



**A. Lanfranco
& Associates Inc.**

Environmental Consultants

**Prepared for
METRO VANCOUVER**

**Metrotower III 4730 Kingsway
Burnaby, BC V5H 0C6**

WASTE TO ENERGY FACILITY
Appendices of Compliance Emissions Testing Report
August 2021 Survey

Table of Contents

Appendix

- A Quality Assurance / Quality Control Results
- B Laboratory Results
- C Computer Generated Results
- D Field Data Sheets
- E Calibration Sheets and Technician Certificates

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.
- Hexavalent Chromium (Cr⁺⁶) analysis conducted at ALS Labs, Burnaby, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N₂O) analysis conducted at A. Lanfranco Inc., Surrey, B.C.
- Particulate analysis conducted at A. Lanfranco and Associates Inc., Surrey, BC.
- Chain of Custody protocols followed for all samples.
- Excellent blank values for all sample types. All samples blank corrected.

Sample Type	Blank Value		
Third Q 2021	Unit 1	Unit 2	Unit 3
Filter	0.1 mg	0.0 mg	0 mg
Front Half Washings	0.2 mg	0.0 mg	-0.1 mg
Mercury Front	<0.02 ug	<0.02 ug	<0.02 ug
Mercury Back	<0.09 ug	<0.09 ug	<0.08 ug
Trace Metals Front *	<21.1 ug	<20.0 ug	<20.0 ug
Trace Metals Back*	<24.0 ug	<22.7 ug	<23.5 ug
Fluoride	<5.0 ug	<5.0 ug	<5.0 ug
Hexavalent Chromium	N/A	N/A	<0.22 ug

Sum of all reported elements except Hg*

APPENDIX - B

LABORATORY RESULTS

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1514407
#101, 9488 - 189 Street	Project Name: Metals and Hg Samples	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: Aug 18, 2021
V4N 4W7	LSD:	Date Reported: Sep 14, 2021
Attn: Missy	P.O.:	Report Number: 2652149
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 - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

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: **1514407**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652149

		Reference Number	1514407-1	1514407-2	1514407-3
		Sample Date	Aug 09, 2021	Aug 10, 2021	Aug 10, 2021
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	Unit 1 Run 1 (MD 1 + 4 Bottles)	Unit 1 Run 2 (MD 2 + 4 Bottles)	Unit 1 Run 3 (MD 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	25	20	31	5
Antimony	µg	7	<2	4	2.5
Arsenic	µg	3.0	<1	1	1
Cadmium	µg	1.0	0.5	1	0.25
Chromium	µg	3.21	0.87	9.14	0.2
Cobalt	µg	0.4	0.4	0.5	0.25
Copper	µg	<0.3	<0.3	2	0.25
Lead	µg	12	6.6	12	1.5
Manganese	µg	2	2	9.4	0.25
Nickel	µg	3.6	2.7	25.7	0.5
Phosphorus	µg	20	20	20	2.5
Selenium	µg	2	<2	2	1.5
Tellurium	µg	<2	3.5	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	70.2	74.2	88.1	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	27	45	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	1	1.0	1	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.66	1.8	0.32	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	3.4	7.1	4.7	0.25
Lead	µg	3.8	3.7	2	1.5
Manganese	µg	1	2	0.7	0.25
Nickel	µg	0.7	2	0.8	0.5
Phosphorus	µg	20	26	21	2.5
Selenium	µg	<1	<1	<1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	2	<1	1.5
Vanadium	µg	<0.8	<0.8	<0.9	1
Zinc	µg	6.1	8.3	3.2	0.5
Volume	Sample	mL	870	890	820
Volume	aliquot volume	mL	820	840	770
Mercury by CVAA					
Mercury	As Tested	µg/L	0.08	<0.05	0.05
Dilution Factor	As Tested		1	1	1

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: **1514407**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652149

		Reference Number	1514407-1	1514407-2	1514407-3	
		Sample Date	Aug 09, 2021	Aug 10, 2021	Aug 10, 2021	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 1 Run 1 (MD 1 + 4 Bottles)	Unit 1 Run 2 (MD 2 + 4 Bottles)	Unit 1 Run 3 (MD 3 + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.03	<0.02	0.02	
Mercury	As Tested	µg/L	0.16	0.11	0.10	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	870	890	820	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	1.1	0.80	0.69	
Mercury	As Tested	µg/L	0.07	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	155	175	165	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	0.02	<0.01	<0.01	
Mercury	As Tested	µg/L	13.3	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	560	510	560	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	12	<0.04	<0.04	
Mercury	As Tested	µg/L	8.75	0.10	0.16	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	2.8	0.033	0.052	

Analytical Report

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Project Name: Metals and Hg Samples
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1514407**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652149

		Reference Number	1514407-4	1514407-5	1514407-6	
		Sample Date	Aug 10, 2021	Aug 11, 2021	Aug 11, 2021	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 2 Run 1 (MV 1 + 4 Bottles)	Unit 2 Run 2 (MV 2 + 4 Bottles)	Unit 2 Run 3 (MV 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	20	20	5	
Antimony	µg	<2	<2	<2	2.5	
Arsenic	µg	<1	<1	2	1	
Cadmium	µg	<0.3	<0.3	<0.3	0.25	
Chromium	µg	<0.2	7.37	1.5	0.2	
Cobalt	µg	0.3	0.4	<0.3	0.25	
Copper	µg	<0.3	<0.3	<0.3	0.25	
Lead	µg	<2	<2	<2	1.5	
Manganese	µg	1	4.0	1	0.25	
Nickel	µg	<0.5	21	2	0.5	
Phosphorus	µg	20	20	20	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	9.3	8.8	8.7	0.5	
Back Half Metals Fraction 2A						
Aluminum	µg	26	26	8	5	
Antimony	µg	<2	<2	<2	2.5	
Arsenic	µg	2.2	3.0	<0.8	1	
Cadmium	µg	<0.2	<0.2	<0.2	0.25	
Chromium	µg	3.49	2.58	0.66	0.2	
Cobalt	µg	0.4	<0.2	<0.2	0.25	
Copper	µg	4.5	2	4.4	0.25	
Lead	µg	2.5	2	<1	1.5	
Manganese	µg	1	1	0.7	0.25	
Nickel	µg	2	2.3	0.8	0.5	
Phosphorus	µg	20	22	23	2.5	
Selenium	µg	<1	2	<1	1.5	
Tellurium	µg	<2	<2	3.3	2	
Thallium	µg	<1	<1	2.3	1.5	
Vanadium	µg	<0.8	<0.8	<0.8	1	
Zinc	µg	2.6	2	2	0.5	
Volume	Sample	mL	900	880	890	
Volume	aliquot volume	mL	850	830	840	
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	

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: **1514407**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652149

		Reference Number	1514407-4	1514407-5	1514407-6	Nominal Detection Limit
		Sample Date	Aug 10, 2021	Aug 11, 2021	Aug 11, 2021	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 2 Run 1 (MV 1 + 4 Bottles)	Unit 2 Run 2 (MV 2 + 4 Bottles)	Unit 2 Run 3 (MV 3 + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
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	0.14	0.98	0.63	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	900	880	890	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	1.0	6.9	4.5	
Mercury	As Tested	µg/L	<0.05	<0.05	0.12	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	150	185	135	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<0.01	0.025	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	520	540	520	
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	0.21	0.27	0.18	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	0.068	0.086	0.056	

Analytical Report

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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: **1514407**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652149

		Reference Number	1514407-7	1514407-8	1514407-9	
		Sample Date	Aug 11, 2021	Aug 12, 2021	Aug 12, 2021	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (MB 1 + 4 Bottles)	Unit 3 Run 2 (MB 2 + 4 Bottles)	Unit 3 Run 3 (MB 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	72	28	96	5	
Antimony	µg	5	5	5	2.5	
Arsenic	µg	<1	<1	1	1	
Cadmium	µg	2	1	2	0.25	
Chromium	µg	5.76	3.54	0.62	0.2	
Cobalt	µg	<0.3	0.4	<0.3	0.25	
Copper	µg	1	3.0	8.9	0.25	
Lead	µg	9.3	15	14	1.5	
Manganese	µg	4.6	3.0	2	0.25	
Nickel	µg	21	9.9	3.0	0.5	
Phosphorus	µg	31	25	26	2.5	
Selenium	µg	<2	<2	5.3	1.5	
Tellurium	µg	<2	<2	<2	2	
Thallium	µg	<2	3.0	<2	1.5	
Vanadium	µg	<1	<1	<1	1	
Zinc	µg	141	139	137	0.5	
Back Half Metals Fraction 2A						
Aluminum	µg	10	10	10	5	
Antimony	µg	<2	<2	<2	2.5	
Arsenic	µg	<0.8	1	3.9	1	
Cadmium	µg	<0.2	<0.2	<0.2	0.25	
Chromium	µg	0.43	0.98	0.39	0.2	
Cobalt	µg	<0.2	<0.2	0.3	0.25	
Copper	µg	2.3	7.3	1	0.25	
Lead	µg	2	2	<1	1.5	
Manganese	µg	1	0.7	0.8	0.25	
Nickel	µg	1.0	1.0	0.8	0.5	
Phosphorus	µg	24	22	22	2.5	
Selenium	µg	<1	<1	<1	1.5	
Tellurium	µg	<2	2	<2	2	
Thallium	µg	<1	3.0	<1	1.5	
Vanadium	µg	<0.8	<0.8	<0.9	1	
Zinc	µg	2.3	2.2	2	0.5	
Volume	Sample	mL	860	860	825	
Volume	aliquot volume	mL	810	810	775	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.98	0.27	0.18	0.05
Dilution Factor	As Tested		1	1	1	

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: 1514407 Control Number: Date Received: Aug 18, 2021 Date Reported: Sep 14, 2021 Report Number: 2652149
Attn: Missy Sampled By: Company:		

		Reference Number	1514407-7	1514407-8	1514407-9	Nominal Detection Limit
		Sample Date	Aug 11, 2021	Aug 12, 2021	Aug 12, 2021	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Unit 3 Run 1 (MB 1 + 4 Bottles)	Unit 3 Run 2 (MB 2 + 4 Bottles)	Unit 3 Run 3 (MB 3 + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte	Units	Results	Results	Results		
Mercury by CVAA - Continued						
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.39	0.11	0.073	
Mercury	As Tested	µg/L	0.86	0.55	0.40	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	860	860	825	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	5.9	3.8	2.7	
Mercury	As Tested	µg/L	0.10	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	176	178	165	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	0.03	<0.01	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	520	650	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.05	
Mercury	As Tested	µg/L	0.18	0.24	0.12	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	0.056	0.078	0.040	

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: 1514407 Control Number: Date Received: Aug 18, 2021 Date Reported: Sep 14, 2021 Report Number: 2652149
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	Sep 1, 2021	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Sep 1, 2021	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Aug 25, 2021	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Aug 31, 2021	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Sep 1, 2021	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 30, 2021	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 19, 2021	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.



www.Element.com

Project Information

Project ID: Metro Vancouver WTE
Project Name: Metals and Hg Samples
Project Location:
Legal Location:
PO/AFE#:
Proj. Acct. Code:
Quote #:

Invoice To

Company: A. Lanfranco & Associates Inc.
Address: 101-9488 189 Street
Surrey BC, V4N 4W7
Attention:
Phone: 604-881-2582
Cell:
Fax:
E-mail: mark.lanfranco@alanfranco.com
Agreement ID:
Copy of Report: YES / NO

Report To

Company:
Address:
Attention:
Phone:
Cell:
Fax:
E-mail 1:
E-mail 2:
Copy of Invoice: YES / NO

Additional Reports to

1) Name:
E-mail:
2) Name:
E-mail:
Sample Custody
Sampled by:
Company:
I authorize Element to proceed with the work indicated on this form:
Signature:
Date/Time:

Report Results

Requirements

- ☐ Same Day (200%)
☐ Next Day/Two Day (100%)
☐ Three or Four Days (50%)
☒ 5 to 7 Days (Regular TAT)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

- ☒ Email ☐ QA/QC
☐ Online ☒ PDF
☐ Fax ☐ Excel

- ☐ HCDWORG ☐ SPIGEC
☐ AB Tier 1 ☐ BCCSR
Other (list below)

Date Required

Special Instructions/Comments (please include contact information including phone number if different from above).

