

**DRAX-Pinnacle Pellet WL
Williams Lake, B.C.
Dryer Stacks 1-4
June 17, 2022
Permit 17557**

Our Job Number: ME2223-028

Report Author: Matt McCall
McCall Environmental

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July 21, 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) – June 17, 2022
Permit – PA-17557
McCall File Number – ME2223-028

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

Testing Parameters

Dryer Stacks 1-4

- Total Particulate and Condensable Organics State of Oregon Method

Key Personnel

- Report Generation: Matt McCall 250-542-5118
- Sr Field Tech: Danny Lawrence 250-857-5713
- Field Tech: Dave Brandle and Nick Angus 250-564-9106
- Plant Personnel: Ian Tencarre 250-267-7580

All stacks have been examined for cyclonic flow and determined to be tested as laminar in nature.

Test results are summarized immediately following this cover letter.

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

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

MCCALL ENVIRONMENTAL

Matt McCall

Summary of Test Results

Dryer Results June 17, 2022

Total Particulate		Average of Triplicate Tests				
Parameter	Stack 1	Stack2	Stack 3	Stack 4	Avg/ Total	Permit
Test Date	June 17/22	June 17/22	June 17/22	June 17/22	N/A	
Gas Temperature (°C)	32.3	33.3	37.9	44.2	36.9	
% Moisture	2.70	3.61	3.34	3.77	3.36	
Velocity (m/sec)	7.62	7.43	7.79	7.13	7.49	
ACFM	47223	46073	48316	44224	185836	
Std. Dry Flow Rate (m ³ /sec)	19.44	18.72	19.40	17.33	74.89	90.00
Tot Part. Dry Basis ref. Cond. (mg/m ³)	6.60	5.05	7.46	5.32	6.11	15.00
Front Half Particulate (mg/m ³)	4.72	2.55	2.81	3.32	3.35	
Back Half Condensables (mg/m ³)	1.88	2.50	4.65	2.00	2.76	
Mass Emission Rate (kg/hr)	0.46	0.34	0.52	0.33	1.66	

* 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.

Last time this sources was tested on April 14, 2022 the total velocity was 75.71 m³/sec and an average concentration of 11.40 mg/m³.

The plant was operating normally at the time of testing and field personnel observed no irregularities.

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

Dryer Stack 1
June 17/22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	90 ° F	32 ° C
Moisture Content (by volume):	2.70 %	
Average Stack Gas Velocity:	24.99 ft/sec	7.62 m/sec
Total Actual Gas Flow Rate:	47223 ACFM	
Dry Gas flow Rate at Reference Conditions:	41184 SCFM	19.44 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	6.60 mg/m ³
Front Half Particulate	0.00 gr/ft ³	4.72 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	1.88 mg/m ³
Mass Emission Rate	1.02 lbs/hr	0.46 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	84 ° F	29 ° C
Moisture Content (by volume):	1.7 %	
Average Stack Gas Velocity:	24.8 ft/sec	7.5 m/sec
Total Actual Gas Flow Rate:	46786 ACFM	
Dry Gas flow Rate at Reference Conditions:	41696 SCFM	19.7 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.9 mg/m ³
Front Half Particulate	.003 gr/ft ³	7.0 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	1.39 lbs/hr	0.63 kg/hr

TEST 2:

Gas Temperature:	94 ° F	34 ° C
Moisture Content (by volume):	2.8 %	
Average Stack Gas Velocity:	25.2 ft/sec	7.7 m/sec
Total Actual Gas Flow Rate:	47643 ACFM	
Dry Gas flow Rate at Reference Conditions:	41235 SCFM	19.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.5 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.6 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	0.70 lbs/hr	0.32 kg/hr

TEST 3:

Gas Temperature:	93 ° F	34 ° C
Moisture Content (by volume):	3.6 %	
Average Stack Gas Velocity:	25.0 ft/sec	7.6 m/sec
Total Actual Gas Flow Rate:	47239 ACFM	
Dry Gas flow Rate at Reference Conditions:	40620 SCFM	19.2 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.4 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.5 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.9 mg/m ³
Mass Emission Rate	0.97 lbs/hr	0.44 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 1
Permit Number: RA-17557
Job Number: ME2223-028
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
49	50	51
June 17/22	June 17/22	June 17/22
8:45	9:59	11:15
9:49	11:03	12:18
60	60	60
DL/NA/CB	DL/NA/CB	DL/NA/CB
1013	1013	1013
27.95	27.95	27.95
-0.13	-0.13	-0.13
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
1.0083	1.0083	1.0083
0.83446	0.83446	0.83446
31.5	31.5	31.5
10	20	26
4	3	3
0.0011	0.0001	0.0001
0.0065	0.0027	0.0046
0.0020	0.0020	0.0020
0.0000	0.0000	0.0000
0.0096	0.0048	0.0067

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

June 17/22

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	1.61	40	41	79	0.00	0.94
A-11	0.22	1.69	40	40	77	1.68	0.91
A-10	0.23	1.76	40	39	78	3.34	1.00
A-9	0.22	1.70	44	43	78	5.20	0.97
A-8	0.22	1.69	43	42	81	6.97	0.99
A-7	0.20	1.54	45	45	80	8.77	1.01
A-6	0.19	1.47	49	45	80	10.54	1.00
A-5	0.18	1.40	52	46	80	12.25	0.99
A-4	0.16	1.24	54	49	83	13.91	0.99
A-3	0.16	1.25	56	52	83	15.48	1.02
A-2	0.15	1.17	57	53	83	17.11	0.95
A-1	0.17	1.34	60	55	84	18.57	0.98
B-12	0.12	0.92	60	56	85	20.18	1.03
B-11	0.13	1.03	62	59	85	21.61	1.05
B-10	0.14	1.10	61	59	85	23.13	0.96
B-9	0.14	1.11	64	62	86	24.57	0.99
B-8	0.15	1.18	63	62	87	26.07	1.00
B-7	0.16	1.27	66	64	87	27.63	0.93
B-6	0.16	1.26	65	64	90	29.14	1.02
B-5	0.17	1.35	66	65	87	30.78	0.98
B-4	0.18	1.43	68	68	88	32.41	0.92
B-3	0.20	1.59	68	67	89	34.00	0.99
B-2	0.21	1.68	69	71	88	35.80	0.99
B-1	0.22	1.76	70	70	88	37.65	0.93
						39.42	

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

June 17/22

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	0.20	1.59	72	72	91	0.00	0.93
A-11	0.22	1.73	69	69	94	1.68	0.97
A-10	0.22	1.73	67	69	93	3.50	0.99
A-9	0.23	1.82	68	70	93	5.36	0.94
A-8	0.22	1.74	69	69	92	7.16	0.99
A-7	0.21	1.67	71	70	92	9.03	0.97
A-6	0.18	1.47	72	71	96	10.82	1.01
A-5	0.17	1.34	70	70	95	12.55	0.98
A-4	0.17	1.35	71	71	93	14.17	0.96
A-3	0.15	1.19	73	73	96	15.76	1.00
A-2	0.16	1.26	74	74	94	17.32	0.96
A-1	0.16	1.26	74	73	100	18.88	0.96
B-12	0.14	1.11	74	74	96	20.43	1.00
B-11	0.13	1.03	74	74	96	21.94	0.98
B-10	0.13	1.03	73	73	93	23.37	1.00
B-9	0.14	1.12	76	74	91	24.83	0.96
B-8	0.16	1.27	75	74	94	26.29	0.92
B-7	0.16	1.28	77	76	92	27.79	0.92
B-6	0.17	1.36	76	76	91	29.29	0.98
B-5	0.18	1.44	77	76	92	30.93	0.91
B-4	0.20	1.60	77	77	94	32.50	1.01
B-3	0.21	1.69	78	78	92	34.34	0.99
B-2	0.22	1.77	78	78	93	36.20	0.97
B-1	0.22	1.77	79	78	92	38.06	0.98
						39.93	

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

June 17/22

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	1.69	80	80	94	0.00	0.94
A-11	0.21	1.69	79	81	94	1.75	0.93
A-10	0.23	1.85	77	78	93	3.49	0.94
A-9	0.22	1.77	78	78	93	5.31	1.03
A-8	0.22	1.77	79	78	92	7.26	0.97
A-7	0.20	1.61	78	78	92	9.11	0.98
A-6	0.19	1.52	77	78	94	10.89	0.97
A-5	0.17	1.36	78	79	93	12.60	0.96
A-4	0.16	1.28	79	79	93	14.20	1.00
A-3	0.15	1.21	80	80	92	15.82	1.02
A-2	0.16	1.29	81	80	92	17.43	1.02
A-1	0.16	1.29	82	81	92	19.10	0.97
B-12	0.13	1.05	82	82	94	20.68	0.92
B-11	0.13	1.05	82	82	94	22.04	0.99
B-10	0.15	1.22	83	83	93	23.50	0.99
B-9	0.14	1.13	83	83	92	25.07	1.00
B-8	0.14	1.13	83	83	95	26.60	0.95
B-7	0.14	1.30	83	83	93	28.05	1.00
B-6	0.16	1.30	85	84	93	29.59	0.95
B-5	0.18	1.46	84	84	94	31.15	1.01
B-4	0.20	1.62	83	83	92	32.90	1.00
B-3	0.20	1.62	84	84	93	34.73	1.02
B-2	0.21	1.71	86	85	92	36.60	0.96
B-1	0.21	1.71	85	85	92	38.42	0.99
						40.28	



Dryer Stack 1
Drax
Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.981

Delta P:	0.177 "H ₂ O	Us avg:	24.75 ft/sec
Delta H:	1.398	ACFM:	46786 ft ³ /min
Tm avg:	515.8 °R	SDCFM:	41696 ft ³ /min
Ts avg:	543.8 °R	Vm std:	38.15 ft ³
Bwo:	0.017	Vm corr:	39.75 ft ³
Md:	28.84	Vm:	39.42 ft ³
Ms:	28.65	MF:	1.0083
Pb:	27.95 "Hg	PCON:	8.89 mg/m ³
Pm:	28.05 "Hg	ERAT:	0.63 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.970

Delta P:	0.180 "H ₂ O	Us avg:	25.21 ft/sec
Delta H:	1.443	ACFM:	47643 ft ³ /min
Tm avg:	533.4 °R	SDCFM:	41235 ft ³ /min
Ts avg:	553.5 °R	Vm std:	37.37 ft ³
Bwo:	0.028	Vm corr:	40.26 ft ³
Md:	28.84	Vm:	39.93 ft ³
Ms:	28.53	MF:	1.0083
Pb:	27.95 "Hg	PCON:	4.54 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.32 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.979

