



**A.Lanfranco
& Associates Inc.**

Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III

4515 Central Boulevard

Burnaby, BC V5H 0C6

WASTE-TO-ENERGY FACILITY

Appendices of Emissions Testing Report

February 2023 Survey

First Quarter 2023

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APPENDIX – A

QUALITY ASSURANCE / QUALITY CONTROL RESULTS

Quality assurance / quality control (QA/QC) is divided into four categories: administration, preparation, testing, and analysis. The following sections detail results found for the above four categories.

Administration:

- All field, process, and analytical data was reviewed to ensure data integrity and accuracy.
- Duplicate proof of draft and final report, including data entry, conducted.

Preparation:

- All glassware cleaned
- Blank samples of reagents collected.

Testing:

- Stack diameter and absence of cyclonic flow confirmed
- Calibrated magnehelic used for all velocity measurements
- All trains past pre- and post- leak checks.
- Isokinetics all within $100\% \pm 10\%$.

Analysis:

- Trace Metals and Mercury analysis conducted at Element Labs, Surrey, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N₂O) analysis conducted with portable analyzer by A. Lanfranco and Associates.
- Particulate analysis conducted at A. Lanfranco and Associates Inc., Surrey, BC.
- Chain of Custody protocols followed for all samples.
- Acceptable blank values for all sample types. All samples blank corrected.

Sample Type	Blank Value		
	Unit 1	Unit 2	Unit 3
First Quarter 2023			
Filter	0.2 mg	0.1 mg	0.2 mg
Front Half Washings	2.0 mg	-1.5 mg	1.0 mg
Mercury Front	<0.02 ug	<0.02 ug	<0.02 ug
Mercury Back	<0.268 ug	<0.27 ug	<0.268 ug
Trace Metals Front *	<45.3 ug	<50.1 ug	<59.0 ug
Trace Metals Back*	<43.5 ug	<39.2 ug	<37.5 ug
Ammonia	<4.9 ug	136 ug	<5.0 ug
Fluoride	<6 ug	<6 ug	<6 ug

Sum of all reported elements except Hg*

APPENDIX - B

CALCULATIONS

Appendix B Calculations

The following sections show the equations and define the variables that were used for this survey. The equations are organized in three sections. Equations 1-11 were used to calculate particulate concentration at standard conditions on a dry basis. Equations 12-26 were used to sample within the $100 \pm 10\%$ isokinetic variation and to confirm that sampling meets this isokinetic variation threshold. Equations 27-29 were used to calculate the volumetric flowrate of the stack flue gas.

App B.1 Contaminant Concentration Calculations

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

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

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

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

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

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

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

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

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

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

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

Appendix B Calculations

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)
$V_{std(imp)}$	= 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.

Appendix B Calculations

App B.2 Isokinetic Variation Calculations

$$\Delta H_i = \frac{2.62 \times 10^7 \times c_p \times A_n \times (1 - B_{wo}) \times M_D \times (T_m + 459.67) \times \Delta p_i}{k_o \times M_w \times (T_{stk} + 459.67)} \quad \text{Equation 12}$$

$$R_m = 85.49 \times c_p \times \sqrt{\Delta p_i} \times \sqrt{\frac{(T_{stk_i} + 459.67)}{M_w \times P_B}} \times 60 \times A_n \times \frac{(T_{m_i} + 459.67) \times (1 - B_{wo})}{(T_{stk_i} + 459.67) \times y} \quad \text{Equation 13}$$

$$A_n = \pi \left(\frac{d_n}{24} \right)^2 \quad \text{Equation 14}$$

$$M_w = M_D \times (1 - B_{wo}) + 18 \times B_{wo} \quad \text{Equation 15}$$

$$M_D = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + 0.28 \times (100 - \%CO_2 - \%O_2) \quad \text{Equation 16}$$

$$T_{stk} = \frac{1}{n} \sum_{i=1}^n T_{stk_i}, \text{ where } n = \text{the number of points} \quad \text{Equation 17}$$

$$B_{wo} = \frac{V_{cond}}{V_{cond} + V_{std(imp)}} \quad \text{Equation 18}$$

$$V_{cond} = 0.04707 \times V_{gain} \quad \text{Equation 19}$$

$$Iso = \frac{1}{n} \sum_{i=1}^n Iso_i, \text{ where } n = \text{the number of points} \quad \text{Equation 20}$$

$$Iso_i = \frac{v_{nzi}}{v_i} \quad \text{Equation 21}$$

$$v_i = 85.49 \times c_p \times \sqrt{\Delta p_i} \times \sqrt{\frac{(T_{stk_i} + 459.67)}{(P_{stk} \times M_w)}} \quad \text{Equation 22}$$

$$v_{nzi} = \frac{(V_i - V_{i-1}) \times y \times (T_{stk_i} + 459.67) \times (P_B + \frac{\Delta H_{i(act)}}{13.6})}{A_n \times t_i \times 60 \times (T_{m(i)} + 459.67) \times P_{stk} \times (1 - B_{wo})} \quad \text{Equation 23}$$

$$P_{stk} = P_B + \frac{P_g}{13.6} \quad \text{Equation 24}$$

Appendix B Calculations

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

Equation 25

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

Equation 26

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 ₂ O)
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 ₂ O)
P_g	= Stack Static pressure (inches of H ₂ O)
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)

App B.3 Volumetric Flowrate Calculations

$$Q_S = Q_A \times \frac{(T_{Std} + 459.67)}{(T_{Stk} + 459.67)} \times \frac{P_{Stk}}{P_{Std}} \quad \text{Equation 27}$$

$$Q_A = \frac{v_{stk} \times 60 \times A_{stk}}{35.315} \quad \text{Equation 28}$$

$$A_{stk} = \pi \left(\frac{d}{24} \right)^2 \quad \text{Equation 29}$$

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)

APPENDIX - C

LABORATORY RESULTS

Appendix B - Particulate Analysis

Client: Metro Vancouver
Source: Units 1, 2, and 3

Sample Date: Feb 14- 16, 2023
Location: WTE (Burnaby, B.C)

A. Lanfranco & Associates Standard Operating Procedure:

SOP 1.2.1 Gravimetric determination of total particulate matter

Filter Collection:

Test #	Initial (grams)	Final (grams)	Net Difference (grams)	Blank Adjusted (grams)
Unit 1 Blank	0.4553	0.4555	0.0002	
Unit 1 Run 1	0.4546	0.4543	-0.0003	ND
Unit 1 Run 2	0.4526	0.4521	-0.0005	ND
Unit 1 Run 3	0.4561	0.4557	-0.0004	ND
Unit 2 Blank	0.4534	0.4535	0.0001	
Unit 2 Run 1	0.4471	0.4468	-0.0003	ND
Unit 2 Run 2	0.4465	0.4464	-0.0001	ND
Unit 2 Run 3	0.4559	0.4594	0.0035	0.0034
Unit 3 Blank	0.4538	0.4540	0.0002	
Unit 3 Run 1	0.4411	0.4520	0.0109	0.0107
Unit 3 Run 2	0.4540	0.4660	0.0120	0.0118
Unit 3 Run 3	0.4575	0.4649	0.0074	0.0072

Front Half Washings:

Test #	Initial (grams)	Final (grams)	Net Difference (grams)	Blank Adjusted (grams)
Unit 1 Blank	85.6022	85.6042	0.0020	
Unit 1 Run 1	84.4150	84.4191	0.0041	0.0021
Unit 1 Run 2	87.4046	87.4084	0.0038	0.0018
Unit 1 Run 3	84.9575	84.9603	0.0028	0.0008
Unit 2 Blank	84.4013	84.3998	-0.0015	
Unit 2 Run 1	84.6665	84.6669	0.0004	0.0019
Unit 2 Run 2	98.7235	98.7238	0.0003	0.0018
Unit 2 Run 3	86.4751	86.4764	0.0013	0.0028
Unit 3 Blank	85.7028	85.7038	0.0010	
Unit 3 Run 1	116.0553	116.0610	0.0057	0.0047
Unit 3 Run 2	84.8107	84.8167	0.0060	0.0050
Unit 3 Run 3	110.7380	110.7395	0.0015	0.0005

Task	Unit	Personnel	Date	Quality Control	Y/N
Filter Recovery:	Unit 1	C. Lanfranco	17-Feb-23	Adequate PW volume:	Y
	Unit 2	C. Lanfranco	17-Feb-23	No sample leakage:	Y
	Unit 3	C. Lanfranco	17-Feb-23	Filter not compromised:	Y
PW Initial Analysis:	Unit 1	C. Lanfranco	17-Feb-23		
	Unit 2	C. Lanfranco	17-Feb-23		
	Unit 3	C. Lanfranco	17-Feb-23		
PW, FilterFinal Analysis:	Unit 1	J. Ching	17-Feb-23		
	Unit 2	J. Ching	17-Feb-23		
	Unit 3	J. Ching	17-Feb-23		
Data entered to computer:	All	J. Ching	02-Feb-23		

Comments:

No problems encountered in sample analysis.

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1634374
#101, 9488 - 189 Street	Project Name: Filter Reagent Blanks	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: Feb 23, 2023
V4N 4W7	LSD:	Date Reported: Mar 8, 2023
Attn: Missy	P.O.:	Report Number: 2846822
Sampled By:	Proj. Acct. code:	
Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Filter Reagent Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634374**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 8, 2023
Report Number: 2846822

		Reference Number	1634374-1	1634374-2	1634374-3
		Sample Date	Feb 10, 2023	Feb 10, 2023	Feb 10, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1 Container 1 (filter)	Reagent Blank Unit 2 Container 1 (filter)	Reagent Blank Unit 3 Container 1 (filter)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	9	<5	<5	5
Antimony	µg	<2	3	6	2.5
Arsenic	µg	3.6	<1	<1	1
Cadmium	µg	0.4	0.3	<0.3	0.25
Chromium	µg	<0.2	<0.2	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	<0.3	0.5	0.25
Lead	µg	<2	<2	2	1.5
Manganese	µg	<0.3	<0.3	<0.3	0.25
Nickel	µg	1	0.8	2	0.5
Phosphorus	µg	30	31	28	2.5
Selenium	µg	2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	2	1	2	0.5
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Filter Reagent Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634374**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 8, 2023
Report Number: 2846822

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1633303
#101, 9488 - 189 Street	Project Name: HF Blanks	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: Feb 17, 2023
V4N 4W7	LSD:	Date Reported: Feb 23, 2023
Attn: Missy	P.O.:	Report Number: 2845232
Sampled By:	Proj. Acct. code:	
Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street
		Surrey, BC V4N 4W7
		Phone: (604) 881-2582 Fax: (604) 881-2581
		Email: mark.lanfranco@alanfranco.com

<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
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Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: HF Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633303**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845232

		Reference Number	1633303-1	1633303-2	1633303-3	Nominal Detection Limit
		Sample Date	Feb 16, 2023	Feb 14, 2023	Feb 15, 2023	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit #1 HF Blank / 17 °C	Unit #2 HF Blank / 17 °C	Unit #3 HF Blank / 17 °C	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	
Air Quality						
Volume	Sample	mL	198	198	198	
Dilution Factor	fluoride		1.00000000	1.00000000	1.00000000	
Fluoride	As Tested	mg/L	<0.03	<0.03	<0.03	0.03
Fluoride	Water Soluble	µg/sample	<6	<6	<6	

Approved by:



Randy Neumann, BSc
Director

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: HF Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1633303 Control Number: Date Received: Feb 17, 2023 Date Reported: Feb 23, 2023 Report Number: 2845232
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Anions by IEC in air (VAN)	EMC	* Determination of Hydrogen Halide & Halogen Emissions from Stationary Sources (Isokinetic), 26A <i>* Reference Method Modified</i>	Feb 21, 2023	Element Vancouver

References

EMC	Emission Measurement Center of EPA
-----	------------------------------------

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Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: HF Samples Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1633304 Control Number: Date Received: Feb 17, 2023 Date Reported: Feb 23, 2023 Report Number: 2845233
Attn: Missy Sampled By: Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: HF Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633304**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845233

		Reference Number	1633304-1	1633304-2	1633304-3	
		Sample Date	Feb 16, 2023	Feb 16, 2023	Feb 16, 2023	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit #1 HF Run 1 / 17 °C	Unit #1 HF Run 2 / 17 °C	Unit #1 HF Run 3 / 17 °C	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Volume	Sample	mL	362	370	377	
Dilution Factor	fluoride		1.00000000	1.00000000	1.00000000	
Fluoride	As Tested	mg/L	<0.03	<0.03	<0.03	0.03
Fluoride	Water Soluble	µg/sample	<10	<10	<10	

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: HF Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633304**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845233

Reference Number	1633304-4	1633304-5	1633304-6
Sample Date	Feb 14, 2023	Feb 14, 2023	Feb 14, 2023
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit #2 HF Run 1 / 17 °C	Unit #2 HF Run 2 / 17 °C	Unit #2 HF Run 3 / 17 °C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Air Quality					
Volume	Sample	mL	343	348	372
Dilution Factor	fluoride		1.00000000	1.00000000	1.00000000
Fluoride	As Tested	mg/L	<0.03	<0.03	<0.03
Fluoride	Water Soluble	µg/sample	<10	<10	<10

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: HF Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633304**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845233

		Reference Number	1633304-7	1633304-8	1633304-9	Nominal Detection Limit	
		Sample Date	Feb 15, 2023	Feb 15, 2023	Feb 15, 2023		
		Sample Time	NA	NA	NA		
		Sample Location					
		Sample Description	Unit #3 HF Run 1 / 17 °C	Unit #3 HF Run 2 / 17 °C	Unit #3 HF Run 3 / 17 °C		
		Matrix	Stack Samples	Stack Samples	Stack Samples	0.03	
Analyte		Units	Results	Results	Results		
Air Quality							
Volume	Sample	mL	398	355	329		
Dilution Factor	fluoride		1.00000000	1.00000000	1.00000000		
Fluoride	As Tested	mg/L	<0.03	<0.03	<0.03		
Fluoride	Water Soluble	µg/sample	<10	<10	<10		

Approved by:



Randy Neumann, BSc
Director

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.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Methodology and Notes

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: HF Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633304**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845233

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Anions by IEC in air (VAN)	EMC	* Determination of Hydrogen Halide & Halogen Emissions from Stationary Sources (Isokinetic), 26A <i>* Reference Method Modified</i>	Feb 21, 2023	Element Vancouver

References

EMC Emission Measurement Center of EPA

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Metals and Hg Samples Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1634304 Control Number: Date Received: Feb 23, 2023 Date Reported: Mar 9, 2023 Report Number: 2846707
Attn: Missy Sampled By: Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Metals and Hg Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634304**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846707

	Reference Number	1634304-1	1634304-2	1634304-3	
	Sample Date	Feb 16, 2023	Feb 16, 2023	Feb 16, 2023	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	Unit 1 Run 1 (MV Unit 1 Run 1 + 4 Bottles)	Unit 1 Run 2 (MV Unit 1 Run 2 + 4 Bottles)	Unit 1 Run 3 (MV Unit 1 Run 3 + 4 Bottles)	
	Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	32	35	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	1	<1	<1	1
Cadmium	µg	<0.3	0.3	<0.3	0.25
Chromium	µg	1.4	1.3	1.4	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	1	2	0.7	0.25
Lead	µg	3.7	<2	<2	1.5
Manganese	µg	1	2	1	0.25
Nickel	µg	3.4	4.0	3.1	0.5
Phosphorus	µg	33	34	33	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	4.4	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	12	12	8.7	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	20	20	43	5
Antimony	µg	<2	4	<2	2.5
Arsenic	µg	<0.9	<0.9	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.22	<0.2	<0.2	0.2
Cobalt	µg	<0.2	0.5	<0.2	0.25
Copper	µg	2.4	0.5	1	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	0.6	0.7	0.6	0.25
Nickel	µg	2.3	2.3	2	0.5
Phosphorus	µg	25	22	27	2.5
Selenium	µg	<1	<1	<1	1.5
Tellurium	µg	<2	2.6	<2	2
Thallium	µg	2.5	3.8	<1	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	5.5	5.1	3.6	0.5
Volume	Sample	mL	757	706	677
Volume	aliquot volume	mL	707	656	627
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Metals and Hg Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634304**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846707

		Reference Number	1634304-1	1634304-2	1634304-3	
		Sample Date	Feb 16, 2023	Feb 16, 2023	Feb 16, 2023	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 1 Run 1 (MV Unit 1 Run 1 + 4 Bottles)	Unit 1 Run 2 (MV Unit 1 Run 2 + 4 Bottles)	Unit 1 Run 3 (MV Unit 1 Run 3 + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	757	706	677	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.3	<0.3	<0.3	
Mercury	As Tested	µg/L	0.09	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	117	81	100	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	0.02	<0.006	<0.008	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	0.27	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	0.085	<0.02	<0.02	

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Metals and Hg Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634304**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846707

		Reference Number	1634304-4	1634304-5	1634304-6
		Sample Date	Feb 14, 2023	Feb 14, 2023	Feb 14, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit 2 Run 1 (MV Unit 2 Run 1 + 4 Bottles)	Unit 2 Run 2 (MR-2 Run 2 + 4 Bottles)	Unit 2 Run 3 (MV Unit #2 Run 3 + 4 Bottles)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	10	20	10	5
Antimony	µg	<2	<2	3	2.5
Arsenic	µg	<1	<1	3.4	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	0.94	2.57	0.53	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	2	2	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	0.8	1	0.9	0.25
Nickel	µg	3.1	3.9	2.6	0.5
Phosphorus	µg	30	37	36	2.5
Selenium	µg	3.4	3.7	<2	1.5
Tellurium	µg	<2	<2	2	2
Thallium	µg	2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	5.9	5.6	8.6	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	73	38	110	5
Antimony	µg	<2	<2	5	2.5
Arsenic	µg	<0.9	<0.9	1	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.53	3.75	0.94	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	6.5	4.4	7.7	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	5.3	35.9	7.5	0.25
Nickel	µg	0.7	2.7	3.6	0.5
Phosphorus	µg	29	27	27	2.5
Selenium	µg	<1	<1	<1	1.5
Tellurium	µg	<2	3.1	<2	2
Thallium	µg	<1	<1	2	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	3.8	13	4.1	0.5
Volume	Sample	mL	657	686	708
Volume	aliquot volume	mL	607	636	658
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Metals and Hg Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634304**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846707

