



September 14, 2016

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

**Attention:** Andrew Meyer, Paul Pawlowski  
**Re:** Air Emission Testing of August 30-31, 2016  
Permit 107369, ME1617-105

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

Testing Parameters

- 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
- CF-12
  - o 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

### Dryer 1 North Stack: August 31, 2016 Summary of Test Results 1-3

Gas Temperature:	111 °F	44 °C
Moisture Content (by volume):	6.27 %	
Average Stack Gas Velocity:	32.0 ft/sec	9.8 m/sec
Total Actual Gas Flow Rate:	70515 ACFM	
Dry Gas flow Rate at Reference Conditions:	57462 SCFM	27.1 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.002 gr/ft <sup>3</sup>	4.6 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	1.6 mg/m <sup>3</sup>
Back Half Condensibles	0.001 gr/ft <sup>3</sup>	3.1 mg/m <sup>3</sup>
Mass Emission Rate	1.00 lbs/hr	0.45 kg/hr

### Dryer 1 South Stack: August 31, 2016 Summary of Test Results 1-3

Gas Temperature:	110 °F	43 °C
Moisture Content (by volume):	6.30 %	
Average Stack Gas Velocity:	32.6 ft/sec	9.9 m/sec
Total Actual Gas Flow Rate:	71671 ACFM	
Dry Gas flow Rate at Reference Conditions:	58514 SCFM	27.6 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.002 gr/ft <sup>3</sup>	3.6 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	1.2 mg/m <sup>3</sup>
Back Half Condensibles	0.001 gr/ft <sup>3</sup>	2.4 mg/m <sup>3</sup>
Mass Emission Rate	0.79 lbs/hr	0.36 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 <sup>3</sup> /sec	27.1	27.6		54.7
Total Particulate Concentration mg/m <sup>3</sup>	4.6	3.6		4.1
Mass Emission Rate Kg/hr	.45	.36		.81

Dryer 2 North Stack: August 30, 2016 Summary of Test Results 1-3

Gas Temperature:	108 °F	42 °C
Moisture Content (by volume):	4.75 %	
Average Stack Gas Velocity:	30.4 ft/sec	9.3 m/sec
Total Actual Gas Flow Rate:	66872 ACFM	
Dry Gas flow Rate at Reference Conditions:	57072 SCFM	26.9 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.001 gr/ft <sup>3</sup>	1.6 mg/m <sup>3</sup>
Front Half Particulate	0.000 gr/ft <sup>3</sup>	0.6 mg/m <sup>3</sup>
Back Half Condensibles	0.000 gr/ft <sup>3</sup>	1.0 mg/m <sup>3</sup>
Mass Emission Rate	0.35 lbs/hr	0.16 kg/hr

Dryer 2 South Stack: August 30, 2016 Summary of Test Results 1-3

Gas Temperature:	104 °F	40 °C
Moisture Content (by volume):	4.96 %	
Average Stack Gas Velocity:	30.8 ft/sec	9.4 m/sec
Total Actual Gas Flow Rate:	67749 ACFM	
Dry Gas flow Rate at Reference Conditions:	58135 SCFM	27.4 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft <sup>3</sup>	6.0 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	2.9 mg/m <sup>3</sup>
Back Half Condensibles	0.001 gr/ft <sup>3</sup>	3.0 mg/m <sup>3</sup>
Mass Emission Rate	1.29 lbs/hr	0.59 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 <sup>3</sup> /sec	26.9	27.4		54.3
Total Particulate Concentration mg/m <sup>3</sup>	1.6	6.0		3.8
Mass Emission Rate Kg/hr	.16	.59		.75

CF-12 Stack: August 30, 2016 Summary of Test Results 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

138 °F	59 °C
3.42 %	
62.3 ft/sec	18.99 m/sec
73399 ACFM	
60416 SCFM	28.51 m <sup>3</sup> /sec
0.003 gr/ft <sup>3</sup>	7.5 mg/m <sup>3</sup>
0.001 gr/ft <sup>3</sup>	1.5 mg/m <sup>3</sup>
0.003 gr/ft <sup>3</sup>	6.0 mg/m <sup>3</sup>
1.71 lbs/hr	0.77 kg/hr

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

**31-Aug-16**

**Permit Number: 107369**

**AVERAGE OF AIR EMISSION TESTS 1 TO 3**

Gas Temperature:	111 ° F	44 ° C
Moisture Content (by volume):	6.27 %	
Average Stack Gas Velocity:	32.0 ft/sec	9.8 m/sec
Total Actual Gas Flow Rate:	70515 ACFM	
Dry Gas flow Rate at Reference Conditions:	57462 SCFM	27.1 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.002 gr/ft <sup>3</sup>	4.6 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	1.6 mg/m <sup>3</sup>
Back Half Condensibles	0.001 gr/ft <sup>3</sup>	3.1 mg/m <sup>3</sup>
Mass Emission Rate	1.00 lbs/hr	0.45 kg/hr

**SUMMARY OF AIR EMISSION TESTS**

**TEST 1:**

Gas Temperature:	108 ° F	42 ° C
Moisture Content (by volume):	5.9 %	
Average Stack Gas Velocity:	31.7 ft/sec	9.7 m/sec
Total Actual Gas Flow Rate:	69842 ACFM	
Dry Gas flow Rate at Reference Conditions:	57458 SCFM	27.1 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft <sup>3</sup>	8.5 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	3.2 mg/m <sup>3</sup>
Back Half Condensibles	.002 gr/ft <sup>3</sup>	5.4 mg/m <sup>3</sup>
Mass Emission Rate	1.84 lbs/hr	0.83 kg/hr

**TEST 2:**

Gas Temperature:	112 ° F	45 ° C
Moisture Content (by volume):	6.2 %	
Average Stack Gas Velocity:	32.2 ft/sec	9.8 m/sec
Total Actual Gas Flow Rate:	70857 ACFM	
Dry Gas flow Rate at Reference Conditions:	57653 SCFM	27.2 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	2.2 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	.7 mg/m <sup>3</sup>
Back Half Condensibles	.001 gr/ft <sup>3</sup>	1.5 mg/m <sup>3</sup>
Mass Emission Rate	0.48 lbs/hr	0.22 kg/hr

**TEST 3:**

Gas Temperature:	113 ° F	45 ° C
Moisture Content (by volume):	6.7 %	
Average Stack Gas Velocity:	32.2 ft/sec	9.8 m/sec
Total Actual Gas Flow Rate:	70847 ACFM	
Dry Gas flow Rate at Reference Conditions:	57275 SCFM	27.0 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	3.2 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	.9 mg/m <sup>3</sup>
Back Half Condensibles	.001 gr/ft <sup>3</sup>	2.3 mg/m <sup>3</sup>
Mass Emission Rate	0.68 lbs/hr	0.31 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:** ME1617-105  
**Pollution Control Permit:** 15.0 mg/m3  
**Number of Tests:** 3 tests  
**Minutes per Point:** 2.5 minutes

	TEST 1	TEST 2	TEST 3
<b>Filter Number:</b>	A63	64	65
<b>Date of Test:</b>	31-Aug-16	31-Aug-16	31-Aug-16
<b>Start Time:</b>	8:45	10:10	11:30
<b>Stop Time:</b>	9:55	11:15	12:35
<b>On-line Sampling Time:</b>	60	60	60
<b>Testing Personnel:</b>	DL/NA	DL/NA	DL/NA
<b>Sampler Model:</b>	1012	1012	1012
<b>Barometric Pressure("Hg):</b>	28.15	28.15	28.15
<b>Static Pressure("H<sub>2</sub>O):</b>	-0.06	-0.06	-0.06
<b>%CO<sub>2</sub>:</b>	0.0	0.0	0.1
<b>%O<sub>2</sub>:</b>	21.0	21.0	20.9
<b>%CO:</b>	0.0	0.0	0.0
<b>%N<sub>2</sub>:</b>	79.0	79.0	79.0
<b>Diameter of Nozzle(inches):</b>	0.300	0.300	0.300
<b>Meter Factor:</b>	0.9961	0.9961	0.9961
<b>Type-S Pitot Tube Coefficient:</b>	0.84158	0.84158	0.84158
<b>Cross Sectional Area of Stack(ft<sup>2</sup>):</b>	36.67	36.67	36.67
<b>Impinger Condensate(g):</b>	55	60	66
<b>Weight of Moisture in Silica Gel(g):</b>	6.2	5.5	4.9
<b>Weight of Filter Particulate(g):</b>	0.0017	0.0004	0.0004
<b>Weight of Probe Washings(g):</b>	0.0024	0.0005	0.0008
<b>Weight of Impinger Content Organic(g):</b>	0.0070	0.0020	0.0030
<b>Total Weight of Particulate(g):</b>	0.0111	0.0029	0.0042