Delta P:	0.177 "H ₂ O	Us avg:	24.99 ft/sec
Delta H:	1.443	ACFM:	47239 ft ³ /min
Tm avg:	541.3 °R	SDCFM:	40620 ft ³ /min
Ts avg:	553.0 °R	Vm std:	37.15 ft ³
Bwo:	0.036	Vm corr:	40.61 ft ³
Md:	28.84	Vm:	40.28 ft ³
Ms:	28.45	MF:	1.0083
Pb:	27.95 "Hg	PCON:	6.37 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.44 kg/hr
Ps:	27.94 "Hg		

Dryer Stack 2
June 17/22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	92 ° F	33 ° C
Moisture Content (by volume):	3.61 %	
Average Stack Gas Velocity:	24.38 ft/sec	7.43 m/sec
Total Actual Gas Flow Rate:	46073 ACFM	
Dry Gas flow Rate at Reference Conditions:	39676 SCFM	18.72 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	5.05 mg/m ³
Front Half Particulate	0.00 gr/ft ³	2.55 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	2.50 mg/m ³
Mass Emission Rate	0.75 lbs/hr	0.34 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	90 ° F	32 ° C
Moisture Content (by volume):	4.1 %	
Average Stack Gas Velocity:	24.6 ft/sec	7.5 m/sec
Total Actual Gas Flow Rate:	46512 ACFM	
Dry Gas flow Rate at Reference Conditions:	39945 SCFM	18.9 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.4 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.3 mg/m ³
Back Half Condensibles	.002 gr/ft ³	4.1 mg/m ³
Mass Emission Rate	1.26 lbs/hr	0.57 kg/hr

TEST 2:

Gas Temperature:	93 ° F	34 ° C
Moisture Content (by volume):	3.5 %	
Average Stack Gas Velocity:	24.5 ft/sec	7.5 m/sec
Total Actual Gas Flow Rate:	46212 ACFM	
Dry Gas flow Rate at Reference Conditions:	39797 SCFM	18.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	3.6 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.9 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.54 lbs/hr	0.24 kg/hr

TEST 3:

Gas Temperature:	93 ° F	34 ° C
Moisture Content (by volume):	3.2 %	
Average Stack Gas Velocity:	24.1 ft/sec	7.3 m/sec
Total Actual Gas Flow Rate:	45497 ACFM	
Dry Gas flow Rate at Reference Conditions:	39286 SCFM	18.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.001 gr/ft ³	3.2 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.4 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.46 lbs/hr	0.21 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 2
Permit Number: RA-17557
Job Number: ME2223-028
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
52	53	54
June 17/22	June 17/22	June 17/22
8:53	9:58	11:03
9:55	11:00	12:05
60	60	60
NA/CB	NA/CB	NA/CB
980	980	980
27.95	27.95	27.95
-0.13	-0.13	-0.13
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.320	0.320	0.320
0.9958	0.9958	0.9958
0.83867	0.83867	0.83867
31.5	31.5	31.5
35	26	21
4	6	8
0.0001	0.0001	0.0001
0.0051	0.0022	0.0016
0.0050	0.0020	0.0020
0.0000	0.0000	0.0000
0.0102	0.0043	0.0037

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

June 17/22

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	0.15	1.31	54	54	92	84.87	1.06
A-11	0.14	1.24	63	53	90	86.70	1.05
A-10	0.17	1.51	67	55	90	88.47	0.99
A-9	0.17	1.53	72	57	89	90.33	0.99
A-8	0.16	1.44	77	59	90	92.19	1.04
A-7	0.16	1.45	79	60	90	94.10	1.02
A-6	0.16	1.45	80	60	90	95.98	1.03
A-5	0.17	1.54	81	61	90	97.88	1.01
A-4	0.16	1.45	82	61	89	99.80	1.04
A-3	0.14	1.28	84	62	89	101.72	1.02
A-2	0.15	1.37	85	63	89	103.50	1.03
A-1	0.14	1.28	86	64	89	105.36	1.00
B-12	0.23	2.11	88	66	89	107.11	0.99
B-11	0.23	2.12	89	67	89	109.32	0.99
B-10	0.21	1.94	90	69	89	111.55	0.99
B-9	0.20	1.85	92	70	90	113.68	1.01
B-8	0.21	1.94	93	71	90	115.80	0.99
B-7	0.20	1.86	94	73	90	117.94	0.99
B-6	0.18	1.67	95	74	91	120.03	1.00
B-5	0.16	1.49	96	75	91	122.05	0.99
B-4	0.15	1.39	97	76	92	123.94	1.02
B-3	0.15	1.39	98	77	93	125.82	1.00
B-2	0.16	1.49	99	78	94	127.66	1.00
B-1	0.15	1.40	101	79	94	129.56	0.99
						131.40	

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

June 17/22

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	0.15	1.38	79	79	90	31.59	0.97
A-11	0.15	1.38	82	78	92	33.37	0.97
A-10	0.16	1.47	86	78	93	35.15	0.99
A-9	0.16	1.48	93	78	93	37.03	0.99
A-8	0.17	1.58	98	79	95	38.92	1.00
A-7	0.16	1.49	98	79	94	40.89	1.02
A-6	0.16	1.49	99	79	94	42.85	1.02
A-5	0.15	1.40	100	80	93	44.80	0.96
A-4	0.15	1.40	100	81	93	46.59	0.94
A-3	0.15	1.40	100	81	92	48.34	0.98
A-2	0.14	1.31	101	81	93	50.17	1.00
A-1	0.14	1.31	101	82	93	51.97	0.99
B-12	0.22	2.06	101	82	93	53.76	1.00
B-11	0.22	2.06	101	82	93	56.01	1.01
B-10	0.22	2.07	102	83	92	58.28	1.00
B-9	0.21	1.98	102	83	91	60.54	1.02
B-8	0.21	1.98	102	84	91	62.80	1.01
B-7	0.19	1.79	103	85	92	65.03	0.96
B-6	0.16	1.51	104	86	92	67.06	1.03
B-5	0.16	1.51	104	87	92	69.06	1.04
B-4	0.15	1.42	105	87	93	71.08	1.00
B-3	0.16	1.51	106	88	93	72.96	0.98
B-2	0.15	1.42	106	89	93	74.87	1.02
B-1	0.15	1.42	108	90	94	76.79	1.00
						78.68	

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

June 17/22

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	0.16	1.49	89	89	93	78.96	1.01
A-11	0.16	1.50	93	88	93	80.91	1.02
A-10	0.15	1.40	95	88	94	82.87	0.97
A-9	0.15	1.40	97	88	94	84.68	0.97
A-8	0.16	1.51	99	89	93	86.49	0.97
A-7	0.17	1.60	102	89	93	88.37	0.99
A-6	0.15	1.42	104	89	93	90.35	0.99
A-5	0.15	1.42	105	89	92	92.22	0.99
A-4	0.15	1.42	105	89	92	94.10	1.01
A-3	0.14	1.33	106	89	93	96.02	1.01
A-2	0.14	1.33	106	89	93	97.87	0.99
A-1	0.14	1.32	107	89	94	99.68	1.00
B-12	0.23	2.18	108	89	94	101.50	0.97
B-11	0.22	2.08	108	89	95	103.76	0.98
B-10	0.21	1.98	108	89	95	105.99	0.98
B-9	0.21	1.99	109	89	95	108.17	0.98
B-8	0.18	1.71	110	90	94	110.36	1.03
B-7	0.15	1.43	111	90	92	112.50	0.98
B-6	0.15	1.43	111	90	92	114.37	0.98
B-5	0.16	1.53	112	90	91	116.24	0.99
B-4	0.15	1.44	112	90	90	118.19	1.00
B-3	0.15	1.44	113	90	89	120.10	1.00
B-2	0.15	1.44	114	91	90	122.02	1.00
B-1	0.14	1.34	114	91	90	123.93	0.99
						125.77	

Dryer Stack 2
 Drax
 Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 1.009

Delta P:	0.170 "H ₂ O	Us avg:	24.61 ft/sec
Delta H:	1.563	ACFM:	46512 ft ³ /min
Tm avg:	535.5 °R	SDCFM:	39945 ft ³ /min
Ts avg:	550.4 °R	Vm std:	42.85 ft ³
Bwo:	0.041	Vm corr:	46.33 ft ³
Md:	28.84	Vm:	46.53 ft ³
Ms:	28.39	MF:	0.9958
Pb:	27.95 "Hg	PCON:	8.41 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.57 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.996

Delta P:	0.167 "H ₂ O	Us avg:	24.45 ft/sec
Delta H:	1.576	ACFM:	46212 ft ³ /min
Tm avg:	550.9 °R	SDCFM:	39797 ft ³ /min
Ts avg:	552.7 °R	Vm std:	42.16 ft ³
Bwo:	0.035	Vm corr:	46.89 ft ³
Md:	28.84	Vm:	47.09 ft ³
Ms:	28.46	MF:	0.9958
Pb:	27.95 "Hg	PCON:	3.60 mg/m ³
Pm:	28.07 "Hg	ERAT:	0.24 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.991

Delta P:	0.162 "H ₂ O	Us avg:	24.07 ft/sec
Delta H:	1.547	ACFM:	45497 ft ³ /min
Tm avg:	557.5 °R	SDCFM:	39286 ft ³ /min
Ts avg:	552.7 °R	Vm std:	41.41 ft ³
Bwo:	0.032	Vm corr:	46.61 ft ³
Md:	28.84	Vm:	46.81 ft ³
Ms:	28.49	MF:	0.9958
Pb:	27.95 "Hg	PCON:	3.16 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.21 kg/hr
Ps:	27.94 "Hg		

Dryer Stack 3
June 17/22
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):	3.34 %	
Average Stack Gas Velocity:	25.56 ft/sec	7.79 m/sec
Total Actual Gas Flow Rate:	48316 ACFM	
Dry Gas flow Rate at Reference Conditions:	41107 SCFM	19.40 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	7.46 mg/m ³
Front Half Particulate	0.00 gr/ft ³	2.81 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	4.65 mg/m ³
Mass Emission Rate	1.15 lbs/hr	0.52 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	3.1 %	
Average Stack Gas Velocity:	25.1 ft/sec	7.7 m/sec
Total Actual Gas Flow Rate:	47530 ACFM	
Dry Gas flow Rate at Reference Conditions:	40588 SCFM	19.2 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	7.8 mg/m ³
Front Half Particulate	.002 gr/ft ³	4.0 mg/m ³
Back Half Condensibles	.002 gr/ft ³	3.8 mg/m ³
Mass Emission Rate	1.18 lbs/hr	0.54 kg/hr

TEST 2:

Gas Temperature:	101 ° F	38 ° C
Moisture Content (by volume):	3.8 %	
Average Stack Gas Velocity:	25.6 ft/sec	7.8 m/sec
Total Actual Gas Flow Rate:	48308 ACFM	
Dry Gas flow Rate at Reference Conditions:	40844 SCFM	19.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.004 gr/ft ³	8.4 mg/m ³
Front Half Particulate	.001 gr/ft ³	2.8 mg/m ³
Back Half Condensibles	.002 gr/ft ³	5.6 mg/m ³
Mass Emission Rate	1.28 lbs/hr	0.58 kg/hr

