

**Pinnacle Renewable Energy Inc
Williams Lake, B.C.
Dryer Stacks 1-4
Total Particulate Testing**

**Permit 17557
June 28, 2024**

Our Job Number: ME2425-051

Report Author: Matt McCall
McCall Environmental



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July 31, 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) – June 28, 2024
Permit – PA-17557
McCall File Number – ME2425-051

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: Dave Brandle, Nick Angus 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 June 28, 2024

Average of Triplicate Tests Dryer Stacks 1-4

Parameter	Stack 1	Stack2	Stack 3	Stack 4	Avg/Total	Permit	15-Mar-24
Test Date	28-Jun-24	28-Jun-24	28-Jun-24	28-Jun-24	N/A		N/A
Gas Temperature (°C)	27.2	31.9	41.1	31.6	32.9		26.51
% Moisture	1.47	2.61	3.39	2.21	2.42		2.57
Velocity (m/sec)	6.75	6.99	6.52	6.56	6.71		6.89
ACFM	41849	43343	40417	40696	166306		170873
Std. Dry Flow Rate (m ³ /sec)	17.83	17.98	16.14	16.96	68.92	*132	73.35
Tot Part. Dry Basis ref. Cond. (mg/m ³)	10.11	6.10	9.40	6.00	7.89	15.00	4.82
Front Half Particulate (mg/m ³)	8.22	4.45	7.34	4.30	6.08		2.99
Back Half Condensables (mg/m ³)	1.89	1.65	2.06	1.70	1.82		1.83
Mass Emission Rate (kg/hr)	0.65	0.39	0.55	0.37	1.95	7.67	1.27

* 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 March 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
28-Jun-24
Pinnacle Renewable Energy
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	83 ° F	28 ° C
Moisture Content (by volume):	1.71 %	
Average Stack Gas Velocity:	22.56 ft/sec	6.88 m/sec
Total Actual Gas Flow Rate:	42646 ACFM	
Dry Gas flow Rate at Reference Conditions:	38267 SCFM	18.06 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	7.55 mg/m ³
Front Half Particulate	0.00 gr/ft ³	5.69 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.86 mg/m ³
Mass Emission Rate	1.08 lbs/hr	0.49 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	81 ° F	27 ° C
Moisture Content (by volume):	1.5 %	
Average Stack Gas Velocity:	22.1 ft/sec	6.7 m/sec
Total Actual Gas Flow Rate:	41849 ACFM	
Dry Gas flow Rate at Reference Conditions:	37784 SCFM	17.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	10.1 mg/m ³
Front Half Particulate	.004 gr/ft ³	8.2 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	1.43 lbs/hr	0.65 kg/hr

TEST 2:

Gas Temperature:	82 ° F	28 ° C
Moisture Content (by volume):	2.1 %	
Average Stack Gas Velocity:	22.5 ft/sec	6.9 m/sec
Total Actual Gas Flow Rate:	42602 ACFM	
Dry Gas flow Rate at Reference Conditions:	38122 SCFM	18.0 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.6 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	0.94 lbs/hr	0.43 kg/hr

TEST 3:

Gas Temperature:	86 ° F	30 ° C
Moisture Content (by volume):	1.6 %	
Average Stack Gas Velocity:	23.0 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	43488 ACFM	
Dry Gas flow Rate at Reference Conditions:	38894 SCFM	18.4 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.0 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.1 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.8 mg/m ³
Mass Emission Rate	0.87 lbs/hr	0.40 kg/hr



Client: Pinnacle Renewable Energy
Plant Location: Williams Lake, BC
Process: Dryer Stack 1
Permit Number: RA-17557
Job Number: ME2425-051
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
K75	K76	K77
28-Jun-24	28-Jun-24	28-Jun-24
8:23	9:50	11:13
9:27	10:52	12:16
60	60	60
CB/KS	CB/KS	CB/KS
1021	1021	1021
28.10	28.10	28.10
-0.15	-0.15	-0.15
1.00	1.00	1.00
20.00	20.00	20.00
0.00	0.00	0.00
79.00	79.00	79.00
0.310	0.310	0.310
1.0175	1.0175	1.0175
0.83829	0.83829	0.83829
31.5	31.5	31.5
10	15	11
1.8	2.1	1.9
0.0001	0.0001	0.0002
0.0086	0.0050	0.0043
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0107	0.0071	0.0065

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

28-Jun-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	2.24	62	61	80	30.18	0.96
A-11	0.20	2.15	65	63	79	32.06	0.96
A-10	0.19	2.05	69	63	79	33.90	1.06
A-9	0.17	1.84	72	64	79	35.90	0.97
A-8	0.15	1.63	72	64	79	37.63	1.01
A-7	0.13	1.42	75	66	79	39.33	1.02
A-6	0.11	1.20	80	68	79	40.93	1.08
A-5	0.10	1.10	81	69	79	42.50	0.99
A-4	0.11	1.21	81	70	80	43.88	1.01
A-3	0.11	1.21	83	72	82	45.35	1.03
A-2	0.14	1.54	85	74	82	46.85	0.94
A-1	0.15	1.66	86	75	82	48.40	1.02
B-12	0.14	1.56	87	76	80	50.15	1.05
B-11	0.16	1.77	85	77	82	51.90	0.91
B-10	0.15	1.66	86	78	82	53.52	1.03
B-9	0.16	1.77	87	80	82	55.30	1.01
B-8	0.16	1.78	90	82	82	57.10	0.91
B-7	0.16	1.79	95	84	82	58.73	0.95
B-6	0.14	1.57	97	85	83	60.44	1.06
B-5	0.12	1.35	97	86	82	62.23	0.96
B-4	0.11	1.24	97	87	82	63.73	1.02
B-3	0.12	1.35	99	88	82	65.26	1.00
B-2	0.13	1.47	99	89	82	66.84	0.90
B-1	0.14	1.58	100	90	82	68.32	0.99
						70.01	

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

28-Jun-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	2.26	86	86	83	71.16	1.02
A-11	0.21	2.36	83	83	82	73.18	1.04
A-10	0.20	2.26	89	83	82	75.29	1.00
A-9	0.18	2.04	91	84	84	77.27	1.03
A-8	0.16	1.83	94	84	82	79.21	1.06
A-7	0.14	1.59	95	85	85	81.11	0.95
A-6	0.12	1.36	97	86	85	82.71	1.00
A-5	0.11	1.26	96	87	82	84.26	1.00
A-4	0.10	1.14	97	88	82	85.76	0.95
A-3	0.12	1.37	97	89	82	87.12	1.00
A-2	0.13	1.49	98	90	82	88.68	0.99
A-1	0.16	1.84	100	91	82	90.30	0.98
B-12	0.15	1.73	103	92	82	92.08	1.02
B-11	0.17	1.97	104	93	82	93.88	0.99
B-10	0.16	1.85	105	93	83	95.74	1.02
B-9	0.17	1.97	106	94	82	97.60	0.98
B-8	0.17	1.98	107	95	82	99.44	1.04
B-7	0.15	1.75	108	96	82	101.40	0.95
B-6	0.15	1.75	107	97	81	103.08	1.01
B-5	0.13	1.52	108	98	82	104.88	0.96
B-4	0.11	1.28	109	98	82	106.47	1.00
B-3	0.11	1.28	109	99	82	108.00	1.00
B-2	0.12	1.40	108	99	82	109.52	0.99
B-1	0.15	1.75	108	99	83	111.10	1.07
						113.00	

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

28-Jun-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	2.37	95	95	84	13.83	0.95
A-11	0.20	2.24	91	93	86	15.80	1.04
A-10	0.21	2.36	94	92	86	17.90	1.00
A-9	0.19	2.15	97	92	84	19.96	1.01
A-8	0.17	1.92	99	93	84	21.95	1.02
A-7	0.15	1.70	99	93	84	23.87	1.01
A-6	0.13	1.48	102	94	84	25.64	1.01
A-5	0.12	1.36	102	95	85	27.30	0.92
A-4	0.11	1.25	103	96	85	28.75	1.07
A-3	0.13	1.47	102	96	86	30.38	0.97
A-2	0.14	1.59	104	96	86	31.98	0.98
A-1	0.17	1.94	106	97	86	33.66	0.96
B-12	0.16	1.82	106	97	86	35.48	0.93
B-11	0.18	2.05	108	99	86	37.18	0.96
B-10	0.17	1.94	108	99	85	39.05	0.99
B-9	0.18	2.06	110	101	88	40.93	1.00
B-8	0.18	2.06	111	101	87	42.88	0.98
B-7	0.16	1.84	111	101	86	44.79	1.00
B-6	0.16	1.84	111	101	87	46.64	0.97
B-5	0.14	1.61	111	101	86	48.43	0.99
B-4	0.10	1.15	111	102	85	50.14	1.00
B-3	0.10	1.15	110	103	85	51.61	1.02
B-2	0.11	1.26	111	103	86	53.11	0.98
B-1	0.14	1.61	111	103	86	54.61	0.98
						56.31	

Dryer Stack 1
Pinnacle Renewable Energy
Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.993

Delta P:	0.143 "H₂O	Us avg:	22.14 ft/sec
Delta H:	1.589	ACFM:	41849 ft³/min
Tm avg:	540.0 °R	SDCFM:	37784 ft³/min
Ts avg:	540.9 °R	Vm std:	37.37 ft³
Bwo:	0.015	Vm corr:	40.53 ft³
Md:	28.96	Vm:	39.83 ft³
Ms:	28.80	MF:	1.0175
Pb:	28.10 "Hg	PCON:	10.11 mg/m³
Pm:	28.22 "Hg	ERAT:	0.65 kg/hr
Ps:	28.09 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 1.002

Delta P:	0.147 "H₂O	Us avg:	22.54 ft/sec
Delta H:	1.710	ACFM:	42602 ft³/min
Tm avg:	555.7 °R	SDCFM:	38122 ft³/min
Ts avg:	542.4 °R	Vm std:	38.16 ft³
Bwo:	0.021	Vm corr:	42.57 ft³
Md:	28.96	Vm:	41.84 ft³
Ms:	28.73	MF:	1.0175
Pb:	28.10 "Hg	PCON:	6.57 mg/m³
Pm:	28.23 "Hg	ERAT:	0.43 kg/hr
Ps:	28.09 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.989

