

Pinnacle Renewable Energy Inc

**Williams Lake Div
RA-17557
September 27, 2024**

Our Job Number: ME2425-090

Report Author: Matt McCall
McCall Environmental



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October 30, 2024

Pinnacle Renewable Energy Inc
1160 South Lakeside Dr.
Williams Lake, B.C.
V2J 6K9

Attention: Mr. Ian Tencarre

Reference: Parameters Tested – Total Particulate & Cond. Organics
Test Date(s) – September 27, 2024
Permit – PA-17557
McCall File Number – ME2425-090

As requested our firm has performed a series of air emission tests at your facility in Williams Lake BC.

Testing Parameters

Dryer Stacks 1-4

- Total Particulate and Condensable Organics State of Oregon Method

Key Personnel

- Report Generation: Matt McCall 250-542-5118
- Field Tech: Dan Lawrence, Chris Bodden, Kiefer Stauber 250-564-9106
- Plant Personnel: Ian Tencarre 250-267-7580

Test results are summarized immediately following this cover letter.

Lab analysis for condensable organic fractions was carried out by Element Labs in Surrey, B.C. A copy of their report is included in the Appendix of this report.

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

MCCALL ENVIRONMENTAL

Matt McCall

Summary of Test Results

Dryer Results September 27, 2024

Average of Triplicate Tests Dryer Stacks 1-4

Parameter	Stack 1	Stack2	Stack 3	Stack 4	Avg/Total	Permit	28-Jun-24
Test Date	27-Sep-24	27-Sep-24	27-Sep-24	27-Sep-24	N/A		N/A
Gas Temperature (°C)	28.9	30.1	25.9	34.8	29.9		32.92
% Moisture	1.87	2.28	2.58	2.63	2.34		2.42
Velocity (m/sec)	7.07	7.49	7.57	6.92	7.26		6.71
ACFM	43864	46414	46947	42914	180138		166306
Std. Dry Flow Rate (m ³ /sec)	18.39	19.22	19.65	17.44	74.70	*132	68.92
Tot Part. Dry Basis ref. Cond. (mg/m ³)	5.40	4.03	5.36	14.62	7.19	15.00	7.89
Front Half Particulate (mg/m ³)	3.55	2.29	3.41	4.83	3.52		6.08
Back Half Condensables (mg/m ³)	1.85	1.74	1.95	9.79	3.84		1.82
Mass Emission Rate (kg/hr)	0.36	0.28	0.38	0.92	1.93	7.67	1.95

* Note: ACFM, m³/sec, and kg/hr, are combined as opposed to averaged.

* Permitted flow rate is 33.0 m³/sec per stack, combined flow rate of 132

* Standard reference conditions are on a dry basis, 20 deg C and pressure at sea level 29.92 inches Hg.

**Average Total Particulate across the four stacks is weighted against individual stack flow

Discussion Of Test Results

Test results are in compliance with permitted limits.

The last time this sources was tested was in June 2024. Those results are included in the summary table above.

Field personnel did not notice any abnormalities in and around the test site in terms of abnormal opacity of fly ash during testing. To the best of our knowledge the plant was operating normally throughout the duration of the testing.

These sources are quite turbulent however are not considered cyclonic and are tested with standard testing methodologies.

Dryer Stack 1
27-Sep-24
Pinnacle Renewable Energy
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	84 ° F	29 ° C
Moisture Content (by volume):	1.87 %	
Average Stack Gas Velocity:	23.21 ft/sec	7.07 m/sec
Total Actual Gas Flow Rate:	43864 ACFM	
Dry Gas flow Rate at Reference Conditions:	38969 SCFM	18.39 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	5.40 mg/m ³
Front Half Particulate	0.00 gr/ft ³	3.55 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.85 mg/m ³
Mass Emission Rate	0.79 lbs/hr	0.36 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	83 ° F	28 ° C
Moisture Content (by volume):	1.7 %	
Average Stack Gas Velocity:	23.1 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	43712 ACFM	
Dry Gas flow Rate at Reference Conditions:	38997 SCFM	18.4 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	3.0 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.8 mg/m ³
Mass Emission Rate	0.70 lbs/hr	0.32 kg/hr

TEST 2:

Gas Temperature:	85 ° F	30 ° C
Moisture Content (by volume):	1.9 %	
Average Stack Gas Velocity:	23.3 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	43954 ACFM	
Dry Gas flow Rate at Reference Conditions:	38927 SCFM	18.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	5.9 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.0 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	0.86 lbs/hr	0.39 kg/hr

TEST 3:

Gas Temperature:	84 ° F	29 ° C
Moisture Content (by volume):	2.0 %	
Average Stack Gas Velocity:	23.2 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	43924 ACFM	
Dry Gas flow Rate at Reference Conditions:	38982 SCFM	18.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.5 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.8 mg/m ³
Mass Emission Rate	0.81 lbs/hr	0.37 kg/hr



Client: Pinnacle Renewable Energy
Plant Location: Williams Lake, BC
Process: Dryer Stack 1
Permit Number: RA-17557
Job Number:
Pollution Control Permit: 15 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(g):
Weight of 2" Filter(g):
Total Weight of Particulate(g):

TEST 1	TEST 2	TEST 3
M99	N1	N2
27-Sep-24	27-Sep-24	27-Sep-24
8:11	9:41	11:09
9:13	10:43	12:11
60	60	60
CB/KS	CB/KS	CB/KS
980	980	980
27.90	27.90	27.90
0.12	0.12	0.12
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.310	0.310	0.310
0.9980	0.9980	0.9980
0.84182	0.84182	0.84182
31.5	31.5	31.5
12	14	15
1.7	1.8	1.5
0.0011	0.0013	0.0006
0.0021	0.0030	0.0034
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0052	0.0063	0.0060

Sampling Data for - TEST 1-
Dryer Stack 1
Pinnacle Renewable Energy
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.17	1.42	58	58	83	56.90	0.92
A-11	0.17	1.44	64	58	81	58.55	1.01
A-10	0.18	1.53	71	58	81	60.38	0.98
A-9	0.16	1.37	75	60	81	62.23	1.00
A-8	0.16	1.36	75	60	83	64.02	0.93
A-7	0.15	1.29	78	63	83	65.68	0.95
A-6	0.14	1.20	80	62	81	67.33	0.99
A-5	0.13	1.12	84	65	83	68.99	1.05
A-4	0.13	1.12	84	66	83	70.69	0.98
A-3	0.14	1.21	85	68	85	72.29	0.93
A-2	0.21	1.83	88	70	84	73.86	1.00
A-1	0.25	2.19	92	71	83	75.93	0.92
B-12	0.17	1.49	93	73	82	78.02	1.03
B-11	0.17	1.49	93	73	83	79.96	1.02
B-10	0.16	1.40	92	74	83	81.89	0.93
B-9	0.17	1.54	91	74	83	83.60	0.97
B-8	0.14	1.23	95	77	84	85.43	0.92
B-7	0.11	0.97	91	77	84	87.01	1.05
B-6	0.11	0.97	94	78	84	88.60	1.03
B-5	0.10	0.88	93	78	82	90.18	0.93
B-4	0.12	1.05	94	77	83	91.54	1.02
B-3	0.15	1.33	94	79	83	93.17	0.99
B-2	0.15	1.33	95	79	83	94.93	1.01
B-1	0.15	1.33	96	79	83	96.74	1.03
						98.59	

Sampling Data for - TEST 2-
Dryer Stack 1
Pinnacle Renewable Energy
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.17	1.46	76	75	85	98.72	0.96
A-11	0.18	1.54	71	72	84	100.50	0.97
A-10	0.18	1.56	86	73	85	102.34	0.92
A-9	0.16	1.38	81	73	85	104.10	1.03
A-8	0.17	1.47	83	74	87	105.96	0.96
A-7	0.16	1.39	85	74	86	107.74	0.97
A-6	0.15	1.31	89	75	86	109.50	0.99
A-5	0.14	1.23	91	76	85	111.25	0.97
A-4	0.13	1.14	93	77	85	112.90	1.02
A-3	0.13	1.14	94	78	86	114.58	0.94
A-2	0.22	1.93	95	78	87	116.14	0.97
A-1	0.23	2.02	97	78	86	118.21	0.95
B-12	0.16	1.42	99	80	85	120.29	0.94
B-11	0.17	1.50	97	81	86	122.02	1.09
B-10	0.17	1.50	100	83	87	124.08	0.98
B-9	0.16	1.41	100	82	87	125.94	0.95
B-8	0.14	1.24	99	83	87	127.69	1.00
B-7	0.12	1.07	99	84	85	129.42	1.10
B-6	0.11	0.97	99	84	85	131.18	1.01
B-5	0.10	0.89	99	84	85	132.74	0.96
B-4	0.10	0.89	96	84	84	134.15	1.03
B-3	0.16	1.44	98	85	84	135.65	0.92
B-2	0.15	1.34	98	85	83	137.35	0.91
B-1	0.15	1.34	103	85	83	138.99	0.95
						140.70	

Sampling Data for - TEST 3-
Dryer Stack 1
Pinnacle Renewable Energy
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.17	1.51	78	100	83	41.78	0.96
A-11	0.19	1.67	91	80	83	43.61	0.96
A-10	0.18	1.59	92	80	84	45.53	0.96
A-9	0.17	1.50	95	81	86	47.40	0.96
A-8	0.13	1.15	98	81	85	49.21	1.00
A-7	0.14	1.24	96	83	84	50.87	1.02
A-6	0.16	1.42	97	81	83	52.64	0.99
A-5	0.15	1.34	108	84	84	54.46	0.98
A-4	0.13	1.16	101	85	84	56.24	1.00
A-3	0.13	1.16	99	85	83	57.91	0.92
A-2	0.20	1.78	100	86	84	59.45	1.00
A-1	0.24	2.15	105	86	83	61.52	0.92
B-12	0.15	1.34	108	88	85	63.63	0.99
B-11	0.16	1.44	106	89	84	65.43	1.00
B-10	0.17	1.54	108	88	83	67.30	1.04
B-9	0.17	1.54	109	91	83	69.31	0.92
B-8	0.15	1.35	106	90	83	71.10	1.01
B-7	0.13	1.17	109	93	85	72.94	1.05
B-6	0.12	1.08	107	91	84	74.72	0.94
B-5	0.11	0.99	107	91	85	76.25	1.00
B-4	0.10	0.90	106	92	84	77.81	1.02
B-3	0.15	1.36	107	94	83	79.33	1.00
B-2	0.15	1.36	107	94	83	81.15	0.99
B-1	0.16	1.45	109	94	84	82.95	0.99
						84.82	



Dryer Stack 1
 Pinnacle Renewable Energy
 Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.984

Delta P:	0.152 "H ₂ O	Us avg:	23.13 ft/sec
Delta H:	1.337	ACFM:	43712 ft ³ /min
Tm avg:	537.8 °R	SDCFM:	38997 ft ³ /min
Ts avg:	542.8 °R	Vm std:	38.23 ft ³
Bwo:	0.017	Vm corr:	41.61 ft ³
Md:	28.84	Vm:	41.69 ft ³
Ms:	28.66	MF:	0.9980
Pb:	27.90 "Hg	PCON:	4.80 mg/m ³
Pm:	28.00 "Hg	ERAT:	0.32 kg/hr
Ps:	27.91 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.978

Delta P:	0.153 "H ₂ O	Us avg:	23.26 ft/sec
Delta H:	1.358	ACFM:	43954 ft ³ /min
Tm avg:	546.1 °R	SDCFM:	38927 ft ³ /min
Ts avg:	545.3 °R	Vm std:	37.91 ft ³
Bwo:	0.019	Vm corr:	41.90 ft ³
Md:	28.84	Vm:	41.98 ft ³
Ms:	28.63	MF:	0.9980
Pb:	27.90 "Hg	PCON:	5.87 mg/m ³
Pm:	28.00 "Hg	ERAT:	0.39 kg/hr
Ps:	27.91 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.984

