A.Lanfranco & Associates Inc.
Environmental Consultants

Prepared for

All Roads Construction Ltd.

Coquitlam, B.C.

EMISSION MONITORING REPORT

August 2023 COMPLIANCE SURVEY

Permit GVA1145

Prepared by S. Harrington

Issued on Aug.29, 2023

CERTIFICATION

The field monitoring for this survey was conducted by certified stack test technicians as required by the British Columbia Ministry of Environment (BC MOE) Field Sampling Manual.

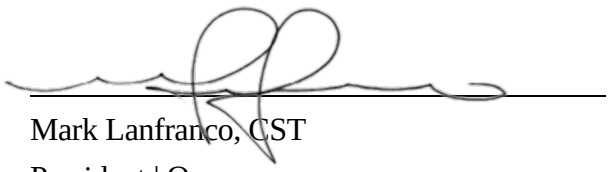
The field crew consisted of:

Mr. S. Harrington (certified), Mr. M. Lanfranco (certified), and Mr. B. Lester.

The report was prepared by Mr. S. Harrington (certified) using reporting principles and guidelines generally acceptable to B.C. MOE and Metro Vancouver (MV).

The field crew and A. Lanfranco and Associates Inc. certify that the test methods used were MOE/MV approved reference methods for the parameters investigated.

Report reviewed on Aug.28, 2023 by:



Mark Lanfranco, CST
President | Owner

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1.0 TEST PROGRAM ORGANIZATION

Plant Test Coordinator:	Mr. Dennis Eby Plant Manager All Roads Construction Ltd. D.Eby@allroadsconstruction.com
Sampling Coordinator:	Mr. Mark Lanfranco President | Owner A. Lanfranco and Associates Inc. (604) 881-2582 mark.lanfranco@alanfranco.com
Sampling Crew:	Mr. S. Harrington – A. Lanfranco and Associates Inc. Mr. M. Lanfranco – A. Lanfranco and Associates Inc. Mr. J. Ching – A. Lanfranco and Associates Inc.

The following table presents the average emission results for the listed parameters. The emission survey was conducted at the All Roads Construction hot mix asphalt plant in Coquitlam, B.C. on August 15, 2023.

PARAMETER	RESULT	PERMITTED LEVEL
Particulate (mg/Sm^3 @ 16% O_2)	0.59	30
Carbon Monoxide (mg/Sm^3 @ 16% O_2)	95.4	200
Total Hydrocarbons (mg/Sm^3 @ 16% O_2)	16.8	40
Flowrate (Sm^3/min)	509	870
Temperature (°C)	100	

All results are at standard conditions of 20°C and 101.325 kPa (dry)

There are no permit exceedances and the results are similar to previous testing. The differences year to year are considered to be in a normal range of outcomes for this process.

2.0 INTRODUCTION

In August 2023, All Roads commissioned A. Lanfranco and Associates Inc. of Surrey, B.C. to conduct an emission survey on the baghouse stack at their Coquitlam asphalt plant.

The purpose of the survey was to measure and report various emission parameters from the asphalt manufacturing process. The testing was conducted to determine compliance with permitted particulate matter, carbon monoxide, and organics discharges at 16% O_2. The emission limits are stipulated in All Roads Permit GVA1145..

This report documents the methods used and results found for the triplicate one-hour emission tests that were conducted on August 15, 2023.

3.0 PROCESS DESCRIPTION

The All Roads hot mix asphalt plant, located at 2320 Rogers Avenue in Coquitlam, B.C. is a rotary drum mix asphalt plant. The unit is a natural gas fired Gencor Ultra II drum burner.

Dust laden flue gases generated in the mixer and dryer are cleaned by a Gencor CFS151 Baghouse. Following the fabric filtration, cleaned flue gases are discharged to atmosphere through a 1.37-meter stack which is monitored by a Dwyer real time particulate monitoring system. An ID fan is employed in the system.

On August 15, 2023, the plant maintained an average production rate of about 215 tonnes/hr during the monitoring.

4.0 METHODOLOGY

The sampling and analytical methods used throughout this survey conform to the procedures outlined in the B.C. "Source Testing Code" 2020 Edition and the B.C. air analytical manual.

4.1 Sampling Techniques

Samples from the main stack were collected from two ports located at 90 degrees to each other. Particulate samples were taken with an APEX sample train (Fig. 1) equipped with a heated five foot stainless steel probe and heated filter assembly. The sample ports were about 3.5 diameters downstream and 1.0 diameters upstream of the nearest disturbances. From this criteria a 24 point, two traverse sampling regime was established for the particulate tests (Fig. 2 and 2a). Each point was sampled for two and one-half minutes resulting in the final sample volumes of about 1.2 cubic meters.

Velocities were measured with an S-type pitot tube and oil manometer. The probe and connecting glassware were brushed and rinsed with distilled water and acetone into a glass sample bottle after sample completion. Flue gas analysis (O_2 and CO_2) were conducted with Fyrite analysers and an on-line CEM system. Cyclonic flow was not present in the stack.

CEM System for Organics, CO and O_2

Continuous emission monitoring (CEM) was conducted for Organics (THC)/CO/O_2/CO_2 using A. Lanfranco and Associates Inc. CEM mobile laboratory. This unit is a trailer with the following instrumentation:

CO/CO_2/O_2 California Analytical Model 300 Infrared Analyzer with ranges 0 to 2500 ppm CO, and 0 to 25% CO_2, and 0 to 25% O_2

THC VIG Model 20 FID Analyzer with ranges 0 to 100000 ppm

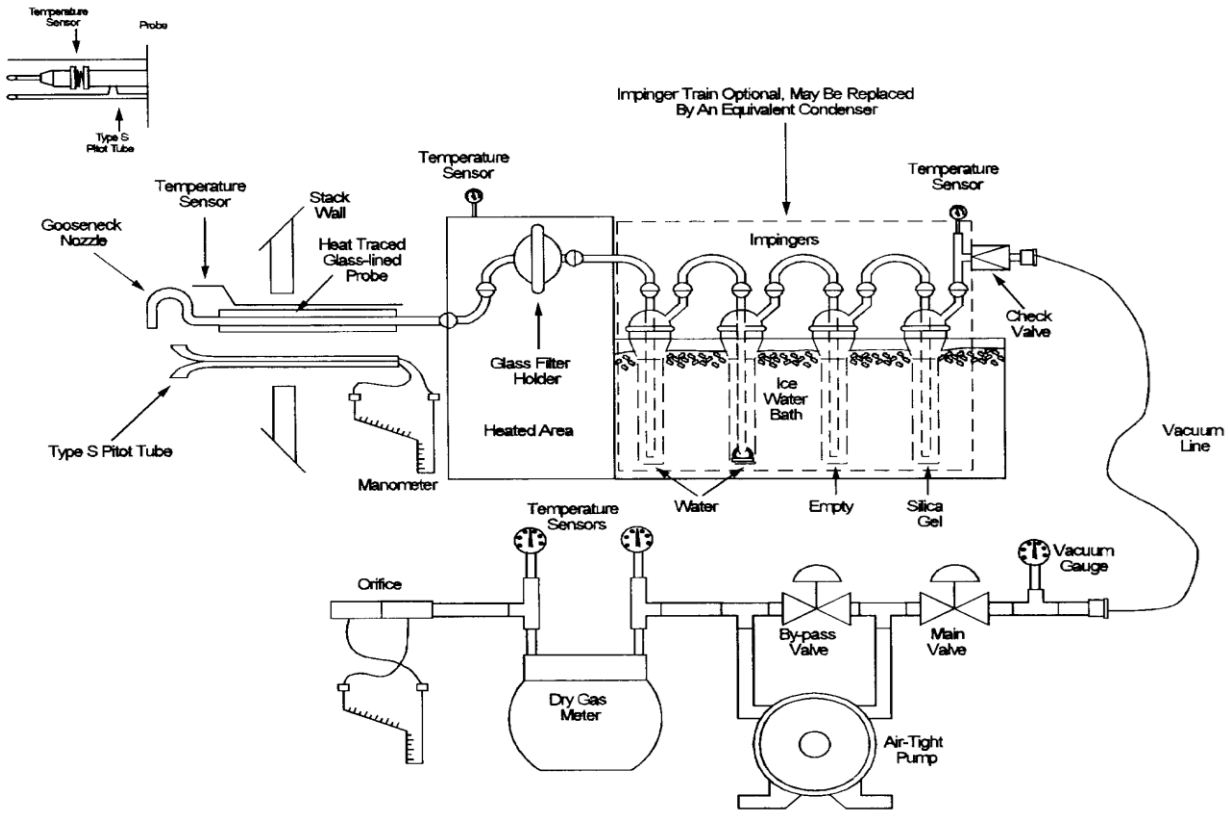


Figure 1 EPA Method 5 Particulate Sampling Train

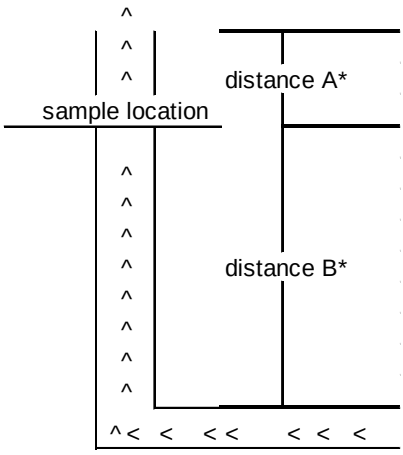
Figure - 2 Location of Traverse Points in Circular Stacks

(inches from inside wall to traverse point)

Client Stack I.D.: All Roads - Baghouse

Diameter (inches)	54		
Total Points	24	Diameters Upstream:	1
# of Ports Used	2		
Points / Traverse	12	Diameters Downstream:	3.5

Point	Distance from Wall
1	1.1
2	3.6
3	6.4
4	9.6
5	13.5
6	19.2
7	34.8
8	40.5
9	44.4
10	47.6
11	50.4
12	52.9



* distance A : duct diameters upstream from flow disturbance
* distance B : duct diameters downstream from flow disturbance
< < < < : flow direction

Figure 2a Location of Traverse Points in Circular Stacks

(percent of diameter from inside wall to traverse point)

Traverse Point Number on a Diameter	Number of Traverse Points on a Diameter					
	2	4	6	8	10	12
1	14.6%	6.7%	4.4%	3.2%	2.6%	2.1%
2	85.4%	25.0%	14.6%	10.5%	8.2%	6.7%
3		75.0%	29.6%	19.4%	14.6%	11.8%
4		93.3%	70.4%	32.3%	22.6%	17.7%
5			85.4%	67.7%	34.2%	25.0%
6			95.6%	80.6%	65.8%	35.6%
7				89.5%	77.4%	64.4%
8				96.8%	85.4%	75.0%
9					91.8%	82.3%
10					97.4%	88.2%
11						93.3%
12						97.9%

A diagram of the sampling, conditioning and analyzer system is provided in Figure 3. With this system the stack gas is withdrawn from the source through a coarse filter and stainless steel probe with associated pumps, filters and water removal components. The THC analyzer withdrew a side-stream of the filtered gas for hot FID analysis.

Prior to compliance testing and between each test all measuring instrumentation was calibrated with Protocol 1 and NIST Traceable, 1% certified calibration gas standards.
Calibration gas certificates are appended.

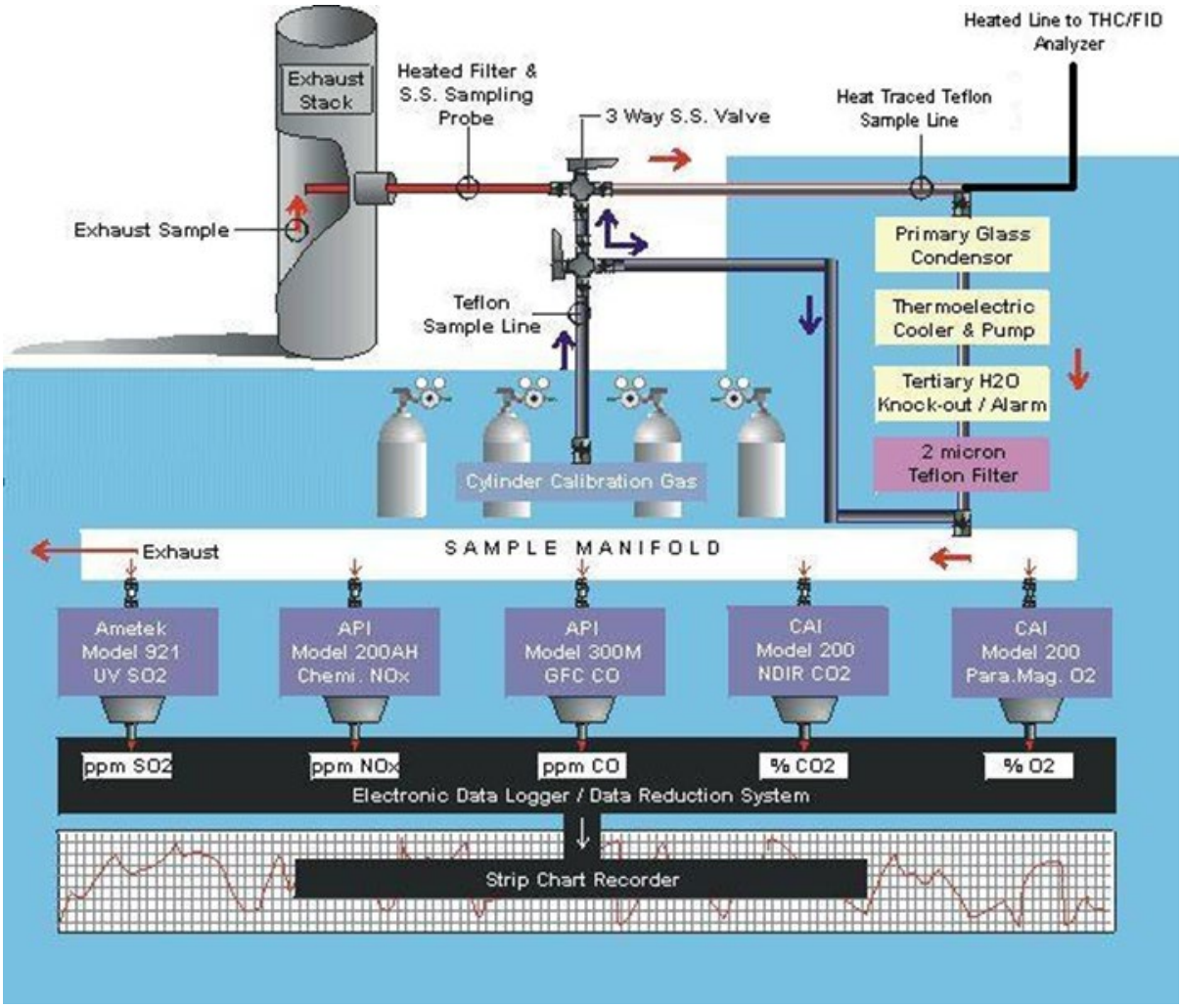


Figure 3 – CEM Measurement System Schematic

4.2 Analytical Techniques

Gravimetric analysis of the particulate samples was conducted by A. Lanfranco and Associates Inc. at their Surrey laboratory. The filters were conditioned by drying at 105°C and desiccating for 24 hours. Final weighing of the filter occurred after the conditioning process, at which time the initial weight of the filter was subtracted.