		Reference Number	1634304-4	1634304-5	1634304-6	
		Sample Date	Feb 14, 2023	Feb 14, 2023	Feb 14, 2023	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 2 Run 1 (MV Unit 2 Run 1 + 4 Bottles)	Unit 2 Run 2 (MR-2 Run 2 + 4 Bottles)	Unit 2 Run 3 (MV Unit #2 Run 3 + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	657	686	708	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.3	<0.3	<0.3	
Mercury	As Tested	µg/L	<0.05	0.10	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	91	79	79	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.007	0.013	<0.006	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	<0.05	0.06	0.09	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	<0.02	0.02	0.03	

Analytical Report

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Metals and Hg Samples Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1634304 Control Number: Date Received: Feb 23, 2023 Date Reported: Mar 9, 2023 Report Number: 2846707
Attn: Missy Sampled By: Company:		

		Reference Number	1634304-7	1634304-8	1634304-9
		Sample Date	Feb 15, 2023	Feb 15, 2023	Feb 15, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit 3 Run 1 (M4 1 Run 1 + 4 Bottles	Unit 3 Run 2 (MV Unit 3 Run 2 + 4 Bottles)	Unit 3 Run 3 (MF-3 Run 3 + 4 Bottles)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	20	33	20	5
Antimony	µg	<2	6	9	2.5
Arsenic	µg	3.3	<1	<1	1
Cadmium	µg	2	1	1	0.25
Chromium	µg	1.5	3.73	1.1	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	4.8	11	7.4	0.25
Lead	µg	12	35.0	24	1.5
Manganese	µg	1	3.8	1	0.25
Nickel	µg	2	4.7	2.6	0.5
Phosphorus	µg	26	46	36	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	3.2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	102	213	192	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	26	49	20	5
Antimony	µg	<2	4	3	2.5
Arsenic	µg	<0.9	<0.9	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.68	1.3	<0.2	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	3.1	3.8	0.8	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	2	4.2	1.0	0.25
Nickel	µg	2	3.1	2	0.5
Phosphorus	µg	27	28	23	2.5
Selenium	µg	5.8	<1	2.4	1.5
Tellurium	µg	<2	<2	2.9	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	4.7	4.1	2.9	0.5
Volume	Sample	mL	679	654	656
Volume	aliquot volume	mL	629	604	606
Mercury by CVAA					
Mercury	As Tested	µg/L	0.14	0.13	0.16
					0.05

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Metals and Hg Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634304**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846707

		Reference Number	1634304-7	1634304-8	1634304-9	
		Sample Date	Feb 15, 2023	Feb 15, 2023	Feb 15, 2023	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (M4 1 Run 1 + 4 Bottles	Unit 3 Run 2 (MV Unit 3 Run 2 + 4 Bottles)	Unit 3 Run 3 (MF-3 Run 3 + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.058	0.052	0.062	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	679	654	656	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.3	<0.3	<0.3	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	84	96	92	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.007	<0.008	<0.007	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	<0.02	<0.02	<0.02	

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Metals and Hg Samples Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1634304 Control Number: Date Received: Feb 23, 2023 Date Reported: Mar 9, 2023 Report Number: 2846707
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

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Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Field Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1634302 Control Number: Date Received: Feb 23, 2023 Date Reported: Mar 9, 2023 Report Number: 2846705
Attn: Missy Sampled By: Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Field Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634302**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846705

		Reference Number	1634302-1	1634302-2	1634302-3
		Sample Date	Feb 16, 2023	Feb 14, 2023	Feb 15, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Field Blank Unit 1 (MV Unit 1 BLK + 4 Bottles)	Field Blank Unit 2 (MV Unit 2 BLK + 4 Bottles)	Field Blank Unit 3 (MV Unit 3 BLK + 4 Bottles)
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	9	8	20	5
Antimony	µg	<2	<2	3	2.5
Arsenic	µg	<1	1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	0.35	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	<0.3	<0.3	<0.3	0.25
Nickel	µg	1.0	2	1	0.5
Phosphorus	µg	30	36	33	2.5
Selenium	µg	3.3	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	2	2.7	2	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	7	8	9	5
Antimony	µg	<2	5	<2	2.5
Arsenic	µg	<0.9	<0.9	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.25	<0.2	<0.2	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	0.8	0.9	1	0.25
Lead	µg	2.3	<1	<1	1.5
Manganese	µg	0.3	0.3	0.4	0.25
Nickel	µg	1	2	1	0.5
Phosphorus	µg	24	22	23	2.5
Selenium	µg	<1	<1	<1	1.5
Tellurium	µg	2.6	<2	<2	2
Thallium	µg	3.2	<1	<1	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	2	1	3.1	0.5
Volume	Sample	mL	530	551	549
Volume	aliquot volume	mL	480	501	499
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Field Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634302**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846705

		Reference Number	1634302-1	1634302-2	1634302-3	Nominal Detection Limit
		Sample Date	Feb 16, 2023	Feb 14, 2023	Feb 15, 2023	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Field Blank Unit 1 (MV Unit 1 BLK + 4 Bottles)	Field Blank Unit 2 (MV Unit 2 BLK + 4 Bottles)	Field Blank Unit 3 (MV Unit 3 BLK + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	530	551	549	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.2	<0.2	<0.2	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	102	123	98	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.008	<0.010	<0.008	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	0.06	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	0.02	<0.02	<0.02	

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Field Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634302**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846705

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Reagent Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1634297 Control Number: Date Received: Feb 23, 2023 Date Reported: Mar 9, 2023 Report Number: 2846699
Attn: Missy Sampled By: Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

Delivery	Format	Deliverables
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Reagent Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634297**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846699

		Reference Number	1634297-1	1634297-2	1634297-3
		Sample Date	Feb 10, 2023	Feb 10, 2023	Feb 10, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A					
Aluminum	µg	<5	<5	<5	5
Antimony	µg	<2	4	<2	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	<0.2	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	0.8	<0.3	0.25
Lead	µg	<2	<2	3.3	1.5
Manganese	µg	<0.3	<0.3	<0.3	0.25
Nickel	µg	0.7	3.5	1	0.5
Phosphorus	µg	<2	<2	<2	2.5
Selenium	µg	<2	2.9	2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	1	2	2	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	6	9	20	5
Antimony	µg	<3	<3	<3	2.5
Arsenic	µg	<1	<1	1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	0.42	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	2	2	1	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	<0.3	0.5	0.3	0.25
Nickel	µg	3.3	3.6	2	0.5
Phosphorus	µg	20	30	20	2.5
Selenium	µg	<2	<2	2	1.5
Tellurium	µg	4.4	<2	4.8	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	4.8	2	2	0.5
Volume	Sample	mL	212	212	212
Volume	aliquot volume	mL	162	162	162
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: Reagent Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1634297**
Control Number:
Date Received: Feb 23, 2023
Date Reported: Mar 9, 2023
Report Number: 2846699

		Reference Number	1634297-1	1634297-2	1634297-3
		Sample Date	Feb 10, 2023	Feb 10, 2023	Feb 10, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued					
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	212	212	212
Volume	aliquot volume	mL	5.0	5.0	5.0
Volume	Final	mL	45	45	45
Mercury	Fraction 2B	µg/sample	<0.10	<0.10	<0.10
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	114	128	112
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3A	µg/sample	<0.009	<0.01	<0.009
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	500	500	500
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04
Mercury	As Tested	µg/L	0.07	0.07	0.07
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	200	200	200
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 3C	µg/sample	0.02	0.02	0.02

Approved by:



Max Hewitt
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: Reagent Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1634297 Control Number: Date Received: Feb 23, 2023 Date Reported: Mar 9, 2023 Report Number: 2846699
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Mar 6, 2023	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Feb 27, 2023	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

Please direct any inquiries regarding this report to our Client Services group.

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Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1633302
#101, 9488 - 189 Street	Project Name: NH3 Blanks	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: Feb 17, 2023
V4N 4W7	LSD:	Date Reported: Feb 23, 2023
Attn: Missy	P.O.:	Report Number: 2845231
Sampled By:	Proj. Acct. code:	
Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

Delivery	Format	Deliverables
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: NH3 Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633302**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845231

		Reference Number	1633302-1	1633302-2	1633302-3
		Sample Date	Feb 16, 2023	Feb 14, 2023	Feb 15, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit #1 NH3 Blk / 17 °C	Unit #2 NH3 Blk / 17 °C	Unit #3 NH3 Blk / 17 °C
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Air Quality					
Ammonium - N	As Tested	µg/L	<25	681	<25
Dilution Factor	As Tested		1.00	1.00	1.00
Sample Volume	Sample volume	mL	196	200	198
Ammonium - N		µg/sample	<4.9	136	<5.0

Approved by:



Randy Neumann, BSc
Director

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Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: NH3 Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1633302 Control Number: Date Received: Feb 17, 2023 Date Reported: Feb 23, 2023 Report Number: 2845231
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	* Automated Phenate Method, 4500-NH3 G	Feb 22, 2023	Element Edmonton - Roper Road
* Reference Method Modified				

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Please direct any inquiries regarding this report to our Client Services group.

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Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: NH3 Samples Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1633305 Control Number: Date Received: Feb 17, 2023 Date Reported: Feb 23, 2023 Report Number: 2845234
Attn: Missy Sampled By: Company:		

Contact	Company	Address
Mark Lanfranco	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com

<u>Delivery</u>	<u>Format</u>	<u>Deliverables</u>
Email	PDF	COA / COC
Email	PDF	COC / Test Report

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: NH3 Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633305**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845234

		Reference Number	1633305-1	1633305-2	1633305-3
		Sample Date	Feb 16, 2023	Feb 16, 2023	Feb 16, 2023
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit #1 NH3 Run 1 / 17 °C	Unit #1 NH3 Run 2 / 17 °C	Unit #1 NH3 Run 3 / 17 °C
		Matrix	Stack Samples	Stack Samples	Stack Samples
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Air Quality					
Ammonium - N	As Tested	µg/L	5790	4030	9290
Dilution Factor	As Tested		1.00	1.00	1.00
Sample Volume	Sample volume	mL	329	411	380
Ammonium - N		µg/sample	1900	1660	3530

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: NH3 Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633305**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845234

Reference Number	1633305-4	1633305-5	1633305-6
Sample Date	Feb 14, 2023	Feb 14, 2023	Feb 14, 2023
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit #2 NH3 Run 1 / 17 °C	Unit #2 NH3 Run 2 / 17 °C	Unit #2 NH3 Run 3 / 17 °C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Air Quality					
Ammonium - N	As Tested	µg/L	3080	2740	3460
Dilution Factor	As Tested		1.00	1.00	1.00
Sample Volume	Sample volume	mL	312	327	306
Ammonium - N		µg/sample	960	897	1060

Analytical Report

Bill To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

Project ID: Metro Vancouver WTE
Project Name: NH3 Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1633305**
Control Number:
Date Received: Feb 17, 2023
Date Reported: Feb 23, 2023
Report Number: 2845234

Reference Number	1633305-7	1633305-8	1633305-9
Sample Date	Feb 15, 2023	Feb 15, 2023	Feb 15, 2023
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit #3 NH3 Run 1 / 17 °C	Unit #3 NH3 Run 2 / 17 °C	Unit #3 NH3 Run 3 / 17 °C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Air Quality					
Ammonium - N	As Tested	µg/L	5640	5670	4520
Dilution Factor	As Tested		1.00	1.00	1.00
Sample Volume	Sample volume	mL	346	336	310
Ammonium - N		µg/sample	1950	1900	1400

Approved by:



Randy Neumann, BSc
Director

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Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Metro Vancouver WTE Project Name: NH3 Samples Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1633305 Control Number: Date Received: Feb 17, 2023 Date Reported: Feb 23, 2023 Report Number: 2845234
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	* Automated Phenate Method, 4500-NH3 G	Feb 22, 2023	Element Edmonton - Roper Road
* Reference Method Modified				

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Please direct any inquiries regarding this report to our Client Services group.

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LABORATORY REPORT

March 1, 2023

Mark Lanfranco
A. Lanfranco and Associates Inc.
Unit 101 - 9488 189 St.
Surrey, BC V4N 4W7

RE: Metro Vancouver W.T.E.

Dear Mark:

Enclosed are the results of the samples submitted to our laboratory on February 21, 2023. For your reference, these analyses have been assigned our service request number P2300735.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

ALS | Environmental


By Sue Anderson at 2:52 pm, Mar 01, 2023

Sue Anderson
Project Manager



Client: A. Lanfranco and Associates Inc.
Project: Metro Vancouver W.T.E.

Service Request No: P2300735

CASE NARRATIVE

The samples were received intact under chain of custody on February 21, 2023 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

C3 through C6 Hydrocarbons, Methane, Ethene & Ethane Analysis

The samples were analyzed per modified EPA Method TO-3 for C3 through >C6 hydrocarbons and methane, ethene, ethane, and using a gas chromatograph equipped with a flame ionization detector (FID). This procedure is described in laboratory SOP VOA-TO3C1C6. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP or AIHA-LAP, LLC accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Alaska DEC	http://dec.alaska.gov/eh/lab.aspx	17-019
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/page/la-lab-accreditation	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml	2018027
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1776326
New Jersey DEP (NELAP)	http://www.nj.gov/dep/enforcement/oqa.html	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-008
Pennsylvania DEP	http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html	T104704413-19-10
Utah DOH (NELAP)	http://health.utah.gov/lab/lab_cert_env	CA016272019-10
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946
Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.		

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: A. Lanfranco and Associates Inc.
Project ID: Metro Vancouver W.T.E.

Service Request: P2300735

Date Received: 2/21/2023
Time Received: 09:30

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	TO-3 Modified - C1C6+ Can	TO-3 Modified - MEEPP Can
Unit 1 Run 1	P2300735-001	Air	2/16/2023	10:47	SC02325	-2.91	4.43	X	X
Unit 1 Run 2	P2300735-002	Air	2/16/2023	11:56	SC00105	-2.40	4.20	X	X
Unit 1 Run 3	P2300735-003	Air	2/16/2023	13:05	SC02276	-3.62	4.25	X	X
Unit 2 Run 1	P2300735-004	Air	2/14/2023	11:40	SC00303	-3.92	3.90	X	X
Unit 2 Run 2	P2300735-005	Air	2/14/2023	12:48	SC00122	-3.72	4.01	X	X
Unit 2 Run 3	P2300735-006	Air	2/14/2023	13:59	SC01035	-3.04	3.81	X	X
Unit 3 Run 1	P2300735-007	Air	2/15/2023	10:41	SC00142	0.67	3.74	X	X
Unit 3 Run 2	P2300735-008	Air	2/15/2023	11:51	SC00617	-2.24	3.89	X	X
Unit 3 Run 3	P2300735-009	Air	2/15/2023	13:03	SC00979	-2.22	4.16	X	X



Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard

ALS Project No. 23807345

Company Name & Address (Reporting Information) A.Lanfranco & Associates Inc.				Project Name Metro Vancouver W.T.E.				ALS Contact:		Comments e.g. Actual Preservative or specific instructions
								Analysis Method		
Project Manager Mark Lanfranco				P.O. # / Billing Information				TO-3 (List on File)		
Phone 604-881-2582		Fax		Bill to Account						
Email Address for Result Reporting mark.lanfranco@alanfranco.com				Sampler (Print & Sign) Daryl Sampson <i>Daryl Sampson</i>						
Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume		
Unit 1 Run 1	<u>1</u>	02-16-23	0947-1047	SC02325	OA00647	-30"	-7.5"	6L		
Unit 1 Run 2	<u>2</u>	02-16-23	1056-1156	SC00105	OA0084	-30"	-7.5"	6L		
Unit 1 Run 3	<u>3</u>	02-16-22	1205-1305	SN11190	OA01142	-29"	-8"	6L		
Unit 2 Run 1	<u>4</u>	02-14-23	1040-1140	SCO0303	OA00491	-28"	-12"	6L		
Unit 2 Run 2	<u>5</u>	02-14-23	1148-1248	SC00122	OA01849	-30"	-11"	6L		
Unit 2 Run 3	<u>6</u>	02-14-23	1259-1359	SC01035	OA01007	-28"	-6"	6L		
Unit 3 Run 1	<u>7</u>	02-15-23	0941-1041	SC00142	OA00012	-29"	-0"	6L		
Unit 3 Run 2	<u>8</u>	02-15-23	1051-1151	SC00105	OA0084	-30"	-7"	6L		
Unit 3 Run 3	<u>9</u>	02-15-23	1203-1303	SCO0979	OA01178	-30"	-7.5"	6L		
Report Tier Levels - please select										Project Requirements (MRLs, QAPP)
Tier I - Results (Default if not specified) _____ Tier III (Results + QC & Calibration Summaries) _____ EDD required Yes / No _____ Chain of Custody Seal: (Circle) _____ Tier II (Results + QC Summaries) _____ Tier IV (Data Validation Package) 10% Surcharge _____ Type: _____ Units: _____ INTACT BROKEN ABSENT										
Relinquished by: (Signature)				Date:	Time:	Received by: (Signature)		Date:	Time:	Cooler / Blank Temperature _____ °C
Relinquished by: (Signature)				Date:	Time:	Received by: (Signature)		Date:	Time:	

ALS Environmental Sample Acceptance Check Form

Client: A. Lanfranco and Associates Inc. Work order: P2300735
 Project: Metro Vancouver W.T.E.
 Sample(s) received on: 2/21/23 Date opened: 2/21/23 by: ADAVID