Delta P:	0.153 "H₂O	Us avg:	23.01 ft/sec
Delta H:	1.759	ACFM:	43488 ft³/min
Tm avg:	561.2 °R	SDCFM:	38894 ft³/min
Ts avg:	545.5 °R	Vm std:	38.37 ft³
Bwo:	0.016	Vm corr:	43.22 ft³
Md:	28.96	Vm:	42.48 ft³
Ms:	28.79	MF:	1.0175
Pb:	28.10 "Hg	PCON:	5.98 mg/m³
Pm:	28.23 "Hg	ERAT:	0.40 kg/hr
Ps:	28.09 "Hg		

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

Gas Temperature:	89 ° F	32 ° C
Moisture Content (by volume):	2.61 %	
Average Stack Gas Velocity:	22.93 ft/sec	6.99 m/sec
Total Actual Gas Flow Rate:	43343 ACFM	
Dry Gas flow Rate at Reference Conditions:	38091 SCFM	17.98 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	6.10 mg/m ³
Front Half Particulate	0.00 gr/ft ³	4.45 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.65 mg/m ³
Mass Emission Rate	0.87 lbs/hr	0.39 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	90 ° F	32 ° C
Moisture Content (by volume):	2.7 %	
Average Stack Gas Velocity:	22.9 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	43212 ACFM	
Dry Gas flow Rate at Reference Conditions:	37914 SCFM	17.9 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.5 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.8 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.92 lbs/hr	0.42 kg/hr

TEST 2:

Gas Temperature:	89 ° F	32 ° C
Moisture Content (by volume):	2.5 %	
Average Stack Gas Velocity:	23.3 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	43945 ACFM	
Dry Gas flow Rate at Reference Conditions:	38688 SCFM	18.3 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	1.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.6 mg/m ³
Mass Emission Rate	0.49 lbs/hr	0.22 kg/hr

TEST 3:

Gas Temperature:	89 ° F	32 ° C
Moisture Content (by volume):	2.6 %	
Average Stack Gas Velocity:	22.7 ft/sec	6.9 m/sec
Total Actual Gas Flow Rate:	42873 ACFM	
Dry Gas flow Rate at Reference Conditions:	37669 SCFM	17.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.5 mg/m ³
Front Half Particulate	.003 gr/ft ³	6.8 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	1.20 lbs/hr	0.54 kg/hr



Client: Pinnacle Renewable Energy Inc.
Plant Location: Williams Lake, BC
Process: Dryer Stack 2
Permit Number: RA-17557
Job Number: ME2425-051
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
K78	K79	K80
28-Jun-24	28-Jun-24	28-Jun-24
8:23	9:50	11:13
9:25	10:53	12:15
60	60	60
CB/KS	CB/KS	CB/KS
980	980	980
28.10	28.10	28.10
-0.16	-0.16	-0.16
1.00	1.00	1.00
20.00	20.00	20.00
0.00	0.00	0.00
79.00	79.00	79.00
0.330	0.330	0.330
1.0027	1.0027	1.0027
0.84182	0.84182	0.84182
31.5	31.5	31.5
22	20	22
3.1	2.8	2.4
0.0001	0.0002	0.0001
0.0057	0.0019	0.0081
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0078	0.0041	0.0102

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

28-Jun-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	2.17	63	63	91	80.54	1.01
A-11	0.20	2.10	72	64	89	82.79	0.92
A-10	0.18	1.90	75	64	89	84.81	0.95
A-9	0.16	1.69	79	65	89	86.80	0.91
A-8	0.17	1.81	81	66	89	88.61	1.03
A-7	0.14	1.49	86	67	89	90.72	1.04
A-6	0.14	1.49	88	68	88	92.66	1.05
A-5	0.15	1.61	88	70	89	94.63	1.02
A-4	0.12	1.30	90	71	89	96.61	0.93
A-3	0.10	1.07	89	72	90	98.24	1.09
A-2	0.10	1.07	90	73	91	99.97	0.93
A-1	0.11	1.18	90	74	91	101.46	0.99
B-12	0.14	1.51	92	76	91	103.11	1.06
B-11	0.15	1.63	96	77	90	105.11	0.99
B-10	0.18	1.95	96	77	90	107.05	1.03
B-9	0.16	1.74	99	78	90	109.27	1.05
B-8	0.15	1.64	99	80	90	111.42	0.97
B-7	0.16	1.75	99	80	90	113.35	0.97
B-6	0.17	1.86	100	81	91	115.34	1.01
B-5	0.15	1.65	101	82	89	117.46	1.01
B-4	0.14	1.54	101	83	89	119.47	1.05
B-3	0.12	1.32	101	84	89	121.49	0.94
B-2	0.13	1.43	100	85	88	123.17	0.96
B-1	0.15	1.65	101	85	89	124.96	0.94
						126.83	

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

28-Jun-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	2.17	78	77	89	27.37	0.96
A-11	0.20	2.19	82	78	89	29.52	0.96
A-10	0.19	2.09	89	77	89	31.69	0.96
A-9	0.19	2.10	93	77	88	33.81	0.93
A-8	0.17	1.88	94	78	89	35.86	1.01
A-7	0.16	1.77	97	79	89	37.98	0.99
A-6	0.16	1.77	98	80	90	40.00	1.02
A-5	0.15	1.67	100	81	89	42.09	0.97
A-4	0.13	1.45	100	82	89	44.01	1.00
A-3	0.11	1.23	100	83	88	45.86	1.01
A-2	0.10	1.12	100	84	89	47.58	0.93
A-1	0.10	1.12	101	84	90	49.10	1.10
B-12	0.13	1.45	102	86	90	50.89	1.02
B-11	0.15	1.68	103	87	90	52.79	0.96
B-10	0.19	2.14	106	88	90	54.71	0.94
B-9	0.18	2.03	108	89	89	56.83	1.02
B-8	0.16	1.81	109	89	90	59.08	0.90
B-7	0.15	1.70	108	90	89	60.96	1.05
B-6	0.17	1.93	109	91	89	63.09	1.03
B-5	0.16	1.82	110	92	89	65.31	0.95
B-4	0.15	1.70	110	93	90	67.29	0.96
B-3	0.13	1.48	110	93	89	69.23	1.05
B-2	0.13	1.48	110	94	89	71.21	0.99
B-1	0.15	1.70	110	94	89	73.08	0.93
						74.96	

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

28-Jun-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	2.32	89	86	89	75.78	0.99
A-11	0.19	2.11	95	87	91	78.10	0.95
A-10	0.19	2.11	98	85	90	80.22	0.93
A-9	0.17	1.90	101	86	89	82.30	0.97
A-8	0.15	1.68	101	86	89	84.36	1.01
A-7	0.14	1.57	103	87	89	86.38	1.01
A-6	0.13	1.46	103	87	89	88.34	1.02
A-5	0.11	1.23	105	88	89	90.24	1.05
A-4	0.12	1.35	105	89	89	92.04	1.00
A-3	0.11	1.24	106	90	89	93.83	1.05
A-2	0.11	1.24	106	90	89	95.65	0.98
A-1	0.10	1.13	106	92	89	97.34	1.03
B-12	0.14	1.58	106	92	90	99.04	1.08
B-11	0.17	1.98	107	94	90	101.14	0.96
B-10	0.18	2.04	110	93	89	103.21	1.02
B-9	0.16	1.82	112	93	89	105.48	1.03
B-8	0.15	1.70	112	93	89	107.64	1.01
B-7	0.17	1.93	112	94	89	109.68	0.99
B-6	0.16	1.82	112	95	89	111.81	0.99
B-5	0.15	1.71	113	96	89	113.88	1.02
B-4	0.13	1.36	112	96	89	115.96	0.95
B-3	0.12	1.36	111	97	89	117.77	0.96
B-2	0.13	1.48	110	97	89	119.51	0.97
B-1	0.14	1.59	111	98	89	121.34	1.01
						123.33	

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

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.994

Delta P:	0.148 "H ₂ O	Us avg:	22.86 ft/sec
Delta H:	1.606	ACFM:	43212 ft ³ /min
Tm avg:	542.5 °R	SDCFM:	37914 ft ³ /min
Ts avg:	549.6 °R	Vm std:	42.60 ft ³
Bwo:	0.027	Vm corr:	46.41 ft ³
Md:	28.96	Vm:	46.29 ft ³
Ms:	28.66	MF:	1.0027
Pb:	28.10 "Hg	PCON:	6.47 mg/m ³
Pm:	28.22 "Hg	ERAT:	0.42 kg/hr
Ps:	28.09 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.984

Delta P:	0.153 "H ₂ O	Us avg:	23.25 ft/sec
Delta H:	1.728	ACFM:	43945 ft ³ /min
Tm avg:	553.2 °R	SDCFM:	38688 ft ³ /min
Ts avg:	549.2 °R	Vm std:	42.97 ft ³
Bwo:	0.025	Vm corr:	47.72 ft ³
Md:	28.96	Vm:	47.59 ft ³
Ms:	28.69	MF:	1.0027
Pb:	28.10 "Hg	PCON:	3.37 mg/m ³
Pm:	28.23 "Hg	ERAT:	0.22 kg/hr
Ps:	28.09 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.999

Delta P:	0.146 "H ₂ O	Us avg:	22.68 ft/sec
Delta H:	1.655	ACFM:	42873 ft ³ /min
Tm avg:	558.7 °R	SDCFM:	37669 ft ³ /min
Ts avg:	549.2 °R	Vm std:	42.50 ft ³
Bwo:	0.026	Vm corr:	47.68 ft ³
Md:	28.96	Vm:	47.55 ft ³
Ms:	28.67	MF:	1.0027
Pb:	28.10 "Hg	PCON:	8.48 mg/m ³
Pm:	28.22 "Hg	ERAT:	0.54 kg/hr
Ps:	28.09 "Hg		

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

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	3.39 %	
Average Stack Gas Velocity:	21.38 ft/sec	6.52 m/sec
Total Actual Gas Flow Rate:	40417 ACFM	
Dry Gas flow Rate at Reference Conditions:	34207 SCFM	16.14 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	9.40 mg/m ³
Front Half Particulate	0.00 gr/ft ³	7.34 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	2.06 mg/m ³
Mass Emission Rate	1.20 lbs/hr	0.55 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	108 ° F	42 ° C
Moisture Content (by volume):	2.9 %	
Average Stack Gas Velocity:	21.6 ft/sec	6.6 m/sec
Total Actual Gas Flow Rate:	40823 ACFM	
Dry Gas flow Rate at Reference Conditions:	34588 SCFM	16.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.8 mg/m ³
Front Half Particulate	.003 gr/ft ³	5.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.0 mg/m ³
Mass Emission Rate	1.01 lbs/hr	0.46 kg/hr