TEST 3:

Gas Temperature:	100 ° F	38 ° C
Moisture Content (by volume):	3.1 %	
Average Stack Gas Velocity:	26.0 ft/sec	7.9 m/sec
Total Actual Gas Flow Rate:	49110 ACFM	
Dry Gas flow Rate at Reference Conditions:	41888 SCFM	19.8 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.2 mg/m ³
Front Half Particulate	.001 gr/ft ³	1.6 mg/m ³
Back Half Condensibles	.002 gr/ft ³	4.6 mg/m ³
Mass Emission Rate	0.98 lbs/hr	0.44 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 3
Permit Number: RA-17557
Job Number: ME2223-028
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
58	59	60
June 17/22	June 17/22	June 17/22
12:35	1:50	3:04
1:40	2:53	4:09
60	60	60
DL/CB	DL/CB	DL/CB
1013	1013	1013
27.95	27.95	27.95
-0.12	-0.12	-0.12
0.00	0.00	0.00
20.90	20.90	20.90
0.00	0.00	0.00
79.10	79.10	79.10
0.300	0.300	0.300
1.0083	1.0083	1.0083
0.83446	0.83446	0.83446
31.5	31.5	31.5
16	27	20
9	5	6
0.0020	0.0010	0.0010
0.0022	0.0020	0.0008
0.0040	0.0060	0.0050
0.0000	0.0000	0.0000
0.0082	0.0090	0.0068

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

June 17/22

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	0.23	1.92	86	86	100	0.00	0.97
A-11	0.24	1.99	81	82	99	1.90	0.95
A-10	0.22	1.83	83	83	98	3.79	0.99
A-9	0.19	1.58	81	82	95	5.68	1.00
A-8	0.17	1.41	80	81	96	7.47	1.00
A-7	0.15	1.25	82	81	97	9.16	1.01
A-6	0.15	1.25	82	82	97	10.76	1.03
A-5	0.16	1.33	85	84	98	12.40	0.97
A-4	0.15	1.24	84	84	100	14.00	0.94
A-3	0.14	1.17	86	86	98	15.49	1.04
A-2	0.16	1.33	86	89	101	17.10	0.97
A-1	0.17	1.42	86	87	101	18.70	0.91
B-12	0.21	1.75	87	87	100	20.25	0.94
B-11	0.20	1.67	90	89	102	22.02	0.99
B-10	0.21	1.75	89	89	100	23.84	0.97
B-9	0.19	1.59	90	90	103	25.68	0.99
B-8	0.17	1.42	90	91	102	27.47	1.01
B-7	0.16	1.34	91	91	101	29.20	0.99
B-6	0.15	1.26	93	92	101	30.84	0.99
B-5	0.15	1.26	93	93	103	32.43	0.98
B-4	0.16	1.34	94	94	103	34.00	0.99
B-3	0.17	1.44	93	92	98	35.64	0.95
B-2	0.19	1.61	92	92	99	37.28	0.98
B-1	0.18	1.52	92	92	98	39.05	0.99
						40.79	

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

June 17/22

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	0.24	2.01	95	93	104	0.00	0.98
A-11	0.24	2.01	89	91	101	1.98	0.97
A-10	0.23	1.93	89	90	101	3.94	0.98
A-9	0.22	1.84	89	89	100	5.86	0.96
A-8	0.23	1.92	89	89	103	7.70	0.98
A-7	0.19	1.59	90	90	101	9.63	1.02
A-6	0.16	1.34	91	90	100	11.46	1.01
A-5	0.15	1.26	90	90	100	13.13	1.00
A-4	0.15	1.26	91	92	99	14.73	0.99
A-3	0.16	1.35	92	92	100	16.31	0.99
A-2	0.17	1.43	92	92	101	17.94	1.03
A-1	0.16	1.35	92	91	100	19.70	1.06
B-12	0.20	1.69	92	92	100	21.45	0.98
B-11	0.20	1.69	94	94	100	23.25	0.92
B-10	0.19	1.61	95	95	100	24.96	1.00
B-9	0.17	1.44	96	96	100	26.77	1.01
B-8	0.16	1.36	96	96	102	28.50	1.01
B-7	0.16	1.36	97	97	101	30.17	0.98
B-6	0.15	1.27	97	97	100	31.80	1.01
B-5	0.16	1.36	98	98	101	33.43	0.97
B-4	0.17	1.44	97	97	100	35.05	1.01
B-3	0.18	1.53	98	98	100	36.78	1.01
B-2	0.17	1.44	98	98	102	38.56	0.98
B-1	0.18	1.53	100	100	102	40.25	1.00
						42.03	

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

June 17/22

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	1.87	99	98	102	0.00	0.96
A-11	0.23	1.94	94	96	101	1.89	0.97
A-10	0.23	1.94	92	96	97	3.82	1.01
A-9	0.22	1.88	92	99	96	5.85	0.92
A-8	0.21	1.78	93	95	98	7.66	0.98
A-7	0.15	1.27	94	95	97	9.53	1.03
A-6	0.16	1.36	94	96	97	11.20	1.04
A-5	0.16	1.36	94	96	97	12.95	0.97
A-4	0.16	1.36	95	96	98	14.58	1.01
A-3	0.17	1.44	96	97	101	16.28	0.96
A-2	0.18	1.53	97	97	101	17.94	0.98
A-1	0.20	1.70	99	99	101	19.68	1.00
B-12	0.21	1.78	99	99	102	21.55	0.96
B-11	0.23	1.96	100	100	101	23.40	0.97
B-10	0.20	1.71	100	100	100	25.35	1.01
B-9	0.18	1.53	99	100	101	27.26	0.99
B-8	0.18	1.54	101	102	100	29.02	1.05
B-7	0.15	1.27	101	101	104	30.90	1.01
B-6	0.15	1.27	100	101	102	32.55	0.96
B-5	0.17	1.44	101	101	102	34.12	0.97
B-4	0.18	1.53	101	101	102	35.81	0.99
B-3	0.19	1.61	100	100	102	37.58	0.95
B-2	0.21	1.78	100	100	101	39.33	0.98
B-1	0.21	1.78	100	100	102	41.22	0.99
						43.12	



Dryer Stack 3
Drax
Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 0.981

Delta P:	0.177 "H ₂ O	Us avg:	25.15 ft/sec
Delta H:	1.486	ACFM:	47530 ft ³ /min
Tm avg:	547.4 °R	SDCFM:	40588 ft ³ /min
Ts avg:	559.6 °R	Vm std:	37.20 ft ³
Bwo:	0.031	Vm corr:	41.13 ft ³
Md:	28.84	Vm:	40.79 ft ³
Ms:	28.50	MF:	1.0083
Pb:	27.95 "Hg	PCON:	7.78 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.54 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 0.994

Delta P:	0.182 "H ₂ O	Us avg:	25.56 ft/sec
Delta H:	1.542	ACFM:	48308 ft ³ /min
Tm avg:	553.6 °R	SDCFM:	40844 ft ³ /min
Ts avg:	560.8 °R	Vm std:	37.91 ft ³
Bwo:	0.038	Vm corr:	42.38 ft ³
Md:	28.84	Vm:	42.03 ft ³
Ms:	28.42	MF:	1.0083
Pb:	27.95 "Hg	PCON:	8.38 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.58 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 0.986

Delta P:	0.189 "H ₂ O	Us avg:	25.98 ft/sec
Delta H:	1.610	ACFM:	49110 ft ³ /min
Tm avg:	558.0 °R	SDCFM:	41888 ft ³ /min
Ts avg:	560.2 °R	Vm std:	38.59 ft ³
Bwo:	0.031	Vm corr:	43.48 ft ³
Md:	28.84	Vm:	43.12 ft ³
Ms:	28.50	MF:	1.0083
Pb:	27.95 "Hg	PCON:	6.22 mg/m ³
Pm:	28.07 "Hg	ERAT:	0.44 kg/hr
Ps:	27.94 "Hg		

Dryer Stack 4
June 17/22
Drax
Permit Number: RA-17557
Williams Lake, BC
AVERAGE OF AIR EMISSION TESTS 1 TO 3

Gas Temperature:	111 ° F	44 ° C
Moisture Content (by volume):	3.77 %	
Average Stack Gas Velocity:	23.40 ft/sec	7.13 m/sec
Total Actual Gas Flow Rate:	44224 ACFM	
Dry Gas flow Rate at Reference Conditions:	36721 SCFM	17.33 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	0.00 gr/ft ³	5.32 mg/m ³
Front Half Particulate	0.00 gr/ft ³	3.32 mg/m ³
Back Half Condensibles	0.00 gr/ft ³	2.00 mg/m ³
Mass Emission Rate	0.73 lbs/hr	0.33 kg/hr

SUMMARY OF AIR EMISSION TESTS
TEST 1:

Gas Temperature:	112 ° F	44 ° C
Moisture Content (by volume):	3.9 %	
Average Stack Gas Velocity:	23.3 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	43985 ACFM	
Dry Gas flow Rate at Reference Conditions:	36446 SCFM	17.2 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	4.7 mg/m ³
Front Half Particulate	.001 gr/ft ³	3.0 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.64 lbs/hr	0.29 kg/hr

TEST 2:

Gas Temperature:	115 ° F	46 ° C
Moisture Content (by volume):	3.9 %	
Average Stack Gas Velocity:	23.6 ft/sec	7.2 m/sec
Total Actual Gas Flow Rate:	44555 ACFM	
Dry Gas flow Rate at Reference Conditions:	36687 SCFM	17.3 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.002 gr/ft ³	5.2 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.5 mg/m ³
Back Half Condensibles	.001 gr/ft ³	1.7 mg/m ³
Mass Emission Rate	0.71 lbs/hr	0.32 kg/hr

TEST 3:

Gas Temperature:	107 ° F	42 ° C
Moisture Content (by volume):	3.5 %	
Average Stack Gas Velocity:	23.4 ft/sec	7.1 m/sec
Total Actual Gas Flow Rate:	44134 ACFM	
Dry Gas flow Rate at Reference Conditions:	37030 SCFM	17.5 m ³ /sec
Total Particulate Concentration:		
Dry Basis Actual at Reference Conditions	.003 gr/ft ³	6.1 mg/m ³
Front Half Particulate	.002 gr/ft ³	3.5 mg/m ³
Back Half Condensibles	.001 gr/ft ³	2.6 mg/m ³
Mass Emission Rate	0.84 lbs/hr	0.38 kg/hr



