

**Drax- Pinnacle Pellet Renewable Energy
Dryer Stacks 1-4, Cyclofilter
Quarter 4 Compliance Testing
November 4-25, 2022
PA-17557**

Our Job Number: ME2223-108

Report Author: Matt McCall
McCall Environmental

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December 15, 2022

DRAX
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) – November 4-25, 2022
Permit – PA-17557
McCall File Number – ME2223-108

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

Cyclofilter Stack

- Total Particulate and Condensable Organics State of Oregon Method

Key Personnel

- Report Generation: Matt McCall 250-542-5118
- Field Tech: Dan Lawrence, 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 November 4, 2022

Average of Triplicate Tests Dryer Stacks 1-4

Parameter	Stack 1	Stack2	Stack 3	Stack 4	Avg/Total	Permit	29-Sep-22
Test Date	04-Nov-22	04-Nov-22	04-Nov-22	04-Nov-22	N/A		N/A
Gas Temperature (°C)	30.8	30.5	29.3	37.8	32.1		33.44
% Moisture	3.25	4.66	3.11	3.59	3.65		2.15
Velocity (m/sec)	7.83	6.95	7.20	7.63	7.40		7.16
ACFM	48574	43067	44627	47310	183579		177642
Std. Dry Flow Rate (m ³ /sec)	19.76	17.28	18.31	18.79	74.14	90.00	74.07
Tot Part. Dry Basis ref. Cond. (mg/m ³)	8.48	7.60	8.78	14.38	9.81	15.00	6.29
Front Half Particulate (mg/m ³)	4.54	5.52	6.34	11.51	6.98		4.52
Back Half Condensables (mg/m ³)	3.93	2.08	2.45	2.87	2.83		1.77
Mass Emission Rate (kg/hr)	0.60	0.47	0.58	0.97	2.63		1.68

* Mass Emission Rates (Flow, kg/hr are a total combined value, concentration, temp etc is averaged)

* Standard reference conditions are on a dry basis corrected to 20 deg C and a pressure of 29.92 inches Hg

Discussion Of Test Results

Test results are in compliance with permitted limits.

The last time this sources was tested was in September of 2022. Those results are included in the summary table above.

Field personnel did not notice any abnormalities in and around the test site 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.

Cyclofilter Results November 25, 2022

Particulate Results Cyclofilter Stack: Nov 25, 2022

Parameter	Test 1	Test 2	Test 3	Average	Permit	30-Sep-21
Start Time	8:09	9:17	10:23	N/A		N/A
Stop Time	9:11	10:19	11:25	N/A		N/A
Gas Temperature (°C)	41.3	40.6	39.8	40.6		49.8
% Moisture	3.1	2.3	1.6	2.3		3.6
Velocity (m/sec)	17.67	18.16	18.41	18.08		18.11
ACFM	68290	70165	71140	69865		69970
Std. Dry Flow Rate (m ³ /sec)	27.31	28.33	29.02	28.22	34.00	26.99
Oxygen in % (dry basis)	21.00	21.00	21.00	21.00		21.00
Carbon Dioxide % (dry basis)	0.00	0.00	0.00	0.00		0.00
Tot Part. Dry Basis ref. Cond. (mg/m ³)	7.88	8.26	8.55	8.23	10.00	5.07
Front Half Filterable Particulate (mg/m ³)	5.86	5.27	4.71	5.28		3.06
Back Half Cond. Organics (mg/m ³)	2.02	2.98	3.84	2.95		2.01
Mass Emission Rate (kg/hr)	0.01	0.01	0.01	0.01		0.01

* Standard reference conditions are on a dry basis corrected to 20 deg C and a pressure of 29.92 inches Hg

Discussion Of Test Results

Test results are in compliance with permitted limits.

The last time this sources was tested was in September of 2021. Those results are included in the summary table above.

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

This stack is non-cyclonic and tested with standard testing methodologies.

Dryer Stack 1
04-Nov-22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	87 ° F	31 ° C
Moisture Content (by volume):	3.25 %	
Average Stack Gas Velocity:	25.70 ft/sec	7.83 m/sec
Total Actual Gas Flow Rate:	48574 ACFM	
Dry Gas flow Rate at Reference Conditions:	41879 SCFM	19.76 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	8.48 mg/m ³
Front Half Particulate	0.00 gr/ft ³	4.54 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	3.93 mg/m ³
Mass Emission Rate	1.33 lbs/hr	0.60 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	81 ° F	27 ° C
Moisture Content (by volume):	3.3 %	
Average Stack Gas Velocity:	25.3 ft/sec	7.7 m/sec
Total Actual Gas Flow Rate:	47813 ACFM	
Dry Gas flow Rate at Reference Conditions:	41701 SCFM	19.7 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.006 gr/ft ³	12.7 mg/m ³
Front Half Particulate	.003 gr/ft ³	6.3 mg/m ³
Back Half Condensibles	.003 gr/ft ³	6.4 mg/m ³
Mass Emission Rate	1.99 lbs/hr	0.90 kg/hr

TEST 2:

Gas Temperature:	92 ° F	33 ° C
Moisture Content (by volume):	3.2 %	
Average Stack Gas Velocity:	25.9 ft/sec	7.9 m/sec
Total Actual Gas Flow Rate:	49011 ACFM	
Dry Gas flow Rate at Reference Conditions:	41951 SCFM	19.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.6 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.4 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.1 mg/m ³
Mass Emission Rate	0.88 lbs/hr	0.40 kg/hr

TEST 3:

Gas Temperature:	90 ° F	32 ° C
Moisture Content (by volume):	3.2 %	
Average Stack Gas Velocity:	25.9 ft/sec	7.9 m/sec
Total Actual Gas Flow Rate:	48898 ACFM	
Dry Gas flow Rate at Reference Conditions:	41985 SCFM	19.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.1 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	3.2 mg/m ³
Mass Emission Rate	1.12 lbs/hr	0.51 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 1
Permit Number: RA-17557
Job Number: ME2223-108
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
65	67	3
04-Nov-22	04-Nov-22	04-Nov-22
9:30	10:53	12:08
10:35	11:58	1:13
60	60	60
DL/NA	DL/NA	DL/NA
1012	1012	1012
27.65	27.65	27.65
-0.06	-0.06	-0.06
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.275	0.275	0.275
1.0073	1.0073	1.0073
0.83446	0.83446	0.83446
31.5	31.5	31.5
20	18	18
4	5	5
0.0001	0.0001	0.0001
0.0058	0.0031	0.0035
0.0060	0.0020	0.0030
0.0000	0.0000	0.0000
0.0119	0.0052	0.0066

Sampling Data for - **TEST 1-**
Dryer Stack 1
Drax
Williams Lake, BC

04-Nov-22

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	1.32	52	54	81	0.00	1.03
A-11	0.20	1.25	48	49	82	1.57	1.05
A-10	0.23	1.43	50	49	82	3.11	1.03
A-9	0.22	1.37	51	50	81	4.74	1.00
A-8	0.21	1.32	53	51	80	6.29	1.05
A-7	0.19	1.19	55	52	80	7.88	0.98
A-6	0.19	1.15	59	54	79	9.30	0.99
A-5	0.16	1.02	65	56	78	10.74	0.99
A-4	0.15	0.96	69	59	79	12.08	0.97
A-3	0.14	0.90	70	60	79	13.35	0.98
A-2	0.15	0.97	71	62	80	14.60	1.00
A-1	0.14	0.91	72	63	79	15.92	0.98
B-12	0.19	1.23	73	63	79	17.17	1.03
B-11	0.20	1.30	75	64	80	18.70	1.04
B-10	0.18	1.17	77	66	80	20.30	0.99
B-9	0.21	1.37	78	67	81	21.75	1.01
B-8	0.20	1.30	80	68	81	23.34	1.05
B-7	0.20	1.30	81	69	82	24.96	1.00
B-6	0.22	1.44	83	71	83	26.51	0.98
B-5	0.19	1.25	84	72	82	28.11	0.98
B-4	0.18	1.18	86	73	82	29.60	1.08
B-3	0.17	1.12	88	74	83	31.20	1.00
B-2	0.15	0.98	89	75	83	32.64	1.00
B-1	0.14	0.93	91	77	82	33.99	0.98
						35.28	

Sampling Data for - **TEST 2-**
Dryer Stack 1
Drax
Williams Lake, BC

04-Nov-22

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	1.42	79	78	90	0.00	0.95
A-11	0.22	1.43	82	78	91	1.54	0.99
A-10	0.21	1.36	84	79	91	3.14	0.95
A-9	0.20	1.30	85	79	92	4.65	0.98
A-8	0.22	1.44	87	80	90	6.17	1.00
A-7	0.22	1.44	88	81	89	7.81	1.00
A-6	0.19	1.25	90	81	89	9.45	1.00
A-5	0.18	1.18	91	82	90	10.98	1.02
A-4	0.18	1.19	93	84	88	12.50	1.01
A-3	0.16	1.06	95	86	88	14.01	1.02
A-2	0.14	0.93	97	86	89	15.45	1.02
A-1	0.13	0.86	98	88	90	16.81	1.03
B-12	0.20	1.33	100	90	91	18.13	0.97
B-11	0.20	1.33	101	91	92	19.67	1.02
B-10	0.19	1.27	101	92	91	21.30	1.03
B-9	0.21	1.40	102	92	93	22.91	0.99
B-8	0.21	1.40	103	93	94	24.52	0.98
B-7	0.20	1.33	104	93	94	26.13	0.98
B-6	0.21	1.40	104	94	95	27.70	1.03
B-5	0.19	1.27	104	95	94	29.38	1.01
B-4	0.18	1.20	105	95	94	30.96	1.01
B-3	0.17	1.13	105	96	96	32.50	0.99
B-2	0.17	1.13	104	96	95	33.96	0.98
B-1	0.15	1.00	104	98	94	35.40	0.99
						36.77	

Sampling Data for - *TEST 3-*
 Dryer Stack 1
 Drax
 Williams Lake, BC

04-Nov-22

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	1.40	95	94	89	0.00	1.04
A-11	0.20	1.34	96	96	90	1.69	0.98
A-10	0.21	1.40	98	96	91	3.26	1.02
A-9	0.21	1.41	100	96	91	4.93	1.02
A-8	0.20	1.34	102	97	90	6.60	1.00
A-7	0.20	1.35	103	97	88	8.21	0.99
A-6	0.19	1.29	104	98	87	9.80	0.98
A-5	0.18	1.22	104	98	88	11.35	0.96
A-4	0.16	1.08	105	98	88	12.82	0.97
A-3	0.16	1.08	106	99	89	14.22	0.97
A-2	0.14	0.94	106	99	90	15.63	0.97
A-1	0.15	1.01	107	99	90	16.94	0.99
B-12	0.22	1.49	107	100	91	18.33	0.97
B-11	0.22	1.49	107	100	91	19.98	0.98
B-10	0.21	1.42	108	101	92	21.64	1.01
B-9	0.20	1.35	108	101	91	23.31	1.01
B-8	0.20	1.36	108	101	90	24.95	1.00
B-7	0.21	1.43	108	101	89	26.57	1.00
B-6	0.20	1.36	109	101	89	28.23	0.97
B-5	0.19	1.29	109	102	89	29.81	0.99
B-4	0.19	1.29	109	102	89	31.37	0.98
B-3	0.18	1.22	110	102	90	32.92	0.99
B-2	0.16	1.09	110	103	92	34.44	1.01
B-1	0.15	1.02	110	103	93	35.90	1.01
						37.32	



Dryer Stack 1
Drax
Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 1.008

Delta P:	0.183 "H ₂ O	Us avg:	25.30 ft/sec
Delta H:	1.182	ACFM:	47813 ft ³ /min
Tm avg:	526.6 °R	SDCFM:	41701 ft ³ /min
Ts avg:	540.8 °R	Vm std:	33.03 ft ³
Bwo:	0.033	Vm corr:	35.54 ft ³
Md:	28.84	Vm:	35.28 ft ³
Ms:	28.48	MF:	1.0073
Pb:	27.65 "Hg	PCON:	12.72 mg/m ³
Pm:	27.74 "Hg	ERAT:	0.90 kg/hr
Ps:	27.65 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.998

Delta P:	0.189 "H ₂ O	Us avg:	25.93 ft/sec
Delta H:	1.252	ACFM:	49011 ft ³ /min
Tm avg:	551.9 °R	SDCFM:	41951 ft ³ /min
Ts avg:	551.7 °R	Vm std:	32.85 ft ³
Bwo:	0.032	Vm corr:	37.04 ft ³
Md:	28.84	Vm:	36.77 ft ³
Ms:	28.49	MF:	1.0073
Pb:	27.65 "Hg	PCON:	5.59 mg/m ³
Pm:	27.74 "Hg	ERAT:	0.40 kg/hr
Ps:	27.65 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.992

Delta P:	0.188 "H ₂ O	Us avg:	25.87 ft/sec
Delta H:	1.278	ACFM:	48898 ft ³ /min
Tm avg:	562.4 °R	SDCFM:	41985 ft ³ /min
Ts avg:	549.9 °R	Vm std:	32.73 ft ³
Bwo:	0.032	Vm corr:	37.59 ft ³
Md:	28.84	Vm:	37.32 ft ³
Ms:	28.49	MF:	1.0073
Pb:	27.65 "Hg	PCON:	7.12 mg/m ³
Pm:	27.74 "Hg	ERAT:	0.51 kg/hr
Ps:	27.65 "Hg		

Dryer Stack 2
04-Nov-22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	87 ° F	31 ° C
Moisture Content (by volume):	4.66 %	
Average Stack Gas Velocity:	22.79 ft/sec	6.95 m/sec
Total Actual Gas Flow Rate:	43067 ACFM	
Dry Gas flow Rate at Reference Conditions:	36620 SCFM	17.28 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	7.60 mg/m ³
Front Half Particulate	0.00 gr/ft ³	5.52 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	2.08 mg/m ³
Mass Emission Rate	1.04 lbs/hr	0.47 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	81 ° F	27 ° C
Moisture Content (by volume):	4.0 %	
Average Stack Gas Velocity:	22.5 ft/sec	6.8 m/sec
Total Actual Gas Flow Rate:	42459 ACFM	
Dry Gas flow Rate at Reference Conditions:	36752 SCFM	17.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.4 mg/m ³
Front Half Particulate	.002 gr/ft ³	5.4 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.1 mg/m ³
Mass Emission Rate	1.02 lbs/hr	0.46 kg/hr