TEST 2:

Gas Temperature:	111 ° F	44 ° C
Moisture Content (by volume):	3.7 %	
Average Stack Gas Velocity:	21.4 ft/sec	6.5 m/sec
Total Actual Gas Flow Rate:	40415 ACFM	
Dry Gas flow Rate at Reference Conditions:	33829 SCFM	16.0 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.006 gr/ft ³	12.8 mg/m ³
Front Half Particulate	.005 gr/ft ³	10.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.1 mg/m ³
Mass Emission Rate	1.62 lbs/hr	0.73 kg/hr

TEST 3:

Gas Temperature:	99 ° F	37 ° C
Moisture Content (by volume):	3.6 %	
Average Stack Gas Velocity:	21.2 ft/sec	6.5 m/sec
Total Actual Gas Flow Rate:	40013 ACFM	
Dry Gas flow Rate at Reference Conditions:	34204 SCFM	16.1 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.7 mg/m ³
Front Half Particulate	.002 gr/ft ³	5.6 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.0 mg/m ³
Mass Emission Rate	0.98 lbs/hr	0.45 kg/hr



Client: Pinnacle Renewable Energy Inc.
Plant Location: Williams Lake, BC
Process: Dryer Stack 3
Permit Number: RA-17557
Job Number: ME2425-051
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
K87	K88	K89
28-Jun-24	28-Jun-24	28-Jun-24
8:23	9:48	11:14
9:25	10:50	12:16
60	60	60
DB/NA	DB/NA	DB/NA
955	955	955
28.10	28.10	28.10
-0.09	-0.09	-0.09
1.00	1.00	1.00
20.00	20.00	20.00
0.00	0.00	0.00
79.00	79.00	79.00
0.310	0.310	0.310
1.0079	1.0079	1.0079
0.85654	0.85654	0.85654
31.5	31.5	31.5
18	23	23
4.2	3.9	4
0.0002	0.0008	0.0002
0.0055	0.0093	0.0053
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0077	0.0121	0.0075

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

28-Jun-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	0.14	1.54	55	55	85	65.70	1.00
A-11	0.14	1.51	61	55	98	67.31	1.00
A-10	0.13	1.42	72	64	104	68.90	1.03
A-9	0.13	1.41	75	59	106	70.50	1.02
A-8	0.12	1.30	79	59	110	72.08	1.02
A-7	0.11	1.19	80	60	110	73.61	1.03
A-6	0.10	1.08	81	60	110	75.09	1.04
A-5	0.10	1.08	83	61	111	76.51	1.04
A-4	0.10	1.09	84	62	109	77.94	1.05
A-3	0.11	1.20	88	65	110	79.38	1.03
A-2	0.11	1.21	90	66	111	80.88	1.02
A-1	0.11	1.21	90	67	110	82.36	1.04
B-12	0.13	1.43	91	67	110	83.87	1.03
B-11	0.13	1.43	91	68	109	85.50	1.01
B-10	0.14	1.55	91	69	109	87.11	1.00
B-9	0.12	1.32	92	69	111	88.76	1.02
B-8	0.11	1.21	92	70	111	90.31	1.04
B-7	0.11	1.20	93	70	110	91.83	1.00
B-6	0.12	1.32	93	70	111	93.29	1.03
B-5	0.13	1.44	95	71	110	94.87	0.96
B-4	0.14	1.55	96	71	110	96.40	1.00
B-3	0.15	1.67	97	72	109	98.06	0.98
B-2	0.15	1.67	98	73	109	99.74	1.00
B-1	0.14	1.56	100	75	111	101.47	1.01
						103.15	

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

28-Jun-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	0.13	1.41	69	69	109	3.34	1.03
A-11	0.13	1.42	77	68	109	4.93	1.01
A-10	0.14	1.53	84	69	111	6.50	0.97
A-9	0.10	1.11	88	70	111	8.07	1.04
A-8	0.10	1.11	90	70	112	9.51	1.03
A-7	0.11	1.21	91	71	112	10.94	0.94
A-6	0.10	1.11	93	71	110	12.30	0.92
A-5	0.10	1.11	94	72	110	13.58	0.95
A-4	0.11	1.22	96	73	110	14.90	0.98
A-3	0.11	1.22	97	75	111	16.33	0.95
A-2	0.11	1.22	97	75	111	17.72	1.01
A-1	0.11	1.23	98	76	110	19.20	0.98
B-12	0.14	1.57	98	76	109	20.64	0.98
B-11	0.13	1.45	98	76	109	22.26	1.00
B-10	0.13	1.45	99	76	110	23.86	0.99
B-9	0.14	1.56	99	76	111	25.45	0.97
B-8	0.13	1.45	99	76	111	27.06	1.02
B-7	0.12	1.34	100	77	112	28.69	1.03
B-6	0.11	1.23	100	77	112	30.27	1.01
B-5	0.11	1.23	100	78	111	31.75	1.04
B-4	0.11	1.23	101	78	110	33.28	1.00
B-3	0.13	1.46	101	77	110	34.76	0.99
B-2	0.14	1.57	101	77	111	36.34	0.97
B-1	0.15	1.68	101	77	111	37.95	1.00
						39.67	

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

28-Jun-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	0.14	1.53	75	75	110	39.90	1.04
A-11	0.14	1.56	83	77	105	41.58	1.01
A-10	0.13	1.46	89	77	104	43.24	1.00
A-9	0.12	1.36	93	78	100	44.83	1.02
A-8	0.12	1.38	98	80	97	46.40	1.03
A-7	0.11	1.26	99	80	96	48.01	1.00
A-6	0.11	1.27	100	81	96	49.51	1.02
A-5	0.11	1.27	101	81	97	51.04	1.03
A-4	0.10	1.15	101	82	98	52.58	1.01
A-3	0.10	1.15	100	82	98	54.02	1.04
A-2	0.10	1.15	100	82	96	55.50	1.03
A-1	0.11	1.27	101	82	97	56.97	1.04
B-12	0.14	1.60	101	82	100	58.53	0.97
B-11	0.13	1.49	102	83	100	60.17	1.01
B-10	0.13	1.50	102	83	98	61.81	1.01
B-9	0.14	1.62	102	83	97	63.46	1.01
B-8	0.13	1.50	102	83	97	65.17	0.99
B-7	0.11	1.27	102	83	97	66.79	0.99
B-6	0.10	1.15	101	84	99	68.28	1.03
B-5	0.11	1.26	101	84	100	69.76	1.03
B-4	0.11	1.26	102	84	101	71.30	1.04
B-3	0.13	1.49	102	84	101	72.86	1.00
B-2	0.13	1.50	102	85	99	74.49	0.99
B-1	0.14	1.61	103	85	99	76.10	0.99
						77.78	



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

Data for TEST 1		OVERALL ISOKINETICS - TEST 1 1.016	
Delta P:	0.123 "H₂O	Us avg:	21.60 ft/sec
Delta H:	1.358	ACFM:	40823 ft³/min
Tm avg:	535.9 °R	SDCFM:	34588 ft³/min
Ts avg:	568.1 °R	Vm std:	35.05 ft³
Bwo:	0.029	Vm corr:	37.75 ft³
Md:	28.96	Vm:	37.45 ft³
Ms:	28.64	MF:	1.0079
Pb:	28.10 "Hg	PCON:	7.76 mg/m³
Pm:	28.20 "Hg	ERAT:	0.46 kg/hr
Ps:	28.09 "Hg		

Data for TEST 2		OVERALL ISOKINETICS - TEST 2 0.991	
Delta P:	0.120 "H₂O	Us avg:	21.38 ft/sec
Delta H:	1.338	ACFM:	40415 ft³/min
Tm avg:	544.4 °R	SDCFM:	33829 ft³/min
Ts avg:	570.5 °R	Vm std:	33.47 ft³
Bwo:	0.037	Vm corr:	36.62 ft³
Md:	28.96	Vm:	36.33 ft³
Ms:	28.56	MF:	1.0079
Pb:	28.10 "Hg	PCON:	12.77 mg/m³
Pm:	28.20 "Hg	ERAT:	0.73 kg/hr
Ps:	28.09 "Hg		

Data for TEST 3		OVERALL ISOKINETICS - TEST 3 1.013	
Delta P:	0.120 "H₂O	Us avg:	21.17 ft/sec
Delta H:	1.377	ACFM:	40013 ft³/min
Tm avg:	550.0 °R	SDCFM:	34204 ft³/min
Ts avg:	559.3 °R	Vm std:	34.54 ft³
Bwo:	0.036	Vm corr:	38.18 ft³
Md:	28.96	Vm:	37.88 ft³
Ms:	28.57	MF:	1.0079
Pb:	28.10 "Hg	PCON:	7.67 mg/m³
Pm:	28.20 "Hg	ERAT:	0.45 kg/hr
Ps:	28.09 "Hg		

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

Gas Temperature:	89 ° F	32 ° C
Moisture Content (by volume):	2.21 %	
Average Stack Gas Velocity:	21.53 ft/sec	6.56 m/sec
Total Actual Gas Flow Rate:	40696 ACFM	
Dry Gas flow Rate at Reference Conditions:	35944 SCFM	16.96 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	6.00 mg/m ³
Front Half Particulate	0.00 gr/ft ³	4.30 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.70 mg/m ³
Mass Emission Rate	0.81 lbs/hr	0.37 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	88 ° F	31 ° C
Moisture Content (by volume):	2.2 %	
Average Stack Gas Velocity:	21.3 ft/sec	6.5 m/sec
Total Actual Gas Flow Rate:	40188 ACFM	
Dry Gas flow Rate at Reference Conditions:	35568 SCFM	16.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.3 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.6 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.84 lbs/hr	0.38 kg/hr

TEST 2:

Gas Temperature:	89 ° F	32 ° C
Moisture Content (by volume):	1.7 %	
Average Stack Gas Velocity:	21.4 ft/sec	6.5 m/sec
Total Actual Gas Flow Rate:	40449 ACFM	
Dry Gas flow Rate at Reference Conditions:	35893 SCFM	16.9 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.6 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.89 lbs/hr	0.40 kg/hr

TEST 3:

Gas Temperature:	89 ° F	32 ° C
Moisture Content (by volume):	2.8 %	
Average Stack Gas Velocity:	21.9 ft/sec	6.7 m/sec
Total Actual Gas Flow Rate:	41453 ACFM	
Dry Gas flow Rate at Reference Conditions:	36370 SCFM	17.2 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.0 mg/m ³
Front Half Particulate	.001 gr/ft ³	3.4 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 4
Permit Number: RA-17557
Job Number: ME2425-051
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
K84	K85	K86
28-Jun-24	28-Jun-24	28-Jun-24
8:23	9:48	11:10
9:24	10:49	12:11
60	60	60
DB/NA	DB/NA	DB/NA
1039	1039	1039
28.10	28.10	28.10
-0.11	-0.11	-0.11
1.00	1.00	1.00
20.00	20.00	20.00
0.00	0.00	0.00
79.00	79.00	79.00
0.334	0.334	0.334
0.9999	0.9999	0.9999
0.83867	0.83867	0.83867
31.5	31.5	31.5
16	10	21
3.8	4.8	4.2
0.0002	0.0001	0.0004
0.0052	0.0057	0.0036
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0074	0.0078	0.0060

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

28-Jun-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	0.16	1.25	60	60	87	31.43	1.04
A-11	0.16	1.27	75	67	87	33.50	1.01
A-10	0.14	1.13	85	69	88	35.55	1.02
A-9	0.12	0.97	89	71	88	37.52	1.04
A-8	0.11	0.90	93	73	88	39.38	1.01
A-7	0.11	0.90	97	72	88	41.12	1.00
A-6	0.10	0.82	98	72	87	42.86	1.06
A-5	0.10	0.82	99	74	87	44.61	1.01
A-4	0.10	0.83	101	77	87	46.28	1.03
A-3	0.09	0.75	101	80	87	48.00	0.98
A-2	0.09	0.75	102	81	88	49.56	0.99
A-1	0.09	0.75	103	84	88	51.14	0.98
B-12	0.14	1.16	104	85	88	52.71	0.95
B-11	0.15	1.25	104	85	88	54.60	0.98
B-10	0.13	1.09	105	86	87	56.62	0.97
B-9	0.14	1.17	105	87	87	58.49	0.97
B-8	0.15	1.26	106	87	87	60.42	1.00
B-7	0.16	1.34	107	88	87	62.48	1.00
B-6	0.16	1.34	108	89	88	64.61	0.99
B-5	0.15	1.26	108	89	88	66.72	1.00
B-4	0.14	1.18	109	90	88	68.79	1.01
B-3	0.15	1.26	109	91	88	70.81	1.00
B-2	0.15	1.26	109	91	89	72.88	1.00
B-1	0.15	1.26	109	92	89	74.96	1.00
						77.03	

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

28-Jun-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	0.16	1.27	69	67	88	77.40	1.00
A-11	0.15	1.20	78	70	88	79.44	0.98
A-10	0.14	1.13	84	72	88	81.40	1.03
A-9	0.13	1.06	90	74	89	83.40	0.99
A-8	0.12	0.98	92	79	90	85.27	0.97
A-7	0.11	0.90	93	81	91	87.03	0.98
A-6	0.11	0.91	96	87	91	88.74	1.00
A-5	0.10	0.83	102	89	91	90.49	1.02
A-4	0.10	0.83	103	90	91	92.22	1.05
A-3	0.10	0.84	105	92	90	94.00	0.95
A-2	0.09	0.76	109	96	90	95.61	0.99
A-1	0.10	0.85	113	97	90	97.22	1.04
B-12	0.14	1.19	116	99	89	99.00	0.98
B-11	0.15	1.28	115	100	89	101.01	0.99
B-10	0.15	1.28	115	100	89	103.11	1.00
B-9	0.14	1.19	115	101	89	105.22	1.02
B-8	0.14	1.19	115	102	89	107.31	0.99
B-7	0.15	1.28	115	102	89	109.33	1.01
B-6	0.15	1.28	115	102	89	111.46	0.98
B-5	0.16	1.36	115	101	89	113.54	1.00
B-4	0.15	1.28	115	101	89	115.72	1.02
B-3	0.15	1.28	115	101	89	117.88	0.98
B-2	0.14	1.19	115	102	89	119.96	1.00
B-1	0.14	1.19	115	102	89	122.01	0.99
						124.04	

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

28-Jun-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	0.15	1.24	92	92	90	25.70	1.00
A-11	0.16	1.34	96	93	89	27.74	1.00
A-10	0.16	1.34	98	95	89	29.86	1.00
A-9	0.15	1.26	101	96	89	31.99	1.03
A-8	0.13	1.08	102	97	89	34.11	0.99
A-7	0.11	0.92	103	98	89	36.02	1.00
A-6	0.11	0.92	105	99	89	37.80	1.02
A-5	0.11	0.93	107	101	90	39.61	1.00
A-4	0.12	1.01	108	102	90	41.40	0.99
A-3	0.12	1.02	109	103	90	43.24	0.99
A-2	0.11	0.93	110	104	90	45.09	0.99
A-1	0.09	0.76	111	103	90	46.87	1.01
B-12	0.14	1.19	112	103	91	48.51	0.99
B-11	0.14	1.19	112	103	90	50.52	1.00
B-10	0.15	1.27	113	104	90	52.54	1.01
B-9	0.15	1.27	114	104	89	54.66	0.99
B-8	0.16	1.37	115	104	89	56.75	0.99
B-7	0.14	1.19	115	104	89	58.89	0.99
B-6	0.14	1.19	115	104	89	60.91	1.01
B-5	0.16	1.37	116	104	89	62.97	1.00
B-4	0.16	1.37	116	104	88	65.14	0.99
B-3	0.15	1.28	116	104	89	67.29	0.99
B-2	0.15	1.28	116	104	90	69.38	0.99
B-1	0.15	1.28	116	104	90	71.47	1.02
						73.61	



Dryer Stack 4
 Pinnacle Renewable Energy Inc
 Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 1.001

Delta P:	0.130 "H ₂ O	Us avg:	21.26 ft/sec
Delta H:	1.082	ACFM:	40188 ft ³ /min
Tm avg:	550.1 °R	SDCFM:	35568 ft ³ /min
Ts avg:	547.7 °R	Vm std:	41.22 ft ³
Bwo:	0.022	Vm corr:	45.60 ft ³
Md:	28.96	Vm:	45.60 ft ³
Ms:	28.72	MF:	0.9999
Pb:	28.10 "Hg	PCON:	6.34 mg/m ³
Pm:	28.18 "Hg	ERAT:	0.38 kg/hr
Ps:	28.09 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.999

Delta P:	0.131 "H ₂ O	Us avg:	21.40 ft/sec
Delta H:	1.106	ACFM:	40449 ft ³ /min
Tm avg:	558.4 °R	SDCFM:	35893 ft ³ /min
Ts avg:	549.4 °R	Vm std:	41.54 ft ³
Bwo:	0.017	Vm corr:	46.64 ft ³
Md:	28.96	Vm:	46.64 ft ³
Ms:	28.78	MF:	0.9999
Pb:	28.10 "Hg	PCON:	6.63 mg/m ³
Pm:	28.18 "Hg	ERAT:	0.40 kg/hr
Ps:	28.09 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 1.001

Delta P:	0.137 "H ₂ O	Us avg:	21.93 ft/sec
Delta H:	1.167	ACFM:	41453 ft ³ /min
Tm avg:	565.1 °R	SDCFM:	36370 ft ³ /min
Ts avg:	549.5 °R	Vm std:	42.16 ft ³
Bwo:	0.028	Vm corr:	47.91 ft ³
Md:	28.96	Vm:	47.91 ft ³
Ms:	28.66	MF:	0.9999
Pb:	28.10 "Hg	PCON:	5.03 mg/m ³
Pm:	28.19 "Hg	ERAT:	0.31 kg/hr
Ps:	28.09 "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)

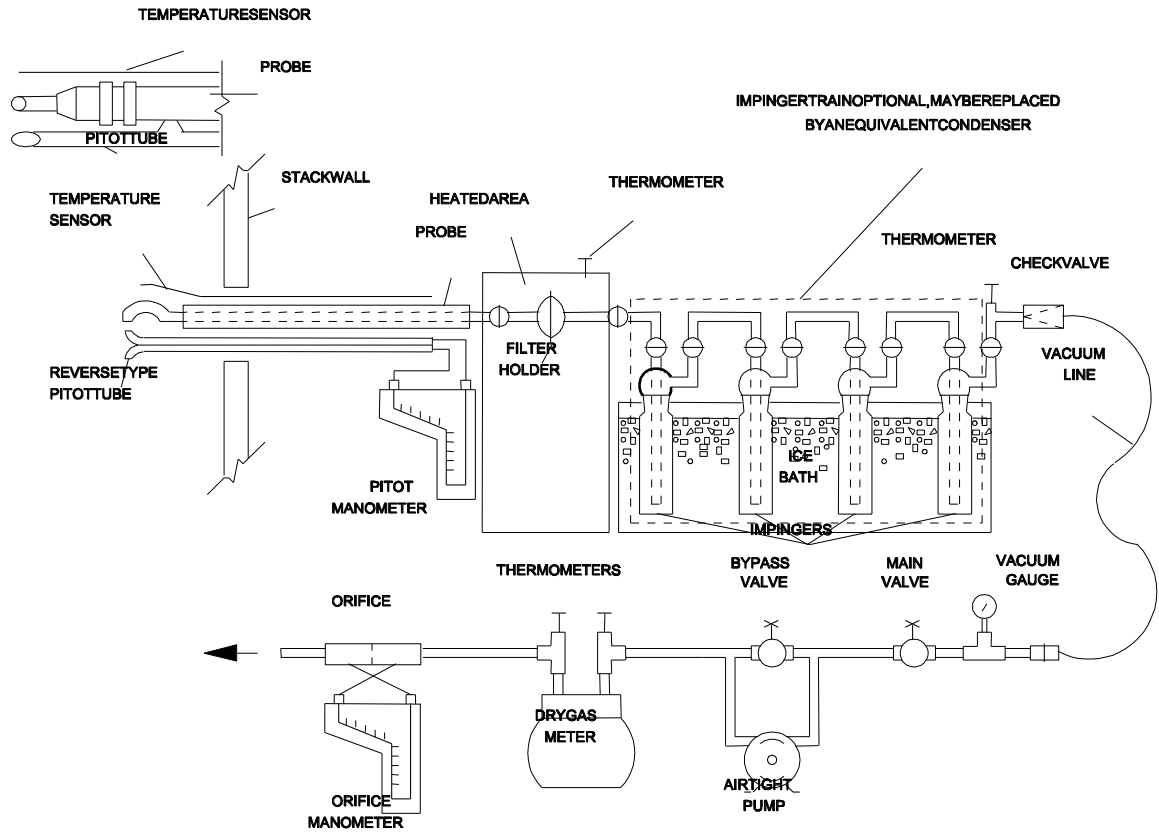
O₂, CO₂, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

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.