Client: Drax
Plant Location: Williams Lake, BC
Process: Dryer Stack 4
Permit Number: RA-17557
Job Number: ME2223-028
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
55	56	57
June 17/22	June 17/22	June 17/22
12:31	1:40	2:50
1:34	2:43	3:53
60	60	60
NA/CB	NA/CB	NA/CB
980	980	980
27.95	27.95	27.95
-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
0.325	0.325	0.325
0.9958	0.9958	0.9958
0.83867	0.83867	0.83867
31.5	31.5	31.5
31	30	23
4	5	9
0.0001	0.0002	0.0001
0.0034	0.0038	0.0040
0.0020	0.0020	0.0030
0.0000	0.0000	0.0000
0.0055	0.0060	0.0071

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

June 17/22

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	1.41	82	81	103	26.40	1.05
A-11	0.14	1.40	89	81	110	28.30	1.02
A-10	0.12	1.21	92	84	110	30.15	1.02
A-9	0.13	1.30	93	82	110	31.86	1.02
A-8	0.12	1.20	98	81	114	33.65	1.05
A-7	0.12	1.21	99	82	111	35.41	1.00
A-6	0.12	1.21	102	84	111	37.09	1.07
A-5	0.13	1.31	102	85	112	38.91	1.03
A-4	0.12	1.21	103	88	112	40.73	1.08
A-3	0.12	1.22	104	91	113	42.56	1.00
A-2	0.13	1.32	104	89	112	44.26	1.04
A-1	0.13	1.33	109	89	112	46.11	0.99
B-12	0.14	1.43	111	91	113	47.88	1.06
B-11	0.15	1.53	109	90	113	49.84	0.99
B-10	0.14	1.43	109	92	114	51.74	1.03
B-9	0.14	1.42	110	92	117	53.65	1.02
B-8	0.16	1.64	110	93	111	55.53	1.05
B-7	0.19	1.96	111	93	110	57.62	1.04
B-6	0.22	2.26	112	94	112	59.87	0.95
B-5	0.17	1.75	112	94	112	62.08	1.05
B-4	0.16	1.64	113	94	113	64.24	1.04
B-3	0.16	1.65	113	95	113	66.31	1.05
B-2	0.19	1.95	113	95	115	68.40	1.02
B-1	0.20	2.04	112	95	116	70.61	1.02
						72.87	

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

June 17/22

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	1.32	94	94	109	73.88	1.07
A-11	0.14	1.42	98	95	111	75.78	1.03
A-10	0.14	1.43	104	97	113	77.68	1.04
A-9	0.14	1.43	110	100	120	79.61	1.04
A-8	0.12	1.22	113	97	123	81.54	0.93
A-7	0.12	1.21	111	97	124	83.14	1.09
A-6	0.13	1.31	114	98	125	85.00	1.05
A-5	0.13	1.32	113	98	122	86.88	0.95
A-4	0.13	1.32	113	98	122	88.57	1.02
A-3	0.12	1.23	115	101	121	90.39	1.01
A-2	0.12	1.23	114	100	120	92.14	1.09
A-1	0.13	1.33	114	99	118	94.02	0.98
B-12	0.15	1.54	114	100	116	95.78	0.99
B-11	0.16	1.65	116	100	115	97.70	1.04
B-10	0.14	1.45	117	99	114	99.78	0.99
B-9	0.14	1.45	116	100	114	101.63	1.02
B-8	0.15	1.56	116	100	111	103.54	0.99
B-7	0.20	2.08	117	100	111	105.46	1.06
B-6	0.22	2.31	121	101	109	107.83	0.97
B-5	0.19	1.99	120	101	110	110.13	0.99
B-4	0.17	1.78	121	102	110	112.31	0.99
B-3	0.16	1.67	121	101	111	114.38	1.01
B-2	0.18	1.87	118	101	112	116.42	0.98
B-1	0.20	2.09	119	102	110	118.50	1.00
						120.75	

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

June 17/22

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	1.43	97	96	111	21.70	1.06
A-11	0.14	1.44	109	99	114	23.65	1.07
A-10	0.13	1.34	111	102	114	25.65	0.98
A-9	0.12	1.24	112	101	111	27.43	1.05
A-8	0.12	1.24	113	98	113	29.25	1.02
A-7	0.12	1.24	113	99	111	31.02	1.05
A-6	0.12	1.25	114	99	110	32.85	1.07
A-5	0.14	1.45	114	100	111	34.72	1.00
A-4	0.13	1.35	114	101	110	36.60	1.06
A-3	0.12	1.26	116	100	110	38.52	1.01
A-2	0.13	1.35	115	99	109	40.29	1.10
A-1	0.14	1.46	115	99	109	42.28	1.04
B-12	0.15	1.56	117	100	111	44.24	1.05
B-11	0.15	1.56	117	100	113	46.29	0.95
B-10	0.15	1.56	117	101	111	48.15	0.99
B-9	0.14	1.47	118	102	109	50.29	0.98
B-8	0.16	1.67	118	101	109	52.15	1.01
B-7	0.19	1.99	119	101	109	54.20	1.01
B-6	0.21	2.20	119	101	109	56.43	0.99
B-5	0.20	2.09	120	102	111	58.73	0.97
B-4	0.16	1.67	120	102	112	60.92	0.97
B-3	0.15	1.57	120	101	111	62.88	1.01
B-2	0.18	1.87	118	102	114	64.86	1.02
B-1	0.21	2.18	121	103	114	67.03	0.99
						69.33	

Dryer Stack 4
 Drax
 Williams Lake, BC

Data for **TEST 1**

OVERALL ISOKINETICS - TEST 1 1.029

Delta P:	0.146 "H ₂ O	Us avg:	23.27 ft/sec
Delta H:	1.501	ACFM:	43985 ft ³ /min
Tm avg:	556.8 °R	SDCFM:	36446 ft ³ /min
Ts avg:	572.0 °R	Vm std:	41.15 ft ³
Bwo:	0.039	Vm corr:	46.27 ft ³
Md:	28.84	Vm:	46.47 ft ³
Ms:	28.42	MF:	0.9958
Pb:	27.95 "Hg	PCON:	4.72 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.29 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 2**

OVERALL ISOKINETICS - TEST 2 1.014

Delta P:	0.149 "H ₂ O	Us avg:	23.57 ft/sec
Delta H:	1.550	ACFM:	44555 ft ³ /min
Tm avg:	566.5 °R	SDCFM:	36687 ft ³ /min
Ts avg:	575.5 °R	Vm std:	40.81 ft ³
Bwo:	0.039	Vm corr:	46.67 ft ³
Md:	28.84	Vm:	46.87 ft ³
Ms:	28.41	MF:	0.9958
Pb:	27.95 "Hg	PCON:	5.19 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.32 kg/hr
Ps:	27.94 "Hg		

Data for **TEST 3**

OVERALL ISOKINETICS - TEST 3 1.019

Delta P:	0.149 "H ₂ O	Us avg:	23.35 ft/sec
Delta H:	1.560	ACFM:	44134 ft ³ /min
Tm avg:	567.8 °R	SDCFM:	37030 ft ³ /min
Ts avg:	566.9 °R	Vm std:	41.37 ft ³
Bwo:	0.035	Vm corr:	47.43 ft ³
Md:	28.84	Vm:	47.63 ft ³
Ms:	28.45	MF:	0.9958
Pb:	27.95 "Hg	PCON:	6.06 mg/m ³
Pm:	28.06 "Hg	ERAT:	0.38 kg/hr
Ps:	27.94 "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)

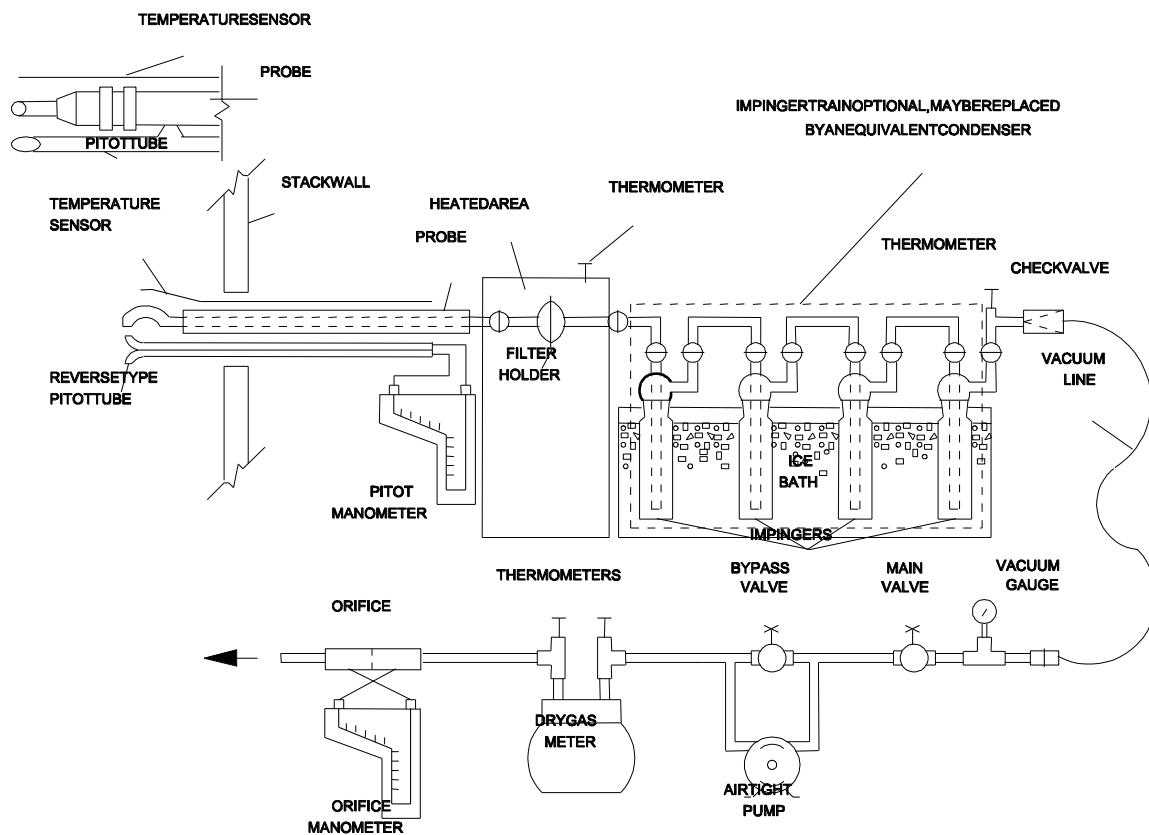
O₂, CO₂, and CO were found using either Fuji Analytical Analyzer by means of infrared and paramagnetic technology (EPA 3A) or by fyrite (EPA Method 3).