Probe washings were evaporated to dryness in porcelain dishes, desiccated for 24 hours and weighed. Blanks were carried through all procedures

CEM data was collected by data acquisition system by comparing stack gas responses to calibration gas responses.

Calibration gas mixtures used were:

Cylinder No.	CO (ppm)	THC (ppm)	O_2 (Vol %)
Zero Gas	0	0	0
No. 3 Gas*	n/a	n/a	0
No. 2 Gas*	244.5	n/a	0
No. 1 Gas*	443.5	n/a	
Mid Methane*		46.2	11.02
Hi Methane*	n/a	89.8	n/a
Ambient Air	-	-	20.9

* EPA Protocol Gas

5.0 RESULTS

The results of the particulate and stack parameters were calculated using a computer program consistent with reporting requirements of Metro Vancouver. Standard conditions used were 20^{o}C and 101.325 kPa (dry).

Detailed test results are presented in Table 1. Supporting data is presented in Tables 2, 3 and the Appendices.

CEM minutely averages are presented in Appendix 1.

Corrections to 16% O_2 were made with CEM data. Total Hydrocarbons are expressed as Methane (CH_4).

TABLE 1: BAGHOUSE STACK EMISSION RESULTS

Parameter		Test 1	Test 2	Test 3	Average
Test Date		Aug.15, 2023	Aug.15, 2023	Aug.15, 2023	
Test Time		20:10-21:11	21:22-22:23	22:37-23:38	
CEM Test Time		20:10-21:10	21:25-22:25	21:40-12:40	
Duration	(minutes)	60	60	60	
Particulate	(mg/Sm^3)	1.24	1.17	0.80	1.07
Particulate	(mg/Sm^3 @ 16% O_2)	0.69	0.65	0.45	0.59
Particulate	(kg/hr)	0.04	0.04	0.02	0.03
Particulate	(kg/day)	0.90	0.86	0.59	0.78
Flowrate	(Sm^3/min)	505	511	511	509
Flowrate	(Am^3/min)	890	890	888	889
Temperature	(°C)	98.3	100	101	100
CO	(mg/Sm^3 @ 16% O_2)	101.8	90.6	93.9	95.4
THC	(mg/Sm^3 @ 16% O_2)	18.2	15.8	16.4	16.8
O_2	(vol % dry)	12.0	12.0	12.1	12.1
CO_2	(vol % dry)	5.00	5.03	5.01	5.01
H_2O	(vol %)	28.0	26.6	26.3	27.0
Isokinetic Variation	(%)	98.5	99.4	99.3	99.1

Standard conditions of 20 deg C and 101.325 kPa

TABLE 2: PROCESS OPERATING CONDITIONS

	Production Rate (Tonnes/hr)	Mix Temp. (°C)	RAP
Date: Aug.15,2023	215	158	17%

TABLE 3: GRAMS PER TONNE OF ASPHALT

Parameter	Mass Emission (grams/tonne of asphalt)
Particulate Matter	0.08
Carbon Monoxide	13.6
Total Hydrocarbons	2.39

6.0 DISCUSSION OF RESULTS

Particulate emissions from the asphalt plant ranged from 0.5 to 0.7 mg/Sm^3 at 16% O_2, averaging 0.6 mg/Sm^3 at 16% O_2. This result is well below the permitted level of 30 mg/Sm^3 @ 16% O_2 and indicates that the particulate abatement system is functioning at an acceptable level.

The carbon monoxide, organics and particulate for this survey are in compliance with All Roads Construction Ltd. Permit GVA1145 dated August 30, 2022.

There were no problems encountered in sample collection or analysis. Particulate samples were collected isokinetically at all points and the process operated in a normal manner during testing. The test results, therefore, are considered to be an accurate representation of emission characteristics for the process conditions maintained on the test date.

APPENDIX 1

COMPUTER OUTPUTS OF

MEASURED AND CALCULATED DATA

Client:	All Roads	**Date:**	Aug.15, 2023
Jobsite:	Coquitlam, BC	**Run:**	1 - Particulate
Source:	Baghouse Stack	**Run Time:**	20:10-21:11

Particulate Concentration:	**1.2**	**mg/dscm**	0.0005	gr/dscf
	0.7	mg/Acm	0.0003	gr/Acf
	0.7	mg/dscm (@ 16% O2)	0.0003	gr/dscf (@ 16% O2)
Emission Rate:	0.04	kg/hr	0.083	lb/hr
Sample Gas Volume:	1.1678	dscm	41.241	dscf
Total Sample Time:	60.0	minutes		
Average Isokineticity:	98.5	%		

Flue Gas Characteristics

Moisture:	28.00	%		
Temperature	98.3	oC	209.0	oF
Flow	504.5	dscm/min	17817	dscf/min
	8.41	dscm/sec	297.0	dscf/sec
	890.4	Acm/min	31444	Acf/min
Velocity	10.044	m/sec	32.95	f/sec
Gas Analysis	12.04	% O2	5.00	% CO2
	29.282	Mol. Wt (g/gmole) Dry	26.122	Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 20 deg C, 101.325 kPa
Imperial: 68 deg F, 29.92 in.Hg

Client:	All Roads	**Date:**	Aug.15, 2023
Jobsite:	Coquitlam, BC	**Run:**	1 - Particulate
Source:	Baghouse Stack	**Run Time:**	20:10-21:11

Control Unit (Y)	0.9857
Nozzle Diameter (in.)	0.3380
Pitot Factor	0.8432
Baro. Press. (in. Hg)	29.85
Static Press. (in. H2O)	-0.16
Stack Height (ft)	40
Stack Diameter (in.)	54.0
Stack Area (sq.ft.)	15.904
Minutes Per Reading	2.5
Minutes Per Point	2.5
Port Length (inches)	3.5

Gas Analysis (Vol. %):

	CO2	O2
CEMS	5.00	12.04
Average =	**5.00**	**12.04**

Condensate Collection:

Impinger 1 (grams)	215.0
Impinger 2 (grams)	100.0
Impinger 3 (grams)	15.0
Impinger 4 (grams)	10.8
Total Gain (grams)	**340.8**

Collection:

Filter (grams)	**0.00005**
Washings (grams)	**0.00140**
Impinger (grams)	**0.00000**
Total (grams)	**0.00145**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	189.850							
1	1	2.5	191.800	0.280	1.84	87	87	200	1.1	98.7
	2	5.0	193.740	0.280	1.83	87	87	202	3.6	98.3
	3	7.5	195.750	0.300	1.97	87	87	202	6.4	98.5
	4	10.0	197.760	0.300	1.70	87	87	202	9.6	98.4
	5	12.5	199.630	0.260	1.57	87	87	204	13.5	98.5
	6	15.0	201.420	0.240	1.44	87	87	204	19.2	98.1
	7	17.5	203.140	0.220	1.44	88	88	206	34.8	98.4
	8	20.0	204.860	0.220	1.43	88	88	206	40.5	98.4
	9	22.5	206.580	0.220	1.37	88	88	208	44.4	98.5
	10	25.0	208.260	0.210	1.37	88	88	208	47.6	98.5
	11	27.5	209.940	0.210	1.30	88	88	206	50.4	98.3
	12	30.0	211.570	0.200	1.30	88	88	206	52.9	97.8
		0.0	211.570							
2	1	2.5	213.520	0.290	1.97	86	86	210	1.1	97.9
	2	5.0	215.510	0.300	1.96	86	86	214	3.6	98.6
	3	7.5	217.490	0.300	1.94	87	87	214	6.4	97.9
	4	10.0	219.420	0.280	1.80	87	87	215	9.6	98.8
	5	12.5	221.320	0.270	1.73	87	87	215	13.5	99.0
	6	15.0	223.100	0.240	1.54	87	87	215	19.2	98.4
	7	17.5	224.810	0.220	1.42	87	87	214	34.8	98.6
	8	20.0	226.510	0.220	1.42	87	87	214	40.5	98.0
	9	22.5	228.220	0.220	1.41	87	87	214	44.4	98.6
	10	25.0	229.860	0.200	1.30	87	87	212	47.6	99.0
	11	27.5	231.500	0.200	1.30	88	88	212	50.4	98.8
	12	30.0	233.150	0.200	1.30	88	88	212	52.9	99.4
			Average:	0.245	1.569	87.3	87.3	209.0		98.5

Client:	All Roads	**Date:**	Aug.15, 2023
Jobsite:	Coquitlam, BC	**Run:**	2 - Particulate
Source:	Baghouse Stack	**Run Time:**	21:22-22:23

Particulate Concentration:	**1.2**	**mg/dscm**	0.0005	gr/dscf
	0.7	mg/Acm	0.0003	gr/Acf
	0.6	mg/dscm (@ 16% O2)	0.0003	gr/dscf (@ 16% O2)
Emission Rate:	0.04	kg/hr	0.079	lb/hr
Sample Gas Volume:	1.1942	dscm	42.172	dscf
Total Sample Time:	60.0	minutes		
Average Isokineticity:	99.4	%		

Flue Gas Characteristics

Moisture:	26.64	%		
Temperature	100.4	oC	212.7	oF
Flow	511.0	dscm/min	18048	dscf/min
	8.52	dscm/sec	300.8	dscf/sec
	890.0	Acm/min	31431	Acf/min
Velocity	10.039	m/sec	32.94	f/sec
Gas Analysis	12.04	% O2	5.03	% CO2
	29.286	Mol. Wt (g/gmole) Dry	26.280	Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 20 deg C, 101.325 kPa
Imperial: 68 deg F, 29.92 in.Hg

Client:	All Roads	**Date:**	Aug.15, 2023
Jobsite:	Coquitlam, BC	**Run:**	2 - Particulate
Source:	Baghouse Stack	**Run Time:**	21:22-22:23

Control Unit (Y)	0.9852
Nozzle Diameter (in.)	0.3380
Pitot Factor	0.8432
Baro. Press. (in. Hg)	29.85
Static Press. (in. H2O)	-0.16
Stack Height (ft)	40
Stack Diameter (in.)	54.0
Stack Area (sq.ft.)	15.904
Minutes Per Reading	2.5
Minutes Per Point	2.5
Port Length (inches)	3.5

Gas Analysis (Vol. %):

	CO2	O2
CEMS	5.03	12.04
Average =	**5.03**	**12.04**

Condensate Collection:

Impinger 1 (grams)	255.0
Impinger 2 (grams)	45.0
Impinger 3 (grams)	15.0
Impinger 4 (grams)	10.3
Total Gain (grams)	**325.3**

Collection:

Filter (grams)	**0.00080**
Washings (grams)	**0.00060**
Impinger (grams)	**0.00000**
Total (grams)	**0.00140**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	233.382							
1	1	2.5	235.360	0.280	1.90	85	85	210	1.1	99.6
	2	5.0	237.370	0.290	1.89	85	85	210	3.6	99.5
	3	7.5	239.410	0.300	2.02	85	85	210	6.4	99.3
	4	10.0	241.380	0.280	1.75	85	85	214	9.6	99.5
	5	12.5	243.280	0.260	1.75	85	85	215	13.5	99.6
	6	15.0	245.100	0.240	1.55	85	85	215	19.2	99.3
	7	17.5	246.850	0.220	1.50	85	85	214	34.8	99.6
	8	20.0	248.600	0.220	1.50	85	85	212	40.5	99.5
	9	22.5	250.350	0.220	1.30	85	85	212	44.4	99.4
	10	25.0	252.100	0.220	1.48	86	86	212	47.6	99.3
	11	27.5	253.850	0.220	1.42	86	86	212	50.4	99.3
	12	30.0	255.520	0.200	1.35	86	86	212	52.9	99.4
		0.0	255.520							
2	1	2.5	257.510	0.280	1.91	86	86	206	1.1	99.8
	2	5.0	259.500	0.280	1.90	86	86	210	3.6	100.1
	3	7.5	261.560	0.310	2.10	86	86	214	6.4	98.8
	4	10.0	263.620	0.310	2.08	86	86	215	9.6	98.8
	5	12.5	265.560	0.270	1.82	87	87	215	13.5	99.5
	6	15.0	267.460	0.260	1.75	87	87	215	19.2	99.3
	7	17.5	269.270	0.220	1.50	86	86	214	34.8	102.9
	8	20.0	270.880	0.200	1.35	86	86	214	40.5	95.9
	9	22.5	272.550	0.200	1.35	86	86	213	44.4	99.4
	10	25.0	274.210	0.200	1.35	86	86	213	47.6	98.8
	11	27.5	275.880	0.200	1.35	86	86	213	50.4	99.4
	12	30.0	277.550	0.200	1.35	86	86	214	52.9	99.5
			Average:	0.245	1.634	85.7	85.7	212.7		99.4