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

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

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).

$$= M_d (1 - B_{ws}) + 18.0 B_{ws}$$

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):* 30.05
Pitot I.D.: **140** *Wind Tunnel Temperature (°F):* 70.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
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): 29.9
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
Pitot I.D.: **301** Wind Tunnel Temperature ($^{\circ}$ F): 65.0
Nozzle: 0.250

Wind Velocity (ft/sec)	Ref.Pitot ("H ₂ O)	S-Type Pitot ("H ₂ O)	Pitot Factor
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: 10-Jan-24 *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 ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</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:



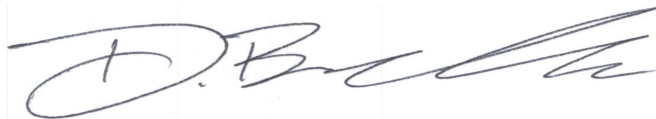
**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 10-Jan-24
 CONSOLE MANUF.: NAPP MODEL 31
 CONSOLE I.D.: C-955

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	64.0	64.0	64.0
P=Pres. Differential at WTM ("Hg)	0.0699	0.1250	0.1766
Pb= Atmospheric Pressure ("Hg)	27.95	27.95	27.95
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6006	0.6006	0.6006
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	86.0	84.0	90.0
To= Dry Test Meter Outlet Temp. (oF.)	67.0	66.0	68.0
Ri= Initial Dry Test volume (ft3)	97.56	89.73	4.38
Rf= Final Dry Test Volume (ft3)	102.43	94.62	9.28
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	27.8801	27.8250	27.7734
Pd= Pb + (^H/13.59) "Hg	28.0236	28.0972	28.1708
Tw= Ta +460 (oR.)	524.0	524.0	524.0
Td= [(Ti + To)/2] + 460 (oR.)	536.5	535.0	539.0
Bw= Pv/Pb ("Hg)	0.0215	0.0215	0.0215
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	1.0153	1.0037	1.0047
Y (MEAN)(WTMF) =	1.0079		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 10-Jan-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	27.95	27.95	27.95
Y=gas meter factor	1.0153	1.0153	1.0037
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	12.7	14.9	21.9
Rf=final gas meter vol.	14.67	17.66	25.21
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.400028	0.560446	0.664449
To=meter outlet Temp (oF)	68	68	68
Tm=meter out temp. (oR)	528	528	528
$P_m=P_b + \Delta H$	27.98679	28.02358	28.06038
$SQRT(T_m/P_m \cdot H/M_d)$	0.570655	0.806498	0.987107
Ko=orifice const.	0.700998	0.694912	0.673128

Ko MEAN : 0.68968

$Ko \cdot 4 \cdot 144 = 397.2555$

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 10-Jan-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	27.95	27.95	27.95
Y=gas meter factor	1.0037	1.0047	1.0047
Delta H=	2	2.5	3
Ri=int. gas meter vol.	25.6	29.7	34.3
Rf=final gas meter vol.	29.42	33.9	38.84
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.766827	0.843948	0.912268
Tm=meter out temp. (oF)	69	69	70
Tm=meter out temp. (oR.)	529	529	530
Pm=Pb + ^H	28.09717	28.13396	28.17075
SQRT(Tm/Pm*H/Md)	1.140144	1.273886	1.395878
Ko=orifice const.	0.67257	0.662499	0.653544

Ko MEAN : 0.662871

Ko*4*144= 381.8136

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 10-Jan-24
 CONSOLE MANUF.: NAPP MODEL 31
 CONSOLE I.D.: C-980

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	64.0	64.0	64.0
P=Pres. Differential at WTM ("Hg)	0.0883	0.1471	0.2133
Pb= Atmospheric Pressure ("Hg)	27.95	27.95	27.95
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6006	0.6006	0.6006
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	90.0	90.0	97.0
To= Dry Test Meter Outlet Temp. (oF.)	75.0	74.0	76.0
Ri= Initial Dry Test volume (ft3)	82.34	75.42	88.32
Rf= Final Dry Test Volume (ft3)	87.31	80.35	93.33
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	27.8617	27.8029	27.7367
Pd= Pb + (^H/13.59) "Hg	28.0236	28.0972	28.1708
Tw= Ta +460 (oR.)	524.0	524.0	524.0
Td= [(Ti + To)/2] + 460 (oR.)	542.5	542.0	546.5
Bw= Pv/Pb ("Hg)	0.0215	0.0215	0.0215
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0054	1.0078	0.9950
Y (MEAN)(WTMF) =	1.0027		

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



ORIFICE METER CALIBRATION

DATE: January 10 /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	27.95	27.95	27.95
Y=gas meter factor	1.0054	1.0054	1.0078
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	94.3	97.2	0.8
Rf=final gas meter vol.	96.47	100.33	4.62
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.4363436	0.6293804	0.7699592
To=meter outlet Temp (oF)	75	76	77
Tm=meter out temp. (oR)	535	536	537
Pm=Pb + ^H	27.986792	28.0235835	28.0603753
SQRT(Tm/Pm*H/Md)	0.5744253	0.812585	0.99548398
Ko=orifice const.	0.7596176	0.774541	0.77345213

Ko MEAN = 0.7692036

Ko*4*144= 443.06127

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: January 10 /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	27.95	27.95	27.95
Y=gas meter factor	1.0078	0.995	0.995
Delta H=	2	2.5	3
Ri=int. gas meter vol.	5.5	10.9	16.2
Rf=final gas meter vol.	9.87	15.72	21.51
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/\Delta T(FT^3/MIN)$	0.8808172	0.95918	1.05669
Tm=meter out temp. (oF)	77	77	78
Tm=meter out temp. (oR.)	537	537	538
$P_m=P_b + \Delta H$	28.097167	28.133959	28.170751
$SQRT(T_m/P_m \cdot H/M_d)$	1.148733	1.2834825	1.4063739
Ko=orifice const.	0.7667728	0.7473261	0.7513578

Ko MEAN = 0.7551522

$Ko^4 \cdot 144 = 434.96768$

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.)	64.0	64.0	64.0
P=Pres. Differential at WTM ("Hg)	0.0669	0.1250	0.1839
Pb= Atmospheric Pressure ("Hg)	27.90	27.90	27.90
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6006	0.6006	0.6006
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	81.0	83.0	86.0
To= Dry Test Meter Outlet Temp. (oF.)	72.0	69.0	70.0
Ri= Initial Dry Test volume (ft3)	73.67	66.93	80.43
Rf= Final Dry Test Volume (ft3)	78.52	71.76	85.27
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	27.8331	27.7750	27.7161
Pd= Pb + (^H/13.59) "Hg	27.9736	28.0472	28.1208
Tw= Ta +460 (oR.)	524.0	524.0	524.0
Td= [(Ti + To)/2] + 460 (oR.)	536.5	536.0	538.0
Bw= Pv/Pb ("Hg)	0.0215	0.0215	0.0215
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	1.0196	1.0181	1.0149
Y (MEAN)(WTMF) =	1.0175		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 09-Jan-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	27.9	27.9	27.9
Y=gas meter factor	1.0196	1.0196	1.0181
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	91.2	93.6	97
Rf=final gas meter vol.	93.05	96.23	100.22
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.377252	0.5363096	0.6556564
To=meter outlet Temp (oF)	69	69	69
Tm=meter out temp. (oR)	529	529	529
Pm=Pb + ^H	27.936792	27.973584	28.010375
SQRT(Tm/Pm*H/Md)	0.5717061	0.8079826	0.9889225
Ko=orifice const.	0.6598705	0.6637638	0.6630008

Ko MEAN = 0.6622117

Ko*4*144= 381.43394

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 09-Jan-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	27.9	27.9	27.9
Y=gas meter factor	1.0181	1.0149	1.0149
Delta H=	2	2.5	3
Ri=int. gas meter vol.	1.1	5.7	10.5
Rf=final gas meter vol.	4.8	9.88	15.1
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / T(FT^3/MIN)$	0.753394	0.8484564	0.933708
To=meter outlet Temp (oF)	69	69	70
Tm=meter out temp. (oR)	529	529	530
$P_m = P_b + \Delta H$	28.047167	28.083959	28.120751
$SQRT(T_m / P_m * H / M_d)$	1.1411601	1.2750198	1.3971188
Ko=orifice const.	0.6602001	0.6654457	0.6683096

Ko MEAN = 0.6646518

$Ko * 4 * 144 = 382.83944$

McCALL ENVIRONMENTAL LTD.