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

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, $g/dscf$ ($g/dscf$).
 I = Percent of isokinetic sampling.
 L_a = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to $0.00057 m^3/min$ ($0.02 cfm$) or 4 percent of the average sampling rate, whichever is less.
 L_i = Individual leakage rate observed during the leak check conducted prior to the " i^{th} " component change ($i = 1, 2, 3...n$), m^3/min (cfm).
 L_p = Leakage rate observed during the post-test leak check, m^3/min (cfm).
 m_a = Mass of residue of acetone after evaporation, mg .
 m_n = Total amount of particulate matter collected, mg .
 M_w = Molecular weight of water, $18.0 g/g\text{-mole}$ ($18.0 lb/lb\text{-mole}$).
 P_{bar} = Barometric pressure at the sampling site, $mm\ Hg$ ($in.\ Hg$).
 P_s = Absolute stack gas pressure, $mm\ Hg$ ($in.\ Hg$).
 P_{std} = Standard absolute pressure, $760\ mm\ Hg$ ($29.92\ in.\ Hg$).
 R = Ideal gas constant, $0.06236 \frac{[(mmHg)(m^3)]}{[(^{\circ}K)(g\text{-mole})]}$
 $\{21.85 \frac{[(in.\ Hg)(ft^3)]}{[(^{\circ}R)(lb\text{-mole})]}\}$.
 T_m = Absolute average DGM temperature (see Figure 5-2), $^{\circ}K$ ($^{\circ}R$).
 T_s = Absolute average stack gas temperature (see Figure 5-2), $^{\circ}K$ ($^{\circ}R$).
 T_{std} = Standard absolute temperature, $293^{\circ}K$ ($528^{\circ}R$).
 V_a = Volume of acetone blank, ml .
 V_{aw} = Volume of acetone used in wash, ml .
 V_{lc} = Total volume liquid collected in impingers and silica gel (see Figure 5-3), ml .
 V_m = Volume of gas sample as measured by dry gas meter, dcm (dcf).
 $V_{m(std)}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, $dscm$ ($dscf$).
 $V_{w(std)}$ = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).
 v_s = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec).
 W_a = Weight of residue in acetone wash, mg .
 Y = Dry gas meter calibration factor.
 ΔH = Average pressure differential across the orifice meter (see Figure 5-2), $mm\ H_2O$ ($in.\ H_2O$).
 ρ_a = Density of acetone, mg/ml (see label on bottle).
 ρ_w = Density of water, $0.9982\ g/ml$ ($0.002201\ lb/ml$).
 θ = Total sampling time, min .
 θ_1 = Sampling time interval, from the beginning of a run until the first component change, min .
 θ_i = Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, min .
 θ_p = Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, min .
 13.6 = Specific gravity of mercury.
 60 = Sec/min .
 100 = Conversion to percent.

Average Dry Gas Meter Temperature and Average Orifice Pressure Drop.

Dry Gas Volume. Correct the sample volume measured by the dry gas meter to standard conditions (20°C, 760 mm Hg or 68°F, 29.92 in. Hg) by using Equation 5-1.

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

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

where:

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

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

NOTE: Equation 5-1 can be used as written unless leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds L_a . If L_p or L_i exceeds L_a , Equation 5-1 must be modified as follows:

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

$$[V_m - (L_p - L_a) \theta]$$

(b) Case II. One or more component changes made during the sampling run. In this case, replace V_m in Equation 5-1 by the expression:

$$\left[V_m - (L_1 - L_a) \theta_1 - \sum_{i=2}^n (L_i - L_a) \theta_i - (L_p - L_a) \theta_p \right]$$

and substitute only for those leakage rates (L_i or L_p) which exceed L_a .

Volume of Water Vapor.

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

where:

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

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

Moisture Content.

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

Acetone Blank Concentration.

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

Acetone Wash Blank.

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

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

Particulate Concentration.

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

Conversion Factors:

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

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

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

where:

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

Calculation from Intermediate Values.

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

$$= \frac{K_4 T_s V_{m(std)}}{P_s v_s A_n \theta (1 - B_{ws})}$$
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, $ds m^3/hr$ ($dscf/hr$).
t_s	=	Stack temperature, $^{\circ}C$ ($^{\circ}F$).
T_s	=	Absolute stack temperature, $^{\circ}K$ ($^{\circ}R$).

Calibration Certificate for S-Type Pitot Tube

Date: 17-Jan-22 *Barometric Pressure ("Hg):* 28.25
Pitot I.D.: **248** *Wind Tunnel Temperature (^oF):* 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: 10-Jan-22 *Barometric Pressure ("Hg):* 29.78
Pitot I.D.: **217** *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>
13.51	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: 05-Jan-22

CONSOLE MANUF.: NAPP MODEL 31

CONSOLE I.D.: C-980

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	64.4	64.4	64.4
P=Pres. Differential at WTM ("Hg)	0.0809	0.1471	0.1986
Pb= Atmospheric Pressure ("Hg)	28.60	28.60	28.60
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.)	85.0	87.0	92.0
To= Dry Test Meter Outlet Temp. (oF.)	71.0	70.0	74.0
Ri= Initial Dry Test volume (ft3)	18.15	12.23	25.13
Rf= Final Dry Test Volume (ft3)	23.13	17.18	30.10
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	28.5191	28.4529	28.4014
Pd= Pb + (^H/13.59) "Hg	28.6736	28.7472	28.8208
Tw= Ta +460 (oR.)	524.4	524.4	524.4
Td= [(Ti + To)/2] + 460 (oR.)	538.0	538.5	543.0
Bw= Pv/Pb ("Hg)	0.0217	0.0217	0.0217
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	0.9944	0.9965	0.9964
Y (MEAN)(WTMF) =	0.9958		

N.R. MCCALL & ASSOCIATES LTD.

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: Jan 5 /2022

CONSOLE I.D. C-980

	RUN 1	RUN 2	RUN 3
MD= mol. wt. dry air	28.967	28.967	28.967
Pb=bar. pressure "Hg	28.6	28.6	28.6
Y=gas meter factor	0.9944	0.9944	0.9965
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	30.87	33.41	36.9
Rf=final gas meter vol.	33.07	36.46	40.63
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.437536	0.606584	0.743389
To=meter outlet Temp (oF)	71	72	73
Tm=meter out temp. (oR)	531	532	533
Pm=Pb + ^H	28.636792	28.6735835	28.7103753
SQRT(Tm/Pm*H/Md)	0.5657419	0.80031889	0.98047842
Ko=orifice const.	0.7733845	0.75792788	0.75819007

Ko MEAN = 0.7631675

Ko*4*144= 439.58447

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: Jan 5 /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	28.6	28.6	28.6
Y=gas meter factor	0.9965	0.9964	0.9964
Delta H=	2	2.5	3
Ri=int. gas meter vol.	41.11	46	51.62
Rf=final gas meter vol.	45.28	50.64	56.72
min. samp	5	5	5
$Q_m = Y(R_f - R_i) / \Delta T (FT^3 / MIN)$	0.831081	0.9246592	1.016328
Tm=meter out temp. (oF)	75	77	79
Tm=meter out temp. (oR.)	535	537	539
$P_m = P_b + \Delta H$	28.747167	28.783959	28.820751
$SQRT(T_m / P_m * H / M_d)$	1.133555	1.268908	1.391716
Ko=orifice const.	0.7331634	0.7287047	0.7302697

Ko MEAN = 0.7307126

$Ko * 4 * 144 = 420.89045$

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:



CALIBRATION CERTIFICATE DRY GAS METER

DATE: Feb 10/22

CONSOLE MANUF.: NAPP/MILLENNIUM MODEL 32

CONSOLE I.D.: MU 1013

PARAMETER SUMMARY	RUN #1	RUN #2	RUN #3
Ta = Ambient (WTM) Temperature (oF.)	66.0	66.0	66.0
P=Pres. Differential at WTM ("Hg)	0.0809	0.1472	0.2133
Pb= Atmospheric Pressure ("Hg)	28.30	28.30	28.30
Pv= Vapour Pressure Water at Temp. Ta ("Hg)	0.6440	0.6440	0.6440
H=Pres. Differential at Orifice	1.0	2.0	3.0
Ti= Dry Test Meter Inlet Temp. (oF.)	77.0	74.0	78.0
To= Dry Test Meter Outlet Temp. (oF.)	78.0	74.0	80.0
Ri= Initial Dry Test volume (ft3)	0.00	0.00	0.00
Rf= Final Dry Test Volume (ft3)	4.88	4.82	4.87
Vi= Initial Wet Test Volume (ft3)	0.0	0.0	0.0
Vf= Final Wet Test Volume (ft3)	5.000	5.000	5.000
Pw= Pb - (^P/13.59) "Hg	28.2191	28.1528	28.0867
Pd= Pb + (^H/13.59) "Hg	28.3736	28.4472	28.5208
Tw= Ta +460 (oR.)	526.0	526.0	526.0
Td= [(Ti + To)/2] + 460 (oR.)	537.5	534.0	539.0
Bw= Pv/Pb ("Hg)	0.0228	0.0228	0.0228
WET TEST METER FACTOR (WTMF)	0.9922	0.9922	0.9922
ated Y Value)(WTMF)	1.0097	1.0106	1.0046
Y (MEAN)(WTMF) =	1.0083		

N.R. MCCALL & ASSOCIATES LTD.

Calibrating Technician Signature:



ORIFICE METER CALIBRATION

DATE: Feb 10/22

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	28.3	28.3	28.3
Y=gas meter factor	1.0162	1.0162	1.0138
Delta H=	0.5	1	1.5
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	1.8	2.63	3.28
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.365832	0.5345212	0.6650528
To=meter outlet Temp (oF)	86	85	86
Tm=meter out temp. (oR)	546	545	546
Pm=Pb + ^H	28.336792	28.3735835	28.4103753
SQRT(Tm/Pm*H/Md)	0.5767057	0.8143093	0.99758912
Ko=orifice const.	0.6343478	0.65641053	0.66666003

Ko MEAN = 0.6524728

Ko*4*144= 375.82433

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

ORIFICE METER CALIBRATION

DATE: Feb 10/22

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	28.3	28.3	28.3
Y=gas meter factor	1.0138	1.0091	1.0091
Delta H=	2	2.5	3
Ri=int. gas meter vol.	0	0	0
Rf=final gas meter vol.	3.81	4.35	4.71
min. samp	5	5	5
Qm=Y(Rf-Ri)/^T(FT3/MIN)	0.7725156	0.877917	0.9505722
To=meter outlet Temp (oF)	86	88	89
Tm=meter out temp. (oR)	546	548	549
Pm=Pb + ^H	28.447167	28.4839588	28.5207506
SQRT(Tm/Pm*H/Md)	1.1511716	1.28857099	1.41193455
Ko=orifice const.	0.6710691	0.68131054	0.67324098

Ko MEAN = 0.6752069

Ko*4*144= 388.91915

McCALL ENVIRONMENTAL LTD.