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

**Data for TEST 1**

**OVERALL ISOKINETICS - TEST 1: 0.997**

<b>Delta P:</b>	<b>0.272 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>31.74 ft/sec</b>
<b>Delta H:</b>	<b>1.745</b>	<b>ACFM:</b>	<b>69842 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>540.9 °R</b>	<b>SDCFM:</b>	<b>57458 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>568.1 °R</b>	<b>Vm std:</b>	<b>45.94 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.059</b>	<b>Vm corr:</b>	<b>49.80 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>49.99 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.20</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.15 "Hg</b>	<b>PCON:</b>	<b>8.53 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.28 "Hg</b>	<b>ERAT:</b>	<b>0.83 kg/hr</b>
<b>Ps:</b>	<b>28.15 "Hg</b>		

**Data for TEST 2**

**OVERALL ISOKINETICS - TEST 2: 1.001**

<b>Delta P:</b>	<b>0.278 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>32.20 ft/sec</b>
<b>Delta H:</b>	<b>1.835</b>	<b>ACFM:</b>	<b>70857 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>561.3 °R</b>	<b>SDCFM:</b>	<b>57653 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>572.3 °R</b>	<b>Vm std:</b>	<b>46.29 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.062</b>	<b>Vm corr:</b>	<b>52.06 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>52.26 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.16</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.15 "Hg</b>	<b>PCON:</b>	<b>2.21 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.28 "Hg</b>	<b>ERAT:</b>	<b>0.22 kg/hr</b>
<b>Ps:</b>	<b>28.15 "Hg</b>		

**Data for TEST 3**

**OVERALL ISOKINETICS - TEST 3: 1.015**

<b>Delta P:</b>	<b>0.277 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>32.20 ft/sec</b>
<b>Delta H:</b>	<b>1.850</b>	<b>ACFM:</b>	<b>70847 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>570.2 °R</b>	<b>SDCFM:</b>	<b>57275 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>573.4 °R</b>	<b>Vm std:</b>	<b>46.71 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.067</b>	<b>Vm corr:</b>	<b>53.35 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.85</b>	<b>Vm:</b>	<b>53.56 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.13</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.15 "Hg</b>	<b>PCON:</b>	<b>3.18 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.29 "Hg</b>	<b>ERAT:</b>	<b>0.31 kg/hr</b>
<b>Ps:</b>	<b>28.15 "Hg</b>		

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

**31-Aug-16**

**Permit Number: 107369**

**AVERAGE OF AIR EMISSION TESTS 1 TO 3**

Gas Temperature:	110 ° F	43 ° C
Moisture Content (by volume):	6.30 %	
Average Stack Gas Velocity:	32.6 ft/sec	9.9 m/sec
Total Actual Gas Flow Rate:	71671 ACFM	
Dry Gas flow Rate at Reference Conditions:	58514 SCFM	27.6 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.002 gr/ft <sup>3</sup>	3.6 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	1.2 mg/m <sup>3</sup>
Back Half Condensibles	0.001 gr/ft <sup>3</sup>	2.4 mg/m <sup>3</sup>
Mass Emission Rate	0.79 lbs/hr	0.36 kg/hr

**SUMMARY OF AIR EMISSION TESTS**

**TEST 1:**

Gas Temperature:	105 ° F	41 ° C
Moisture Content (by volume):	6.6 %	
Average Stack Gas Velocity:	32.5 ft/sec	9.9 m/sec
Total Actual Gas Flow Rate:	71541 ACFM	
Dry Gas flow Rate at Reference Conditions:	58749 SCFM	27.7 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	1.9 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	1.1 mg/m <sup>3</sup>
Back Half Condensibles	.000 gr/ft <sup>3</sup>	.9 mg/m <sup>3</sup>
Mass Emission Rate	0.42 lbs/hr	0.19 kg/hr

**TEST 2:**

Gas Temperature:	112 ° F	44 ° C
Moisture Content (by volume):	6.4 %	
Average Stack Gas Velocity:	32.6 ft/sec	9.9 m/sec
Total Actual Gas Flow Rate:	71661 ACFM	
Dry Gas flow Rate at Reference Conditions:	58289 SCFM	27.5 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft <sup>3</sup>	6.7 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	1.3 mg/m <sup>3</sup>
Back Half Condensibles	.002 gr/ft <sup>3</sup>	5.4 mg/m <sup>3</sup>
Mass Emission Rate	1.47 lbs/hr	0.67 kg/hr

**TEST 3:**

Gas Temperature:	113 ° F	45 ° C
Moisture Content (by volume):	5.9 %	
Average Stack Gas Velocity:	32.6 ft/sec	9.9 m/sec
Total Actual Gas Flow Rate:	71811 ACFM	
Dry Gas flow Rate at Reference Conditions:	58503 SCFM	27.6 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	2.2 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	1.3 mg/m <sup>3</sup>
Back Half Condensibles	.000 gr/ft <sup>3</sup>	.9 mg/m <sup>3</sup>
Mass Emission Rate	0.48 lbs/hr	0.22 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:** ME1617-105  
**Pollution Control Permit:** 15.0 mg/m3  
**Number of Tests:** 3 tests  
**Minutes per Point:** 2.5 minutes

	TEST 1	TEST 2	TEST 3
<b>Filter Number:</b>	A66	67	68
<b>Date of Test:</b>	31-Aug-16	31-Aug-16	31-Aug-16
<b>Start Time:</b>	9:10	10:30	11:55
<b>Stop Time:</b>	10:17	11:40	13:05
<b>On-line Sampling Time:</b>	60	60	60
<b>Testing Personnel:</b>	DL/NA	DL/NA	DL/NA
<b>Sampler Model:</b>	1013	1013	1013
<b>Barometric Pressure("Hg):</b>	28.15	28.15	28.15
<b>Static Pressure("H<sub>2</sub>O):</b>	-0.06	-0.06	-0.06
<b>%CO<sub>2</sub>:</b>	0.0	0.0	0.1
<b>%O<sub>2</sub>:</b>	21.0	21.0	20.9
<b>%CO:</b>	0.0	0.0	0.0
<b>%N<sub>2</sub>:</b>	79.0	79.0	79.0
<b>Diameter of Nozzle(inches):</b>	0.275	0.275	0.275
<b>Meter Factor:</b>	0.9976	0.9976	0.9976
<b>Type-S Pitot Tube Coefficient:</b>	0.83446	0.83446	0.83446
<b>Cross Sectional Area of Stack(ft<sup>2</sup>):</b>	36.67	36.67	36.67
<b>Impinger Condensate(g):</b>	55	50	45
<b>Weight of Moisture in Silica Gel(g):</b>	5.5	6.8	7.1
<b>Weight of Filter Particulate(g):</b>	0.0003	0.0006	0.0009
<b>Weight of Probe Washings(g):</b>	0.0009	0.0009	0.0005
<b>Weight of Impinger Content Organic(g):</b>	0.0010	0.0060	0.0010
<b>Total Weight of Particulate(g):</b>	0.0022	0.0075	0.0024









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

**Data for TEST 1**

**OVERALL ISOKINETICS - TEST 1: 1.017**

Delta P:	0.291 "H <sub>2</sub> O	Us avg:	32.52 ft/sec
Delta H:	1.713	ACFM:	71541 ft <sup>3</sup> /min
Tm avg:	538.1 °R	SDCFM:	58749 ft <sup>3</sup> /min
Ts avg:	564.9 °R	Vm std:	40.29 ft <sup>3</sup>
Bwo:	0.066	Vm corr:	43.45 ft <sup>3</sup>
Md:	28.84	Vm:	43.55 ft <sup>3</sup>
Ms:	28.12	MF:	0.9976
Pb:	28.15 "Hg	PCON:	1.93 mg/m <sup>3</sup>
Pm:	28.28 "Hg	ERAT:	0.19 kg/hr
Ps:	28.15 "Hg		