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- | | Yes | No | N/A |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1 Were sample containers properly marked with client sample ID? | ☒ | ☐ | ☐ |
| 2 Did sample containers arrive in good condition? | ☒ | ☐ | ☐ |
| 3 Were chain-of-custody papers used and filled out? | ☒ | ☐ | ☐ |
| 4 Did sample container labels and/or tags agree with custody papers? | ☐ | ☒ | ☐ |
| 5 Was sample volume received adequate for analysis? | ☒ | ☐ | ☐ |
| 6 Are samples within specified holding times? | ☒ | ☐ | ☐ |
| 7 Was proper temperature (thermal preservation) of cooler at receipt adhered to? | ☐ | ☐ | ☒ |
| 8 Were custody seals on outside of cooler/Box/Container? | ☐ | ☒ | ☐ |
| Location of seal(s)? _____ Sealing Lid? | ☐ | ☐ | ☒ |
| Were signature and date included? | ☐ | ☐ | ☒ |
| Were seals intact? | ☐ | ☐ | ☒ |
| 9 Do containers have appropriate preservation , according to method/SOP or Client specified information? | ☐ | ☐ | ☒ |
| Is there a client indication that the submitted samples are pH preserved? | ☐ | ☐ | ☒ |
| Were VOA vials checked for presence/absence of air bubbles? | ☐ | ☐ | ☒ |
| Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it? | ☐ | ☐ | ☒ |
| 10 Tubes: Are the tubes capped and intact? | ☐ | ☐ | ☒ |
| 11 Badges: Are the badges properly capped and intact? | ☐ | ☐ | ☒ |
| Are dual bed badges separated and individually capped and intact? | ☐ | ☐ | ☒ |

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P2300735-001.01	6.0 L Source Can					
P2300735-002.01	6.0 L Source Can					
P2300735-003.01	6.0 L Source Can					
P2300735-004.01	6.0 L Source Can					
P2300735-005.01	6.0 L Source Can					
P2300735-006.01	6.0 L Source Can					
P2300735-007.01	6.0 L Source Can					
P2300735-008.01	6.0 L Source Can					
P2300735-009.01	6.0 L Source Can					

Explain any discrepancies: (include lab sample ID numbers): _____
 Per client the correct can ID for sample -008 is SC00617.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 1 Run 1

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-001

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02325

Date Collected: 2/16/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.91 Final Pressure (psig): 4.43

Container Dilution Factor: 1.62

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.81	
C ₄ as n-Butane	ND	0.81	
C ₅ as n-Pentane	ND	0.81	
C ₆ as n-Hexane	ND	0.81	
C ₆ + as n-Hexane	ND	1.6	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 1 Run 2

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-002

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00105

Date Collected: 2/16/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.40 **Final Pressure (psig):** 4.20

Container Dilution Factor: 1.54

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.77	
C ₄ as n-Butane	ND	0.77	
C ₅ as n-Pentane	ND	0.77	
C ₆ as n-Hexane	ND	0.77	
C ₆ + as n-Hexane	ND	1.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 1 Run 3

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-003

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02276

Date Collected: 2/16/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.62 Final Pressure (psig): 4.25

Container Dilution Factor: 1.71

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.86	
C ₄ as n-Butane	ND	0.86	
C ₅ as n-Pentane	ND	0.86	
C ₆ as n-Hexane	ND	0.86	
C ₆ + as n-Hexane	2.5	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 2 Run 1

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-004

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00303

Date Collected: 2/14/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.92

Final Pressure (psig): 3.90

Container Dilution Factor: 1.73

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.87	
C ₄ as n-Butane	ND	0.87	
C ₅ as n-Pentane	1.2	0.87	
C ₆ as n-Hexane	ND	0.87	
C ₆ + as n-Hexane	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 2 Run 2

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-005

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00122

Date Collected: 2/14/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.72 Final Pressure (psig): 4.01

Container Dilution Factor: 1.70

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.85	
C ₄ as n-Butane	ND	0.85	
C ₅ as n-Pentane	ND	0.85	
C ₆ as n-Hexane	ND	0.85	
C ₆ + as n-Hexane	2.2	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 2 Run 3

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-006

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01035

Date Collected: 2/14/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -3.04

Final Pressure (psig): 3.81

Container Dilution Factor: 1.59

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.80	
C ₄ as n-Butane	ND	0.80	
C ₅ as n-Pentane	ND	0.80	
C ₆ as n-Hexane	ND	0.80	
C ₆ + as n-Hexane	2.0	1.6	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 3 Run 1

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-007

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00142

Date Collected: 2/15/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): 0.67 Final Pressure (psig): 3.74

Container Dilution Factor: 1.20

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.60	
C ₄ as n-Butane	ND	0.60	
C ₅ as n-Pentane	ND	0.60	
C ₆ as n-Hexane	ND	0.60	
C ₆ + as n-Hexane	2.1	1.2	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 3 Run 2

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-008

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00617

Date Collected: 2/15/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.24

Final Pressure (psig): 3.89

Container Dilution Factor: 1.49

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.75	
C ₄ as n-Butane	ND	0.75	
C ₅ as n-Pentane	ND	0.75	
C ₆ as n-Hexane	ND	0.75	
C ₆ + as n-Hexane	2.7	1.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 3 Run 3

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-009

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00979

Date Collected: 2/15/23

Date Received: 2/21/23

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.22 Final Pressure (psig): 4.16

Container Dilution Factor: 1.51

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.76	
C ₄ as n-Butane	ND	0.76	
C ₅ as n-Pentane	ND	0.76	
C ₆ as n-Hexane	ND	0.76	
C ₆ + as n-Hexane	2.3	1.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Method Blank

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P230222-MB

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/22/23

Volume(s) Analyzed: 1.0 ml(s)

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.50	
C ₄ as n-Butane	ND	0.50	
C ₅ as n-Pentane	ND	0.50	
C ₆ as n-Hexane	ND	0.50	
C ₆ + as n-Hexane	ND	1.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Duplicate Lab Control Sample

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P230222-DLCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Stephanie Reynoso

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/22/23

Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount	Result		% Recovery		ALS	RPD	RPD	Data
	LCS / DLCS ppmV	LCS ppmV	DLCS ppmV	LCS	DLCS	Acceptance Limits			
Propane	1,000	1,030	1,070	103	107	92-120	4	6	
n-Butane	1,000	1,030	1,070	103	107	91-121	4	6	
n-Pentane	1,000	1,000	1,050	100	105	89-118	5	6	
n-Hexane	1,000	1,040	1,090	104	109	92-125	5	6	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 1 Run 1

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-001

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02325

Date Collected: 2/16/23

Date Received: 2/21/23

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.91 Final Pressure (psig): 4.43

Container Dilution Factor: 1.62

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	1.3	1.1	2.0	1.6	
74-85-1	Ethene	ND	0.56	ND	0.49	
74-84-0	Ethane	ND	0.60	ND	0.49	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 1 Run 2

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-002

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00105

Date Collected: 2/16/23

Date Received: 2/21/23

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.40 Final Pressure (psig): 4.20

Container Dilution Factor: 1.54

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	1.4	1.0	2.1	1.5	
74-85-1	Ethene	ND	0.53	ND	0.46	
74-84-0	Ethane	ND	0.57	ND	0.46	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 1 Run 3

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-003

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02276

Date Collected: 2/16/23

Date Received: 2/21/23

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.62 Final Pressure (psig): 4.25

Container Dilution Factor: 1.71

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.1	ND	1.7	
74-85-1	Ethene	ND	0.59	ND	0.51	
74-84-0	Ethane	ND	0.63	ND	0.51	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 2 Run 1

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-004

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00303

Date Collected: 2/14/23

Date Received: 2/21/23

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.92 Final Pressure (psig): 3.90

Container Dilution Factor: 1.73

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	2.0	1.1	3.0	1.7	
74-85-1	Ethene	ND	0.60	ND	0.52	
74-84-0	Ethane	ND	0.64	ND	0.52	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 2 Run 2

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-005

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00122

Date Collected: 2/14/23

Date Received: 2/21/23

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.72 Final Pressure (psig): 4.01

Container Dilution Factor: 1.70

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.1	ND	1.7	
74-85-1	Ethene	ND	0.58	ND	0.51	
74-84-0	Ethane	ND	0.63	ND	0.51	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Unit 2 Run 3
Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735
ALS Sample ID: P2300735-006

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Drew Picard
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC01035

Date Collected: 2/14/23
Date Received: 2/21/23
Date Analyzed: 2/23/23
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -3.04 **Final Pressure (psig):** 3.81

Container Dilution Factor: 1.59

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	1.1	1.0	1.7	1.6	
74-85-1	Ethene	ND	0.55	ND	0.48	
74-84-0	Ethane	ND	0.59	ND	0.48	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Unit 3 Run 1

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P2300735-007

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00142

Date Collected: 2/15/23

Date Received: 2/21/23

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): 0.67 Final Pressure (psig): 3.74

Container Dilution Factor: 1.20

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	2.1	0.79	3.2	1.2	
74-85-1	Ethene	ND	0.41	ND	0.36	
74-84-0	Ethane	ND	0.44	ND	0.36	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Unit 3 Run 2
Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735
ALS Sample ID: P2300735-008

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Drew Picard
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00617

Date Collected: 2/15/23
Date Received: 2/21/23
Date Analyzed: 2/23/23
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.24 **Final Pressure (psig):** 3.89

Container Dilution Factor: 1.49

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	1.5	0.98	2.3	1.5	
74-85-1	Ethene	ND	0.51	ND	0.45	
74-84-0	Ethane	ND	0.55	ND	0.45	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Unit 3 Run 3
Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735
ALS Sample ID: P2300735-009

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Drew Picard
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00979

Date Collected: 2/15/23
Date Received: 2/21/23
Date Analyzed: 2/23/23
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.22 **Final Pressure (psig):** 4.16

Container Dilution Factor: 1.51

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	1.3	0.99	2.0	1.5	
74-85-1	Ethene	ND	0.52	ND	0.45	
74-84-0	Ethane	ND	0.56	ND	0.45	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Method Blank

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P230223-MB

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/23/23

Volume(s) Analyzed: 0.50 ml(s)

CAS #	Compound	Result mg/m ³	MRL mg/m ³	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	0.66	ND	1.0	
74-85-1	Ethene	ND	0.34	ND	0.30	
74-84-0	Ethane	ND	0.37	ND	0.30	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Duplicate Lab Control Sample

Client Project ID: Metro Vancouver W.T.E.

ALS Project ID: P2300735

ALS Sample ID: P230223-DLCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Drew Picard

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/23/23

Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount	Result		% Recovery		ALS	RPD	RPD	Data
		LCS / DLCS ppmV	LCS ppmV	DLCS ppmV	LCS	DLCS	Acceptance Limits			
74-82-8	Methane	1.52	1.55	1.54	102	101	70-130	1.0	15	
74-85-1	Ethene	1.51	1.55	1.51	103	100	70-130	3	15	
74-84-0	Ethane	1.50	1.54	1.50	103	100	70-130	3	15	

APPENDIX - D

COMPUTER GENERATED RESULTS

Client: Metro Vancouver
Jobsite: WTE (Burnaby, BC)
Source: Unit 1

Date: 16-Feb-23
Run: 1 - Particulate / Metals
Run Time: 09:00 - 11:08

Concentrations:

Particulate	0.80 mg/dscm	0.00035 gr/dscf
	0.46 mg/Acm	0.00020 gr/Acf
	0.75 mg/dscm (@ 11% O2)	0.00033 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.057 Kg/hr	0.126 lb/hr
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Flue Gas Characteristics:

Flow	1199 dscm/min	42345 dscf/min
	19.98 dscm/sec	706 dscf/sec
	2060 Acm/min	72747 Acf/min

Velocity	13.479 m/sec	44.22 f/sec
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Temperature	155.0 oC	311.0 oF
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Moisture	11.4 %
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Gas Analysis	10.5 % O2
	9.5 % CO2

29.942 Mol. Wt (g/gmole) Dry
28.586 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7020 dscm	95.421 dscf
Sample Time	120.0 minutes	
Isokineticity	99.3 %	

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

Date: 16-Feb-23
Run: 1 - Particulate / Metals
Run Time: 11:10 - 13:15

Traverse / Point	Time (min.)	Dry Gas Meter	Pitot ^P	Orifice ^H	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin.
		(ft3)	(in. H2O)	(in. H2O)	Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	286.266								
1	5.0	290.310	0.45	2.22	48	48	10	311	1.5	99.3
2	10.0	294.220	0.42	2.07	49	49	10	312	4.7	99.2
3	15.0	297.740	0.34	1.68	49	49	10	312	8.4	99.2
4	20.0	301.110	0.31	1.53	49	49	10	311	12.5	99.3
5	25.0	304.310	0.28	1.38	50	50	10	311	17.7	99.0
6	30.0	307.580	0.29	1.44	51	51	10	311	25.2	99.2
7	35.0	311.390	0.39	1.94	53	53	11	310	45.6	99.4
8	40.0	316.030	0.58	2.88	54	54	11	313	53.2	99.5
9	45.0	320.660	0.57	2.85	56	56	10	310	58.3	99.5
10	50.0	325.080	0.52	2.60	56	56	10	310	62.5	99.4
11	55.0	329.200	0.45	2.26	57	57	10	310	66.1	99.3
12	60.0	332.780	0.34	1.70	57	57	10	311	69.4	99.2
Traverse 2	0.0	332.780								
1	5.0	336.390	0.34	1.72	60	60	9	307	1.5	99.2
2	10.0	340.100	0.36	1.82	60	60	9	308	4.7	99.2
3	15.0	343.760	0.35	1.77	60	60	9	308	8.4	99.2
4	20.0	347.580	0.38	1.93	61	61	9	308	12.5	99.2
5	25.0	351.450	0.39	1.97	62	62	9	311	17.7	99.3
6	30.0	355.610	0.45	2.28	63	63	9	312	25.2	99.3
7	35.0	359.860	0.47	2.38	63	63	10	312	45.6	99.3
8	40.0	364.250	0.50	2.53	64	64	10	313	53.2	99.3
9	45.0	368.560	0.48	2.44	65	65	10	313	58.3	99.3
10	50.0	372.690	0.44	2.23	65	65	11	313	62.5	99.4
11	55.0	376.630	0.40	2.03	65	65	11	313	66.1	99.4
12	60.0	380.530	0.39	1.99	66	66	11	313	69.4	99.4
Average:			0.412	2.068	57.6	57.6	10.0	311.0		99.3

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C.)
Source: Unit 1

Date: 16-Feb-23
Run: 2 - Particulate / Metals
Run Time: 11:22 - 13:26

Concentrations:

Particulate	0.68 mg/dscm	0.00030 gr/dscf
	0.39 mg/Acm	0.00017 gr/Acf
	0.65 mg/dscm (@ 11% O2)	0.00028 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.049 Kg/hr	0.107 lb/hr
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Flue Gas Characteristics:

Flow	1196 dscm/min	42241 dscf/min
	19.94 dscm/sec	704 dscf/sec
	2083 Acm/min	73545 Acf/min

Velocity	13.627 m/sec	44.71 f/sec
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Temperature	156.2 oC	313.1 oF
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Moisture	12.3 %
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Gas Analysis	10.6 % O2
	9.7 % CO2

29.970 Mol. Wt (g/gmole) Dry
28.499 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7258 dscm	96.261 dscf
Sample Time	120.0 minutes	
Isokineticity	100.4 %	

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

Client:	Metro Vancouver	Date:	16-Feb-23
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 1	Run Time:	11:22 - 13:26

Control Unit (Y)	0.9818	Collection:	Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3083	Filter (grams) 0.00005	CO2	O2	Impinger 1	180.0
Pitot Factor	0.8423	Washings (grams) 0.00180	9.65	10.60	Impinger 2	82.0
Baro. Press. (in. Hg)	30.09		9.70	10.50	Impinger 3	8.0
Static Press. (in. H2O)	-19.00	Total (grams) 0.00185			Impinger 4	2.0
Stack Height (ft)	30				Impinger 5	0.0
Stack Diameter (in.)	70.90				Impinger 6	0.0
Stack Area (sq.ft.)	27.417				Gel	14.5
Minutes Per Reading	5.0		9.68	10.55	Gain (grams)	286.5
Minutes Per Point	5.0					

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	381.036								
1	5.0	385.140	0.42	2.19	67	67	4	308	1.5	100.4
2	10.0	389.480	0.47	2.45	67	67	4	308	4.7	100.4
3	15.0	393.250	0.36	1.85	64	64	4	314	8.4	100.5
4	20.0	396.830	0.33	1.69	61	61	4	314	12.5	100.2
5	25.0	400.190	0.29	1.48	61	61	4	314	17.7	100.3
6	30.0	404.040	0.38	1.94	61	61	4	314	25.2	100.5
7	35.0	407.940	0.39	1.99	61	61	4	314	45.6	100.5
8	40.0	412.440	0.52	2.66	61	61	4	314	53.2	100.6
9	45.0	416.980	0.53	2.71	61	61	4	314	58.3	100.5
10	50.0	421.390	0.50	2.56	61	61	4	314	62.5	100.5
11	55.0	425.400	0.41	2.11	62	62	4	310	66.1	100.3
12	60.0	429.360	0.40	2.06	62	62	4	310	69.4	100.3
Traverse 2	0.0	429.360								
1	5.0	433.080	0.35	1.80	64	64	4	313	1.5	100.5
2	10.0	436.850	0.36	1.85	64	64	4	313	4.7	100.4
3	15.0	440.570	0.35	1.80	65	65	4	314	8.4	100.4
4	20.0	444.500	0.39	2.01	65	65	4	314	12.5	100.5
5	25.0	448.430	0.39	2.01	65	65	4	314	17.7	100.5
6	30.0	452.550	0.43	2.22	65	65	4	314	25.2	100.4
7	35.0	456.720	0.44	2.27	65	65	4	314	45.6	100.4
8	40.0	461.030	0.47	2.42	65	65	4	314	53.2	100.5
9	45.0	465.300	0.46	2.37	65	65	4	314	58.3	100.6
10	50.0	469.420	0.43	2.22	65	65	4	314	62.5	100.4
11	55.0	473.400	0.40	2.06	65	65	4	314	66.1	100.5
12	60.0	477.223	0.37	1.90	65	65	4	315	69.4	100.4
Average:			0.410	2.109	63.6	63.6	4.0	313.1		100.4