Calibrating Technician Signature:

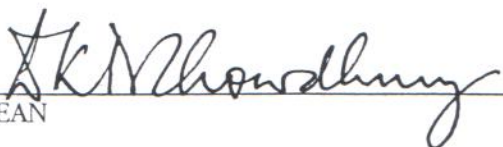


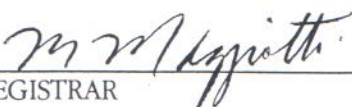


This is to verify that
Matthew McCall
has successfully completed
a course of study in
Source Testing for Particulates
(35 hours)

Endorsed by
The B.C. Ministry of Environment

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


DEAN


REGISTRAR

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY



MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

David Brandle

has successfully completed

The program of studies and is awarded the certificate in

STACK SAMPLING

May 3 – May 7, 2004

May, 2004
Date

Doreen Brandle
Dean
Faculty of Continuing Education and Extension



North Carolina State University

Environmental Programs

This certificate awarded to

Danny Lawrence

for satisfactory completion of course and examination for

SI: 414 Quality Assurance for Source Emission Measurements

Joe F. VanArsdale
Manager

Christine S. Murphy
Registrar

May 22, 2000

Date Completed

3.5 CEUs

Awarded under EPA Assistance Agreement CT - 825724



Analytical Report

Bill To: McCall Environmental 6733 Buchanan Road Coldstream, BC, Canada V1B 3C5	Project ID: Drax Project Name: Dryer Stacks Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1579679 Control Number: Date Received: Jun 21, 2022 Date Reported: Jun 24, 2022 Report Number: 2760012
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

		Reference Number	1579679-1	1579679-2	1579679-3
		Sample Date	Jun 17, 2022	Jun 17, 2022	Jun 17, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 1 Test 1 / 21.8 °C / Filter 49	Dryer Stack 1 Test 2 / 21.8 °C / Filter 50	Dryer Stack 1 Test 3 / 21.8 °C / Filter 51
		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	306	318	327
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: Drax Project Name: Dryer Stacks Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1579679 Control Number: Date Received: Jun 21, 2022 Date Reported: Jun 24, 2022 Report Number: 2760012
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

		Reference Number	1579679-4	1579679-5	1579679-6
		Sample Date	Jun 17, 2022	Jun 17, 2022	Jun 17, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 2 Test 1 / 21.8 °C / Filter 52	Dryer Stack 2 Test 2 / 21.8 °C / Filter 53	Dryer Stack 2 Test 3 / 21.8 °C / Filter 54
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	5	<2	2
Volume	Sample volume	mL	326	328	324
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: Drax Project Name: Dryer Stacks Project Location: Williams Lake, BC LSD: P.O.:	Lot ID: 1579679 Control Number: Date Received: Jun 21, 2022 Date Reported: Jun 24, 2022 Report Number: 2760012
Attn: Accounts Payable Sampled By: Company:	Proj. Acct. code:	

		Reference Number	1579679-7	1579679-8	1579679-9
		Sample Date	Jun 17, 2022	Jun 17, 2022	Jun 17, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 3 Test 1 / 21.8 °C / Filter 55	Dryer Stack 3 Test 2 / 21.8 °C / Filter 56	Dryer Stack 3 Test 3 / 21.8 °C / Filter 57
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	4	6	5
Volume	Sample volume	mL	330	331	321
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: Drax Project Name: Dryer Stacks Project Location: Williams Lake, BC LSD: P.O.: Proj. Acct. code:	Lot ID: 1579679 Control Number: Date Received: Jun 21, 2022 Date Reported: Jun 24, 2022 Report Number: 2760012
Attn: Accounts Payable Sampled By: Company:		

		Reference Number	1579679-10	1579679-11	1579679-12
		Sample Date	Jun 17, 2022	Jun 17, 2022	Jun 17, 2022
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Dryer Stack 4 Test 1 / 21.8 °C / Filter 58	Dryer Stack 4 Test 2 / 21.8 °C / Filter 59	Dryer Stack 4 Test 3 / 21.8 °C / Filter 60
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Aggregate Organic Constituents					
Oil and Grease	Total	mg/sample	<2	<2	3
Volume	Sample volume	mL	315	322	315
pH adjustment	required prior to O&G extraction		Yes	Yes	Yes

Approved by:



Carol Nam, Dipl. T.
Quality Assurance Coordinator

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

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

ME2223-028

Client: DRAX - W. LAKE			Console: 1013		Pb: 27.95 "Hg		Filter: 49		File:		Date: JUNE 17-22	
Process: DRYER ST. 1			Mf: 1.0083		Static: -.13 "H ₂ O		Flask: /		+ %CO ₂		%O ₂ CO	
Test: 1			K _o : 6997		Ps: 27.94		Silica: 99		+		0 21	
Personnel: DL/NA/CB			Pitot: 248		Pm: 28.06		Total Vol: 310 ml					
Start time: 8:45			Cp: 83446		Area: 31.50 ft ²		Start Vol: 300 ml					
Stop time: 9:49			Nozzle: 300		Bwo: .05		Plant Type:				Mix:	
Permitt # RA-17557			Start Leakage Rate@ 15 "Hg .007 ft ³ /min		Pollution Abatement Equip:							
up strm down strm			Finish Leakage Rate@ 15 "Hg .009 ft ³ /min		Load:		Burner:		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/TT= 2.5 ZERO= 5.0	
			IN	OUT								
A-12	.21	1.61	40	41	79	0.00	245	1000	1000	5		
11	.22	1.69	40	40	77	1.68						
10	.23	1.76	40	39	78	3.34						
9	.22	1.70	44	43	78	5.20						
8	.22	1.69	43	42	81	6.97	250			5		
7	.20	1.54	45	45	80	8.77						
6	.19	1.47	49	45	80	10.54						
5	.18	1.40	52	46	80	12.25						
4	.16	1.24	54	49	83	13.91	250			5		
3	.16	1.25	56	52	83	15.48						
2	.15	1.17	57	53	83	17.11						
1	.17	1.34	60	55	84	18.57						
B-12	.12	0.92	60	56	85	20.18	250			5		
11	.13	1.03	62	59	85	21.61						
10	.14	1.10	61	59	85	23.13						
9	.14	1.11	64	62	86	24.57						
8	.15	1.18	63	62	87	26.07	249			5		
7	.16	1.27	66	64	87	27.63						
6	.16	1.26	65	64	90	29.14						
5	.17	1.35	66	65	87	30.78						
4	.18	1.43	68	68	88	32.41						
3	.20	1.59	68	67	89	34.00	252			5		
2	.21	1.68	69	71	88	35.80						
1	.22	1.76	70	70	88	37.65						
						39.42						

Client: Prox W. Lake			Console: 1013		Pb: 27.95 "Hg		Filter: 50		File:		Date: JUNE 17/22			
Process: Dryer St. 1			Mf: 1.0083		Static: -.13 "H ₂ O		Flask: ✓		+		%CO ₂		%O ₂	CO
Test: 2			K _o : .6997		Ps: 27.94		Silica: 50		+		0		21	
Personnel: DL MA CB			Pitot: 248		Pm: 28.06		Total Vol: 320 ml							
Start time: 9:59			C _p : 83446		Area: 31.50 ft ²		Start Vol: 300 ml							
Stop time: 11:03			Nozzle: 300		Bwo: 105		Plant Type:				Mix:			
Permitt #			Start Leakage Rate@ 15 "Hg .006 ft ³ /min		Pollution Abatement Equip:									
up strm down strm			Finish Leakage Rate@ 15 "Hg .008 ft ³ /min		Load:		Burner:		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= 5.0		
			IN	OUT										
A12	.20	1.59	72	72	91	0.00	242	1050	147	4				
11	.22	1.73	69	69	94	1.68								
10	.22	1.73	67	69	93	3.50								
9	.23	1.82	68	70	93	5.36				3				
8	.22	1.74	69	69	92	7.16								
7	.21	1.67	71	70	92	9.03	242							
6	.18	1.42	72	71	96	10.82								
5	.17	1.34	70	70	95	12.55				3				
4	.17	1.35	71	71	93	14.17								
3	.15	1.19	73	73	96	15.76								
2	.16	1.26	74	74	94	17.32				3				
1	.16	1.26	74	73	100	18.88	251							
B12	.14	1.11	74	74	96	20.43								
11	.13	1.03	74	74	96	21.94				3				
10	.13	1.03	73	73	93	23.37								
9	.14	1.12	76	74	91	24.83								
8	.16	1.27	75	74	94	26.29	256			3				
7	.16	1.28	77	76	92	27.79								
6	.17	1.36	76	76	91	29.29								
5	.18	1.44	77	76	92	30.93				3				
4	.20	1.60	77	77	94	32.50								
3	.21	1.69	78	78	92	34.34								
2	.22	1.77	78	78	93	36.20	254			3				
1	.22	1.77	79	78	92	38.06								
						39.93								

Client: DRAX W. LAKE			Console: 1013		Pb: 27.95 "Hg		Filter: 51		File:		Date: JUNE 17/22			
Process: DRYER ST. 1			Mf: 1.0083		Static: -.13 "H ₂ O		Flask: ✓		+		%CO ₂		%O ₂	CO
Test: 3			K _o : 6997		Ps: 27.94		Silica: 51		+		0		21	
Personnel: DL			Pitot: 248		Pm: 28.06		Total Vol: 326 ml							
Start time: 11:15			C _p : 8.3446		Area: 31.50 ft ²		Start Vol: 300 ml							
Stop time: 12:18			Nozzle: 300		Bwo: .05		Plant Type:						Mix:	
Permitt #			Start Leakage Rate@ 15 "Hg .004 ft ³ /min		Pollution Abatement Equip:									
up strm down strm			Finish Leakage Rate@ 15 "Hg .009 ft ³ /min		Load:		Burner:				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= 5.0			
			IN	OUT										
A-12	.21	1.69	80	81	94	0.00	246	ICED	140T	3				
11	.21	1.69	79	80	94	1.75								
10	.23	1.85	77	78	93	3.49								
9	.22	1.77	78	78	93	5.31								
8	.22	1.77	79	78	92	7.26				3				
7	.20	1.61	78	78	92	9.11	257							
6	.19	1.52	77	78	94	10.89								
5	.17	1.36	78	79	93	12.60				3				
4	.16	1.28	79	79	93	14.20								
3	.15	1.21	80	80	92	15.82								
2	.16	1.29	81	80	92	17.43	259			3				
1	.16	1.29	82	81	92	19.10								
B-12	.13	1.05	82	82	94	20.68								
11	.13	1.05	82	82	94	22.04				3				
10	.15	1.22	83	83	93	23.50								
9	.14	1.13	83	83	92	25.07	259							
8	.14	1.13	83	83	95	26.60				3				
7	.16	1.30	83	83	93	28.05								
6	.16	1.30	85	84	93	29.59								
5	.18	1.46	84	84	94	31.15				3				
4	.20	1.62	83	83	92	32.90	269							
3	.20	1.62	84	84	93	34.73								
2	.21	1.71	86	85	92	36.60				3				
1	.21	1.71	85	85	92	38.42								
						40.28								