*Front and Back ICAP as per EPA Method 29. *Hg analysis as per EPA Method 29. *Please report µg/sample.

Site I.D.	Sample Description	Depth start end in cm m	Date/Time sampled	Matrix	Sampling method	Number of Containers ↓	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg								
1	Unit 1 Run 1 (MD 1 + 4 Bottles)		9-Aug-21			5	✓	✓	✓	✓	✓	✓								
2	Unit 1 Run 2 (MD 2 + 4 Bottles)		10-Aug-21			5	✓	✓	✓	✓	✓	✓								
3	Unit 1 Run 3 (MD 3 + 4 Bottles)		10-Aug-21			5	✓	✓	✓	✓	✓	✓								
4																				
5	Unit 2 Run 1 (MV 1 + 4 Bottles)		10-Aug-21			5	✓	✓	✓	✓	✓	✓								
6	Unit 2 Run 2 (MV 2 + 4 Bottles)		11-Aug-21			5	✓	✓	✓	✓	✓	✓								
7	Unit 2 Run 3 (MV 3 + 4 Bottles)		11-Aug-21			5	✓	✓	✓	✓	✓	✓								
8																				
9	Unit 3 Run 1 (MB 1 + 4 Bottles)		11-Aug-21			5	✓	✓	✓	✓	✓	✓								
10	Unit 3 Run 2 (MB 2 + 4 Bottles)		12-Aug-21			5	✓	✓	✓	✓	✓	✓								
11	Unit 3 Run 3 (MB 3 + 4 Bottles)		12-Aug-21			5	✓	✓	✓	✓	✓	✓								
12																				
13																				
14																				
15																				

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (<https://www.element.com/terms/terms-and-conditions>)

Page ____ of ____ Control #
ED 120-005

Lot: 1514407 COC



Temp. received: 21.0 °C
Date/Time stamp: AUG 18 '21 13:16
Delivery Method: HD
Waybill: LC
Received by:

CERTIFICATE OF ANALYSIS

Work Order : **VA21B7133**
Client : **A. Lanfranco & Associates Inc.**
Contact : Mark Lanfranco
Address : Unit # 101 9488 - 189 St
 Surrey BC Canada V4N 4W7
Telephone : 604 881 2582
Project : Metro Vancouver WTE
PO : HF
C-O-C number : ----
Sampler : A. Lanfranco
Site : ----
Quote number : Standing Offer
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 3
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 13-Aug-2021 11:25
Date Analysis Commenced : 19-Aug-2021
Issue Date : 23-Aug-2021 11:13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
µg/sample	micrograms per sample
mL	millilitre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.



Analytical Results

Sub-Matrix: Impinger

Client sample ID

(Matrix: Air)

					Unit 1 HF Run 1	Unit 1 HF Run 2	Unit 1 HF Run 3	Unit 2 HF Run 1	Unit 2 HF Run 2
Client sampling date / time					10-Aug-2021	10-Aug-2021	10-Aug-2021	11-Aug-2021	11-Aug-2021
Analyte	CAS Number	Method	LOR	Unit	VA21B7133-001	VA21B7133-002	VA21B7133-003	VA21B7133-004	VA21B7133-005
					Result	Result	Result	Result	Result
Field Tests									
volume, impinger	----	EP248	0.1	mL	400	485	415	465	415
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<40.0 ^{DLDS}	<24.2 ^{DLDS}	<5.0	<93.0 ^{DLDS}	<83.0 ^{DLDS}

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Impinger

Client sample ID

(Matrix: Air)

					Unit 2 HF Run 3	Unit 3 HF Run 1	Unit 3 HF Run 2	Unit 3 HF Run 3	----
Client sampling date / time					11-Aug-2021	12-Aug-2021	12-Aug-2021	12-Aug-2021	----
Analyte	CAS Number	Method	LOR	Unit	VA21B7133-006	VA21B7133-007	VA21B7133-008	VA21B7133-009	-----
					Result	Result	Result	Result	----
Field Tests									
volume, impinger	----	EP248	0.1	mL	465	400	355	385	----
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<23.2 ^{DLDS}	<40.0 ^{DLDS}	<17.8 ^{DLDS}	<19.2 ^{DLDS}	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA21B7133	Page	: 1 of 5
Client	: A. Lanfranco & Associates Inc.	Laboratory	: Vancouver - Environmental
Contact	: Mark Lanfranco	Account Manager	: Brent Mack
Address	: Unit # 101 9488 - 189 St Surrey BC Canada V4N 4W7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 13-Aug-2021 11:25
PO	: HF	Issue Date	: 23-Aug-2021 11:13
C-O-C number	: ----		
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Air

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 1 HF Run 1	E248.F	10-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	10 days	✔
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 1 HF Run 2	E248.F	10-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	10 days	✔
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 1 HF Run 3	E248.F	10-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	10 days	✔
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 3 HF Run 1	E248.F	12-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	8 days	✔
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 3 HF Run 2	E248.F	12-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	8 days	✔
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 3 HF Run 3	E248.F	12-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	8 days	✔
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 2 HF Run 1	E248.F	11-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	9 days	✔



Matrix: **Air** Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 2 HF Run 2	E248.F	11-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	9 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 2 HF Run 3	E248.F	11-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	9 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Air**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Fluoride by IC (Impinger, mg/sample)	E248.F Vancouver - Environmental	Air	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. Reported sample volumes are for the bottle/sub-sample submitted for the listed analyses.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation of Anions for IC (Impinger)	EP248 Vancouver - Environmental	Air	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. Reported sample volumes are for the bottle/sub-sample submitted for the listed analyses.

QUALITY CONTROL REPORT

Work Order : **VA21B7133**

Page : 1 of 3

Client : A. Lanfranco & Associates Inc.
Contact : Mark Lanfranco
Address : Unit # 101 9488 - 189 St
 Surrey BC Canada V4N 4W7
Telephone : 604 881 2582
Project : Metro Vancouver WTE
PO : HF
C-O-C number : ----
Sampler : A. Lanfranco
Site : ----
Quote number : Standing Offer
No. of samples received : 9
No. of samples analysed : 9

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
 Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 13-Aug-2021 11:25
Date Analysis Commenced : 19-Aug-2021
Issue Date : 23-Aug-2021 11:13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Air

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 271035)											
VA21B7133-001	Unit 1 HF Run 1	fluoride	16984-48-8	E248.F	40.0	mg/sample	<40.0	<0.0400	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	µg/sample 400	400		Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QC Lot: 271035)						
fluoride	16984-48-8	E248.F	0.005	mg/sample	<0.0050	----
volume, impinger	----	EP248	0.1	mL	500	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 271035)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	99.8	90.0	110	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Air

					Matrix Spike (MS) Report				
					Spike		Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High
Anions and Nutrients (QCLot: 271035)									
VA21B7133-002	Unit 1 HF Run 2	fluoride	16984-48-8	E248.F	2.48 mg/sample	2.425 mg/sample	102	75.0	125

- No Matrix Spike (MS) Results are required to be reported.

GENF 20.00 Front



A. Lanfranco & Associates Inc.
ATTN: Mark Lanfranco
Unit # 101 9488 - 189 St.
Surrey BC V4N 4W7

Date Received: 19-AUG-21
Report Date: 30-AUG-21 09:34 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2630412
Project P.O. #: NOT SUBMITTED
Job Reference: MV WTE UNIT 3
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

		Sample ID Description Sampled Date Sampled Time Client ID	L2630412-1 Air 16-AUG-21 MV WTE UNIT 3 - CR+6 BLANK	L2630412-2 Air 16-AUG-21 MV WTE UNIT 3 - CR+6 RUN 1	L2630412-3 Air 16-AUG-21 MV WTE UNIT 3 - CR+6 RUN 2	L2630412-4 Air 17-AUG-21 MV WTE UNIT 3 - CR+6 RUN 3	
Grouping	Analyte						
STACK							
Speciated Metals	Chromium, Hexavalent (ug)		<0.22	0.42	<0.35	<0.38	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CR-CR6-IC-BU-WT	Stack	Chromium, Hexavalent (Cr6+)	EPA 7199 / Method 306

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg ww - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



L2630412-COFC

COC #

Page 1 of 1

[illegible]

GENF 20.00 Front

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID: Metro Vancouver WTE	Lot ID: 1514511
#101, 9488 - 189 Street	Project Name: Filter Reagent Blanks	Control Number:
Surrey, BC, Canada	Project Location:	Date Received: Aug 18, 2021
V4N 4W7	LSD:	Date Reported: Sep 13, 2021
Attn: Missy	P.O.:	Report Number: 2652292
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 - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

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: **1514511**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 13, 2021
Report Number: 2652292

		Reference Number	1514511-1	1514511-2	1514511-3
		Sample Date	Aug 09, 2021	Aug 09, 2021	Aug 09, 2021
		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	<2	<2	2.5
Arsenic	µg	1	<1	2	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	1	0.4	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	0.9	1	0.6	0.25
Nickel	µg	<0.5	2	<0.5	0.5
Phosphorus	µg	20	10	20	2.5
Selenium	µg	<2	3.4	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	6.9	2.6	3.8	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: **1514511**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 13, 2021
Report Number: 2652292

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	Sep 3, 2021	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 19, 2021	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.

Temp. received: 22.0 °C	Date/Time stamp: AUG 18 '21 13:09
Delivery Method: H10	
Waybill: _____	
Received by: / /	

CERTIFICATE OF ANALYSIS

Work Order : **VA21B7134**
Client : **A. Lanfranco & Associates Inc.**
Contact : Mark Lanfranco
Address : Unit # 101 9488 - 189 St
 Surrey BC Canada V4N 4W7
Telephone : 604 881 2582
Project : Metro Vancouver WTE
PO : HF
C-O-C number :
Sampler : A. Lanfranco
Site : ----
Quote number : Standing Offer
No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 2
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 13-Aug-2021 11:25
Date Analysis Commenced : 19-Aug-2021
Issue Date : 23-Aug-2021 11:13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
 LOR: Limit of Reporting (detection limit).