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C.)
Source: Unit 1

Date: 16-Feb-23
Run: 3 - Particulate / Metals
Run Time: 13:43 - 15:44

Concentrations:

Particulate	0.3 mg/dscm	0.0001 gr/dscf
	0.2 mg/Acm	0.0001 gr/Acf
	0.3 mg/dscm (@ 11% O2)	0.0001 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.022 Kg/hr	0.049 lb/hr
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Flue Gas Characteristics:

Flow	1261 dscm/min	44529 dscf/min
	21.02 dscm/sec	742 dscf/sec
	2210 Acm/min	78048 Acf/min

Velocity	14.462 m/sec	47.45 f/sec
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Temperature	154.9 oC	310.8 oF
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Moisture	13.1 %
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Gas Analysis	10.3 % O2
	9.6 % CO2

29.950 Mol. Wt (g/gmole) Dry
28.381 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.8998 dscm	102.408 dscf
Sample Time	120.0 minutes	
Isokineticity	101.3 %	

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

Client:	Metro Vancouver	Date:	16-Feb-23
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 1	Run Time:	13:43 - 15:44

Control Unit (Y)	0.9818	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3083	Filter (grams) 0.00005	CO2 O2	Impinger 1 212.0
Pitot Factor	0.8352	Washings (grams) 0.00080	9.25 10.50	Impinger 2 94.0
Baro. Press. (in. Hg)	30.09	Traverse 1	10.00 10.00	Impinger 3 5.0
Static Press. (in. H2O)	-19.00	Traverse 2		Impinger 4 2.0
Stack Height (ft)	30			Impinger 5 0.0
Stack Diameter (in.)	70.90			Impinger 6 0.0
Stack Area (sq.ft.)	27.417			Gel 16.0
Minutes Per Reading	5.0			Gain (grams) 329.0
Minutes Per Point	5.0			

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ΔP (in. H2O)	Orifice ΔH (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	479.162								
1	5.0	493.720	0.52	2.70	66	66	5	296	1.5	101.3
2	10.0	488.380	0.54	2.81	68	68	5	298	4.7	101.4
3	15.0	493.080	0.55	2.85	69	69	5	302	8.4	101.5
4	20.0	497.760	0.56	2.84	66	66	5	315	12.5	101.6
5	25.0	502.430	0.56	2.84	66	66	5	316	17.7	101.4
6	30.0	506.920	0.52	2.64	66	66	5	315	25.2	101.1
7	35.0	511.420	0.52	2.63	66	66	6	316	45.6	101.4
8	40.0	515.760	0.48	2.44	67	67	6	316	53.2	101.5
9	45.0	519.770	0.41	2.08	67	67	6	315	58.3	101.3
10	50.0	523.630	0.38	1.93	67	67	6	315	62.5	101.3
11	55.0	527.330	0.35	1.78	65	65	5	312	66.1	101.3
12	60.0	530.640	0.28	1.43	64	64	5	309	69.4	101.2
Traverse 2	0.0	530.640								
1	5.0	535.280	0.55	2.80	64	64	6	310	1.5	101.6
2	10.0	539.960	0.56	2.85	65	65	6	312	4.7	101.6
3	15.0	544.680	0.57	2.89	65	65	6	313	8.4	101.6
4	20.0	549.440	0.58	2.95	65	65	6	312	12.5	101.5
5	25.0	554.150	0.57	2.89	64	64	6	311	17.7	101.4
6	30.0	558.760	0.55	2.79	64	64	6	312	25.2	101.1
7	35.0	563.120	0.49	2.49	64	64	6	312	45.6	101.2
8	40.0	567.160	0.42	2.13	64	64	6	312	53.2	101.2
9	45.0	571.050	0.39	1.98	64	64	6	313	58.3	101.2
10	50.0	574.790	0.36	1.83	64	64	5	312	62.5	101.2
11	55.0	578.390	0.33	1.68	65	65	5	310	66.1	101.3
12	60.0	581.760	0.29	1.48	64	64	5	305	69.4	101.0
Average:			0.472	2.405	65.4	65.4	5.5	310.8		101.3

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)
Source: Unit 1

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		16-Feb-23	16-Feb-23	16-Feb-23
Test Time		09:47 - 10:47	10:56 - 11:56	12:05 - 13:05
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.09	30.09	30.09
DGM Factor	(Y)	0.9983	0.9983	0.9983
Initial Reading	(m ³)	567.258	567.846	568.463
Final Reading	(m ³)	567.843	568.460	569.082
Temp. Outlet	(Avg. oF)	59.0	64.0	65.5
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.60	0.62	0.63
HF	(mg)	0.005	0.005	0.005
Oxygen	(Vol. %)	10.5	10.6	10.3
HF	(mg/Sm ³)	0.009	0.008	0.008
HF	(mg/Sm ³ @ 11% O2)	0.008	0.008	0.008
Moisture	(Vol. %)	12.3	12.3	13.1

Tstd. (oF)

68

Pstd. (in. Hg)

29.92

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)
Source: Unit 1

Sample Type: NH₃

Parameter		Test 1	Test 2	Test 3
Test Date		16-Feb-23	16-Feb-23	16-Feb-23
Test Time		09:47 - 10:47	10:56 - 11:56	12:05 - 13:05
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.09	30.09	30.09
DGM Factor	(Y)	1.0320	1.0320	1.0320
Initial Reading	(m ³)	237.353	237.870	238.411
Final Reading	(m ³)	237.866	238.408	238.951
Temp. Outlet	(Avg. oF)	62.3	67.0	68.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.54	0.56	0.56
NH ₃	(mg)	2.3	2.0	4.3
Oxygen	(Vol. %)	10.5	10.6	10.3
NH ₃	(mg/Sm ³)	4.3	3.6	7.6
NH ₃	(mg/Sm ³ @ 11% O2)	4.1	3.4	7.1
Moisture	(Vol. %)	12.3	12.3	13.1

Tstd. (oF)

68

Pstd. (in. Hg)

29.92

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C)
Source: Unit 2

Date: 14-Feb-23
Run: 1 - Particulate / Metals
Run Time: 09:54 - 11:55

Concentrations:

Particulate	0.8 mg/dscm	0.0003 gr/dscf
	0.4 mg/Acm	0.0002 gr/Acf
	0.7 mg/dscm (@ 11% O2)	0.0003 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.050 Kg/hr	0.110 lb/hr
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Flue Gas Characteristics:

Flow	1106 dscm/min	39061 dscf/min
	18.43 dscm/sec	651 dscf/sec
	1920 Acm/min	67797 Acf/min

Velocity	12.562 m/sec	41.21 f/sec
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Temperature	146.5 oC	295.7 oF
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Moisture	13.9 %
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Gas Analysis	9.6 % O2
	10.2 % CO2

30.010 Mol. Wt (g/gmole) Dry
28.339 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5829 dscm	91.217 dscf
Sample Time	120.0 minutes	
Isokineticity	102.9 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	14-Feb-23
Jobsite:	WTE (Burnaby, B.C)	Run:	1 - Particulate / Metals
Source:	Unit 2	Run Time:	09:54 - 11:55

Control Unit (Y)	0.9727	Collection:	Gas Analysis (Vol. %):		Condensate Collection:		
Nozzle Diameter (in.)	0.3083		CO2	O2	Impinger 1	170.0	
Pitot Factor	0.8352	Filter (grams) 0.00005	10.00	9.30	Impinger 2	97.0	
Baro. Press. (in. Hg)	30.06	Washings (grams) 0.00190			Traverse 1	Impinger 3	12.0
Static Press. (in. H2O)	-19.00	Total (grams) 0.00195	Traverse 2	10.35	9.80	Impinger 4	5.0
Stack Height (ft)	30		Impinger 5	1.0			
Stack Diameter (in.)	70.90				Impinger 6	8.0	
Stack Area (sq.ft.)	27.417				Gel	20.2	
Minutes Per Reading	5.0		10.18	9.55	Gain (grams)	313.2	
Minutes Per Point	5.0						

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	672.650								
1	5.0	676.490	0.38	1.97	48	48	8	294	1.5	102.9
2	10.0	680.270	0.37	1.92	46	46	8	293	4.7	103.0
3	15.0	683.990	0.36	1.86	46	46	8	294	8.4	102.8
4	20.0	687.660	0.35	1.81	46	46	8	294	12.5	102.9
5	25.0	690.710	0.24	1.24	47	47	8	294	17.7	102.9
6	30.0	693.880	0.26	1.35	47	47	7.5	294	25.2	102.8
7	35.0	697.660	0.37	1.92	47	47	7.5	294	45.6	102.9
8	40.0	701.990	0.48	2.50	50	50	7	296	53.2	103.1
9	45.0	706.280	0.47	2.45	51	51	7	295	58.3	103.0
10	50.0	710.480	0.45	2.35	51	51	7	295	62.5	103.0
11	55.0	714.640	0.44	2.30	52	52	6.5	295	66.1	103.0
12	60.0	718.850	0.45	2.35	52	52	6.5	295	69.4	103.1
Traverse 2	0.0	718.850								
1	5.0	722.910	0.41	2.17	55	55	8	289	1.5	103.1
2	10.0	727.050	0.43	2.26	56	56	8	296	4.7	102.9
3	15.0	731.240	0.44	2.31	56	56	8	297	8.4	103.1
4	20.0	735.390	0.43	2.26	57	57	8	298	12.5	103.1
5	25.0	739.240	0.37	1.95	57	57	8	297	17.7	103.0
6	30.0	742.990	0.35	1.85	58	58	9	296	25.2	102.8
7	35.0	746.520	0.31	1.63	58	58	9	298	45.6	102.9
8	40.0	749.620	0.24	1.26	58	58	9	298	53.2	102.6
9	45.0	752.860	0.26	1.37	59	59	8	297	58.3	102.8
10	50.0	756.220	0.28	1.48	59	59	7	299	62.5	102.9
11	55.0	759.640	0.29	1.53	59	59	7	299	66.1	103.0
12	60.0	762.940	0.27	1.43	60	60	6.5	299	69.4	102.7
Average:			0.363	1.897	53.1	53.1	7.7	295.7		102.9

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C)
Source: Unit 2

Date: 14-Feb-23
Run: 2 - Particulate / Metals
Run Time: 12:07 - 14:08

Concentrations:

Particulate	0.75 mg/dscm	0.00033 gr/dscf
	0.43 mg/Acm	0.00019 gr/Acf
	0.66 mg/dscm (@ 11% O2)	0.00029 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.050 Kg/hr	0.110 lb/hr
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Flue Gas Characteristics:

Flow	1112 dscm/min	39263 dscf/min
	18.53 dscm/sec	654 dscf/sec
	1915 Ac/m/min	67617 Acf/min

Velocity	12.529 m/sec	41.10 f/sec
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Temperature	142.3 oC	288.2 oF
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Moisture	14.1 %
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Gas Analysis	9.6 % O2
	10.1 % CO2

29.997 Mol. Wt (g/gmole) Dry
28.306 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.4697 dscm	87.218 dscf
Sample Time	120.0 minutes	
Isokineticity	102.2 %	

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

Date: 14-Feb-23
Run: 2 - Particulate / Metals
Run Time: 12:07 - 14:08

Traverse / Point	Time (min.)	Dry Gas Meter	Pitot ^P	Orifice ^H (in. H2O)	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
		(ft3)	(in. H2O)		Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	763.635								
1	5.0	767.660	0.40	2.13	58	58	8	304	1.5	103.1
2	10.0	771.630	0.39	2.07	58	58	8	304	4.7	103.0
3	15.0	775.710	0.41	2.19	58	58	8	302	8.4	103.2
4	20.0	779.580	0.37	1.97	58	58	8	304	12.5	103.1
5	25.0	783.500	0.38	2.02	58	58	7	304	17.7	103.0
6	30.0	786.940	0.29	1.56	58	58	7	297	25.2	102.9
7	35.0	790.130	0.25	1.34	59	59	7	300	45.6	102.7
8	40.0	793.190	0.23	1.23	59	59	7	301	53.2	102.8
9	45.0	796.450	0.26	1.39	59	59	6	300	58.3	103.0
10	50.0	799.760	0.27	1.44	58	58	6	300	62.5	102.8
11	55.0	803.190	0.29	1.55	58	58	6	300	66.1	102.8
12	60.0	806.320	0.24	1.28	58	58	6	299	69.4	103.0
Traverse 2	0.0	806.320								
1	5.0	810.310	0.39	2.10	57	57	8	294	1.5	103.1
2	10.0	814.250	0.38	2.04	57	57	8	294	4.7	103.1
3	15.0	818.340	0.41	2.20	57	57	8	295	8.4	103.1
4	20.0	822.510	0.43	2.29	58	58	8	30	12.5	82.6
5	25.0	826.580	0.41	2.18	57	57	8.5	302	17.7	103.1
6	30.0	830.500	0.38	2.03	57	57	8.5	300	25.2	103.0
7	35.0	834.330	0.36	1.93	57	57	8.5	297	45.6	103.1
8	40.0	838.310	0.39	2.09	57	57	8	297	53.2	103.0
9	45.0	842.330	0.40	2.13	56	56	8	299	58.3	103.1
10	50.0	846.400	0.41	2.19	56	56	8	299	62.5	103.1
11	55.0	850.520	0.42	2.24	56	56	7.5	297	66.1	103.0
12	60.0	854.690	0.43	2.30	56	56	7.5	297	69.4	103.0
Average:			0.358	1.912	57.5	57.5	7.5	288.2		102.2

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C)
Source: Unit 2

Date: 14-Feb-23
Run: 3 - Particulate / Metals
Run Time: 14:17 - 16:18

Concentrations:

Particulate	2.4 mg/dscm	0.0011 gr/dscf
	1.4 mg/Acm	0.0006 gr/Acf
	2.2 mg/dscm (@ 11% O2)	0.0010 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.16 Kg/hr	0.346 lb/hr
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Flue Gas Characteristics:

Flow	1068 dscm/min	37732 dscf/min
	17.81 dscm/sec	629 dscf/sec
	1880 Acm/min	66403 Acf/min

Velocity	12.304 m/sec	40.37 f/sec
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Temperature	149.0 oC	300.2 oF
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Moisture	14.6 %
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Gas Analysis	9.8 % O2
	10.3 % CO2

30.041 Mol. Wt (g/gmole) Dry
28.285 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5346 dscm	89.508 dscf
Sample Time	120.0 minutes	
Isokineticity	104.7 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	14-Feb-23
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 2	Run Time:	14:17 - 16:18

Control Unit (Y)	0.9727	Collection:		Gas Analysis (Vol. %):		Condensate Collection:			
Nozzle Diameter (in.)	0.3083		Filter (grams)	0.00340	CO2	O2	Impinger 1	226.0	
Pitot Factor	0.8352		Washings (grams)	0.00280	Traverse 1	10.40	9.90	Impinger 2	72.0
Baro. Press. (in. Hg)	30.06				Traverse 2	10.20	9.75	Impinger 3	10.0
Static Press. (in. H2O)	-19.00	Total (grams) 0.0062					Impinger 4	2.0	
Stack Height (ft)	30						Impinger 5	0.0	
Stack Diameter (in.)	70.90						Impinger 6	0.0	
Stack Area (sq.ft.)	27.417						Gel	14.7	
Minutes Per Reading	5.0				10.30	9.83	Gain (grams)	324.7	
Minutes Per Point	5.0								

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	855.334								
1	5.0	858.870	0.32	1.66	53	53	5.5	302	1.5	103.5
2	10.0	862.520	0.34	1.76	53	53	5.5	302	4.7	103.6
3	15.0	866.220	0.35	1.81	53	53	5.5	303	8.4	103.6
4	20.0	869.820	0.33	1.72	54	54	5.5	302	12.5	103.5
5	25.0	873.580	0.36	1.87	54	54	5.5	302	17.7	103.6
6	30.0	876.960	0.29	1.51	54	54	5.5	302	25.2	103.6
7	35.0	880.160	0.26	1.35	54	54	5.5	302	45.6	103.6
8	40.0	883.230	0.24	1.25	54	54	5.5	302	53.2	103.4
9	45.0	886.430	0.26	1.35	54	54	5.5	301	58.3	103.5
10	50.0	889.690	0.27	1.41	54	54	5.5	300	62.5	103.4
11	55.0	893.020	0.28	1.46	55	55	4.5	300	66.1	103.6
12	60.0	896.840	0.23	1.20	55	55	4.5	300	69.4	131.0
Traverse 2	0.0	896.840								
1	5.0	900.820	0.40	2.09	55	55	6	300	1.5	103.7
2	10.0	904.750	0.39	2.04	55	55	6	300	4.7	103.7
3	15.0	908.630	0.38	1.98	55	55	6	300	8.4	103.7
4	20.0	912.660	0.41	2.15	56	56	6	300	12.5	103.6
5	25.0	916.640	0.40	2.09	56	56	6.5	300	17.7	103.5
6	30.0	920.470	0.37	1.94	56	56	6.5	299	25.2	103.5
7	35.0	924.250	0.36	1.89	56	56	6.5	299	45.6	103.5
8	40.0	928.150	0.38	2.00	57	57	6.5	297	53.2	103.6
9	45.0	932.150	0.40	2.11	57	57	6.5	297	58.3	103.6
10	50.0	936.150	0.40	2.11	57	57	6	297	62.5	103.6
11	55.0	940.190	0.41	2.15	57	57	6	299	66.1	103.5
12	60.0	944.293	0.42	2.21	58	58	6	299	69.4	103.7
Average:			0.344	1.796	55.1	55.1	3.0	300.2		104.7