**Data for TEST 2**

**OVERALL ISOKINETICS - TEST 2: 0.999**

Delta P:	0.289 "H <sub>2</sub> O	Us avg:	32.57 ft/sec
Delta H:	1.717	ACFM:	71661 ft <sup>3</sup> /min
Tm avg:	557.6 °R	SDCFM:	58289 ft <sup>3</sup> /min
Ts avg:	571.7 °R	Vm std:	39.26 ft <sup>3</sup>
Bwo:	0.064	Vm corr:	43.87 ft <sup>3</sup>
Md:	28.84	Vm:	43.98 ft <sup>3</sup>
Ms:	28.15	MF:	0.9976
Pb:	28.15 "Hg	PCON:	6.75 mg/m <sup>3</sup>
Pm:	28.28 "Hg	ERAT:	0.67 kg/hr
Ps:	28.15 "Hg		

**Data for TEST 3**

**OVERALL ISOKINETICS - TEST 3: 0.984**

Delta P:	0.290 "H <sub>2</sub> O	Us avg:	32.64 ft/sec
Delta H:	1.742	ACFM:	71811 ft <sup>3</sup> /min
Tm avg:	565.3 °R	SDCFM:	58503 ft <sup>3</sup> /min
Ts avg:	573.5 °R	Vm std:	38.82 ft <sup>3</sup>
Bwo:	0.059	Vm corr:	43.97 ft <sup>3</sup>
Md:	28.85	Vm:	44.08 ft <sup>3</sup>
Ms:	28.21	MF:	0.9976
Pb:	28.15 "Hg	PCON:	2.18 mg/m <sup>3</sup>
Pm:	28.28 "Hg	ERAT:	0.22 kg/hr
Ps:	28.15 "Hg		



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

**30-Aug-16**

**Permit Number: 107369**

**AVERAGE OF AIR EMISSION TESTS 1 TO 3**

Gas Temperature:	108 ° F	42 ° C
Moisture Content (by volume):	4.75 %	
Average Stack Gas Velocity:	30.4 ft/sec	9.3 m/sec
Total Actual Gas Flow Rate:	66872 ACFM	
Dry Gas flow Rate at Reference Conditions:	57072 SCFM	26.9 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.001 gr/ft <sup>3</sup>	1.6 mg/m <sup>3</sup>
Front Half Particulate	0.000 gr/ft <sup>3</sup>	0.6 mg/m <sup>3</sup>
Back Half Condensibles	0.000 gr/ft <sup>3</sup>	1.0 mg/m <sup>3</sup>
Mass Emission Rate	0.35 lbs/hr	0.16 kg/hr

**SUMMARY OF AIR EMISSION TESTS**

**TEST 1:**

Gas Temperature:	105 ° F	41 ° C
Moisture Content (by volume):	5.4 %	
Average Stack Gas Velocity:	30.3 ft/sec	9.2 m/sec
Total Actual Gas Flow Rate:	66687 ACFM	
Dry Gas flow Rate at Reference Conditions:	56878 SCFM	26.8 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	1.3 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	.5 mg/m <sup>3</sup>
Back Half Condensibles	.000 gr/ft <sup>3</sup>	.8 mg/m <sup>3</sup>
Mass Emission Rate	0.27 lbs/hr	0.12 kg/hr

**TEST 2:**

Gas Temperature:	110 ° F	43 ° C
Moisture Content (by volume):	4.0 %	
Average Stack Gas Velocity:	30.5 ft/sec	9.3 m/sec
Total Actual Gas Flow Rate:	67112 ACFM	
Dry Gas flow Rate at Reference Conditions:	57597 SCFM	27.2 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	2.3 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	.8 mg/m <sup>3</sup>
Back Half Condensibles	.001 gr/ft <sup>3</sup>	1.5 mg/m <sup>3</sup>
Mass Emission Rate	0.49 lbs/hr	0.22 kg/hr

**TEST 3:**

Gas Temperature:	110 ° F	43 ° C
Moisture Content (by volume):	4.9 %	
Average Stack Gas Velocity:	30.4 ft/sec	9.3 m/sec
Total Actual Gas Flow Rate:	66816 ACFM	
Dry Gas flow Rate at Reference Conditions:	56742 SCFM	26.8 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft <sup>3</sup>	1.3 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	.6 mg/m <sup>3</sup>
Back Half Condensibles	.000 gr/ft <sup>3</sup>	.7 mg/m <sup>3</sup>
Mass Emission Rate	0.29 lbs/hr	0.13 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:** ME1617-105  
**Pollution Control Permit:** 15.0 mg/m3  
**Number of Tests:** 3 tests  
**Minutes per Point:** 2.5 minutes

	TEST 1	TEST 2	TEST 3
<b>Filter Number:</b>	A54	55	56
<b>Date of Test:</b>	30-Aug-16	30-Aug-16	30-Aug-16
<b>Start Time:</b>	9:25	10:45	12:05
<b>Stop Time:</b>	10:30	11:50	13:10
<b>On-line Sampling Time:</b>	60	60	60
<b>Testing Personnel:</b>	DL/WS	DL/WS	DL/WS
<b>Sampler Model:</b>	1012	1012	1012
<b>Barometric Pressure("Hg):</b>	28.85	28.85	28.85
<b>Static Pressure("H<sub>2</sub>O):</b>	0.05	0.05	0.05
<b>%CO<sub>2</sub>:</b>	0.0	0.0	0.1
<b>%O<sub>2</sub>:</b>	21.0	21.0	20.9
<b>%CO:</b>	0.0	0.0	0.0
<b>%N<sub>2</sub>:</b>	79.0	79.0	79.0
<b>Diameter of Nozzle(inches):</b>	0.305	0.305	0.305
<b>Meter Factor:</b>	0.9961	0.9961	0.9961
<b>Type-S Pitot Tube Coefficient:</b>	0.83446	0.83446	0.83446
<b>Cross Sectional Area of Stack(ft<sup>2</sup>):</b>	36.67	36.67	36.67
<b>Impinger Condensate(g):</b>	50	35	45
<b>Weight of Moisture in Silica Gel(g):</b>	6.5	7.1	6.9
<b>Weight of Filter Particulate(g):</b>	0.0001	0.0002	0.0002
<b>Weight of Probe Washings(g):</b>	0.0006	0.0009	0.0006
<b>Weight of Impinger Content Organic(g):</b>	0.0010	0.0020	0.0010
<b>Total Weight of Particulate(g):</b>	0.0017	0.0031	0.0018









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

**Data for TEST 1**

**OVERALL ISOKINETICS - TEST 1: 0.993**

<b>Delta P:</b>	<b>0.261 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>30.31 ft/sec</b>
<b>Delta H:</b>	<b>1.714</b>	<b>ACFM:</b>	<b>66687 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>540.4 °R</b>	<b>SDCFM:</b>	<b>56878 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>565.0 °R</b>	<b>Vm std:</b>	<b>46.88 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.054</b>	<b>Vm corr:</b>	<b>49.55 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>49.74 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.26</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>1.28 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.98 "Hg</b>	<b>ERAT:</b>	<b>0.12 kg/hr</b>
<b>Ps:</b>	<b>28.85 "Hg</b>		

**Data for TEST 2**

**OVERALL ISOKINETICS - TEST 2: 1.001**

<b>Delta P:</b>	<b>0.263 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>30.50 ft/sec</b>
<b>Delta H:</b>	<b>1.835</b>	<b>ACFM:</b>	<b>67112 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>562.8 °R</b>	<b>SDCFM:</b>	<b>57597 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>569.7 °R</b>	<b>Vm std:</b>	<b>47.84 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.040</b>	<b>Vm corr:</b>	<b>52.63 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>52.84 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.41</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>2.29 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.99 "Hg</b>	<b>ERAT:</b>	<b>0.22 kg/hr</b>
<b>Ps:</b>	<b>28.85 "Hg</b>		

**Data for TEST 3**

**OVERALL ISOKINETICS - TEST 3: 1.005**

<b>Delta P:</b>	<b>0.260 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>30.37 ft/sec</b>
<b>Delta H:</b>	<b>1.846</b>	<b>ACFM:</b>	<b>66816 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>572.6 °R</b>	<b>SDCFM:</b>	<b>56742 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>570.2 °R</b>	<b>Vm std:</b>	<b>47.35 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.049</b>	<b>Vm corr:</b>	<b>53.00 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.85</b>	<b>Vm:</b>	<b>53.21 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.32</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>1.34 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.99 "Hg</b>	<b>ERAT:</b>	<b>0.13 kg/hr</b>
<b>Ps:</b>	<b>28.85 "Hg</b>		