Unit	Description
µg/sample	micrograms per sample
mL	millilitre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Impinger

(Matrix: Air)

					Client sample ID	Unit 1 HF Blank	Unit 2 HF Blank	Unit 3 HF Blank	----	----
					Client sampling date / time	10-Aug-2021	11-Aug-2021	12-Aug-2021	----	----
Analyte	CAS Number	Method	LOR	Unit		VA21B7134-001	VA21B7134-002	VA21B7134-003	-----	-----
						Result	Result	Result	----	----
Field Tests										
volume, impinger	----	EP248	0.1	mL		310	280	310	----	----
Anions and Nutrients										
fluoride	16984-48-8	E248.F	5.0	µg/sample		<5.0	<5.0	<5.0	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA21B7134	Page	: 1 of 4
Client	: A. Lanfranco & Associates Inc.	Laboratory	: Vancouver - Environmental
Contact	: Mark Lanfranco	Account Manager	: Brent Mack
Address	: Unit # 101 9488 - 189 St Surrey BC Canada V4N 4W7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 13-Aug-2021 11:25
PO	: HF	Issue Date	: 23-Aug-2021 11:13
C-O-C number	:		
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Air**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 1 HF Blank	E248.F	10-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	10 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 3 HF Blank	E248.F	12-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	8 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE Unit 2 HF Blank	E248.F	11-Aug-2021	19-Aug-2021	----	----		19-Aug-2021	28 days	9 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Air**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	271035	1	12	8.3	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Fluoride by IC (Impinger, mg/sample)	E248.F Vancouver - Environmental	Air	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. Reported sample volumes are for the bottle/sub-sample submitted for the listed analyses.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation of Anions for IC (Impinger)	EP248 Vancouver - Environmental	Air	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. Reported sample volumes are for the bottle/sub-sample submitted for the listed analyses.



Environmental

QUALITY CONTROL REPORT

Work Order : **VA21B7134**

Page : 1 of 3

Client : A. Lanfranco & Associates Inc.
Contact : Mark Lanfranco
Address : Unit # 101 9488 - 189 St
Surrey BC Canada V4N 4W7
Telephone : 604 881 2582
Project : Metro Vancouver WTE
PO : HF
C-O-C number :
Sampler : A. Lanfranco
Site : ----
Quote number : Standing Offer
No. of samples received : 3
No. of samples analysed : 3

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 13-Aug-2021 11:25
Date Analysis Commenced : 19-Aug-2021
Issue Date : 23-Aug-2021 11:13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percentage Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Air					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 271035)											
VA21B7133-001	Anonymous	fluoride	16984-48-8	E248.F	40.0	mg/sample	<40.0	<0.0400	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	µg/sample 400	400		Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Air						
Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QC Lot: 271035)						
fluoride	16984-48-8	E248.F	0.005	mg/sample	<0.0050	----
volume, impinger	----	EP248	0.1	mL	500	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 271035)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	99.8	90.0	110	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Air

					Matrix Spike (MS) Report				
					Spike		Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High
Anions and Nutrients (QCLot: 271035)									
VA21B7133-002	Anonymous	fluoride	16984-48-8	E248.F	2.48 mg/sample	2.425 mg/sample	102	75.0	125

- No Matrix Spike (MS) Results are required to be reported.

GENF 20.00 Front

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: 1514510 Control Number: Date Received: Aug 18, 2021 Date Reported: Sep 14, 2021 Report Number: 2652291
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 - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

Missy	A. Lanfranco & Associates	#101, 9488 - 189 Street Surrey, BC V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: missy@alanfranco.com
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Delivery	Format	Deliverables
Email - Single Report	PDF	Invoice

Notes To Clients:

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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: **1514510**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652291

		Reference Number	1514510-1	1514510-2	1514510-3
		Sample Date	Aug 09, 2021	Aug 09, 2021	Aug 09, 2021
		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	6	<5	<5	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	<0.2	<0.2	<0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	0.5	0.5	0.4	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	<2	<2	<2	2.5
Selenium	µg	6.1	3.1	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	2.9	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	0.8	1	0.8	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	6	6	6	5
Antimony	µg	<3	<3	<3	2.5
Arsenic	µg	5.3	3.8	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	0.31	0.58	0.2
Cobalt	µg	0.5	<0.3	<0.3	0.25
Copper	µg	7.4	4.9	<0.3	0.25
Lead	µg	3	3.9	2	1.5
Manganese	µg	<0.3	0.6	0.5	0.25
Nickel	µg	0.8	0.8	0.8	0.5
Phosphorus	µg	20	20	20	2.5
Selenium	µg	<2	2	3.2	1.5
Tellurium	µg	<2	<2	3.2	2
Thallium	µg	4.0	<2	4.7	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	1.0	0.7	0.5
Volume	Sample	mL	200	210	215
Volume	aliquot volume	mL	150	160	165
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: **1514510**
Control Number:
Date Received: Aug 18, 2021
Date Reported: Sep 14, 2021
Report Number: 2652291

		Reference Number	1514510-1	1514510-2	1514510-3	
		Sample Date	Aug 09, 2021	Aug 09, 2021	Aug 09, 2021	
		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	0.08	0.10	0.08	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	210	215	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	0.1	0.2	0.1	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	105	108	150	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.008	<0.009	<0.01	
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: Reagent Blanks Project Location: LSD: P.O.: Proj. Acct. code:	Lot ID: 1514510 Control Number: Date Received: Aug 18, 2021 Date Reported: Sep 14, 2021 Report Number: 2652291
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	Sep 1, 2021	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Sep 1, 2021	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Aug 25, 2021	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Sep 1, 2021	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 30, 2021	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	Aug 19, 2021	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.

Project Information

Project ID: Metro Vancouver WTE
 Project Name: Reagent Blanks
 Project Location:
 Legal Location:
 PO/AFE#:
 Proj. Acct. Code:
 Quote #:

Invoice To

Company: A. Lanfranco & Associates Inc.
 Address: 101-9488 189 Street
 Surrey BC, V4N 4W7
 Attention:
 Phone: 604-881-2582
 Cell:
 Fax:
 E-mail: mark.lanfranco@alarifranco.com
 Agreement ID:
 Copy of Report: YES / NO

Report To

Company:
 Address:
 Attention:
 Phone:
 Cell:
 Fax:
 E-mail 1:
 E-mail 2:
 Copy of Invoice: YES / NO

Additional Reports to

1) Name:
 E-mail:
 2) Name:
 E-mail:
Sample Custody
 Sampled by:
 Company:
 I authorize Element to proceed with the work indicated on this form:
 Signature:
 Date/Time:

Report Results

Requirements

- ☐ Same Day (200%)
☐ Next Day/Two Day (100%)
☐ Three or Four Days (50%)
☒ 5 to 7 Days (Regular TAT)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

- ☒ Email ☐ QA/QC
☐ Online ☒ PDF
☐ Fax ☐ Excel

- ☐ HCDWORG ☐ SPIGEC
☐ AB Tier 1 ☐ BCCSR
 Other (list below)

Date Required

Special Instructions/Comments (please include contact information including phone number if different from above).

*Front and Back ICAP as per EPA Method 29. *Hg analysis as per EPA Method 29. *Please report ug/sample.

Site I.D.	Sample Description	Depth start end in cm m	Date/Time sampled	Matrix	Sampling method	Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg								
1	Reagent Blank Unit 1		9-Aug-21			5	✓	✓	✓	✓	✓	✓								
2																				
3	Reagent Blank Unit 2		9-Aug-21			5	✓	✓	✓	✓	✓	✓								
4																				
5	Reagent Blank Unit 3		9-Aug-21			5	✓	✓	✓	✓	✓	✓								
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (<https://www.element.com/terms/terms-and-conditions>)

Page ____ of ____ Control #
 ED 120-005

Lot: 1514510 COC



Temp. °C received: 220
 Date/Time stamp: AUG 18 '21 13:00
 Delivery Method: HB
 Waybill:
 Received by: LC

Filter Collection:

Test #	Initial	Final	Net Difference	Blank Adjusted
	(grams)	(grams)	(grams)	(grams)
Unit 1 Run 1	0.4612	0.4662	0.0050	0.0049
Unit 1 Run 2	0.4641	0.4658	0.0017	0.0016
Unit 1 Run 3	0.4716	0.4733	0.0017	0.0016
Unit 1 Blank	0.4668	0.4669	0.0001	
Unit 2 Run 1	0.4698	0.4694	-0.0004	ND
Unit 2 Run 2	0.4676	0.4671	-0.0005	ND
Unit 2 Run 3	0.4681	0.4672	-0.0009	ND
Unit 2 Blank	0.4660	0.4660	0.0000	
Unit 3 Run 1	0.4712	0.4819	0.0107	0.0107
Unit 3 Run 2	0.4664	0.4721	0.0057	0.0057
Unit 3 Run 3	0.4666	0.4721	0.0055	0.0055
Unit 3 Blank	0.4632	0.4632	0.0000	

Front Half Washings:

Test #	Initial	Final	Net Difference	Blank Adjusted
	(grams)	(grams)	(grams)	(grams)
Unit 1 Run 1	113.2053	113.2057	0.0004	0.0002
Unit 1 Run 2	126.8784	126.8784	0.0000	ND
Unit 1 Run 3	124.1023	124.1045	0.0022	0.0020
Unit 1 Blank	128.6604	128.6606	0.0002	
Unit 2 Run 1	118.9316	118.9311	-0.0005	ND
Unit 2 Run 2	112.9487	112.9489	0.0002	0.0002
Unit 2 Run 3	124.3828	124.3820	-0.0008	ND
Unit 2 Blank	114.3663	114.3663	0.0000	
Unit 3 Run 1	121.8359	121.8385	0.0026	0.0027
Unit 3 Run 2	126.2329	126.2334	0.0005	0.0006
Unit 3 Run 3	112.9815	112.9817	0.0002	0.0003
Unit 3 Blank	112.9646	112.9645	-0.0001	

APPENDIX - C

COMPUTER GENERATED RESULTS

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

Date: 9-Aug-21
Run: 1 - Particulate / Metals
Run Time: 11:45 - 13:50

Concentrations:

Particulate	1.79 mg/dscm	0.00078 gr/dscf
	0.98 mg/Acm	0.00043 gr/Acf
	1.63 mg/dscm (@ 11% O2)	0.00071 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.127 Kg/hr	0.280 lb/hr
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Flue Gas Characteristics:

Flow	1183 dscm/min	41766 dscf/min
	19.71 dscm/sec	696 dscf/sec
	2171 Acm/min	76657 Acf/min

Velocity	14.204 m/sec	46.60 f/sec
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Temperature	156.1 oC	313.0 oF
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Moisture	16.7 %
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Gas Analysis	10.0 % O2
	10.4 % CO2