TEST 2:

Gas Temperature:	90 ° F	32 ° C
Moisture Content (by volume):	5.3 %	
Average Stack Gas Velocity:	23.0 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	43380 ACFM	
Dry Gas flow Rate at Reference Conditions:	36461 SCFM	17.2 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	8.0 mg/m ³
Front Half Particulate	.003 gr/ft ³	5.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.1 mg/m ³
Mass Emission Rate	1.09 lbs/hr	0.49 kg/hr

TEST 3:

Gas Temperature:	90 ° F	32 ° C
Moisture Content (by volume):	4.7 %	
Average Stack Gas Velocity:	22.9 ft/sec	7.0 m/sec
Total Actual Gas Flow Rate:	43363 ACFM	
Dry Gas flow Rate at Reference Conditions:	36649 SCFM	17.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.4 mg/m ³
Front Half Particulate	.002 gr/ft ³	5.3 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.1 mg/m ³
Mass Emission Rate	1.02 lbs/hr	0.46 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 2
Permit Number: RA-17557
Job Number: ME2223-108
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
68	69	70
04-Nov-22	04-Nov-22	04-Nov-22
9:30	10:45	12:00
10:35	11:50	1:05
60	60	60
DL/NA	DL/NA	DL/NA
1013	1013	1013
27.65	27.65	27.65
-0.10	-0.10	-0.10
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.300	0.300	0.300
0.9954	0.9954	0.9954
0.84158	0.84158	0.84158
31.5	31.5	31.5
26	35	30
4	5	5
0.0001	0.0001	0.0001
0.0051	0.0055	0.0050
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0072	0.0076	0.0071

Sampling Data for - **TEST 1-**
Dryer Stack 2
Drax
Williams Lake, BC

04-Nov-22

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	1.02	40	40	82	0.00	1.02
A-11	0.12	0.94	38	39	82	1.44	1.04
A-10	0.12	0.94	39	38	83	2.84	1.01
A-9	0.13	1.02	39	38	78	4.20	0.99
A-8	0.13	1.03	42	38	78	5.60	1.01
A-7	0.14	1.11	42	39	78	7.02	1.01
A-6	0.15	1.19	46	41	78	8.50	1.00
A-5	0.14	1.12	51	45	80	10.02	1.00
A-4	0.14	1.13	55	50	82	11.51	0.98
A-3	0.15	1.21	54	50	81	12.98	0.99
A-2	0.16	1.29	54	49	80	14.52	1.02
A-1	0.13	1.21	53	50	81	16.15	1.06
B-12	0.16	1.30	56	52	80	17.65	1.06
B-11	0.17	1.38	57	53	81	19.35	0.95
B-10	0.16	1.30	57	54	80	20.93	0.98
B-9	0.15	1.21	59	59	82	22.51	1.01
B-8	0.14	1.14	59	58	80	24.10	0.98
B-7	0.13	1.07	62	61	80	25.58	0.99
B-6	0.12	0.98	64	62	83	27.03	1.00
B-5	0.13	1.07	65	64	83	28.45	0.96
B-4	0.15	1.24	68	65	82	29.87	0.95
B-3	0.15	1.24	69	67	84	31.38	0.97
B-2	0.16	1.32	68	68	84	32.92	0.97
B-1	0.15	1.24	71	75	84	34.51	0.96
						36.06	

Sampling Data for - **TEST 2-**
Dryer Stack 2
Drax
Williams Lake, BC

04-Nov-22

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	1.17	80	79	90	0.00	0.97
A-11	0.12	0.99	76	77	91	1.50	1.01
A-10	0.13	1.08	74	73	87	2.93	0.99
A-9	0.13	1.08	74	73	87	4.39	1.01
A-8	0.14	1.16	73	73	87	5.88	0.99
A-7	0.13	1.08	73	73	86	7.39	0.97
A-6	0.15	1.25	77	76	87	8.82	0.99
A-5	0.15	1.25	77	76	88	10.40	0.98
A-4	0.14	1.17	79	78	86	11.97	1.00
A-3	0.14	1.16	80	80	93	13.52	1.01
A-2	0.15	1.26	80	79	88	15.08	0.99
A-1	0.15	1.26	82	82	87	16.66	0.99
B-12	0.15	1.26	82	82	86	18.26	1.00
B-11	0.17	1.44	84	84	87	19.87	1.00
B-10	0.17	1.43	86	87	91	21.60	0.95
B-9	0.16	1.36	88	87	88	23.24	0.98
B-8	0.15	1.28	89	90	89	24.89	1.02
B-7	0.15	1.27	89	88	90	26.55	0.98
B-6	0.13	1.10	90	89	90	28.14	1.01
B-5	0.13	1.10	91	92	93	29.67	0.98
B-4	0.14	1.19	91	91	93	31.16	0.98
B-3	0.16	1.36	92	92	93	32.70	0.99
B-2	0.16	1.36	93	95	95	34.37	1.01
B-1	0.14	1.19	93	94	96	36.08	0.96
						37.59	

**Sampling Data for - TEST 3-
 Dryer Stack 2**

04-Nov-22

**Drax
 Williams Lake, BC**

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	1.10	100	99	100	0.00	0.97
A-11	0.14	1.19	88	90	90	1.49	0.96
A-10	0.12	1.01	82	84	88	3.01	1.03
A-9	0.13	1.10	83	84	87	4.50	0.99
A-8	0.13	1.09	88	86	96	6.00	0.99
A-7	0.15	1.26	85	86	94	7.50	0.99
A-6	0.14	1.19	84	85	87	9.10	1.02
A-5	0.15	1.27	83	85	88	10.70	0.98
A-4	0.16	1.35	85	85	86	12.30	1.01
A-3	0.15	1.27	88	88	91	14.00	0.96
A-2	0.14	1.18	87	87	89	15.57	1.00
A-1	0.14	1.19	88	87	88	17.15	0.98
B-12	0.14	1.19	87	89	88	18.70	1.01
B-11	0.15	1.28	88	89	88	20.30	0.93
B-10	0.16	1.36	88	91	89	21.83	0.99
B-9	0.16	1.36	92	92	91	23.50	0.97
B-8	0.15	1.27	93	93	93	25.15	0.97
B-7	0.16	1.37	93	91	89	26.75	0.95
B-6	0.14	1.20	92	90	89	28.37	1.00
B-5	0.13	1.11	91	90	90	29.96	0.99
B-4	0.15	1.28	90	91	91	31.47	1.00
B-3	0.15	1.28	90	90	90	33.11	0.96
B-2	0.16	1.36	91	91	91	34.68	1.04
B-1	0.15	1.28	91	90	91	36.45	0.98
						38.05	



Dryer Stack 2
Drax
Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.996

Delta P:	0.142 "H ₂ O	Us avg:	22.47 ft/sec
Delta H:	1.154	ACFM:	42459 ft ³ /min
Tm avg:	513.4 °R	SDCFM:	36752 ft ³ /min
Ts avg:	541.1 °R	Vm std:	34.22 ft ³
Bwo:	0.040	Vm corr:	35.89 ft ³
Md:	28.84	Vm:	36.06 ft ³
Ms:	28.40	MF:	0.9954
Pb:	27.65 "Hg	PCON:	7.43 mg/m ³
Pm:	27.73 "Hg	ERAT:	0.46 kg/hr
Ps:	27.64 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.990

Delta P:	0.145 "H ₂ O	Us avg:	22.95 ft/sec
Delta H:	1.219	ACFM:	43380 ft ³ /min
Tm avg:	543.0 °R	SDCFM:	36461 ft ³ /min
Ts avg:	549.5 °R	Vm std:	33.73 ft ³
Bwo:	0.053	Vm corr:	37.42 ft ³
Md:	28.84	Vm:	37.59 ft ³
Ms:	28.26	MF:	0.9954
Pb:	27.65 "Hg	PCON:	7.96 mg/m ³
Pm:	27.74 "Hg	ERAT:	0.49 kg/hr
Ps:	27.64 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.986

Delta P:	0.145 "H ₂ O	Us avg:	22.94 ft/sec
Delta H:	1.231	ACFM:	43363 ft ³ /min
Tm avg:	548.8 °R	SDCFM:	36649 ft ³ /min
Ts avg:	550.2 °R	Vm std:	33.79 ft ³
Bwo:	0.047	Vm corr:	37.87 ft ³
Md:	28.84	Vm:	38.05 ft ³
Ms:	28.33	MF:	0.9954
Pb:	27.65 "Hg	PCON:	7.42 mg/m ³
Pm:	27.74 "Hg	ERAT:	0.46 kg/hr
Ps:	27.64 "Hg		

Dryer Stack 3
04-Nov-22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	85 ° F	29 ° C
Moisture Content (by volume):	3.11 %	
Average Stack Gas Velocity:	23.61 ft/sec	7.20 m/sec
Total Actual Gas Flow Rate:	44627 ACFM	
Dry Gas flow Rate at Reference Conditions:	38794 SCFM	18.31 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	8.78 mg/m ³
Front Half Particulate	0.00 gr/ft ³	6.34 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	2.45 mg/m ³
Mass Emission Rate	1.28 lbs/hr	0.58 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	86 ° F	30 ° C
Moisture Content (by volume):	3.2 %	
Average Stack Gas Velocity:	23.3 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	44026 ACFM	
Dry Gas flow Rate at Reference Conditions:	38162 SCFM	18.0 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	6.6 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	1.18 lbs/hr	0.54 kg/hr

TEST 2:

Gas Temperature:	84 ° F	29 ° C
Moisture Content (by volume):	3.0 %	
Average Stack Gas Velocity:	23.6 ft/sec	7.2 m/sec
Total Actual Gas Flow Rate:	44619 ACFM	
Dry Gas flow Rate at Reference Conditions:	38865 SCFM	18.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	9.3 mg/m ³
Front Half Particulate	.003 gr/ft ³	6.1 mg/m ³
Back Half Condensibles	.001 gr/ft ³	3.3 mg/m ³
Mass Emission Rate	1.36 lbs/hr	0.62 kg/hr

TEST 3:

Gas Temperature:	84 ° F	29 ° C
Moisture Content (by volume):	3.1 %	
Average Stack Gas Velocity:	23.9 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	45236 ACFM	
Dry Gas flow Rate at Reference Conditions:	39354 SCFM	18.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.8 mg/m ³
Front Half Particulate	.003 gr/ft ³	6.3 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.4 mg/m ³
Mass Emission Rate	1.29 lbs/hr	0.59 kg/hr

Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 3
Permit Number: RA-17557
Job Number: ME2223-108
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
59	60	61
04-Nov-22	04-Nov-22	04-Nov-22
9:33	10:45	12:05
10:38	11:52	1:08
60	60	60
CB/KS	CB/KS	CB/KS
980	980	980
27.70	27.70	27.70
-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
0.325	0.325	0.325
0.9910	0.9910	0.9910
0.83867	0.83867	0.83867
31.5	31.5	31.5
25	22	24
5	6	6
0.0004	0.0001	0.0001
0.0076	0.0073	0.0078
0.0020	0.0040	0.0030
0.0000	0.0000	0.0000
0.0100	0.0114	0.0109

Sampling Data for - **TEST 1-**
Dryer Stack 3
Drax
Williams Lake, BC

04-Nov-22

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	1.67	50	50	102	68.00	1.09
A-11	0.17	1.69	55	49	81	70.08	0.98
A-10	0.16	1.58	61	49	88	71.99	1.04
A-9	0.16	1.59	70	50	87	73.96	1.01
A-8	0.15	1.50	71	52	86	75.88	0.97
A-7	0.14	1.40	73	53	86	77.68	1.02
A-6	0.13	1.30	74	54	88	79.52	1.07
A-5	0.13	1.32	79	57	86	81.38	1.08
A-4	0.13	1.22	82	58	85	83.27	1.01
A-3	0.12	1.23	83	60	84	85.04	1.10
A-2	0.12	1.22	84	61	86	86.90	1.03
A-1	0.11	1.15	92	64	79	88.64	0.97
B-12	0.23	2.40	91	65	80	90.24	0.96
B-11	0.21	2.17	92	67	87	92.53	0.98
B-10	0.19	1.97	95	68	86	94.74	0.93
B-9	0.19	1.98	92	70	85	96.75	0.99
B-8	0.16	1.67	94	71	84	98.90	1.05
B-7	0.16	1.67	95	72	84	101.00	1.08
B-6	0.15	1.56	94	72	86	103.15	1.06
B-5	0.12	1.47	94	74	84	105.19	1.07
B-4	0.15	1.57	94	74	85	107.07	1.06
B-3	0.16	1.68	96	76	85	109.13	0.99
B-2	0.14	1.46	96	75	86	111.11	0.99
B-1	0.14	1.47	98	75	86	112.97	1.02
						114.88	

Sampling Data for - **TEST 2-**
Dryer Stack 3
Drax
Williams Lake, BC

04-Nov-22

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	1.84	72	70	85	16.63	0.99
A-11	0.17	1.76	80	74	84	18.69	0.96
A-10	0.17	1.76	82	75	84	20.64	1.04
A-9	0.16	1.68	95	75	84	22.77	1.05
A-8	0.15	1.57	95	73	85	24.88	1.07
A-7	0.15	1.58	97	77	84	26.95	0.99
A-6	0.14	1.48	100	78	85	28.88	1.08
A-5	0.13	1.38	101	79	83	30.93	1.03
A-4	0.12	1.27	102	80	83	32.82	1.03
A-3	0.12	1.28	102	82	83	34.64	1.04
A-2	0.11	1.16	102	82	88	36.47	0.95
A-1	0.11	1.17	104	85	86	38.07	0.95
B-12	0.23	2.45	103	85	84	39.68	1.01
B-11	0.22	2.36	108	86	83	42.15	0.92
B-10	0.20	2.15	110	88	84	44.37	1.00
B-9	0.19	2.05	111	89	84	46.67	1.07
B-8	0.17	1.84	112	90	83	49.07	1.03
B-7	0.17	1.84	112	91	84	51.26	0.96
B-6	0.16	1.73	112	91	84	53.31	1.03
B-5	0.15	1.62	111	92	84	55.44	1.01
B-4	0.15	1.61	110	94	85	57.46	0.95
B-3	0.17	1.83	109	92	85	59.37	1.05
B-2	0.15	1.61	110	91	85	61.60	1.01
B-1	0.14	1.51	111	91	85	63.62	1.05
						65.64	