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)
Source: Unit 2

Sample Type: HF				
Parameter		Test 1	Test 2	Test 3
Test Date		14-Feb-23	14-Feb-23	14-Feb-23
Test Time		10:40 - 11:40	12:06 - 13:06	13:15 - 14:15
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.12	30.12	30.12
DGM Factor	(Y)	0.9983	0.9983	0.9983
Initial Reading	(m ³)	563.484	564.083	564.708
Final Reading	(m ³)	564.082	564.701	565.319
Temp. Outlet	(Avg. oF)	52.0	56.3	55.5
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.62083	0.63634	0.62950
HF	(mg)	0.005	0.005	0.005
Oxygen	(Vol. %)	9.6	9.6	9.8
HF	(mg/Sm ³)	0.008	0.008	0.008
HF	(mg/Sm ³ @ 11% O ₂)	0.007	0.007	0.007
Moisture (isokinetic)	(Vol. %)	13.9	14.1	14.6

*Wet Basis Calculated on moisture from isokinetic tests
Tstd. (oF) 68

Pstd. (in. Hg) 29.92

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)
Source: Unit 2

Sample Type: NH ₃				
Parameter		Test 1	Test 2	Test 3
Test Date		14-Feb-23	14-Feb-23	14-Feb-23
Test Time		10:40 - 11:40	12:06 - 13:06	13:15 - 14:15
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.12	30.12	30.12
DGM Factor	(Y)	1.0320	1.0320	1.0320
Initial Reading	(m ³)	233.934	234.492	235.075
Final Reading	(m ³)	234.491	235.073	235.688
Temp. Outlet	(Avg. oF)	52.6	57.3	60.7
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.59583	0.61621	0.64572
NH ₃	(mg)	1.0	0.9	1.1
Oxygen	(Vol. %)	9.6	9.6	9.8
NH ₃	(mg/Sm ³)	1.7	1.5	1.7
NH ₃	(mg/Sm ³ @ 11% O ₂)	1.5	1.3	1.6
Moisture (isokinetic)	(Vol. %)	13.9	14.1	14.6

*Wet Basis Calculated on moisture from isokinetic tests
Tstd. (oF) 68

Pstd. (in. Hg) 29.92

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C.)
Source: Unit 3

Date: 15-Feb-23
Run: 1 - Particulate / Metals
Run Time: 09:09 - 11:11

Concentrations:

Particulate	6.20 mg/dscm	0.00271 gr/dscf
	3.52 mg/Acm	0.00154 gr/Acf
	5.66 mg/dscm (@ 11% O2)	0.00247 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.399 Kg/hr	0.879 lb/hr
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Flue Gas Characteristics:

Flow	1072 dscm/min	37847 dscf/min
	17.86 dscm/sec	631 dscf/sec
	1888 Acm/min	66660 Acf/min

Velocity	12.351 m/sec	40.52 f/sec
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Temperature	153.9 oC	309.0 oF
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Moisture	14.3 %
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Gas Analysis	10.1 % O2
	10.1 % CO2

30.018 Mol. Wt (g/gmole) Dry
28.297 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.4847 dscm	87.748 dscf
Sample Time	120.0 minutes	
Isokineticity	102.2 %	

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

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C)
Source: Unit 3

Date: 15-Feb-23
Run: 1 - Particulate / Metals
Run Time: 09:09 - 11:11

Control Unit (Y)	0.9976	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3083	Filter (grams) 0.01070	CO2 O2	Impinger 1 226.0
Pitot Factor	0.8352	Washings (grams) 0.00470	10.10 10.05	Impinger 2 62.0
Baro. Press. (in. Hg)	30.28	Traverse 1	10.10 10.05	Impinger 3 8.0
Static Press. (in. H2O)	-19.00	Traverse 2		Impinger 4 2.0
Stack Height (ft)	30	Total (grams) 0.01540		Impinger 5 0.0
Stack Diameter (in.)	70.90			Impinger 6 0.0
Stack Area (sq.ft.)	27.417			Gel 13.6
Minutes Per Reading	5.0		10.10 10.05	Gain (grams) 311.6
Minutes Per Point	5.0			

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	970.068								
1	5.0	973.320	0.30	1.41	49	49	5.5	311	1.5	102.2
2	10.0	976.520	0.29	1.37	50	50	5.5	311	4.7	102.1
3	15.0	979.720	0.29	1.37	50	50	5.5	311	8.4	102.1
4	20.0	982.810	0.27	1.27	50	50	5.5	311	12.5	102.1
5	25.0	985.960	0.28	1.32	50	50	4	311	17.7	102.2
6	30.0	988.830	0.23	1.09	53	53	4	311	25.2	102.1
7	35.0	992.660	0.41	1.95	53	53	4	311	45.6	102.3
8	40.0	996.780	0.47	2.24	55	55	5	311	53.2	102.4
9	45.0	1001.040	0.50	2.39	57	57	5	311	58.3	102.3
10	50.0	1005.280	0.49	2.35	59	59	5.5	311	62.5	102.5
11	55.0	1009.340	0.45	2.16	59	59	5	311	66.1	102.3
12	60.0	1013.260	0.42	2.02	59	59	5	311	69.4	102.2
Traverse 2	0.0	1013.260								
1	5.0	1017.240	0.43	2.07	61	61	5	311	1.5	102.2
2	10.0	1021.320	0.45	2.18	61	61	5	308	4.7	102.2
3	15.0	1025.360	0.44	2.12	62	62	5	311	8.4	102.4
4	20.0	1029.450	0.45	2.18	63	63	5	310	12.5	102.2
5	25.0	1033.510	0.44	2.14	64	64	5.5	310	17.7	102.4
6	30.0	1037.660	0.46	2.23	64	64	5.5	310	25.2	102.4
7	35.0	1040.670	0.24	1.17	65	65	5.5	308	45.6	102.3
8	40.0	1043.490	0.21	1.03	65	65	4.5	304	53.2	102.1
9	45.0	1046.440	0.23	1.13	65	65	4.5	305	58.3	102.2
10	50.0	1049.390	0.23	1.13	65	65	4.5	304	62.5	102.1
11	55.0	1052.280	0.22	1.06	65	65	4	302	66.1	102.1
12	60.0	1055.103	0.21	1.03	65	65	4	302	69.4	102.1
Average:			0.350	1.684	58.7	58.7	4.9	309.0		102.2

Client: Metro Vancouver
Jobsite: WTE (Burnaby, B.C.)
Source: Unit 3

Date: 15-Feb-23
Run: 2 - Particulate / Metals
Run Time: 11:27 - 13:42

Concentrations:

Particulate	6.94 mg/dscm	0.00303 gr/dscf
	4.00 mg/Acm	0.00175 gr/Acf
	6.40 mg/dscm (@ 11% O2)	0.00280 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.446 Kg/hr	0.982 lb/hr
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Flue Gas Characteristics:

Flow	1071 dscm/min	37815 dscf/min
	17.85 dscm/sec	630 dscf/sec
	1858 Acm/min	65617 Acf/min

Velocity	12.158 m/sec	39.89 f/sec
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Temperature	155.9 oC	312.7 oF
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Moisture	12.6 %
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Gas Analysis	10.2 % O2
	10.0 % CO2

30.011 Mol. Wt (g/gmole) Dry
28.495 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.4220 dscm	85.534 dscf
Sample Time	120.0 minutes	
Isokineticity	99.7 %	

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

Client:	Metro Vancouver	Date:	15-Feb-23
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 3	Run Time:	11:27 - 13:42

Control Unit (Y)	0.9976	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3083	Filter (grams) 0.01180	CO2 O2	Impinger 1 202.0
Pitot Factor	0.8425	Washings (grams) 0.00500	10.05 10.15	Impinger 2 34.0
Baro. Press. (in. Hg)	30.28	Traverse 1	10.00 10.20	Impinger 3 4.0
Static Press. (in. H2O)	-19.00	Traverse 2		Impinger 4 5.0
Stack Height (ft)	30			Impinger 5 5.0
Stack Diameter (in.)	70.90			Impinger 6 0.0
Stack Area (sq.ft.)	27.417			Gel 12.5
Minutes Per Reading	5.0			Gain (grams) 262.5
Minutes Per Point	5.0			
			10.03 10.18	

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	56.176								
1	5.0	60.230	0.44	2.13	65	65	7	312	1.5	99.7
2	10.0	64.330	0.45	2.18	65	65	7	312	4.7	99.7
3	15.0	68.480	0.46	2.23	66	66	7	314	8.4	99.8
4	20.0	72.450	0.42	2.04	66	66	7	314	12.5	99.9
5	25.0	76.560	0.45	2.18	66	66	7.5	314	17.7	99.9
6	30.0	80.400	0.39	1.90	67	67	7.5	311	25.2	99.8
7	35.0	83.530	0.26	1.27	67	67	8	311	45.6	99.5
8	40.0	86.480	0.23	1.12	68	68	8	310	53.2	99.4
9	45.0	89.240	0.20	0.98	69	69	8	310	58.3	99.5
10	50.0	92.070	0.21	1.03	69	69	8	310	62.5	99.6
11	55.0	94.970	0.22	1.08	69	69	9.5	310	66.1	99.7
12	60.0	97.940	0.23	1.13	70	70	5	310	69.4	99.7
Traverse 2	0.0	97.940								
1	5.0	100.730	0.20	0.99	72	72	6	308	1.5	99.9
2	10.0	103.650	0.22	1.08	73	73	6	315	4.7	100.0
3	15.0	106.620	0.23	1.13	72	72	6	314	8.4	99.6
4	20.0	109.660	0.24	1.18	72	72	6	313	12.5	99.7
5	25.0	112.820	0.26	1.28	72	72	6.5	313	17.7	99.6
6	30.0	115.980	0.26	1.27	72	72	6.5	314	25.2	99.7
7	35.0	119.900	0.40	1.96	73	73	8.5	314	45.6	99.7
8	40.0	124.200	0.48	2.36	73	73	8.5	314	53.2	99.9
9	45.0	128.620	0.51	2.50	73	73	9.5	316	58.3	99.8
10	50.0	132.790	0.45	2.21	74	74	9.5	315	62.5	99.9
11	55.0	136.910	0.44	2.16	74	74	9.5	315	66.1	99.8
12	60.0	140.893	0.41	2.02	75	75	9.5	315	69.4	99.7
Average:			0.336	1.642	70.1	70.1	7.6	312.7		99.7

Client: Metro Vancouver
Jobsite: WTE(Burnaby,B.C)
Source: Unit 3

Date: 15-Feb-23
Run: 3 - Particulate / Metals
Run Time: 13:55 - 15:56

Concentrations:

Particulate	3.16 mg/dscm	0.00138 gr/dscf
	1.79 mg/Acm	0.00078 gr/Acf
	2.90 mg/dscm (@ 11% O2)	0.00127 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.200 Kg/hr	0.442 lb/hr
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Flue Gas Characteristics:

Flow	1058 dscm/min	37357 dscf/min
	17.63 dscm/sec	623 dscf/sec
	1863 Acn/min	65793 Acf/min

Velocity	12.191 m/sec	40.00 f/sec
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Temperature	157.0 oC	314.6 oF
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Moisture	13.7 %
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Gas Analysis	10.1 % O2
	10.1 % CO2

30.020 Mol. Wt (g/gmole) Dry
28.374 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.4378 dscm	86.092 dscf
Sample Time	120.0 minutes	
Isokineticity	101.6 %	

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

Client:	Metro Vancouver	Date:	15-Feb-23
Jobsite:	WTE(Burnaby,B.C)	Run:	3 - Particulate / Metals
Source:	Unit 3	Run Time:	13:55 - 15:56

Control Unit (Y)	0.9976	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3083	Filter (grams) 0.00720	CO2	Impinger 1
Pitot Factor	0.8352	Washings (grams) 0.00050	O2	Impinger 2
Baro. Press. (in. Hg)	30.28		Traverse 1	Impinger 3
Static Press. (in. H2O)	-19.00		Traverse 2	Impinger 4
Stack Height (ft)	30	Total (grams) 0.00770		Impinger 5
Stack Diameter (in.)	70.90			Impinger 6
Stack Area (sq.ft.)	27.417			Gel
Minutes Per Reading	5.0		10.10	10.10
Minutes Per Point	5.0			Gain (grams)
				290.2

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	141.275								
1	5.0	144.130	0.21	1.04	75	75	4	314	1.5	101.5
2	10.0	147.050	0.22	1.08	75	75	4	314	4.7	101.4
3	15.0	150.040	0.23	1.13	75	75	4	314	8.4	101.6
4	20.0	153.090	0.24	1.18	75	75	4	314	12.5	101.5
5	25.0	156.200	0.25	1.23	75	75	4	314	17.7	101.4
6	30.0	159.500	0.28	1.38	76	76	4.5	315	25.2	101.6
7	35.0	163.490	0.41	2.02	76	76	4.5	316	45.6	101.7
8	40.0	167.760	0.47	2.32	76	76	5.5	316	53.2	101.7
9	45.0	172.160	0.50	2.46	76	76	5.5	317	58.3	101.7
10	50.0	176.340	0.45	2.22	77	77	5.5	317	62.5	101.6
11	55.0	180.430	0.43	2.12	77	77	5.5	316	66.1	101.6
12	60.0	184.480	0.42	2.07	77	77	5.5	316	69.4	101.8
Traverse 2	0.0	184.480								
1	5.0	188.630	0.44	2.18	78	78	5.5	316	1.5	101.8
2	10.0	192.870	0.46	2.27	78	78	5.5	316	4.7	101.7
3	15.0	197.070	0.45	2.23	79	79	5.5	316	8.4	101.7
4	20.0	201.230	0.44	2.18	79	79	5.5	315	12.5	101.8
5	25.0	205.340	0.43	2.13	79	79	5.5	315	17.7	101.7
6	30.0	209.400	0.42	2.08	79	79	5.5	315	25.2	101.6
7	35.0	212.720	0.28	1.39	79	79	5.5	314	45.6	101.5
8	40.0	215.800	0.24	1.20	80	80	5.5	313	53.2	101.5
9	45.0	218.750	0.22	1.10	80	80	4.5	313	58.3	101.5
10	50.0	221.630	0.21	1.05	80	80	4.5	313	62.5	101.4
11	55.0	224.660	0.23	1.15	81	81	4	311	66.1	101.6
12	60.0	227.750	0.24	1.20	81	81	4	311	69.4	101.5
Average:			0.340	1.684	77.6	77.6	4.9	314.6		101.6

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)
Source: Unit 3

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		15-Feb-23	15-Feb-23	15-Feb-23
Test Time		09:41 - 10:41	10:51 - 11:51	12:03 - 13:03
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.33	30.33	30.33
DGM Factor	(Y)	0.9983	0.9983	0.9983
Initial Reading	(m ³)	565.337	565.934	566.593
Final Reading	(m ³)	565.927	566.591	567.216
Temp. Outlet	(Avg. oF)	55.7	65.0	67.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.61258	0.66897	0.63263
HF	(mg)	0.005	0.005	0.005
Oxygen	(Vol. %)	10.1	10.2	10.1
HF	(mg/Sm³)	0.008	0.008	0.008
HF	(mg/Sm³ @ 11% O2)	0.008	0.007	0.007
Moisture (isokinetic)	(Vol. %)	14.3	12.6	13.7

*Wet Basis Calculated on moisture from isokinetic tests

Tstd. (oF) 68 Pstd. (in. Hg) 29.92

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)
Source: Unit 3

Sample Type: NH₃

Parameter		Test 1	Test 2	Test 3
Test Date		15-Feb-23	15-Feb-23	15-Feb-23
Test Time		09:41 - 10:41	10:51 - 11:51	12:03 - 13:03
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.33	30.33	30.33
DGM Factor	(Y)	1.0320	1.0320	1.0320
Initial Reading	(m ³)	235.693	236.222	236.792
Final Reading	(m ³)	236.217	236.788	237.346
Temp. Outlet	(Avg. oF)	61.7	71.3	72.5
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.55547	0.58967	0.57474
NH ₃	(mg)	2.4	2.3	1.7
Oxygen	(Vol. %)	10.1	10.2	10.1
NH₃	(mg/Sm³)	4.3	3.9	3.0
NH₃	(mg/Sm³ @ 11% O2)	3.9	3.6	2.7
Moisture (isokinetic)	(Vol. %)	14.3	12.6	13.7

*Wet Basis Calculated on moisture from isokinetic tests

Tstd. (oF) 68 Pstd. (in. Hg) 29.92

Client: Metro Vancouver
Jobsite: WTE (Burnaby,B.C)

Parameter: N₂O

Molecular Weight: 44.00 grams/mol **Reportable Detection**
Lab Detection Limit: 0.1 ppm **Limit:** 0.18 mg/Sm³

Sample ID	Date	Time	N ₂ O ppm	N ₂ O mg/Sm ³	N ₂ O mg/Sm ³ @ 11% O ₂
Unit 1 - Run 1	2023-02-16	09:47-10:47	1.00	1.83	1.74
Unit 1 - Run 2	2023-02-16	10:56-11:56	0.00	0.18	0.18
Unit 1 - Run 3	2023-02-16	12:05-13:05	0.00	0.18	0.17
Average					0.69
Unit 2 - Run 1	2023-02-14	10:40-11:40	0.00	0.18	0.16
Unit 2 - Run 2	2023-02-14	11:48-12:48	1.00	1.83	1.61
Unit 2 - Run 3	2023-02-14	12:59-13:59	1.00	1.83	1.64
Average					1.14
Unit 3 - Run 1	2023-02-15	09:41-10:41	1.00	1.83	1.67
Unit 3 - Run 2	2023-02-15	10:51-11:51	1.00	1.83	1.69
Unit 3 - Run 3	2023-02-15	12:03-13:03	0.00	0.18	0.17
Average					1.18