30.060 Mol. Wt (g/gmole) Dry
28.045 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.8444 dscm	100.450 dscf
Sample Time	120.0 minutes	
Isokineticity	108.3 %	

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

Client:	Metro Vancouver	Date:	9-Aug-21
Jobsite:	WTE (Burnaby, BC)	Run:	1 - Particulate / Metals
Source:	Unit 1	Run Time:	11:45 - 13:50

Control Unit (Y)	1.0040	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3050	Filter (grams)	0.00490	CO2	O2	Impinger 1	226.0
Pitot Factor	0.8461	Washings (grams)	0.00020	10.25	10.00	Impinger 2	146.0
Baro. Press. (in. Hg)	30.09			10.50	10.00	Impinger 3	24.0
Static Press. (in. H2O)	-19.50	Total (grams)	0.00510			Impinger 4	11.0
Stack Height (ft)	30					Impinger 5	2.0
Stack Diameter (in.)	70.90					Impinger 6	1.0
Stack Area (sq.ft.)	27.417			10.38	10.00	Gel	18.1
Minutes Per Reading	5.0						
Minutes Per Point	5.0					Gain (grams)	428.1

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	887.100								
1	5.0	890.920	0.35	1.97	80	80	6	310	1.5	108.7
2	10.0	894.740	0.35	1.97	81	81	6	312	4.7	108.6
3	15.0	898.390	0.32	1.80	82	82	7	312	8.4	108.3
4	20.0	902.040	0.32	1.80	82	82	7	312	12.5	108.3
5	25.0	905.690	0.32	1.80	81	81	8	310	17.7	108.4
6	30.0	909.620	0.37	2.09	82	82	8	310	25.2	108.4
7	35.0	914.400	0.55	3.10	82	82	12	312	45.6	108.5
8	40.0	919.320	0.58	3.27	83	83	12	313	53.2	108.7
9	45.0	924.060	0.54	3.05	83	83	10	312	58.3	108.4
10	50.0	928.710	0.52	2.93	84	84	10	312	62.5	108.1
11	55.0	933.620	0.58	3.27	83	83	8	311	66.1	108.3
12	60.0	938.640	0.60	3.38	84	84	8	310	69.4	108.7
Traverse 2	0.0	938.640								
1	5.0	942.820	0.42	2.37	83	83	8	312	1.5	108.2
2	10.0	947.100	0.44	2.48	84	84	8	315	4.7	108.3
3	15.0	951.380	0.44	2.48	84	84	8	315	8.4	108.3
4	20.0	955.570	0.42	2.37	85	85	8	314	12.5	108.2
5	25.0	960.090	0.49	2.76	84	84	8	315	17.7	108.5
6	30.0	964.460	0.46	2.59	84	84	8	315	25.2	108.2
7	35.0	968.830	0.46	2.59	84	84	9	315	45.6	108.2
8	40.0	973.300	0.48	2.71	85	85	9	316	53.2	108.2
9	45.0	977.480	0.42	2.37	85	85	10	314	58.3	108.0
10	50.0	981.470	0.38	2.14	86	86	10	314	62.5	108.1
11	55.0	985.230	0.34	1.92	85	85	10	315	66.1	107.9
12	60.0	988.880	0.32	1.80	86	86	10	315	69.4	107.7
Average:			0.436	2.459	83.4	83.4	8.7	313.0		108.3

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

Date: 10-Aug-21
Run: 2 - Particulate / Metals
Run Time: 09:48 - 11:50

Concentrations:

Particulate	0.61 mg/dscm	0.00027 gr/dscf
	0.34 mg/Acm	0.00015 gr/Acf
	0.56 mg/dscm (@ 11% O2)	0.00024 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.042 Kg/hr	0.093 lb/hr
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Flue Gas Characteristics:

Flow	1149 dscm/min	40572 dscf/min
	19.15 dscm/sec	676 dscf/sec
	2059 Acm/min	72713 Acf/min
Velocity	13.473 m/sec	44.20 f/sec
Temperature	155.1 oC	311.2 oF
Moisture	14.9 %	
Gas Analysis	10.0 % O2	
	10.4 % CO2	
	30.066 Mol. Wt (g/gmole) Dry	
	28.266 Mol. Wt (g/gmole) Wet	

Sample Parameters:

Sample Volume	2.6942 dscm	95.147 dscf
Sample Time	120.0 minutes	
Isokineticity	105.6 %	

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

Client:	Metro Vancouver	Date:	10-Aug-21
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 1	Run Time:	09:48 - 11:50

Control Unit (Y)	1.0040	Collection:	Gas Analysis (Vol. %):		Condensate Collection:		
Nozzle Diameter (in.)	0.3050	Filter (grams)	0.00160	CO2	O2	Impinger 1	148.0
Pitot Factor	0.8461	Washings (grams)	0.00005	10.50	10.00	Impinger 2	128.0
Baro. Press. (in. Hg)	30.10			10.33	10.00	Impinger 3	42.0
Static Press. (in. H2O)	-19.50	Total (grams)	0.00165			Impinger 4	12.0
Stack Height (ft)	30					Impinger 5	4.0
Stack Diameter (in.)	70.90					Impinger 6	2.0
Stack Area (sq.ft.)	27.417					Gel	18.5
Minutes Per Reading	5.0			10.42	10.00	Gain (grams)	354.5
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	993.460								
1	5.0	997.110	0.32	1.80	80	80	4	314	1.5	107.0
2	10.0	1000.760	0.32	1.80	81	81	4	316	4.7	106.9
3	15.0	1004.410	0.32	1.80	82	82	4	318	8.4	106.9
4	20.0	1008.070	0.32	1.80	84	84	4	318	12.5	106.8
5	25.0	1011.600	0.30	1.69	86	86	4	316	17.7	105.8
6	30.0	1015.130	0.30	1.69	88	88	4	314	25.2	105.3
7	35.0	1018.660	0.30	1.69	86	86	8	312	45.6	105.5
8	40.0	1023.320	0.52	2.93	84	84	8	312	53.2	106.5
9	45.0	1028.100	0.55	3.10	84	84	10	310	58.3	106.2
10	50.0	1033.010	0.58	3.27	85	85	10	308	62.5	105.9
11	55.0	1037.570	0.50	2.82	86	86	6	308	66.1	105.6
12	60.0	1041.550	0.38	2.14	86	86	6	306	69.4	105.4
Traverse 2	0.0	1041.550								
1	5.0	1045.320	0.34	1.92	86	86	6	312	1.5	105.9
2	10.0	1049.300	0.38	2.14	87	87	6	310	4.7	105.5
3	15.0	1053.380	0.40	2.26	87	87	6	310	8.4	105.5
4	20.0	1057.560	0.42	2.37	88	88	6	311	12.5	105.3
5	25.0	1061.840	0.44	2.48	89	89	6	312	17.7	105.3
6	30.0	1066.120	0.44	2.37	89	89	6	312	25.2	105.3
7	35.0	1070.300	0.42	2.37	90	90	6	310	45.6	104.9
8	40.0	1074.480	0.42	2.26	90	90	6	310	53.2	104.9
9	45.0	1078.560	0.40	2.26	91	91	7	308	58.3	104.6
10	50.0	1082.640	0.40	2.14	91	91	7	306	62.5	104.4
11	55.0	1086.620	0.38	2.03	92	92	7	306	66.1	104.3
12	60.0	1090.490	0.36	2.88	92	92	7	310	69.4	104.6
Average:			0.396	2.250	86.8	86.8	6.2	311.2		105.6

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

Date: 10-Aug-21
Run: 3 - Particulate / Metals
Run Time: 12:06 - 14:08

Concentrations:

Particulate	1.3 mg/dscm	0.0006 gr/dscf
	0.7 mg/Acm	0.0003 gr/Acf
	1.2 mg/dscm (@ 11% O2)	0.0005 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.092 Kg/hr	0.203 lb/hr
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Flue Gas Characteristics:

Flow	1201 dscm/min	42420 dscf/min
	20.02 dscm/sec	707 dscf/sec
	2181 Acm/min	77034 Acf/min

Velocity	14.274 m/sec	46.83 f/sec
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Temperature	156.5 oC	313.8 oF
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Moisture	15.8 %
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Gas Analysis	10.0 % O2
	10.0 % CO2

30.000 Mol. Wt (g/gmole) Dry
28.109 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.8204 dscm	99.604 dscf
Sample Time	120.0 minutes	
Isokineticity	105.7 %	

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

Client:	Metro Vancouver	Date:	10-Aug-21
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 1	Run Time:	12:06 - 14:08

Control Unit (Y)	1.0040	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3050	Filter (grams)	0.00160	CO2	O2	Impinger 1	200.0
Pitot Factor	0.8461	Washings (grams)	0.00200	10.00	10.00	Impinger 2	124.0
Baro. Press. (in. Hg)	30.10			10.00	10.00	Impinger 3	36.0
Static Press. (in. H2O)	-19.50	Total (grams)	0.00360			Impinger 4	14.0
Stack Height (ft)	30					Impinger 5	5.0
Stack Diameter (in.)	70.90					Impinger 6	2.0
Stack Area (sq.ft.)	27.417					Gel	14.9
Minutes Per Reading	5.0			10.00	10.00	Gain (grams)	395.9
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)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	91.100								
1	5.0	95.180	0.40	2.26	88	88	5	312	1.5	106.2
2	10.0	99.360	0.42	2.37	89	89	5	313	4.7	106.0
3	15.0	103.830	0.48	2.71	90	90	5	313	8.4	106.0
4	20.0	108.390	0.50	2.82	90	90	5	316	12.5	106.2
5	25.0	113.040	0.52	2.93	91	91	6	316	17.7	106.0
6	30.0	117.690	0.52	2.93	92	92	6	316	25.2	105.8
7	35.0	122.340	0.52	2.93	90	90	6	316	45.6	106.2
8	40.0	126.770	0.47	2.65	89	89	6	314	53.2	106.4
9	45.0	131.100	0.45	2.54	90	90	6	312	58.3	105.9
10	50.0	135.180	0.40	2.26	89	89	6	310	62.5	105.8
11	55.0	139.100	0.37	2.09	90	90	6	308	66.1	105.3
12	60.0	142.920	0.35	1.97	92	92	6	310	69.4	105.3
Traverse 2	0.0	142.920								
1	5.0	146.570	0.32	1.80	90	90	6	314	1.5	105.8
2	10.0	150.330	0.34	1.92	91	91	6	312	4.7	105.4
3	15.0	154.090	0.34	1.92	92	92	6	312	8.4	105.3
4	20.0	157.740	0.32	1.80	92	92	6	314	12.5	105.4
5	25.0	161.500	0.34	1.92	92	92	6	316	17.7	105.5
6	30.0	165.260	0.34	1.92	91	91	6	316	25.2	105.7
7	35.0	169.910	0.52	2.93	92	92	8	316	45.6	105.8
8	40.0	174.920	0.60	3.38	93	93	8	318	53.2	106.2
9	45.0	179.940	0.60	3.38	93	93	7	316	58.3	106.2
10	50.0	184.590	0.52	2.93	94	94	7	314	62.5	105.3
11	55.0	189.150	0.50	2.82	94	94	7	314	66.1	105.2
12	60.0	193.430	0.44	2.48	95	95	7	312	69.4	104.9
Average:			0.441	2.486	91.2	91.2	6.2	313.8		105.7