**Pinnacle Pellet Lavington**  
**Dryer 2 South Stack**  
**Lavington, BC**

**30-Aug-16**

**Permit Number: 107369**

**AVERAGE OF AIR EMISSION TESTS 1 TO 3**

Gas Temperature:	104 ° F	40 ° C
Moisture Content (by volume):	4.96 %	
Average Stack Gas Velocity:	30.8 ft/sec	9.4 m/sec
Total Actual Gas Flow Rate:	67749 ACFM	
Dry Gas flow Rate at Reference Conditions:	58135 SCFM	27.4 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft <sup>3</sup>	6.0 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	2.9 mg/m <sup>3</sup>
Back Half Condensibles	0.001 gr/ft <sup>3</sup>	3.0 mg/m <sup>3</sup>
Mass Emission Rate	1.29 lbs/hr	0.59 kg/hr

**SUMMARY OF AIR EMISSION TESTS**

**TEST 1:**

Gas Temperature:	96 ° F	35 ° C
Moisture Content (by volume):	5.4 %	
Average Stack Gas Velocity:	30.1 ft/sec	9.2 m/sec
Total Actual Gas Flow Rate:	66241 ACFM	
Dry Gas flow Rate at Reference Conditions:	57398 SCFM	27.1 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft <sup>3</sup>	7.6 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	3.0 mg/m <sup>3</sup>
Back Half Condensibles	.002 gr/ft <sup>3</sup>	4.6 mg/m <sup>3</sup>
Mass Emission Rate	1.63 lbs/hr	0.74 kg/hr

**TEST 2:**

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	4.8 %	
Average Stack Gas Velocity:	31.2 ft/sec	9.5 m/sec
Total Actual Gas Flow Rate:	68566 ACFM	
Dry Gas flow Rate at Reference Conditions:	58696 SCFM	27.7 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft <sup>3</sup>	5.3 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	2.6 mg/m <sup>3</sup>
Back Half Condensibles	.001 gr/ft <sup>3</sup>	2.7 mg/m <sup>3</sup>
Mass Emission Rate	1.17 lbs/hr	0.53 kg/hr

**TEST 3:**

Gas Temperature:	109 ° F	43 ° C
Moisture Content (by volume):	4.7 %	
Average Stack Gas Velocity:	31.1 ft/sec	9.5 m/sec
Total Actual Gas Flow Rate:	68439 ACFM	
Dry Gas flow Rate at Reference Conditions:	58311 SCFM	27.5 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft <sup>3</sup>	5.0 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	3.2 mg/m <sup>3</sup>
Back Half Condensibles	.001 gr/ft <sup>3</sup>	1.8 mg/m <sup>3</sup>
Mass Emission Rate	1.08 lbs/hr	0.49 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:** ME1617-105  
**Pollution Control Permit:** 15.0 mg/m3  
**Number of Tests:** 3 tests  
**Minutes per Point:** 2.5 minutes

	TEST 1	TEST 2	TEST 3
<b>Filter Number:</b>	A57	58	59
<b>Date of Test:</b>	30-Aug-16	30-Aug-16	30-Aug-16
<b>Start Time:</b>	9:50	11:14	12:35
<b>Stop Time:</b>	10:57	12:20	13:42
<b>On-line Sampling Time:</b>	60	60	60
<b>Testing Personnel:</b>	DL/NA	DL/NA	DL/NA
<b>Sampler Model:</b>	1013	1013	1013
<b>Barometric Pressure("Hg):</b>	28.85	28.85	28.85
<b>Static Pressure("H<sub>2</sub>O):</b>	-0.10	-0.10	-0.10
<b>%CO<sub>2</sub>:</b>	0.0	0.0	0.1
<b>%O<sub>2</sub>:</b>	21.0	21.0	20.9
<b>%CO:</b>	0.0	0.0	0.0
<b>%N<sub>2</sub>:</b>	79.0	79.0	79.0
<b>Diameter of Nozzle(inches):</b>	0.275	0.275	0.275
<b>Meter Factor:</b>	0.9976	0.9976	0.9976
<b>Type-S Pitot Tube Coefficient:</b>	0.84158	0.84158	0.84158
<b>Cross Sectional Area of Stack(ft<sup>2</sup>):</b>	36.67	36.67	36.67
<b>Impinger Condensate(g):</b>	40	36	35
<b>Weight of Moisture in Silica Gel(g):</b>	6.2	6.0	5.9
<b>Weight of Filter Particulate(g):</b>	0.0005	0.0004	0.0013
<b>Weight of Probe Washings(g):</b>	0.0027	0.0025	0.0022
<b>Weight of Impinger Content Organic(g):</b>	0.0050	0.0030	0.0020
<b>Total Weight of Particulate(g):</b>	0.0082	0.0059	0.0055











**Pinnacle Pellet Lavington  
Dryer 2 South Stack  
Pinnacle Pellet Lavington**

**Data for TEST 1**

**OVERALL ISOKINETICS - TEST 1: 0.987**

<b>Delta P:</b>	<b>0.257 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>30.11 ft/sec</b>
<b>Delta H:</b>	<b>1.522</b>	<b>ACFM:</b>	<b>66241 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>535.7 °R</b>	<b>SDCFM:</b>	<b>57398 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>555.8 °R</b>	<b>Vm std:</b>	<b>38.23 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.054</b>	<b>Vm corr:</b>	<b>40.06 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>40.16 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.26</b>	<b>MF:</b>	<b>0.9976</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>7.58 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.96 "Hg</b>	<b>ERAT:</b>	<b>0.74 kg/hr</b>
<b>Ps:</b>	<b>28.84 "Hg</b>		

**Data for TEST 2**

**OVERALL ISOKINETICS - TEST 2: 0.988**

<b>Delta P:</b>	<b>0.271 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>31.16 ft/sec</b>
<b>Delta H:</b>	<b>1.665</b>	<b>ACFM:</b>	<b>68566 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>561.1 °R</b>	<b>SDCFM:</b>	<b>58696 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>566.0 °R</b>	<b>Vm std:</b>	<b>39.14 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.048</b>	<b>Vm corr:</b>	<b>42.96 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>43.06 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.32</b>	<b>MF:</b>	<b>0.9976</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>5.32 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.97 "Hg</b>	<b>ERAT:</b>	<b>0.53 kg/hr</b>
<b>Ps:</b>	<b>28.84 "Hg</b>		

**Data for TEST 3**

**OVERALL ISOKINETICS - TEST 3: 0.995**

<b>Delta P:</b>	<b>0.268 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>31.11 ft/sec</b>
<b>Delta H:</b>	<b>1.676</b>	<b>ACFM:</b>	<b>68439 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>568.8 °R</b>	<b>SDCFM:</b>	<b>58311 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>569.4 °R</b>	<b>Vm std:</b>	<b>39.12 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.047</b>	<b>Vm corr:</b>	<b>43.52 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.85</b>	<b>Vm:</b>	<b>43.62 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.34</b>	<b>MF:</b>	<b>0.9976</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>4.97 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.97 "Hg</b>	<b>ERAT:</b>	<b>0.49 kg/hr</b>
<b>Ps:</b>	<b>28.84 "Hg</b>		



**Pinnacle Pellet  
CF-12  
Lavington BC**

**30-Aug-16**

**Permit Number: 107369**

**AVERAGE OF AIR EMISSION TESTS 1 TO 3**

Gas Temperature:	138 ° F	59 ° C
Moisture Content (by volume):	3.42 %	
Average Stack Gas Velocity:	62.3 ft/sec	18.99 m/sec
Total Actual Gas Flow Rate:	73399 ACFM	
Dry Gas flow Rate at Reference Conditions:	60416 SCFM	28.51 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.003 gr/ft <sup>3</sup>	7.5 mg/m <sup>3</sup>
Front Half Particulate	0.001 gr/ft <sup>3</sup>	1.5 mg/m <sup>3</sup>
Back Half Condensibles	0.003 gr/ft <sup>3</sup>	6.0 mg/m <sup>3</sup>
Mass Emission Rate	1.71 lbs/hr	0.77 kg/hr