Client:	All Roads	**Date:**	Aug.15, 2023
Jobsite:	Coquitlam, BC	**Run:**	3 - Particulate
Source:	Baghouse Stack	**Run Time:**	22:37-23:38

Particulate Concentration:	**0.8**	**mg/dscm**	0.0003	gr/dscf
	0.5	mg/Acm	0.0002	gr/Acf
	0.4	mg/dscm (@ 16% O2)	0.0002	gr/dscf (@ 16% O2)
Emission Rate:	0.02	kg/hr	0.054	lb/hr
Sample Gas Volume:	1.1931	dscm	42.136	dscf
Total Sample Time:	60.0	minutes		
Average Isokineticity:	99.3	%		

Flue Gas Characteristics

Moisture:	26.33	%		
Temperature	100.8	oC	213.4	oF
Flow	511.3	dscm/min	18058	dscf/min
	8.52	dscm/sec	301.0	dscf/sec
	887.8	Acm/min	31354	Acf/min
Velocity	10.015	m/sec	32.86	f/sec
Gas Analysis	12.13	% O2	5.01	% CO2
	29.287	Mol. Wt (g/gmole) Dry	26.315	Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 20 deg C, 101.325 kPa
Imperial: 68 deg F, 29.92 in.Hg

Client:	All Roads	**Date:**	Aug.15, 2023
Jobsite:	Coquitlam, BC	**Run:**	3 - Particulate
Source:	Baghouse Stack	**Run Time:**	22:37-23:38

Control Unit (Y)	0.9852
Nozzle Diameter (in.)	0.3380
Pitot Factor	0.8432
Baro. Press. (in. Hg)	29.85
Static Press. (in. H2O)	-0.16
Stack Height (ft)	40
Stack Diameter (in.)	54.0
Stack Area (sq.ft.)	15.904
Minutes Per Reading	2.5
Minutes Per Point	2.5
Port Length (inches)	3.5

Gas Analysis (Vol. %):

	CO2	O2
CEMS	5.01	12.13
Average =	**5.01**	**12.13**

Condensate Collection:

Impinger 1 (grams)	250.0
Impinger 2 (grams)	50.0
Impinger 3 (grams)	10.0
Impinger 4 (grams)	10.0
Total Gain (grams)	**320.0**

Collection:

Filter (grams)	**0.00005**
Washings (grams)	**0.00090**
Impinger (grams)	**0.00000**
Total (grams)	**0.00095**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	277.880							
1	1	2.5	279.860	0.280	1.90	88	88	212	1.1	99.0
	2	5.0	281.840	0.280	1.89	88	88	213	3.6	99.1
	3	7.5	283.890	0.300	2.03	88	88	213	6.4	99.1
	4	10.0	285.940	0.300	2.02	88	88	215	9.6	99.3
	5	12.5	287.860	0.260	1.75	88	88	215	13.5	99.8
	6	15.0	289.770	0.260	1.75	88	88	215	19.2	99.3
	7	17.5	291.570	0.230	1.55	88	88	215	34.8	99.4
	8	20.0	293.330	0.220	1.50	88	88	215	40.5	99.4
	9	22.5	295.100	0.220	1.50	89	89	215	44.4	99.8
	10	25.0	296.850	0.210	1.48	89	89	215	47.6	101.0
	11	27.5	298.570	0.210	1.42	88	88	214	50.4	99.3
	12	30.0	300.240	0.200	1.35	87	87	214	52.9	99.0
		0.0	300.240							
	1	2.5	302.290	0.300	2.03	87	87	213	1.1	99.3
	2	5.0	304.300	0.290	1.96	87	87	213	3.6	99.0
	3	7.5	306.310	0.290	1.96	88	88	213	6.4	98.8
	4	10.0	308.260	0.270	1.83	88	88	213	9.6	99.3
	5	12.5	310.170	0.260	1.76	88	88	214	13.5	99.2
	6	15.0	311.990	0.240	1.62	88	88	214	19.2	98.4
	7	17.5	313.750	0.220	1.50	88	88	212	34.8	99.2
	8	20.0	315.470	0.210	1.42	88	88	212	40.5	99.2
	9	22.5	317.150	0.200	1.36	88	88	212	44.4	99.2
	10	25.0	318.840	0.200	1.36	89	89	212	47.6	99.7
	11	27.5	320.520	0.200	1.36	89	89	212	50.4	99.1
	12	30.0	322.200	0.200	1.36	89	89	211	52.9	99.0
			Average:	0.244	1.653	88.1	88.1	213.4		99.3

A. Lanfranco and Associates Inc.
METLab CEM Report

Client: All Roads - Coquitlam, BC
Source: Baghouse
Run: 1

Moisture % = 28.00

O2 Correction 16
Year: 2023

Date	Time	O2 (Vol. %)	CO2 (Vol. %)	CO (ppm)	THC (ppm as CH_4)
15-Aug	2011	12.43	4.78	149.84	38.84
15-Aug	2012	12.43	4.78	153.17	41.42
15-Aug	2013	12.40	4.80	154.54	40.40
15-Aug	2014	12.39	4.80	156.01	43.17
15-Aug	2015	12.18	4.94	161.89	41.17
15-Aug	2016	12.04	5.02	159.93	40.12
15-Aug	2017	12.10	4.96	160.42	40.37
15-Aug	2018	12.13	4.95	158.07	36.95
15-Aug	2019	12.11	4.95	153.85	36.28
15-Aug	2020	12.11	4.96	156.01	35.63
15-Aug	2021	12.10	4.96	157.28	37.53
15-Aug	2022	12.07	4.98	159.73	37.78
15-Aug	2023	12.08	4.97	158.26	38.17
15-Aug	2024	12.00	5.02	170.02	43.86
15-Aug	2025	12.01	5.01	166.30	40.87
15-Aug	2026	11.96	5.04	170.12	42.74
15-Aug	2027	11.95	5.06	170.32	42.79
15-Aug	2028	11.94	5.05	176.29	46.60
15-Aug	2029	11.91	5.07	179.04	46.38
15-Aug	2030	11.97	5.04	175.71	45.11
15-Aug	2031	11.91	5.07	180.51	47.28
15-Aug	2032	11.93	5.05	178.45	45.19
15-Aug	2033	11.93	5.06	176.59	43.38
15-Aug	2034	11.95	5.05	174.63	42.15
15-Aug	2035	11.94	5.06	172.08	40.92
15-Aug	2036	11.92	5.06	171.10	39.33
15-Aug	2037	11.96	5.04	166.99	36.90
15-Aug	2038	11.94	5.06	164.73	36.67
15-Aug	2039	12.00	5.02	164.05	36.33
15-Aug	2040	11.97	5.04	166.89	37.00
15-Aug	2041	11.99	5.03	162.77	35.71
15-Aug	2042	11.97	5.04	162.18	35.55
15-Aug	2043	11.96	5.04	158.95	33.16
15-Aug	2044	12.01	5.02	156.50	33.03
15-Aug	2045	12.01	5.01	156.11	33.06
15-Aug	2046	12.02	5.01	156.30	31.93
15-Aug	2047	11.99	5.03	159.73	33.93
15-Aug	2048	12.00	5.03	159.34	33.69
15-Aug	2049	11.99	5.03	158.46	33.26
15-Aug	2050	12.02	5.01	152.38	30.40
15-Aug	2051	12.03	5.00	145.23	28.33
15-Aug	2052	12.03	5.01	144.74	27.67
15-Aug	2053	12.07	4.99	143.66	28.29
15-Aug	2054	12.04	5.00	146.21	29.05
15-Aug	2055	12.05	5.00	146.80	29.39
15-Aug	2056	12.05	4.99	149.84	30.46
15-Aug	2057	12.02	5.01	149.54	29.32
15-Aug	2058	12.04	5.00	145.92	28.21
15-Aug	2059	12.02	5.01	147.29	28.98
15-Aug	2100	12.01	5.01	144.74	27.64
15-Aug	2101	11.99	5.02	149.54	29.44
15-Aug	2102	12.02	5.01	146.21	27.70
15-Aug	2103	12.04	4.99	144.84	27.48
15-Aug	2104	12.02	5.02	145.43	27.79
15-Aug	2105	12.06	5.00	145.43	28.04
15-Aug	2106	12.02	5.02	146.11	29.47
15-Aug	2107	12.05	5.00	146.70	27.89
15-Aug	2108	12.03	5.01	146.70	28.51
15-Aug	2109	12.08	4.99	146.99	28.13
15-Aug	2110	12.07	4.99	148.86	29.07
	Average	12.04	5.00	157.9	35.4
	Minimum	11.91	4.78	143.7	27.5
	Maximum	12.43	5.07	180.5	47.3
Mass Concentration (mg/m3 dry)		**n/a**	**n/a**	**184.0**	**32.8**
Mass Concentration (mg/m3 dry) Corrected to 16% O2				**101.8**	**18.2**

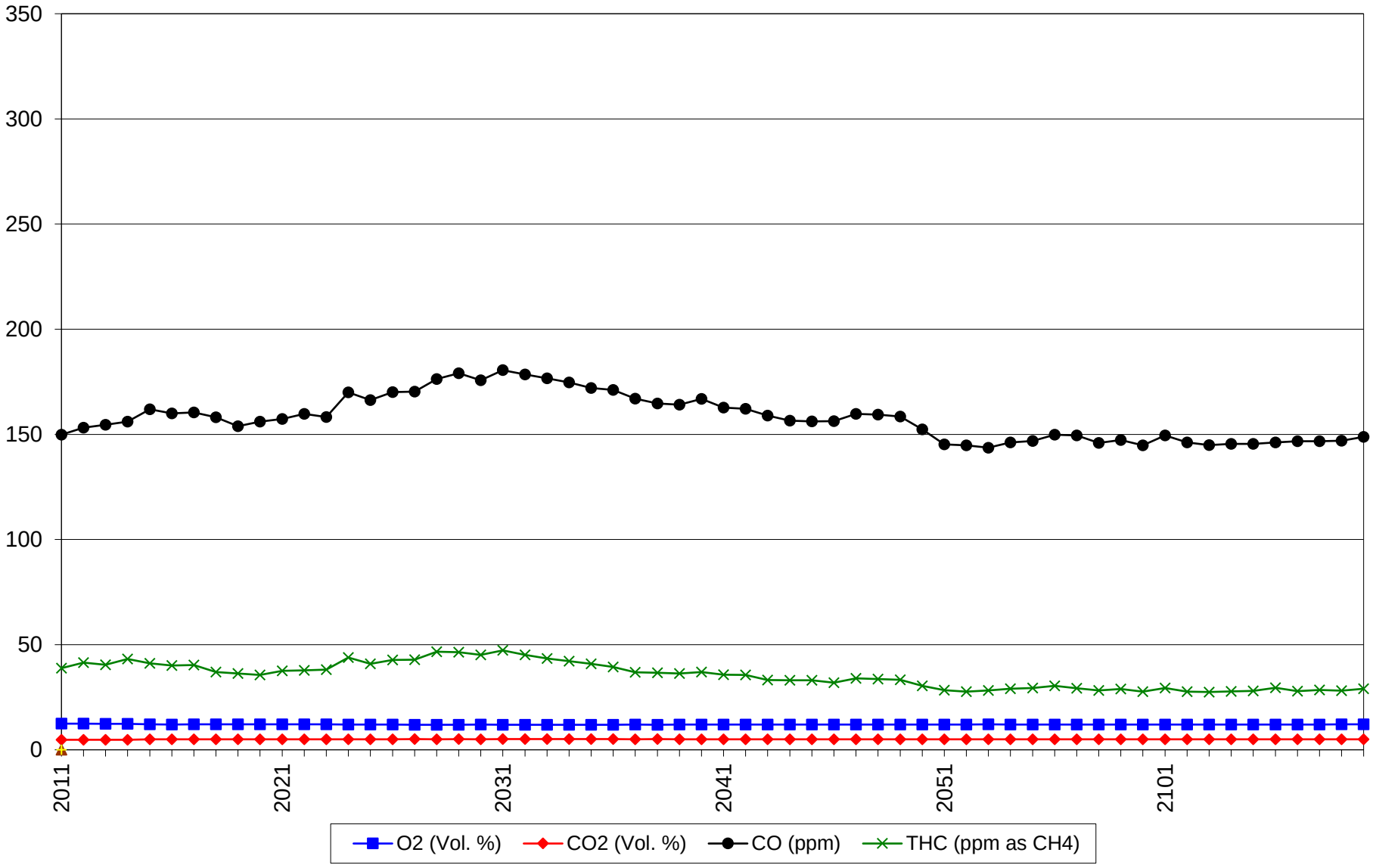
Calibration Summary				
Analyzer Range	25.00	20.00	1000.00	100.00
Cylinder Value	11.02	11.00	244.50	46.20
Analyzer Calibration Span	11.10	10.96	246.00	-
Analyzer Calibration Zero	0.05	0.00	-1.00	-
Initial System Span Response	11.04	10.96	247.00	46.00
Final System Span Response	11.00	11.00	265.00	45.00
Initial System Zero Response	0.05	0.04	-1.00	0.00
Final System Zero Response	0.00	0.00	14.00	1.00

Error Summary					**Limits**
Analyzer Cal. Error	0.3%	-0.2%	0.2%	-0.4%	(+/- 2% or 5% THC)
Initial Span Bias (% of Span)	-0.2%	0.0%	0.1%	-	(+/- 5%)
Final Span Bias (% of Span)	-0.4%	0.2%	1.9%	-	(+/- 5%)
Initial Zero Bias (% of Span)	0.0%	0.2%	0.0%	-	(+/- 5%)
Final Zero Bias (% of Span)	-0.2%	0.0%	1.5%	-	(+/- 5%)
Test Span Drift (% of Span)	-0.2%	0.2%	1.8%	-1.0%	(+/- 3%)
Test Zero Drift (% of Span)	-0.2%	-0.2%	1.5%	1.0%	(+/- 3%)

Baghouse Stack - Run 1 (August 15, 2023)