Delta P:	0.153 "H ₂ O	Us avg:	23.24 ft/sec
Delta H:	1.383	ACFM:	43924 ft ³ /min
Tm avg:	554.9 °R	SDCFM:	38982 ft ³ /min
Ts avg:	543.8 °R	Vm std:	38.25 ft ³
Bwo:	0.020	Vm corr:	42.95 ft ³
Md:	28.84	Vm:	43.04 ft ³
Ms:	28.62	MF:	0.9980
Pb:	27.90 "Hg	PCON:	5.54 mg/m ³
Pm:	28.00 "Hg	ERAT:	0.37 kg/hr
Ps:	27.91 "Hg		

Dryer Stack 2
27-Sep-24
Pinnacle Renewable Energy Inc.
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	86 ° F	30 ° C
Moisture Content (by volume):	2.28 %	
Average Stack Gas Velocity:	24.56 ft/sec	7.49 m/sec
Total Actual Gas Flow Rate:	46414 ACFM	
Dry Gas flow Rate at Reference Conditions:	40718 SCFM	19.22 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	4.03 mg/m ³
Front Half Particulate	0.00 gr/ft ³	2.29 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.74 mg/m ³
Mass Emission Rate	0.62 lbs/hr	0.28 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	84 ° F	29 ° C
Moisture Content (by volume):	2.5 %	
Average Stack Gas Velocity:	24.4 ft/sec	7.4 m/sec
Total Actual Gas Flow Rate:	46175 ACFM	
Dry Gas flow Rate at Reference Conditions:	40561 SCFM	19.1 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft ³	3.4 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.6 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.51 lbs/hr	0.23 kg/hr

TEST 2:

Gas Temperature:	87 ° F	31 ° C
Moisture Content (by volume):	1.8 %	
Average Stack Gas Velocity:	24.6 ft/sec	7.5 m/sec
Total Actual Gas Flow Rate:	46424 ACFM	
Dry Gas flow Rate at Reference Conditions:	40880 SCFM	19.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.3 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.5 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.65 lbs/hr	0.30 kg/hr

TEST 3:

Gas Temperature:	87 ° F	31 ° C
Moisture Content (by volume):	2.6 %	
Average Stack Gas Velocity:	24.7 ft/sec	7.5 m/sec
Total Actual Gas Flow Rate:	46642 ACFM	
Dry Gas flow Rate at Reference Conditions:	40712 SCFM	19.2 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.5 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.68 lbs/hr	0.31 kg/hr



Client: Pinnacle Renewable Energy Inc.
Plant Location: Williams Lake, BC
Process: Dryer Stack 2
Permit Number: RA-17557
Job Number: ME2425-090
Pollution Control Permit: 15 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(g):
Weight of 2" Filter(g):
Total Weight of Particulate(g):

TEST 1	TEST 2	TEST 3
N3	N4	N5
27-Sep-24	27-Sep-24	27-Sep-24
8:11	9:41	11:09
9:13	10:43	12:11
60	60	60
CB/KS	CB/KS	CB/KS
1021	1021	1021
27.80	27.80	27.80
-0.19	-0.19	-0.19
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.310	0.310	0.310
0.9945	0.9945	0.9945
0.83829	0.83829	0.83829
31.5	31.5	31.5
20	14	21
1.9	1.5	1.6
0.0001	0.0010	0.0017
0.0018	0.0019	0.0014
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0039	0.0049	0.0051

Sampling Data for - TEST 1-
Dryer Stack 2
Pinnacle Renewable Energy Inc.
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.24	2.45	53	53	84	60.35	1.03
A-11	0.23	2.36	60	54	85	62.51	1.01
A-10	0.19	1.95	62	53	84	64.59	1.00
A-9	0.14	1.45	66	54	83	66.48	1.02
A-8	0.13	1.35	67	54	83	68.15	1.02
A-7	0.13	1.35	70	54	83	69.76	1.02
A-6	0.15	1.56	71	55	83	71.37	0.98
A-5	0.15	1.57	75	57	83	73.03	1.01
A-4	0.13	1.36	76	59	84	74.75	1.09
A-3	0.12	1.26	76	61	84	76.48	0.99
A-2	0.19	2.00	77	63	85	77.99	1.00
A-1	0.19	2.00	79	63	85	79.91	1.02
B-12	0.20	2.12	83	64	85	81.88	1.00
B-11	0.19	2.01	84	66	85	83.87	1.00
B-10	0.20	2.13	86	69	85	85.81	1.02
B-9	0.20	2.14	87	70	84	87.85	1.03
B-8	0.18	1.93	88	71	84	89.92	0.99
B-7	0.15	1.61	89	74	84	91.82	0.97
B-6	0.13	1.40	89	73	84	93.52	1.05
B-5	0.13	1.40	90	74	84	95.24	1.00
B-4	0.15	1.61	90	75	85	96.87	0.95
B-3	0.20	2.16	91	76	85	98.54	0.97
B-2	0.18	1.94	92	76	87	100.51	1.03
B-1	0.21	2.27	94	76	86	102.49	0.97
						104.51	

Sampling Data for - TEST 2-
Dryer Stack 2
Pinnacle Renewable Energy Inc.
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.23	2.46	74	73	88	4.78	0.98
A-11	0.23	2.46	75	72	88	6.87	1.00
A-10	0.20	2.15	80	72	87	9.00	1.00
A-9	0.15	1.61	82	72	91	11.01	1.02
A-8	0.14	1.51	84	73	90	12.78	0.98
A-7	0.13	1.41	84	73	87	14.44	0.96
A-6	0.14	1.52	86	72	86	16.00	1.04
A-5	0.16	1.74	87	74	86	17.76	0.97
A-4	0.15	1.67	89	75	86	19.52	0.96
A-3	0.13	1.42	90	76	86	21.22	1.00
A-2	0.12	1.31	90	77	87	22.86	0.99
A-1	0.17	1.86	91	79	87	24.42	1.00
B-12	0.18	1.97	94	80	89	26.30	1.01
B-11	0.20	2.21	95	81	86	28.26	0.99
B-10	0.21	2.32	96	82	86	30.30	1.00
B-9	0.20	2.21	97	83	87	32.41	1.03
B-8	0.19	2.11	98	85	87	34.54	1.00
B-7	0.18	2.00	98	84	86	36.55	1.01
B-6	0.16	1.78	99	85	86	38.54	1.00
B-5	0.15	1.67	99	85	86	40.40	1.02
B-4	0.13	1.44	99	86	87	42.24	1.00
B-3	0.18	2.00	100	86	86	43.91	0.95
B-2	0.20	2.23	100	88	86	45.79	1.01
B-1	0.21	2.35	101	89	86	47.89	0.99
						50.00	

Sampling Data for - TEST 3-
Dryer Stack 2
Pinnacle Renewable Energy Inc.
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.24	2.63	84	86	87	50.42	1.03
A-11	0.22	2.40	86	83	89	52.70	0.98
A-10	0.21	2.29	90	83	90	54.77	1.02
A-9	0.16	1.76	92	85	88	56.89	1.03
A-8	0.13	1.44	94	85	86	58.78	1.02
A-7	0.13	1.43	94	84	88	60.47	0.93
A-6	0.14	1.54	95	83	87	62.01	1.03
A-5	0.15	1.65	97	81	86	63.77	0.96
A-4	0.16	1.77	97	82	86	65.48	0.92
A-3	0.15	1.67	100	87	86	67.17	1.03
A-2	0.18	1.86	100	88	86	69.01	0.92
A-1	0.21	2.34	101	87	92	70.82	0.98
B-12	0.20	2.21	102	88	87	72.88	0.98
B-11	0.19	2.24	103	91	87	74.91	1.07
B-10	0.21	2.35	103	92	87	77.07	0.92
B-9	0.20	2.25	105	94	87	79.02	1.01
B-8	0.17	1.91	105	94	87	81.13	1.01
B-7	0.16	1.80	105	95	87	83.07	1.00
B-6	0.15	1.69	105	96	86	84.93	1.01
B-5	0.13	1.47	105	95	86	86.76	1.01
B-4	0.14	1.57	105	95	88	88.46	0.96
B-3	0.16	1.80	106	96	87	90.14	1.03
B-2	0.19	2.14	107	96	87	92.07	0.92
B-1	0.18	2.03	107	97	87	93.95	1.07
						96.08	



Dryer Stack 2
Pinnacle Renewable Energy Inc.
Williams Lake, BC

Data for TEST 1		OVERALL ISOKINETICS - TEST 1		1.006
Delta P:	0.170 "H₂O	Us avg:	24.43 ft/sec	
Delta H:	1.808	ACFM:	46175 ft³/min	
Tm avg:	531.6 °R	SDCFM:	40561 ft³/min	
Ts avg:	544.3 °R	Vm std:	40.72 ft³	
Bwo:	0.025	Vm corr:	43.92 ft³	
Md:	28.84	Vm:	44.16 ft³	
Ms:	28.57	MF:	0.9945	
Pb:	27.80 "Hg	PCON:	3.38 mg/m³	
Pm:	27.93 "Hg	ERAT:	0.23 kg/hr	
Ps:	27.79 "Hg			

Data for TEST 2		OVERALL ISOKINETICS - TEST 2		0.996
Delta P:	0.171 "H₂O	Us avg:	24.56 ft/sec	
Delta H:	1.892	ACFM:	46424 ft³/min	
Tm avg:	545.2 °R	SDCFM:	40880 ft³/min	
Ts avg:	547.0 °R	Vm std:	40.67 ft³	
Bwo:	0.018	Vm corr:	44.97 ft³	
Md:	28.84	Vm:	45.22 ft³	
Ms:	28.64	MF:	0.9945	
Pb:	27.80 "Hg	PCON:	4.25 mg/m³	
Pm:	27.94 "Hg	ERAT:	0.30 kg/hr	
Ps:	27.79 "Hg			

Data for TEST 3		OVERALL ISOKINETICS - TEST 3		0.994
Delta P:	0.172 "H₂O	Us avg:	24.68 ft/sec	
Delta H:	1.927	ACFM:	46642 ft³/min	
Tm avg:	554.4 °R	SDCFM:	40712 ft³/min	
Ts avg:	547.3 °R	Vm std:	40.39 ft³	
Bwo:	0.026	Vm corr:	45.41 ft³	
Md:	28.84	Vm:	45.66 ft³	
Ms:	28.56	MF:	0.9945	
Pb:	27.80 "Hg	PCON:	4.46 mg/m³	
Pm:	27.94 "Hg	ERAT:	0.31 kg/hr	
Ps:	27.79 "Hg			

Dryer Stack 3
27-Sep-24
Pinnacle Renewable Energy Inc.
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	79 ° F	26 ° C
Moisture Content (by volume):	2.58 %	
Average Stack Gas Velocity:	24.84 ft/sec	7.57 m/sec
Total Actual Gas Flow Rate:	46947 ACFM	
Dry Gas flow Rate at Reference Conditions:	41641 SCFM	19.65 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	5.36 mg/m ³
Front Half Particulate	0.00 gr/ft ³	3.41 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.95 mg/m ³
Mass Emission Rate	0.84 lbs/hr	0.38 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	77 ° F	25 ° C
Moisture Content (by volume):	2.6 %	
Average Stack Gas Velocity:	24.9 ft/sec	7.6 m/sec
Total Actual Gas Flow Rate:	46972 ACFM	
Dry Gas flow Rate at Reference Conditions:	41803 SCFM	19.7 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.3 mg/m ³
Front Half Particulate	.003 gr/ft ³	5.8 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.5 mg/m ³
Mass Emission Rate	1.30 lbs/hr	0.59 kg/hr

