
11/10/2015	632	26.3	3.8	6931	630	
11/11/2015	663	27.6	3.9	7594	633	
11/12/2015	679	28.3	4.0	8273	636	
11/13/2015	621	25.9	3.7	8894	635	4646
11/14/2015	348	14.5	2.1	9242	616	
11/15/2015	700	29.2	4.2	9942	621	
11/16/2015	550	22.9	3.3	10492	617	
11/17/2015	429	17.9	2.6	10921	607	
11/18/2015	587	24.5	3.5	11508	606	
11/19/2015	434	18.1	2.6	11942	597	
11/20/2015	702	29.3	4.2	12644	602	3750
11/21/2015	642	26.8	3.8	13286	604	
11/22/2015	533	22.2	3.2	13819	601	
11/23/2015	543	22.6	3.2	14362	598	
11/24/2015	614	25.6	3.7	14976	599	
11/25/2015	713	29.7	4.2	15689	603	
11/26/2015	630	26.3	3.8	16319	604	
11/27/2015		0.0		16319		3675

Report Transmission Cover Page

Bill To: McCall Environmental	Project:	Lot ID: 1106304
Report To: McCall Environmental	ID: Lavington Pellet	Control Number: C0027395
5100 Nightingale Road	Name:	Date Received: Nov 13, 2015
Prince George, BC, Canada	Location:	Date Reported: Nov 16, 2015
V2K 5V9	LSD:	Report Number: 2061180
Attn: Matt McCall	P.O.:	
Sampled By:	Acct code:	
Company:		

Contact & Affiliation	Address	Delivery Commitments
Matt McCall	5100 Nightingale Road	On [Lot Verification] send
McCall Environmental	Prince George, British Columbia V2K 5V9	(COA) by Email - Multiple Reports By Agreement
	Phone: (250) 962-6921	On [Report Approval] send
	Fax: (250) 962-6931	(COC, Test Report) by Email - Merge Reports
	Email: mmccall@telus.net	

Notes To Clients:

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Analytical Report

Bill To: McCall Environmental
 Report To: McCall Environmental
 5100 Nightingale Road
 Prince George, BC, Canada
 V2K 5V9
 Attn: Matt McCall
 Sampled By:
 Company:

Project:
 ID: Lavington Pellet
 Name:
 Location:
 LSD:
 P.O.:
 Acct code:

Lot ID: **1106304**
 Control Number: C0027395
 Date Received: Nov 13, 2015
 Date Reported: Nov 16, 2015
 Report Number: 2061180

	Reference Number	1106304-1	1106304-2	1106304-3		
	Sample Date	Nov 11, 2015	Nov 11, 2015	Nov 11, 2015		
	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	3	5	3	1
Volume	Sample volume	mL	320	320	330	
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes	

Analytical Report

Bill To: McCall Environmental
 Report To: McCall Environmental
 5100 Nightingale Road
 Prince George, BC, Canada
 V2K 5V9
 Attn: Matt McCall
 Sampled By:
 Company:

Project:
 ID: Lavington Pellet
 Name:
 Location:
 LSD:
 P.O.:
 Acct code:

Lot ID: **1106304**
 Control Number: C0027395
 Date Received: Nov 13, 2015
 Date Reported: Nov 16, 2015
 Report Number: 2061180

	Reference Number	1106304-7	1106304-8	1106304-9	
	Sample Date	Nov 11, 2015	Nov 11, 2015	Nov 11, 2015	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Filter U12 / Dryer 1A	Filter U13 / Dryer 1A	Filter U14 / Dryer 1A	
		/ Test 1	/ Test 2	/ Test 3	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	4	2	5
Volume	Sample volume	mL	320	310	320
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental
 Report To: McCall Environmental
 5100 Nightingale Road
 Prince George, BC, Canada
 V2K 5V9
 Attn: Matt McCall
 Sampled By:
 Company:

Project:
 ID: Lavington Pellet
 Name:
 Location:
 LSD:
 P.O.:
 Acct code:

Lot ID: **1106304**
 Control Number: C0027395
 Date Received: Nov 13, 2015
 Date Reported: Nov 16, 2015
 Report Number: 2061180