All Roads - Coquitlam, BC

METLab CEM Results



A. Lanfranco and Associates Inc.

A. Lanfranco and Associates Inc.
METLab CEM Report

Client: All Roads - Coquitlam, BC
Source: Baghouse
Run: 2

Moisture % = 26.64

O2 Correction 16
Year: 2023

Date	Time	O2 (Vol. %)	CO2 (Vol. %)	CO (ppm)	THC (ppm as CH_4)
15-Aug	2126	12.12	4.98	138.06	30.41
15-Aug	2127	12.09	5.00	139.04	30.84
15-Aug	2128	12.09	4.99	138.45	30.19
15-Aug	2129	12.08	5.01	141.99	30.98
15-Aug	2130	12.09	5.00	143.17	33.10
15-Aug	2131	12.08	5.00	146.90	34.25
15-Aug	2132	12.05	5.03	142.97	31.45
15-Aug	2133	12.08	5.01	141.69	32.70
15-Aug	2134	12.04	5.03	144.25	32.21
15-Aug	2135	12.05	5.02	140.22	31.63
15-Aug	2136	12.04	5.03	141.20	31.73
15-Aug	2137	12.05	5.03	140.61	32.15
15-Aug	2138	12.05	5.02	137.96	31.44
15-Aug	2139	12.02	5.04	139.63	32.97
15-Aug	2140	12.04	5.02	139.92	33.12
15-Aug	2141	12.02	5.03	141.30	34.39
15-Aug	2142	12.05	5.02	137.57	33.71
15-Aug	2143	12.03	5.03	141.50	33.69
15-Aug	2144	12.04	5.03	138.94	33.55
15-Aug	2145	12.05	5.01	139.73	34.11
15-Aug	2146	12.03	5.03	139.83	32.96
15-Aug	2147	12.05	5.01	138.94	34.01
15-Aug	2148	12.01	5.04	138.06	33.24
15-Aug	2149	12.04	5.03	138.45	34.28
15-Aug	2150	12.00	5.04	142.18	34.93
15-Aug	2151	12.06	5.02	137.76	32.89
15-Aug	2152	12.05	5.01	135.31	31.43
15-Aug	2153	12.03	5.04	136.10	31.13
15-Aug	2154	12.07	5.01	134.92	31.63
15-Aug	2155	12.03	5.02	136.29	31.44
15-Aug	2156	12.06	5.01	132.76	30.15
15-Aug	2157	12.04	5.02	135.31	31.01
15-Aug	2158	12.07	5.01	134.33	30.21
15-Aug	2159	12.04	5.02	138.35	32.52
15-Aug	2200	12.03	5.03	139.63	33.24
15-Aug	2201	12.06	5.01	141.79	33.77
15-Aug	2202	12.04	5.03	144.74	33.85
15-Aug	2203	12.06	5.01	145.52	33.62
15-Aug	2204	11.98	5.05	151.61	36.63
15-Aug	2205	12.02	5.04	148.96	34.53
15-Aug	2206	12.01	5.04	145.42	33.54
15-Aug	2207	11.99	5.06	140.12	29.66
15-Aug	2208	12.03	5.03	136.00	29.27
15-Aug	2209	12.00	5.05	136.88	28.84
15-Aug	2210	12.03	5.03	135.51	27.98
15-Aug	2211	12.00	5.05	139.34	28.83
15-Aug	2212	12.04	5.03	137.37	27.06
15-Aug	2213	12.03	5.04	136.39	27.39
15-Aug	2214	12.02	5.05	136.68	27.31
15-Aug	2215	12.04	5.03	139.92	28.03
15-Aug	2216	12.01	5.06	141.20	27.90
15-Aug	2217	12.02	5.05	142.87	28.20
15-Aug	2218	11.98	5.07	146.41	29.61
15-Aug	2219	12.05	5.03	141.99	27.13
15-Aug	2220	12.05	5.03	142.18	28.06
15-Aug	2221	12.03	5.05	143.07	27.55
15-Aug	2222	12.05	5.03	145.62	28.77
15-Aug	2223	12.01	5.06	146.50	28.96
15-Aug	2224	12.03	5.04	146.80	30.17
15-Aug	2225	12.00	5.06	150.23	31.45
	Average	12.04	5.03	140.6	31.4
	Minimum	11.98	4.98	132.8	27.1
	Maximum	12.12	5.07	151.6	36.6
Mass Concentration (mg/m3 dry)		**n/a**	**n/a**	**163.8**	**28.5**
Mass Concentration (mg/m3 dry) Corrected to 16% O2				**90.6**	**15.8**

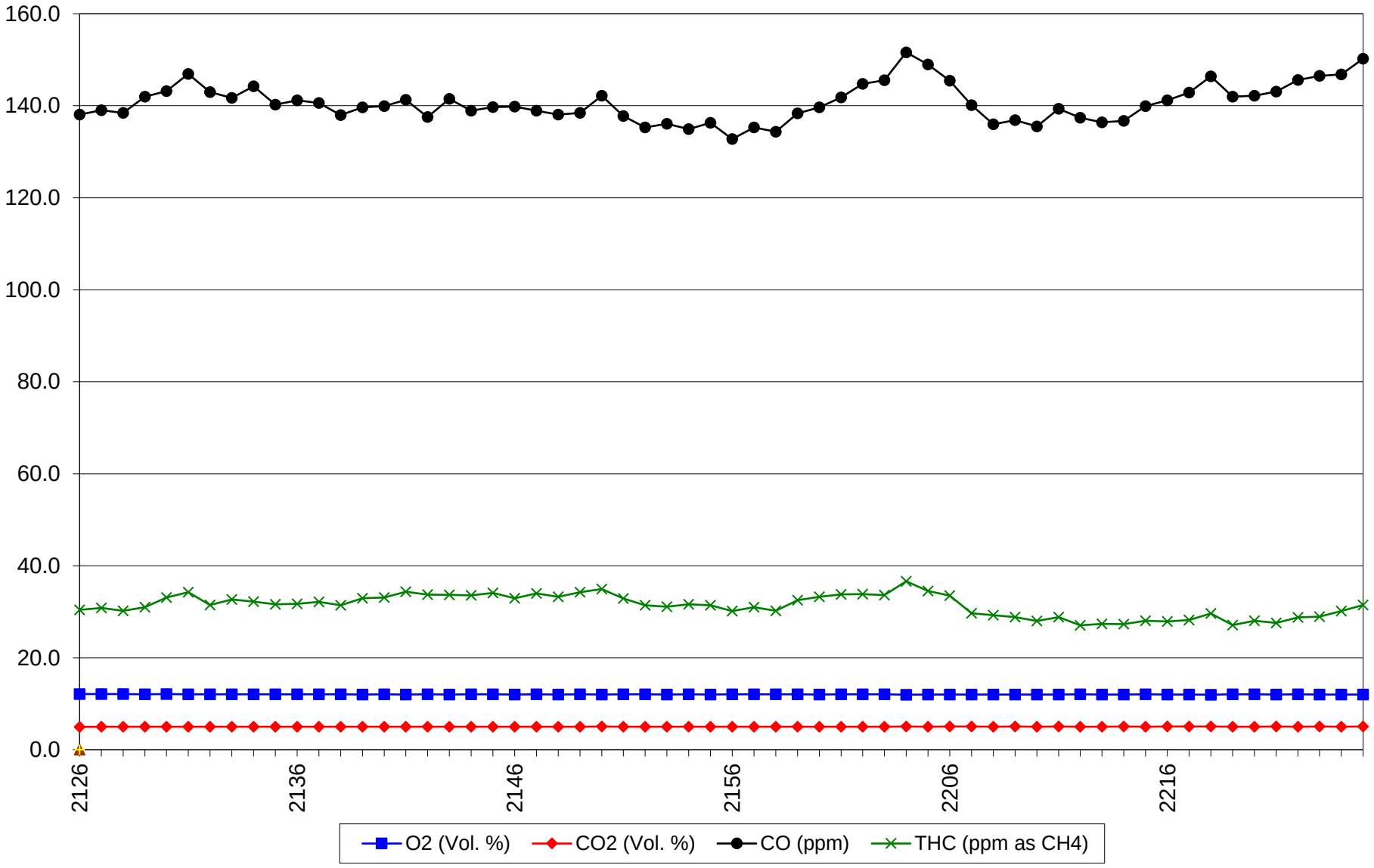
Calibration Summary				
Analyzer Range	25.00	20.00	1000.00	100.00
Cylinder Value	11.02	11.00	244.50	46.20
Analyzer Calibration Span	11.10	10.96	246.00	-
Analyzer Calibration Zero	0.05	0.00	-1.00	-
Initial System Span Response	11.00	11.00	265.00	45.00
Final System Span Response	11.00	11.00	267.00	43.00
Initial System Zero Response	0.00	0.00	14.00	1.00
Final System Zero Response	0.04	0.02	20.00	1.00

Error Summary					**Limits**
Analyzer Cal. Error	0.3%	-0.2%	0.2%	-2.6%	(+/- 2% or 5% THC)
Initial Span Bias (% of Span)	-0.4%	0.2%	1.9%	-	(+/- 5%)
Final Span Bias (% of Span)	-0.4%	0.2%	2.1%	-	(+/- 5%)
Initial Zero Bias (% of Span)	-0.2%	0.0%	1.5%	-	(+/- 5%)
Final Zero Bias (% of Span)	0.0%	0.1%	2.1%	-	(+/- 5%)
Test Span Drift (% of Span)	0.0%	0.0%	0.2%	-2.0%	(+/- 3%)
Test Zero Drift (% of Span)	0.2%	0.1%	0.6%	0.0%	(+/- 3%)

Baghouse Stack - Run 2 (August 15, 2023)

All Roads - Coquitlam, BC

METLab CEM Results



A. Lanfranco and Associates Inc.

A. Lanfranco and Associates Inc.
METLab CEM Report

Client: All Roads - Coquitlam, BC
Source: Baghouse
Run: 3

Moisture % = 26.33

O2 Correction 16
Year: 2023

Date	Time	O2 (Vol. %)	CO2 (Vol. %)	CO (ppm)	THC (ppm as CH_4)
15-Aug	2241	12.02	5.05	147.68	31.33
15-Aug	2242	12.02	5.06	152.00	33.03
15-Aug	2243	12.04	5.04	149.74	31.80
15-Aug	2244	12.01	5.06	149.25	31.80
15-Aug	2245	12.05	5.04	145.82	30.98
15-Aug	2246	12.03	5.05	147.29	31.65
15-Aug	2247	12.06	5.03	144.54	30.89
15-Aug	2248	12.04	5.05	147.29	31.53
15-Aug	2249	12.05	5.04	145.13	31.17
15-Aug	2250	12.07	5.03	145.03	31.33
15-Aug	2251	12.05	5.04	146.90	32.37
15-Aug	2252	12.08	5.02	142.97	30.88
15-Aug	2253	12.05	5.04	144.05	31.58
15-Aug	2254	12.08	5.02	142.67	31.31
15-Aug	2255	12.06	5.04	144.93	32.70
15-Aug	2256	12.06	5.04	143.85	31.40
15-Aug	2257	12.07	5.03	143.17	32.16
15-Aug	2258	12.05	5.05	142.77	32.46
15-Aug	2259	12.09	5.02	143.56	32.11
15-Aug	2300	12.05	5.05	146.50	33.08
15-Aug	2301	12.08	5.03	144.74	34.35
15-Aug	2302	12.04	5.05	149.65	36.96
15-Aug	2303	12.04	5.05	152.69	37.19
15-Aug	2304	12.03	5.06	151.81	37.24
15-Aug	2305	11.99	5.08	152.40	36.30
15-Aug	2306	12.04	5.05	150.43	36.75
15-Aug	2307	12.02	5.06	149.94	35.57
15-Aug	2308	12.08	5.03	146.11	33.56
15-Aug	2309	12.06	5.04	144.54	33.46
15-Aug	2310	12.10	5.02	143.36	31.67
15-Aug	2311	12.13	5.00	142.28	31.40
15-Aug	2312	12.09	5.03	143.66	30.77
15-Aug	2313	12.13	5.01	141.99	30.85
15-Aug	2314	12.09	5.03	143.26	29.06
15-Aug	2315	12.12	5.01	140.51	29.59
15-Aug	2316	12.10	5.03	147.19	31.46
15-Aug	2317	13.44	4.29	136.00	31.51
15-Aug	2318	12.29	4.89	157.89	40.63
15-Aug	2319	12.04	5.06	161.72	38.92
15-Aug	2320	12.06	5.05	156.32	36.20
15-Aug	2321	12.03	5.06	157.70	35.71
15-Aug	2322	12.08	5.04	157.21	35.84
15-Aug	2323	12.08	5.04	155.24	36.37
15-Aug	2324	12.10	5.03	152.40	32.74
15-Aug	2325	12.10	5.03	150.23	32.00
15-Aug	2326	12.08	5.04	149.45	32.78
15-Aug	2327	12.12	5.03	149.25	32.71
15-Aug	2328	12.08	5.04	148.57	31.89
15-Aug	2329	12.13	5.02	144.15	30.31
15-Aug	2330	12.11	5.03	141.40	30.07
15-Aug	2331	12.15	5.01	137.37	30.15
15-Aug	2332	12.14	5.01	136.59	29.26
15-Aug	2333	12.12	5.03	133.35	29.16
15-Aug	2334	12.14	5.01	134.62	29.79
15-Aug	2335	12.12	5.02	133.35	29.54
15-Aug	2336	12.18	4.99	129.91	28.04
15-Aug	2337	12.16	5.00	125.88	26.63
15-Aug	2338	12.19	4.99	124.70	27.03
15-Aug	2339	12.18	4.99	124.41	27.64
15-Aug	2340	12.15	5.01	124.90	26.48
	Average	12.13	5.01	144.16	32.44
	Minimum	11.99	4.29	124.41	26.48
	Maximum	13.44	5.08	161.72	40.63
Mass Concentration (mg/m3 dry)		**n/a**	**n/a**	**168.0**	**29.4**
Mass Concentration (mg/m3 dry) Corrected to 16% O2				**93.9**	**16.4**