Sampling Data for - **TEST 3-**
Dryer Stack 3
Drax
Williams Lake, BC

04-Nov-22

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	2.03	87	84	85	67.75	1.00
A-11	0.18	1.94	97	83	83	69.94	1.02
A-10	0.17	1.84	100	85	85	72.13	1.00
A-9	0.15	1.63	99	84	83	74.23	1.03
A-8	0.16	1.73	100	85	84	76.26	1.07
A-7	0.16	1.73	101	84	84	78.43	0.97
A-6	0.15	1.62	101	84	84	80.40	1.04
A-5	0.14	1.52	101	84	83	82.45	1.07
A-4	0.13	1.41	101	85	84	84.48	1.08
A-3	0.12	1.30	100	84	84	86.47	1.01
A-2	0.12	1.29	100	83	84	88.25	1.07
A-1	0.11	1.19	101	83	84	90.14	1.03
B-12	0.23	2.48	99	84	86	91.88	0.97
B-11	0.21	2.27	101	84	84	94.23	1.04
B-10	0.19	2.06	105	84	84	96.65	1.07
B-9	0.20	2.18	105	84	83	99.03	0.97
B-8	0.18	1.95	104	84	85	101.25	1.00
B-7	0.17	1.84	104	84	84	103.40	0.95
B-6	0.15	1.62	102	83	85	105.40	1.01
B-5	0.16	1.73	101	84	84	107.38	1.03
B-4	0.16	1.73	101	84	85	109.48	1.02
B-3	0.18	1.95	102	84	84	111.56	0.97
B-2	0.16	1.73	102	85	84	113.65	1.00
B-1	0.14	1.51	100	83	85	115.68	1.04
						117.65	

Dryer Stack 3
 Drax
 Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 1.023

Delta P:	0.153 "H ₂ O	Us avg:	23.29 ft/sec
Delta H:	1.581	ACFM:	44026 ft ³ /min
Tm avg:	533.4 °R	SDCFM:	38162 ft ³ /min
Ts avg:	545.7 °R	Vm std:	42.76 ft ³
Bwo:	0.032	Vm corr:	46.46 ft ³
Md:	28.84	Vm:	46.88 ft ³
Ms:	28.49	MF:	0.9910
Pb:	27.70 "Hg	PCON:	8.26 mg/m ³
Pm:	27.82 "Hg	ERAT:	0.54 kg/hr
Ps:	27.69 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 1.012

Delta P:	0.157 "H ₂ O	Us avg:	23.61 ft/sec
Delta H:	1.689	ACFM:	44619 ft ³ /min
Tm avg:	552.9 °R	SDCFM:	38865 ft ³ /min
Ts avg:	544.3 °R	Vm std:	43.13 ft ³
Bwo:	0.030	Vm corr:	48.57 ft ³
Md:	28.84	Vm:	49.01 ft ³
Ms:	28.51	MF:	0.9910
Pb:	27.70 "Hg	PCON:	9.33 mg/m ³
Pm:	27.82 "Hg	ERAT:	0.62 kg/hr
Ps:	27.69 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 1.020

Delta P:	0.162 "H ₂ O	Us avg:	23.93 ft/sec
Delta H:	1.762	ACFM:	45236 ft ³ /min
Tm avg:	552.3 °R	SDCFM:	39354 ft ³ /min
Ts avg:	544.2 °R	Vm std:	43.97 ft ³
Bwo:	0.031	Vm corr:	49.45 ft ³
Md:	28.84	Vm:	49.90 ft ³
Ms:	28.50	MF:	0.9910
Pb:	27.70 "Hg	PCON:	8.75 mg/m ³
Pm:	27.83 "Hg	ERAT:	0.59 kg/hr
Ps:	27.69 "Hg		

Dryer Stack 4
04-Nov-22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	3.59 %	
Average Stack Gas Velocity:	25.03 ft/sec	7.63 m/sec
Total Actual Gas Flow Rate:	47310 ACFM	
Dry Gas flow Rate at Reference Conditions:	39810 SCFM	18.79 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.01 gr/ft ³	14.38 mg/m ³
Front Half Particulate	0.01 gr/ft ³	11.51 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	2.87 mg/m ³
Mass Emission Rate	2.14 lbs/hr	0.97 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	3.6 %	
Average Stack Gas Velocity:	24.8 ft/sec	7.5 m/sec
Total Actual Gas Flow Rate:	46804 ACFM	
Dry Gas flow Rate at Reference Conditions:	39385 SCFM	18.6 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.006 gr/ft ³	13.4 mg/m ³
Front Half Particulate	.005 gr/ft ³	10.5 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.9 mg/m ³
Mass Emission Rate	1.98 lbs/hr	0.90 kg/hr

TEST 2:

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	3.5 %	
Average Stack Gas Velocity:	25.1 ft/sec	7.7 m/sec
Total Actual Gas Flow Rate:	47460 ACFM	
Dry Gas flow Rate at Reference Conditions:	39952 SCFM	18.9 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.007 gr/ft ³	16.2 mg/m ³
Front Half Particulate	.006 gr/ft ³	13.3 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.9 mg/m ³
Mass Emission Rate	2.42 lbs/hr	1.10 kg/hr

TEST 3:

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	3.7 %	
Average Stack Gas Velocity:	25.2 ft/sec	7.7 m/sec
Total Actual Gas Flow Rate:	47666 ACFM	
Dry Gas flow Rate at Reference Conditions:	40092 SCFM	18.9 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.006 gr/ft ³	13.5 mg/m ³
Front Half Particulate	.005 gr/ft ³	10.7 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.8 mg/m ³
Mass Emission Rate	2.03 lbs/hr	0.92 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 4
Permit Number: RA-17557
Job Number: ME2223-108
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
62	63	64
04-Nov-22	04-Nov-22	04-Nov-22
9:10	10:21	11:30
10:14	11:25	12:34
60	60	60
CB/KS	CB/KS	CB/KS
1021	1021	1021
27.70	27.70	27.70
-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
0.300	0.300	0.300
0.9903	0.9903	0.9903
0.83829	0.83829	0.83829
31.5	31.5	31.5
24	21	23
5	7	7
0.0001	0.0008	0.0003
0.0108	0.0131	0.0110
0.0030	0.0030	0.0030
0.0000	0.0000	0.0000
0.0139	0.0169	0.0143

Sampling Data for - **TEST 1-**
Dryer Stack 4
Drax
Williams Lake, BC

04-Nov-22

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	1.98	50	50	100	74.00	0.99
A-11	0.21	1.91	54	47	96	75.82	0.99
A-10	0.18	1.63	57	47	98	77.61	1.00
A-9	0.18	1.64	60	48	98	79.29	1.04
A-8	0.17	1.55	63	49	98	81.04	0.97
A-7	0.17	1.56	64	51	99	82.63	0.97
A-6	0.17	1.56	70	55	101	84.23	1.00
A-5	0.18	1.66	72	56	101	85.89	1.02
A-4	0.18	1.67	74	58	100	87.64	0.96
A-3	0.16	1.49	75	60	98	89.29	0.98
A-2	0.15	1.39	74	60	99	90.88	0.96
A-1	0.14	1.31	74	62	99	92.39	1.00
B-12	0.19	1.77	78	63	102	93.92	0.96
B-11	0.19	1.78	80	65	101	95.63	1.01
B-10	0.18	1.69	82	66	101	97.43	0.98
B-9	0.18	1.70	81	67	100	99.13	1.01
B-8	0.17	1.60	82	67	101	100.89	1.07
B-7	0.16	1.51	84	69	101	102.71	0.95
B-6	0.16	1.51	84	70	101	104.28	1.04
B-5	0.15	1.42	84	72	100	105.99	0.96
B-4	0.14	1.32	86	74	100	107.53	0.99
B-3	0.14	1.34	86	75	99	109.07	1.01
B-2	0.14	1.33	87	77	100	110.64	1.01
B-1	0.14	1.33	88	77	101	112.21	0.98
						113.74	

Sampling Data for - TEST 2-
Dryer Stack 4
Drax
Williams Lake, BC

04-Nov-22

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	1.99	76	76	98	14.40	0.97
A-11	0.21	2.00	80	76	97	16.24	1.05
A-10	0.20	1.93	95	77	98	18.24	0.92
A-9	0.19	1.84	97	77	98	19.98	1.02
A-8	0.19	1.82	86	76	98	21.86	0.99
A-7	0.17	1.63	87	78	99	23.66	1.01
A-6	0.18	1.72	87	80	99	25.40	1.00
A-5	0.18	1.72	88	79	100	27.18	1.00
A-4	0.17	1.62	89	80	101	28.95	1.02
A-3	0.16	1.48	89	81	103	30.71	0.97
A-2	0.15	1.43	89	80	106	32.34	1.00
A-1	0.15	1.44	90	81	102	33.95	0.97
B-12	0.20	1.92	90	82	103	35.53	0.91
B-11	0.19	1.82	91	84	103	37.24	1.01
B-10	0.19	1.84	93	85	101	39.09	0.95
B-9	0.18	1.75	96	86	101	40.84	1.10
B-8	0.17	1.65	99	89	101	42.81	0.92
B-7	0.17	1.66	98	89	101	44.42	1.00
B-6	0.16	1.55	98	89	103	46.17	1.01
B-5	0.16	1.56	99	90	101	47.89	0.98
B-4	0.15	1.47	99	91	100	49.57	0.99
B-3	0.15	1.47	101	92	101	51.21	1.01
B-2	0.14	1.38	101	92	98	52.88	0.97
B-1	0.14	1.38	102	93	98	54.44	0.98
						56.02	

Sampling Data for - *TEST 3-*
 Dryer Stack 4
 Drax
 Williams Lake, BC

04-Nov-22

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	2.04	93	91	99	58.41	0.96
A-11	0.20	1.95	96	92	101	60.27	1.04
A-10	0.20	1.96	99	93	100	62.25	0.92
A-9	0.20	1.96	100	92	101	64.00	0.98
A-8	0.20	1.97	100	96	99	65.87	0.96
A-7	0.17	1.67	100	97	101	67.72	1.05
A-6	0.17	1.66	100	92	100	69.58	0.98
A-5	0.18	1.76	100	91	101	71.30	0.96
A-4	0.18	1.76	99	92	100	73.04	0.99
A-3	0.16	1.56	100	91	103	74.84	0.99
A-2	0.15	1.47	99	91	100	76.52	1.01
A-1	0.14	1.37	98	91	99	78.19	1.00
B-12	0.21	2.05	97	90	101	79.79	1.02
B-11	0.20	1.96	99	91	101	81.78	0.94
B-10	0.19	1.87	98	92	98	83.58	0.98
B-9	0.18	1.77	99	91	98	85.40	1.01
B-8	0.17	1.68	101	92	98	87.23	1.02
B-7	0.17	1.67	103	90	99	89.04	0.99
B-6	0.17	1.67	99	90	97	90.79	0.99
B-5	0.16	1.58	99	91	97	92.54	1.00
B-4	0.16	1.57	100	90	99	94.25	0.99
B-3	0.15	1.47	102	90	100	95.95	1.03
B-2	0.14	1.38	103	91	100	97.66	1.00
B-1	0.14	1.36	99	90	101	99.27	1.08
						101.00	

Dryer Stack 4
 Drax
 Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.994

Delta P:	0.168 "H ₂ O	Us avg:	24.76 ft/sec
Delta H:	1.569	ACFM:	46804 ft ³ /min
Tm avg:	528.2 °R	SDCFM:	39385 ft ³ /min
Ts avg:	559.8 °R	Vm std:	36.57 ft ³
Bwo:	0.036	Vm corr:	39.35 ft ³
Md:	28.84	Vm:	39.74 ft ³
Ms:	28.44	MF:	0.9903
Pb:	27.70 "Hg	PCON:	13.42 mg/m ³
Pm:	27.82 "Hg	ERAT:	0.90 kg/hr
Ps:	27.69 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.989

Delta P:	0.173 "H ₂ O	Us avg:	25.11 ft/sec
Delta H:	1.670	ACFM:	47460 ft ³ /min
Tm avg:	548.0 °R	SDCFM:	39952 ft ³ /min
Ts avg:	560.4 °R	Vm std:	36.93 ft ³
Bwo:	0.035	Vm corr:	41.22 ft ³
Md:	28.84	Vm:	41.62 ft ³
Ms:	28.46	MF:	0.9903
Pb:	27.70 "Hg	PCON:	16.16 mg/m ³
Pm:	27.82 "Hg	ERAT:	1.10 kg/hr
Ps:	27.69 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.996

Delta P:	0.174 "H ₂ O	Us avg:	25.22 ft/sec
Delta H:	1.715	ACFM:	47666 ft ³ /min
Tm avg:	555.4 °R	SDCFM:	40092 ft ³ /min
Ts avg:	559.7 °R	Vm std:	37.29 ft ³
Bwo:	0.037	Vm corr:	42.18 ft ³
Md:	28.84	Vm:	42.59 ft ³
Ms:	28.44	MF:	0.9903
Pb:	27.70 "Hg	PCON:	13.54 mg/m ³
Pm:	27.83 "Hg	ERAT:	0.92 kg/hr
Ps:	27.69 "Hg		