Client Name: Drax
Williams Lake
 Process: Drier Stack 2
 Test Number: 1
 Date: Jun. 17/22
 Start Time: 853
 Finish Time: 955
 Starting Vol. 300
 Final Vol. 335
 Flask: 52
 Console: 980
 Stack Diameter

BP 27.95
 DN 0.320
 CP 0.83867
 MF 0.9958
 Moist. 39
 PM 28.06
 AS 31.50
 Ko 0.7631
 Pitot 217
 Port
 Static -0.13
 PS 27.94

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: NA/CB

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .007 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	.15	1.31	54	54	92	84.87	2	270	ICED	
11	.14	1.24	63	53	90	86.70				
10	.17	1.51	67	55	90	88.47				
9	.17	1.53	72	57	89	90.33				
8	.16	1.44	77	59	90	92.19				
7	.16	1.45	79	60	90	94.10				
6	.16	1.45	80	60	90	95.98				
5	.17	1.54	81	61	90	97.88				
4	.16	1.45	82	61	89	99.80				
3	.14	1.28	84	62	89	101.72				
2	.15	1.37	85	63	89	103.50				
1	.14	1.28	86	64	89	105.36	2			
B12	.23	2.11	88	66	89	107.11				
11	.23	2.12	89	67	89	109.32				
10	.21	1.94	90	69	89	111.55				
9	.20	1.85	92	70	90	113.68				
8	.21	1.94	93	71	90	115.80				
7	.20	1.86	94	73	90	117.94				
6	.18	1.67	95	74	91	120.03				
5	.16	1.49	96	75	91	122.05				
4	.15	1.39	97	76	92	123.94				
3	.15	1.39	98	77	93	125.82				
2	.16	1.49	99	78	94	127.66	2			
1	.15	1.40	101	79	94	129.56				
						131.40				

Client Name: Drax
Williams lake
 Process: Dryer stack 2
 Test Number: 2
 Date: Jun. 17/22
 Start Time 958
 Finish Time 1100
 Starting Vol. 300
 Final Vol. 326
 Flask: 53
 Console: 980
 Stack Diameter

BP 27.95
 DN 0.320
 CP 0.83867
 MF 0.9958
 Moist. 3%
 PM 28.06
 AS 31.50
 Ko 0.7631
 Pitot 217
 Port
 Static -0.13
 PS 27.94

CO ₂	O ₂	CO	N ₂
0	21		

Personnel: NA/CB

Leakage Rate @ 15 inches

Load:

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Mean Yaw Angle

Start: .002 Finish: .002

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A-12	.15	1.38	79	79	90	31.59	2	270	ICED	
11	.15	1.38	82	78	92	33.37				
10	.16	1.47	86	78	93	35.15				
9	.16	1.48	93	78	93	37.03				
8	.17	1.58	98	79	95	38.92				
7	.16	1.49	98	79	94	40.89				
6	.16	1.49	99	79	94	42.85				
5	.15	1.40	100	80	93	44.80				
4	.15	1.40	100	81	93	46.59				
3	.15	1.40	100	81	92	48.34	2			
2	.14	1.31	101	81	93	50.17				
1	.14	1.31	101	82	93	51.97				
B-12	.22	2.06	101	82	93	53.76				
11	.22	2.06	101	82	93	56.01				
10	.22	2.07	102	83	92	58.28				
9	.21	1.98	102	83	91	60.54				
8	.21	1.98	102	84	91	62.80				
7	.19	1.79	103	85	92	65.03				
6	.16	1.51	104	86	92	67.06	3			
5	.16	1.51	104	87	92	69.06				
4	.15	1.42	105	87	93	71.08				
3	.16	1.51	106	88	93	72.96				
2	.15	1.42	106	89	93	74.87				
1	.15	1.42	108	90	94	76.79				
						78.68				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 2
 Test Number: 3
 Date: Jun 17/22
 Start Time: 1103
 Finish Time: 1205
 Starting Vol.: 300
 Final Vol.: 321
 Flask: 54
 Console: 980
 Stack Diameter:

BP 27.95
 DN 0.320
 CP 0.83867
 MF 0.9958
 Moist. 3%
 PM 28.06
 AS 31.50
 Ko 0.7631
 Pitot 217
 Port
 Static -0.13
 PS 27.94

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: NA/CB

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .003

Finish: .002

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A-12	.16	1.49	89	89	93	78.96	1	270	1CED	
11	.16	1.50	93	88	93	80.91				
10	.15	1.40	95	88	94	82.87				
9	.15	1.40	97	88	94	84.68				
8	.16	1.51	99	89	93	86.49				
7	.17	1.60	102	89	93	88.37				
6	.15	1.42	104	89	93	90.35				
5	.15	1.42	105	89	92	92.22				
4	.15	1.42	105	89	92	94.10				
3	.14	1.33	106	89	93	96.02	2			
2	.14	1.33	106	89	93	97.87				
1	.14	1.32	107	89	94	99.68				
B-12	.23	2.18	108	89	94	101.50				
11	.22	2.08	108	89	95	103.76				
10	.21	1.98	108	89	95	105.99				
9	.21	1.99	109	89	95	108.17				
8	.18	1.71	110	90	94	110.36				
7	.15	1.43	111	90	92	112.50				
6	.15	1.43	111	90	92	114.37				
5	.16	1.53	112	90	91	116.24	2			
4	.15	1.44	112	90	90	118.19				
3	.15	1.44	113	90	89	120.10				
2	.15	1.44	114	91	90	122.02				
1	.14	1.34	114	91	90	123.93				
						125.77				

Client Name: DRAX
Williams Lake
 Process: Drier Stack 3
 Test Number: 1
 Date: JUNE 17/22
 Start Time: 12:35
 Finish Time: 1:40
 Starting Vol.: 300
 Final Vol.: 316
 Flask: 58
 Console: 1013
 Stack Diameter

BP 27.95
 DN 300
 CP .83446
 MF 1.0083
 Moist. 5%
 PM 28.06
 AS 31.50
 Ko .6997
 Pitot 248
 Port
 Static -12
 PS 27.95

CO ₂	O ₂	CO	N ₂
0	21		

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: PL/CB

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: .006 Finish: .008

Load:

.21-13

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.23	1.92	86	86	100	0.00	3	244	(CEN)	
11	.24	1.99	81	82	99	1.90				
10	.22	1.83	83	83	98	3.79				
9	.19	1.58	81	82	95	5.68				
8	.17	1.41	80	81	96	7.47	3			
7	.15	1.25	82	81	97	9.16		249		
6	.15	1.25	82	82	97	10.76				
5	.16	1.33	85	84	98	12.40				
4	.15	1.24	84	84	100	14.00				
3	.14	1.17	86	86	98	15.49	3			
2	.16	1.33	86	89	101	17.10		255		
1	.17	1.42	86	87	101	18.70				
B12	.21	1.75	87	87	100	20.25				
11	.20	1.67	90	89	102	22.02				
10	.21	1.75	89	89	100	23.84	3			
9	.19	1.59	90	90	103	25.68				
8	.17	1.42	90	91	102	27.47		253		
7	.16	1.34	91	91	101	29.20	3			
6	.15	1.26	93	92	101	30.84				
5	.15	1.26	93	93	103	32.43				
4	.16	1.34	94	94	103	34.00				
3	.17	1.44	93	92	98	35.64				
2	.19	1.61	92	92	99	37.28	3	256		
1	.18	1.52	92	92	98	39.05				
						40.79				

Client: DRAX			Console: 1013		Pb: 27.95 "Hg		Filter: 59		File:		Date: JUNE 17/22			
Process: DRYER ST. 3			Mf: 1.0083		Static: -.12 "H ₂ O		Flask: ✓		+		%CO ₂		%O ₂	CO
Test: 2			K ₀ : .6997		Ps: 27.95		Silica: 59		+		0		21	
Personnel: DL/CB			Pitot: 248		Pm: 28.06		Total Vol: 327 ml							
Start time: 1:50			C _p : .83446		Area: 31.50 ft ²		Start Vol: 300 ml							
Stop time: 2:53			Nozzle: 300		Bwo: 103		Plant Type:				Mix:			
Permitt #			Start Leakage Rate@ 15 "Hg .004 ft ³ /min		Pollution Abatement Equip:									
up strm down strm			Finish Leakage Rate@ 15 "Hg 1009 ft ³ /min		Load:		Burner:		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- 5.0		
			IN	OUT										
A-12	.24	2.01	95	93	104	0.00	252	1050	Hot.	3				
11	.24	2.01	89	91	101	1.98								
10	.23	1.93	89	90	101	3.94								
9	.22	1.84	89	89	100	5.86				3				
8	.23	1.92	89	89	103	7.70								
7	.19	1.59	90	90	101	9.63								
6	.16	1.34	91	90	100	11.46	256							
5	.15	1.26	90	90	100	13.13				3				
4	.15	1.26	91	92	99	14.73								
3	.16	1.35	92	92	100	16.31								
2	.17	1.43	92	92	101	17.94								
1	.16	1.35	92	91	100	19.70				3				
B-12	.20	1.69	92	92	100	21.45								
11	.20	1.69	94	94	100	23.25	261							
10	.19	1.61	95	95	100	24.96								
9	.17	1.44	96	96	100	26.77				3				
8	.16	1.36	96	96	102	28.50								
7	.16	1.36	97	97	101	30.17								
6	.15	1.27	97	97	100	31.80	258							
5	.16	1.36	98	98	101	33.43				3				
4	.17	1.44	97	97	100	35.05								
3	.18	1.53	98	98	100	36.78								
2	.17	1.44	98	98	102	38.56								
1	.18	1.53	100	100	102	40.25	256	✓	✓	3				
						42.03								