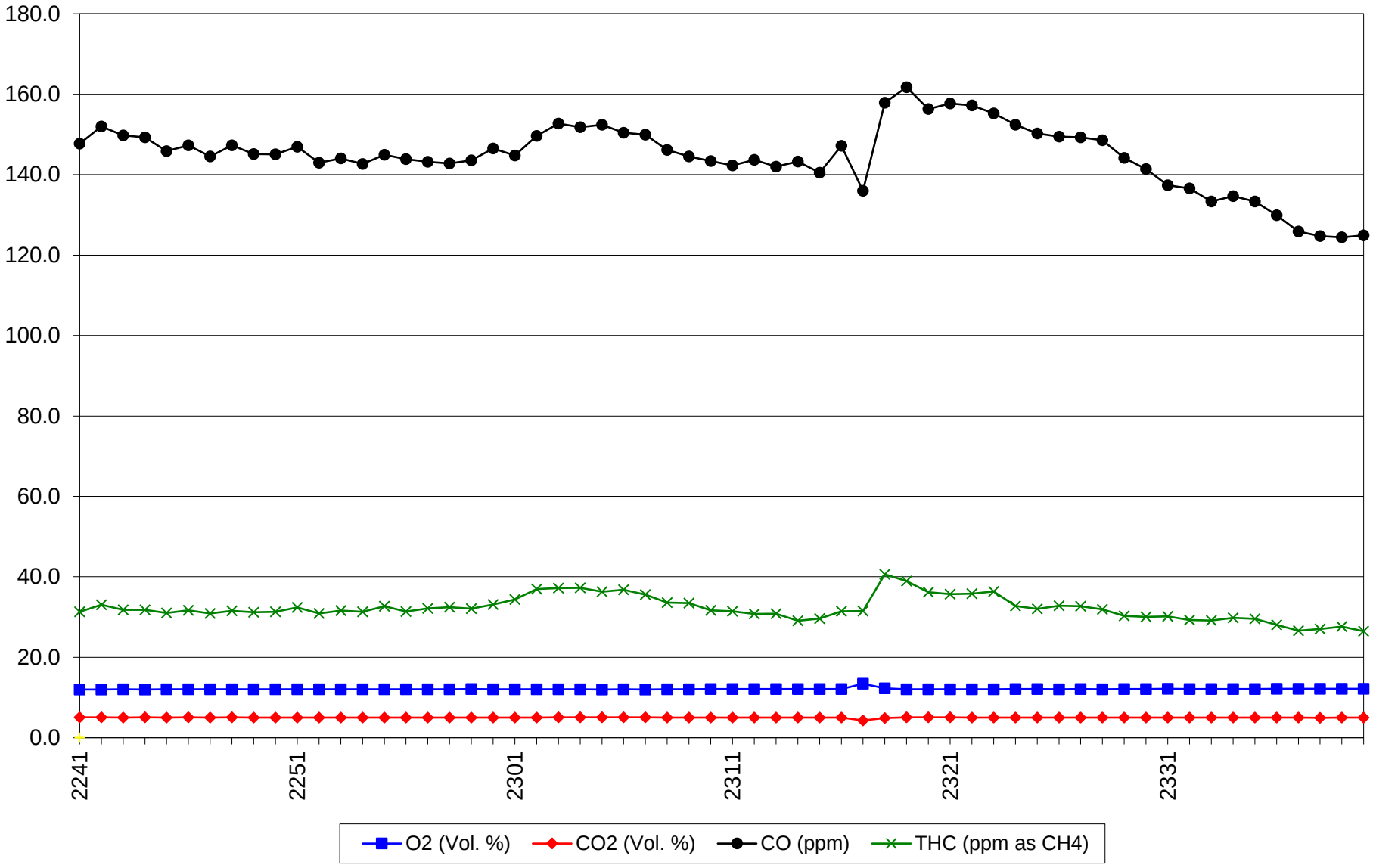
Calibration Summary				
Analyzer Range	25.00	20.00	1000.00	100.00
Cylinder Value	11.02	11.00	244.50	46.20
Analyzer Calibration Span	11.10	10.96	246.00	-
Analyzer Calibration Zero	0.05	0.00	-1.00	-
Initial System Span Response	11.00	11.00	265.00	45.00
Final System Span Response	11.00	11.00	267.00	43.00
Initial System Zero Response	0.00	0.00	14.00	1.00
Final System Zero Response	0.04	0.02	20.00	1.00

Error Summary					**Limits**
Analyzer Cal. Error	0.3%	-0.2%	0.2%	-2.6%	(+/- 2% or 5% THC)
Initial Span Bias (% of Span)	-0.4%	0.2%	1.9%	-	(+/- 5%)
Final Span Bias (% of Span)	-0.4%	0.2%	2.1%	-	(+/- 5%)
Initial Zero Bias (% of Span)	-0.2%	0.0%	1.5%	-	(+/- 5%)
Final Zero Bias (% of Span)	0.0%	0.1%	2.1%	-	(+/- 5%)
Test Span Drift (% of Span)	0.0%	0.0%	0.2%	-2.0%	(+/- 3%)
Test Zero Drift (% of Span)	0.2%	0.1%	0.6%	0.0%	(+/- 3%)

Baghouse Stack - Run 3 (August 15, 2023)

All Roads - Coquitlam, BC

METLab CEM Results



A. Lanfranco and Associates Inc.

APPENDIX 2

CALCULATIONS

The following sections show the equations and define the variables that were used for this survey. The equations are organized in four sections. Equations 1-11 were used to calculate particulate concentration at standard conditions on a dry basis and with an Oxygen correction. Equations 11-26 were used to sample within the 100 ± 10% isokinetic variation and to confirm that sampling meets this isokinetic variation threshold. Equations 26-28 were used to calculate the volumetric flowrate of the stack flue gas. Equations 29-36 were used to calculate the results from the CEM system.

A2.1 Contaminant Concentration Calculations

$$c = \frac{m}{V_{std}} \quad \textbf{Equation 1}$$

$$m_{part} = m_{filter} + m_{pw} + m_{cond} \quad \textbf{Equation 2}$$

$$m_i = m_{ana,i} - m_{blank} \quad \textbf{Equation 3}$$

$$V_{std} = \frac{V_{std(imp)}}{35.315} \quad \textbf{Equation 4}$$

$$V_{std(imp)} = \frac{V_{samp} \times y \times P_m \times (T_{std} + 459.67)}{P_{std} \times (T_{m(ave)} + 459.67)} \quad \textbf{Equation 5}$$

$$V_{samp} = V_{final} - V_{init} \quad \textbf{Equation 6}$$

$$P_m = P_B + \frac{\Delta H_{ave}}{13.6} \quad \textbf{Equation 7}$$

$$\Delta H_{ave} = \frac{1}{n}\sum_{i=1}^{n} \Delta H_{i(act)}, where\ n = the\ number\ of\ points \quad \textbf{Equation 8}$$

$$OC = \frac{20.9 - \%O_{2c}}{20.9 - \%O_{2m}} \quad \textbf{Equation 9}$$

$$\%O_{2m} = \frac{1}{n}\sum_{i=1}^{n} \%O_{2i}, where\ n = the\ number\ of\ O_2\ measurements \quad \textbf{Equation 10}$$

$$\%CO_{2m} = \frac{1}{n}\sum_{i=1}^{n} \%CO_{2i}, where\ n = the\ number\ of\ CO_2\ measurements \quad \textbf{Equation 11}$$

Where,

c	= *Contaminant concentration*
m	= *Contaminant mass*
m_i	= *Net analytical mass (mg, ng, or µg)*
$m_{ana,i}$	= *Analytical mass (mg, ng, or µg)*
m_{blank}	= *Blank analytical mass (mg, ng, or µg)*
m_{part}	= *Total particulate mass (mg)*
m_{filter}	= *Net particulate gain from filter (mg)*
m_{pw}	= *Net particulate gain from probe wash (mg)*
m_{cond}	= *Net condensable particulate from lab analysis (mg)*
$V_{std(imp)}$	= *Sample volume at standard conditions (ft^3)*
V_{std}	= *Sample volume at standard conditions (m^3)*
V_{samp}	= *Sample volume at actual conditions (ft^3)*
V_{final}	= *Final gas meter reading (ft^3)*
V_{init}	= *Initial gas meter reading (ft^3)*
T_{std}	= *Standard temperature (68 °F)*
T_m	= *Gas meter temperature (°F)*
$T_{m(ave)}$	= *Average gas meter temperature (°F)*
P_m	= *Absolute meter pressure (inches of Hg)*
P_B	= *Barometric pressure (inches of Hg)*
ΔH_{ave}	= *Average of individual point orifice pressures (inches of H_2O)*
$\Delta H_{i(act)}$	= *Individual recorded point orifice pressures (inches of H_2O)*
OC	= *Oxygen correction factor (dimensionless)*
$\%O_{2c}$	= *Oxygen concentration to correct to (% dry basis)*
$\%O_{2m}$	= *Average measured stack gas oxygen concentration (% dry basis)*
$\%CO_{2m}$	= *Average measured stack gas oxygen concentration (% dry basis)*

Equation 1 is the general concentration calculation used for all contaminants. The contaminant mass, *m*, is the net analytic mass for the given contaminant. For particulate, *m* is the sum of the mass contributed from probe washing and filter particulate.

A2.2 Isokinetic Variation Calculations

$$\Delta H_i = \frac{2.62 \times 10^7 \times c_p \times A_n \times (1 - B_{wo}) \times M_D \times (T_m + 459.67) \times \Delta p_i}{k_o \times M_w \times (T_{Stk} + 459.67)}$$ **Equation 11**

$$R_m = 85.49 \times c_p \times \sqrt{\Delta p_i} \times \sqrt{\frac{(T_{stk_i} + 459.67)}{M_w \times P_B}} \times 60 \times A_n \times \frac{(T_{m_i} + 459.67) \times (1 - B_{wo})}{(T_{stk_i} + 459.67) \times y}$$ **Equation 12**

$$A_n = \pi \left(\frac{d_n}{24}\right)^2$$ **Equation 13**

$$M_w = M_D \times (1 - B_{wo}) + 18 \times B_{wo}$$ **Equation 14**

$$M_D = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + 0.28 \times (100 - \%CO_2 - \%O_2)$$ **Equation 15**

$$T_{Stk} = \frac{1}{n}\sum_{i=1}^{n} T_{Stk_i}, where\ n = the\ number\ of\ points$$ **Equation 16**

$$B_{wo} = \frac{V_{cond}}{V_{cond} + V_{std(imp)}}$$ **Equation 17**

$$V_{cond} = 0.04707 \times V_{gain}$$ **Equation 18**

$$Iso = \frac{1}{n}\sum_{i=1}^{n} Iso_i, where\ n = the\ number\ of\ points$$ **Equation 19**

$$Iso_i = \frac{v_{nzi}}{v_i}$$ **Equation 20**

$$v_i = 85.49 \times c_p \times \sqrt{\Delta p_i} \times \sqrt{\frac{(T_{Stk_i} + 459.67)}{(P_{Stk} \times M_W)}}$$ **Equation 21**

$$v_{nzi} = \frac{(V_i - V_{i-1}) \times y \times (T_{Stk_i} + 459.67) \times (P_B + \frac{\Delta H_{i(act)}}{13.6})}{A_n \times t_i \times 60 \times (T_{m(i)} + 459.67) \times P_{stk} \times (1 - B_{wo})}$$ **Equation 22**

$$P_{stk} = P_B + \frac{P_g}{13.6}$$ **Equation 23**

Equation 24

$$v_{stk} = \frac{1}{n}\sum_{i=1}^{n} v_i \text{ , where } n = \text{the number of points}$$

Equation 25

$$v_{nz} = \frac{1}{n}\sum_{i=1}^{n} v_{nzi} \text{ , where } n = \text{the number of points}$$

Where,

A_n	= *Nozzle area (ft^2)*
d_n	= *Diameter of nozzle (inches)*
c_p	= *Pitot coefficient (dimensionless)*
Δp_i	= *Individual point differential pressures (inches of H_2O)*
T_{Stk}	= *Average flue gas temperature (°F), second subscript i, indicates individual point measurements*
$\Delta H_{i(act)}$	= *Calculated individual point orifice pressures (inches of H_2O)*
P_g	= *Stack Static pressure (inches of H_2O)*
P_{stk}	= *Absolute stack pressure (inches of Hg)*
M_w	= *Wet gas molecular weight (g/gmol)*
M_D	= *Dry gas molecular weight (g/gmol)*
$\%CO_2$	= *Stack gas carbon dioxide concentration (% dry basis)*
$\%O_2$	= *Stack gas oxygen concentration (% dry basis)*
B_{wo}	= *Stack gas water vapour, proportion by volume*
V_{cond}	= *Total volume of water vapor collected, corrected to standard conditions (ft^3)*
V_{gain}	= *Condensate gain of impinger contents (mL)*
P_{std}	= *Standard pressure (29.92 inches of Hg)*
v_{stk}	= *Average flue gas velocity (ft/sec)*
v_i	= *Individual point flue gas velocity (ft/sec)*
v_{nz}	= *Average velocity at nozzle(ft/sec)*
v_{nzi}	= *Individual point velocity at nozzle(ft/sec)*
Iso_i	= *Individual point isokinetic variation (%)*
Iso	= *Average isokinetic variation (%)*
R_m	= *Isokinetic sampling rate (ft^3/min)*

A2.3 Volumetric Flowrate Calculations

$$Q_S = Q_A \times \frac{(T_{Std} + 459.67)}{(T_{Stk} + 459.67)} \times \frac{P_{Stk}}{P_{Std}}$$ **Equation 26**

$$Q_A = \frac{v_{stk} \times 60 \times A_{stk}}{35.315}$$ **Equation 27**

$$A_{stk} = \pi \left(\frac{d}{24}\right)^2$$ **Equation 28**

Where,

Q_A = *Actual flowrate (Am^3/min)*
Q_S = *Flowrate (m^3/min) at standard conditions on a dry basis*
A_{stk} = *Area of stack (ft^2)*
d = *Diameter of stack (inches)*