Pinnacle Pellet
Nov 25, 2022
Cyclofilter Baghouse Stack
Permit Number: RA-17557
Williams Lake BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	105 ° F	41 ° C
Moisture Content (by volume):	2.34 %	
Average Stack Gas Velocity:	59.3 ft/sec	18.08 m/sec
Total Actual Gas Flow Rate:	69865 ACFM	
Dry Gas flow Rate at Reference Conditions:	59798 SCFM	28.22 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.004 gr/ft ³	8.2 mg/m ³
Front Half Particulate	0.002 gr/ft ³	5.3 mg/m ³
Back Half Condensibles	0.001 gr/ft ³	3.0 mg/m ³
Mass Emission Rate	0.03 lbs/hr	0.01 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	106 ° F	41 ° C
Moisture Content (by volume):	3.1 %	
Average Stack Gas Velocity:	58.0 ft/sec	17.7 m/sec
Total Actual Gas Flow Rate:	68290 ACFM	
Dry Gas flow Rate at Reference Conditions:	57865 SCFM	27.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.9 mg/m ³
Front Half Particulate	.003 gr/ft ³	5.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.0 mg/m ³
Mass Emission Rate	0.03 lbs/hr	0.01 kg/hr

TEST 2:

Gas Temperature:	105 ° F	41 ° C
Moisture Content (by volume):	2.3 %	
Average Stack Gas Velocity:	59.6 ft/sec	18.2 m/sec
Total Actual Gas Flow Rate:	70165 ACFM	
Dry Gas flow Rate at Reference Conditions:	60038 SCFM	28.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.3 mg/m ³
Front Half Particulate	.002 gr/ft ³	5.3 mg/m ³
Back Half Condensibles	.001 gr/ft ³	3.0 mg/m ³
Mass Emission Rate	0.03 lbs/hr	0.01 kg/hr

TEST 3:

Gas Temperature:	104 ° F	40 ° C
Moisture Content (by volume):	1.6 %	
Average Stack Gas Velocity:	60.4 ft/sec	18.4 m/sec
Total Actual Gas Flow Rate:	71140 ACFM	
Dry Gas flow Rate at Reference Conditions:	61491 SCFM	29.0 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.6 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.7 mg/m ³
Back Half Condensibles	.002 gr/ft ³	3.8 mg/m ³
Mass Emission Rate	0.03 lbs/hr	0.01 kg/hr

DATA FOR TESTS 1 TO 3

Client: Pinnacle Pellet
Plant Location: Williams Lake BC
Process: Cyclofilter Baghouse Stack
Permit Number: RA-17557
Job Number:
Pollution Control Permit: 15.0 mg/m3 30 m3/sec
Number of Tests: 3 tests
Minutes per Point: 2.5 minutes

	TEST 1	TEST 2	TEST 3
Filter Number:	W36	W37	W38
Date of Test:	Nov 25, 2022	Nov 25, 2022	Nov 25, 2022
Start Time:	8:09	9:17	10:23
Stop Time:	9:11	10:19	11:25
On-line Sampling Time:	60	60	60
Testing Personnel:	CB/KS	CB/KS	CB/KS
Sampler Model:	1021	1021	1021
Barometric Pressure("Hg):	28.05	28.05	28.05
Static Pressure("H₂O):	0.10	0.10	0.10
%CO₂:	0.0	0.0	0.0
%O₂:	21.0	21.0	21.0
%CO:	0.0	0.0	0.0
%N₂:	79.0	79.0	79.0
Diameter of Nozzle(inches):	0.190	0.190	0.190
Meter Factor:	0.9903	0.9903	0.9903
Type-S Pitot Tube Coefficient:	0.83867	0.83867	0.83867
Cross Sectional Area of Stack(ft²):	19.63	19.63	19.63
Impinger Condensate(g):	19	13	9
Weight of Moisture in Silica Gel(g):	4.5	5.1	3.8
Weight of Filter Particulate(g):	0.0043	0.0007	0.0008
Weight of Probe Washings(g):	0.0015	0.0046	0.0041
Weight of Impinger Content Organic(g):	0.0020	0.0030	0.0040
Total Weight of Particulate(g):	0.0078	0.0083	0.0089

Sampling Data for - *TEST 1*

Nov 25, 2022

Pinnacle Pellet

Cyclofilter Baghouse Stack

Williams Lake BC

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	1.80	2.72	60	59	105	52.70	1.05
A-11	1.70	2.59	67	61	105	54.94	0.98
A-10	1.50	2.29	71	61	105	56.98	0.99
A-9	1.10	1.69	75	63	105	58.94	1.04
A-8	1.00	1.54	78	65	107	60.71	0.92
A-7	0.70	1.08	80	69	107	62.21	1.07
A-6	0.55	0.85	79	67	108	63.68	0.98
A-5	0.65	1.00	82	68	111	64.87	0.94
A-4	0.65	1.00	84	70	108	66.11	1.00
A-3	0.60	0.93	90	71	106	67.44	1.00
A-2	0.70	1.09	87	72	106	68.73	1.08
A-1	0.70	1.09	83	75	108	70.23	1.04
B-12	1.30	2.03	85	77	108	71.67	0.99
B-11	1.00	1.55	87	79	107	73.54	1.06
B-10	0.85	1.34	93	80	112	75.30	1.00
B-9	0.75	1.18	95	81	107	76.84	1.00
B-8	0.70	1.11	93	82	108	78.29	1.01
B-7	0.65	1.03	94	83	104	79.71	1.04
B-6	0.70	1.12	94	84	104	81.12	1.01
B-5	0.80	1.28	95	86	104	82.55	0.98
B-4	0.85	1.36	97	86	105	84.03	0.94
B-3	1.10	1.77	97	88	105	85.50	1.07
B-2	1.20	1.94	99	89	104	87.41	0.93
B-1	1.30	2.10	102	91	105	89.15	1.01
						91.11	

Sampling Data for - *TEST 2*

Nov 25, 2022

Pinnacle Pellet

Cyclofilter Baghouse Stack

Williams Lake BC

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	1.80	2.75	87	87	109	92.23	1.01
A-11	1.60	2.49	100	92	108	94.50	1.00
A-10	1.50	2.33	104	92	110	96.66	0.94
A-9	1.20	1.87	104	92	108	98.64	1.01
A-8	1.10	1.72	104	93	107	100.54	0.99
A-7	0.80	1.25	104	94	109	102.32	1.05
A-6	0.60	0.93	103	94	108	103.94	0.99
A-5	0.70	1.10	104	95	106	105.26	1.02
A-4	0.70	1.10	104	95	105	106.73	0.95
A-3	0.65	1.02	105	97	105	108.11	1.02
A-2	0.75	1.19	106	97	103	109.54	0.94
A-1	0.70	1.11	106	98	103	110.96	1.00
B-12	1.40	2.22	107	98	103	112.42	0.98
B-11	1.10	1.75	109	100	102	114.43	1.00
B-10	0.90	1.44	112	102	104	116.27	0.91
B-9	0.80	1.28	112	101	102	117.78	0.90
B-8	0.75	1.19	111	102	104	119.20	1.01
B-7	0.70	1.01	111	102	106	120.74	1.04
B-6	0.75	1.20	110	102	103	122.26	0.92
B-5	0.85	1.35	111	102	104	123.66	0.97
B-4	0.90	1.44	111	103	104	125.22	0.99
B-3	1.20	1.92	111	102	102	126.87	1.01
B-2	1.30	2.08	113	103	104	128.81	0.98
B-1	1.40	2.24	113	102	103	130.76	0.97
						132.77	

Sampling Data for - *TEST 3*

Nov 25, 2022

Pinnacle Pellet

Cyclofilter Baghouse Stack

Williams Lake BC

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	1.80	2.88	99	98	105	34.23	1.03
A-11	1.70	2.73	103	99	104	36.61	0.97
A-10	1.50	2.41	106	99	105	38.80	1.01
A-9	1.30	2.10	107	98	104	40.95	0.98
A-8	1.20	1.94	109	99	104	42.90	1.02
A-7	0.90	1.44	108	97	106	44.86	1.00
A-6	0.60	0.96	104	98	105	46.51	1.06
A-5	0.65	1.04	103	97	103	47.94	0.94
A-4	0.75	1.21	107	96	102	49.27	0.98
A-3	0.60	0.97	108	97	102	50.76	0.99
A-2	0.70	1.12	103	97	102	52.11	1.01
A-1	0.65	1.04	104	97	104	53.58	0.95
B-12	1.40	2.25	104	98	104	54.92	0.97
B-11	1.20	1.93	107	98	104	56.91	0.98
B-10	1.00	1.63	109	99	104	58.78	1.00
B-9	0.90	1.45	108	99	104	60.54	1.00
B-8	0.80	1.30	18	100	103	62.20	1.07
B-7	0.75	1.21	107	99	102	63.75	1.03
B-6	0.70	1.13	106	100	101	65.31	0.96
B-5	0.90	1.45	106	99	102	66.72	0.97
B-4	1.00	1.61	107	99	103	68.33	1.01
B-3	1.30	2.10	109	100	104	70.10	0.94
B-2	1.30	2.10	110	101	105	71.98	1.02
B-1	1.40	2.27	110	101	104	74.02	0.98
						76.06	

Pinnacle Pellet
Cyclofilter Baghouse Stack
Pinnacle Pellet

Data for TEST 1		OVERALL ISOKINETICS - TEST 1		1.006
Delta P:	0.924 "H ₂ O	Us avg:	57.98 ft/sec	
Delta H:	1.487	ACFM:	68290 ft ³ /min	
Tm avg:	540.7 °R	SDCFM:	57865 ft ³ /min	
Ts avg:	566.4 °R	Vm std:	34.96 ft ³	
Bwo:	0.031	Vm corr:	38.04 ft ³	
Md:	28.84	Vm:	38.41 ft ³	
Ms:	28.51	MF:	0.9903	
Pb:	28.05 "Hg	PCON:	7.88 mg/m ³	
Pm:	28.16 "Hg	ERAT:	0.77 kg/hr	
Ps:	28.06 "Hg			

Data for TEST 2		OVERALL ISOKINETICS - TEST 2		0.983
Delta P:	0.980 "H ₂ O	Us avg:	59.57 ft/sec	
Delta H:	1.583	ACFM:	70165 ft ³ /min	
Tm avg:	562.2 °R	SDCFM:	60038 ft ³ /min	
Ts avg:	565.1 °R	Vm std:	35.49 ft ³	
Bwo:	0.023	Vm corr:	40.15 ft ³	
Md:	28.84	Vm:	40.54 ft ³	
Ms:	28.59	MF:	0.9903	
Pb:	28.05 "Hg	PCON:	8.26 mg/m ³	
Pm:	28.17 "Hg	ERAT:	0.84 kg/hr	
Ps:	28.06 "Hg			

Data for TEST 3		OVERALL ISOKINETICS - TEST 3		0.994
Delta P:	1.013 "H ₂ O	Us avg:	60.40 ft/sec	
Delta H:	1.678	ACFM:	71140 ft ³ /min	
Tm avg:	560.6 °R	SDCFM:	61491 ft ³ /min	
Ts avg:	563.6 °R	Vm std:	36.74 ft ³	
Bwo:	0.016	Vm corr:	41.42 ft ³	
Md:	28.84	Vm:	41.83 ft ³	
Ms:	28.67	MF:	0.9903	
Pb:	28.05 "Hg	PCON:	8.55 mg/m ³	
Pm:	28.17 "Hg	ERAT:	0.89 kg/hr	
Ps:	28.06 "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)

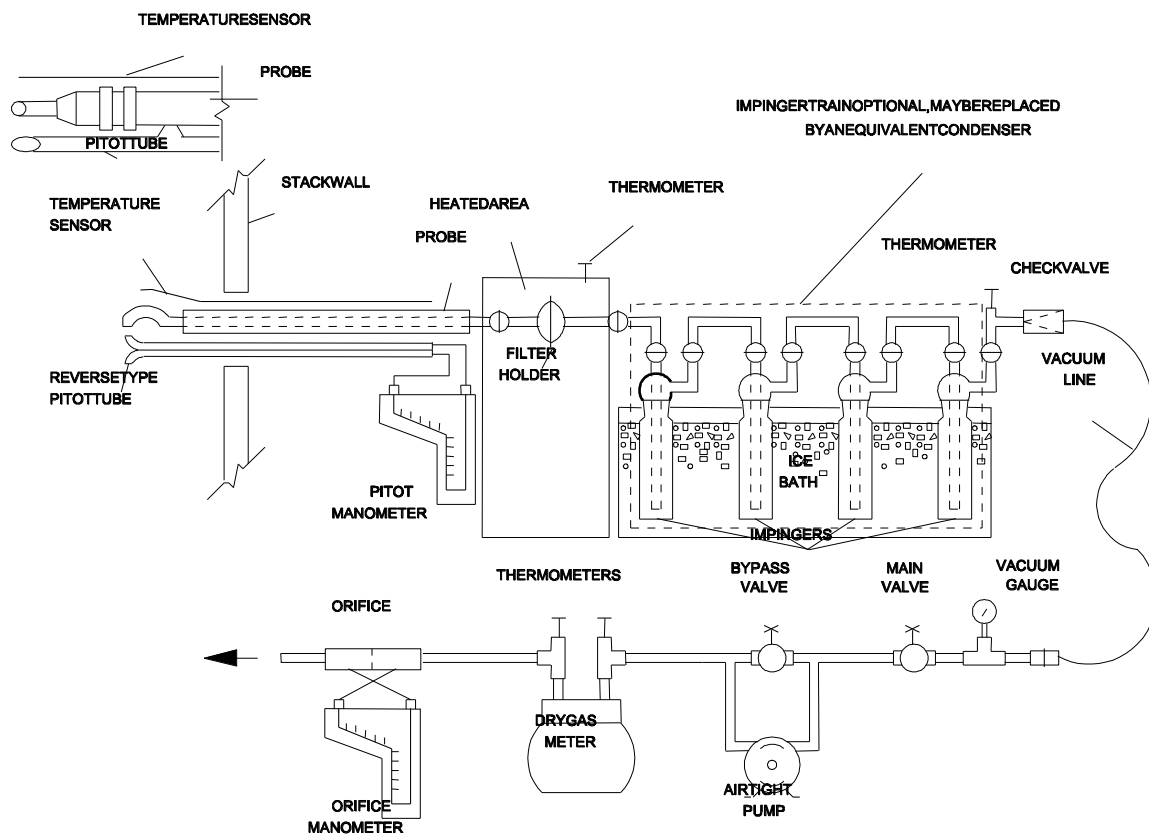
O₂, CO₂, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

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.

$$\begin{aligned} V_{m(\text{std})} &= V_m Y \left(\frac{T_{\text{std}}}{T_m} \right) \left[\frac{P_{\text{bar}} + \frac{\Delta H}{13.6}}{P_{\text{std}}} \right] \\ &= K_1 V_m Y \frac{P_{\text{bar}} + \left(\frac{\Delta H}{13.6} \right)}{T_m} \end{aligned} \quad \text{Eq. 5-1}$$

where:

$$\begin{aligned} K_1 &= 0.3858 \text{ }^\circ\text{K/mm Hg for metric units,} \\ &= 17.64 \text{ }^\circ\text{R/in. Hg for English units.} \end{aligned}$$

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:

$$\begin{aligned} K_2 &= 0.001333 \text{ m}^3/\text{ml for metric units,} \\ &= 0.04707 \text{ ft}^3/\text{ml for English units.} \end{aligned}$$

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:

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

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

Calculation from Intermediate Values.