Client: <u>DRAV</u>			Console: <u>1013</u>		Pb: <u>27.95</u> "Hg	Filter: <u>60</u>	File:		Date: <u>JUNE 17/22</u>		
Process: <u>DRYER ST. 3</u>			Mf: <u>110083</u>		Static: <u>-12</u> "H ₂ O	Flask: <u>✓</u>	+	%CO ₂	%O ₂	CO	
Test: <u>3</u>			K _o : <u>.6997</u>		Ps: <u>27.95</u>	Silica: <u>60</u>	+	<u>0</u>	<u>21</u>		
Personnel: <u>DL/CB</u>			Pitot: <u>248</u>		Pm: <u>28.06</u>	Total Vol: <u>320</u> ml					
Start time: <u>3:04</u>			Cp: <u>.83446</u>		Area: <u>31.50</u> ft ²	Start Vol: <u>300</u> ml					
Stop time: <u>4:09</u>			Nozzle: <u>.300</u>		Bwo: <u>.03</u>	Plant Type:		Mix:			
Permitt #			Start Leakage Rate@ <u>15</u> "Hg <u>.004</u> ft ³ /min			Pollution Abatement Equip:					
up strm down strm			Finish Leakage Rate@ <u>15</u> "Hg <u>.004</u> ft ³ /min			Load:		Burner:		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= <u>25</u> ZERO= <u>5.0</u>
			IN	OUT							
A-12	.22	1.87	99	98	102	0.00	241	1020	Hot	3	
11	.23	1.94	94	96	101	1.89					
10	.23	1.94	92	96	97	3.82					
9	.22	1.88	92	99	96	5.85					
8	.21	1.78	93	95	98	7.66				3	
7	.15	1.27	94	95	97	9.53	251				
6	.16	1.36	94	96	97	11.20					
5	.16	1.36	94	96	97	12.95					
4	.16	1.36	95	96	98	14.58				3	
3	.17	1.44	96	97	101	16.28					
2	.18	1.53	97	97	101	17.94	254				
1	.20	1.70	99	99	101	19.68					
B-12	.21	1.78	99	99	102	21.55				3	
11	.23	1.96	100	100	101	23.40					
10	.20	1.71	100	100	100	25.35					
9	.18	1.53	99	100	101	27.26					
8	.18	1.54	101	102	100	29.02	259			3	
7	.15	1.27	101	101	104	30.90					
6	.15	1.27	100	101	102	32.55					
5	.17	1.44	101	101	102	34.12					
4	.18	1.53	101	101	102	35.81					
3	.19	1.61	100	100	102	37.58	266			3	
2	.21	1.78	100	100	101	39.33					
1	.21	1.78	100	100	102	41.22					
						43.12					

Client Name: Drax
Williams Lake
 *Process: Dryer Stack 4
 Test Number: 1
 Date: Jun 17/22
 Start Time: 1231
 Finish Time: 134
 Starting Vol.: 300
 Final Vol.: 331
 Flask: 55
 Console: 930
 Stack Diameter

BP 27.95
 DN 325
 CP 0.83867
 MF 0.9958
 Moist. 390
 PM 28.06
 AS 31.50
 Ko 0.7631
 Pitot 217
 Port
 Static -10
 PS 27.94

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

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: NA/CB

Mean Yaw Angle

Leakage Rate @ 15 inches

Start: 1005 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
A12	.14	1.41	82	81	103	26.40	2	270	1000	
11	.14	1.40	89	81	110	28.30				
10	.12	1.21	92	84	110	30.15	2			
9	.13	1.30	93	82	110	31.86				
8	.12	1.20	98	81	114	33.65	2			
7	.12	1.21	99	82	111	35.41				
6	.12	1.21	102	84	111	37.09	2			
5	.13	1.31	102	85	112	38.91				
4	.12	1.21	103	88	112	40.73	2			
3	.12	1.22	104	91	113	42.56				
2	.13	1.32	104	89	112	44.26	2			
1	.13	1.33	109	89	112	46.11				
B12	.14	1.43	111	91	113	47.88	2			
11	.15	1.53	109	90	113	49.84				
10	.14	1.43	109	92	114	51.74	2			
9	.14	1.42	110	92	117	53.65				
8	.16	1.64	110	93	111	55.53	2			
7	.19	1.96	111	93	110	57.62				
6	.22	2.26	112	94	112	59.87	2			
5	.17	1.75	112	94	112	62.08				
4	.16	1.64	113	94	113	64.24	2			
3	.16	1.65	113	95	113	66.31				
2	.19	1.95	113	95	115	68.40	2			
1	.20	2.04	112	95	116	70.61				
						72.87				

Client Name: Prax
Williams Lake
 Process: Dryer Stack 4
 Test Number: 2
 Date: June 17 2022
 Start Time 140
 Finish Time 243
 Starting Vol. 300
 Final Vol. 330
 Flask: 56
 Console: 980
 Stack Diameter

BP 27.95
 DN
 CP .83867
 MF .9958
 Moist. 3%
 PM 28.06
 AS 31.50
 Ko .7631
 Pitot 217
 Port
 Static -10
 PS 27.94

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

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL NA CB

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	1.32	94	94	109	73.88	2	270	1004	
11	.14	1.42	98	95	111	75.78				
10	.14	1.43	104	97	113	77.68	2			
9	.14	1.43	110	100	120	79.61				
8	.12	1.22	113	97	123	81.54	2			
7	.12	1.21	111	97	124	83.14				
6	.13	1.31	114	98	125	85.00	2			
5	.13	1.32	113	98	122	86.88				
4	.13	1.32	113	98	122	88.57	2			
3	.12	1.23	115	101	121	90.39				
2	.12	1.23	114	100	120	92.14	2			
1	.13	1.33	114	99	118	94.02				
B12	.15	1.54	114	100	116	95.78	2			
11	.16	1.65	116	100	115	97.70				
10	.14	1.45	117	99	114	99.78	3			
9	.14	1.45	116	100	114	101.63				
8	.15	1.56	116	100	111	103.54	3			
7	.20	2.08	117	100	111	105.46				
6	.22	2.31	121	101	109	107.83	3			
5	.19	1.99	120	101	110	110.13				
4	.17	1.78	121	102	110	112.31	3			
3	.16	1.67	121	101	111	114.38				
2	.18	1.87	118	101	112	116.47	3			
1	.20	2.09	119	102	110	118.50				
						120.75				

Client Name: Drax
Williams Lake
 Process: Dryer Stack 4
 Test Number: 3
 Date: June 17 2022
 Start Time 250
 Finish Time 353
 Starting Vol. 300
 Final Vol. 323
 Flask: 57
 Console: 9.80
 Stack Diameter

BP 27.95
 DN 320
 CP 83867
 MF 9958
 Moist. 3%
 PM 28.06
 AS 31.50
 Ko 7631
 Pitot 217
 Port
 Static -10
 PS 27.94

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

Duct Diameters

Up-Stream

Duct Diameters

Downstream

Personnel: DL NA CD

Mean Yaw Angle

Leakage Rate @ 15 inches

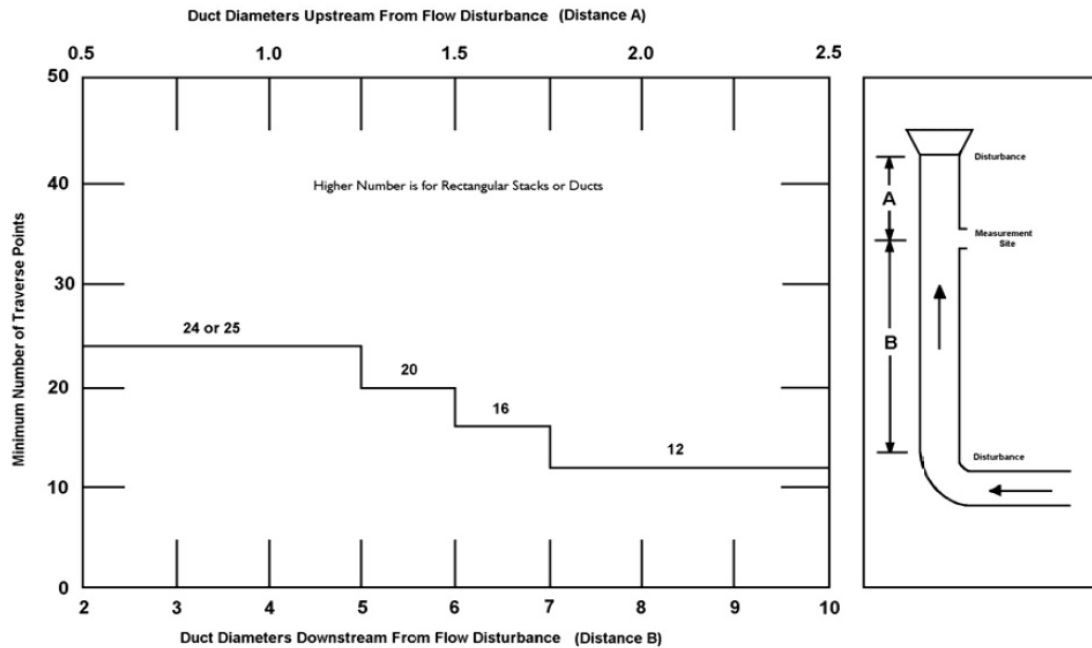
Start: 1007 Finish: 1005

Load:

Sample Points	Delta P	Delta H	Temp. In	Temp. Out	Stack Temp.	Gas Volume	Pump Vacuum	Box Temp.	Last Imp. Temp.	Points
A12	.14	1.43	97	96	111	21.70	2	270	1008	
11	.14	1.44	109	99	114	23.65				
10	.13	1.34	111	102	114	25.65	2			
9	.12	1.24	117	101	111	27.43				
8	.12	1.24	113	98	113	29.25	2			
7	.12	1.24	113	99	111	31.02				
6	.12	1.25	114	99	110	32.85	2			
5	.14	1.45	114	100	111	34.72				
4	.13	1.35	114	101	110	36.60	2			
3	.12	1.26	116	106	110	38.52				
2	.13	1.35	115	99	109	40.29	2			
1	.14	1.46	115	99	109	42.28				
B12	.15	1.56	117	100	111	44.24	2			
11	.15	1.56	117	100	113	46.29				
10	.15	1.56	117	101	111	48.15	2			
9	.14	1.47	118	102	109	50.29				
8	.16	1.67	118	101	109	52.15	2			
7	.14	1.49	119	101	109	54.20				
6	.21	2.20	119	101	109	56.43	3			
5	.20	2.09	120	102	111	58.73				
4	.16	1.67	120	102	112	60.92	3			
3	.15	1.57	120	101	111	62.88				
2	.18	1.87	118	102	114	64.86	3			
1	.21	2.18	121	103	114	67.03				
						69.33				



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



*Drax
Williams Lake*

Daily production rate June 17th

25.2 MT/hr

Average for the previous calendar month

22.7 MT/hr

90th percentile production rate

26.2 MT/hr

Average Dryer Fan 1 exit gas temperature
Average Dryer Fan 2 exit gas temperature
Average Dryer Fan 3 exit gas temperature
Average Dryer Fan 4 exit gas temperature
Average Cyclofilter exit gas temperature, [°C]
Volumetric emission flow rates, [m³/hour]
TPM, [mg/m³]
PM, [mg/m³]

Included in Stack Test
Included in Stack Test
Included in Stack Test
Included in Stack Test
Included in Stack Test
Included in Stack Test
Included in Stack Test
Included in Stack Test