Date:	16-Feb-23			14-Feb-23			15-Feb-23		
	Unit 1			Unit 2			Unit 3		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Test Times:	09:47-10:47	10:56 - 11:56	12:05 - 13:05	10:40-11:40	11:48-12:48	12:59-13:59	09:41-10:41	10:51-11:51	12:03-13:03
Methane (ppmv)	2.00	2.10	ND	3.0	ND	1.7	3.20	2.30	2.0
Ethane (ppmv)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethene (ppmv)	ND	ND	ND	ND	ND	ND	ND	ND	ND
C3 as Propane (ppmv)	ND	ND	ND	ND	ND	ND	ND	ND	ND
C4 as n-Butane (ppmv)	ND	ND	ND	ND	ND	ND	ND	ND	ND
C5 as n-Pentane (ppmv)	ND	ND	ND	1.2	ND	ND	ND	ND	ND
C6 as n-Hexane (ppmv)	ND	ND	ND	ND	ND	ND	ND	ND	ND
C6+ as n-Hexane (ppmv)	ND	ND	2.5	ND	2.2	2.0	2.1	2.7	2.3

Detection Limits:

Methane	1.6	1.5	1.7	1.7	1.7	1.6	1.2	1.5	1.5
Ethane	0.49	0.46	0.51	0.52	0.51	0.48	0.36	0.45	0.45
Ethene	0.49	0.46	0.51	0.52	0.51	0.48	0.36	0.45	0.45
C3 as Propane	0.81	0.77	0.86	0.87	0.85	0.80	0.60	0.75	0.76
C4 as n-Butane	0.81	0.77	0.86	0.87	0.85	0.80	0.60	0.75	0.76
C5 as n-Pentane	0.81	0.77	0.86	0.87	0.85	0.80	0.60	0.75	0.76
C6 as n-Hexane	0.81	0.77	0.86	0.87	0.85	0.80	0.60	0.75	0.76
C6+	1.6	1.5	1.7	1.7	1.7	1.6	1.2	1.5	1.5

Using 1/2 DL Convention

Sample Date:	16-Feb-23			14-Feb-23			15-Feb-23		
	Unit 1			Unit 2			Unit 3		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Test Times:	09:47-10:47	10:56 - 11:56	12:05 - 13:05	10:40-11:40	11:48-12:48	12:59-13:59	09:41-10:41	10:51-11:51	12:03-13:03
Methane (ppm)	2.00	2.10	0.85	3.00	0.85	1.70	3.20	2.30	2.00
Ethane (ppm)	0.25	0.23	0.26	0.26	0.26	0.24	0.18	0.23	0.23
Ethene (ppm)	0.25	0.23	0.26	0.26	0.26	0.24	0.18	0.23	0.23
C3 as Propane (ppm)	0.41	0.39	0.43	0.44	0.43	0.40	0.30	0.38	0.38
C4 as n-Butane (ppm)	0.41	0.39	0.43	0.44	0.43	0.40	0.30	0.38	0.38
C5 as n-Pentane (ppm)	0.41	0.39	0.43	1.20	0.43	0.40	0.30	0.38	0.38
C6 as n-Hexane (ppm)	0.41	0.39	0.43	0.44	0.43	0.40	0.30	0.38	0.38
C6+ as n-Hexane (ppm)	0.80	0.75	2.50	0.85	2.20	2.00	2.10	2.70	2.30

Methane (mg/m³ as CH₄)	1.33	1.40	0.57	2.00	0.57	1.13	2.14	1.53	1.33
Ethane (mg/m³ as CH₄)	0.16	0.15	0.17	0.17	0.17	0.16	0.12	0.15	0.15
Ethene (mg/m³ as CH₄)	0.16	0.15	0.17	0.17	0.17	0.16	0.12	0.15	0.15
C3 as Propane (mg/m³ as CH₄)	0.27	0.26	0.29	0.29	0.28	0.27	0.20	0.25	0.25
C4 as n-Butane (mg/m³ as CH₄)	0.27	0.26	0.29	0.29	0.28	0.27	0.20	0.25	0.25
C5 as n-Pentane (mg/m³ as CH₄)	0.27	0.26	0.29	0.80	0.28	0.27	0.20	0.25	0.25
C6 as n-Hexane (mg/m³ as CH₄)	0.27	0.26	0.29	0.29	0.28	0.27	0.20	0.25	0.25
C6+ as n-Hexane (mg/m³ as CH₄)	0.53	0.50	1.67	0.57	1.47	1.33	1.40	1.80	1.53

Total mg/Sm³ @11% O₂ as CH₄	2.31	2.32	2.67	3.51	2.67	2.88	3.01	3.35	3.05
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All data is corrected to standard conditions (S) of 20 °C, 101.325 kPa (dry) unless otherwise noted.

APPENDIX - E

FIELD DATA SHEETS

CLIENT <u>Metro Van WTE</u>					NOZZLE <u>G-3091</u>		DIAMETER, IN. <u>.3083</u>		IMPINGER		INITIAL	FINAL	TOTAL GAIN		
SOURCE <u>Un. #</u>					PROBE <u>FAVARD</u>		Cp <u>.8352</u>		VOLUMES	(mL)	(mL)	(mL)			
PARAMETER / RUN No <u>PAHCl/metals R1</u>					PORT LENGTH				Imp. #1	<u>0</u>	<u>120</u>	<u>120</u>			
DATE <u>Feb 16, 2023</u>					STATIC PRESSURE, IN. H2O <u>119</u>				Imp. #2	<u>100</u>	<u>194</u>	<u>94</u>			
OPERATOR: <u>16</u>					STACK DIAMETER <u>10.9</u>				Imp. #3	<u>100</u>	<u>120</u>	<u>20</u>			
CONTROL UNIT <u>CAT 6105</u>					STACK HEIGHT <u>70.0</u>				Imp. #4	<u>0</u>	<u>5</u>	<u>5</u>			
Y <u>.9818</u>									Imp. #5	<u>100</u>	<u>106</u>	<u>6</u>			
ΔH@ <u>1.822</u>									Imp. #6	<u>100</u>	<u>100</u>	<u>0</u>			
BAROMETRIC PRESSURE, IN. Hg <u>30.09</u>					INITIAL LEAK TEST <u>.001915"</u>				Upstream Diameters						
ASSUMED MOISTURE, Bw <u>150%</u>					FINAL LEAK TEST <u>1.0002151</u>				Downstream Diameters						
									<u>test #1</u>						
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites				
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %			
1	9:00	286.266													
2	10	290.31	1.45	2.22	49	311	250	251	57	10.0					
3		294.22	1.42	2.07	49	312									
4	20	297.74	1.34	1.68	49	312	252	253	57	10.5	9.5	10.7			
5		301.11	1.31	1.53	49	311									
6	30	304.31	1.28	1.38	50	311	257	249	57	10.5					
7		307.58	1.29	1.49	51	311									
8	40	311.39	1.39	1.94	53	310	250	249	57	11.0					
9		316.03	1.58	2.88	54	313									
10	50	320.66	1.57	2.55	56	310	257	257	57	10.0	9.7	10.2			
11		325.08	1.52	2.60	56	310									
12	60	329.20	1.45	2.26	57	310	249	249	57	10.0					
1		332.78	1.34	1.70	57	311									
2	10	336.39	1.34	1.72	60	307	252	252	57	9.0					
3		340.10	1.36	1.82	60	308									
4	20	343.46	1.35	1.77	60	308	250	249	57	9.0	9.5	10.5			
5		347.58	1.38	1.83	61	308									
6	30	351.45	1.37	1.97	62	311	257	252	57	10.0					
7		355.61	1.45	2.28	63	312									
8	40	359.86	1.47	2.38	63	312	250	257	56	11.0					
9		364.25	1.50	2.53	64	317									
10	50	368.56	1.48	2.64	65	317	250	251	56	11.0	9.4	10.4			
11		372.69	1.44	2.23	65	317									
12	60	376.63	1.40	1.93	65	313	257	249	56	11.0					
1	11:08	380.530	1.39	1.98	66	313									
END test															

CLIENT: Metro Van WTE					NOZZLE 6-3121		DIAMETER, IN. 3083		IMPINGER		INITIAL		FINAL		TOTAL GAIN	
SOURCE Unit #1					PROBE 7B		Cp 8423		VOLUMES		(mL)		(mL)		(mL)	
PARAMETER / RUN No R2					PORT LENGTH				Imp. #1		0		180		180	
DATE Feb 16, 2023					STATIC PRESSURE, IN. H2O -107				Imp. #2		100		182		82	
OPERATOR: 36					STACK DIAMETER 30.9				Imp. #3		100		108		8	
CONTROL UNIT CAE 6103 Y 19818					STACK HEIGHT 20				Imp. #4		0		2		2	
BAROMETRIC PRESSURE, IN. Hg 30.09					INITIAL LEAK TEST 1000 @ 15"				Imp. #5		100		100		0	
ASSUMED MOISTURE, Bw 150%					FINAL LEAK TEST 1000 @ 15"				Imp. #6		100		100		0	
					Upstream Diameters											
					Downstream Diameters											
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites					
	11:22	381.036									CO ₂ Vol. %	O ₂ Vol. %				
1		385.14	1.42	2.19	67	308	250	252	52	4.0						
2	10	389.48	1.47	2.45	67	308										
3		393.75	1.40	1.85	64	314	250	252	52	4.0	9.6	10.7				
4	20	396.83	1.33	1.69	61	314										
5		400.19	1.38	1.48	61	314	250	257	52	4.0						
6	30	404.04	1.38	1.94	61	314										
7		407.94	1.35	1.99	61	314	250	252	52	4.0						
8	40	412.44	1.52	2.06	61	314					9.7	10.5				
9		416.98	1.53	2.31	61	314	249	252	52	4.0						
10	50	421.39	1.50	2.56	61	314										
11		425.40	1.41	2.11	62	310	249	253	52	4.0						
12	60	429.36	1.40	2.06	62	310										
1		433.05	1.35	1.50	64	313										
2	16	436.85	1.36	1.85	64	313	250	252	52	4.0						
3		440.57	1.35	1.80	65	314	250	248	52	4.0	9.8	10.7				
4	20	444.50	1.39	2.01	65	314										
5		448.43	1.39	2.01	65	314	257	249	52	4.0						
6	30	452.35	1.43	2.22	65	314										
7		456.32	1.44	2.27	65	314	250	248	52	4.0						
8	40	460.10	1.47	2.42	65	314										
9		465.30	1.44	2.37	65	314	250	249	52	4.0						
10	50	469.47	1.43	2.22	65	314										
11		475.40	1.40	2.06	65	314	250	252	52	4.0	9.6	10.3				
12	60	479.23	1.37	1.90	65	315										
	13:26	END TEST														

CLIENT: Metro Umn WTE					NOZZLE G-3/21		DIAMETER, IN. 3083		IMPINGER		INITIAL		FINAL		TOTAL GAIN	
SOURCE Unit #2					PROBE TA-2002		Cp .8352		VOLUMES		(mL)		(mL)		(mL)	
PARAMETER / RUN No Partic / metal 121					PORT LENGTH				Imp. #1		100		170			
DATE Feb 14, 2023					STATIC PRESSURE, IN. H2O		-19.0		Imp. #2		100		197			
OPERATOR: F. J. B. A. J. G. B. A.					STACK DIAMETER		70.40		Imp. #3		100		112			
CONTROL UNIT CME AL #1 Y 01727					STACK HEIGHT		20.0		Imp. #4		100		5			
BAROMETRIC PRESSURE, IN. Hg 30.06					INITIAL LEAK TEST 1000 @ 15"				Imp. #5		100		101			
ASSUMED MOISTURE, Bw 14%					FINAL LEAK TEST 1000 @ 15"				Imp. #6		100		108			
					Upstream Diameters											
					Downstream Diameters											
					TEST #1											
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites					
	9:54	672.650			Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %				
1		676.49	1.38	1.97	48	294	250	257	58	8.0						
2	10	680.27	1.37	1.97	46	293										
3		683.99	1.36	1.86	46	294	250	249	58	9.0	10.0	9.5				
4	20	687.66	1.35	1.81	46	294										
5		690.31	1.24	1.24	47	294	250	248	58	7.5						
6	30	693.98	1.26	1.35	47	294										
7		697.66	1.37	1.92	47	294	253	254	58	7.0						
8	40	701.39	1.45	2.50	50	296										
9		705.05	1.47	2.45	51	295	250	253	58	6.5						
10	50	710.48	1.45	2.35	51	295										
11		714.64	1.44	2.30	52	295	251	252	58	6.5	10.0	9.1				
12	60	718.85	1.15	2.35	52	295										
1		722.91	1.41	2.17	55	289	251	252	57	8.0	10.3	9.9				
2	10	727.05	1.43	2.26	56	296										
3		731.24	1.44	2.31	56	297	250	249	57	9.0						
4	20	735.39	1.43	2.26	57	298										
5		739.54	1.37	1.95	57	297	249	248	57	9.5						
6	30	743.69	1.35	1.85	58	296										
7		747.84	1.31	1.63	58	298	250	250	57	8.0						
8	40	751.99	1.24	1.76	55	298										
9		756.14	1.26	1.57	59	297	249	248	57	7.0	10.4	9.7				
10	50	760.29	1.28	1.48	59	299										
11		764.44	1.29	1.53	59	299	250	251	57	6.5						
12	60	768.59	1.27	1.43	60	299										
	11:55	END test														

CLIENT

SOURCE

PARAMETER / RUN No

DATE

OPERATOR

CONTROL UNIT

BAROMETRIC PRESSURE, IN. Hg

ASSUMED MOISTURE, Bw

metro VAN WTE

UNIT #7

PAUSE/metals 122

16.15.2023

SGTBN

AUL5

30.28

15%

NOZZLE

PROBE

PORT LENGTH

STATIC PRESSURE, IN. H2O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

47-321

4B

-19

70.90

20

0.01 @ 15"

0.00 @ 15"

DIAMETER, IN.

Cp

IMPINGER VOLUMES

INITIAL (mL)

FINAL (mL)

TOTAL GAIN (mL)

3.583

18423

Imp. #1

Imp. #2

Imp. #3

Imp. #4

Imp. #5

Imp. #6

Upstream Diameters

Downstream Diameters

0

100

100

0

100

100

test #1

Point

Clock Time

Dry Gas Meter ft³

Pitot ΔP IN. H₂O

Orifice ΔH IN. H₂O

Dry Gas Outlet

Stack

Probe

Box

Impinger Exit

Pump Vac. IN. Hg

CO₂ Vol. %

O₂ Vol. %

11:27

56.176

1

2

3

4

5

6

7

8

9

10

11

12

10

20

30

40

50

60

60.23

62.33

64.48

67.45

70.56

73.40

76.53

79.48

82.24

84.07

86.97

89.94

1.44

1.45

1.46

1.47

1.48

1.49

1.50

1.51

1.52

1.53

1.54

1.55

2.13

2.18

2.23

2.24

2.25

2.26

2.27

2.28

2.29

2.30

2.31

2.32

65

65

66

66

66

67

67

68

69

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69

70

312

312

314

314

314

311

311

310

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256

257

252

252

249

250

250

250

252

250

251

250

50

50

50

50

50

50

50

50

50

50

50

50

7.0

7.5

8.0

8.5

9.0

9.5

10.0

10.0

10.1

10.3

10.3

10.3

1

2

3

4

5

6

7

8

9

10

11

12

10

20

30

40

50

100.73

103.85

106.62

109.66

112.82

115.98

119.90

124.20

128.62

132.79

136.91

140.893

0.20

0.22

0.23

0.24

0.26

0.26

0.40

0.49

0.51

0.45

0.44

0.41

0.99

1.08

1.13

1.18

1.18

1.27

1.27

1.46

1.56

2.00

2.16

2.02

72

73

72

72

72

72

72

73

73

73

74

75

308

315

314

313

313

313

314

314

314

316

315

315

251

253

250

248

249

250

248

252

247

250

251

253

50

50

50

50

50

50

50

50

50

50

50

50

6.0

6.0

6.0

6.5

6.5

6.5

6.5

6.5

6.5

6.5

6.5

6.5

13:42

END test

CLIENT <u>metro Van WTE</u>				NOZZLE <u>19-3091</u>		DIAMETER, IN. <u>.3083</u>		IMPINGER		INITIAL		FINAL		TOTAL GAIN	
SOURCE <u>Unit #3</u>				PROBE <u>TA GW120</u>		Cp <u>.8352</u>		VOLUMES		(mL)		(mL)		(mL)	
PARAMETER / RUN No <u>PAHCL/metals 12-3</u>				PORT LENGTH						Imp. #1		192		192	
DATE <u>Feb 15, 2022</u>				STATIC PRESSURE, IN. H2O <u>-19</u>						Imp. #2		165		65	
OPERATOR: <u>SB + JS</u>				STACK DIAMETER <u>10.90</u>						Imp. #3		110		10	
CONTROL UNIT <u>Auls</u>				STACK HEIGHT <u>20</u>						Imp. #4		5		5	
										Imp. #5		100		6	
										Imp. #6		100		0	
BAROMETRIC PRESSURE, IN. Hg <u>30.28</u>				INITIAL LEAK TEST <u>.0001015"</u>						Upstream Diameters					
ASSUMED MOISTURE, Bw <u>15%</u>				FINAL LEAK TEST <u>.0001015"</u>						Downstream Diameters					
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F					Pump Vac. IN. Hg	Fyrites				
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO ₂ Vol. %	O ₂ Vol. %			
1		141.275	1.21	1.04	75	314	250	252	90	4.0					
2	10	147.65	1.22	1.08	75	314	250	252	90	4.0					
3		150.04	1.23	1.13	75	314	257	252	90	4.0	10.0	10.0			
4	20	153.09	1.24	1.18	75	314	257	252	90	4.0					
5		156.90	1.25	1.23	75	314	250	249	90	4.5					
6	30	159.50	1.28	1.38	76	315	250	250	90	5.5					
7		163.49	1.41	2.02	76	316	250	250	90	5.5					
8	40	167.76	1.47	2.32	76	316	250	250	90	5.5					
9		171.16	1.50	2.46	76	317	250	249	90	5.5					
10	50	176.34	1.45	2.22	77	317	250	249	90	5.5					
11		180.43	1.43	2.12	77	316	250	251	90	5.5	10.2	10.4			
12	60	184.48	1.42	2.07	77	316	250	251	90	5.5					
13		188.63	1.44	2.18	78	316	250	252	90	5.5					
14	10	192.87	1.46	2.27	78	316	257	251	90	5.5	10.0	9.9			
15		197.07	1.45	2.23	79	316	257	251	90	5.5					
16	20	201.23	1.44	2.18	79	315	250	250	90	5.5					
17		205.39	1.43	2.13	79	315	250	250	90	5.5					
18	30	209.40	1.42	2.09	79	315	250	249	90	5.5					
19		212.32	1.28	1.39	79	314	250	249	90	5.5					
20	40	215.80	1.29	1.20	80	313	250	257	90	4.5	10.2	10.0			
21		218.75	1.21	1.05	80	313	250	257	90	4.5					
22	50	221.63	1.23	1.15	80	313	249	249	90	4.0					
23		224.60	1.24	1.20	81	311	249	249	90	4.0					
24	15:56	END test													