**SUMMARY OF AIR EMISSION TESTS**

**TEST 1:**

Gas Temperature:	140 ° F	60 ° C
Moisture Content (by volume):	3.0 %	
Average Stack Gas Velocity:	62.5 ft/sec	19.0 m/sec
Total Actual Gas Flow Rate:	73599 ACFM	
Dry Gas flow Rate at Reference Conditions:	60715 SCFM	28.7 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft <sup>3</sup>	5.4 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	1.0 mg/m <sup>3</sup>
Back Half Condensibles	.002 gr/ft <sup>3</sup>	4.5 mg/m <sup>3</sup>
Mass Emission Rate	1.24 lbs/hr	0.56 kg/hr

**TEST 2:**

Gas Temperature:	138 ° F	59 ° C
Moisture Content (by volume):	3.7 %	
Average Stack Gas Velocity:	62.5 ft/sec	19.1 m/sec
Total Actual Gas Flow Rate:	73629 ACFM	
Dry Gas flow Rate at Reference Conditions:	60391 SCFM	28.5 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft <sup>3</sup>	8.6 mg/m <sup>3</sup>
Front Half Particulate	.001 gr/ft <sup>3</sup>	2.6 mg/m <sup>3</sup>
Back Half Condensibles	.003 gr/ft <sup>3</sup>	6.0 mg/m <sup>3</sup>
Mass Emission Rate	1.95 lbs/hr	0.88 kg/hr

**TEST 3:**

Gas Temperature:	137 ° F	58 ° C
Moisture Content (by volume):	3.5 %	
Average Stack Gas Velocity:	62.0 ft/sec	18.9 m/sec
Total Actual Gas Flow Rate:	72970 ACFM	
Dry Gas flow Rate at Reference Conditions:	60141 SCFM	28.4 m <sup>3</sup> /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft <sup>3</sup>	8.6 mg/m <sup>3</sup>
Front Half Particulate	.000 gr/ft <sup>3</sup>	1.0 mg/m <sup>3</sup>
Back Half Condensibles	.003 gr/ft <sup>3</sup>	7.6 mg/m <sup>3</sup>
Mass Emission Rate	1.94 lbs/hr	0.88 kg/hr

**DATA FOR TESTS 1 TO 3**

**Client:** Pinnacle Pellet  
**Plant Location:** Lavington BC  
**Process:** CF-12  
**Permit Number:** 107369  
**Job Number:** ME1617-105  
**Pollution Control Permit:** 15.0 mg/m3  
**Number of Tests:** 3 tests  
**Minutes per Point:** 2.5 minutes

	TEST 1	TEST 2	TEST 3
<b>Filter Number:</b>	A60	61	62
<b>Date of Test:</b>	30-Aug-16	30-Aug-16	30-Aug-16
<b>Start Time:</b>	2:15	3:40	5:10
<b>Stop Time:</b>	3:23	4:50	6:15
<b>On-line Sampling Time:</b>	60	60	60
<b>Testing Personnel:</b>	DL/NA	DL/NA	DL/NA
<b>Sampler Model:</b>	1012	1012	1012
<b>Barometric Pressure("Hg):</b>	28.85	28.85	28.85
<b>Static Pressure("H<sub>2</sub>O):</b>	0.60	0.60	0.60
<b>%CO<sub>2</sub>:</b>	0.0	0.0	0.1
<b>%O<sub>2</sub>:</b>	21.0	21.0	20.9
<b>%CO:</b>	0.0	0.0	0.0
<b>%N<sub>2</sub>:</b>	79.0	79.0	79.0
<b>Diameter of Nozzle(inches):</b>	0.215	0.215	0.215
<b>Meter Factor:</b>	0.9961	0.9961	0.9961
<b>Type-S Pitot Tube Coefficient:</b>	0.84158	0.84158	0.84158
<b>Cross Sectional Area of Stack(ft<sup>2</sup>):</b>	19.63	19.63	19.63
<b>Impinger Condensate(g):</b>	30	38	35
<b>Weight of Moisture in Silica Gel(g):</b>	1.0	1.0	1.0
<b>Weight of Filter Particulate(g):</b>	0.0011	0.0010	0.0005
<b>Weight of Probe Washings(g):</b>	0.0002	0.0025	0.0008
<b>Weight of Impinger Content Organic(g):</b>	0.0060	0.0080	0.0100
<b>Total Weight of Particulate(g):</b>	0.0073	0.0115	0.0113











**Pinnacle Pellet**  
**CF-12**  
**Pinnacle Pellet**

Data for **TEST 1**

**OVERALL ISOKINETICS - TEST 1: 1.014**

<b>Delta P:</b>	<b>1.037 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>62.49 ft/sec</b>
<b>Delta H:</b>	<b>1.864</b>	<b>ACFM:</b>	<b>73599 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>566.8 °R</b>	<b>SDCFM:</b>	<b>60715 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>599.7 °R</b>	<b>Vm std:</b>	<b>47.45 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.030</b>	<b>Vm corr:</b>	<b>52.57 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>52.78 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.52</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>5.43 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.99 "Hg</b>	<b>ERAT:</b>	<b>0.56 kg/hr</b>
<b>Ps:</b>	<b>28.89 "Hg</b>		

Data for **TEST 2**

**OVERALL ISOKINETICS - TEST 2: 1.014**

<b>Delta P:</b>	<b>1.037 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>62.51 ft/sec</b>
<b>Delta H:</b>	<b>1.863</b>	<b>ACFM:</b>	<b>73629 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>566.5 °R</b>	<b>SDCFM:</b>	<b>60391 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>598.4 °R</b>	<b>Vm std:</b>	<b>47.16 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.037</b>	<b>Vm corr:</b>	<b>52.23 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.84</b>	<b>Vm:</b>	<b>52.43 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.43</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>8.61 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.99 "Hg</b>	<b>ERAT:</b>	<b>0.88 kg/hr</b>
<b>Ps:</b>	<b>28.89 "Hg</b>		

Data for **TEST 3**

**OVERALL ISOKINETICS - TEST 3: 1.002**

<b>Delta P:</b>	<b>1.022 "H<sub>2</sub>O</b>	<b>Us avg:</b>	<b>61.95 ft/sec</b>
<b>Delta H:</b>	<b>1.770</b>	<b>ACFM:</b>	<b>72970 ft<sup>3</sup>/min</b>
<b>Tm avg:</b>	<b>562.5 °R</b>	<b>SDCFM:</b>	<b>60141 ft<sup>3</sup>/min</b>
<b>Ts avg:</b>	<b>596.9 °R</b>	<b>Vm std:</b>	<b>46.42 ft<sup>3</sup></b>
<b>Bwo:</b>	<b>0.035</b>	<b>Vm corr:</b>	<b>51.06 ft<sup>3</sup></b>
<b>Md:</b>	<b>28.85</b>	<b>Vm:</b>	<b>51.26 ft<sup>3</sup></b>
<b>Ms:</b>	<b>28.47</b>	<b>MF:</b>	<b>0.9961</b>
<b>Pb:</b>	<b>28.85 "Hg</b>	<b>PCON:</b>	<b>8.60 mg/m<sup>3</sup></b>
<b>Pm:</b>	<b>28.98 "Hg</b>	<b>ERAT:</b>	<b>0.88 kg/hr</b>
<b>Ps:</b>	<b>28.89 "Hg</b>		