	Reference Number	1106304-10	1106304-11	1106304-12	
	Sample Date	Nov 11, 2015	Nov 11, 2015	Nov 11, 2015	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Filter U9 / Dryer 1B /	Filter U10 / Dryer 1B	Filter U11 / Dryer 1B	
		Test 1	/ Test 2	/ Test 3	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	7	2	3
Volume	Sample volume	mL	350	350	350
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental	Project:	Lot ID: 1106304
Report To: McCall Environmental	ID: Lavington Pellet	Control Number: C0027395
5100 Nightingale Road	Name:	Date Received: Nov 13, 2015
Prince George, BC, Canada	Location:	Date Reported: Nov 16, 2015
V2K 5V9	LSD:	Report Number: 2061180
Attn: Matt McCall	P.O.:	
Sampled By:	Acct code:	
Company:		

	Reference Number	1106304-13	1106304-14	1106304-15	
	Sample Date	Nov 11, 2015	Nov 11, 2015	Nov 11, 2015	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Dryer 2A / Test 1	Dryer 2A / Test 2	Dryer 2A / Test 3	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	3	4	3
Volume	Sample volume	mL	320	350	330
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental
 Report To: McCall Environmental
 5100 Nightingale Road
 Prince George, BC, Canada
 V2K 5V9
 Attn: Matt McCall
 Sampled By:
 Company:

Project:
 ID: Lavington Pellet
 Name:
 Location:
 LSD:
 P.O.:
 Acct code:

Lot ID: **1106304**
 Control Number: C0027395
 Date Received: Nov 13, 2015
 Date Reported: Nov 16, 2015
 Report Number: 2061180

		Reference Number	1106304-16	1106304-17	1106304-18	
		Sample Date	Nov 11, 2015	Nov 11, 2015	Nov 11, 2015	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Dryer 2B / Test 1	Dryer 2B / Test 2	Dryer 2B / Test 3	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents						
Oil and Grease	Total	mg/sample	4	6	7	1
Volume	Sample volume	mL	350	690	350	
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes	

Approved by: 
 Mathieu Simoneau
 Operations Manager

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.

Methodology and Notes

Bill To: McCall Environmental	Project:	Lot ID: 1106304
Report To: McCall Environmental	ID: Lavington Pellet	Control Number: C0027395
5100 Nightingale Road	Name:	Date Received: Nov 13, 2015
Prince George, BC, Canada	Location:	Date Reported: Nov 16, 2015
V2K 5V9	LSD:	Report Number: 2061180
Attn: Matt McCall	P.O.:	
Sampled By:	Acct code:	
Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Oil and Grease in water (Surrey)	BCELM	* Oil & Grease in Water - Direct Hexane Extraction, Oil & Grease	16-Nov-15	Exova Surrey

** Reference Method Modified*

References

BCELM B.C. Environmental Laboratory Manual

Comments:

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Project Information

Project ID: LAVINGTON PELLET
Project Name:
Project Location:
Legal Location:
PO/AFE#:
Proj. Acct. Code:
Quote #

Invoice to:

Company: MCCAIG ENV.
Address:
Attention: MATT MCCAIG
Phone:
Cell:
Fax:
E-mail:
Agreement ID:
Copy of report:

Report To:

Company: SAMS
Address:
Attention:
Phone:
Cell:
Fax:
E-mail 1:
E-mail 2:
Copy of invoice:

Report Results

E-Mail
Mail
Online
Fax
PDF
Excel
QA/QC

Regulatory Requirement

HCDWQG
Ab Tier 1
SPIGEC
BCCSR
Other (list below)

RUSH Priority

Emergency (contact lab for turnaround and pricing)
Priority 1-2 working days (100% surcharge)
Urgent 2-3 working days (50% surcharge)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Date Required: ASAP Signature: [Signature]

Special Instructions/Comments (please include contact information including ph. # if different from above).

Number of Containers

Sample Custody (please print)

Sampled by:
Company:
This section for Lab use only
Date/Time stamp: 11-13-15 10:48 RCVD

Table with 6 columns: Site I.D., Sample Description, Depth start end in cm m, Date/Time Sampled, Matrix, Sampling Method. Rows 1-15 contain handwritten sample data.

RED HOT RUSH
S-197, ULINE, 1-800-295-5510

Submission of this form acknowledges acceptance of Exova's Standard Terms and Conditions (http://www.exova.com/about/terms-and-conditions/)

Please indicate any potentially hazardous samples

Page of Control # C 0027395

Lot: 1106304 COC



Shipping: COD Y/ N
and size of coolers
Temp. received: 17.1°C
Delivery Method: #
Waybill:
Received by: LC