TEST 2:

Gas Temperature:	79 ° F	26 ° C
Moisture Content (by volume):	2.6 %	
Average Stack Gas Velocity:	24.9 ft/sec	7.6 m/sec
Total Actual Gas Flow Rate:	47009 ACFM	
Dry Gas flow Rate at Reference Conditions:	41648 SCFM	19.7 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft ³	2.8 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.2 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.44 lbs/hr	0.20 kg/hr

TEST 3:

Gas Temperature:	80 ° F	26 ° C
Moisture Content (by volume):	2.6 %	
Average Stack Gas Velocity:	24.8 ft/sec	7.6 m/sec
Total Actual Gas Flow Rate:	46859 ACFM	
Dry Gas flow Rate at Reference Conditions:	41471 SCFM	19.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.9 mg/m ³
Front Half Particulate	.001 gr/ft ³	3.3 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.77 lbs/hr	0.35 kg/hr



Client: Pinnacle Renewable Energy Inc.
Plant Location: Williams Lake, BC
Process: Dryer Stack 3
Permit Number: RA-17557
Job Number: ME2425-090
Pollution Control Permit: 15 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(g):
Weight of 2" Filter(g):
Total Weight of Particulate(g):

TEST 1	TEST 2	TEST 3
M92	M93	M97
27-Sep-24	27-Sep-24	27-Sep-24
8:12	9:41	11:08
9:14	10:43	12:10
60	60	60
KS/DL	KS/DL	KS/DL
1039	1039	1039
27.80	27.80	27.80
-0.08	-0.08	-0.08
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.310	0.310	0.310
1.0054	1.0054	1.0054
0.83365	0.83365	0.83365
31.5	31.5	31.5
20	20	21
3.3	3.4	3.1
0.0006	0.0006	0.0002
0.0063	0.0008	0.0037
0.0030	0.0020	0.0020
0.0000	0.0000	0.0000
0.0099	0.0034	0.0059

Sampling Data for - TEST 1-
Dryer Stack 3
Pinnacle Renewable Energy Inc.
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.18	1.29	55	54	88	36.53	0.97
A-11	0.18	1.32	62	55	83	38.27	1.00
A-10	0.19	1.40	68	55	81	40.09	1.02
A-9	0.19	1.42	72	56	79	42.00	1.00
A-8	0.18	1.35	76	57	78	43.88	0.98
A-7	0.17	1.29	80	59	76	45.70	0.96
A-6	0.17	1.30	84	60	73	47.43	1.02
A-5	0.16	1.23	86	62	72	49.29	1.06
A-4	0.16	1.23	89	64	73	51.17	1.07
A-3	0.17	1.32	92	67	73	53.08	1.08
A-2	0.17	1.32	94	69	73	55.07	1.04
A-1	0.18	1.41	96	72	73	57.00	1.04
B-12	0.20	1.56	98	73	75	59.00	0.99
B-11	0.20	1.56	98	73	75	61.00	0.99
B-10	0.20	1.57	100	75	76	63.01	1.03
B-9	0.19	1.49	103	77	77	65.11	1.05
B-8	0.18	1.42	105	79	77	67.19	1.00
B-7	0.17	1.34	105	81	77	69.13	0.97
B-6	0.17	1.34	106	81	77	70.97	0.92
B-5	0.16	1.26	105	83	78	72.70	1.08
B-4	0.18	1.42	106	83	79	74.68	1.00
B-3	0.18	1.42	106	84	79	76.62	0.96
B-2	0.19	1.51	107	85	78	78.48	1.02
B-1	0.20	1.59	107	85	79	80.53	0.98
						82.55	

Sampling Data for - TEST 2-
Dryer Stack 3
Pinnacle Renewable Energy Inc.
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.19	1.45	76	76	89	82.76	1.07
A-11	0.19	1.48	84	80	83	84.80	1.07
A-10	0.20	1.57	92	79	81	86.88	1.02
A-9	0.19	1.50	94	79	81	88.93	1.04
A-8	0.17	1.34	96	79	80	90.98	1.10
A-7	0.16	1.28	99	80	77	93.03	1.00
A-6	0.16	1.28	101	82	77	94.85	1.05
A-5	0.15	1.20	103	83	77	96.77	1.05
A-4	0.15	1.20	104	83	77	98.63	0.92
A-3	0.18	1.44	106	84	79	100.26	0.98
A-2	0.16	1.29	107	85	77	102.17	1.01
A-1	0.19	1.54	109	86	76	104.03	1.05
B-12	0.19	1.54	109	87	78	106.14	1.01
B-11	0.19	1.54	111	88	77	108.17	1.01
B-10	0.20	1.63	113	90	77	110.21	0.97
B-9	0.20	1.63	113	90	78	112.23	0.92
B-8	0.19	1.55	114	92	78	114.15	1.02
B-7	0.18	1.47	114	92	78	116.23	0.97
B-6	0.18	1.47	115	93	79	118.15	1.00
B-5	0.17	1.38	116	94	81	120.13	1.04
B-4	0.17	1.39	116	95	80	122.12	1.00
B-3	0.17	1.39	117	96	81	124.04	1.05
B-2	0.19	1.55	117	96	83	126.06	1.01
B-1	0.19	1.55	117	96	83	128.12	1.06
						130.27	

Sampling Data for - TEST 3-
Dryer Stack 3
Pinnacle Renewable Energy Inc.
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.18	1.38	82	82	91	30.34	1.06
A-11	0.19	1.49	89	88	84	32.33	1.03
A-10	0.20	1.58	92	90	84	34.35	0.97
A-9	0.20	1.59	99	90	83	36.31	0.99
A-8	0.18	1.45	102	90	79	38.34	1.02
A-7	0.17	1.37	108	90	79	40.33	1.02
A-6	0.17	1.39	109	90	78	42.28	1.04
A-5	0.16	1.30	111	91	79	44.27	1.02
A-4	0.15	1.22	112	92	77	46.17	1.03
A-3	0.17	1.39	113	93	78	48.03	1.03
A-2	0.17	1.39	115	95	79	50.00	0.97
A-1	0.18	1.47	116	95	78	51.86	0.93
B-12	0.20	1.64	118	96	79	53.71	0.96
B-11	0.20	1.65	122	97	78	55.73	1.05
B-10	0.19	1.56	120	98	79	57.95	1.04
B-9	0.19	1.58	121	100	76	60.08	1.04
B-8	0.18	1.49	121	100	78	62.22	1.02
B-7	0.17	1.41	122	102	76	64.26	0.98
B-6	0.17	1.41	122	102	77	66.17	1.02
B-5	0.16	1.33	122	102	78	68.16	1.06
B-4	0.16	1.33	123	103	79	70.17	1.08
B-3	0.16	1.33	124	105	80	72.22	1.04
B-2	0.18	1.49	124	105	80	74.20	0.98
B-1	0.20	1.66	125	107	81	76.17	1.04
						78.38	



Dryer Stack 3
Pinnacle Renewable Energy Inc.
Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 1.009

Delta P:	0.180 "H₂O	Us avg:	24.85 ft/sec
Delta H:	1.390	ACFM:	46972 ft³/min
Tm avg:	541.0 °R	SDCFM:	41803 ft³/min
Ts avg:	537.0 °R	Vm std:	42.11 ft³
Bwo:	0.026	Vm corr:	46.27 ft³
Md:	28.84	Vm:	46.02 ft³
Ms:	28.56	MF:	1.0054
Pb:	27.80 "Hg	PCON:	8.30 mg/m³
Pm:	27.90 "Hg	ERAT:	0.59 kg/hr
Ps:	27.79 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 1.017

Delta P:	0.179 "H₂O	Us avg:	24.87 ft/sec
Delta H:	1.444	ACFM:	47009 ft³/min
Tm avg:	556.4 °R	SDCFM:	41648 ft³/min
Ts avg:	539.5 °R	Vm std:	42.28 ft³
Bwo:	0.026	Vm corr:	47.77 ft³
Md:	28.84	Vm:	47.51 ft³
Ms:	28.56	MF:	1.0054
Pb:	27.80 "Hg	PCON:	2.84 mg/m³
Pm:	27.91 "Hg	ERAT:	0.20 kg/hr
Ps:	27.79 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 1.018

Delta P:	0.178 "H₂O	Us avg:	24.79 ft/sec
Delta H:	1.454	ACFM:	46859 ft³/min
Tm avg:	564.5 °R	SDCFM:	41471 ft³/min
Ts avg:	539.6 °R	Vm std:	42.14 ft³
Bwo:	0.026	Vm corr:	48.30 ft³
Md:	28.84	Vm:	48.04 ft³
Ms:	28.55	MF:	1.0054
Pb:	27.80 "Hg	PCON:	4.94 mg/m³
Pm:	27.91 "Hg	ERAT:	0.35 kg/hr
Ps:	27.79 "Hg		

Dryer Stack 4
27-Sep-24
Pinnacle Renewable Energy Inc
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	95 ° F	35 ° C
Moisture Content (by volume):	2.63 %	
Average Stack Gas Velocity:	22.71 ft/sec	6.92 m/sec
Total Actual Gas Flow Rate:	42914 ACFM	
Dry Gas flow Rate at Reference Conditions:	36952 SCFM	17.44 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.01 gr/ft ³	14.62 mg/m ³
Front Half Particulate	0.00 gr/ft ³	4.83 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	9.79 mg/m ³
Mass Emission Rate	2.02 lbs/hr	0.92 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	94 ° F	35 ° C
Moisture Content (by volume):	2.7 %	
Average Stack Gas Velocity:	22.7 ft/sec	6.9 m/sec
Total Actual Gas Flow Rate:	42815 ACFM	
Dry Gas flow Rate at Reference Conditions:	36844 SCFM	17.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.012 gr/ft ³	27.1 mg/m ³
Front Half Particulate	.003 gr/ft ³	6.1 mg/m ³
Back Half Condensibles	.009 gr/ft ³	21.0 mg/m ³
Mass Emission Rate	3.74 lbs/hr	1.69 kg/hr

TEST 2:

Gas Temperature:	94 ° F	34 ° C
Moisture Content (by volume):	2.7 %	
Average Stack Gas Velocity:	22.6 ft/sec	6.9 m/sec
Total Actual Gas Flow Rate:	42706 ACFM	
Dry Gas flow Rate at Reference Conditions:	36820 SCFM	17.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.005 gr/ft ³	10.6 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.7 mg/m ³
Back Half Condensibles	.003 gr/ft ³	5.9 mg/m ³
Mass Emission Rate	1.46 lbs/hr	0.66 kg/hr

TEST 3:

Gas Temperature:	96 ° F	36 ° C
Moisture Content (by volume):	2.5 %	
Average Stack Gas Velocity:	22.9 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	43222 ACFM	
Dry Gas flow Rate at Reference Conditions:	37192 SCFM	17.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.2 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.5 mg/m ³
Mass Emission Rate	0.87 lbs/hr	0.39 kg/hr



Client: Pinnacle Renewable Energy Inc
Plant Location: Williams Lake, BC
Process: Dryer Stack 4
Permit Number: RA-17557
Job Number: ME2425-090
Pollution Control Permit: 15 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(g):
Weight of 2" Filter(g):
Total Weight of Particulate(g):

TEST 1	TEST 2	TEST 3
M46	M47	M91
27-Sep-24	27-Sep-24	27-Sep-24
8:11	9:41	11:08
9:15	10:44	12:14
60	60	60
KS/DL	KS/DL	KS/DL
955	955	955
27.80	27.80	27.80
-0.07	-0.07	-0.07
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.334	0.334	0.334
0.9994	0.9994	0.9994
0.83867	0.83867	0.83867
31.5	31.5	31.5
22	22	20
2.9	2.6	2.6
0.0014	0.0017	0.0011
0.0058	0.0039	0.0034
0.0250	0.0070	0.0030
0.0000	0.0000	0.0000
0.0322	0.0126	0.0075