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

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

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

Average Stack Gas Dry Volumetric Flow Rate.

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

where:

A	=	Cross-sectional area of stack, m ² (ft ²).
B _{ws}	=	Water vapor in the gas stream (from Method 5 or Reference Method 4), proportion by volume.
C _p	=	Pitot tube coefficient, dimensionless.
K _p	=	Pitot tube constant,
M _d	=	Molecular weight of stack gas, dry basis (see Section 3.6), g/gmole (lb/lb-mole).
M _s	=	Molecular weight of stack gas, wet basis, g/g-mole (lb/lb-mole).

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

P _{bar}	=	Barometric pressure at measurement site, mm Hg (in. Hg).
P _g	=	Stack static pressure, mm Hg (in. Hg).
P _s	=	Absolute stack pressure, mm Hg (in. Hg),

$$= P_{bar} + P_g$$

P _{std}	=	Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
Q _{sd}	=	Dry volumetric stack gas flow rate corrected to standard conditions, dsm ³ /hr (dscf/hr).
t _s	=	Stack temperature, °C (°F).
T _s	=	Absolute stack temperature, °K (°R).

Calibration Certificate for S-Type Pitot Tube

Date: 10-Jan-22 *Barometric Pressure ("Hg):* 30.05
Pitot I.D.: **140** *Wind Tunnel Temperature (^oF):* 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: 17-Jan-22 *Barometric Pressure ("Hg):* 28.25
Pitot I.D.: **248** *Wind Tunnel Temperature (°F):* 71.0
Nozzle: .

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
12.83	0.03545	0.04995	0.83396
20.47	0.09017	0.12459	0.84223
41.56	0.37165	0.53192	0.82753
64.49	0.89496	1.25108	0.83732
83.83	1.51225	2.12472	0.83521
106.66	2.44834	3.47904	0.83050

Average= 0.83446

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



Calibration Certificate for S-Type Pitot Tube

Date: 17-Jan-22 *Barometric Pressure ("Hg):* 28.25
Pitot I.D.: **242** *Wind Tunnel Temperature (^oF):* 71.0
Nozzle: 0.250

<i>Wind Velocity (ft/sec)</i>	<i>Ref.Pitot ("H₂O)</i>	<i>S-Type Pitot ("H₂O)</i>	<i>Pitot Factor</i>
13.07	0.03676	0.05091	0.84120
19.56	0.08230	0.11495	0.83765
42.21	0.38343	0.53104	0.84123
64.61	0.89820	1.20776	0.85375
84.98	1.55395	2.11982	0.84763
106.66	2.44808	3.49980	0.82799

Average= 0.84158

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



Calibration Certificate for S-Type Pitot Tube

Date: 10-Jan-22 *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: 04-Jul-22

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-980

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	71.6	71.6	71.6
P=Pres. Differential at WTM ("Hg)	0.0883	0.1545	0.2134
Pb= Atmospheric Pressure ("Hg)	27.95	27.95	27.95
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.7910	0.7910	0.7910
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	97.0	100.0	108.0
To= Dry Test Meter Outlet Temp. (oF.)	82.0	82.0	87.0
Ri= Initial Dry Test volume (ft3)	14.76	6.50	24.86
Rf= Final Dry Test Volume (ft3)	19.76	11.49	29.88
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	27.7955	27.7366
Pd= Pb + (^H/13.59) "Hg	28.0236	28.0972	28.1708
Tw= Ta +460 (oR.)	531.6	531.6	531.6
Td= [(Ti + To)/2] + 460 (oR.)	549.5	551.0	557.5
Bw= Pv/Pb ("Hg)	0.0283	0.0283	0.0283
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	0.9908	0.9906	0.9915
Y (MEAN)(WTMF) =	0.9910		

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Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Jul-22

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	27.95	27.95	27.95
Y=gas meter factor	0.99	0.9900	0.9908
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	85.4	87.8	91
Rf=final gas meter vol.	87.27	90.5	94.28
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \Delta T (FT^3 / MIN)$	0.37026	0.5346	0.6499648
To=meter outlet Temp (oF)	90	90	93
Tm=meter out temp. (oR)	550	550	553
$P_m = P_b + \Delta H$	27.986792	28.023584	28.060375
$SQRT(T_m / P_m * H / M_d)$	0.5824223	0.8231287	1.0102054
Ko=orifice const.	0.6357242	0.6494732	0.6433986

Ko MEAN = 0.6428653

$K_o * 4 * 144 = 370.29044$

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Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: July 4 /2022

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	0.9906	0.9915	0.9915
Delta H=	2	2.5	3
Ri=int. gas meter vol.	46.6	51.7	60.8
Rf=final gas meter vol.	51	56.58	66.12
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \Delta T (FT^3 / MIN)$	0.871728	0.967704	1.054956
Tm=meter out temp. (oF)	91	92	92
Tm=meter out temp. (oR.)	551	552	552
$P_m = P_b + \Delta H$	28.097167	28.133959	28.170751
$SQRT(T_m / P_m * H / M_d)$	1.1636109	1.3012848	1.4245549
Ko=orifice const.	0.7491577	0.7436527	0.7405513

Ko MEAN = 0.7444539

$Ko^4 * 144 = 428.80544$

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 04-Jul-22

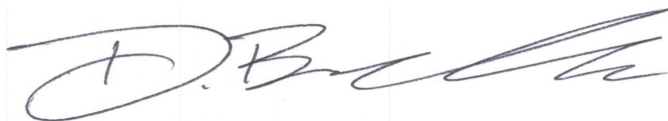
CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-1021

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	71.6	71.6	71.6
P=Pres. Differential at WTM ("Hg)	0.0662	0.1250	0.1766
Pb= Atmospheric Pressure ("Hg)	27.95	27.95	27.95
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.7910	0.7910	0.7910
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	86.0	85.0	97.0
To= Dry Test Meter Outlet Temp. (oF.)	78.0	74.0	84.0
Ri= Initial Dry Test volume (ft3)	64.18	58.32	71.10
Rf= Final Dry Test Volume (ft3)	69.12	63.21	76.07
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	27.8838	27.8250	27.7734
Pd= Pb + (^H/13.59) "Hg	28.0236	28.0972	28.1708
Tw= Ta +460 (oR.)	531.6	531.6	531.6
Td= [(Ti + To)/2] + 460 (oR.)	542.0	539.5	550.5
Bw= Pv/Pb ("Hg)	0.0283	0.0283	0.0283
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
(Calculated Y Value)(WTMF)	0.9900	0.9908	0.9903
Y (MEAN)(WTMF) =	0.9903		

MCCALL ENVIRONMENTAL

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Jul-22

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	27.95	27.95	27.95
Y=gas meter factor	0.99	0.9900	0.9908
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	85.4	87.8	91
Rf=final gas meter vol.	87.27	90.5	94.28
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \Delta T (FT^3 / MIN)$	0.37026	0.5346	0.6499648
To=meter outlet Temp (oF)	90	90	93
Tm=meter out temp. (oR)	550	550	553
$P_m = P_b + \Delta H$	27.986792	28.023584	28.060375
$SQRT(T_m / P_m * H / M_d)$	0.5824223	0.8231287	1.0102054
Ko=orifice const.	0.6357242	0.6494732	0.6433986

Ko MEAN = 0.6428653

$K_o * 4 * 144 = 370.29044$

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Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Jul-22

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	27.95	27.95	27.95
Y=gas meter factor	0.9908	0.9903	0.9903
Delta H=	2	2.5	3
Ri=int. gas meter vol.	95	1.5	6.5
Rf=final gas meter vol.	98.8	5.82	11.26
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \sqrt{T(FT^3/MIN)}$	0.753008	0.8556192	0.9427656
To=meter outlet Temp (oF)	94	95	96
Tm=meter out temp. (oR)	554	555	556
$P_m = P_b + \Delta H$	28.097167	28.133959	28.170751
$SQRT(T_m / P_m * H / M_d)$	1.1667743	1.3048161	1.429707
Ko=orifice const.	0.6453759	0.6557393	0.6594117

Ko MEAN = 0.653509

$K_o * 4 * 144 = 376.42117$

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: 04-Aug-22

CONSOLE MANUF.: NAPP/MILLENNIUM MODEL 32

CONSOLE I.D.: MU 1012

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	65.0	65.0	65.0
P=Pres. Differential at WTM ("Hg)	0.0736	0.1325	0.2134
Pb= Atmospheric Pressure ("Hg)	28.80	28.80	28.80
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6220	0.6220	0.6220
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	84.0	80.0	86.0
To= Dry Test Meter Outlet Temp. (oF.)	85.0	81.0	88.0
Ri= Initial Dry Test volume (ft3)	0.00	0.00	0.00
Rf= Final Dry Test Volume (ft3)	4.95	4.92	4.96
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	28.7264	28.6675	28.5866
Pd= Pb + (^H/13.59) "Hg	28.8736	28.9472	29.0208
Tw= Ta +460 (oR.)	525.0	525.0	525.0
Td= [(Ti + To)/2] + 460 (oR.)	544.5	540.5	547.0
Bw= Pv/Pb ("Hg)	0.0216	0.0216	0.0216
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0118	1.0059	1.0044
Y (MEAN)(WTMF) =	1.0073		

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Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Aug-22

CONSOLE I.D. MU 1012

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.8	28.8	28.8
Y=gas meter factor	1.0118	1.0118	1.0059
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	1.82	2.66	3.33
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.3682952	0.5382776	0.6699294
To=meter outlet Temp (oF)	85	86	86
Tm=meter out temp. (oR)	545	546	546
Pm=Pb + ^H	28.836792	28.8735835	28.9103753
SQRT(Tm/Pm*H/Md)	0.5711603	0.80796811	0.98892493
Ko=orifice const.	0.6448193	0.66621145	0.677432

Ko MEAN = 0.6628209

Ko*4*144= 381.78485

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Aug-22

CONSOLE I.D. MU 1012

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.8	28.8	28.8
Y=gas meter factor	1.0059	1.0044	1.0044
Delta H=	2	2.5	3
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	3.84	4.37	4.81
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.7725312	0.8778456	0.9662328
To=meter outlet Temp (oF)	89	89	89
Tm=meter out temp. (oR)	549	549	549
Pm=Pb + ^H	28.947167	28.9839588	29.0207506
SQRT(Tm/Pm*H/Md)	1.1443171	1.27857311	1.39971856
Ko=orifice const.	0.6751024	0.68658225	0.69030506

Ko MEAN = 0.6839966

Ko*4*144= 393.98202

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



**CALIBRATION CERTIFICATE
DRY GAS METER**

DATE: August 4/22

CONSOLE MANUF.: NAPP/MILLENNIUM MODEL 32

CONSOLE I.D.: MU 1013

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	65.0	65.0	65.0
P=Pres. Differential at WTM ("Hg)	0.0773	0.1508	0.2171
Pb= Atmospheric Pressure ("Hg)	28.80	28.80	28.80
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6220	0.6220	0.6220
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	79.0	76.0	82.0
To= Dry Test Meter Outlet Temp. (oF.)	82.0	77.0	83.0
Ri= Initial Dry Test volume (ft3)	0.00	0.00	0.00
Rf= Final Dry Test Volume (ft3)	4.94	4.94	5.01
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	28.7227	28.6492	28.5829
Pd= Pb + (^H/13.59) "Hg	28.8736	28.9472	29.0208
Tw= Ta +460 (oR.)	525.0	525.0	525.0
Td= [(Ti + To)/2] + 460 (oR.)	540.5	536.5	542.5
Bw= Pv/Pb ("Hg)	0.0216	0.0216	0.0216
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0063	0.9937	0.9860
Y (MEAN)(WTMF) =	0.9954		

N.R. MCCALL & ASSOCIATES LTD.