Calibrating Technician Signature:

CALIBRATION CERTIFICATE DRY GAS METER

DATE: 09-Jan-24

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1039

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	64.0	64.0	64.0
P=Pres. Differential at WTM ("Hg)	0.1030	0.2060	0.3016
Pb= Atmospheric Pressure ("Hg)	27.90	27.90	27.90
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6006	0.6006	0.6006
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	83.0	90.0	93.0
To= Dry Test Meter Outlet Temp. (oF.)	77.0	76.0	78.0
Ri= Initial Dry Test volume (ft3)	61.43	54.53	73.41
Rf= Final Dry Test Volume (ft3)	66.45	59.45	78.37
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	27.7970	27.6940	27.5984
Pd= Pb + (^H/13.59) "Hg	27.9736	28.0472	28.1208
Tw= Ta +460 (oR.)	524.0	524.0	524.0
Td= [(Ti + To)/2] + 460 (oR.)	540.0	543.0	545.5
Bw= Pv/Pb ("Hg)	0.0215	0.0215	0.0215
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	0.9902	1.0095	0.9999
Y (MEAN)(WTMF) =	0.9999		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 09-Jan-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	27.9	27.9	27.9
Y=gas meter factor	0.9902	0.9902	1.0095
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	83.2	86.4	90.6
Rf=final gas meter vol.	85.77	90.01	95.03
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/^T(FT^3/MIN)$	0.5089628	0.7149244	0.894417
Tm=meter out temp. (oF)	78	78	79
Tm=meter out temp. (oR.)	538	538	539
$P_m=P_b + ^H$	27.936792	27.973584	28.010375
$SQRT(T_m/P_m*H/M_d)$	0.5765489	0.8148268	0.9982258
Ko=orifice const.	0.8827748	0.8773943	0.8960067

Ko MEAN = 0.8853919

$Ko^4*144=$ 509.98575

McCALL ENVIRONMENTAL



Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: 09-Jan-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	27.9	27.9	27.9
Y=gas meter factor	1.0095	0.9999	0.9999
Delta H=	2	2.5	3
Ri=int. gas meter vol.	95.7	101.7	108.1
Rf=final gas meter vol.	100.79	107.41	114.34
min. samp	5	5	5
$Q_m=Y(R_f-R_i)/^T(FT^3/MIN)$	1.027671	1.1418858	1.2478752
Tm=meter out temp. (oF)	79	79	79
Tm=meter out temp. (oR.)	539	539	539
$P_m=P_b + ^H$	28.047167	28.083959	28.120751
$SQRT(T_m/P_m*H/M_d)$	1.1518956	1.2870146	1.4089312
Ko=orifice const.	0.8921564	0.8872361	0.8856892

Ko MEAN = 0.8883606

$Ko*4*144=$ 511.69569

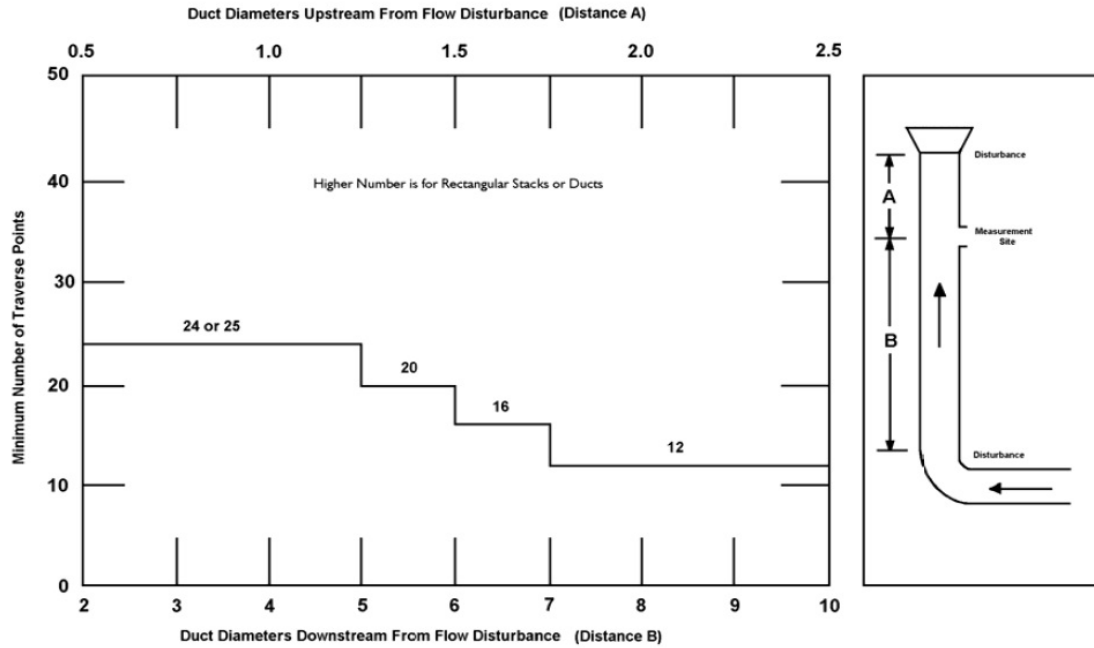
McCALL ENVIRONMENTAL



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°

Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Pellet Plant Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1743062 Control Number: Date Received: Jul 3, 2024 Date Reported: Jul 8, 2024 Report Number: 3021428 Report Type: Final Report
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

	Reference Number	1743062-1	1743062-2	1743062-3		
	Sample Date					
	Sample Time					
	Sample Location					
	Sample Description	Dryer Stack 1 - Test 1 / 19.4 °C	Dryer Stack 1 - Test 2 / 19.4 °C	Dryer Stack 1 - Test 3 / 19.4 °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	2
Volume	Sample volume	mL	301	311	314	
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: Pellet Plant Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1743062 Control Number: Date Received: Jul 3, 2024 Date Reported: Jul 8, 2024 Report Number: 3021428 Report Type: Final Report
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

	Reference Number	1743062-4	1743062-5	1743062-6	
	Sample Date				
	Sample Time				
	Sample Location				
	Sample Description	Dryer Stack 2 - Test 1 / 19.4 °C	Dryer Stack 2 - Test 2 / 19.4 °C	Dryer Stack 2 - Test 3 / 19.4 °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	323	319	322
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: Pellet Plant Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1743062 Control Number: Date Received: Jul 3, 2024 Date Reported: Jul 8, 2024 Report Number: 3021428 Report Type: Final Report
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

	Reference Number	1743062-7	1743062-8	1743062-9	
	Sample Date				
	Sample Time				
	Sample Location				
	Sample Description	Dryer Stack 3 - Test 1 / 19.4 °C	Dryer Stack 3 - Test 2 / 19.4 °C	Dryer Stack 3 - Test 3 / 19.4 °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	319	323	326
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: Pellet Plant Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1743062 Control Number: Date Received: Jul 3, 2024 Date Reported: Jul 8, 2024 Report Number: 3021428 Report Type: Final Report
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	


	Reference Number	1743062-10	1743062-11	1743062-12	
	Sample Date				
	Sample Time				
	Sample Location				
	Sample Description	Dryer Stack 4 - Test 1 / 19.4 °C	Dryer Stack 4 - Test 2 / 19.4 °C	Dryer Stack 4 - Test 3 / 19.4 °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	320	312	325
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: Pellet Plant Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1743062 Control Number: Date Received: Jul 3, 2024 Date Reported: Jul 8, 2024 Report Number: 3021428 Report Type: Final Report
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

Reference Number 1743062-13
Sample Date
Sample Time
Sample Location
Sample Description Blank / 19.4 °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	433		
pH adjustment	required prior to O&G extraction		Yes		

Approved by: 
 Rachel Eden, B. Sc.
 Operations Manager

Methodology and Notes

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Pellet Plant Project Name: Drax Project Location: Williams Lake LSD: P.O.:	Lot ID: 1743062 Control Number: Date Received: Jul 3, 2024 Date Reported: Jul 8, 2024 Report Number: 3021428 Report Type: Final Report
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

Method of Analysis

Method Name	Reference	Method	Location
Oil and Grease in water (VAN)	BCELM	* Oil & Grease in Water - Direct Hexane Extraction (2023), Oil & Grease <i>* Reference Method Modified</i>	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: Dray
Williams lake
 Process: Dryer Stack 1
 Test Number: 1
 Date: Jan 28/24
 Start Time: 8:23
 Finish Time: 9:27
 Starting Vol. 300
 Final Vol. 310
 Flask: K75
 Console: 1021
 Stack Diameter

BP 28.10
 DN .310 .310
 CP 83 829
 MF 1.0175
 Moist. 2%
 PM 28.21
 AS
 Ko 0.6646
 Pitot 140
 Port
 Static -.15 -.09 Load:
 PS 28.08

CO ₂	O ₂	CO	N ₂
1	20		
0	21		
0	21		
0	21		

Duct Diameters
 Up-Stream

Duct Diameters
 Downstream

Personnel: KS/DL/LCJ

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: -003 Finish: .005

.11 - .18

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
12	.21	2.24	62	61	80	30.18	4	270	LED	
11	.20	2.15	65	63	79	32.06				
10	.19	2.05	69	63	79	33.90				
9	.17	1.84	72	64	79	35.20				
8	.15	1.63	72	64	79	37.63	4			
7	.13	1.42	75	66	79	39.33				
6	.11	1.20	80	68	79	40.93				
5	.10	1.10	81	69	79	42.50				
4	.11	1.21	81	70	80	43.88				
3	.11	1.21	83	72	82	45.35	4			
2	.14	1.54	85	74	82	46.85				
1	.15	1.66	86	75	82	48.40				
30	.14	1.56	87	76	80	50.15				
11	.16	1.77	85	77	82	51.90				
10	.15	1.66	86	78	82	53.52	4			
9	.16	1.77	87	80	82	55.30				
8	.16	1.78	90	82	82	57.10				
7	.16	1.79	95	84	82	58.73				
6	.14	1.57	97	85	83	60.44				
5	.12	1.35	97	86	82	62.23				
4	.11	1.24	97	87	82	63.73				
3	.12	1.35	99	88	82	65.26				
2	.13	1.47	99	89	82	66.84				
1	.14	1.58	100	90	82	68.62				
						70.01				

Client Name: Dray
Williams Lake
 Process: Dryer Stack 1
 Test Number: 2
 Date: June 25/12/24
 Start Time 9:50
 Finish Time 10:52
 Starting Vol. 300
 Final Vol. 315
 Flask: K 76
 Console: 1021
 Stack Diameter

BP 28.16
 DN .310
 CP 0.83829
 MF 1.0175
 Moist. 1%
 PM 28.21
 AS
 Ko 0.6646
 Pitot 140
 Port
 Static -.15
 PS 28.08

CO ₂	O ₂	CO	N ₂
1	20		
0	21		
0	21		
1	20		

Duct Diameters
Up-Stream

Duct Diameters
Downstream

Personnel: RS / DL / CB

Mean Yaw Angle

Leakage Rate @ 15 inches Start: .002 Finish: .004

Load: 77

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	2.26	86	86	83	71.16	1	270	ELED	
11	.21	2.36	83	83	82	73.18				
10	.20	2.26	89	83	82	75.29				
9	.18	2.04	91	84	84	77.27				
8	.16	1.83	94	84	82	79.21	1			
7	.14	1.59	95	85	85	81.11				
6	.12	1.36	97	86	85	82.71				
5	.11	1.26	96	87	82	84.26				
4	.10	1.14	97	88	82	85.76				
3	.12	1.37	97	89	82	87.12	1			
2	.13	1.49	98	90	82	88.68				
1	.16	1.84	100	91	82	90.80				
B 12	.15	1.73	103	92	82	92.08				
11	.17	1.97	104	93	82	93.88	1			
10	.16	1.85	105	93	83	95.74				
9	.17	1.97	106	94	82	97.60				
8	.17	1.98	107	95	82	99.44				
7	.15	1.75	108	96	82	101.40				
6	.15	1.75	107	97	81	103.08				
5	.13	1.52	108	98	82	104.88	1			
4	.11	1.28	109	98	82	106.47				
3	.11	1.28	109	99	82	108.00				
2	.12	1.40	108	99	82	109.52				
1	.15	1.75	108	99	83	111.10				
						113.00				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 1
 Test Number: 3
 Date: June 28/24
 Start Time 11:13
 Finish Time 12:10
 Starting Vol. 300
 Final Vol. 311
 Flask: K77
 Console: 1021
 Stack Diameter