Sampling Data for - TEST 1-
Dryer Stack 4
Pinnacle Renewable Energy Inc
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.21	2.75	46	45	94	72.16	0.98
A-11	0.20	2.65	55	48	93	74.32	0.95
A-10	0.18	2.40	60	48	93	76.40	0.99
A-9	0.17	2.28	66	50	94	78.46	1.00
A-8	0.16	2.15	68	49	92	80.50	0.94
A-7	0.12	1.62	70	51	92	82.36	0.95
A-6	0.12	1.63	74	51	92	84.00	0.97
A-5	0.11	1.49	74	53	92	85.68	1.08
A-4	0.11	1.50	77	55	92	87.47	0.95
A-3	0.11	1.50	78	56	93	89.06	0.97
A-2	0.11	1.50	79	57	94	90.68	0.97
A-1	0.10	1.37	80	59	93	92.30	0.98
B-12	0.18	2.47	80	62	94	93.87	0.98
B-11	0.18	2.47	81	63	94	95.97	1.00
B-10	0.19	2.63	82	66	94	98.13	0.98
B-9	0.15	2.07	83	67	94	100.30	0.98
B-8	0.15	2.06	81	64	96	102.24	1.05
B-7	0.15	2.07	83	64	95	104.30	0.99
B-6	0.14	1.94	86	66	95	106.25	1.01
B-5	0.14	1.94	90	65	97	108.18	0.95
B-4	0.13	1.80	92	67	98	110.00	1.03
B-3	0.13	1.80	94	68	99	111.90	0.97
B-2	0.12	1.67	96	70	98	113.70	0.99
B-1	0.11	1.53	97	73	98	115.48	1.00
						117.20	

Sampling Data for - TEST 2-
Dryer Stack 4
Pinnacle Renewable Energy Inc
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.20	2.63	57	58	94	17.40	0.96
A-11	0.20	2.67	69	61	94	19.52	0.96
A-10	0.18	2.41	74	62	96	21.66	1.04
A-9	0.18	2.41	79	62	98	23.87	1.00
A-8	0.16	2.16	82	63	96	26.00	1.03
A-7	0.13	1.76	83	63	96	28.10	0.96
A-6	0.12	1.63	85	64	95	29.86	1.07
A-5	0.12	1.63	85	64	95	31.75	0.96
A-4	0.11	1.49	86	65	96	33.45	1.00
A-3	0.11	1.50	90	66	97	35.15	1.00
A-2	0.10	1.36	89	67	96	36.85	1.02
A-1	0.10	1.36	90	68	96	38.50	1.04
B-12	0.17	2.31	92	68	93	40.20	0.94
B-11	0.18	2.45	93	69	93	42.20	0.95
B-10	0.18	2.49	94	70	93	44.28	0.95
B-9	0.18	2.50	96	71	92	46.36	1.04
B-8	0.16	2.22	96	72	93	48.65	0.99
B-7	0.14	1.95	98	72	91	50.70	0.96
B-6	0.14	1.96	99	73	90	52.58	1.03
B-5	0.14	1.96	100	74	90	54.60	0.97
B-4	0.12	1.68	99	74	90	56.50	0.97
B-3	0.12	1.68	98	74	91	58.27	0.93
B-2	0.11	1.54	98	74	91	59.95	1.00
B-1	0.11	1.54	98	74	90	61.69	0.99
						63.42	

Sampling Data for - TEST 3-
Dryer Stack 4
Pinnacle Renewable Energy Inc
Williams Lake, BC

27-Sep-24

SAMPLE POINT	VELOCITY HEAD ("H ₂ O)	ORIFICE PRESSURE ("H ₂ O)	DRY GAS METER		STACK GAS TEMP (° F)	GAS SAMPLE VOLUME (ft ³)	ISOKINETICS
			TEMP IN (° F)	TEMP OUT (° F)			
A-12	0.22	2.96	65	65	91	63.58	0.96
A-11	0.20	2.71	77	68	95	65.85	1.01
A-10	0.18	2.43	80	68	97	68.15	1.04
A-9	0.18	2.44	83	69	97	70.40	0.97
A-8	0.17	2.33	87	70	93	72.50	0.92
A-7	0.13	1.78	90	70	95	74.45	1.02
A-6	0.13	1.79	91	71	95	76.35	0.95
A-5	0.12	1.66	93	72	94	78.12	1.04
A-4	0.11	1.52	95	72	93	80.00	1.07
A-3	0.10	1.39	96	74	94	81.85	1.00
A-2	0.11	1.53	97	75	94	83.50	0.98
A-1	0.11	1.53	99	76	98	85.20	0.92
B-12	0.20	2.71	99	76	97	86.80	0.94
B-11	0.17	2.36	103	77	98	88.99	0.99
B-10	0.19	2.64	104	78	98	91.13	1.00
B-9	0.17	2.38	104	79	96	93.42	1.00
B-8	0.18	2.52	105	80	96	95.60	0.94
B-7	0.15	2.10	103	80	95	97.70	1.02
B-6	0.14	1.96	103	80	93	99.78	0.99
B-5	0.14	1.96	102	81	95	101.74	0.99
B-4	0.12	1.68	102	81	98	103.70	0.99
B-3	0.11	1.53	103	82	100	105.50	1.03
B-2	0.10	1.39	102	82	101	107.30	0.96
B-1	0.11	1.53	102	82	101	108.89	0.95
						110.55	



Dryer Stack 4
 Pinnacle Renewable Energy Inc
 Williams Lake, BC

Data for TEST 1		OVERALL ISOKINETICS - TEST 1 0.985	
Delta P:	0.143 "H ₂ O	Us avg:	22.65 ft/sec
Delta H:	1.970	ACFM:	42815 ft ³ /min
Tm avg:	528.5 °R	SDCFM:	36844 ft ³ /min
Ts avg:	554.4 °R	Vm std:	42.00 ft ³
Bwo:	0.027	Vm corr:	45.01 ft ³
Md:	28.84	Vm:	45.04 ft ³
Ms:	28.54	MF:	0.9994
Pb:	27.80 "Hg	PCON:	27.07 mg/m ³
Pm:	27.94 "Hg	ERAT:	1.69 kg/hr
Ps:	27.79 "Hg		

Data for TEST 2		OVERALL ISOKINETICS - TEST 2 0.989	
Delta P:	0.142 "H ₂ O	Us avg:	22.60 ft/sec
Delta H:	1.970	ACFM:	42706 ft ³ /min
Tm avg:	538.3 °R	SDCFM:	36820 ft ³ /min
Ts avg:	553.6 °R	Vm std:	42.14 ft ³
Bwo:	0.027	Vm corr:	45.99 ft ³
Md:	28.84	Vm:	46.02 ft ³
Ms:	28.54	MF:	0.9994
Pb:	27.80 "Hg	PCON:	10.56 mg/m ³
Pm:	27.94 "Hg	ERAT:	0.66 kg/hr
Ps:	27.79 "Hg		

Data for TEST 3		OVERALL ISOKINETICS - TEST 3 0.987	
Delta P:	0.145 "H ₂ O	Us avg:	22.87 ft/sec
Delta H:	2.035	ACFM:	43222 ft ³ /min
Tm avg:	545.3 °R	SDCFM:	37192 ft ³ /min
Ts avg:	556.0 °R	Vm std:	42.46 ft ³
Bwo:	0.025	Vm corr:	46.94 ft ³
Md:	28.84	Vm:	46.97 ft ³
Ms:	28.57	MF:	0.9994
Pb:	27.80 "Hg	PCON:	6.24 mg/m ³
Pm:	27.95 "Hg	ERAT:	0.39 kg/hr
Ps:	27.79 "Hg		

Air Emission Monitoring Procedure **State Of Oregon Method 7**

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 State of Oregon Method 7 (See Figure 1). The State of Oregon Method 7 sampling train is a modified Method 5 sample train with the addition of a non heated filter in-between the third and fourth impinger.

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

At the end of each test, the probe interior, cyclone and connecting tubing from the probe to the filter housing were rinsed with distilled water and acetone. These washings were evaporated to dryness and the resulting solids were weighed. The weight of the cyclone flask and the filter was used together with the weight of solids in the washings to calculate the filterable 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.

Condensable Organics are collected in the impinger train and a rinsing procedure is employed utilizing solvents such as Hexane or Methylene Chloride in between tests. The rinsings and condensate are forwarded to a laboratory accredited to perform the analysis in accordance with the method and a copy of that report is included in the Appendix of any report issued.

O₂, CO₂, CO (where applicable)

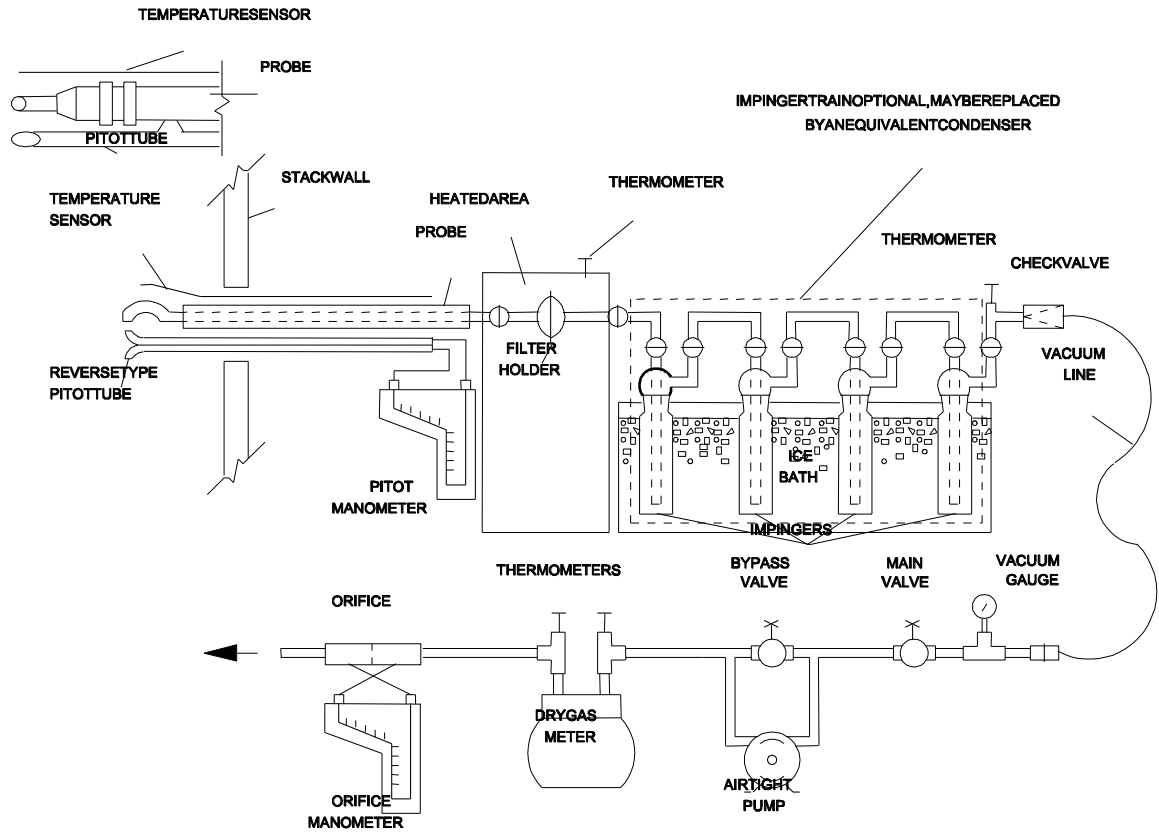
O₂, CO₂, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

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.