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

Date: 10-Aug-21
Run: 1 - Particulate/Metals
Run Time: 13:06 - 15:08

Concentrations:

Particulate	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.002 Kg/hr	0.005 lb/hr
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Flue Gas Characteristics:

Flow	1150 dscm/min	40612 dscf/min
	19.17 dscm/sec	677 dscf/sec
	2151 Acm/min	75953 Acf/min

Velocity	14.073 m/sec	46.17 f/sec
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Temperature	160.9 oC	321.6 oF
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Moisture	17.3 %
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Gas Analysis	8.9 % O2
	10.6 % CO2

30.055 Mol. Wt (g/gmole) Dry
27.971 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7808 dscm	98.205 dscf
Sample Time	120.0 minutes	
Isokineticity	107.3 %	

*** 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 2

Date: 10-Aug-21
Run: 1 - Particulate/Metals
Run Time: 13:06 - 15:08

Control Unit (Y)	1.0145	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3073	Filter (grams)	0.00005	CO2	O2	Impinger 1	232.0
Pitot Factor	0.8412	Washings (grams)	0.00005	10.50	9.00	Impinger 2	124.0
Baro. Press. (in. Hg)	30.07			10.75	8.75	Impinger 3	48.0
Static Press. (in. H2O)	-19.50					Impinger 4	8.0
Stack Height (ft)	30					Impinger 5	4.0
Stack Diameter (in.)	70.90					Impinger 6	2.0
Stack Area (sq.ft.)	27.417					Cel	18.1
Minutes Per Reading	5.0			10.63	8.88	Gain (grams)	436.1
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	528.415								
1	5.0	533.490	0.65	3.38	80	80	7	320	1.5	107.5
2	10.0	538.650	0.68	3.52	81	81	7	325	4.7	107.5
3	15.0	543.440	0.58	3.01	82	82	8	326	8.4	107.5
4	20.0	547.920	0.51	2.64	82	82	8	326	12.5	107.2
5	25.0	552.450	0.52	2.70	82	82	8	325	17.7	107.3
6	30.0	556.580	0.43	2.23	82	82	8	325	25.2	107.4
7	35.0	560.620	0.41	2.13	83	83	8	324	45.6	107.3
8	40.0	564.300	0.34	1.77	83	83	8	323	53.2	107.2
9	45.0	567.780	0.30	1.57	84	84	7	321	58.3	107.5
10	50.0	571.150	0.28	1.47	85	85	7	319	62.5	107.4
11	55.0	574.330	0.25	1.32	86	86	6	318	66.1	107.0
12	60.0	577.240	0.21	1.11	86	86	6	318	69.4	106.7
Traverse 2	0.0	577.240								
1	5.0	580.440	0.25	1.32	88	88	6	320	1.5	107.4
2	10.0	583.750	0.27	1.42	88	88	6	322	4.7	107.0
3	15.0	587.140	0.28	1.48	89	89	6	323	8.4	107.5
4	20.0	590.570	0.29	1.54	90	90	6	321	12.5	106.6
5	25.0	594.200	0.32	1.70	91	91	6	320	17.7	107.2
6	30.0	597.980	0.35	1.86	91	91	6	318	25.2	106.6
7	35.0	602.900	0.59	3.13	91	91	7	321	45.6	107.4
8	40.0	607.920	0.61	3.21	91	91	7	320	53.2	107.7
9	45.0	613.020	0.63	3.34	91	91	7	321	58.3	107.8
10	50.0	617.990	0.60	3.18	92	92	7	322	62.5	107.5
11	55.0	622.840	0.57	3.02	92	92	7	322	66.1	107.6
12	60.0	627.600	0.55	2.93	92	92	7	318	69.4	107.2
Average:			0.436	2.291	86.8	86.8	6.9	321.6		107.3

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

Date: 11-Aug-21
Run: 2 - Particulate/Metals
Run Time: 08:35 - 10:37

Concentrations:

Particulate	0.09 mg/dscm	0.00004 gr/dscf
	0.05 mg/Acm	0.00002 gr/Acf
	0.07 mg/dscm (@ 11% O2)	0.00003 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.007 Kg/hr	0.014 lb/hr
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Flue Gas Characteristics:

Flow	1179 dscm/min	41645 dscf/min
	19.65 dscm/sec	694 dscf/sec
	2134 Acn/min	75371 Acf/min

Velocity	13.965 m/sec	45.82 f/sec
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Temperature	148.5 oC	299.3 oF
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Moisture	16.8 %
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Gas Analysis	7.9 % O2
	11.4 % CO2

30.136 Mol. Wt (g/gmole) Dry
28.095 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.6953 dscm	95.184 dscf
Sample Time	120.0 minutes	
Isokineticity	106.3 %	

*** Standard Conditions:**

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

Date: 11-Aug-21
Run: 2 - Particulate/Metals
Run Time: 08:35 - 10:37

Traverse / Point	Time (min.)	Dry Gas Meter (lit)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature			Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
					Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)			
Traverse 1	0.0	628.054								
1	5.0	632.920	0.59	3.12	78	78	5	295	1.5	106.5
2	10.0	637.660	0.56	2.96	78	78	5	296	4.7	106.6
3	15.0	641.990	0.47	2.47	79	79	5	303	8.4	106.4
4	20.0	646.530	0.52	2.73	79	79	5	304	12.5	106.2
5	25.0	651.040	0.51	2.67	80	80	6	305	17.7	106.4
6	30.0	655.240	0.44	2.31	81	81	6	306	25.2	106.5
7	35.0	658.840	0.32	1.69	82	82	5	304	45.6	106.5
8	40.0	662.390	0.31	1.65	83	83	5	300	53.2	106.2
9	45.0	665.980	0.32	1.70	84	84	5	302	58.3	105.7
10	50.0	669.490	0.30	1.60	84	84	5	296	62.5	106.3
11	55.0	672.940	0.29	1.55	84	84	5	295	66.1	106.1
12	60.0	676.280	0.27	1.45	84	84	5	292	69.4	106.3
Traverse 2	0.0	676.280								
1	5.0	680.940	0.52	2.81	86	86	5	291	1.5	106.7
2	10.0	685.440	0.49	2.62	87	87	5	301	4.7	106.6
3	15.0	689.280	0.36	1.92	86	86	5	302	8.4	106.2
4	20.0	692.730	0.29	1.55	87	87	5	302	12.5	106.1
5	25.0	695.990	0.26	1.38	87	87	5	304	17.7	105.6
6	30.0	699.600	0.32	1.70	87	87	5	305	25.2	106.2
7	35.0	704.750	0.64	3.42	88	88	6	302	45.6	106.9
8	40.0	709.920	0.65	3.47	88	88	6	302	53.2	106.5
9	45.0	714.980	0.62	3.33	89	89	7	299	58.3	106.2
10	50.0	719.630	0.52	2.81	89	89	7	296	62.5	106.3
11	55.0	724.160	0.49	2.66	89	89	7	292	66.1	106.3
12	60.0	728.600	0.47	2.56	89	89	7	289	69.4	106.2
Average:			0.439	2.339	84.5	84.5	5.5	299.3		106.3

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

Date: 11-Aug-21
Run: 3 - Particulate/Metals
Run Time: 10:55 - 12:56

Concentrations:

Particulate	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.006 lb/hr
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Flue Gas Characteristics:

Flow	1167 dscm/min	41213 dscf/min
	19.45 dscm/sec	687 dscf/sec
	2128 Acn/min	75153 Acf/min

Velocity	13.925 m/sec	45.69 f/sec
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Temperature	153.1 oC	307.6 oF
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Moisture	16.5 %
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Gas Analysis	8.3 % O2
	11.1 % CO2

30.112 Mol. Wt (g/gmole) Dry
28.108 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7886 dscm	98.478 dscf
Sample Time	120.0 minutes	
Isokineticity	106.0 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	11-Aug-21
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate/Metals
Source:	Unit 2	Run Time:	10:55 - 12:56

Control Unit (Y)	1.0145	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3073	Filter (grams) 0.00005		CO2	O2	Impinger 1	242.0
Pitot Factor	0.8412	Washings (grams) 0.00005	Traverse 1	10.75	8.65	Impinger 2	116.0
Baro. Press. (in. Hg)	30.02		Traverse 2	11.50	7.95	Impinger 3	26.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.0001				Impinger 4	7.0
Stack Height (ft)	30					Impinger 5	4.0
Stack Diameter (in.)	70.90					Impinger 6	2.0
Stack Area (sq.ft.)	27.417					Gel	17.8
Minutes Per Reading	5.0			11.13	8.30	Gain (grams)	414.8
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	728.990								
1	5.0	732.650	0.32	1.73	88	88	5	294	1.5	106.1
2	10.0	736.360	0.33	1.77	88	88	5	298	4.7	106.2
3	15.0	740.060	0.33	1.77	87	87	5	297	8.4	106.0
4	20.0	744.080	0.39	2.09	88	88	5	298	12.5	105.9
5	25.0	747.540	0.29	1.55	87	87	5	301	17.7	106.0
6	30.0	751.400	0.36	1.93	88	88	5	298	25.2	105.8
7	35.0	756.540	0.64	3.42	88	88	6	302	45.6	106.3
8	40.0	761.880	0.69	3.68	88	88	6	303	53.2	106.5
9	45.0	767.040	0.65	3.46	88	88	6	306	58.3	106.2
10	50.0	771.960	0.59	3.13	89	89	6	310	62.5	106.3
11	55.0	776.480	0.50	2.64	88	88	7	310	66.1	106.1
12	60.0	780.710	0.44	2.32	88	88	7	311	69.4	105.9
Traverse 2	0.0	780.710								
1	5.0	785.660	0.60	3.17	89	89	7	313	1.5	106.2
2	10.0	790.520	0.58	3.06	89	89	7	313	4.7	106.1
3	15.0	794.800	0.45	2.37	89	89	7	314	8.4	105.9
4	20.0	799.180	0.47	2.48	89	89	7	313	12.5	106.0
5	25.0	803.690	0.50	2.63	89	89	7	315	17.7	106.0
6	30.0	807.980	0.45	2.37	89	89	7	313	25.2	106.1
7	35.0	811.720	0.35	1.80	90	90	6	314	45.6	105.4
8	40.0	815.340	0.32	1.69	90	90	6	315	53.2	106.0
9	45.0	818.920	0.31	1.64	90	90	6	312	58.3	106.2
10	50.0	822.380	0.29	1.54	90	90	6	312	62.5	106.1
11	55.0	825.710	0.27	1.43	91	91	6	311	66.1	105.6
12	60.0	828.980	0.26	1.38	90	90	6	309	69.4	105.7
Average:			0.432	2.294	88.8	88.8	3.0	307.6		106.0