BP 28.10
 DN .310
 CP 0.83829
 MF 1.0175
 Moist. 2%
 PM 28.21
 AS
 Ko 0.6646
 Pitot 140
 Port
 Static -.15
 PS 28.08

CO ₂	O ₂	CO	N ₂
1	20		
0	21		
0	21		
0	21		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream

Personnel: KS/DL/ICB

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .002 Finish: .003

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.21	2.37	95	95	84	13.83	4	270	LED	
11	.20	2.24	91	93	86	15.80				
10	.21	2.36	94	92	86	17.90				
9	.19	2.15	97	92	84	19.96				
8	.17	1.92	99	93	84	21.95	4			
7	.15	1.70	99	93	84	23.87				
6	.13	1.48	102	94	84	25.64				
5	.12	1.36	102	95	85	27.30				
4	.11	1.25	103	96	85	28.75				
3	.13	1.47	102	96	86	30.38	3			
2	.14	1.59	104	96	86	31.98				
1	.17	1.94	106	97	86	33.66				
B12	.16	1.82	106	97	86	35.48				
11	.18	2.05	108	99	86	37.18	4			
10	.17	1.94	108	99	85	39.05				
9	.18	2.06	110	101	88	40.93				
8	.18	2.06	111	101	87	42.88				
7	.16	1.84	111	101	86	44.79	4			
6	.16	1.84	111	101	87	46.64				
5	.14	1.61	111	101	86	48.43				
4	.10	1.15	111	102	85	50.14				
3	.10	1.15	110	103	85	51.61	4			
2	.11	1.26	111	103	86	53.11				
1	.14	1.61	111	103	86	54.61				
						56.31				

Client Name: Drax
Williams ake
 Process: Dryer Jack's
 Test Number:
 Date: JUNE 28/24
 Start Time 823
 Finish Time 9.25
 Starting Vol. 300
 Final Vol. 322
 Flask: K78
 Console: 480
 Stack Diameter

BP 2810
 DN 0.330
 CP 84182
 MF 1.0027
 Moist. 3%
 PM 28.21
 AS
 Ko .7551
 Pitot 107
 Port
 Static -.16 -.10
 PS 28.08

CO ₂	O ₂	CO	N ₂
1	20		
0	21		
0	21		
0	21		

Duct Diameters
Up-Stream

Duct Diameters
Downstream

Personnel: KS/DL/CB

Mean Yaw Angle

Leakage Rate @ 15 inches Start: .006 Finish: .008

Load:

.13-.20

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	2.17	68	63	91	80.54	2	270	ICE	
11	.20	2.10	72	64	89	82.79				
10	.18	1.90	75	64	89	84.81				
9	.16	1.69	79	65	89	86.80				
8	.17	1.81	81	66	89	88.61				
7	.14	1.49	86	67	89	90.72				
6	.14	1.49	88	68	88	92.66	1			
5	.15	1.61	88	70	89	94.63				
4	.12	1.30	90	71	89	96.61				
3	.10	1.07	89	72	90	98.24				
2	.10	1.07	90	73	91	99.97				
1	.11	1.18	90	74	91	101.46				
B 12	.14	1.51	92	76	91	103.11				
11	.15	1.63	96	77	90	105.11				
10	.18	1.95	96	77	90	107.05				
9	.16	1.74	99	78	90	109.27				
8	.15	1.64	99	80	90	111.47				
7	.16	1.75	99	80	90	113.35				
6	.17	1.86	100	81	91	115.34				
5	.15	1.65	101	82	89	117.46				
4	.14	1.54	101	83	89	119.47				
3	.12	1.32	101	84	89	121.49				
2	.13	1.43	100	85	88	123.17				
1	.15	1.65	101	85	89	124.96				
						126.83				

Client Name: Draft
Williams Leaker
 Process: Proyer Stack
 Test Number: 2
 Date: June 28 2024
 Start Time: 950
 Finish Time: 1053
 Starting Vol.: 300
 Final Vol.: 20
 Flask: K79
 Console: 98c
 Stack Diameter

BP 28.10
 DN .330
 CP .84187
 MF 1.00279
 Moist. 2%
 PM 28.21
 AS
 Ko .7551
 Pitot 107
 Port
 Static -.16
 PS 28.08

CO ₂	O ₂	CO	N ₂
0	21		
0	21		
1	20		
0	21		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream

Personnel: CB DLDBKMA Mean Yaw Angle

Leakage Rate @ 15 inches Start: 1.004 Finish: .006

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.20	2.17	78	77	89	27.37	7	278	≠LED	
11	.20	2.19	82	78	89	29.52				
10	.19	2.09	89	77	89	31.69				
9	.19	2.10	93	77	88	33.81				
8	.17	1.88	94	78	89	35.86				
7	.16	1.77	97	79	89	37.98				
6	.16	1.77	98	80	90	40.00	2			
5	.15	1.67	100	81	89	42.09				
4	.13	1.45	100	82	89	44.01				
3	.11	1.23	100	83	88	45.86				
2	.10	1.12	100	84	89	47.58				
1	.10	1.12	101	84	90	49.10				
B12	.13	1.45	102	86	90	50.87	1			
11	.15	1.68	103	87	90	52.79				
10	.19	2.14	106	88	90	54.71				
9	.18	2.03	108	89	89	56.83				
8	.16	1.81	109	89	90	59.08				
7	.15	1.70	108	90	89	60.96				
6	.17	1.93	109	91	89	63.09	1			
5	.16	1.82	110	92	89	65.31				
4	.15	1.70	110	93	90	67.29				
3	.13	1.48	110	93	89	69.23				
2	.13	1.48	110	94	89	71.21				
1	.15	1.70	110	94	89	73.08				
						74.96				

Client Name: Doak
Williams Lake
 Process: Dry Stack 2
 Test Number: 3
 Date: June 28 2024
 Start Time 11.13
 Finish Time 12.15
 Starting Vol. 300
 Final Vol. 322
 Flask: K80
 Console: 980
 Stack Diameter

BP 28.10
 DN .330
 CP .84182
 MF 1.0027
 Moist. 2%
 PM 28.21
 AS
 Ko .7551
 Pitot 107
 Port
 Static -.16
 PS 28.08

CO ₂	O ₂	CO	N ₂
0	21		
0	21		
0	21		
0	21		

Duct Diameters
Up-Stream

Duct Diameters
Downstream

Personnel: DL DB CB KJ NH Mean Yaw Angle

Leakage Rate @ 15 inches Start: .002 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
A12	.21	2.32	89	86	89	75.78	1	270	ELED	
11	.19	2.11	95	87	91	78.10				
10	.19	2.11	98	85	90	80.22				
9	.17	1.90	101	86	89	82.30				
8	.15	1.68	101	86	89	84.36				
7	.14	1.57	103	87	89	86.38	1			
6	.13	1.46	103	87	89	88.34				
5	.11	1.23	105	88	89	90.24				
4	.12	1.35	105	89	89	92.04				
3	.11	1.24	106	90	89	93.83				
2	.11	1.24	106	90	89	95.65	1			
1	.10	1.13	106	92	89	97.34				
B12	.14	1.58	106	92	90	99.04				
11	.17	1.98	107	94	90	101.14				
10	.18	2.04	110	93	89	103.21				
9	.16	1.82	112	93	89	105.40	1			
8	.15	1.70	112	93	89	107.64				
7	.17	1.93	112	94	89	109.68				
6	.16	1.82	112	95	89	111.81				
5	.15	1.71	113	96	89	113.88				
4	.13	1.36	112	96	89	115.96	1			
3	.12	1.36	111	97	89	117.77				
2	.13	1.48	110	97	89	119.51				
1	.14	1.59	111	98	89	121.34				
						123.33				

Client Name: Drax
Williams Lake
 Process: Upper Stack
 Test Number: 1
 Date: June 28/24
 Start Time: 8:23
 Finish Time: 9:25
 Starting Vol.: 300
 Final Vol.: 318
 Flask: K-87
 Console: C-999
 Stack Diameter

BP 28.10
 DN 0.310
 CPO 0.85654
 MF 1.0079
 Moist. 2%
 PM 28.21
 AS
 Ko .6628
 Pitot 301
 Port
 Static r.09
 PS 28.07

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
 Up-Stream

Duct Diameters
 Downstream

Personnel: DB / N.A

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .004 Finish: .003

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	.14	1.54	55	55	85	69.70	1	270	ICED	
"	.14	1.51	61	55	98	67.31				
0	.13	1.42	72	64	104	68.90				
9	.13	1.41	75	59	106	70.50				
8	.12	1.30	79	59	110	72.08				
7	.11	1.19	80	60	110	73.61				
6	.10	1.08	81	60	110	75.09	1			
5	.10	1.08	83	61	111	76.51				
4	.10	1.09	84	62	109	77.94				
3	.11	1.20	88	65	110	79.38				
2	.11	1.21	90	66	111	80.88	1			
1	.11	1.21	90	67	110	82.36				
B 1	.13	1.43	91	67	110	83.87				
"	.13	1.43	91	68	109	85.50				
10	.14	1.55	91	69	109	87.11				
9	.12	1.32	92	69	111	88.76				
8	.11	1.21	92	70	111	90.31				
7	.11	1.22	93	70	110	91.83				
6	.12	1.32	93	70	111	93.29	1			
5	.13	1.44	95	71	110	94.87				
4	.14	1.55	96	71	110	96.40				
3	.15	1.67	97	72	109	98.06				
2	.15	1.67	98	73	109	99.74				
1	.14	1.56	100	75	111	101.47	1			
						103.15				