Modified EPA Method 5 Diagram (State of Oregon Method 7)- Figure 1

GENERAL 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.

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

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

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.

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

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.

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

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.

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

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.

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

where:

$$\begin{aligned} K_3 &= 0.003454 [(\text{mm Hg})(\text{m}^3)]/[(\text{ml})(^\circ\text{K})] \text{ for metric units,} \\ &= 0.002669 [(\text{in. Hg})(\text{ft}^3)]/[(\text{ml})(^\circ\text{R})] \text{ for English units.} \end{aligned}$$

Calculation from Intermediate Values.

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

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.

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

where:

- A = Cross-sectional area of stack, m² (ft²).
- B_{ws} = Water vapor in the gas stream (from Method 5 or Reference Method 4), proportion by volume.
- C_p = Pitot tube coefficient, dimensionless.
- K_p = Pitot tube constant,
- M_d = Molecular weight of stack gas, dry basis (see Section 3.6), g/gmole (lb/lb-mole).
- M_s = Molecular weight of stack gas, wet basis, g/g-mole (lb/lb-mole).

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

- 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, dsm³/hr (dscf/hr).
- t_s = Stack temperature, °C (°F).
- T_s = Absolute stack temperature, °K (°R).

Calibration Certificate for S-Type Pitot Tube

Date: 10-Jan-24 Barometric Pressure ("Hg): 29.9
Pitot I.D.: **107** Wind Tunnel Temperature ($^{\circ}$ F): 66.0
Nozzle: 0.250

Wind Velocity (ft/sec)	Ref.Pitot ("H ₂ O)	S-Type Pitot ("H ₂ O)	Pitot Factor
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: 10-Jan-24 Barometric Pressure ("Hg): 30.05
Pitot I.D.: **140** Wind Tunnel Temperature ($^{\circ}$ F): 70.0
Nozzle: 0.250

Wind Velocity (ft/sec)	Ref.Pitot ("H ₂ O)	S-Type Pitot ("H ₂ O)	Pitot Factor
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: 10-Jan-24 Barometric Pressure ("Hg): 29.78
Pitot I.D.: **217** Wind Tunnel Temperature ($^{\circ}$ F): 70.0
Nozzle: 0.250

Wind Velocity (ft/sec)	Ref.Pitot ("H ₂ O)	S-Type Pitot ("H ₂ O)	Pitot Factor
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: 10-Jan-24 Barometric Pressure ("Hg): 29.78
Pitot I.D.: **200** Wind Tunnel Temperature ($^{\circ}$ F): 70.0
Nozzle: 0.250

Wind Velocity (ft/sec)	Ref.Pitot ("H ₂ O)	S-Type Pitot ("H ₂ O)	Pitot Factor
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:

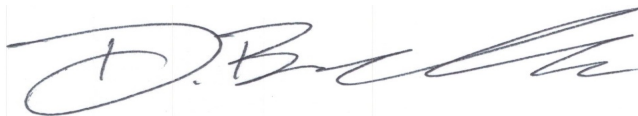


**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 03-Jul-24
 CONSOLE MANUF.: NAPP MODEL 31
 CONSOLE I.D.: C-980

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	68.0	68.0	68.0
P=Pres. Differential at WTM ("Hg)	0.0809	0.1471	0.2133
Pb= Atmospheric Pressure ("Hg)	28.25	28.25	28.25
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6900	0.6900	0.6900
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	91.0	93.0	98.0
To= Dry Test Meter Outlet Temp. (oF.)	77.0	77.0	78.0
Ri= Initial Dry Test volume (ft3)	26.34	15.50	34.24
Rf= Final Dry Test Volume (ft3)	31.30	20.45	39.21
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	28.1691	28.1029	28.0367
Pd= Pb + (^H/13.59) "Hg	28.3236	28.3972	28.4708
Tw= Ta +460 (oR.)	528.0	528.0	528.0
Td= [(Ti + To)/2] + 460 (oR.)	544.0	545.0	548.0
Bw= Pv/Pb ("Hg)	0.0244	0.0244	0.0244
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	0.9999	0.9988	0.9953
Y (MEAN)(WTMF) =	0.9980		

N.R. MCCALL & ASSOCIATES LTD.
 Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: July 3 2024

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	28.25	28.25	28.25
Y=gas meter factor	0.9999	0.9999	0.9988
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	42.3	45.4	49.4
Rf=final gas meter vol.	44.43	48.47	53.1
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.4259574	0.6139386	0.739112
To=meter outlet Temp (oF)	77	77	77
Tm=meter out temp. (oR)	537	537	537
Pm=Pb + ^H	28.286792	28.3235835	28.3603753
SQRT(Tm/Pm*H/Md)	0.5724381	0.80902377	0.9902048
Ko=orifice const.	0.7441108	0.75886349	0.74642337

Ko MEAN = 0.7497992

Ko*4*144= 431.88436

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: July 3 2024

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	28.25	28.25	28.25
Y=gas meter factor	0.9988	0.9953	0.9953
Delta H=	2	2.5	3
Ri=int. gas meter vol.	57.1	62.6	68.1
Rf=final gas meter vol.	61.33	67.31	73.25
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.8449848	0.9375726	1.025159
Tm=meter out temp. (oF)	78	78	78
Tm=meter out temp. (oR.)	538	538	538
Pm=Pb + ^H	28.397167	28.433959	28.470751
SQRT(Tm/Pm*H/Md)	1.1437125	1.2778819	1.3989447
Ko=orifice const.	0.7388087	0.7336927	0.7328088

Ko MEAN = 0.7351034

Ko*4*144= 423.41957

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 09-Jan-24
 CONSOLE MANUF.: NAPP MODEL 31
 CONSOLE I.D.: C-1021

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	68.0	68.0	68.0
P=Pres. Differential at WTM ("Hg)	0.0699	0.1250	0.1839
Pb= Atmospheric Pressure ("Hg)	28.25	28.25	28.25
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6900	0.6900	0.6900
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	84.0	85.0	89.0
To= Dry Test Meter Outlet Temp. (oF.)	76.0	76.0	77.0
Ri= Initial Dry Test volume (ft3)	2.90	95.04	8.80
Rf= Final Dry Test Volume (ft3)	7.82	99.99	13.75
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	28.1801	28.1250	28.0661
Pd= Pb + (^H/13.59) "Hg	28.3236	28.3972	28.4708
Tw= Ta +460 (oR.)	528.0	528.0	528.0
Td= [(Ti + To)/2] + 460 (oR.)	540.0	540.5	543.0
Bw= Pv/Pb ("Hg)	0.0244	0.0244	0.0244
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	1.0010	0.9913	0.9912
Y (MEAN)(WTMF) =	0.9945		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 03-Jul-24

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	28.25	28.25	28.25
Y=gas meter factor	1.001	1.0010	0.9913
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	14.4	16.6	19.8
Rf=final gas meter vol.	16.3	19.3	23.14
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.38038	0.54054	0.6621884
To=meter outlet Temp (oF)	77	77	77
Tm=meter out temp. (oR)	537	537	537
Pm=Pb + ^H	28.286792	28.323584	28.360375
SQRT(Tm/Pm*H/Md)	0.5724381	0.8090238	0.9902048
Ko=orifice const.	0.664491	0.6681386	0.6687388

Ko MEAN = 0.6671228

Ko*4*144= 384.26275

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 03-Jul-24

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	28.25	28.25	28.25
Y=gas meter factor	0.9913	0.9912	0.9912
Delta H=	2	2.5	3
Ri=int. gas meter vol.	23.5	27.8	32.7
Rf=final gas meter vol.	27.38	32.16	37.51
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \sqrt{T(FT^3/MIN)}$	0.7692488	0.8643264	0.9535344
To=meter outlet Temp (oF)	77	77	77
Tm=meter out temp. (oR)	537	537	537
$P_m = P_b + \Delta H$	28.397167	28.433959	28.470751
$SQRT(T_m / P_m * H / M_d)$	1.1426491	1.2766937	1.397644
Ko=orifice const.	0.6732153	0.6770037	0.6822441

Ko MEAN = 0.6774877

$K_o * 4 * 144 = 390.23292$

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 02-Jul-24

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1039

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	68.0	68.0	68.0
P=Pres. Differential at WTM ("Hg)	0.0883	0.1692	0.2354
Pb= Atmospheric Pressure ("Hg)	28.15	28.15	28.15
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6901	0.6901	0.6901
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	99.0	98.0	104.0
To= Dry Test Meter Outlet Temp. (oF.)	84.0	84.0	85.0
Ri= Initial Dry Test volume (ft3)	71.66	64.71	77.64
Rf= Final Dry Test Volume (ft3)	76.66	69.66	82.63
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	28.0617	27.9808	27.9146
Pd= Pb + (^H/13.59) "Hg	28.2236	28.2972	28.3708
Tw= Ta +460 (oR.)	528.0	528.0	528.0
Td= [(Ti + To)/2] + 460 (oR.)	551.5	551.0	554.5
Bw= Pv/Pb ("Hg)	0.0245	0.0245	0.0245
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0052	1.0088	1.0021
Y (MEAN)(WTMF) =	1.0054		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 02-Jul-24

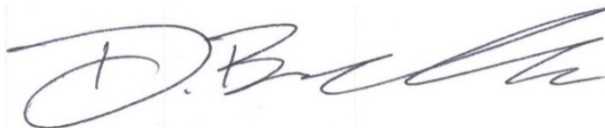
CONSOLE I.D. C-1039

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.15	28.15	28.15
Y=gas meter factor	1.0052	1.0052	1.0088
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	85.6	88.2	91.9
Rf=final gas meter vol.	87.82	91.39	95.85
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.4463088	0.6413176	0.796952
Tm=meter out temp. (oF)	85	85	79
Tm=meter out temp. (oR.)	545	545	539
Pm=Pb + ^H	28.186792	28.223584	28.260375
SQRT(Tm/Pm*H/Md)	0.5777084	0.8164703	0.9938007
Ko=orifice const.	0.7725503	0.7854757	0.8019234

Ko MEAN = 0.7866498

Ko*4*144= 453.11028

McCALL ENVIRONMENTAL



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 02-Jul-24

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	28.15	28.15	28.15
Y=gas meter factor	1.0088	1.0021	1.0021
Delta H=	2	2.5	3
Ri=int. gas meter vol.	96.5	1.7	7.3
Rf=final gas meter vol.	101.04	6.77	12.85
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/^T(FT^3/MIN)$	0.9159904	1.0161294	1.112331
Tm=meter out temp. (oF)	86	87	87
Tm=meter out temp. (oR.)	546	547	547
$P_m=P_b + ^H$	28.297167	28.333959	28.370751
$SQRT(T_m/P_m*H/M_d)$	1.1542186	1.290798	1.4130812
Ko=orifice const.	0.7936022	0.7872102	0.7871671

Ko MEAN = 0.7893265

$Ko^4*144= 454.65206$

McCALL ENVIRONMENTAL



Calibrating Technician Signature:

**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 02-Jul-24
 CONSOLE MANUF.: NAPP MODEL 31
 CONSOLE I.D.: C-955

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	68.0	68.0	68.0
P=Pres. Differential at WTM ("Hg)	0.0699	0.1250	0.1766
Pb= Atmospheric Pressure ("Hg)	28.15	28.15	28.15
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6900	0.6900	0.6900
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	89.0	90.0	95.0
To= Dry Test Meter Outlet Temp. (oF.)	72.0	71.0	73.0
Ri= Initial Dry Test volume (ft3)	21.33	14.44	27.23
Rf= Final Dry Test Volume (ft3)	26.23	19.38	32.15
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	28.0801	28.0250	27.9734
Pd= Pb + (^H/13.59) "Hg	28.2236	28.2972	28.3708
Tw= Ta +460 (oR.)	528.0	528.0	528.0
Td= [(Ti + To)/2] + 460 (oR.)	540.5	540.5	544.0
Bw= Pv/Pb ("Hg)	0.0245	0.0245	0.0245
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	1.0059	0.9932	0.9992
Y (MEAN)(WTMF) =	0.9994		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 02-Jul-24