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

Date: 11-Aug-21
Run: 1 - Particulate / Metals
Run Time: 11:57 - 14:00

Concentrations:

Particulate	4.90 mg/dscm	0.00214 gr/dscf
	2.73 mg/Acm	0.00119 gr/Acf
	4.45 mg/dscm (@ 11% O2)	0.00195 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.343 Kg/hr	0.756 lb/hr
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Flue Gas Characteristics:

Flow	1165 dscm/min	41132 dscf/min
	19.41 dscm/sec	686 dscf/sec
	2092 Acm/min	73892 Acf/min

Velocity	13.691 m/sec	44.92 f/sec
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Temperature	149.8 oC	301.7 oF
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Moisture	16.3 %
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Gas Analysis	10.0 % O2
	10.5 % CO2

30.080 Mol. Wt (g/gmole) Dry
28.114 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7319 dscm	96.478 dscf
Sample Time	120.0 minutes	
Isokineticity	105.7 %	

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

Client:	Metro Vancouver	Date:	11-Aug-21
Jobsite:	WTE (Burnaby, B.C)	Run:	1 - Particulate / Metals
Source:	Unit 3	Run Time:	11:57 - 14:00

Control Unit (Y)	0.9918	Collection:	Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3050	Filter (grams) 0.01070	CO2	O2	Impinger 1	240.0
Pitot Factor	0.8461	Washings (grams) 0.00270	10.50	10.00	Impinger 2	103.0
Baro. Press. (in. Hg)	30.10		10.50	10.00	Impinger 3	28.0
Static Press. (in. H20)	-19.00	Total (grams) 0.01340			Impinger 4	9.0
Stack Height (ft)	30				Impinger 5	4.0
Stack Diameter (in.)	70.90				Impinger 6	2.0
Stack Area (sq.ft.)	27.417				Gel	12.5
Minutes Per Reading	5.0		10.50	10.00	Gain (grams)	398.5
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)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	845.850								
1	5.0	850.500	0.52	2.93	80	80	8	300	1.5	106.3
2	10.0	855.410	0.58	3.27	82	82	8	300	4.7	106.0
3	15.0	860.440	0.60	3.38	82	82	8	308	8.4	107.3
4	20.0	865.130	0.52	2.93	84	84	8	310	12.5	107.1
5	25.0	869.920	0.54	2.97	85	85	8	312	17.7	107.3
6	30.0	874.600	0.52	2.86	86	86	8	311	25.2	106.6
7	35.0	878.290	0.32	1.76	87	87	8	310	45.6	106.6
8	40.0	881.740	0.28	1.54	88	88	8	309	53.2	106.2
9	45.0	885.190	0.28	1.54	88	88	8	300	58.3	105.6
10	50.0	888.520	0.26	1.43	89	89	8	292	62.5	105.0
11	55.0	891.840	0.26	1.43	90	90	8	290	66.1	104.3
12	60.0	895.030	0.24	1.32	91	91	8	288	69.4	104.0
Traverse 2	0.0	895.030								
1	5.0	898.720	0.32	1.76	91	91	8	286	1.5	104.1
2	10.0	902.630	0.36	1.98	92	92	8	288	4.7	104.0
3	15.0	906.320	0.32	1.76	92	92	8	300	8.4	104.9
4	20.0	909.890	0.30	1.65	93	93	8	310	12.5	105.3
5	25.0	913.460	0.30	1.65	94	94	8	310	17.7	105.1
6	30.0	917.370	0.36	1.98	95	95	8	309	25.2	104.9
7	35.0	922.240	0.56	3.08	96	96	8	309	45.6	104.9
8	40.0	926.930	0.52	2.93	96	96	8	307	53.2	104.6
9	45.0	932.060	0.62	3.41	97	97	8	304	58.3	104.5
10	50.0	937.170	0.58	3.19	97	97	8	300	62.5	107.3
11	55.0	941.780	0.48	2.64	98	98	8	298	66.1	105.9
12	60.0	946.100	0.40	2.20	99	99	8	290	69.4	107.9
Average:			0.418	2.316	90.5	90.5	8.0	301.7		105.7

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

Date: 12-Aug-21
Run: 2 - Particulate / Metals
Run Time: 08:23 - 11:24

Concentrations:

Particulate	2.31 mg/dscm	0.00101 gr/dscf
	1.28 mg/Acm	0.00056 gr/Acf
	1.98 mg/dscm (@ 11% O2)	0.00087 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.157 Kg/hr	0.347 lb/hr
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Flue Gas Characteristics:

Flow	1133 dscm/min	40003 dscf/min
	18.88 dscm/sec	667 dscf/sec
	2044 Acm/min	72194 Acf/min

Velocity	13.377 m/sec	43.89 f/sec
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Temperature	152.8 oC	307.0 oF
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Moisture	15.8 %
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Gas Analysis	9.4 % O2
	9.9 % CO2

29.954 Mol. Wt (g/gmole) Dry
28.070 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7216 dscm	96.112 dscf
Sample Time	120.0 minutes	
Isokineticity	105.0 %	

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

Client:	Metro Vancouver	Date:	12-Aug-21
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 3	Run Time:	08:23 - 11:24

Control Unit (Y)	0.9918	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3097	Filter (grams) 0.00570	CO2 O2	Impinger 1 218.0
Pitot Factor	0.8450	Washings (grams) 0.00060	9.75 9.65	Impinger 2 106.0
Baro. Press. (in. Hg)	29.99	Traverse 1	10.00 9.05	Impinger 3 26.0
Static Press. (in. H2O)	-19.00	Traverse 2		Impinger 4 10.0
Stack Height (ft)	30	Total (grams) 0.00630		Impinger 5 4.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 17.0
Minutes Per Reading	5.0		9.88 9.35	Gain (grams) 382.0
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	946.854								
1	5.0	951.280	0.45	2.57	75	75	6	290	1.5	104.9
2	10.0	956.280	0.57	3.25	76	76	6	292	4.7	105.4
3	15.0	961.280	0.58	3.25	77	77	6	306	8.4	105.3
4	20.0	966.180	0.56	3.13	77	77	6	309	12.5	105.2
5	25.0	970.820	0.50	2.79	78	78	6	312	17.7	105.3
6	30.0	975.380	0.48	2.69	80	80	6	308	25.2	105.0
7	35.0	979.150	0.33	1.85	79	79	5	310	45.6	104.8
8	40.0	982.500	0.26	1.46	80	80	5	311	53.2	104.7
9	45.0	986.020	0.28	1.59	81	81	6	302	58.3	105.2
10	50.0	989.420	0.26	1.49	82	82	6	295	62.5	104.7
11	55.0	992.540	0.22	1.26	83	83	6	297	66.1	104.4
12	60.0	995.510	0.20	1.14	84	84	6	303	69.4	104.4
Traverse 2	0.0	995.510								
1	5.0	999.120	0.29	1.66	85	85	5	301	1.5	105.2
2	10.0	1002.930	0.33	1.87	86	86	5	312	4.7	104.7
3	15.0	1006.800	0.34	1.92	86	86	5	313	8.4	104.8
4	20.0	1010.550	0.32	1.80	86	86	5	314	12.5	104.7
5	25.0	1013.940	0.26	1.47	87	87	5	312	17.7	104.6
6	30.0	1017.520	0.29	1.64	86	86	5	311	25.2	104.8
7	35.0	1022.480	0.55	3.12	87	87	5	310	45.6	105.5
8	40.0	1027.400	0.54	3.09	88	88	5	306	53.2	105.2
9	45.0	1032.220	0.52	2.96	90	90	6	312	58.3	105.0
10	50.0	1036.720	0.45	2.56	91	91	6	313	62.5	105.1
11	55.0	1041.380	0.49	2.76	88	88	6	317	66.1	105.2
12	60.0	1045.800	0.44	2.50	88	88	6	312	69.4	104.9
Average:			0.396	2.243	83.3	83.3	5.6	307.0		105.0

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

Date: 12-Aug-21
Run: 3 - Particulate / Metals
Run Time: 12:04 -14:06

Concentrations:

Particulate	2.13 mg/dscm	0.00093 gr/dscf
	1.15 mg/Acm	0.00050 gr/Acf
	1.79 mg/dscm (@ 11% O2)	0.00078 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.144 Kg/hr	0.316 lb/hr
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Flue Gas Characteristics:

Flow	1123 dscm/min	39668 dscf/min
	18.72 dscm/sec	661 dscf/sec
	2080 Acn/min	73447 Acf/min

Velocity	13.609 m/sec	44.65 f/sec
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Temperature	159.4 oC	318.8 oF
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Moisture	16.6 %
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Gas Analysis	9.1 % O2
	10.3 % CO2

30.005 Mol. Wt (g/gmole) Dry
28.010 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7231 dscm	96.165 dscf
Sample Time	120.0 minutes	
Isokineticity	105.9 %	

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

Client:	Metro Vancouver	Date:	12-Aug-21
Jobsite:	WTE(Burnaby,B.C)	Run:	3 - Particulate / Metals
Source:	Unit 3	Run Time:	12:04 -14:06

Control Unit (Y)	0.9918	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3097	Filter (grams) 0.00550	CO2	Impinger 1
Pitot Factor	0.8450	Washings (grams) 0.00030	O2	Impinger 2
Baro. Press. (in. Hg)	29.99			Impinger 3
Static Press. (in. H2O)	-19.00			Impinger 4
Stack Height (ft)	30			Impinger 5
Stack Diameter (in.)	70.90			Impinger 6
Stack Area (sq.ft.)	27.417			Gel
Minutes Per Reading	5.0			
Minutes Per Point	5.0			

		Traverse 1	10.00	9.00	
			10.00	9.50	
		Traverse 2	10.50	9.00	
			10.50	9.00	
			10.25	9.13	

				Gain (grams)	407.3
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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	46.618								
1	5.0	51.430	0.52	2.94	92	92	6	321	1.5	106.0
2	10.0	56.330	0.54	3.04	92	92	6	323	4.7	106.1
3	15.0	61.380	0.57	3.22	92	92	6	322	8.4	106.4
4	20.0	66.280	0.54	3.05	92	92	6	321	12.5	106.0
5	25.0	70.950	0.49	2.77	92	92	7	320	17.7	105.9
6	30.0	75.590	0.48	2.72	93	93	7	320	25.2	106.1
7	35.0	79.260	0.30	1.70	93	93	5	319	45.6	105.8
8	40.0	82.880	0.29	1.65	94	94	5	320	53.2	106.0
9	45.0	86.240	0.25	1.42	95	95	6	319	58.3	105.7
10	50.0	89.550	0.24	1.37	97	97	6	318	62.5	105.8
11	55.0	92.800	0.23	1.33	98	98	5	314	66.1	105.6
12	60.0	95.920	0.21	1.22	99	99	5	309	69.4	105.5
Traverse 2	0.0	95.920								
1	5.0	99.820	0.33	1.88	100	100	5	322	1.5	106.1
2	10.0	103.660	0.32	1.84	101	101	5	321	4.7	105.8
3	15.0	107.600	0.34	1.95	99	99	6	321	8.4	105.7
4	20.0	111.250	0.29	1.66	100	100	6	320	12.5	105.7
5	25.0	114.980	0.30	1.73	101	101	6	319	17.7	106.0
6	30.0	118.820	0.32	1.84	102	102	6	321	25.2	105.6
7	35.0	123.950	0.57	3.29	102	102	6	319	45.6	106.0
8	40.0	129.050	0.56	3.23	103	103	6	320	53.2	106.2
9	45.0	134.080	0.54	3.13	105	105	7	320	58.3	106.2
10	50.0	138.950	0.51	2.96	106	106	7	320	62.5	105.6
11	55.0	143.750	0.49	2.85	105	105	7	317	66.1	106.1
12	60.0	148.330	0.44	2.57	106	106	7	306	69.4	105.8
Average:			0.403	2.307	98.3	98.3	6.0	318.8		105.9