## **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.

### **O<sub>2</sub>, CO<sub>2</sub>, CO (where applicable)**

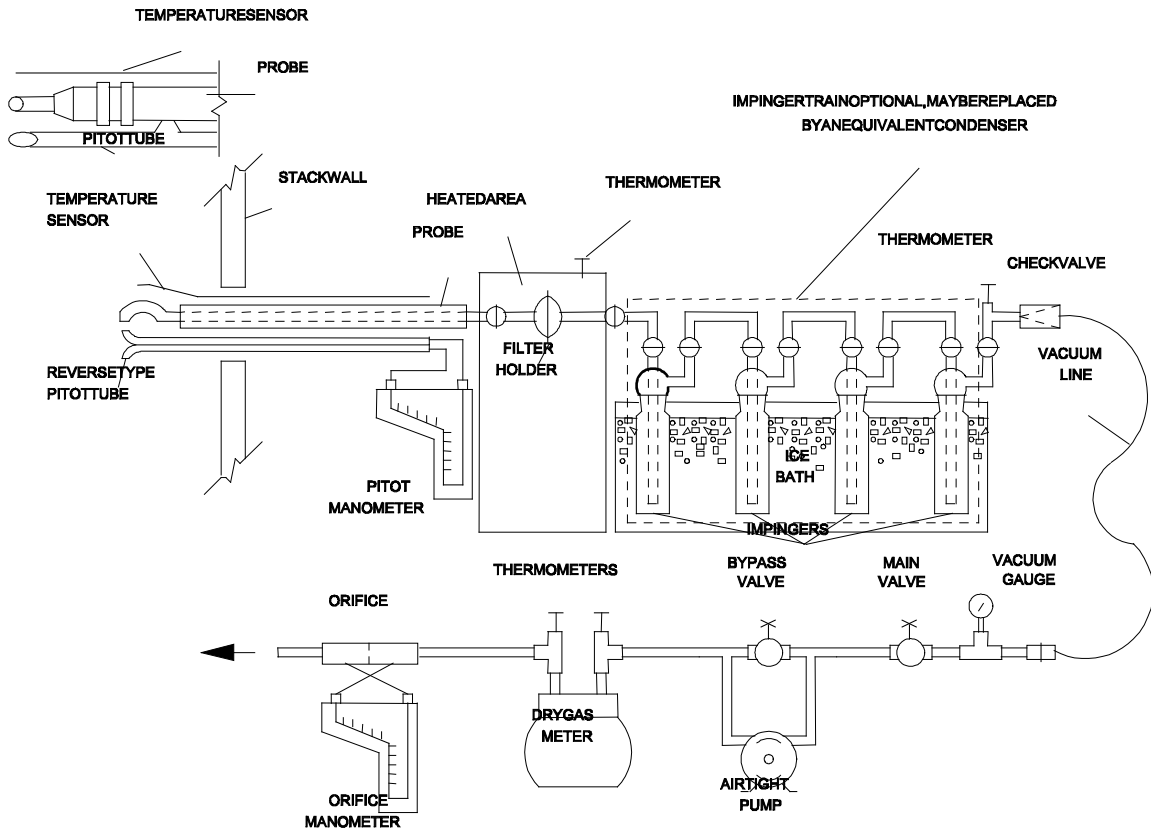
O<sub>2</sub>, CO<sub>2</sub>, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

### **NO<sub>x</sub> (where applicable)**

NO<sub>x</sub> was found using and API Model 252 NO<sub>x</sub> 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.  
 $\Delta H$  = Average pressure differential across the orifice meter (see Figure 5-2),  $mm H_2O$  ( $in. H_2O$ ).  
 $\rho_a$  = Density of acetone,  $mg/ml$  (see label on bottle).  
 $\rho_w$  = Density of water,  $0.9982 g/ml$  ( $0.002201 lb/ml$ ).  
 $\theta$  = Total sampling time,  $min$ .  
 $\theta_1$  = Sampling time interval, from the beginning of a run until the first component change,  $min$ .  
 $\theta_i$  = Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes,  $min$ .  
 $\theta_p$  = 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 <sup>3</sup>	0.02832
g/ft <sup>3</sup>	gr/ft <sup>3</sup>	15.43
g/ft <sup>3</sup>	lb/ft <sup>3</sup>	2.205 x 10 <sup>-3</sup>
g/ft <sup>3</sup>	g/m <sup>3</sup>	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,  $\text{m}^2$  ( $\text{ft}^2$ ).
- $B_{\text{ws}}$  = 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).

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

- $P_{\text{bar}}$  = 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),

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

- $P_{\text{std}}$  = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
- $Q_{\text{sd}}$  = Dry volumetric stack gas flow rate corrected to standard conditions,  $\text{dsm}^3/\text{hr}$  ( $\text{dscf}/\text{hr}$ ).
- $t_s$  = 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 10/16 Barometric Pressure ("Hg): 29.9  
Pitot I.D.. **107** Wind Tunnel Temperature (<sup>o</sup> F): 66.0  
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub> O)</i>	<i>S-Type Pitot ("H<sub>2</sub> O)</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

<i>Date:</i> Jan 10/16	<i>Barometric Pressure ("Hg):</i>	30.05
<i>Pitot I.D.:</i> <b>126</b>	<i>Wind Tunnel Temperature (<sup>o</sup> F):</i>	70.0
<i>Nozzle:</i> 0.250		

<i>Wind Velocity (ft/sec)</i>	<i>Ref. Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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 10/16 *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 ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>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 10/16 *Barometric Pressure ("Hg):* 29.74  
*Pitot I.D.:* **148** *Wind Tunnel Temperature (° F):* 70.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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 10/16 *Barometric Pressure ("Hg):* 29.78  
*Pitot I.D.:* **152** *Wind Tunnel Temperature (° F):* 64.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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 10/16 *Barometric Pressure ("Hg):* 29.78  
*Pitot I.D.:* **200** *Wind Tunnel Temperature (° F):* 70.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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

*Date:* Jan 10/16 *Barometric Pressure ("Hg):* 29.78  
*Pitot I.D.:* **217** *Wind Tunnel Temperature (° F):* 70.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref. Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
13.51	0.04147	0.05467	0.86230
19.93	0.09031	0.12262	0.84962
41.60	0.39339	0.54073	0.84442
62.13	0.87726	1.25293	0.82840
79.94	1.45249	2.09036	0.82524
101.14	2.32467	3.37170	0.82204

*Average= 0.83867*

*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 10/16 *Barometric Pressure ("Hg):* 29.78  
*Pitot I.D.:* **227** *Wind Tunnel Temperature (° F):* 70.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref. Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
14.25	0.04615	0.06120	0.85973
19.82	0.08929	0.12108	0.85014
41.12	0.38421	0.53999	0.83507
62.39	0.88468	1.27113	0.82591
78.33	1.39461	2.01495	0.82363
100.81	2.30975	3.41145	0.81460

Average= 0.83485

*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 10/16	<i>Barometric Pressure ("Hg):</i>	29.78
<i>Pitot I.D.:</i>	<b>241</b>	<i>Wind Tunnel Temperature (<sup>o</sup> F):</i>	72.0
<i>Nozzle:</i>	0.250		

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
12.31	0.03430	0.04718	0.84409
20.04	0.09089	0.12565	0.84200
40.67	0.37457	0.52832	0.83359
62.64	0.88842	1.20546	0.84990
83.77	1.58888	2.13719	0.85361
104.43	2.46938	3.35661	0.84914

*Average= 0.84539*

*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 10/16 *Barometric Pressure ("Hg):* 29.78  
*Pitot I.D.:* **271** *Wind Tunnel Temperature (° F):* 70.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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

<i>Date:</i>	Jan 10/16	<i>Barometric Pressure ("Hg):</i>	30.05
<i>Pitot I.D.:</i>	<b>140</b>	<i>Wind Tunnel Temperature (<sup>o</sup> F):</i>	70.0
<i>Nozzle:</i>	0.250		

<i>Wind Velocity (ft/sec)</i>	<i>Ref. Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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

*Date:* Jan 10/16 *Barometric Pressure ("Hg):* 29.78  
*Pitot I.D.:* **290** *Wind Tunnel Temperature (° F):* 70.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
12.27	0.03426	0.05081	0.81236
20.36	0.09418	0.13231	0.83525
40.71	0.37665	0.51364	0.84776
62.13	0.87724	1.16492	0.85911
80.92	1.47921	1.78114	0.90499
102.16	2.37196	3.20483	0.85170

*Average=* 0.85186

*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 10/16 *Barometric Pressure ("Hg):* 30  
*Pitot I.D.:* **301** *Wind Tunnel Temperature (° F):* 65.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref. Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
11.91	0.03274	0.04425	0.85196
19.94	0.09188	0.12337	0.85433
41.25	0.39334	0.52395	0.85777
62.08	0.89073	1.16706	0.86489
81.83	1.54787	2.07196	0.85568
102.58	2.43231	3.26403	0.85461

*Average=* 0.85654

*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 10/16 *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 ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</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 for S-Type Pitot Tube