CONSOLE I.D. C-955

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.15	28.15	28.15
Y=gas meter factor	1.0059	1.0059	0.9932
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	35.2	37.5	40.8
Rf=final gas meter vol.	37.12	40.23	44.17
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\sqrt{T(FT^3/MIN)}$	0.386266	0.549221	0.669417
To=meter outlet Temp (oF)	72	72	72
Tm=meter out temp. (oR)	532	532	532
$P_m=P_b + \Delta H$	28.18679	28.22358	28.26038
$SQRT(T_m/P_m \cdot H/M_d)$	0.570777	0.806674	0.987326
Ko=orifice const.	0.676737	0.680847	0.67801

Ko MEAN : 0.678531

$Ko \cdot 4 \cdot 144 = 390.8339$

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 02-Jul-24

CONSOLE I.D. C-955

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.15	28.15	28.15
Y=gas meter factor	0.9932	0.9992	0.9992
Delta H=	2	2.5	3
Ri=int. gas meter vol.	44.8	49.6	54.9
Rf=final gas meter vol.	48.66	53.91	59.55
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.76675	0.86131	0.929256
Tm=meter out temp. (oF)	72	72	73
Tm=meter out temp. (oR.)	532	532	533
Pm=Pb + ^H	28.29717	28.33396	28.37075
SQRT(Tm/Pm*H/Md)	1.139325	1.272977	1.394881
Ko=orifice const.	0.672987	0.676611	0.66619

Ko MEAN : 0.671929

Ko*4*144= 387.0313

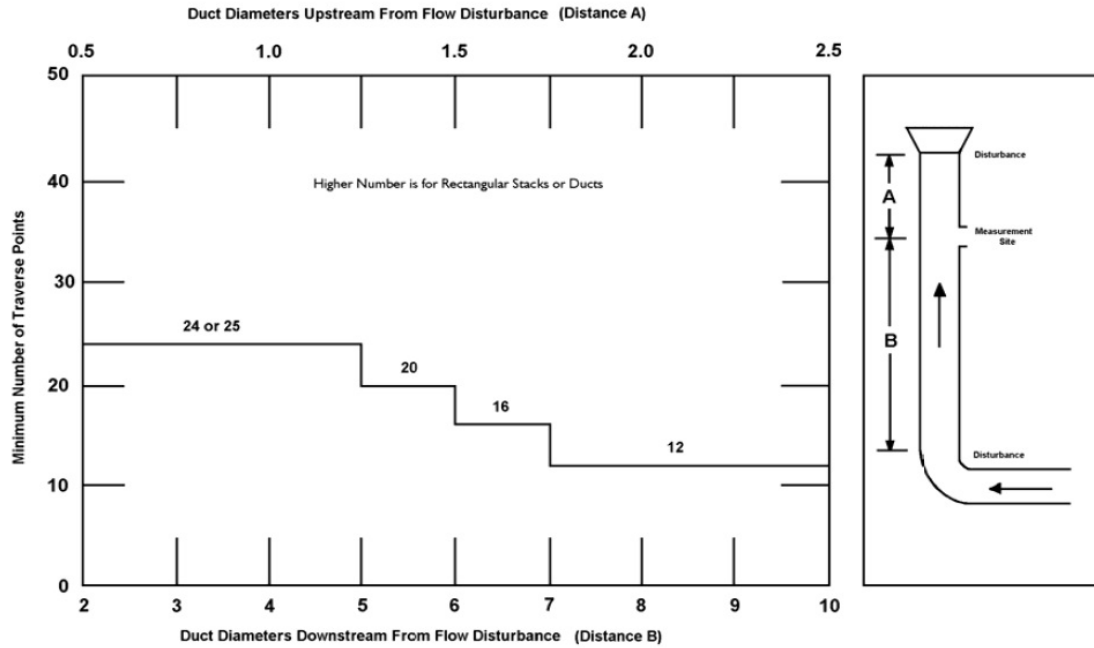
McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:





Site Diagram & Sample Point Selection



Client: Pinnacle Pellet Williams Lake
 Source: Dryer Stacks 1-4
 Pollution Abatement Equipment:
 Duct Diameters Up (A): >2
 Duct Diameters Down (B): 4
 Area of Stack (ft): 31.5
 Stack Diameter (in): 76
 Zero (in): 4
 Number of Points: 24

Traverse Points (in):	
PT-1	1.6
PT-2	5.1
PT-3	8.97
PT-4	13.45
PT-5	19
PT-6	26.98
PT-7	49.02
PT-8	57
PT-9	62.55
PT-10	67.03
PT-11	70.91
PT-12	74.4

Cyclonic Angle: 5°



*Drax
Williams Lake*

Daily production rate Sept 27, 2024

24.6 MT/hr

Average for the previous calendar month

22.6 MT/hr

90th percentile production rate

25.9 MT/hr

Average Dryer Fan 1 exit gas temperature

Included in Stack Test

Average Dryer Fan 2 exit gas temperature

Included in Stack Test

Average Dryer Fan 3 exit gas temperature

Included in Stack Test

Average Dryer Fan 4 exit gas temperature

Included in Stack Test

Average Cyclofilter exit gas temperature, [°C]

Included in Stack Test

Volumetric emission flow rates, [m³/hour]

Included in Stack Test

TPM, [mg/m³]

Included in Stack Test

PM, [mg/m³]

Included in Stack Test

Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1764756 Control Number: Date Received: Oct 3, 2024 Date Reported: Oct 4, 2024 Report Number: 3053817 Report Type: Final Report
Attn: Accounts Payable Sampled By: McCall Company:	Proj. Acct. code:	

Reference Number	1764756-1	1764756-2	1764756-3
Sample Date	Sep 27, 2024	Sep 27, 2024	Sep 27, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Dryer Stack 1 / Test 1 Filter M99 / 14.1 °C	Dryer Stack 1 / Test 2 Filter N1 / 14.1 °C	Dryer Stack 1 / Test 3 Filter N2 / 14.1 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2	<2	<2
Volume	Sample volume	mL	311	307	315
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1764756 Control Number: Date Received: Oct 3, 2024 Date Reported: Oct 4, 2024 Report Number: 3053817 Report Type: Final Report
Attn: Accounts Payable Sampled By: McCall Company:	Proj. Acct. code:	

Reference Number	1764756-4	1764756-5	1764756-6
Sample Date	Sep 27, 2024	Sep 27, 2024	Sep 27, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Dryer Stack 2 / Test 1 Filter N3 / 14.1 °C	Dryer Stack 2 / Test 2 Filter N4 / 14.1 °C	Dryer Stack 2 / Test 3 Filter N5 / 14.1 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2	<2	2
Volume	Sample volume	mL	317	309	318
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1764756 Control Number: Date Received: Oct 3, 2024 Date Reported: Oct 4, 2024 Report Number: 3053817 Report Type: Final Report
Attn: Accounts Payable Sampled By: McCall Company:	Proj. Acct. code:	

Reference Number	1764756-7	1764756-8	1764756-9
Sample Date	Sep 27, 2024	Sep 27, 2024	Sep 27, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Dryer Stack 3 / Test 1 Filter M92 / 14.1 °C	Dryer Stack 3 / Test 2 Filter M93 / 14.1 °C	Dryer Stack 3 / Test 3 Filter M97 / 14.1 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	3	<2	2
Volume	Sample volume	mL	321	310	307
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1764756 Control Number: Date Received: Oct 3, 2024 Date Reported: Oct 4, 2024 Report Number: 3053817 Report Type: Final Report
Attn: Accounts Payable Sampled By: McCall Company:	Proj. Acct. code:	

Reference Number	1764756-10	1764756-11	1764756-12
Sample Date	Sep 27, 2024	Sep 27, 2024	Sep 27, 2024
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Dryer Stack 4 / Test 1 Filter M46 / 14.1 °C	Dryer Stack 4 / Test 2 Filter M47 / 14.1 °C	Dryer Stack 4 / Test 3 Filter M91 / 14.1 °C
Matrix	Water	Water	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	25	7	3
Volume	Sample volume	mL	302	317	311
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1764756 Control Number: Date Received: Oct 3, 2024 Date Reported: Oct 4, 2024 Report Number: 3053817 Report Type: Final Report
Attn: Accounts Payable Sampled By: McCall Company:	Proj. Acct. code:	

Reference Number	1764756-13
Sample Date	Sep 27, 2024
Sample Time	NA
Sample Location	
Sample Description	Blank / Blank Water / 14.1 °C
Matrix	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2		2
Volume	Sample volume	mL	391		
pH adjustment	required prior to O&G extraction		Yes		

Approved by:



 Carol Nam, Dipl. T.
 Quality Assurance Coordinator

Data have been validated by Analytical Quality Control and Element'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 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1764756 Control Number: Date Received: Oct 3, 2024 Date Reported: Oct 4, 2024 Report Number: 3053817 Report Type: Final Report
Attn: Accounts Payable Sampled By: McCall Company:	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Oil and Grease in water (VAN)	BCELM	* Oil & Grease in Water - Direct Hexane Extraction (2023), Oil & Grease <i>* Reference Method Modified</i>	Oct 03, 2024	Element Vancouver

References

BCELM B.C. Environmental Laboratory Manual

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.

Client Name: Drax
W. Williams Lake
 Process: Dryer Stack
 Test Number: 1
 Date: Sept. 27/2024
 Start Time: 8:11 am
 Finish Time: 9:13 am
 Starting Vol.: 300 ml
 Final Vol.: 312 ml
 Flask: M99
 Console: 980
 Stack Diameter: _____

BP 27.80
 DN 310
 CP 84182
 MF 0.9980
 Moist. 2%
 PM 27.91
 AS ~
 Ko 1497
 Pitot 107
 Port ~
 Static 0.12
 PS 2.77A

CO ₂	O ₂	CO	N ₂
0	20.9		

Duct Diameters
 Up-Stream _____
 Duct Diameters
 Downstream _____
 Personnel: CBGB KSRK Mean Yaw Angle _____

Leakage Rate @ 15 inches _____ Start: 014 Finish: 013

Load: _____

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
AQ	0.17	1.42	58	58	83	56.90	1	270	Ice	0
"	0.17	1.44	64	58	81	58.55				2.5
10	0.18	1.53	71	58	81	60.38				5
9	0.16	1.37	75	60	81	62.33				7.5
8	0.16	1.36	75	60	83	64.02				10
7	0.15	1.29	78	63	83	65.68				12.5
6	0.14	1.20	80	62	81	67.33	1			15
5	0.13	1.12	84	65	83	68.99				17.5
4	0.13	1.12	84	66	83	70.69				20
3	0.14	1.21	85	68	85	72.29				22.5
2	0.21	1.83	88	70	84	73.86				25
1	0.25	2.19	92	71	83	75.93				27.5
B12	0.17	1.49	93	73	82	78.02	1			30
11	0.17	1.49	93	73	83	79.96				32.5
10	0.16	1.40	92	74	83	81.89				35
9	0.17	1.54	91	74	83	83.60				37.5
8	0.14	1.23	95	77	84	85.43				40
7	0.11	0.97	91	77	84	87.01				42.5
6	0.11	0.97	94	78	84	88.60	1			45
5	0.10	0.88	93	78	82	90.18				47.5
4	0.12	1.05	96	77	83	91.54				50
3	0.15	1.33	94	79	83	93.17				52.5
2	0.15	1.33	95	79	83	94.93				55
1	0.15	1.33	96	79	83	96.74				57.5
						98.59	1			60