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Aug-22

CONSOLE I.D. MU 1013

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.8	28.8	28.8
Y=gas meter factor	1.0063	1.0063	0.9937
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	1.94	2.8	3.5
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.3904444	0.563528	0.69559
To=meter outlet Temp (oF)	75	76	76
Tm=meter out temp. (oR)	535	536	536
Pm=Pb + ^H	28.836792	28.8735835	28.9103753
SQRT(Tm/Pm*H/Md)	0.5658961	0.80053494	0.97982699
Ko=orifice const.	0.6899578	0.70393929	0.70991104

Ko MEAN = 0.7012694

Ko*4*144= 403.93116

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: 04-Aug-22

CONSOLE I.D. MU 1013

	RUN 4	RUN 5	RUN 6
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.8	28.8	28.8
Y=gas meter factor	0.9937	0.9860	0.9860
Delta H=	2	2.5	3
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	4.09	4.55	4.96
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.8128466	0.89726	0.978112
To=meter outlet Temp (oF)	78	79	80
Tm=meter out temp. (oR)	538	539	540
Pm=Pb + ^H	28.947167	28.9839588	29.0207506
SQRT(Tm/Pm*H/Md)	1.132795	1.26687503	1.38819804
Ko=orifice const.	0.7175584	0.70824665	0.70459111

Ko MEAN = 0.7101321

Ko*4*144= 409.03606

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Dryer Stacks Project Name: Drax Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1613536 Control Number: Date Received: Nov 8, 2022 Date Reported: Nov 15, 2022 Report Number: 2814501
Attn: Accounts Payable Sampled By: D. Lawrence Company: McCall Env.	Proj. Acct. code:	

		Reference Number	1613536-1	1613536-2	1613536-3
		Sample Date	Nov 04, 2022	Nov 04, 2022	Nov 04, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 1 / Test 1 / 7.8°C	Dryer Stack 1 / Test 2 / 7.8°C	Dryer Stack 1 / Test 3 / 7.8°C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	6	2	3
Volume	Sample volume	mL	316	313	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: Dryer Stacks Project Name: Drax Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1613536 Control Number: Date Received: Nov 8, 2022 Date Reported: Nov 15, 2022 Report Number: 2814501
Attn: Accounts Payable Sampled By: D. Lawrence Company: McCall Env.	Proj. Acct. code:	

		Reference Number	1613536-4	1613536-5	1613536-6
		Sample Date	Nov 04, 2022	Nov 04, 2022	Nov 04, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 2 / Test 1 / 7.8°C	Dryer Stack 2 / Test 2 / 7.8°C	Dryer Stack 2 / Test 3 / 7.8°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	324	322	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: Dryer Stacks Project Name: Drax Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1613536 Control Number: Date Received: Nov 8, 2022 Date Reported: Nov 15, 2022 Report Number: 2814501
Attn: Accounts Payable Sampled By: D. Lawrence Company: McCall Env.	Proj. Acct. code:	

		Reference Number	1613536-7	1613536-8	1613536-9
		Sample Date	Nov 04, 2022	Nov 04, 2022	Nov 04, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 3 / Test 1 / 7.8°C	Dryer Stack 3 / Test 2 / 7.8°C	Dryer Stack 3 / Test 3 / 7.8°C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2	4	3
Volume	Sample volume	mL	335	308	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: Dryer Stacks Project Name: Drax Project Location: Williams Lake, BC LSD: P.O.: Proj. Acct. code:	Lot ID: 1613536 Control Number: Date Received: Nov 8, 2022 Date Reported: Nov 15, 2022 Report Number: 2814501
Attn: Accounts Payable Sampled By: D. Lawrence Company: McCall Env.		

		Reference Number	1613536-10	1613536-11	1613536-12
		Sample Date	Nov 04, 2022	Nov 04, 2022	Nov 04, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 4 / Test 1 / 7.8°C	Dryer Stack 4 / Test 2 / 7.8°C	Dryer Stack 4 / Test 3 / 7.8°C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	3	3	3
Volume	Sample volume	mL	349	338	326
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Approved by:



Max Hewitt
Operations Manager

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.

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: 1618108 Control Number: Date Received: Nov 29, 2022 Date Reported: Dec 5, 2022 Report Number: 2822831
Attn: Accounts Payable Sampled By: Kiefer Company: McCall Environmental	Proj. Acct. code:	

		Reference Number	1618108-1	1618108-2	1618108-3
		Sample Date	Nov 25, 2022	Nov 25, 2022	Nov 25, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Drax Williams Lake / Cyclo Filter-Test 1 / Filter W36	Drax Williams Lake / Cyclo Filter-Test 2 / Filter W37	Drax Williams Lake / Cyclo Filter-Test 3 / Filter W38
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2	3	4
Volume	Sample volume	mL	320	297	312
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Approved by:



Max Hewitt
Operations Manager

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: Dryer Stacks Project Name: Drax Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1613536 Control Number: Date Received: Nov 8, 2022 Date Reported: Nov 15, 2022 Report Number: 2814501
Attn: Accounts Payable Sampled By: D. Lawrence Company: McCall Env.	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, Oil & Grease <i>* Reference Method Modified</i>	Nov 9, 2022	Element Vancouver

References

BCELM	B.C. Environmental Laboratory Manual
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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.

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.: Proj. Acct. code:	Lot ID: 1618108 Control Number: Date Received: Nov 29, 2022 Date Reported: Dec 5, 2022 Report Number: 2822831
Attn: Accounts Payable Sampled By: Kiefer Company: McCall Environmental		

		Reference Number	1618108-1	1618108-2	1618108-3
		Sample Date	Nov 25, 2022	Nov 25, 2022	Nov 25, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Drax Williams Lake / Cyclo Filter-Test 1 / Filter W36	Drax Williams Lake / Cyclo Filter-Test 2 / Filter W37	Drax Williams Lake / Cyclo Filter-Test 3 / Filter W38
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2	3	4
Volume	Sample volume	mL	320	297	312
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Approved by:



Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).

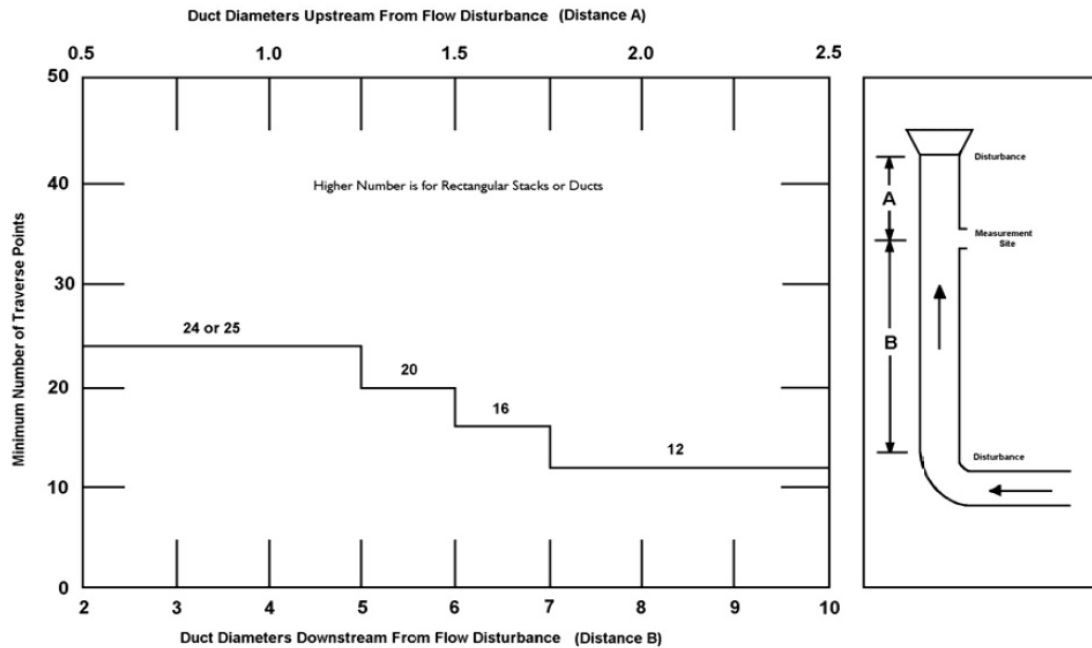
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*Drax
Williams Lake*

Daily production rate Nov 4	25.4 MT/hr
Average for the previous calendar month	23.9 MT/hr
90 th percentile production rate	25.6 MT/hr
Daily production rate Nov 25	25.5 MT/hr
Average for the previous calendar month	23.9 MT/hr
90 th percentile production rate	25.6 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, [m ³ /hour]	Included in Stack Test
TPM, [mg/m ³]	Included in Stack Test
PM, [mg/m ³]	Included in Stack Test



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](#)

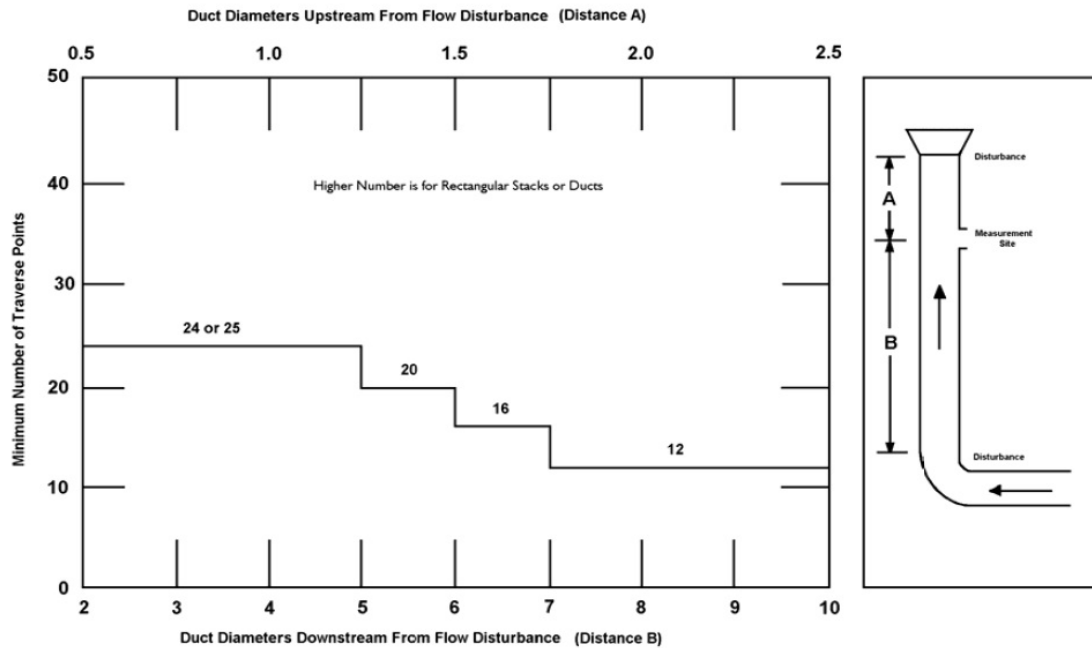
Cyclonic Angle: [5°](#)

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



Site Diagram & Sample Point Selection



Client: Pinnacle Pellet Williams Lake

Source: Cyclofilter Stack

Pollution Abatement Equipment:

Duct Diameters Up (A): 2

Duct Diameters Down (B): 3

Area of Stack (ft): 19.63

Stack Diameter (in): 60

Zero (in): 4

Number of Points: 12

Cyclonic Angle: 10

Traverse Points (in):

PT-1 1.26

PT-2 4.02

PT-3 7.08

PT-4 10.62

PT-5 15

PT-6 21.3

PT-7 38.7

PT-8 45

PT-9 49.38

PT-10 52.92

PT-11 55.98

PT-12 58.74

Client Name: Drax
Williams Lake
 Process: Dryer Stack 1
 Test Number: 1
 Date: Nov 4 2022
 Start Time 9:30
 Finish Time 10:35
 Starting Vol. 300
 Final Vol. 320
 Flask: 65
 Console: 1012
 Stack Diameter

BP 27.65
 DN 275
 CP 83446
 MF 1.0073
 Moist. .04
 PM 27.76
 AS 31.50
 Ko .6628
 Pitot 248
 Port
 Static -0.06
 PS 27.65

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL N/A

Mean Yaw Angle

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
A12	.21	1.32	52	54	81	0.00	1	270	ICED	
11	.20	1.25	48	49	82	1.57				
10	.23	1.43	50	49	82	3.17				
9	.22	1.37	51	50	81	4.74				
8	.21	1.32	53	51	80	6.29	1			
7	.19	1.19	55	52	80	7.88				
6	.19	1.15	54	54	79	9.30				
5	.16	1.02	65	56	78	10.74	1			
4	.15	0.96	69	59	79	12.08				
3	.14	0.90	70	60	79	13.35				
2	.15	0.97	71	62	80	14.60				
1	.14	0.91	72	63	79	15.92	1			
B12	.17	1.23	73	63	79	17.17				
11	.20	1.30	75	64	80	18.70				
10	.18	1.17	77	66	80	20.30				
9	.21	1.37	78	67	81	21.75				
8	.20	1.30	80	68	81	23.34	2			
7	.20	1.30	81	69	82	24.96				
6	.22	1.44	83	71	83	26.51				
5	.19	1.25	84	72	82	28.11				
4	.18	1.18	86	73	82	29.60	2			
3	.17	1.12	88	74	83	31.20				
2	.15	0.98	89	75	83	32.64				
1	.14	0.93	91	77	82	33.99	2			
						35.23				

Client: <u>Drax Williams LK.</u>		Console: <u>1012</u>		Pb: <u>27.65</u> "Hg	Filter: <u>67</u>	RAP %:		Date: <u>Nov. 4/22</u>			
Process: <u>Dryer Stack 1</u>		Mf: <u>1.0073</u>		Static: <u>-0.06</u> "H ₂ O	Silica:	+	%CO ₂	%O ₂	CO		
Test: <u>2</u>		K _o : <u>0.6628</u>		Ps: <u>27.65</u>		+	<u>0</u>	<u>21</u>			
Personnel: <u>Nov. 4/22</u>		Pitot: <u>248</u>		Pm: <u>27.76</u>	Total Vol: <u>318</u> ml						
Start time: <u>10:53</u>		C _p : <u>0.83446</u>		Area: <u>31.50</u> ft ²	Start Vol: <u>300</u> ml						
Stop time: <u>11:58</u>		Nozzle: <u>0.275</u>		Bwo: <u>4.7</u>	Plant Type:		Mix:				
Permitt #		up strm		down strm	Pollution Abatement Equip:						
Location:		Start Leakage Rate@ <u>15</u> "Hg, <u>.002</u> ft ³ /min				Burner:					
Job #:		Finish Leakage Rate@ <u>15</u> "Hg, <u>.002</u> ft ³ /min				Load:			Fuel Type:		
SAMPLE POINT	DELTA P ("H ₂ O)	DELTA H ("H ₂ O)	GAS METER TEMP (°F)		STACK (°F)	VOLUME (ft ³)	BOX TEMP (°F)	LAST IMP (°F)	PROBE (°F)	VACUUM ("Hg)	MIN/PT= ZERO=
			IN	OUT							
A-12	.22	1.42	79	78	90	0.00	250	1CED	HOT	1	
11	.22	1.43	82	78	91	1.54					
10	.21	1.36	84	79	91	3.14					
9	.20	1.30	85	79	92	4.65					
8	.22	1.44	87	80	90	6.17				1	
7	.22	1.44	88	81	89	7.81					
6	.19	1.25	90	81	89	9.45					
5	.18	1.18	91	82	90	10.98					
4	.18	1.19	93	84	88	12.56				1	
3	.16	1.06	95	86	88	14.01					
2	.14	0.93	97	86	89	15.45					
1	.13	0.86	98	87	90	16.81					
B-12	.20	1.33	100	88	91	18.13				2	
11	.20	1.33	101	90	92	19.67					
10	.19	1.27	101	91	91	21.30					
9	.21	1.20	102	92	93	22.91				2	
8	.21	1.40	103	92	94	24.52					
7	.20	1.33	104	93	94	26.13					
6	.21	1.40	104	93	95	27.70					
5	.19	1.27	104	94	94	29.38				2	
4	.18	1.20	105	95	94	30.96	↓	↓	↓		
3	.17	1.13	105	95	96	32.50					
2	.17	1.13	104	96	95	33.96				2	
1	.15	1.00	104	98	94	35.40					
						36.77					