Date: Jan 10/16 Barometric Pressure ("Hg): 29.9  
Pitot I.D.: **283** Wind Tunnel Temperature ( $^{\circ}$  F): 66.0  
Nozzle: 0.250

Wind Velocity (ft/sec)	Ref.Pitot ("H <sub>2</sub> O)	S-Type Pitot ("H <sub>2</sub> O)	Pitot Factor
12.39	0.03531	0.05045	0.82830
20.14	0.09327	0.13261	0.83029
40.78	0.38236	0.52684	0.84340
63.27	0.92048	1.27915	0.83981
81.40	1.52354	2.09079	0.84510
102.58	2.41929	3.31046	0.84632

Average= 0.83887

*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 10/16	<i>Barometric Pressure ("Hg):</i>	29.9
<i>Pitot I.D.:</i> <b>288</b>	<i>Wind Tunnel Temperature (° F):</i>	66.0
<i>Nozzle:</i> 0.250		

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
12.36	0.03511	0.04941	0.83455
20.03	0.09229	0.13527	0.81770
40.44	0.37596	0.54230	0.82430
40.12	0.37006	0.53470	0.82360
60.91	0.85305	1.20217	0.83395
80.80	1.50109	2.09096	0.83881

*Average= 0.82882*

*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 10/16 Barometric Pressure ("Hg): 29.8  
Pitot I.D.. **Apex 1** Wind Tunnel Temperature (<sup>o</sup> F): 71.0  
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
13.13	0.03916	0.05286	0.85209
18.91	0.08115	0.11117	0.84585
42.93	0.41830	0.58244	0.83898
65.63	0.97763	1.33416	0.84746
83.73	1.59148	2.14942	0.85187
101.67	2.34633	3.16217	0.85278

*Average= 0.84817*

*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 10/16 *Barometric Pressure ("Hg):* 29.8  
*Pitot I.D.:* **Apex 2** *Wind Tunnel Temperature (° F):* 71.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
12.87	0.03760	0.05230	0.83938
18.85	0.08065	0.11689	0.82232
41.96	0.39973	0.55884	0.83728
66.56	1.00571	1.36575	0.84954
83.32	1.57579	2.14452	0.84863
103.42	2.42810	3.40493	0.83601

*Average=* 0.83886

*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 10/16 *Barometric Pressure ("Hg):* 29.8  
*Pitot I.D.:* **Apex 3** *Wind Tunnel Temperature (° F):* 71.0  
*Nozzle:* 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H<sub>2</sub>O)</i>	<i>S-Type Pitot ("H<sub>2</sub>O)</i>	<i>Pitot Factor</i>
12.06	0.03303	0.04523	0.84598
18.93	0.08136	0.11221	0.84302
40.79	0.37771	0.52797	0.83736
66.50	1.00373	1.38890	0.84160
80.13	1.45739	2.02841	0.83916
102.79	2.39823	3.35658	0.83682

*Average=* 0.84066

*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: 19-Jul-16

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1038

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	62.0	62.0	62.5
P=Pres. Differential at WTM ("Hg)	0.0930	0.1555	0.2290
Pb= Atmospheric Pressure ("Hg)	28.82	28.82	28.82
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.5708	0.5708	0.5708
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	60.0	64.5	69.5
To= Dry Test Meter Outlet Temp. (oF.)	58.0	62.0	68.5
Ri= Initial Dry Test volume (ft3)	23.88	36.50	53.35
Rf= Final Dry Test Volume (ft3)	28.71	41.39	58.07
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	28.7270	28.6645	28.5910
Pd= Pb + (^H/13.59) "Hg	28.8936	28.9672	29.0408
Tw= Ta +460 (oR.)	522.0	522.0	522.5
Td= [(Ti + To)/2] + 460 (oR.)	519.0	523.3	529.0
Bw= Pv/Pb ("Hg)	0.0198	0.0198	0.0198
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	0.9952	0.9864	1.0269
Y (MEAN)(WTMF) =	1.0028		

MCCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE  
DRY GAS METER**

DATE: 19-Jul-16

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-980

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	62.0	62.0	62.0
P=Pres. Differential at WTM ("Hg)	0.1231	0.1899	0.2703
Pb= Atmospheric Pressure ("Hg)	28.82	28.82	28.82
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.5708	0.5708	0.5708
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	63.0	69.4	74.5
To= Dry Test Meter Outlet Temp. (oF.)	62.5	68.5	73.6
Ri= Initial Dry Test volume (ft3)	34.50	46.20	67.50
Rf= Final Dry Test Volume (ft3)	39.20	51.00	72.30
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	28.6969	28.6301	28.5497
Pd= Pb + (^H/13.59) "Hg	28.8936	28.9672	29.0408
Tw= Ta +460 (oR.)	522.0	522.0	522.0
Td= [(Ti + To)/2] + 460 (oR.)	522.8	528.9	534.1
Bw= Pv/Pb ("Hg)	0.0198	0.0198	0.0198
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0291	1.0146	1.0189
Y (MEAN)(WTMF) =	1.0209		

N.R. MCCALL & ASSOCIATES LTD.

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE  
DRY GAS METER**

DATE: 19-Jul-16

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1021

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	62.0	62.0	62.0
P=Pres. Differential at WTM ("Hg)	0.1258	0.1879	0.2211
Pb= Atmospheric Pressure ("Hg)	28.82	28.82	28.82
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.5708	0.5708	0.5708
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	65.0	70.0	71.0
To= Dry Test Meter Outlet Temp. (oF.)	63.0	66.2	66.8
Ri= Initial Dry Test volume (ft3)	54.20	61.58	82.14
Rf= Final Dry Test Volume (ft3)	59.19	66.45	87.00
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	28.6942	28.6321	28.5989
Pd= Pb + (^H/13.59) "Hg	28.8936	28.9672	29.0408
Tw= Ta +460 (oR.)	522.0	522.0	522.0
Td= [(Ti + To)/2] + 460 (oR.)	524.0	528.1	528.9
Bw= Pv/Pb ("Hg)	0.0198	0.0198	0.0198
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	0.9715	0.9985	0.9984
Y (MEAN)(WTMF) =	0.9894		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:

**CALIBRATION CERTIFICATE  
DRY GAS METER**

DATE: 19-Jul-16

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1039

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	62.0	62.0	62.0
P=Pres. Differential at WTM ("Hg)	0.1655	0.2428	0.2985
Pb= Atmospheric Pressure ("Hg)	28.82	28.82	28.82
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.5708	0.5708	0.5708
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	62.0	65.8	71.0
To= Dry Test Meter Outlet Temp. (oF.)	59.1	63.4	69.0
Ri= Initial Dry Test volume (ft3)	24.40	41.55	63.05
Rf= Final Dry Test Volume (ft3)	29.20	46.29	67.87
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	28.6545	28.5772	28.5215
Pd= Pb + (^H/13.59) "Hg	28.8936	28.9672	29.0408
Tw= Ta +460 (oR.)	522.0	522.0	522.0
Td= [(Ti + To)/2] + 460 (oR.)	520.6	524.6	530.0
Bw= Pv/Pb ("Hg)	0.0198	0.0198	0.0198
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0019	1.0171	1.0060
Y (MEAN)(WTMF) =	1.0083		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 19-Jul-16

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	28.82	28.82	28.82
Y=gas meter factor	0.9952	0.9952	0.9864
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	86.4	100.7	104.8
Rf=final gas meter vol.	88.31	103.41	108.11
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.3801664	0.5393984	0.6529968
Tm=meter out temp. (oF)	66	66	67
Tm=meter out temp. (oR.)	526	526	527
$P_m=P_b + \Delta H$	28.856792	28.893584	28.930375
$SQRT(T_m/P_m \cdot H/M_d)$	0.5609215	0.7927576	0.9712301
Ko=orifice const.	0.6777533	0.6804077	0.6723399

Ko MEAN = 0.6768337

$Ko^4 \cdot 144 = 389.85619$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 19-Jul-16

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	28.82	28.82	28.82
Y=gas meter factor	0.9864	1.0269	1.0269
Delta H=	2	2.5	3
Ri=int. gas meter vol.	110.5	114.5	120.8
Rf=final gas meter vol.	114.33	118.77	125.5
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.7555824	0.8769726	0.965286
Tm=meter out temp. (oF)	64	65	66
Tm=meter out temp. (oR.)	524	525	526
$P_m=P_b + \Delta H$	28.967167	29.003959	29.040751
$SQRT(T_m/P_m \cdot H/M_d)$	1.1175729	1.2498827	1.3696128
Ko=orifice const.	0.6760923	0.7016439	0.7047875