A. Lanfranco and Associates Inc.

Client COVANTA Y LMU-A 0.9983
 Source Unit 3 Cp
 Parameter HF Pbar 30.33 Static -19
 Date Feb 15, 2023 Operator Liam

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0000
Final	0.0001	0.0001	0.0001

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	0941	565.3369	47	311	200			
			56	310				
	1041	565.9274	64	305	260			
2	1051	565.9340	62	304	200			
			66	308				
	1151	566.5905	69	309	262			
3	1203	566.5930	66	312				
			67	316				
	1303	567.2162	68	314				

Client COVANTA Y LMU-B 1.0320
 Source Unit 3 Cp
 Parameter NH₃ Pbar 30.33 Static -19
 Date Feb 15, 2023 Operator Liam

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0001
Final	0.0001	0.0001	0.0001

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	0941	235.6925	50	311				
			64	310				
	1041	236.2165	71	305				
2	1051	236.2215	70	304				
			72	308				
	1151	236.7880	72	309				
3	1203	236.7924	71	312				
			72	316				
	1303	237.3458	74	314				

A. Lanfranco and Associates Inc.

Client COVANTA Y LMU-A 0.9983
 Source Unit 2 Cp
 Parameter HF Pbar 30.12 Static -19
 Date Feb 14, 2023 Operator Liam

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0001
Final	0.0001	0.0001	0.0001

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	10:40	563.4835	44	297	200			
			55	298				
	11:40	564.0818	57	297	270			
2	12:06	564.0830	53	300	200			
			59	300				
	1306	564.7014	57	301	265			
3	1315	564.7080	54	303	200			
			56	300				
	1415	565.3188	56	300	267			

Client COVANTA Y LMU-B 1.0320
 Source Unit 2 Cp
 Parameter NH₃ Pbar 30.12 Static -19
 Date Feb 14, 2023 Operator Liam

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0001
Final	0.0001	0.0001	0.0001

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	10:40	233.9344	45	297	200			
			55	298				
	11:40	234.4905	58	297				
2	12:06	234.4921	52	300				
			60	300				
	1306	235.0725	62	301				
3	1315	235.0754	58	303				
			61	300				
	1415	235.6876	63	300				

A. Lanfranco and Associates Inc.

Client COVANTA Y LMU-A 0.9983
 Source Unit 1 Cp
 Parameter HF Pbar 30.09 Static -19
 Date Feb 16, 2023 Operator Liam

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0001
Final	0.0001	0.0001	0.0001

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	0947	567.2582	50	311	200			
			62	315				
	1047	567.8430	65	317	245			
2	1056	567.8455	63	316	200			
			64	315				
	1156	568.4600	65	314	246			
3	1205	568.4630	64	314	200			
			65	316				
	1305	569.0821	67	314	240			

Client COVANTA Y LMU-B 1.0320
 Source Unit 2 Cp
 Parameter NH₃ Pbar 30.09 Static -19
 Date Feb 16, 2023 Operator Liam

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0001
Final	0.0001	0.0001	0.0001

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	0947	237.3528	54	311				
			65	315				
	1047	237.8658	68	317				
2	1056	237.8700	68	316				
			67	315				
	1156	238.4080	66	314				
3	1205	238.4105	65	314				
			69	316				
	1305	238.9510	71	314				

Client

M.V. W.T.E. BURNABY, B.C.

Source

Unit #2

Date

FEB. 14, 2023CANISTERS + BAGS (N2O)

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)	30.12	30.12	30.12		
Canister Number	SC00303	SC00122	SC01035		
Controller Number	0A005324	0A00849	0A01007		
Gauge Number	0A00491	N/A	N/A		
Initial: Start Time	10:40	11:48	12:59		
Flask Vac. (in. Hg)	28"	30.0"	28.0"		
Final: End Time	11:40	12:48	13:59		
Flask Vac. (in. Hg)	12"	11.0"	6.0"		

Source

Unit #3

Date

FEB. 15, 2023CANISTERS + BAGS.

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)	30.33	30.33	30.33		
Canister Number	SC00142	SC00617	SC00979		
Controller Number	0A00012	0A02060	0A01178		
Gauge Number	N/A	AV5316	N/A		
Initial: Start Time	9:41	10:51	12:03		
Flask Vac. (in. Hg)	29.0"	30.0"	30.0"		
Final: End Time	10:41	11:51	13:03		
Flask Vac. (in. Hg)	0.0"	7.0"	7.5"		

Source

Unit #1

Date

FEB. 16, 2023CANISTERS + BAGS.

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)	30.14	30.14	30.14		
Canister Number	SC02325	SC00105	SN11190		
Controller Number	0A00647	0A0084	0A01142		
Gauge Number	N/A	N/A	N/A		
Initial: Start Time	09:47	10:56	12:05		
Flask Vac. (in. Hg)	30.0"	30.0"	29.0"		
Final: End Time	10:47	11:56	13:05		
Flask Vac. (in. Hg)	7.5"	7.5"	8.0"		

Source

Date

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)					
Canister Number					
Controller Number					
Gauge Number					
Initial: Start Time					
Flask Vac. (in. Hg)					
Final: End Time					
Flask Vac. (in. Hg)					

ML

Metro Van WTEF
Units 1-3
FEB 17/23

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

[illegible]

Analyzer Range	O ₂	CO ₂	CO	THC	SO ₂	NO _x

CEM READINGS

[illegible]

APPENDIX – F

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Christian De La O

Date: January 10, 2023

Signature: *Carter Lanfranco*

Nozzle I.D.	d1	d2	d3	difference	average dia.	average area
	(inch)	(inch)	(inch)	(inch)	(inch)	(ft ²)
A	0.1270	0.1270	0.1255	0.0015	0.1265	0.0000873
G-165	0.1650	0.1660	0.1645	0.0015	0.1652	0.0001488
G-170	0.1700	0.1710	0.1695	0.0015	0.1702	0.0001579
G-178	0.1760	0.1770	0.1790	0.0030	0.1773	0.0001715
E	0.1950	0.1930	0.1960	0.0030	0.1947	0.0002067
L	0.2100	0.2070	0.2090	0.0030	0.2087	0.0002375
Q	0.2110	0.2085	0.2100	0.0025	0.2098	0.0002401
P-2240	0.2160	0.2155	0.2170	0.0015	0.2162	0.0002549
P-224	0.2170	0.2160	0.2180	0.0020	0.2170	0.0002568
G-221	0.2160	0.2185	0.2190	0.0030	0.2178	0.0002588
G-225	0.2190	0.2175	0.2180	0.0015	0.2182	0.0002596
G-2232	0.2210	0.2200	0.2215	0.0015	0.2208	0.0002660
P-223	0.2220	0.2210	0.2200	0.0020	0.2210	0.0002664
G-245	0.2470	0.2455	0.2460	0.0015	0.2462	0.0003305
P-251	0.2545	0.2530	0.2540	0.0015	0.2538	0.0003514
P-254	0.2550	0.2540	0.2535	0.0015	0.2542	0.0003523
P-256	0.2540	0.2550	0.2560	0.0020	0.2550	0.0003547
G-282	0.2820	0.2800	0.2825	0.0025	0.2815	0.0004322
P-281	0.2820	0.2820	0.2815	0.0005	0.2818	0.0004332
G-292	0.2820	0.2840	0.2850	0.0030	0.2837	0.0004389
G-309	0.3045	0.3065	0.3065	0.0020	0.3058	0.0005101
G-3121	0.3090	0.3085	0.3075	0.0015	0.3083	0.0005185
G-3091	0.3080	0.3080	0.3090	0.0010	0.3083	0.0005185
G-3072	0.3090	0.3070	0.3100	0.0030	0.3087	0.0005196
P-313	0.3140	0.3130	0.3130	0.0010	0.3133	0.0005355
P-314	0.3135	0.3135	0.3140	0.0005	0.3137	0.0005366
P-315	0.3145	0.3145	0.3145	0.0000	0.3145	0.0005395
V-06	0.3220	0.3215	0.3200	0.0020	0.3212	0.0005626
P-343	0.3430	0.3440	0.3435	0.0010	0.3435	0.0006435
P-346	0.3465	0.3470	0.3465	0.0005	0.3467	0.0006555
G-345	0.3470	0.3475	0.3475	0.0005	0.3473	0.0006580
P27	0.3490	0.3480	0.3500	0.0020	0.3490	0.0006643
G-367	0.3700	0.3685	0.3690	0.0015	0.3692	0.0007433
P-375	0.3730	0.3750	0.3745	0.0020	0.3742	0.0007636
P-401	0.3980	0.3990	0.4000	0.0020	0.3990	0.0008683
P-407	0.4085	0.4085	0.4090	0.0005	0.4087	0.0009109
G-433	0.4360	0.4360	0.4355	0.0005	0.4358	0.0010360
P-29	0.4690	0.4690	0.4700	0.0010	0.4693	0.0012014
G-468	0.4700	0.4685	0.4720	0.0035	0.4702	0.0012057
P-7	0.4965	0.4945	0.4975	0.0030	0.4962	0.0013427
B	0.5020	0.5030	0.5035	0.0015	0.5028	0.0013790
G-540	0.5400	0.5410	0.5400	0.0010	0.5403	0.0015924
J				0.0000	#DIV/0!	#DIV/0!
G-215				0.0000	#DIV/0!	#DIV/0!
G-218				0.0000	#DIV/0!	#DIV/0!
G-2231				0.0000	#DIV/0!	#DIV/0!
G-2501				0.0000	#DIV/0!	#DIV/0!
P				0.0000	#DIV/0!	#DIV/0!
				0.0000	#DIV/0!	#DIV/0!
				0.0000	#DIV/0!	#DIV/0!
				0.0000	#DIV/0!	#DIV/0!
				0.0000	#DIV/0!	#DIV/0!
				0.0000	#DIV/0!	#DIV/0!

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

Pitot Tube Calibration

Date: 11-Jan-23
Pbar (in.Hg): 29.74

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

Pitot ID: **7A-1**

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	0.0016
0.095	0.130	20.6	0.8463	0.0002
0.420	0.560	43.4	0.8574	0.0112
0.600	0.830	51.9	0.8417	0.0044
0.730	1.020	57.2	0.8375	0.0086
Average :			0.8461	0.0052

Pitot ID: **ST 8A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.040	0.055	13.4	0.8443	0.0031
0.120	0.170	23.2	0.8318	0.0156
0.300	0.400	36.7	0.8574	0.0100
0.470	0.630	45.9	0.8551	0.0077
0.720	0.980	56.8	0.8486	0.0012
Average :			0.8474	0.0075

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.030	0.040	11.6	0.8574	0.0151
0.150	0.210	25.9	0.8367	0.0056
0.230	0.320	32.1	0.8393	0.0030
0.430	0.610	43.9	0.8312	0.0111
0.710	0.970	56.4	0.8470	0.0047
Average :			0.8423	0.0079

Pitot ID: **ST 8B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.045	0.060	14.2	0.8574	0.0046
0.230	0.320	32.1	0.8393	0.0135
0.430	0.580	43.9	0.8524	0.0003
0.630	0.840	53.2	0.8574	0.0046
0.690	0.920	55.6	0.8574	0.0046
Average :			0.8528	0.0055

Pitot ID: **7 AL GVRD-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.050	0.070	16.3	0.8367	0.0015
0.105	0.145	19.9	0.8425	0.0073
0.250	0.350	25.3	0.8367	0.0015
0.430	0.610	35.8	0.8312	0.0040
0.680	0.970	48.4	0.8289	0.0063
Average :			0.8352	0.0041

Pitot ID: **ST 8C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.055	0.075	14.9	0.8478	0.0021
0.105	0.145	19.4	0.8425	0.0033
0.210	0.290	29.0	0.8425	0.0033
0.500	0.680	43.1	0.8489	0.0032
0.710	0.970	52.8	0.8470	0.0013
Average :			0.8457	0.0026

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.040	0.055	13.4	0.8443	0.0069
0.150	0.200	16.3	0.8574	0.0062
0.430	0.580	43.9	0.8524	0.0013
0.480	0.660	30.5	0.8443	0.0069
0.690	0.920	47.0	0.8574	0.0062
Average :			0.8511	0.0055

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: Justin Ching Signature: Carter Lanfranco Date: January 11, 2023

A.Lanfranco & Associates inc.

EPA Method 5
Meter Box Calibration
English Meter Box Units, English K' Factor

Model #: **AU 15**
Serial #: **0028SPC-081915-1**

Date: **10-Jan-23**
Barometric Pressure: **29.59** (in. Hg)
Theoretical Critical Vacuum: **13.96** (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)²(min)).
!!!!!!!

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
3.40	16.00	250.496	267.425	16.929	75.0	75.0	74.0	74.0	73	0.8185	17.5	83.0	82.0	82.5
1.80	15.00	238.876	250.496	11.620	73.0	73.0	76.0	76.0	63	0.5956	20.0	80.0	84.0	82.0
1.20	15.00	229.882	238.876	8.994	70.0	70.0	73.0	73.0	55	0.4606	22.5	80.0	84.0	82.0
0.60	15.00	223.065	229.882	6.817	67.0	67.0	69.0	69.0	48	0.3560	23.0	71.0	77.0	74.0
0.29	15.00	218.360	223.065	4.705	66.0	66.0	62.0	62.0	40	0.2408	24.5	67.0	74.0	70.5

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR Y			CALIBRATION FACTOR dH@					
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)			Ko (value)
16.672	472.1		16.637	471.2	17.292	0.998	0.000		1.728	43.89	-0.011			0.728
11.398	322.8		11.355	321.6	11.791	0.996	-0.001		1.726	43.84	-0.013			0.731
8.859	250.9		8.781	248.7	9.118	0.991	-0.006		1.935	49.15	0.196			0.694
6.749	191.1		6.838	193.6	6.995	1.013	0.016		1.606	40.80	-0.133			0.746
4.690	132.8		4.640	131.4	4.716	0.989	-0.008		1.699	43.14	-0.040			0.743
Average Y----->						0.9976	Average dH@----->		1.739	44.2	Average Ko---->		0.728	

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)	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 H2O that equates to 0.75 cm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +0.2.
For Temperature Device, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Ben Lester

Signature: *Carter Lanfranco*

Date: January 10, 2023

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: 10-Jan-23
Barometric Pressure: 29.59 (in. Hg)
Theoretical Critical Vacuum: 13.96 (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)^{0.5}/(min)).
!!!!!!!

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
3.75	18.00	806.240	826.180	19.940	76.0	76.0	76.0	76.0	73	0.8185	17.0	72.0	73.0	72.5
1.92	15.00	794.260	806.240	11.980	74.0	74.0	76.0	76.0	63	0.5956	20.0	73.0	73.0	73.0
1.20	22.00	780.615	794.260	13.645	73.0	73.0	74.0	74.0	55	0.4606	22.0	75.0	73.0	74.0
0.67	30.00	766.451	780.550	14.099	69.0	69.0	73.0	73.0	48	0.3560	23.5	73.0	75.0	74.0
0.32	21.00	759.655	766.415	6.760	68.0	68.0	69.0	69.0	40	0.2408	25.0	72.0	73.0	72.5

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR Y			CALIBRATION FACTOR dH@					
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)			Ko (value)
19.599	555.0		18.892	535.0	19.273	0.964	-0.009		1.865	47.38	0.021			0.707
11.744	332.6		11.451	324.3	11.693	0.975	0.002		1.809	45.95	-0.036			0.711
13.390	379.2		12.975	367.5	13.275	0.969	-0.004		1.899	48.24	0.055			0.699
13.882	393.1		13.676	387.3	13.991	0.985	0.012		1.783	45.30	-0.061			0.710
6.682	189.2		6.484	183.6	6.615	0.970	-0.002		1.865	47.38	0.021			0.705
Average Y----->						0.9727	Average dH@----->		1.844	46.8	Average Ko---->		0.706	

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)	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 H2O that equates to 0.75 cm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +0.2.
For Temperature Devices, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Liam Forrer

Signature: Liam Forrer

Date: January 10, 2023

A.Lanfranco & Associates inc.

EPA Method 5
Meter Box Calibration
English Meter Box Units, English K' Factor

Model #: **CAE G10J**
Serial #: **0028-1X1310-1**

Date: **10-Jan-23**
Barometric Pressure: **29.55** (in. Hg)
Theoretical Critical Vacuum: **13.94** (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)^{0.5}(min)).
!!!!!!!