A2.4 CEM Calculations

$$[CEM]_i = \frac{(2 \times [CEM]_{mi} - (Z_F + Z_I))}{(S_I + S_F) - (Z_I + Z_F)} \times G_c$$ **Equation 29**

$$E_A = \left(\frac{A_{IS} - G_C}{G_C}\right) \times 100\%$$ **Equation 30**

$$B_{IS} = \left(\frac{S_I - A_{IS}}{R}\right) \times 100\%$$ **Equation 31**

$$B_{FS} = \left(\frac{S_F - A_{IS}}{R}\right) \times 100\%$$ **Equation 32**

$$B_{IZ} = \left(\frac{Z_I - A_{IZ}}{R}\right) \times 100\%$$ **Equation 33**

$$B_{FZ} = \left(\frac{Z_F - A_{IZ}}{R}\right) \times 100\%$$ **Equation 34**

$$D_S = \left(\frac{S_F - S_I}{R}\right) \times 100\%$$ **Equation 35**

$$D_Z = \left(\frac{Z_F - Z_I}{R}\right) \times 100\%$$ **Equation 36**

Where:

$[CEM]_i$ = One-minute average calibration corrected CEM parameter concentration (ppm or % vol)

$[CEM]_{mi}$ = One-minute average measured CEM parameter concentration (ppm or % vol)

S_I = Initial calibration span gas system response (ppm or % vol)

S_F = Final calibration span gas system response (ppm or % vol)

Z_I = Initial calibration zero gas system response (ppm or % vol)

Z_F = Final calibration zero gas system response (ppm or % vol)

A_{IS} = Initial calibration span gas analyzer response (ppm or % vol)

A_{IZ} = Final calibration zero gas analyzer response (ppm or % vol)

E_A = Analyzer calibration error (%)

B_{IS} = Initial system span bias (%)

B_{FS} = Final system span bias (%)

B_{IZ} = Initial system zero bias (%)

B_{FZ} = Final system zero bias (%)

D_S = Test span drift (%)

D_Z = Test zero drift (%)

G_c = Calibration span gas certified concentration (ppm or % vol)

R = Analyzer range (ppm or % vol)

APPENDIX 3

ANALYTICAL

ANALYTICAL RESULTS

Client:	All Roads	**Sample Date:**	Aug.15, 2023
Source:	Baghouse Stack	**Location:**	Coquitlam, BC

A. Lanfranco & Associates Standard Operating Procedure:

SOP 1.2.1 Gravimetric determination of total particulate matter

	Initial (g)	Final (g)	Net (g)	Blank Corrected Net (g)
Filters				
Run 1	0.3497	0.3497	0.0000	ND
Run 2	0.3482	0.3491	0.0009	0.0008
Run 3	0.3500	0.3500	0.0000	ND
Blank	0.3492	0.3493	0.0001	
Probe Washes				
Run 1	119.6189	119.6218	0.0029	0.0014
Run 2	103.1428	103.1449	0.0021	0.0006
Run 3	127.1831	127.1855	0.0024	0.0009
Blank	113.0691	113.0706	0.0015	
Silica Gels				
Run 1	200.0	210.8	10.8	10.8
Run 2	200.0	210.3	10.3	10.3
Run 3	200.0	210.0	10.0	10.0

Task	**Personnel**	**Date**	**Quality Control**	**Y/N**
Filter Recovery:	S.Verby	Aug.18, 2023	Adequate PW volume:	Y
PW Initial Analysis:	S.Verby	Aug.18, 2023	No sample leakage:	Y
PW, Filter and Gel Final Analysis:	S. Verby	Aug.23, 2023	Filter not compromised:	Y
Data entered to computer:	M.Lanfranco	Aug.28, 2023		

Comments:

No problems encountered in sample analysis.

APPENDIX 4

FIELD DATA SHEETS

A. Lanfranco and Associates Inc.

CLIENT	All Roads	NOZZLE	ST-65 DIAMETER, IN. 0.3380
SOURCE	Baghouse stack	PROBE	SA-1 Cp 0.8432
PARAMETER / RUN No	Port 1	PORT LENGTH	3.5"
DATE	August 15 '23	STATIC PRESSURE, IN. H2O	-0.16
OPERATOR:		STACK DIAMETER	54.0 "
CONTROL UNIT	AL-1 Y 0.9857 ΔH@ 1.89	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	29.85	INITIAL LEAK TEST	0.001 @ 15 "
ASSUMED MOISTURE, Bw	30%	FINAL LEAK TEST	0.001 @ 15 "

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	100	313	213
Imp. #2	100	200	100
Imp. #3	0	16	16
Imp. #4	200		
Imp. #5			
Imp. #6			
Upstream Diameters			
Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Equipment: CEMS CO_2 Vol. %	O_2 Vol. %
1	20:10	189.85										
2		193.80	0.28	1.84	87	200	230	252	58	5		
3		193.74	0.28	1.83	87	207						
4		193.75	0.30	1.97	87	207	230	250	58	5	5.0	12.0
5		197.76	0.30	1.97	87	207						
6		199.63	0.28	1.70	87	204	251	251	58	5		
7		201.42	0.24	1.57	88	204						
8		203.18	0.22	1.44	88	206	251	251	58	5		
9		204.86	0.22	1.44	88	206						
10		206.58	0.22	1.43	88	208	250	252	58	4		
11		208.26	0.21	1.37	88	208						
12		211.37	0.20	1.30	88	206	250	251	58	4		
1		213.37	0.28	1.97	86	210	250	250	58	5		
2		215.51	0.30	1.94	86	214						
3		217.49	0.30	1.94	87	214	251	250	58	5		
4		219.42	0.28	1.80	87	215						
5		221.37	0.27	1.73	87	213	250	250	59	5		
6		223.10	0.24	1.58	87	215						
7		224.81	0.22	1.47	87	214	251	251	59	4		
8		226.51	0.22	1.47	87	214						
9		228.21	0.22	1.47	87	214	252	250	59	4		
10		229.86	0.20	1.30	87	214						
11		231.30	0.20	1.30	88	212	252	251	59	4		
12	21:11	233.13	0.20	1.30	88	212						

A. Lanfranco and Associates Inc.

MP

CLIENT	All Roads	NOZZLE S-65 DIAMETER, IN. 0.330	
SOURCE	Baghouse Stack Port	PROBE SA-2 Cp 0.8432	
PARAMETER / RUN No	2	PORT LENGTH 3.5"	
DATE	August 15/23	STATIC PRESSURE, IN. H2O -0.16	
OPERATOR:		STACK DIAMETER 54.0	
CONTROL UNIT	ML-1 Y 0.985 ΔH@	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	29.85	INITIAL LEAK TEST 0.001 @ 15"	
ASSUMED MOISTURE, Bw	28/0 ~	FINAL LEAK TEST 0.001 @ 15"	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	100	355	255
Imp. #2	100	145	45
Imp. #3		15	15
Imp. #4	200		
Imp. #5			
Imp. #6			
Upstream Diameters			
Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	CO_2 Vol. %	O_2 Vol. %
1	21:21	233.387										
1		235.36	0.28	1.90	85	210	140	160	58	5		
2		237.37	0.29	1.96	85	210						
3		239.41	0.30	2.03	85	210	161	149	58	5		
4		241.38	0.28	1.88	85	214						
5		243.28	0.26	1.73	85	215	161	149	58	6		
6		245.10	0.24	1.61	86	213						
7		246.85	0.21	1.30	83	214	162	161	58	4		
8		248.60	0.22	1.48	86	212						
9		250.35	0.22	1.48	86	211	160	160	59	4		
10		252.10	0.22	1.50	86	211						
11		253.85	0.22	1.50	86	211	160	157	59	4		
12		255.32	0.20	1.36	86	212						
1		257.51	0.28	1.91	86	206	160	151	58	5		
2		259.30	0.28	1.90	86	210						
3		261.36	0.31	2.10	86	214	151	150	58	5		
4		263.62	0.31	2.08	86	216						
5		265.350	0.27	1.82	86	213	161	160	58	6		
6		267.200	0.26	1.75	87	216						
7		269.220	0.22	1.50	87	214	162	149	58	4		
8		270.888	0.20	1.33	86	214						
9		272.535	0.20	1.33	86	213	161	149	58	4		
10		274.191	0.20	1.35	86	213						
11		275.858	0.20	1.33	86	213	160	148	58	4		
12	22:23	277.535	0.20	1.35	86	214						

A. Lanfranco and Associates Inc.

CLIENT	All Roads	NOZZLE S165 DIAMETER, IN. 0.3380	
SOURCE	Baghouse Stack Port	PROBE S-2 Cp 0.8437	
PARAMETER / RUN No	3	PORT LENGTH 3.5"	
DATE	August 15/23	STATIC PRESSURE, IN. H2O −0.16	
OPERATOR:		STACK DIAMETER 54.0"	
CONTROL UNIT	AL-1 Y 0.9837 ΔH@ 1.82	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	29.83	INITIAL LEAK TEST 0.001 @ 15"	
ASSUMED MOISTURE, Bw	28%	FINAL LEAK TEST 0.001 @ 15	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	100	330	230
Imp. #2	100	130	30
Imp. #3	0	10	10
Imp. #4	900		
Imp. #5			
Imp. #6			
Upstream Diameters			
Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Ratios CEMS: CO_2 Vol. %	O_2 Vol. %
1	10:37	277.88	0.28	1.90	88	212	246	242	48	4		
2		281.82	0.28	1.89	88	213						
3		285.89	0.30	2.03	88	213	248	250	48	4		
4		289.94	0.30	2.07	88	215						
5		293.86	0.26	1.73	88	215	248	251	48	4		
6		297.77	0.26	1.73	88	215						
7		301.37	0.23	1.53	89	213	250	251	49	3		
8		305.33	0.22	1.50	89	213						
9		309.10	0.22	1.50	89	215	250	251	49	3		
10		312.85	0.22	1.48	88	213						
11		316.37	0.21	1.47	88	214	251	250	48	3		
12		320.24	0.20	1.35	87	214						
1		324.29	0.30	2.03	87	213	250	252	48	4		
2		328.30	0.29	1.96	87	213						
3		332.31	0.29	1.96	88	213	251	251	49	4		
4		336.26	0.27	1.83	88	213						
5		340.17	0.26	1.76	88	214	251	251	49	4		
6		344.22	0.24	1.62	88	214						
7		348.23	0.22	1.50	88	212	250	252	49	3		
8		352.17	0.21	1.42	88	212						
9		356.15	0.20	1.36	88	212	250	250	49	3		
10		360.14	0.20	1.36	88	212						
11		364.32	0.20	1.36	89	211	252	250	49	3		
12	11:38	368.20	0.20	1.36	89	211						

215 TPH
17 % RAP
158 °C

ML

CEM FIELD DATA SHEET

Client: All Rds
Source: Baghouse
Date: Aug 15/23

Technician: ML
Ambient Temp (°C):
Barometric Pressure (in. Hg):

	N_2	H_2	1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	O_2	Comb Air	Low Meth	Mid Meth	High Meth
Cylinder #				659	32B			591			063	785
Pressure (psi)				350	1200			1000			1150	900
Expiry Date												
O_2 (%)								11.02				
CO_2 (%)								11.09				
CO (ppm)				244.5	943.5							
THC (ppm)											46.2	89.8
SO_2 (ppm)												
NOx (ppm)												

Analyzer Range	O_2	CO_2	CO	THC	SO_2	NOx
	25	40	1000	100		

CEM READINGS

Time	Source	O_2	CO_2	CO	THC	SO_2	NOx	Response Time (sec)
	N2	0.05	0	−1	1			O_2 Up
	Amb	20.9						O_2 Dn
	O2	11.1	11					CO_2 Up
	mid			446				CO_2 Dn
	high			246				CO Up
	N2	0	0	−1	2			CO Dn
	O2	11.04	10.96					THC Up
	mid			247				THC Dn
	high			446				SO_2 Up
	mid CH4				46			SO_2 Dn
	high CH4				90			NOx Up
	N2	0.05	0.04	−1	0			NOx Dn
8:10pm	Run 1							
	N2	0	0	14	1			
	O2	11	11					
	mid			265				
	mid CH4				45			
925	Run 2	0.04	0.02	20	1			
1040	Run 3							
	N2							
	O2	11	11					
	mid			267				
	mid CH4				43			

APPENDIX 5

CALIBRATION DATA AND

CERTIFICATIONS

Pitot Tube Calibration

Date: 27-Jun-23
Pbar (in.Hg): 29.84

Temp (R): 539
Dn (in.): 0.25

Pitot ID: **5A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.057	0.077	16.0	0.8518	0.0059
0.180	0.240	28.4	0.8574	0.0115
0.245	0.345	33.1	0.8343	0.0116
0.425	0.570	43.6	0.8549	0.0090
0.560	0.795	50.0	0.8309	0.0149
		Average :	0.8458	0.0106

Pitot ID: **5A-2**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.055	0.075	15.7	0.8478	0.0046
0.090	0.125	20.1	0.8400	0.0031
0.280	0.370	35.4	0.8612	0.0181
0.360	0.500	40.1	0.8400	0.0031
0.530	0.760	48.7	0.8267	0.0164
		Average :	0.8432	0.0091

Pitot ID: **ST 5A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.025	0.035	10.6	0.8367	0.0050
0.115	0.160	22.7	0.8393	0.0024
0.280	0.370	35.4	0.8612	0.0195
0.540	0.760	49.1	0.8345	0.0072
0.600	0.840	51.8	0.8367	0.0050
		Average :	0.8417	0.0078

Pitot ID: **ST 5B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.055	0.075	15.7	0.8478	0.0012
0.125	0.180	23.6	0.8250	0.0216
0.200	0.280	29.9	0.8367	0.0099
0.360	0.500	40.1	0.8400	0.0066
0.680	0.840	55.1	0.8907	0.0441
		Average :	0.8466	0.0167

Pitot ID: **5A-3**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.055	0.075	15.7	0.8478	0.0110
0.125	0.180	23.6	0.8250	0.0118
0.200	0.280	29.9	0.8367	0.0001
0.360	0.500	40.1	0.8400	0.0032
0.540	0.760	49.1	0.8345	0.0023
		Average :	0.8368	0.0057

Pitot ID: **5A-4**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.055	0.075	15.7	0.8478	0.0110
0.125	0.180	23.6	0.8250	0.0118
0.280	0.370	35.4	0.8612	0.0245
0.470	0.680	45.8	0.8231	0.0137
0.530	0.760	48.7	0.8267	0.0100
		Average :	0.8368	0.0142

Pitot ID: **5A-5**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.055	0.075	15.7	0.8478	0.0055
0.170	0.230	27.6	0.8511	0.0089
0.200	0.270	29.9	0.8521	0.0098
0.470	0.680	45.8	0.8231	0.0192
0.540	0.755	49.1	0.8373	0.0050
		Average :	0.8423	0.0097

Pitot ID:

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
		Average :		

* Average absolute deviation must not exceed 0.01.