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

Date: 16-Aug-21
Run: 1 - Cr⁺⁶
Run Time: 10:10 - 12:12

Concentrations:

Hexavalent Chromium	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.000 lb/hr
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Flue Gas Characteristics:

Flow	1208 dscm/min	42662 dscf/min
	20.13 dscm/sec	711 dscf/sec
	2132 Acf/min	75289 Acf/min

Velocity	13.950 m/sec	45.77 f/sec
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Temperature	158.0 oC	316.4 oF
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Moisture	12.4 %
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Gas Analysis	10.2 % O2
	10.0 % CO2

30.001 Mol. Wt (g/gmole) Dry
28.518 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.3719 dscm	83.764 dscf
Sample Time	120.0 minutes	
Isokineticity	105.2 %	

*** Standard Conditions:**

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

Date: 16-Aug-21
Run: 1 - Cr+6
Run Time: 10:10 - 12:12

Gel	21.0
Gain (grams)	251.0

Page 20 of 28

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

Date: 16-Aug-21
Run: 2 - Cr⁺⁶
Run Time: 12:40 - 14:43

Concentrations:

Hexavalent Chromium	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.000 lb/hr
--------------------	------------	-------------

Flue Gas Characteristics:

Flow	1170 dscm/min	41305 dscf/min
	19.49 dscm/sec	688 dscf/sec
	2124 Acf/min	75014 Acf/min

Velocity	13.899 m/sec	45.60 f/sec
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Temperature	156.2 oC	313.2 oF
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Moisture	15.2 %
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Gas Analysis	8.7 % O2
	10.8 % CO2

30.081 Mol. Wt (g/gmole) Dry
28.247 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.2562 dscm	79.676 dscf
Sample Time	120.0 minutes	
Isokineticity	103.3 %	

*** Standard Conditions:**

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

Date: 16-Aug-21
Run: 2 - Cr+6
Run Time: 12:40 - 14:43

10.83	8.70		
		Gel	15.1
		Gain (grams)	303.1

Page 22 of 28

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

Date: 17-Aug-21
Run: 3 - Cr⁺⁶
Run Time: 07:57 - 10:00

Concentrations:

Hexavalent Chromium	0.0 mg/dscm	0.0000 gr/dscf
	0.0 mg/Acm	0.0000 gr/Acf
	0.0 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.00 Kg/hr	0.000 lb/hr
--------------------	------------	-------------

Flue Gas Characteristics:

Flow	1208 dscm/min	42651 dscf/min
	20.13 dscm/sec	711 dscf/sec
	2135 Acm/min	75402 Acf/min

Velocity	13.971 m/sec	45.84 f/sec
-----------------	--------------	-------------

Temperature	146.6 oC	296.0 oF
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Moisture	15.1 %
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Gas Analysis	9.9 % O2
	10.0 % CO2

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

Sample Parameters:

Sample Volume	2.3632 dscm	83.457 dscf
Sample Time	120.0 minutes	
Isokineticity	104.8 %	

*** Standard Conditions:**

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

Date: 17-Aug-21
Run: 3 - Cr+6
Run Time: 07:57 - 10:00

Gel	19.2
Gain (grams)	314.2

Traverse / Point	Time (min.)	Dry Gas Meter	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
					Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	473.555								
1	5.0	477.630	0.57	2.17	65	65	7	308	1.5	107.1
2	10.0	481.780	0.59	2.24	66	66	7	306	4.7	106.9
3	15.0	485.960	0.60	2.28	66	66	8	304	8.4	106.7
4	20.0	489.960	0.55	2.09	67	67	8	299	12.5	106.0
5	25.0	493.890	0.53	2.01	67	67	8	298	17.7	106.0
6	30.0	497.750	0.51	1.94	68	68	8	298	25.2	105.9
7	35.0	501.120	0.39	1.48	69	69	8	297	45.6	105.4
8	40.0	504.130	0.31	1.18	71	71	8	298	53.2	105.1
9	45.0	506.940	0.27	1.03	71	71	8	294	58.3	104.9
10	50.0	509.590	0.24	0.91	72	72	8	293	62.5	104.6
11	55.0	512.120	0.22	0.84	73	73	8	292	66.1	104.0
12	60.0	514.590	0.21	0.80	73	73	8	291	69.4	103.9
Traverse 2	0.0	514.590								
1	5.0	517.600	0.31	1.18	73	73	7	292	1.5	104.3
2	10.0	520.700	0.33	1.25	73	73	7	294	4.7	104.3
3	15.0	523.890	0.35	1.33	74	74	7	296	8.4	104.2
4	20.0	527.220	0.38	1.44	74	74	7	297	12.5	104.5
5	25.0	530.680	0.41	1.56	74	74	7	296	17.7	104.5
6	30.0	534.100	0.40	1.52	75	75	7	294	25.2	104.2
7	35.0	538.100	0.55	2.09	76	76	9	292	45.6	103.7
8	40.0	542.180	0.57	2.17	76	76	9	291	53.2	103.9
9	45.0	546.330	0.59	2.24	77	77	9	292	58.3	103.8
10	50.0	550.370	0.56	2.13	77	77	9	294	62.5	103.8
11	55.0	554.370	0.55	2.09	77	77	10	294	66.1	103.7
12	60.0	558.380	0.55	2.09	77	77	10	293	69.4	103.9
Average:			0.439	1.669	72.1	72.1	8.0	296.0		104.8

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		10-Aug-21	10-Aug-21	10-Aug-21
Test Time		09:50 - 10:50	11:04 - 12:04	12:17 - 13:17
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.10	30.10	30.10
DGM Factor	(Y)	1.0133	1.0133	1.0133
Initial Reading	(m ³)	28.6460	30.2760	31.7920
Final Reading	(m ³)	30.2630	31.7812	33.3811
Temp. Outlet	(Avg. oF)	82.0	100.0	102.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	1.61	1.45	1.52
HF	(mg)	0.003	0.003	0.003
Oxygen	(Vol. %)	10.0	10.0	10.0
HF	(mg/Sm ³)	0.002	0.002	0.002
HF	(mg/Sm ³ @ 11% O2)	0.001	0.002	0.002
Moisture	(Vol. %)	14.9	14.9	15.8

Tstd. (oF) 68

Pstd. (in. Hg) 29.92

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

Sample Type: HF		Test 1	Test 2	Test 3
Parameter				
Test Date		11-Aug-21	11-Aug-21	11-Aug-21
Test Time		09:00 - 10:00	10:14 - 11:36	11:49 - 12:49
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.08	30.08	30.08
DGM Factor	(Y)	1.0133	1.0133	1.0133
Initial Reading	(m ³)	33.4076	35.3124	36.8492
Final Reading	(m ³)	35.2990	36.8320	38.1818
Temp. Outlet	(Avg. oF)	81.0	87.0	93.0
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	1.88277	1.49607	1.29772
HF	(mg)	0.003	0.003	0.003
Oxygen	(Vol. %)	7.9	8.3	8.3
HF	(mg/Sm ³)	0.001	0.002	0.002
HF	(mg/Sm ³ @ 11% O ₂)	0.001	0.001	0.002
Moisture (isokinetic)	(Vol. %)	16.8	16.8	16.5
Tstd. (oF)		68	Pstd. (in. Hg)	29.92

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

Sample Type: HF		Test 1	Test 2	Test 3
Parameter				
Test Date		12-Aug-21	12-Aug-21	12-Aug-21
Test Time		08:46 - 09:46	10:00 - 11:00	11:53 - 12:53
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.99	29.99	29.99
DGM Factor	(Y)	1.0133	1.0133	1.0133
Initial Reading	(m ³)	38.1970	39.0706	39.8956
Final Reading	(m ³)	39.0650	39.8286	40.8278
Temp. Outlet	(Avg. oF)	85.0	101.0	101.0
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.855	0.725	0.892
HF	(mg)	0.003	0.003	0.003
Oxygen	(Vol. %)	9.4	9.4	9.1
HF	(mg/Sm ³)	0.003	0.004	0.003
HF	(mg/Sm ³ @ 11% O ₂)	0.003	0.003	0.002
Moisture (isokinetic)	(Vol. %)	15.8	15.8	16.6
Tstd. (oF)		68	Pstd. (in. Hg)	29.92

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

Parameter: N₂O

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

Sample ID	Date	Time (hh:mm - hh:mm)	N ₂ O (ppm)	N ₂ O (mg/Sm ³)	N ₂ O (mg/Sm ³ @ 11% O ₂)
Unit #1					
Run 1	10-Aug-21	10:30 - 11:30	3.00	5.49	5.44
Run 2	10-Aug-21	11:45 - 12:45	2.00	3.66	3.62
Run 3	10-Aug-21	12:52 - 13:52	3.00	5.49	5.44
Average					4.83
Unit #2					
Run 1	11-Aug-21	08:54 - 09:54	4.00	7.32	8.17
Run 2	11-Aug-21	09:57 - 10:57	2.00	3.66	4.59
Run 3	11-Aug-21	11:00 - 12:00	3.00	5.49	6.55
Average					6.43
Unit #3					
Run 1	11-Aug-21	10:22 - 11:22	3.00	5.49	5.44
Run 2	11-Aug-21	11:24 - 12:24	2.00	3.66	3.88
Run 3	11-Aug-21	12:26 - 13:26	4.00	7.32	7.94
Average					5.75

APPENDIX - D

FIELD DATA SHEETS

CLIENT **MURDO**

SOURCE **Unit #3**

PARAMETER / RUN NO **Ag. 1/21**

DATE **Ag. 1/21**

OPERATOR **C. C. C.**

CONTROL UNIT **Y 9918**

BAROMETRIC PRESSURE, IN. Hg **30.132**

ASSUMED MOISTURE, Bw **132**

NOZZLE **NV.2**

PROBE **7C**

DIAMETER, IN. **3.50**

PORT LENGTH **19.00**

STATIC PRESSURE, IN. H₂O **70.90**

STACK DIAMETER **30**

STACK HEIGHT **15**

INITIAL LEAK TEST **0.002915**

FINAL LEAK TEST **0.002915**

IMPINGING, INITIAL

VOLUMES

Imp. #1

Imp. #2

Imp. #3

Imp. #4

Imp. #5

Imp. #6

Upstream Diameters

Downstream Diameters

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

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STATIC PRESSURE, IN. H₂O

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FINAL LEAK TEST

NOZZLE

PROBE

DIAMETER, IN.