Client Name: Drax Williams Lake
 Process: Dryer Stack 1
 Test Number: 2
 Date: Sept 27/2024
 Start Time: 04:1 am
 Finish Time: 10:43 am
 Starting Vol.: 300 ml
 Final Vol.: 314 ml
 Flask: N-1
 Console: 980
 Stack Diameter: _____

BP 27.80
 DN .310
 CP 84182
 MF 19980
 Moist. 2%
 PM 27.96
 AS ~
 Ko .7497
 Pitot 105
 Port ~
 Static 0.12
 PS 27.79

CO ₂	O ₂	CO	N ₂
<u>0</u>	<u>20.9</u>		

Duct Diameters
 Up-Stream _____
 Duct Diameters
 Downstream _____

Personnel: _____

Mean Yaw Angle _____

Leakage Rate @ 15 inches _____

Start: 01:008 Finish: 01:009

Load: _____

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 12	0.17	1.46	76	75	85	98.72	2	270	Feed	0
11	0.18	1.54	71	72	84	100.50				2.5
10	0.18	1.56	86	73	85	102.34				5
9	0.16	1.38	81	73	85	104.10				7.5
8	0.17	1.47	83	74	87	105.98				10
7	0.16	1.39	85	74	86	107.74				12.5
6	0.15	1.31	89	75	86	109.50	2			15
5	0.14	1.23	91	76	85	111.25				17.5
4	0.13	1.14	93	77	85	112.90				20
3	0.13	1.14	94	78	86	114.58				22.5
2	0.22	1.193	95	78	87	116.14				25
1	0.23	2.02	97	78	86	118.21				27.5
B 12	0.16	1.42	99	80	85	120.29	2			30
11	0.17	1.50	97	81	86	122.02				32.5
10	0.17	1.50	100	83	87	124.08				35
9	0.16	1.41	100	82	87	125.94				37.5
8	0.14	1.24	99	83	87	127.69				40
7	0.12	1.07	99	84	85	129.42				42.5
6	0.11	1.07	99	84	85	131.18	2			45
5	0.10	0.89	99	84	85	132.74				47.5
4	0.10	0.89	96	84	84	134.15	✓			50
3	0.16	1.44	98	95	84	135.65	✓			52.5
2	0.15	1.34	98	85	83	137.35	✓			55
1	0.15	1.34	103	85	83	138.99	✓			57.5
						140.70	~			60

Client Name: Drax
Williams Lake
 Process: Dryer Stack 1
 Test Number: 3
 Date: Sept 27/2024
 Start Time: 11:09
 Finish Time: 12:11
 Starting Vol.: 300 mL
 Final Vol.: 315
 Flask: N2
 Console: 980
 Stack Diameter: _____

BP 27.80
 DN .310
 CP 84182
 MF .9980
 Moist. 2%
 PM 27.91
 AS _____
 Ko .7497
 Pitot: 165
 Port ~
 Static 0.12
 PS 27.79

CO ₂	O ₂	CO	N ₂
0	20.9		
0	20.9		
0	20.9		
0	20.9		

Duct Diameters
 Up-Stream _____
 Duct Diameters
 Downstream _____

Personnel: CB CB KSDX Mean Yaw Angle _____

Leakage Rate @ 15 inches _____ Start: 1010 Finish: 1011

Load: _____

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.17	1.51	77.4	100	83	41.78	1	270	Feed	
11	.19	1.67	91	80	83	43.61				
10	.18	1.59	92	80	84	45.53				
9	.17	1.50	95	81	86	47.40				
8	.13	1.15	98	81	85	49.21				
7	.14	1.24	96	83	84	50.87				
6	.16	1.42	97	81	83	52.64	1			
5	.15	1.34	100	84	84	54.46				
5	.13	1.16	101	85	84	56.24				
3	.13	1.16	99	85	83	57.91				
2	.20	1.78	100	86	84	59.45				
1	.24	2.15	105	86	83	61.52				
B12	.15	1.34	108	88	85	63.63	2			
11	.16	1.44	106	89	84	65.43				
10	.17	1.54	108	88	83	67.30				
9	.17	1.54	109	91	83	69.31				
8	.15	1.35	106	90	83	71.10				
7	.13	1.17	109	93	85	72.94				
6	.12	1.08	107	91	84	74.72	2			
5	.11	0.99	107	91	85	76.25				
4	.10	0.90	106	92	84	77.81				
3	.15	1.36	107	94	83	79.33				
2	.15	1.36	107	94	83	81.15				
1	.16	1.45	109	94	84	82.95				
						84.82				

21/22

Client Name: Drax
Williams lake
 Process: Dryer Stack 2
 Test Number: 1
 Date: Sept 27 2024
 Start Time: 8:11
 Finish Time: 9:13
 Starting Vol.: 300
 Final Vol.: 520 ML
 Flask: N3
 Console: 1021
 Stack Diameter

BP 27.80
 DN .310
 CP .83829
 MF .9945
 Moist. 3%
 PM 27.91
 AS
 Ko .6671
 Pitot 140
 Port
 Static = (0.19)
 PS 27.79

CO ₂	O ₂	CO	N ₂
0	20.9		
0	20.9		
0	20.9		
0	20.9		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream

Personnel: CB CB 105 CB Mean Yaw Angle

Leakage Rate @ 15 inches Start: 1008 Finish: 1011

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 12	.124	2.45	53	53	84	60.35	1	270	Iced	0
11	.123	2.36	60	54	85	62.51				2.5
10	.119	1.95	62	53	84	64.59				5
9	.111	1.45	66	54	83	66.48				7.5
8	.113	1.35	67	54	83	68.15				10
7	.113	1.35	70	54	83	69.76				12.5
6	.115	1.56	71	55	83	71.37	1			15
5	.115	1.57	75	57	83	73.03				17.5
4	0.13	1.36	76	59	84	74.75				20
3	.112	1.26	76	61	84	76.48				22.5
2	.119	2.00	77	63	85	77.99				25
1	.119	2.00	79	63	85	79.91				27.5
B 12	.120	2.17	83	64	85	81.88	1			30
11	.119	2.01	84	66	85	83.87				32.5
10	.120	2.13	86	69	85	85.81				35
9	.120	2.14	87	70	85	87.85				37.5
8	.118	1.93	88	71	84	89.92				40
7	0.115	1.61	89	74	84	91.82				42.5
6	.113	1.40	89	73	84	93.52	1			45
5	.113	1.40	90	74	84	95.24				47.5
4	.115	1.61	90	75	85	96.87				50
3	.120	2.16	91	76	85	98.54				52.5
2	.118	1.94	92	76	87	100.51				55
1	.121	2.27	94	76	86	102.49				57.5
						104.51				60

Client Name: Drax
Williams Lab
 Process: Rega Stack 2
 Test Number: 2
 Date: Sept 17, 2021
 Start Time: 9:41
 Finish Time: 10:43
 Starting Vol.: 300 mL
 Final Vol.: 314 mL
 Flask: N4
 Console: 1021
 Stack Diameter: _____

BP 27.80
 DN .33
 CP .83829
 MF .9945
 Moist. 2%
 PM 27.91
 AS m
 Ko .6071
 Pitot 140
 Port m
 Static -0.19
 PS 27.79

CO ₂	O ₂	CO	N ₂
0	20.9		
0	20.9		
0	20.9		
0	20.9		

Duct Diameters
 Up-Stream _____
 Duct Diameters
 Downstream _____

Personnel: CB CB DL KS Mean Yaw Angle _____

Leakage Rate @ 15 inches _____ Start: .009 Finish: .01

Load: _____

.02

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.23	2.46	74	73	88	4.78	1	27.8	1021	
11	.23	2.46	75	72	88	6.87				
10	.20	2.15	80	72	87	9.08				
9	.15	1.61	82	72	91	11.01				
8	.14	1.51	84	73	90	12.78				
7	.13	1.41	84	73	87	14.44				12.5
6	.14	1.52	86	72	86	16.00	1			15
5	.16	1.74	87	74	86	17.76				17.5
4	.15	1.67	89	75	86	19.52				20
3	.13	1.42	90	76	86	21.22				22.5
2	.12	1.31	90	77	87	22.86				25
1	.17	1.86	91	79	87	24.47				27.5
B12	.18	1.97	94	80	89	26.30	1			30
11	.20	2.21	95	81	86	28.26				32.5
10	.21	2.32	96	82	86	30.30				
9	.20	2.21	97	83	87	32.41				
8	.19	2.11	98	85	87	34.54				
7	.18	2.00	98	84	86	36.55				
6	.16	1.78	99	85	86	38.54				
5	.15	1.67	99	85	86	40.40				
4	.13	1.44	99	86	87	42.24				
3	.18	2.00	100	86	86	43.91				
2	.20	2.23	100	88	86	45.79				
1	.21	2.35	101	89	86	47.84				
						50.00				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 2
 Test Number: 3
 Date: Sept 27 2024
 Start Time 11:09
 Finish Time 12:11
 Starting Vol. 300
 Final Vol. 321
 Flask: N5
 Console: C-1021
 Stack Diameter

BP 27.80
 DN .310
 CP .83829
 MF .9945
 Moist. 2%
 PM 27.91
 AS
 Ko .6671
 Pitot 140
 Port
 Static -.19
 PS 27.79

CO ₂	O ₂	CO	N ₂
6	20.4		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream
 Mean Yaw Angle

Personnel: CB CB DLK

Leakage Rate @ 15 inches

Start: 1.007 Finish: 1.008

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.24	2.63	84	86	87	50.47	1	270	1.007	0
11	.22	2.40	86	83	89	52.70				2.5
10	.21	2.29	90	83	90	54.77				5
9	.16	1.76	92	85	88	56.89				7.5
8	.13	1.44	94	85	86	58.78				10
7	.13	1.45	94	84	88	60.47				12.5
6	.14	1.54	95	83	87	62.01	1			15
5	.15	1.65	97	81	86	63.77				17.5
4	.16	1.77	97	82	86	65.48				20
3	.15	1.67	100	87	86	67.17				22.5
2	.18	1.86	100	88	86	69.01				25.0
1	.21	2.34	101	87	86	70.82				27.5
B12	.20	2.21	102	88	92	72.88	1			30
11	.19	2.24	103	91	87	74.91				32.5
10	.21	2.35	103	92	87	77.07				35.0
9	.20	2.25	105	94	87	79.02				37.5
8	.17	1.91	105	94	87	81.13				40
7	.16	1.80	105	95	87	83.07				42.5
6	.15	1.69	105	96	86	84.92	1			45
5	.13	1.47	105	95	86	86.76				47.5
4	.14	1.57	105	95	87	88.46				50
3	.16	1.80	106	96	87	90.14				52.5
2	.14	2.14	107	96	87	92.07				55
1	.18	2.03	107	97	87	93.95				57.5
						96.08	1			60

Client Name: Dray
Williams lake
 Process: Dryer Stack 3
 Test Number: 1
 Date: SEPT 27/24
 Start Time 8.12
 Finish Time 9.14
 Starting Vol. 300
 Final Vol. 380
 Flask: M92
 Console: 1039
 Stack Diameter

BP 27.80
 DN 310
 CP 83365
 MF 1.0054
 Moist. 3
 PM 27.91
 AS
 Ko 0.7866
 Pitot 200
 Port
 Static - .08
 PS 27.79

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
Up-Stream
 Duct Diameters
Downstream
 Mean Yaw Angle