Ko MEAN = 0.6941746

$Ko^4 \cdot 144 = 399.84454$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 19-Jul-16

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	28.82	28.82	28.82
Y=gas meter factor	1.0019	1.0019	1.0171
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	68.7	71.7	74.42
Rf=final gas meter vol.	71.21	75.19	78.69
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.5029538	0.6993262	0.8686034
Tm=meter out temp. (oF)	66	66	67
Tm=meter out temp. (oR.)	526	526	527
$P_m=P_b + \Delta H$	28.856792	28.893584	28.930375
$SQRT(T_m/P_m \cdot H/M_d)$	0.5609215	0.7927576	0.9712301
Ko=orifice const.	0.8966563	0.8821438	0.8943333

Ko MEAN = 0.8910445

$Ko^4 \cdot 144 = 513.24161$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 19-Jul-16

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	28.82	28.82	28.82
Y=gas meter factor	1.0171	1.0171	1.0060
Delta H=	2	2.5	3
Ri=int. gas meter vol.	79.91	85.01	91.6
Rf=final gas meter vol.	84.69	90.44	97.53
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.9723476	1.1045706	1.193116
Tm=meter out temp. (oF)	67	67	67
Tm=meter out temp. (oR.)	527	527	527
$P_m=P_b + \Delta H$	28.967167	29.003959	29.040751
$SQRT(T_m/P_m \cdot H/M_d)$	1.1207675	1.2522612	1.3709141
Ko=orifice const.	0.867573	0.8820609	0.8703069

Ko MEAN = 0.8733136

$Ko^4 \cdot 144 = 503.02862$

McCALL ENVIRONMENTAL

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 19-Jul-16

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	28.82	28.82	28.82
Y=gas meter factor	0.9715	0.9715	0.9985
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	30.5	33.4	36.55
Rf=final gas meter vol.	32.32	36	39.63
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.353626	0.50518	0.615076
To=meter outlet Temp (oF)	66	67	67
Tm=meter out temp. (oR)	526	527	527
Pm=Pb + ^H	28.856792	28.893584	28.930375
SQRT(Tm/Pm*H/Md)	0.5609215	0.7935108	0.9712301
Ko=orifice const.	0.6304376	0.6366391	0.6332958

Ko MEAN = 0.6334575

Ko\*4\*144= 364.87152

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature: \_\_\_\_\_

ORIFICE METER CALIBRATION

DATE: 19-Jul-16

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	28.82	28.82	28.82
Y=gas meter factor	0.9985	0.9984	0.9984
Delta H=	2	2.5	3
Ri=int. gas meter vol.	39.9	44	46.6
Rf=final gas meter vol.	43.51	48.25	51.25
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.720917	0.84864	0.928512
To=meter outlet Temp (oF)	68	69	69
Tm=meter out temp. (oR)	528	529	529
Pm=Pb + ^H	28.967167	29.003959	29.040751
SQRT(Tm/Pm*H/Md)	1.1218304	1.2546351	1.373513
Ko=orifice const.	0.6426257	0.6764038	0.6760125

Ko MEAN = 0.665014

Ko\*4\*144= 383.04807

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: Jan 6/16

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	28.82	28.82	28.82
Y=gas meter factor	1.0291	1.0291	1.0146
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	3.6	6.36	10.01
Rf=final gas meter vol.	5.71	9.24	13.66
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.4342802	0.5927616	0.740658
To=meter outlet Temp (oF)	65	65	65
Tm=meter out temp. (oR)	525	525	525
Pm=Pb + ^H	28.856792	28.8935835	28.9303753
SQRT(Tm/Pm*H/Md)	0.5603881	0.79200366	0.96938543
Ko=orifice const.	0.7749633	0.74843291	0.76404903

Ko MEAN = 0.7624818

Ko\*4\*144= 439.18949

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: Jan 6/16

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	28.82	28.82	28.82
Y=gas meter factor	1.0146	1.0189	1.0189
Delta H=	2	2.5	3
Ri=int. gas meter vol.	14.1	19.1	25.4
Rf=final gas meter vol.	18.41	24.01	30.61
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.8745852	1.0005598	1.0616938
Tm=meter out temp. (oF)	66	67	68
Tm=meter out temp. (oR.)	526	527	528
$P_m=P_b + \Delta H$	28.967167	29.003959	29.040751
$SQRT(T_m/P_m \cdot H/M_d)$	1.1197037	1.2522612	1.3722142
Ko=orifice const.	0.7810863	0.7990025	0.7737085

Ko MEAN = 0.7845991

$Ko^4 \cdot 144 = 451.92908$

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

## 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: Pinnacle Pellet  
 Name: Lavington  
 Location:  
 LSD:  
 P.O.:  
 Acct code:

Lot ID: **1158612**  
 Control Number: B14776  
 Date Received: Sep 2, 2016  
 Date Reported: Sep 6, 2016  
 Report Number: 2129515

	Reference Number	1158612-1	1158612-2	1158612-3	
	Sample Date	Aug 30, 2016	Aug 30, 2016	Aug 30, 2016	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Test 1 / Dryer 2 North / A54	Test 2 / Dryer 2 North / A55	Test 3 / Dryer 2 North / A56	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Oil and Grease	Total	mg/sample	<1	2	<1
Volume	Sample volume	mL	360	360	350
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: Pinnacle Pellet  
 Name: Lavington  
 Location:  
 LSD:  
 P.O.:  
 Acct code:

Lot ID: **1158612**  
 Control Number: B14776  
 Date Received: Sep 2, 2016  
 Date Reported: Sep 6, 2016  
 Report Number: 2129515

	Reference Number	1158612-4	1158612-5	1158612-6	
	Sample Date	Aug 30, 2016	Aug 30, 2016	Aug 30, 2016	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Test 1 / Dryer 2 South / A57	Test 2 / Dryer 2 South / A58	Test 3 / Dryer 2 South / A59	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Oil and Grease	Total	mg/sample	5	3	2
Volume	Sample volume	mL	340	345	340
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: Pinnacle Pellet  
 Name: Lavington  
 Location:  
 LSD:  
 P.O.:  
 Acct code:

Lot ID: **1158612**  
 Control Number: B14776  
 Date Received: Sep 2, 2016  
 Date Reported: Sep 6, 2016  
 Report Number: 2129515

	Reference Number	1158612-7	1158612-8	1158612-9	
	Sample Date	Aug 30, 2016	Aug 30, 2016	Aug 30, 2016	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Test 1 / CF-12 stack / A60	Test 2 / CF-12 stack / A61	Test 3 / CF-12 stack / A62	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Oil and Grease	Total	mg/sample	6	8	10
Volume	Sample volume	mL	340	335	350
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: Pinnacle Pellet  
 Name: Lavington  
 Location:  
 LSD:  
 P.O.:  
 Acct code:

Lot ID: **1158612**  
 Control Number: B14776  
 Date Received: Sep 2, 2016  
 Date Reported: Sep 6, 2016  
 Report Number: 2129515

	Reference Number	1158612-10	1158612-11	1158612-12	
	Sample Date	Aug 31, 2016	Aug 31, 2016	Aug 31, 2016	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Test 1 / Dryer 1 North / A63	Test 2 / Dryer 1 North / A64	Test 3 / Dryer 1 North / A65	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Oil and Grease	Total	mg/sample	7	2	3
Volume	Sample volume	mL	360	340	375
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: Pinnacle Pellet  
 Name: Lavington  
 Location:  
 LSD:  
 P.O.:  
 Acct code:

Lot ID: **1158612**  
 Control Number: B14776  
 Date Received: Sep 2, 2016  
 Date Reported: Sep 6, 2016  
 Report Number: 2129515

	Reference Number	1158612-13	1158612-14	1158612-15	
	Sample Date	Aug 31, 2016	Aug 31, 2016	Aug 31, 2016	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Test 1 / Dryer 1 South / A66	Test 2 / Dryer 1 South / A67	Test 3 / Dryer 1 South / A68	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Oil and Grease	Total	mg/sample	1	6	<1
Volume	Sample volume	mL	355	370	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.