Calibrated by: Jeremy Gibbs

Signature:

Date: June 27, 2023

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada		Device (inches of Hg)		Difference
		(kPa)	(inches of Hg)	Reading	Elevation Corrected	(Env Can - Elv Corr)
LA	10-Jul-23	101.6	30.01	29.92	29.99	0.02
DS	10-Jul-23	101.6	30.01	29.91	29.98	0.03
CL	10-Jul-23	101.6	30.01	29.92	29.99	0.02
JC	10-Jul-23	101.6	30.01	29.89	29.96	0.05
LF	10-Jul-23	101.6	30.01	29.91	29.98	0.03
SH	10-Jul-23	101.6	30.01	29.90	29.97	0.04
CDO	10-Jul-23	101.6	30.01	29.89	29.96	0.05
JG	10-Jul-23	101.6	30.01	29.87	29.94	0.07
ML	10-Jul-23	101.6	30.01	29.89	29.96	0.05
BL	10-Jul-23	101.6	30.01	29.91	29.98	0.03

Calibrated by: Daryl Sampson Signature: Daryl Sampson Date: 10-Jul-23

Performance Specification is

Device Corrected for Elevation must be +/- 0.1 " Hg of ENV CANADA SEA-LEVEL Pbar

Enter Environment canada Pressure from their website for Vancouver (link below)
and the reading from your barometer on the ground floor of the office.

https://weather.gc.ca/city/pages/bc-74_metric_e.html

A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: CAE AL1
Serial #: 0028-070611-1

Date: 27-Jun-23
Barometric Pressure: 29.82 (in. Hg)
Theoretical Critical Vacuum: 14.07 (in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

---------- DRY GAS METER READINGS ----------									-CRITICAL ORIFICE READINGS-					
		Volume	Volume	Volume	Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual	-- Ambient Temperature --		
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
3.80	15.00	175.000	191.562	16.562	79.0	79.0	84.0	84.0	73	0.8185	17.0	73.0	75.0	74.0
1.90	17.00	192.100	205.646	13.546	84.0	84.0	82.0	82.0	63	0.5956	20.0	75.0	76.0	75.5
1.10	17.00	205.900	216.455	10.555	82.0	82.0	81.0	81.0	55	0.4606	22.0	76.0	76.0	76.0
0.68	18.00	217.100	225.591	8.491	81.0	81.0	80.0	80.0	48	0.3560	24.0	76.0	77.0	76.5
0.35	17.00	225.800	231.294	5.494	80.0	80.0	80.0	80.0	40	0.2408	25.0	77.0	78.0	77.5

********** RESULTS **********

--- DRY GAS METER ---		--------- ORIFICE ---------			-- DRY GAS METER --		--------- ORIFICE ---------			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
16.239	459.9	15.843	448.7	16.084	0.976	-0.010	1.862	47.29	0.042	0.708
13.184	373.4	13.048	369.5	13.283	0.990	0.004	1.758	44.66	-0.062	0.720
10.281	291.2	10.086	285.6	10.277	0.981	-0.004	1.708	43.39	-0.112	0.737
8.277	234.4	8.250	233.6	8.414	0.997	0.011	1.773	45.03	-0.047	0.713
5.356	151.7	5.265	149.1	5.380	0.983	-0.002	2.000	50.80	0.180	0.681
				Average Y---------->	**0.9852**		**Average dH@----->**	**1.820**	**46.2**	**Average Ko----->**	**0.712**

TEMPERATURE CALIBRATION

Calibration Standard -------> Omega Model CL23A S/N:T-218768

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	Results Percent of Absolute
32	32	0	0.00%
100	100	0	0.00%
300	300	0	0.00%
500	500	0	0.00%
1000	1000	0	0.00%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Justin Ching Signature: Justin Ching Date: June 27, 2023

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Christian De La O
Date: 26-Jun-23
Signature: Chris Del A O

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft^2)
ST01	0.1320	0.1315	0.1340	0.0025	0.1325	0.0000958
ST05	0.1750	0.1775	0.1775	0.0025	0.1767	0.0001702
SS-1	0.1775	0.1815	0.1785	0.0040	0.1792	0.0001751
SS-7	0.1805	0.1785	0.1775	0.0030	0.1788	0.0001744
SS-8	0.2090	0.2080	0.2100	0.0020	0.2090	0.0002382
ST10	0.2175	0.2170	0.2185	0.0015	0.2177	0.0002584
SS-18	0.2355	0.2350	0.2355	0.0005	0.2353	0.0003021
ST15	0.2430	0.2430	0.2415	0.0015	0.2425	0.0003207
SS-2	0.2470	0.2445	0.2465	0.0025	0.2460	0.0003301
SS-3	0.2485	0.2490	0.2490	0.0005	0.2488	0.0003377
SS-24	0.2500	0.2475	0.2475	0.0025	0.2483	0.0003364
B	0.2515	0.2525	0.2515	0.0010	0.2518	0.0003459
SS-14	0.2515	0.2485	0.2515	0.0030	0.2505	0.0003422
ST30	0.2510	0.2525	0.2525	0.0015	0.2520	0.0003464
ST20	0.2560	0.2575	0.2575	0.0015	0.2570	0.0003602
A	0.2585	0.2580	0.2575	0.0010	0.2580	0.0003631
SS-9	0.2730	0.2710	0.2730	0.0020	0.2723	0.0004045
ST40	0.2865	0.2865	0.2855	0.0010	0.2862	0.0004466
SS-30	0.2995	0.2980	0.3015	0.0035	0.2997	0.0004898
SS-13	0.3060	0.3070	0.3065	0.0010	0.3065	0.0005124
ST60	0.3060	0.3070	0.3050	0.0020	0.3060	0.0005107
ST50	0.3125	0.3090	0.3095	0.0035	0.3103	0.0005253
SS-10	0.3195	0.3155	0.3185	0.0040	0.3178	0.0005510
SS-327	0.3320	0.3300	0.3305	0.0020	0.3308	0.0005970
ST65	0.3385	0.3370	0.3385	0.0015	0.3380	0.0006231
ST66	0.3395	0.3375	0.3390	0.0020	0.3387	0.0006256
ST80	0.3670	0.3675	0.3670	0.0005	0.3672	0.0007353
ST75	0.3725	0.3725	0.3700	0.0025	0.3717	0.0007534
SS-5	0.3725	0.3735	0.3745	0.0020	0.3735	0.0007609
SS-16	0.3780	0.3765	0.3780	0.0015	0.3775	0.0007773
ST76	0.3750	0.3765	0.3780	0.0030	0.3765	0.0007731
ST85	0.4035	0.4020	0.4010	0.0025	0.4022	0.0008821
SS-15	0.4070	0.4070	0.4040	0.0030	0.4060	0.0008990
DD	0.4135	0.4145	0.4125	0.0020	0.4135	0.0009326
SS11	0.4225	0.4200	0.4225	0.0025	0.4217	0.0009698
ST70	0.4270	0.4260	0.4270	0.0010	0.4267	0.0009929
ST86	0.4565	0.4575	0.4545	0.0030	0.4562	0.0011349
C	0.4865	0.4890	0.4895	0.0030	0.4883	0.0013006
SS-491	0.4980	0.4960	0.4980	0.0020	0.4973	0.0013490
SS-49	0.5010	0.5010	0.5015	0.0005	0.5012	0.0013699
SS-6	0.4985	0.4985	0.4995	0.0010	0.4988	0.0013572
SS-492	0.4955	0.4955	0.4975	0.0020	0.4962	0.0013427
ST90	0.5050	0.5065	0.5045	0.0020	0.5053	0.0013928
ST92	0.5055	0.5040	0.5065	0.0025	0.5053	0.0013928
SS-558	0.5600	0.5600	0.5605	0.0005	0.5602	0.0017114
ST96	0.5605	0.5580	0.5615	0.0035	0.5600	0.0017104
SS-635	0.6435	0.6415	0.6430	0.0020	0.6427	0.0022527
SS-12	0.7460	0.7460	0.7470	0.0010	0.7463	0.0030380

Where:

(a) D1, D2, D3 = three different nozzle diameters; each diameter must be measured to within (0.025mm) 0.001 in.

(b) Difference = maximum difference between any two diameters; must be less than or equal to (0.1mm) 0.004 in.

(c) Average = average of D1, D2 and D3

MESSER

Whitby Spec Gas Plant/Usine
530 Watson Street East
Whitby ON L1N 5R9
Canada

MCRT 4 COMP NITROGEN BAL 152SZ/ MCRT 4 COMP AZOTE BAL 152SZ CERTIFIED

Component Composant			Nominal Nominale	Certified Certifiée
Carbon Monoxide / MONOXYDE CARBONE			450 PPM	443.5 PPM
Sulfur Dioxide / DIOXYDE SOUFRE			190 PPM	183.2 PPM
Nitric Oxide / OXYDE NITRIQUE			460 PPM	465.2 PPM
Nitrogen / AZOTE			BAL	
NO2	<=	4.6	PPM	0.2

Cylinder Details/ Détails - bouteille:
Cylinder Size/ Taille de la bouteille: 152 Contents/ Capacité: 3.703 M3 Valve Outlet/ Robinet de sortie: 660 Nominal Pressure/Pression nominale: 2,000 PSG

Analytical Details/ Détails d'analyse:
Certification Accuracy ± 2% for concentrations 10 ppm and above, ± 5% for concentrations < 10 ppm.
INMS and NIST traceability by one of the following: 1) Mass calibration certificate 2154736Z, 2154736B, 1845447, 2204452, W-017181-11799 or W-028737-17611; 2) Comparison to SRM or NTRM gas mixture.
Certification de précision ± 2% pour des concentrations de 10 ppm et plus, ± 5% pour des concentrations < 10 ppm.
Traçabilité IENM et NIST par l'une des façons suivantes : 1) Certificat d'étalonnage de la masse 2154736Z, 2154736B, 1845447, 2204452, W-017181-11799 ou W-028737-17611; 2) Comparaison avec le mélange gazeux SRM ou NTRM.

Messer Canada Inc. plant management quality system is ISO 9001 registered. The product furnished under the referenced lot number is certified to contain the component concentration listed above. All values are mole/mole basis gas phase unless otherwise indicated. The reported uncertainty is at the 95% confidence level assuming a normal distribution. Messer Canada Inc. warrants that the above product conforms at time of shipment to the above description. The customers exclusive remedy should any of the products furnished under this certificate of analysis not conform to the manufacturers description shall be to receive replacement of the product or refund of the purchase price.

Le système de gestion de la qualité des usines de Messer Canada Inc. a été enregistré avec la Norme internationale ISO 9001. Il est certifié que tout produit fourni, avec un numéro de lot spécifié, contient la concentration d'éléments ci-dessus mentionnés. Toutes les valeurs sont exprimés en mole/ phase gazeuse, sauf indication contraire. Les incertitudes indiquées dans les descriptions sont des incertitudes élargies correspondant à un niveau de confiance d'environ 95 p. 100. Elles sont fondées sur une distribution normale. Messer Canada Inc.'garantit qu'au moment de l'expédition, le produit est conforme à la description ci-dessus. Si l'un des produits fournis en vertu de ce certificat d'analyse n'est pas conforme à la description du fabricant, le recours exclusif du client sera d'exiger le remboursement ou le remplacement du produit.

To reorder, please quote/ Pour renouveler une commande, veuillez indiquer le code: 24108722
Certificate Date (mm/dd/yy) / Date du certificat (mm/jj/aa) :06/15/2021 Use by / Utilisé par: 06/14/2024

Approved Signature/ Approbation du Signataire
Analyst/Analyste: Guihai Zhao

Lot No./ No. lot	Cylinder No./ No. bouteille	Code	Page
1501031	XC015932B	24108722	1/1

Edmonton Spec Gas Plant/Usine
12143 68th Street
Edmonton AB T5B 1P9
Canada

MESSER

MEPA METHANE 45PPM N2 BAL 152SZ/ MEPA MÉTHANE 45PPM N2 BAL 152SZ EPA PROTOCOL

Component Composant	Nominal Nominale	Certified Certifiée
Methane / MÉTHANE	45 PPM	46.2 PPM
Nitrogen / AZOTE	BAL	

Cylinder Details/ Détails - bouteille:
Cylinder Size/ Taille de la bouteille: 152 Contents/ Capacité: 4.000 M3 Valve Outlet/ Robinet de sortie: 350 Nominal Pressure/Pression nominale: 2,000 PSG

Analytical Details/ Détails d'analyse:
Certification Accuracy ± 1%
Certification de précision ± 1%

Messer Canada Inc. plant management quality system is ISO 9001 registered. The product furnished under the referenced lot number is certified to contain the component concentration listed above. All values are mole/mole basis gas phase unless otherwise indicated. The reported uncertainty is at the 95% confidence level assuming a normal distribution. Messer Canada Inc. warrants that the above product conforms at time of shipment to the above description. The customers exclusive remedy should any of the products furnished under this certificate of analysis not conform to the manufacturers description shall be to receive replacement of the product or refund of the purchase price.