* SPARE FILTER *

Client: Drax Williams LK.			Console: 1012		Pb: 27.65	"Hg	Filter: 3	RAP %:		Date: Nov. 4/22	
Process: Dryer Stack 1			Mf: 1.0073		Static: -0.06	"H ₂ O	Silica:	+	%CO ₂	%O ₂	CO
Test: 3			K _o : 0.6628		Ps: 27.65			+	0	21	
Personnel: Nov. 4/22			Pitot: 248		Pm: 27.76		Total Vol: 318	ml			
Start time: 12:08			C _p : 0.83446		Area: 31.50	ft ²	Start Vol: 300	ml			
Stop time: 1:13			Nozzle: 0.275		Bwo: .04		Plant Type:		Mix:		
Permitt #			up strm down strm				Pollution Abatement Equip:				
Location:			Start Leakage Rate@ 15 "Hg.004 ft3/min				Burner:				
Job #:			Finish Leakage Rate@ 15 "Hg.004 ft3/min				Load:				Fuel Type:
SAMPLE POINT	DELTA P ("H ₂ O)	DELTA H ("H ₂ O)	GAS METER TEMP (°F)		STACK (°F)	VOLUME (ft ³)	BOX TEMP (°F)	LAST IMP (°F)	PROBE (°F)	VACUUM ("Hg)	MIN/PT= ZERO=
			IN	OUT							
A-12	.21	1.40	95	94	89	0.00	259	100	607	1	
11	.20	1.34	96	96	90	1.69					
10	.21	1.40	98	96	91	3.26					
9	.21	1.41	100	96	91	4.93					
8	.20	1.34	102	97	90	6.60				1	
7	.20	1.35	103	97	88	8.21					
6	.19	1.29	104	97	87	9.80					
5	.18	1.22	104	98	88	11.35	261			1	
4	.16	1.08	105	98	88	12.82					
3	.16	1.08	106	98	89	14.22					
2	.14	0.94	106	99	90	15.63					
1	.15	1.01	107	99	90	16.94				1	
B-12	.22	1.49	107	99	91	18.33					
11	.22	1.49	107	100	91	19.98					
10	.21	1.42	108	100	92	21.64	263				
9	.20	1.35	108	101	91	23.31				1	
8	.20	1.36	108	101	90	24.95					
7	.21	1.43	108	101	89	26.57					
6	.20	1.36	109	101	89	28.23					
5	.19	1.29	109	102	89	29.81				1	
4	.19	1.29	109	102	89	31.37					
3	.18	1.22	110	102	90	32.92	266				
2	.16	1.09	110	103	92	34.44					
1	.15	1.02	110	103	93	35.90				1	
						37.32					

Client Name: Drax
Williams Lake
 Process: Drift Stack 7
 Test Number: 1
 Date: Nov 4 2022
 Start Time: 9:30
 Finish Time: 10:35
 Starting Vol.: 300
 Final Vol.: 326
 Flask: 68
 Console: 1013
 Stack Diameter: _____

BP 27.65
 DN .300
 CP .84158
 MF .9954
 Moist. .04
 PM 27.76
 AS 31.50
 Ko .7013
 Pitot 242
 Port _____
 Static -10
 PS 27.64

CO ₂	O ₂	CO	N ₂
0	21		
0	21		
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL/NA

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: 1004

Finish: 1006

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.13	1.02	40	40	82	0.00	4	255	ICED	
11	.12	.94	38	39	82	1.44				
10	.12	.94	39	38	83	2.84				
9	.13	1.02	39	38	78	4.20				
8	.13	1.03	42	38	78	5.60	4	254		
7	.14	1.11	42	39	78	7.02				
6	.15	1.19	46	41	78	8.50				
5	.14	1.12	51	45	80	10.02				
4	.14	1.13	55	50	82	11.51	4			
3	.15	1.21	54	50	81	12.98		252		
2	.16	1.29	54	49	80	14.52				
1	.15	1.21	53	50	81	16.15				
B12	.16	1.30	56	52	80	17.65	5			
11	.17	1.38	57	53	81	19.35				
10	.16	1.30	57	54	80	20.93		252		
9	.15	1.21	59	59	82	22.51				
8	.14	1.14	59	58	80	24.10	4			
7	.13	1.07	62	61	80	25.58				
6	.12	.98	64	62	83	27.03				
5	.13	1.07	65	64	83	28.45		254		
4	.15	1.24	68	65	82	29.87				
3	.15	1.24	69	67	84	31.38	4			
2	.16	1.32	68	68	84	32.92				
1	.15	1.24	71	75	84	34.51				
						36.06				

Client: DRAY			Console: 1013		Pb: 27.65 "Hg		Filter: 69		RAP %:		Date: Nov 4/2	
Process: DRYER STACK 2			Mf: 9954		Static: -1.10 "H ₂ O		Silica: 69		+ %CO ₂		%O ₂ CO	
Test: 2			K _o : 7013		Ps: 27.64				+			
Personnel: DL/NA			Pitot: 242		Pm: 27.76		Total Vol: 335 ml		0		21	
Start time: 10:45			C _p : 84158		Area: 31.50 ft ²		Start Vol: 300 ml		0		21	
Stop time: 11:50			Nozzle: .300		Bwo: .04		Plant Type:				Mix:	
Permitt #			up strm		down strm		Pollution Abatement Equip:					
Location: W. LAKE			Start Leakage Rate@ 15 "Hg .004 ft ³ /min		Burner:							
Job #:			Finish Leakage Rate@ 15 "Hg .005 ft ³ /min		Load:						Fuel Type:	
SAMPLE POINT	DELTA P ("H ₂ O)	DELTA H ("H ₂ O)	GAS METER TEMP (°F)		STACK (°F)	VOLUME (ft ³)	BOX TEMP (°F)	LAST IMP (°F)	PROBE (°F)	VACUUM ("Hg)	MIN/PT= 2.5 ZERO=	
			IN	OUT								
A-12	.14	1.17	80	79	90	0.00	245	ICED	167	4		
11	.12	.99	76	77	91	1.50						
10	.13	1.08	74	73	87	2.93						
9	.13	1.08	74	73	87	4.39						
8	.14	1.16	73	73	87	5.88				4		
7	.13	1.08	73	73	86	7.39	246					
6	.15	1.25	77	76	87	8.82						
5	.15	1.25	77	76	88	10.40						
4	.14	1.17	79	78	86	11.97				4		
3	.14	1.16	80	80	93	13.52						
2	.15	1.26	80	79	88	15.08						
1	.15	1.26	82	82	87	16.66	252					
B-12	.15	1.26	82	82	86	18.26				4		
11	.17	1.44	84	84	87	19.87						
10	.17	1.43	86	87	91	21.60						
9	.16	1.36	88	87	88	23.24						
8	.15	1.28	89	90	89	24.89	255			4		
7	.15	1.27	89	88	90	26.55						
6	.13	1.10	90	89	90	28.14						
5	.13	1.10	91	92	93	29.67						
4	.14	1.19	91	91	93	31.16				4		
3	.16	1.36	92	92	93	32.70						
2	.16	1.36	93	95	95	34.37	258			4		
1	.14	1.19	93	94	96	36.08		↓	↓			
						37.59						

Client: DRAX			Console: 1013		Pb: 27.65 "Hg	Filter: 70	RAP %:		Date: Nov 4/22		
Process: DRYER STACK 2			Mf: 19954		Static: 7.10 "H ₂ O	Silica: 70	+	%CO ₂	%O ₂	CO	
Test: 3			K _o : 17013		Ps: 27.64		+	0	21		
Personnel: DL/NA			Pitot: 242		Pm: 27.76	Total Vol: 330 ml		0	21		
Start time: 12:00			C _p : 84158		Area: 31.50 ft ²	Start Vol: 300 ml		0	21		
Stop time: 1:05			Nozzle: 300		Bwo: 1.04	Plant Type:			Mix:		
Permitt #			up strm down strm			Pollution Abatement Equip:					
Location: W. LAKE			Start Leakage Rate@ 15 "Hg .003 ft ³ /min			Burner:					
Job #:			Finish Leakage Rate@ 15 "Hg .005 ft ³ /min			Load:			Fuel Type:		
SAMPLE POINT	DELTA P ("H ₂ O)	DELTA H ("H ₂ O)	GAS METER TEMP (°F)		STACK (°F)	VOLUME (ft ³)	BOX TEMP (°F)	LAST IMP (°F)	PROBE (°F)	VACUUM ("Hg)	MIN/PT= 2.5 ZERO=
			IN	OUT							
A-12	.13	1.10	100	99	100	0.00	250	1080	407	4	
11	.14	1.19	88	90	90	1.49					
16	.12	1.01	82	84	88	3.01					
9	.13	1.10	83	84	87	4.50					
8	.13	1.09	88	86	96	6.00	248			4	
7	.15	1.26	85	86	94	7.50					
6	.14	1.19	84	85	87	9.10					
5	.15	1.27	83	85	88	10.70					
4	.16	1.35	85	85	86	12.30				3	
3	.15	1.27	88	88	91	14.00	253				
2	.14	1.18	87	87	89	15.57					
1	.14	1.19	88	88	88	17.15					
B-12	.14	1.19	87	87	88	18.70				4	
11	.15	1.28	88	89	88	20.30					
10	.16	1.36	88	89	89	21.83	255				
9	.16	1.36	92	91	91	23.50					
8	.15	1.27	93	92	93	25.15					
7	.16	1.37	93	93	89	26.75				4	
6	.14	1.20	92	91	89	28.37					
5	.13	1.11	91	90	90	29.96					
4	.15	1.28	90	90	91	31.47	256				
3	.15	1.28	90	90	90	33.11					
2	.16	1.36	91	91	91	34.68				4	
1	.15	1.28	91	90	91	36.45					
						38.05					

Client Name: Drax
Williams Lake
 Process: Dryer Stack 3
 Test Number: 1
 Date: Nov 4 2027
 Start Time 933
 Finish Time 10:38
 Starting Vol. 300
 Final Vol. 305
 Flask: 59
 Console: 980
 Stack Diameter

BP 27.70
 DN 325
 CP 83867
 MF 9910
 Moist. 3%
 PM 27.81
 AS 31.50
 Ko 7444
 Pitot 217
 Port
 Static -08
 PS 27.69

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL NH CB KS

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: 1015 Finish: 1012

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	1.67	50	50	107	68.00	3	270	1002	
11	.17	1.69	55	49	81	70.08				
10	.16	1.58	61	49	88	71.99	2			
9	.16	1.59	70	50	87	73.96				
8	.15	1.50	71	52	86	75.88	2			
7	.14	1.40	73	53	86	77.68				
6	.13	1.30	74	54	88	79.52	2			
5	.13	1.32	79	57	86	81.38				
4	.13	1.22	82	58	85	83.27	2			
3	.12	1.23	83	60	84	85.04				
2	.12	1.22	84	61	86	86.90	2			
1	.11	1.15	92	64	79	88.64				
B12	.23	2.40	91	65	80	90.24	2			
11	.21	2.17	92	67	87	92.53				
10	.19	1.97	95	68	86	94.74	2			
9	.19	1.98	92	70	85	96.75				
8	.16	1.67	94	71	84	98.90	2			
7	.16	1.67	95	72	84	101.00				
6	.15	1.56	94	72	86	103.15	2			
5	.14	1.47	94	74	84	105.19				
4	.15	1.57	94	74	85	107.07	2			
3	.16	1.68	96	76	85	109.13				
2	.14	1.46	96	75	86	111.11	2			
1	.14	1.47	98	75	86	112.97				
						114.80				

Client Name: Prox
Williams Lake
 Process: Dryer Stack 3
 Test Number: 2
 Date: Nov 4 2021
 Start Time 10:48
 Finish Time 11:52
 Starting Vol. 300
 Final Vol. 322
 Flask: 60
 Console: 980
 Stack Diameter

BP 2770
 DN .325
 CP .83867
 MF .9910
 Moist. 3%
 PM 2781
 AS 31.50
 Ko 7444
 Pitot 217
 Port
 Static -0.08
 PS 27.69

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL / NA / CB / KS

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .004 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
A12	.18	1.84	72	70	85	16.63	1	270	TEMP	
11	.17	1.76	80	74	84	18.69				
10	.17	1.76	82	75	84	20.64				
9	.16	1.68	95	75	84	22.77	1			
8	.15	1.57	95	73	85	24.88				
7	.15	1.58	97	77	84	26.95				
6	.14	1.48	100	78	85	28.88	1			
5	.13	1.38	101	79	83	30.93				
4	.12	1.27	102	80	83	32.82				
3	.12	1.28	102	82	83	34.64	1			
2	.11	1.16	102	82	88	36.47				
1	.11	1.17	104	85	86	38.07				
B12	.23	2.45	103	85	84	39.68	1			
11	.22	2.36	108	86	83	42.15				
10	.20	2.15	110	88	84	44.37				
9	.19	2.05	111	89	84	46.67	1			
8	.17	1.84	112	90	83	49.07				
7	.17	1.84	112	91	84	51.26				
6	.16	1.73	112	91	84	53.31	1			
5	.15	1.62	111	92	84	55.44				
4	.15	1.61	110	91	85	57.46				
3	.17	1.83	109	92	85	59.37	1			
2	.15	1.61	110	91	85	61.60				
1	.14	1.51	111	91	85	63.62				
						65.64				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 3
 Test Number: 3
 Date: Nov 4 2022
 Start Time: 12:05
 Finish Time: 1:08
 Starting Vol.: 300
 Final Vol.: 324
 Flask: 61
 Console: 980
 Stack Diameter: _____