Personnel: FS 10L
 Leakage Rate @ 15 inches Start: .007 Finish: .009

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 2	.18	1.29	55	54	88	36.53	3	270	FLED	
11	.18	1.32	62	55	83	38.27				
10	.19	1.40	68	55	81	40.09				
9	.19	1.42	72	56	79	42.00				
8	.18	1.35	76	57	78	43.88	5			
7	.17	1.29	80	59	76	45.70				
6	.17	1.30	84	60	73	47.43				
5	.16	1.23	86	62	72	49.29				
4	.16	1.23	89	64	73	51.17				
3	.17	1.32	92	67	73	53.08	4			
2	.17	1.32	94	64	73	55.07				
1	.18	1.41	96	72	73	57.00				
B 1	.20	1.56	98	73	75	59.00				
11	.20	1.56	95	73	75	61.00				
10	.20	1.57	100	75	76	63.01	5			
9	.19	1.49	103	77	77	65.11				
8	.18	1.42	105	79	77	67.19				
7	.17	1.34	105	81	77	69.13				
6	.17	1.34	106	81	77	70.97	4			
5	.16	1.26	105	83	78	72.70				
4	.18	1.42	106	83	79	74.68				
3	.18	1.42	106	84	79	76.62				
2	.19	1.51	107	85	78	78.48				
1	.20	1.59	107	85	79	80.53				
						82.55				

2660203

Client Name: Drex
Williams Lake
 Process: Dryer Stack 3
 Test Number: 2
 Date: Sept 27 124
 Start Time 9.41
 Finish Time 10.43
 Starting Vol. 300
 Final Vol. 320
 Flask: M93
 Console: 1039
 Stack Diameter

BP 27.80
 DN 0.310
 CP 0.83365
 MF 1.0054
 Moist. 2%
 PM 27.91
 AS
 Ko 7866
 Pitot 200
 Port
 Static -08
 PS 27.70

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
 Up-Stream

Duct Diameters
 Downstream

Personnel: KS/DC

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: -003 Finish: -005

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 2	.19	1.45	76	78	89	82.76	4	278	JED	
11	.19	1.48	84	80	83	84.80				
10	.20	1.57	92	79	81	86.88				
9	.19	1.50	94	79	81	88.93	5			
8	.17	1.34	96	79	80	90.98				
7	.16	1.28	99	80	77	93.03				
6	.16	1.28	101	82	77	94.85				
5	.15	1.20	103	83	77	96.77	3			
4	.15	1.20	104	83	77	98.63				
3	.18	1.44	106	84	79	100.26				
2	.16	1.29	107	85	77	102.17				
1	.19	1.54	109	86	76	104.03	4			
B 2	.19	1.54	109	87	78	106.14				
11	.19	1.54	111	88	77	108.17				
10	.20	1.63	113	90	77	110.21				
9	.20	1.63	113	90	78	112.23				
8	.19	1.55	114	92	78	114.15				
7	.18	1.47	114	92	78	116.23				
6	.18	1.47	115	93	79	118.15				
5	.17	1.38	116	94	81	120.13				
4	.17	1.39	116	95	80	122.12				
3	.17	1.39	117	96	81	124.04				
2	.19	1.55	117	96	83	126.06				
1	.19	1.55	117	96	83	128.12				
						130.27				

Client Name: Dray
Williams lake
 Process: Dryer Stack 3
 Test Number: 3
 Date: Sept 27 129
 Start Time 11.08
 Finish Time 1210
 Starting Vol. 300
 Final Vol. 321
 Flask: M97
 Console: 1039
 Stack Diameter

BP 27.80
 DN 0310
 CP 0.83365
 MF 1.0054
 Moist. 21.
 PM 27.91
 AS
 Ko 0.7866
 Pitot 200
 Port
 Static -0.08
 PS 27.79

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream
 Mean Yaw Angle

Personnel: RS/DC

Leakage Rate @ 15 inches

Start: 1005 Finish: 1007

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 12	.18	1.38	82	82	91	30.34	3	250	5CED	
11	.19	1.49	89	89	84	32.33				
10	.20	1.58	92	90	84	34.35				
9	.20	1.59	99	90	83	36.31				
8	.18	1.45	102	90	79	38.34	3			
7	.17	1.37	108	90	79	40.33				
6	.17	1.38	109	90	78	42.28				
5	.16	1.30	111	91	79	44.27				
4	.15	1.22	112	92	77	46.17	3			
3	.17	1.39	113	93	78	48.03				
2	.17	1.39	115	95	79	50.00				
1	.18	1.47	116	95	78	51.86				
B 12	.20	1.64	118	96	79	53.71	4			
11	.20	1.65	122	97	78	55.83				
10	.19	1.56	120	98	79	57.95				
9	.19	1.58	121	100	76	60.08				
8	.18	1.49	121	100	78	62.22	4			
7	.17	1.41	122	102	76	64.26				
6	.17	1.41	122	102	77	66.17				
5	.16	1.33	122	102	78	68.16				
4	.16	1.33	123	103	79	70.17	3			
3	.16	1.33	124	105	80	72.22				
2	.18	1.49	124	105	80	74.20				
1	.20	1.66	125	107	81	76.17				
						78.38				

Client Name: Drax
Williams lake
 Process: Dryer Stack 4
 Test Number: 1
 Date: SEPT 27/24
 Start Time 8:11
 Finish Time 9:15
 Starting Vol. 300
 Final Vol. 322
 Flask: M 46
 Console: 955
 Stack Diameter

BP 27.80
 DN .334
 CP .83867
 MF 0.9994
 Moist. .02
 PM 27.91
 AS
 Ko 0.6785
 Pitot 217
 Port
 Static -.07
 PS 27.79

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream

Personnel: KS/OL

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .008 Finish: .014

Load:

.09-16

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 12	.21	2.75	46	45	94	72.16	2	270	1050	
11	.20	2.65	55	48	93	74.32				
10	.18	2.40	60	48	93	76.40				
9	.17	2.28	66	50	94	78.46	2			
8	.16	2.15	68	49	92	80.50				
7	.12	1.62	70	51	92	82.36				
6	.12	1.63	74	51	92	84.00				
5	.11	1.49	74	53	92	85.68	2			
4	.11	1.50	77	55	92	87.42				
3	.11	1.50	78	56	93	89.06				
2	.11	1.50	79	57	94	90.68				
1	.10	1.37	80	59	93	92.30				
B 12	.18	2.47	80	62	94	93.87	2			
11	.18	2.47	81	63	94	95.97				
10	.19	2.63	82	66	94	98.13				
9	.15	2.07	83	67	94	100.30				
8	.15	2.06	81	64	96	102.24	2			
7	.15	2.07	83	64	95	104.30				
6	.14	1.94	86	66	95	106.25				
5	.14	1.94	90	65	97	108.18				
4	.13	1.80	92	67	98	110.00	2			
3	.13	1.80	94	68	99	111.90				
2	.12	1.67	96	70	98	113.70				
1	.11	1.53	97	73	98	115.48				
						117.20				

Client Name: DRAX
W. LAKE
 Process: STARK 4
 Test Number: 2
 Date: SEPT 27/24
 Start Time 9:41
 Finish Time 10:44
 Starting Vol. 300
 Final Vol. 322
 Flask: M-47
 Console: 955
 Stack Diameter _____

BP 27.80
 DN .334
 CP .83867
 MF .9994
 Moist. .02
 PM 27.91
 AS _____
 Ko .6785
 Pitot 217
 Port _____
 Static -.07
 PS 27.79

CO ₂	O ₂	CO	N ₂

Duct Diameters
 Up-Stream _____
 Duct Diameters
 Downstream _____
 Mean Yaw Angle _____

Personnel: DC KS

Leakage Rate @ 15 inches _____

Start: .006 Finish: .009

Load: _____

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A-12	.20	2.63	57	58	94	17.40	1	273	ICED	
11	.20	2.67	69	61	94	19.52				
10	.18	2.41	74	62	96	21.66				
9	.18	2.41	79	62	98	23.87	1			
8	.16	2.16	82	63	96	26.00				
7	.13	1.76	83	63	96	28.10				
6	.12	1.63	85	64	95	29.86				
5	.12	1.63	85	64	95	31.75	1			
4	.11	1.49	86	65	96	33.45				
3	.11	1.50	90	66	97	35.15				
2	.10	1.36	89	67	96	36.85				
1	.10	1.36	90	68	96	38.50	1			
B-12	.17	2.31	92	68	93	40.20				
11	.18	2.45	93	69	93	42.20				
10	.18	2.49	94	70	93	44.28				
9	.18	2.50	96	71	92	46.36	1			
8	.16	2.22	96	72	93	48.65				
7	.14	1.95	98	72	91	50.70				
6	.14	1.96	99	73	90	52.58				
5	.14	1.96	100	74	90	54.60	1			
4	.12	1.68	99	74	90	56.50				
3	.12	1.68	98	74	91	58.27				
2	.11	1.54	98	74	91	59.95				
1	.11	1.54	98	74	90	61.69	2			
						63.42				

Client Name: DRAX
W. LAKE
 Process: DRYER ST. 4
 Test Number: 3
 Date: SEPT 27/24
 Start Time 11:08
 Finish Time 12:14
 Starting Vol. 300
 Final Vol. 320
 Flask: M-91
 Console: 955
 Stack Diameter _____

BP 27.80
 DN 334
 CP 83867
 MF 19994
 Moist. .02
 PM 27.91
 AS _____
 Ko .6785
 Pitot 217
 Port _____
 Static -07
 PS 27.79

CO ₂	O ₂	CO	N ₂

Duct Diameters
 Up-Stream _____
 Duct Diameters
 Downstream _____
 Mean Yaw Angle _____

Personnel: DL KS

Leakage Rate @ 15 inches Start: .004 Finish: .004

Load: _____


Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A-12	.22	2.96	65	65	91	63.58	1	268	1000	
11	.20	2.71	77	68	95	65.85				
10	.18	2.43	80	68	97	68.15				
9	.18	2.44	83	69	97	70.40	1			
8	.17	2.33	87	70	93	72.50				
7	.13	1.78	90	70	95	74.45				
6	.13	1.79	91	71	95	76.35				
5	.12	1.66	93	72	94	78.12	1			
4	.11	1.52	95	72	93	80.00				
3	.10	1.39	96	74	94	81.85				
2	.11	1.53	97	75	94	83.50				
1	.11	1.53	99	76	98	85.20	1			
B-12	.20	2.74	99	76	97	86.80				
11	.17	2.36	103	77	98	88.99				
10	.19	2.64	104	78	98	91.13				
9	.17	2.38	104	79	96	93.42	1			
8	.18	2.52	105	80	96	95.60				
7	.15	2.10	103	80	95	97.70				
6	.14	1.96	103	80	93	99.78				
5	.14	1.96	102	81	95	101.74	1			
4	.12	1.68	102	81	98	103.70				
3	.11	1.53	103	82	100	105.50				
2	.10	1.39	102	82	101	107.30				
1	.11	1.53	102	82	101	108.89	1			
						110.55				



This is to verify that
Matthew McCall
has successfully completed
a course of study in
Source Testing for Particulates
(35 hours)

Endorsed by
The B.C. Ministry of Environment

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


DEAN


REGISTRAR

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY



MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

David Brandle

has successfully completed

The program of studies and is awarded the certificate in

STACK SAMPLING

May 3 – May 7, 2004

May, 2004
Date

Doreen Brandle
Dean
Faculty of Continuing Education and Extension

MOUNT ROYAL UNIVERSITY

Faculty of Continuing Education and Extension

Kiefer Stauber

has successfully completed

Stack Sampling
Certificate of Completion

35 Hours / 2022

October 2022

Date



Dean

Faculty of Continuing Education and Extension

MOUNT ROYAL UNIVERSITY

Faculty of Continuing Education and Extension

Chris Bodden

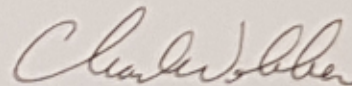
has successfully completed

Stack Sampling Seminar

35 Hours / 2017

June 23, 2017

Date



Dean

Faculty of Continuing Education and Extension