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
3.60	17.00	937.261	955.649	18.388	74.0	74.0	75.0	75.0	73	0.8185	15.5	85.5	82.5	84.0
1.90	16.00	924.799	937.261	12.462	73.0	73.0	74.0	74.0	63	0.5956	18.5	87.0	88.0	87.5
1.15	19.00	913.210	924.799	11.589	71.0	71.0	72.0	72.0	55	0.4606	20.0	80.5	81.0	80.8
0.62	16.00	905.781	913.210	7.429	70.0	70.0	71.0	71.0	48	0.3560	22.0	74.0	80.0	77.0
0.33	16.00	900.665	905.781	5.116	67.0	67.0	71.0	71.0	40	0.2408	23.5	64.0	73.0	68.5

***** RESULTS *****

--- DRY GAS METER ---		----- ORIFICE -----		-- DRY GAS METER --		----- ORIFICE -----						
VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR		CALIBRATION FACTOR					
Vm(std) (cu ft)	Vm(std) (liters)	Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)	dH@					
					Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)		
18.093	512.4	17.629	499.3	18.398	0.974	-0.007	1.837	46.66	0.015	0.711		
12.234	346.5	12.035	340.8	12.641	0.984	0.002	1.846	46.90	0.024	0.704		
11.398	322.8	11.121	314.9	11.537	0.976	-0.006	1.853	47.06	0.031	0.709		
7.311	207.0	7.263	205.7	7.483	0.994	0.012	1.663	42.25	-0.158	0.736		
5.045	142.9	4.952	140.3	5.021	0.982	0.000	1.910	48.51	0.088	0.695		
Average Y----->					0.9818		Average dH@----->		1.822	46.3	Average Ko---->	0.711

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)	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 H2O that equates to 0.75 cm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +0.2.
For Temperature Device, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Ben Lester

Signature: *Carter Lanfranco*

Date: January 10, 2023

A. Lanfranco & Associates inc.

EPA Method 5
Meter Box Calibration
English Meter Box Units, English K' Factor

Model #: **LMU-A**
Serial #: **Kimmon 186**

Date: **10-Jan-23**
Barometric Pressure: **29.52** (in. Hg)
Theoretical Critical Vacuum: **13.92** (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-					
dH (in H2O)	Time (min)	Volume Initial (m³)	Volume Final (m³)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
0.00	15.00	557.8680	558.0660	6.992	68.0	68.0	70.0	70.0	48	0.3560	20.0	65.0	65.0	65.0
0.00	16.00	558.0660	558.2770	7.451	69.0	69.0	65.0	65.0	48	0.3560	20.0	64.0	61.0	62.5
0.00	21.00	558.2770	558.5550	9.817	67.0	67.0	65.0	65.0	48	0.3560	20.0	61.0	58.0	59.5

***** RESULTS *****											
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----		
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR			CALIBRATION FACTOR		
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)
6.883	194.9		6.880	194.8	6.936	1.000	0.001		0.000	0.00	0.000
7.363	208.5		7.356	208.3	7.381	0.999	0.001		0.000	0.00	0.000
9.719	275.2		9.683	274.2	9.660	0.996	-0.002		0.000	0.00	0.000
Average Y----->						0.9983		Average dH@----->	0.0000	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 H2O 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: Liam Forrer

Signature: 

Date: January 10, 2023

A. Lanfranco & Associates inc.

EPA Method 5
Meter Box Calibration
English Meter Box Units, English K' Factor

Model #: **LMU-B**
Serial #: **Wizit 6276**

Date: **10-Jan-23**
Barometric Pressure: **29.58** (in. Hg)
Theoretical Critical Vacuum: **13.95** (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-					
dH (in H2O)	Time (min)	Volume Initial (m³)	Volume Final (m³)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
0.00	22.00	232.3240	232.6050	9.923	68.0	68.0	71.0	71.0	48	0.3560	20.0	63.0	65.0	64.0
0.00	18.00	232.6050	232.8370	8.193	70.0	70.0	73.0	73.0	48	0.3560	20.0	64.0	66.0	65.0
0.00	16.00	232.8370	233.0430	7.275	72.0	72.0	76.0	76.0	48	0.3560	20.0	65.0	69.0	67.0

***** RESULTS *****											
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----		
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR			CALIBRATION FACTOR		
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)
9.779	276.9		10.121	286.6	10.163	1.035	0.003		0.000	0.00	0.000
8.043	227.8		8.273	234.3	8.323	1.028	-0.003		0.000	0.00	0.000
7.109	201.3		7.339	207.9	7.413	1.032	0.001		0.000	0.00	0.000
Average Y----->						1.0320		Average dH@----->	0.0000	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 H2O 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: Liam Forrer

Signature: _____

Date: January 10, 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-Jan-23	100.5	29.68	29.56	29.63	0.05
DS	10-Jan-23	100.5	29.68	29.55	29.62	0.06
CL	10-Jan-23	100.5	29.68	29.56	29.63	0.05
JC	10-Jan-23	100.5	29.68	29.53	29.60	0.08
SB (LF)	10-Jan-23	100.5	29.68	29.55	29.62	0.06
SH	10-Jan-23	100.5	29.68	29.58	29.65	0.03
CDO	10-Jan-23	100.5	29.68	29.53	29.60	0.08
JG	10-Jan-23	100.5	29.68	29.51	29.58	0.10

Calibrated by: Louis Agassiz

Signature:



Date:

10-Jan-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 and ASSOCIATES INC.
ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Daryl Sampson

Date: 7-Jan-23

Signature:

Daryl Sampson

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator			Temperature Settings (degrees F)													
			32		100		200		300		500		800		1700	
Device	ALA #	Serial #	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation	Reading	Variation
Omega HH11A	3	300132	32	0.00%	100	0.00%	200	0.00%	300	0.00%	499	-0.10%	799	-0.08%	1698	-0.09%
Omega HH11A	4	200167	33	0.20%	99	-0.18%	201	0.15%	302	0.26%	499	-0.10%	798	-0.16%	1697	-0.14%
Omega HH11A	6	600059	31	-0.20%	99.6	-0.07%	201.5	0.23%	299	-0.13%	498.6	-0.15%	797	-0.24%	1695	-0.23%
TPI 341K	7	2.0315E+10	31	-0.20%	99.4	-0.11%	198.8	-0.18%	298	-0.26%	498.7	-0.14%	798.5	-0.12%	1694	-0.28%
TPI 341K	8	2.0313E+10	33	0.20%	99.5	-0.09%	200.5	0.08%	300.5	0.07%	492.5	-0.78%	798.2	-0.14%	1695	-0.23%
Cont Cmpny	10	102008464	31	-0.20%	98.5	-0.27%	199	-0.15%	299.5	-0.07%	498	-0.21%	798.3	-0.13%	1698	-0.09%
Omega HH11	14	409426	32	0.00%	99	-0.18%	198	-0.30%	299.4	-0.08%	500	0.00%	798.4	-0.13%	1698	-0.09%
TPI 341K	16	400120029	31.5	-0.10%	99	-0.18%	199	-0.15%	299.2	-0.11%	502	0.21%	799.5	-0.04%	1701	0.05%
TPI 341K	18	2.0329E+10	31	-0.20%	99.5	-0.09%	198.7	-0.20%	299.6	-0.05%	499	-0.10%	799.4	-0.05%	1702	0.09%
TPI 341K	20	2.0329E+10	30	-0.41%	98.4	-0.29%	198.4	-0.24%	299.2	-0.11%	498.7	-0.14%	799	-0.08%	1698	-0.09%
TPI 341K	22	2.0329E+10	32	0.00%	99.5	-0.09%	198.6	-0.21%	299.1	-0.12%	498.7	-0.14%	799	-0.08%	1698	-0.09%
Reference device is a NIST certified digital thermocouple calibrator																
Variation expressed as a percentage of the absolute temperature must be within 1.5 %																

Calibration Certificate

Date: 02-Feb-23
Calibrated by: Louis Agassiz
Authorizing Signature: 

Instrument Calibrated: Testo 1 (330-2LL)
Serial #: 03101345
Customer: ALA

Ambient Conditions: Temperature: 19 °C Barometric Pressure: 101.96 kPa Relative Humidity: 61%

A. Lanfranco and Associates Inc. certifies that the described instrument has been inspected and tested following calibration procedures in the Environment Canada Report EPS 1/PG/7 (Revised 2005). Below are the observed readings after calibrations are complete. Calibration checks should be completed at least every 6 months.

O ₂ Gas	Initial Evaluation				After Calibration				Certified Value (vol %)
	Instrument Reading (vol %)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (vol %)	% Calibration Error	Pass/Fail	Notes	
Zero	0.15	0.15	Pass		0.05	0.05	Pass		0
O ₂	11.0	0.00	Pass		11.0	0.00	Pass		11.00
Ambient	20.9	0.05	Pass		20.9	0.05	Pass		20.95

Performance Specification: +/- 1% O₂ (absolute diff)

CO Gas	Initial Evaluation				After Calibration				Certified Value (ppm)
	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	
Zero	-1	0.3%	Pass		0	0.0%	Pass		0
1 Gas	1899	0.4%	Pass	Re-cal on 2 Gas	1915	0.4%	Pass		1907
2 Gas	475	7.1%	Fail		444	0.1%	Pass		444
3 Gas	230	5.9%	Fail		245	0.2%	Pass		245

Performance Specification: +/- 5% of Certified Gas Value

NO Gas	Initial Evaluation				After Calibration				Certified Value (ppm)
	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	
Zero	0	0.0%	Pass		0	0.0%	Pass		0
1 Gas	102	1.6%	Pass	Re-cal on 3 Gas	100	0.4%	Pass		100
2 Gas	460	1.1%	Pass		467	0.4%	Pass		465
3 Gas	55	20.3%	Fail		45	1.6%	Pass		46

Performance Specification: +/- 5% of Certified Gas Value

NIST Traceable Calibration Gases:

Cylinder	Cylinder ID Number	Certification Date	Expiration Date	Cylinder Pressure (PSI)	NO (ppm)	O ₂ (Vol. %)	CO (ppm)
Zero Gas (N ₂)	833435	30-Jan-2021	29-Nov-2026	1000	0	0	0
1 Gas	XC004912B	10-Jun-2021	11-Jun-2029	300	100.4	-	1907
2 Gas	XC015932B	15-Jun-2021	14-Jun-2024	600	465.2	-	443.5
3 Gas	CC101659	21-Jun-2021	22-Jun-2029	1000	45.71	-	244.5
O ₂ /CO ₂	CC38269	2-Jun-2021	3-May-2029	500	-	11.00	-

Note: National Institute of Standards and Technology traceable certificates are available upon request.

Calibration Certificate

Date: 02-Feb-23
Calibrated by: Louis Agassiz
Authorizing Signature: 

Instrument Calibrated: Testo 2 (330-2LX)
Serial #: 03282252
Customer: ALA

Ambient Conditions: Temperature: 18 °C

Barometric Pressure: 101.96 kPa Relative Humidity: 61%

A. Lanfranco and Associates Inc. certifies that the described instrument has been inspected and tested following calibration procedures in the Environment Canada Report EPS 1/PG/7 (Revised 2005). Below are the observed readings after calibrations are complete. Calibration checks should be completed at least every 6 months.

O ₂	Initial Evaluation				After Calibration				Certified Value (vol %)
	Instrument Reading (vol %)	Calibration Error	Pass/Fail	Notes	Instrument Reading (vol %)	Calibration Error	Pass/Fail	Notes	
Zero	0.03	0.03	Pass		0.01	0.01	Pass		0
O ₂	11.1	0.10	Pass		11.0	0.00	Pass		11.00
Ambient	20.89	0.07	Pass		20.9	0.06	Pass		20.96

Performance Specification: +/- 1% O₂ (absolute diff)

CO	Initial Evaluation				After Calibration				Certified Value (ppm)
	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	
Zero	0	0.0%	Pass		0	0.0%	Pass		0
1 Gas	1600	16.1%	Fail	Recal	1910	0.2%	Pass		1907
2 Gas	490	10.5%	Fail		448	1.0%	Pass		444
3 Gas	210	14.1%	Fail		243	0.6%	Pass		245

Performance Specification: +/- 5% of Certified Gas Value

NO	Initial Evaluation				After Calibration				Certified Value (ppm)
	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	Instrument Reading (ppm)	% Calibration Error	Pass/Fail	Notes	
Zero	0	0.0%	Pass		1	0.3%	Pass		0
1 Gas	98	2.4%	Pass	Recal	100	0.4%	Pass		100.4
2 Gas	435	6.5%	Fail		466	0.2%	Pass		465.2
3 Gas	51	11.6%	Fail		44	3.7%	Pass		45.7

Performance Specification: +/- 5% of Certified Gas Value

NIST Traceable Calibration Gases:

Cylinder	Cylinder ID Number	Certification Date	Expiration Date	Cylinder Pressure (PSI)	NO (ppm)	O ₂ (Vol. %)	CO (ppm)
Zero Gas (N ₂)	833435	30-Jan-2021	29-Nov-2026	1000	0	0	0
1 Gas	XC004912B	10-Jun-2021	11-Jun-2029	300	100.4	-	1907
2 Gas	XC015932B	15-Jun-2021	14-Jun-2024	600	465.2	-	443.5
3 Gas	CC101659	21-Jun-2021	22-Jun-2029	1000	45.71	-	244.5
O ₂ /CO ₂	CC38269	2-Jun-2021	3-May-2029	500	-	11.00	-

Note: National Institute of Standards and Technology traceable certificates are available upon request.

CERTIFICATION OF CALIBRATION

Date Of Calibration: 16-Jan-2023



Certificate Number: IN12898_11/45473

Issued by: QED Environmental Systems Inc.

Customer: DIAMOND SCIENTIFIC
PO BOX 348 MIMS, FL 32754 US

Description: Medical Gas Analyser

Model: G200

Serial Number: IN12898

Nitrous Oxide (N2O)	
Certified Gas (ppm)	Instrument Reading (ppm)
0.0	0.0
101.8	95.8
509.0	493.2
916.2	893.5

Barometer (mbar)	
Reference	Instrument Reading
0979 mbar / 28.92 "Hg	0978 mbar / 28.88 "Hg

N2O readings recorded at: 29.7 °C/85.4 °F

Barometric Pressure: 0979"Hg/28.92 "Hg

Method of Test: The analyzer is calibrated in a temperature controlled chamber using reference gases.

Calibration Passed: Reported calibration readings are within the manufacturer's specification.

Date of Issue : 17 Jan 2023

Approved By Signatory

Chris Fleenor

Laboratory Inspection

Canadian Association for Laboratory Accreditation Inc.

Certificate of Accreditation

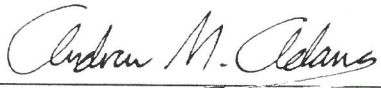
A. Lanfranco and Associates Inc.
101 - 9488 - 189th Street
Surrey, British Columbia



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.: A4232
Issued On: February 5, 2021
Accreditation Date: February 5, 2021
Expiry Date: August 6, 2023





President & CEO





MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Carter Lanfranco

has successfully completed

Stack Sampling

May 2009

Date

Dean
Faculty of Continuing Education and Extension

Conflict of Interest Disclosure Statement

A qualified professional¹ 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 Carter 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: Carter Lanfranco

Witnessed by:

X

Print name: Mark Lanfranco

Date: Dec. 16, 2020

¹Qualified 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.



Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals¹, under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional

Carter Lanfanco

Title

Chief operations officer / caretaker

2. Are you a registered member of a professional association in B.C.?

☐ Yes ☒ No

Name of Association: _____

Registration # _____

3. Brief description of professional services:

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Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature: _____

X

Print Name: _____

Carter Lanfanco

Witnessed by: _____

X

Print Name: _____

Shawn Harrington

Date signed: _____

Dec. 7/2020

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MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Daryl Sampson

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

Conflict of Interest Disclosure Statement

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

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- 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 Daryl Sampson, 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:

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Signature:

X Daryl Sampson

Print name: Daryl Sampson

Date: Dec.18, 2020

Witnessed by:

X 

Print name: Mark Lanfranco

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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.

Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals¹, under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional Daryl Sampson

Title Senior Environmental Technician/Project Manager

2. Are you a registered member of a professional association in B.C.? ☐ Yes ☒ No

Name of Association: _____ Registration # _____

3. Brief description of professional services:

Environmental consulting, specializing in air and atmospheric sciences

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Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature:

x Daryl Sampson

Print Name: Daryl Sampson

Witnessed by:

x [Signature]

Print Name: Louis Agassiz

Date signed: November 23, 2020

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MOUNT ROYAL UNIVERSITY

Faculty of Continuing Education and Extension

Jeremy Shawn Gibbs

has successfully completed

Stack Sampling

35 Hours / 2019

May 22, 2019

Date

BUM
Dean

Faculty of Continuing Education and Extension



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.

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- 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;
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Declaration

I Jeremy Gibbs, 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:

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Signature:

X

Print name:

Jeremy G. B.S.S.

Witnessed by:

X

Print name:

Mark Lanfranco

Date: Dec. 16, 2020

¹Qualified 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.

Declaration of Competency

The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals¹, under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry legislation, regulations and codes of practice have the knowledge, experience and objectivity necessary to fulfill this role.

1. Name of Qualified Professional

Title

Jeremy Gibbs
Environmental technician

2. Are you a registered member of a professional association in B.C.?

☐ Yes ☒ No

Name of Association: _____ Registration # _____

3. Brief description of professional services:

Environmental Consultant Specialize in air and
atmospheric sciences

This declaration of competency 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.

Declaration

I am a qualified professional with the knowledge, skills and experience to provide expert information, advice and/or recommendations in relation to the specific work described above.

Signature:

X

Print Name:

Jeremy Gibbs
Nov 1, 2020

Witnessed by:

X

Print Name:

Connor Laan

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