Client Name: Diox
 Process: Williams Lake
 Test Number: 2
 Date: Sun 25/24
 Start Time: 4:48
 Finish Time: 10:30
 Starting Vol.: 300
 Final Vol.: 323
 Flask: 1K 486
 Console: 955
 Stack Diameter: _____

BP 25.10
 DN 310
 CP 83634
 MF 1.0079
 Moist. 2
 PM 25.21
 AS _____
 Ko .66248
 Pitot 301
 Port _____
 Static -.09
 PS 25.59

CO ₂	O ₂	CO	N ₂
	<u>20</u>		

Duct Diameters
 Up-Stream _____

Duct Diameters
 Downstream _____

Personnel: NA/DB

Mean Yaw Angle _____

Leakage Rate @ 15 inches _____

Start: 1001 Finish: 10

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	.13	1.41	69	69	109	3.34				
11	.13	1.42	77	68	109	4.93				
10	.14	1.53	84	69	111	6.50				
9	.10	1.11	88	70	111	5.02				
8	.10	1.11	90	70	112	9.51				
7	.11	1.21	91	71	112	10.94				
6	.10	1.11	93	71	110	12.30				
5	.10	1.11	94	72	110	13.58				
4	.11	1.22	96	73	110	14.90				
3	.11	1.22	97	75	111	16.33				
2	.11	1.22	97	75	111	17.72				
1	.11	1.23	98	76	110	19.20				
B-12	.14	1.37	94	76	109	20.64				
11	.13	1.45	94	76	109	22.26				
10	.13	1.45	99	76	110	23.76				
9	.14	1.56	99	76	111	25.45				
8	.13	1.45	99	76	111	27.06				
7	.12	1.34	100	77	112	28.69				
6	.11	1.23	100	77	112	30.27				
5	.11	1.23	100	76	111	31.75				
4	.11	1.23	101	76	110	33.23				
3	.13	1.46	101	77	110	34.76				
2	.14	1.57	101	77	111	36.34				
1	.15	1.68	101	77	111	37.95				
						39.67				

Client Name: Drax
Williams LK.
 Process: Dryer Stack 3
 Test Number: 3
 Date: Jun. 28/24
 Start Time: 1114
 Finish Time: 1216
 Starting Vol.: 300
 Final Vol.: 323
 Flask: K89
 Console: 955
 Stack Diameter: _____

BP 28.10
 DN 0.310
 CP 0.85654
 MF 1.0079
 Moist. 2.1
 PM 28.21
 AS _____
 Ko 0.6628
 Pitot 301
 Port _____
 Static -0.09
 PS 28.09

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
 Up-Stream: _____

Duct Diameters
 Downstream: _____

Personnel: NA

Mean Yaw Angle: _____

Leakage Rate @ 15 inches: _____

Start: .003 Finish: -002

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	.14	1.53	75	75	110	39.90	1	270	10ED	
11	.14	1.56	83	77	105	41.58		↓	↓	
10	.13	1.46	89	77	104	43.24				
9	.12	1.36	93	78	100	44.83				
8	.12	1.38	98	80	97	46.40				
7	.11	1.26	94	80	96	48.01				
6	.11	1.27	100	81	96	49.51				
5	.11	1.27	101	81	97	51.04				
4	.10	1.15	101	82	98	52.58	1			
3	.10	1.15	100	82	98	54.02				
2	.10	1.15	100	82	96	55.50				
1	.17	1.27	101	82	97	56.97				
B-12	.14	1.60	101	82	106	58.53				
11	.13	1.49	102	83	100	60.17				
10	.13	1.50	102	83	98	61.81	1			
9	.14	1.62	102	83	97	63.46				
8	.13	1.50	102	83	97	65.17				
7	.11	1.27	102	83	97	66.79				
6	.10	1.15	101	84	99	68.28				
5	.11	1.26	101	84	100	69.76				
4	.11	1.26	102	84	101	71.30	1			
3	.13	1.49	102	84	101	72.86				
2	.13	1.50	102	85	99	74.49				
1	.14	1.61	103	85	99	76.10				
						77.78				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 4
 Test Number: 1
 Date: June 20/24
 Start Time: 8:23
 Finish Time: 9:24
 Starting Vol.: 300
 Final Vol.: 316
 Flask: K-84 ? K-87
 Console: C-1039
 Stack Diameter: _____

BP 20.10
 DN .534
 CP .83867
 MF .9999
 Moist. 3%
 PM 20.21
 AS _____
 Ko .8883
 Pitot 217
 Port _____
 Static -.11
 PS 20.09

CO ₂	O ₂	CO	N ₂
	20		

Duct Diameters
Up-Stream

Duct Diameters
Downstream

Personnel: DB/WA

Mean Yaw Angle _____

Leakage Rate @ 15 inches _____

Start: .001 Finish: .001

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	.16	1.25	60	60	87	31.43	0	1270	1060	
11	.16	1.27	75	67	87	33.50	1			
10	.14	1.13	85	69	88	35.55				
9	.12	0.97	89	71	88	37.52	1			
8	.11	.90	93	73	88	39.38				
7	.11	.90	97	72	88	41.12	1			
6	.10	.82	98	72	87	42.86				
5	.10	.82	99	74	87	44.61	2			
4	.10	.83	101	77	87	46.28				
3	.09	.75	101	80	87	48.00				
2	.09	.75	102	81	88	49.56	2			
1	.09	.75	103	84	88	51.14				
B 12	.14	1.16	104	85	88	52.71	3			
11	.15	1.25	104	85	88	54.60				
10	.13	1.09	105	86	87	56.62				
9	.14	1.17	105	87	87	58.49	3			
8	.15	1.26	106	87	87	60.42				
7	.16	1.34	107	88	87	62.48				
6	.16	1.34	108	89	88	64.61				
5	.15	1.26	108	89	88	66.72				
4	.14	1.18	109	90	88	68.79	3			
3	.15	1.26	109	91	88	70.81				
2	.15	1.26	109	91	89	72.88				
1	.15	1.26	109	92	89	74.96	3	4270	10100	
						77.03				

Client Name: Dray
Williams Lake
 Process: Dryer Stack 4
 Test Number: 2
 Date: June 20/24
 Start Time 9:48
 Finish Time 10:49
 Starting Vol. 300
 Final Vol. 310
 Flask: K-85
 Console: C-1039
 Stack Diameter _____

BP 28.10
 DN .334
 CP .83867
 MF 9999
 Moist. .03
 PM 28.21
 AS _____
 Ko .8883
 Pitot 217
 Port _____
 Static -.11
 PS 28.09

CO ₂	O ₂	CO	N ₂
1	20		

Duct Diameters
 Up-Stream _____

Duct Diameters
 Downstream _____

Personnel: DB/NA

Mean Yaw Angle _____

Leakage Rate @ 15 inches _____

Start: .002 Finish: .001

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	.16	1.27	69	67	89	77.40	0	270	1000	
11	.15	1.20	78	70	88	79.44				
10	.14	1.13	78	72	88	81.40	1			
9	.13	1.06	70	74	89	83.40				
8	.12	.98	92	79	90	85.27				
7	.11	.90	93	81	91	87.03				
6	.11	.91	96	87	91	88.74				
5	.10	.83	102	89	91	90.49				
4	.10	.83	103	90	91	92.22				
3	.10	.84	105	92	90	94.00				
2	.09	.76	109	96	90	95.61				
1	.10	.85	113	97	90	97.22	1			
B-12	.14	1.19	116	99	89	99.00				
11	.15	1.28	115	100	89	101.01				
10	.15	1.28	115	100	89	103.11				
9	.14	1.19	115	101	89	105.22				
8	.14	1.19	115	102	89	107.31				
7	.15	1.28	115	102	89	109.33	1			
6	.15	1.28	115	102	89	111.46				
5	.16	1.36	115	101	89	113.54				
4	.15	1.28	115	101	89	115.72				
3	.15	1.28	115	101	89	117.88	1			
2	.14	1.19	115	102	89	119.96				
1	.14	1.19	115	102	89	122.01	1	270	1000	
						124.04				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 4
 Test Number: 3
 Date: June 28/24
 Start Time 4:10
 Finish Time 12:11
 Starting Vol. 300
 Final Vol. 321
 Flask: K-86
 Console: C-1039
 Stack Diameter

BP 28.10
 DN .334
 CP .83867
 MF .9999
 Moist. .03
 PM 28.21
 AS
 Ko .8883
 Pitot 217
 Port
 Static - .11
 PS 28.09

CO ₂	O ₂	CO	N ₂

Duct Diameters
 Up-Stream

Duct Diameters
 Downstream

Personnel: DB/NA

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .003 Finish: .002

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	.15	1.24	92	92	90	25.70	0	270	ICEV	
11	.16	1.34	96	93	89	27.74	1			
10	.16	1.34	98	95	89	29.86				
9	.15	1.26	101	96	89	31.99				
8	.13	1.08	102	97	89	34.11	1			
7	.11	.92	103	98	89	36.02				
6	.11	.92	105	99	89	37.80				
5	.11	.93	107	101	90	39.61	1			
4	.12	1.01	108	102	90	41.40				
3	.12	1.02	109	103	90	43.24				
2	.11	.93	110	104	90	45.09	1			
1	.09	.76	111	103	90	46.87				
B-12	.14	1.19	112	103	91	48.91	1			
11	.14	1.19	112	103	90	50.92				
10	.15	1.27	113	104	90	52.94				
9	.15	1.27	114	104	89	54.66	1			
8	.16	1.37	115	104	89	56.75				
7	.14	1.19	115	104	89	58.89				
6	.14	1.19	115	104	89	60.91	1			
5	.16	1.37	116	104	89	62.97				
4	.16	1.37	116	104	88	65.14				
3	.15	1.28	116	104	89	67.29	1			
2	.15	1.28	116	104	90	69.38				
1	.15	1.28	116	104	90	71.47	1	270	ICEV	
						73.61				



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

Nicholas Angus

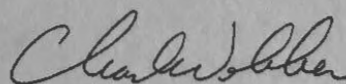
has successfully completed

Stack Sampling Seminar

35 Hours / 2017

June 23, 2017

Date



Dean

Faculty of Continuing Education and Extension





*Drax
Williams Lake*

Daily production rate June 28, 2024

25.0 MT/hr

Average for the previous calendar month

19.1 MT/hr

90th percentile production rate

28.2 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