BP 27.70
 DN .325
 CP 83867
 MF .9910
 Moist. 2%
 PM 27.81
 AS 31.50
 Ko 7444
 Pitot 717
 Port _____
 Static -08
 PS 87.69

CO ₂	O ₂	CO	N ₂
0	21		

Personnel: DLINA/KS/CB

Leakage Rate @ 15 inches

Load:

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Mean Yaw Angle

Start: .008

Finish: -012

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.19	2.03	87	84	85	67.75	1	270	±LED	
11	.18	1.94	97	83	83	69.94				
10	.17	1.84	100	85	83	72.13				
9	.15	1.63	99	84	83	74.23	1			
8	.16	1.73	100	85	84	76.26				
7	.16	1.73	101	84	84	78.43				
6	.15	1.62	101	84	84	80.40	1			
5	.14	1.52	101	84	83	82.45				
4	.13	1.41	101	85	84	84.48				
3	.12	1.30	100	84	84	86.47	1			
2	.12	1.29	100	83	84	88.25				
1	.11	1.19	101	83	84	90.14				
B12	.23	2.40	99	84	86	91.88	1			
11	.21	2.27	101	84	84	94.23				
10	.19	2.06	105	84	84	96.65				
9	.20	2.18	105	84	83	99.03	1			
8	.18	1.95	104	84	85	101.25				
7	.17	1.84	104	84	84	103.40				
6	.15	1.62	102	83	85	105.40	1			
5	.16	1.73	101	84	84	107.38				
4	.16	1.73	101	84	85	109.48				
3	.18	1.95	102	84	85	111.56	1			
2	.16	1.73	102	85	84	113.65				
1	.14	1.51	100	83	85	115.68				
						117.65				

Client Name: Drox
Williams Lake
 Process: Dryer stack 4
 Test Number: 1
 Date: Nov 4 2022
 Start Time: 910
 Finish Time: 10:14
 Starting Vol.: 300
 Final Vol.: 324
 Flask: 62
 Console: 1021
 Stack Diameter: _____

BP 27.70
 DN 300
 CP 83829
 MF 9903
 Moist. 3%
 PM 27.81
 AS 31.50
 Ko 6535
 Pitot 140
 Port _____
 Static 1.08
 PS 27.69

CO ₂	O ₂	CO	N ₂
0	21		
0	21		
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL NH CB KC

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: 1011 Finish: 1017

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volnme	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.22	1.98	50	50	100	74.00	2	270	1002	
11	.21	1.91	54	47	96	75.87				
10	.18	1.63	57	47	98	77.61				
9	.18	1.64	60	48	98	79.29				
8	.17	1.55	63	49	98	81.04	3			
7	.17	1.56	64	51	99	82.67				
6	.17	1.56	70	55	101	84.23				
5	.18	1.66	72	56	101	85.89				
4	.18	1.67	74	58	100	87.64	3			
3	.16	1.49	75	60	98	89.29				
2	.15	1.39	74	60	99	90.88				
1	.14	1.31	74	62	99	92.39				
B12	.19	1.77	78	63	107	93.97	3			
11	.19	1.78	80	65	101	95.63				
10	.18	1.69	82	66	101	97.43				
9	.18	1.70	81	67	100	99.13				
8	.17	1.60	82	67	101	100.89	3			
7	.16	1.51	84	69	101	102.71				
6	.16	1.51	84	70	101	104.28				
5	.15	1.42	84	72	100	105.99				
4	.14	1.33	86	74	100	107.53	3			
3	.14	1.34	86	75	99	109.07				
2	.14	1.33	87	77	100	110.64				
1	.14	1.33	88	77	101	112.81	3			
						113.74				

Client Name: Drax
Williams Lake
 Process: Dryer stack 4
 Test Number: 2
 Date: Nov 4 2022
 Start Time 10.21
 Finish Time 11.25
 Starting Vol. 300
 Final Vol. 321
 Flask: 63
 Console: 107
 Stack Diameter

BP 27.70
 DN 300
 CP .83829
 MF .9903
 Moist. 3%
 PM 27.81
 AS 31.50
 Ko .6635
 Pitot 140
 Port
 Static -1.08
 PS 27.69

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

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: CB KS NA PL

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .004 Finish: .01

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	1.99	76	76	98	14.40	3	276	11.00	
11	.21	2.00	80	76	97	16.24				
10	.20	1.93	95	77	98	18.24				
9	.19	1.84	97	77	98	19.98				
8	.19	1.82	86	76	98	21.86	3			
7	.17	1.63	87	78	99	23.66				
6	.18	1.72	87	78	99	25.40				
5	.18	1.72	88	80	100	27.18				
4	.17	1.62	89	79	101	28.95	3			
3	.16	1.48	89	80	103	30.71				
2	.15	1.43	89	81	106	32.34				
1	.15	1.44	90	80	102	33.95				
B12	.20	1.92	90	81	103	35.53	3			
11	.19	1.82	91	82	103	37.24				
10	.19	1.84	93	84	101	39.09				
9	.18	1.75	96	85	101	40.84				
8	.17	1.65	99	86	101	42.81	3			
7	.17	1.66	98	89	101	44.42				
6	.16	1.55	98	89	103	46.17				
5	.16	1.56	99	89	101	47.89				
4	.15	1.47	99	90	100	49.57	3			
3	.15	1.47	101	91	101	51.21				
2	.14	1.38	101	92	98	52.88				
1	.14	1.38	102	93	98	54.44				
						56.02				

Client Name: Dray Williams Lake
 Process: Drift Stack 4
 Test Number: 3
 Date: Nov 4 2022
 Start Time: 11.30
 Finish Time: 12.34
 Starting Vol.: 300
 Final Vol.: 323
 Flask: 64
 Console: 1021
 Stack Diameter:

BP 27.70
 DN .300
 CP .83829
 MF .9903
 Moist. 3%
 PM 27.81
 AS 31.50
 Ko .6535
 Pitot 140
 Port
 Static -.08
 PS 27.69

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: CB KS NH DL Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .003 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	.21	2.04	93	91	99	58.41	1	270	ICFD	
11	.20	1.95	96	92	101	60.27				
10	.20	1.96	99	93	100	62.25				
9	.20	1.96	100	92	101	64.00				
8	.20	1.97	100	96	99	65.87	2			
7	.17	1.67	100	97	101	67.72				
6	.17	1.66	100	92	100	69.53				
5	.18	1.46	100	91	101	71.30				
4	.18	1.76	99	92	100	73.04	2			
3	.16	1.56	100	91	103	74.89				
2	.15	1.47	99	91	100	76.57				
1	.14	1.37	98	91	99	78.19				
B12	.21	2.05	97	90	101	79.79	2			
11	.20	1.96	99	91	101	81.78				
10	.19	1.87	98	92	98	83.58				
9	.18	1.77	99	91	98	85.40				
8	.17	1.68	101	92	98	87.23	2			
7	.17	1.67	103	90	99	89.04				
6	.17	1.67	99	90	97	90.79				
5	.16	1.58	99	91	97	92.54				
4	.16	1.57	100	90	99	94.25	2			
3	.15	1.47	102	90	100	95.95				
2	.14	1.38	103	91	100	97.66				
1	.14	1.36	99	90	101	99.27				
						106.00				

Client Name: Drax
Williams Lake
 Process: Cyclotiller
 Test Number: 1
 Date: Nov 25 2022
 Start Time: 8:09
 Finish Time: 9:11
 Starting Vol.: 300
 Final Vol.: 319
 Flask: W36
 Console: 1021
 Stack Diameter:

BP 28.05
 DN 0.190
 CP 0.83867
 MF 0.9903
 Moist. 1%
 PM 28.16
 AS
 Ko 0.6535
 Pitot 217
 Port
 Static +0.10
 PS 28.05

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

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream
 Mean Yaw Angle

Personnel: KS/ICB

Leakage Rate @ 15 inches

Start: -003 Finish: -005

Load:

155-130

84

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	1.80	2.72	60	59	105	52.70	4	270	ILED	
11	1.70	2.59	67	61	105	54.94				
10	1.50	2.29	71	61	105	56.98				
9	1.10	1.69	75	63	105	58.94	2			
8	1.08	1.54	78	65	107	60.71				
7	0.70	1.08	80	69	107	62.31				
6	0.55	0.85	79	67	107	63.68	1			
5	0.65	1.00	82	68	108	64.87				
4	0.65	1.00	84	70	111	66.11				
3	0.60	0.93	90	71	108	67.44	2			
2	0.70	1.09	87	72	106	68.73				
1	0.70	1.09	83	75	106	70.23				
B12	1.30	2.03	85	77	108	71.67	4			
11	1.00	1.57	87	79	108	73.54				
10	0.85	1.34	93	80	107	75.33				
9	0.75	1.18	95	81	112	76.84	1			
8	0.70	1.11	93	82	107	78.29				
7	0.65	1.03	94	83	108	79.71				
6	0.70	1.12	94	84	104	81.12	1			
5	0.80	1.28	95	86	104	82.55				
4	0.85	1.36	97	86	104	84.03				
3	1.10	1.77	97	88	105	85.50	3			
2	1.26	1.94	99	89	104	87.41				
1	1.30	2.10	102	91	105	89.15				
						91.11				

Client Name: Drax
Williams lake
 Process: Cyclo Filter
 Test Number: 2
 Date: Nov 25/2022
 Start Time 9.17
 Finish Time 10.19
 Starting Vol. 300
 Final Vol. 313
 Flask: W37
 Console: 1021
 Stack Diameter

BP 28.05
 DN .190
 CP 0.83867
 MF 09903
 Moist. 3%
 PM 28.16
 AS
 Ko 0.6535
 Pitot 217
 Port
 Static +1.0
 PS 28.05

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

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream
 Mean Yaw Angle

Personnel: KS/CS

Leakage Rate @ 15 inches

Start: 1003 Finish: 1005

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	1.80	2.75	87	87	109	92.23	1	270	ICED	
11	1.60	2.49	100	92	108	94.50				
10	1.50	2.33	104	92	110	96.66				
9	1.20	1.87	104	92	108	98.64	1			
8	1.10	1.72	104	93	107	100.54				
7	0.80	1.25	104	94	109	102.32				
6	0.60	0.93	103	94	108	103.94	1			
5	0.70	1.10	104	95	106	105.26				
4	0.70	1.10	104	95	105	106.73	1			
3	0.65	1.02	105	97	105	108.11				
2	0.75	1.19	106	97	103	109.54				
1	0.70	1.11	106	98	103	110.96	1			
B 12	1.40	2.22	107	98	103	112.42				
11	1.10	1.75	109	100	102	114.43				
10	0.90	1.44	112	102	104	116.27	1			
9	0.80	1.28	112	101	102	117.78				
8	0.75	1.19	111	102	104	119.38				
7	0.70	1.01	111	102	106	120.74	1			
6	0.75	1.20	110	102	103	122.26				
5	0.85	1.35	111	102	104	123.66				
4	0.90	1.44	111	103	104	125.22	1			
3	1.20	1.92	111	102	102	126.87				
2	1.30	2.08	113	103	104	128.81				
1	1.40	2.24	113	102	103	130.76				
						132.77				

Client Name: Dray
Williams lake
 Process: Cyclo filter
 Test Number: 3
 Date: Nov 25 2022
 Start Time 10:23
 Finish Time 11:25
 Starting Vol. 300
 Final Vol. 309
 Flask: W38
 Console: 1081
 Stack Diameter

BP 28.05
 DN 0.190
 CP 0.83867
 MF 0.9903
 Moist. 2%
 PM 28.16
 AS
 Ko 06535
 Pitot 217
 Port
 Static +1.0
 PS 28.05

CO ₂	O ₂	CO	N ₂
0	21		
0	21		

Duct Diameters
 Up-Stream
 Duct Diameters
 Downstream

Personnel: KS/CS

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: 1002 Finish: 1004

Load:

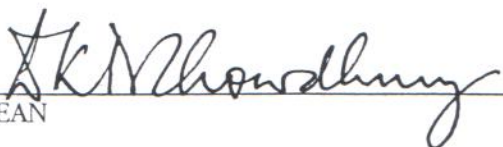
Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A 12	1.80	2.88	99	98	105	34.23	2	270	+LED	
11	1.70	2.73	103	99	104	36.61				
10	1.50	2.41	106	99	105	38.80				
9	1.30	2.10	107	98	104	40.95	1			
8	1.20	1.94	109	99	104	42.90				
7	0.90	1.44	108	97	106	44.86				
6	0.60	0.96	104	98	105	46.51	1			
5	0.65	1.04	103	97	103	47.94				
4	0.75	1.21	107	96	102	49.27				
3	0.60	0.97	108	97	102	50.76	1			
2	0.70	1.12	103	97	102	52.11				
1	0.65	1.04	104	97	104	53.58				
B 12	1.40	2.25	104	98	104	54.92	1			
11	1.20	1.93	107	98	104	56.91				
10	1.00	1.63	109	99	104	58.78				
9	0.90	1.45	108	99	104	60.54	1			
8	0.80	1.29	108	100	103	62.20				
7	0.75	1.21	107	99	102	63.75				
6	0.70	1.13	106	100	101	65.31	1			
5	0.90	1.45	106	99	102	66.72				
4	1.00	1.61	107	99	103	68.33				
3	1.30	2.10	109	100	104	70.10	2			
2	1.30	2.10	110	101	105	71.98				
1	1.40	2.27	110	101	104	74.02				
						76.06				

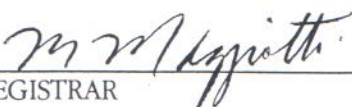


This is to verify that
Matthew McCall
has successfully completed
a course of study in
Source Testing for Particulates
(35 hours)

Endorsed by
The B.C. Ministry of Environment

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


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June 23, 2017

Date _____

Charles W. Allen

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Chris Bodden

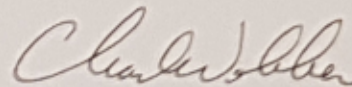
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Stack Sampling Seminar

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June 23, 2017

Date



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