Le système de gestion de la qualité des usines de Messer Canada Inc. a été enregistré avec la Norme internationale ISO 9001. Il est certifié que tout produit fourni, avec un numéro de lot spécifié, contient la concentration d'éléments ci-dessus mentionnés. Toutes les valeurs sont exprimés en mole/ phase gazeuse, sauf indication contraire. Les incertitudes indiquées dans les descriptions sont des incertitudes élargies correspondant à un niveau de confiance d'environ 95 p. 100. Elles sont fondées sur une distribution normale. Messer Canada Inc.'garantit qu'au moment de l'expédition, le produit est conforme à la description ci-dessus. Si l'un des produits fournis en vertu de ce certificat d'analyse n'est pas conforme à la description du fabricant, le recours exclusif du client sera d'exiger le remboursement ou le remplacement du produit.

To reorder, please quote/ Pour renouveler une commande, veuillez indiquer le code: V24107503
Certificate Date (mm/dd/yy) / Date du certificat (mm/jj/aa) :08/31/2021 Use by / Utilisé par: 08/30/2029

Approved Signature/ Approbation du Signataire
Analyst/Analyste: Wesley Ketsa

Lot No./ No. lot	Cylinder No./ No. bouteille	Code	Page
1503566	CC203063	V24107503	1/1

MESSER CANADA INC
530 Watson St. East
Whitby, ON, Canada L1N 5R9

CERTIFICATE OF ANALYSIS

Part Number # 24095743
Lot # 1538714
Cylinder Number: SX10591

PGVP ID # L2021
Procedure: G1
Gas Type Code: OC2
Cylinder pressure: 2000 psig

Certification date
May 17, 2022

Expiration Date
May 18, 2030

ANALYTICAL RESULTS

Component	Requested Concentration ± blending tolerance	Date of Assay	Mean Concentration	Certified Concentration Uncertainty expressed at 95% confidence
Oxygen	11 % ± 5%	May 17, 2022	11.02 %	O_2 11.02 ± 0.01 %
Carbon Dioxide	11 % ± 5%	May 17, 2022	11.09 %	CO_2 11.09 ± 0.03 %

BALANCE GAS: Nitrogen

REFERENCE STANDARDS

Component	Type	Serial Number	Reference Number	Concentration	Expiration Date
Oxygen	GMIS	62674	1498573	10.01 ± 0.04 %	May 10, 2029
	SRM	FF61023	71-F-XX	20.753 ± 0.02 %	February 27, 2026
Carbon Dioxide	GMIS	CC267372	1438051	19.97 ± 0.02 %	May 31, 2026
	NTRM	SG 9916842	101001	19.98 ± 0.14 %	June 16, 2022

CERTIFICATION INSTRUMENTS

Component	Make/Model	Measurement Principle	Serial Number	Last calibration
Oxygen	Servomex 04100 C1	Paramagnetic Sensor	392350	May 9, 2022
Carbon Dioxide	FTIR CX 4015	Infrared	122434	May 5, 2022

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 2012 EPA PROTOCOL PROCEDURE

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

Analyst: Joey Zhao Signature _____ Date: May 17, 2022

Notes:

MESSER

MESSER CANADA INC
530 Watson St. East
Whitby, ON, Canada L1N 5R9

CERTIFICATE OF ANALYSIS

Part Number # 24107514
Lot # 1501009
Cylinder Number: CC101659

PGVP ID # L2021
Procedure: G1
Gas Type Code: SNC
Cylinder pressure: 2000 psig

Certification date
June 21, 2021

Expiration Date
June 22, 2029

ANALYTICAL RESULTS

Component	Requested Concentration ± blending tolerance	Date of Assay	Mean Concentration	Certified Concentration Uncertainty expressed at 95% confidence
Nitric Oxide	45 ppm ± 10%	June 14, 2021 June 21, 2021	45.92 ppm 45.46 ppm	45.71 ± 0.27 ppm
Sulfur Dioxide	40 ppm ± 10%	June 14, 2021 June 21, 2021	35.72 ppm 35.75 ppm	35.74 ± 0.08 ppm
Carbon Monoxide	250 ppm ± 10%	June 14, 2021	244.5 ppm	244.5 ± 1.08 ppm

BALANCE GAS: Nitrogen

NOx concentration: 45.71 ppm ± 0.27 ppm

REFERENCE STANDARDS

Component	Type	Serial Number	Reference Number	Concentration	Expiration Date
Nitric Oxide	GMIS NTRM	CC 711944 ff 5960	1475677 44-T-13	101.3 ± 0.67 ppm 99.75 ± 0.5 ppm	February 25, 2027 January 25, 2020
Sulfur Dioxide	GMIS NTRM	CC173648 ff 22293	1450509 94-I-20	102 ± 0.32 ppm 494.6 ± 1.9 ppm	September 5, 2025 August 30, 2021
Carbon Monoxide	GMIS NTRM	CC 421188 ff 22244	1392043 2-K-65 (1680b)	244.2 ± 0.5 ppm 494.8 ± 10 ppm	June 27, 2028 September 20, 2021

CERTIFICATION INSTRUMENTS

Component	Make/Model	Measurement Principle	Serial Number	Last Calibration
Nitric Oxide	FTIR CX 4015	Infrared	122434	May 31, 2021
Sulfur Dioxide	FTIR CX 4015	Infrared	122434	May 31, 2021
Carbon Monoxide	FTIR CX 4015	Infrared	122434	June 3, 2021

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 2012 EPA PROTOCOL PROCEDURE

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

Analyst: Joey Zhao Signature _____ Date: June 21, 2021

Notes:

MESSER

Edmonton Spec Gas Plant/Usine
12143 68th Street
Edmonton AB T5B 1P9
Canada

MEPA METHANE 90PPM N2 BAL 152SZ/ MEPA MÉTHANE 90PPM N2 BAL 152SZ EPA PROTOCOL

Component Composant	Nominal Nominale	Certified Certifiée
Methane / MÉTHANE	90 PPM	89.8 PPM
Nitrogen / AZOTE	BAL	

Cylinder Details/ Détails - bouteille:
Cylinder Size/ Taille de la bouteille: 152 Contents/ Capacité: 4.010 M3 Valve Outlet/ Robinet de sortie: 350 Nominal Pressure/Pression nominale: 2,000 PSI

Analytical Details/ Détails d'analyse:
Certification Accuracy ± 1%
Certification de précision ± 1%

Messer Canada Inc. plant management quality system is ISO 9001 registered. The product furnished under the referenced lot number is certified to contain the component concentration listed above. All values are mole/mole basis gas phase unless otherwise indicated. The reported uncertainty is at the 95% confidence level assuming a normal distribution. Messer Canada Inc. warrants that the above product conforms at time of shipment to the above description. The customers exclusive remedy should any of the products furnished under this certificate of analysis not conform to the manufacturers description shall be to receive replacement of the product or refund of the purchase price.

Le système de gestion de la qualité des usines de Messer Canada Inc. a été enregistré avec la Norme internationale ISO 9001. Il est certifié que tout produit fourni, avec un numéro de lot spécifié, contient la concentration d'éléments ci-dessus mentionnés. Toutes les valeurs sont exprimés en mole/ phase gazeuse, sauf indication contraire. Les incertitudes indiquées dans les descriptions sont des incertitudes élargies correspondant à un niveau de confiance d'environ 95 p. 100. Elles sont fondées sur une distribution normale. Messer Canada Inc.'garantit qu'au moment de l'expédition, le produit est conforme à la description ci-dessus. Si l'un des produits fournis en vertu de ce certificat d'analyse n'est pas conforme à la description du fabricant, le recours exclusif du client sera d'exiger le remboursement ou le remplacement du produit.

To reorder, please quote/ Pour renouveler une commande, veuillez indiquer le code: V24075457
Certificate Date (mm/dd/yy) / Date du certificat (mm/jj/aa) :12/18/2019 Use by / Utilisé par: 12/17/2027

Approved Signature/ Approbation du Signataire
Analyst/Analyste: Mark Stevens

Lot No./ No. lot	Cylinder No./ No. bouteille	Code	Page
1487129	EB0050785	V24075457	1/1

MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Mark Lanfranco

has successfully completed

The program of studies and is awarded the certificate in

STACK SAMPLING

May 2005
Date

Donna Spaulding
Dean
Faculty of Continuing Education and Extension

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

A qualified professional [1] providing services to either the Ministry of Environment and Climate Change Strategy ("ministry"), or to a regulated person for the purpose of obtaining an authorization from the ministry, or pursuant to a requirement imposed under the *Environmental Management Act,* the *Integrated Pest Management Act* or the *Park Act* has a real or perceived conflict of interest when the qualified professional, or their relatives, close associates or personal friends have a financial or other interest in the outcome of the work being performed.

A real or perceived conflict of interest occurs when a qualified professional has

a) an ownership interest in the regulated person's business;

b) an opportunity to influence a decision that leads to financial benefits from the regulated person or their business other than a standard fee for service (e.g. bonuses, stock options, other profit sharing arrangements);

c) a personal or professional interest in a specific outcome;

d) the promise of a long term or ongoing business relationship with the regulated person, that is contingent upon a specific outcome of work;

e) a spouse or other family member who will benefit from a specific outcome; or

f) any other interest that could be perceived as a threat to the independence or objectivity of the qualified professional in performing a duty or function.

Qualified professionals who work under ministry legislation must take care in the conduct of their work that potential conflicts of interest within their control are avoided or mitigated. Precise rules in conflict of interest are not possible and professionals must rely on guidance of their professional associations, their common sense, conscience and sense of personal integrity.

Declaration

I Mark Lanfranco, as a member of Air and Waste Management Association declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this project. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to Mr. Sajid Barlas, erring on the side of caution.

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

I will maintain my objectivity, conducting my work in accordance with my Code of Ethics and standards of practice.

In addition, I will take the following steps to mitigate the real or perceived conflict(s) I have disclosed, to ensure the public interest remains paramount:

_____

_____

_____

Further, I acknowledge that this disclosure may be interpreted as a threat to my independence and will be considered by the statutory decision maker accordingly.

This conflict of interest disclosure statement is collected under section 26(c) of the *Freedom of Information and Protection of Privacy Act* for the purposes of increasing government transparency and ensuring professional ethics and accountability. By signing and submitting this statement you consent to its publication and its disclosure outside of Canada. This consent is valid from the date submitted and cannot be revoked. If you have any questions about the collection, use or disclosure of your personal information please contact the Ministry of Environment and Climate Change Strategy Headquarters Office at 1-800-663-7867.

Signature:

X _____

Print name: Mark Lanfranco

Witnessed by:

X _____

Print name: Carter Lanfranco

Date: Dec. 16, 2020

[1]*Qualified Professional, in relation to a duty or function under ministry legislation, means an individual who*

a) is registered in British Columbia with a professional association, is acting under that organization's code of ethics, and is subject to disciplinary action by that association, and

b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

BCIT

Shawn Harrington

has met the requirements of

Stack Testing for Pollutants

(CHSC 7760)

School of Process, Energy and Natural Resources
Chemical Sciences Program

Endorsed by:

Greater Vancouver Regional District

Environment Canada Environnement Canada

Province of British Columbia
Ministry of Environment, Lands and Parks

Marsh Hemekey, Dean
School of Process, Energy and Natural Resources

JUNE 21, 2001
Dated

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

A qualified professional [1] providing services to either the Ministry of Environment and Climate Change Strategy ("ministry"), or to a regulated person for the purpose of obtaining an authorization from the ministry, or pursuant to a requirement imposed under the *Environmental Management Act,* the *Integrated Pest Management Act* or the *Park Act* has a real or perceived conflict of interest when the qualified professional, or their relatives, close associates or personal friends have a financial or other interest in the outcome of the work being performed.

A real or perceived conflict of interest occurs when a qualified professional has

a) an ownership interest in the regulated person's business;

b) an opportunity to influence a decision that leads to financial benefits from the regulated person or their business other than a standard fee for service (e.g. bonuses, stock options, other profit sharing arrangements);

c) a personal or professional interest in a specific outcome;

d) the promise of a long term or ongoing business relationship with the regulated person, that is contingent upon a specific outcome of work;

e) a spouse or other family member who will benefit from a specific outcome; or

f) any other interest that could be perceived as a threat to the independence or objectivity of the qualified professional in performing a duty or function.

Qualified professionals who work under ministry legislation must take care in the conduct of their work that potential conflicts of interest within their control are avoided or mitigated. Precise rules in conflict of interest are not possible and professionals must rely on guidance of their professional associations, their common sense, conscience and sense of personal integrity.

Declaration

I Shawn Harrington, as a member of **Air and Waste Management Association** declare

Select one of the following:

☒ Absence from conflict of interest

Other than the standard fee I will receive for my professional services, I have no financial or other interest in the outcome of this **project**. I further declare that should a conflict of interest arise in the future during the course of this work, I will fully disclose the circumstances in writing and without delay to **Mr. Sajid Barlas**, erring on the side of caution.

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

I will maintain my objectivity, conducting my work in accordance with my Code of Ethics and standards of practice.

In addition, I will take the following steps to mitigate the real or perceived conflict(s) I have disclosed, to ensure the public interest remains paramount:

_____

_____

_____

Further, I acknowledge that this disclosure may be interpreted as a threat to my independence and will be considered by the statutory decision maker accordingly.

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Signature:

X Shawn Harrington

Print name: Shawn Harrington

Witnessed by:

X

Print name: Mark Lanfranco

Date: Dec. 16, 2020

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b) *through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function.*

Canadian Association for Laboratory Accreditation Inc.

Certificate of Accreditation

A. Lanfranco and Associates Inc.
101 - 9488 - 189th Street
Surrey, British Columbia

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

Accreditation No.: 1004232
Issued On: 4/11/2023
Accreditation Date: 2/5/2021
Expiry Date: 10/11/2025

President and CEO

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For the specific tests to which this accreditation applies, please refer to the laboratory's scope of accreditation at www.cala.ca.