PORT LENGTH

STATIC PRESSURE, IN. H₂O

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST

FINAL LEAK TEST

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Temperature °F	Impinger Exit	Pump Vac. IN. Hg	Fyrites		TOTAL GAIN (mL)
										CO ₂ Vol. %	O ₂ Vol. %	
1	11:57	845.850	1.52	3.93	3.00	3.00	250	250	66	6	6	240
2		845.50	1.53	3.74	3.00	3.00	250	250	66	6	6	240
3		845.14	1.54	3.55	3.00	3.00	250	250	66	6	6	240
4		845.00	1.55	3.36	3.00	3.00	250	250	66	6	6	240
5		845.00	1.56	3.17	3.00	3.00	250	250	66	6	6	240
6		845.00	1.57	2.98	3.00	3.00	250	250	66	6	6	240
7		845.00	1.58	2.79	3.00	3.00	250	250	66	6	6	240
8		845.00	1.59	2.60	3.00	3.00	250	250	66	6	6	240
9		845.00	1.60	2.41	3.00	3.00	250	250	66	6	6	240
10		845.00	1.61	2.22	3.00	3.00	250	250	66	6	6	240
11		845.00	1.62	2.03	3.00	3.00	250	250	66	6	6	240
12		845.00	1.63	1.84	3.00	3.00	250	250	66	6	6	240
13		845.00	1.64	1.65	3.00	3.00	250	250	66	6	6	240
14		845.00	1.65	1.46	3.00	3.00	250	250	66	6	6	240
15		845.00	1.66	1.27	3.00	3.00	250	250	66	6	6	240
16		845.00	1.67	1.08	3.00	3.00	250	250	66	6	6	240
17		845.00	1.68	0.89	3.00	3.00	250	250	66	6	6	240
18		845.00	1.69	0.70	3.00	3.00	250	250	66	6	6	240
19		845.00	1.70	0.51	3.00	3.00	250	250	66	6	6	240
20		845.00	1.71	0.32	3.00	3.00	250	250	66	6	6	240
21		845.00	1.72	0.13	3.00	3.00	250	250	66	6	6	240
22		845.00	1.73	0.00	3.00	3.00	250	250	66	6	6	240
23		845.00	1.74	0.00	3.00	3.00	250	250	66	6	6	240
24		845.00	1.75	0.00	3.00	3.00	250	250	66	6	6	240
25		845.00	1.76	0.00	3.00	3.00	250	250	66	6	6	240
26		845.00	1.77	0.00	3.00	3.00	250	250	66	6	6	240
27		845.00	1.78	0.00	3.00	3.00	250	250	66	6	6	240
28		845.00	1.79	0.00	3.00	3.00	250	250	66	6	6	240
29		845.00	1.80	0.00	3.00	3.00	250	250	66	6	6	240
30		845.00	1.81	0.00	3.00	3.00	250	250	66	6	6	240
31		845.00	1.82	0.00	3.00	3.00	250	250	66	6	6	240
32		845.00	1.83	0.00	3.00	3.00	250	250	66	6	6	240
33		845.00	1.84	0.00	3.00	3.00	250	250	66	6	6	240
34		845.00	1.85	0.00	3.00	3.00	250	250	66	6	6	240
35		845.00	1.86	0.00	3.00	3.00	250	250	66	6	6	240
36		845.00	1.87	0.00	3.00	3.00	250	250	66	6	6	240
37		845.00	1.88	0.00	3.00	3.00	250	250	66	6	6	240
38		845.00	1.89	0.00	3.00	3.00	250	250	66	6	6	240
39		845.00	1.90	0.00	3.00	3.00	250	250	66	6	6	240
40		845.00	1.91	0.00	3.00	3.00	250	250	66	6	6	240
41		845.00	1.92	0.00	3.00	3.00	250	250	66	6	6	240
42		845.00	1.93	0.00	3.00	3.00	250	250	66	6	6	240
43		845.00	1.94	0.00	3.00	3.00	250	250	66	6	6	240
44		845.00	1.95	0.00	3.00	3.00	250	250	66	6	6	240
45		845.00	1.96	0.00	3.00	3.00	250	250	66	6	6	240
46		845.00	1.97	0.00	3.00	3.00	250	250	66	6	6	240
47		845.00	1.98	0.00	3.00	3.00	250	250	66	6	6	240
48		845.00	1.99	0.00	3.00	3.00	250	250	66	6	6	240
49		845.00	2.00	0.00	3.00	3.00	250	250	66	6	6	240
50		845.00	2.01	0.00	3.00	3.00	250	250	66	6	6	240
51		845.00	2.02	0.00	3.00	3.00	250	250	66	6	6	240
52		845.00	2.03	0.00	3.00	3.00	250	250	66	6	6	240
53		845.00	2.04	0.00	3.00	3.00	250	250	66	6	6	240
54		845.00	2.05	0.00	3.00	3.00	250	250	66	6	6	240
55		845.00	2.06	0.00	3.00	3.00	250	250	66	6	6	240
56		845.00	2.07	0.00	3.00	3.00	250	250	66	6	6	240
57		845.00	2.08	0.00	3.00	3.00	250	250	66	6	6	240
58		845.00	2.09	0.00	3.00	3.00	250	250	66	6	6	240
59		845.00	2.10	0.00	3.00	3.00	250	250	66	6	6	240

DS

METRO VANCOUVER WTE - BURNABY B.C.												
SOURCE		NOZZLE		DIAMETER, IN.		IMPINGER		TOTAL GAIN				
PARAMETER / RUN No		PROBE		Cp		VOLUMES		(mL)				
DATE		PORT LENGTH										
OPERATOR:		STATIC PRESSURE, IN. H ₂ O		~19.0"								
CONTROL UNIT		STACK DIAMETER		30.0'								
		STACK HEIGHT										
BAROMETRIC PRESSURE, IN. Hg		INITIAL LEAK TEST		0.003 @ 15"								
ASSUMED MOISTURE, Bw		FINAL LEAK TEST		0.004 @ 15"								
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 CO ₂ Vol. %	O ₂ Vol. %
1	12:04	46.618	0.52	2.94	92	321	232	226	55	6	10.0	9.0
2	10	56.433	0.54	3.04	92	323						
3		56.338	0.54	3.22	92	322	251	254	49	6		
4	20	56.338	0.54	3.22	92	321	257	256	46	7		
5	30	56.338	0.54	3.22	92	320	254	257	49	8		
6	40	56.338	0.54	3.22	92	319	257	254	51	9	10.0	9.5
7		56.338	0.54	3.22	92	318	257	254	52	10		
8	50	56.338	0.54	3.22	92	317	257	254		11		
9	60	56.338	0.54	3.22	92	316	257	254		12		
10		56.338	0.54	3.22	92	315	257	254				
11		56.338	0.54	3.22	92	314	257	254				
12		56.338	0.54	3.22	92	313	257	254				
1		99.87	0.33	1.88	100	321	257	254	54	5	10.5	9.0
2	10	103.66	0.32	1.88	100	321	257	254	49	6		
3	20	107.60	0.34	1.95	100	320	257	254	52	6		
4	30	111.25	0.30	1.83	100	319	257	254	54	6		
5	40	114.98	0.32	1.83	100	318	257	254	55	7	10.5	9.0
6	50	118.82	0.32	1.83	100	317	257	254	54	7		
7	60	123.05	0.32	1.83	100	316	257	254	54	7		
8		127.05	0.32	1.83	100	315	257	254	54	7		
9		131.05	0.32	1.83	100	314	257	254	54	7		
10		135.05	0.32	1.83	100	313	257	254	54	7		
11		139.05	0.32	1.83	100	312	257	254	54	7		
12	14:06	143.05	0.32	1.83	100	311	257	254	54	7		
		147.05	0.32	1.83	100	310	257	254	54	7		

METRO VANCOUVER WTE - BURNABY B.C.													
SOURCE		Unit #2		NOZZLE 6-3072		DIAMETER, IN. 0.3073		IMPINGER, INITIAL		FINAL		TOTAL GAIN	
PARAMETER / RUN No		Particulate Run		PROBE		Cp		VOLUMES		(mL)		(mL)	
DATE		Aug 10, 2011		PORT LENGTH				Imp. #1		232		232	
OPERATOR		DS, 10, 2011		STATIC PRESSURE, IN. H ₂ O		70.96 - (1.5)		Imp. #2		100		124	
CONTROL UNIT		DUIS		STACK DIAMETER		30.6		Imp. #3		100		148	
		Y 1.0145		STACK HEIGHT		30.6		Imp. #4		100		8	
		ΔH@ 1.775						Imp. #5		100		104	
BAROMETRIC PRESSURE, IN. Hg		30.07		INITIAL LEAK TEST		0.006 @ 15'		Imp. #6		100		102	
ASSUMED MOISTURE, Bw		14%		FINAL LEAK TEST		0.005 @ 15'		Imp. #7		200			
								Imp. #8					

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature of				Impinger Exit	Pump Vac. IN. Hg	Fyrites	
					Dry Gas Outlet	Stack	Probe	Box			CO ₂ Vol. %	O ₂ Vol. %
1	13:06	528.415	0.65	3.38	320	750	251	251	54	7	10.5	9.0
2	10	533.48	0.65	3.52	325	255	261	258	58	8		
3	20	538.65	0.58	3.04	326	248	257	259	59	8		
4	30	543.44	0.51	2.70	325	249	251	257	57	8		
5	40	547.77	0.52	2.73	324	250	247	252	52	7	10.5	9.0
6	50	552.45	0.43	2.13	323	252	245	248	48	6		
7	60	556.58	0.34	1.77	318							
8		560.62	0.30	1.57	318							
9		564.38	0.28	1.47	318							
10		571.15	0.25	1.37	318							
11		574.33	0.25	1.37	318							
12		577.24	0.21	1.11	318							
1		580.44	0.25	1.37	320	251	250	252	52	6	11.0	8.5
2	10	583.75	0.27	1.42	322	249	251	254	54	6		
3	20	587.14	0.28	1.48	323	252	253	256	56	6		
4	30	590.57	0.32	1.50	320	250	251	257	57	7		
5	40	594.28	0.35	1.86	321	249	248	242	42	7	10.5	9.0
6	50	597.90	0.63	3.13	321	250	252	255	45	7		
7	60	602.42	0.63	3.13	322	250	252	252	42	7		
8		607.92	0.60	3.24	322	250	252	252	42	7		
9		613.02	0.57	3.01	318							
10		617.99	0.57	3.01	318							
11		622.84	0.57	3.01	318							
12	15:08	627.60	0.55	2.93	318							

METRO VANCOUVER WTE - BURNABY B.C.

SOURCE: *Unit #2*
 PARAMETER / RUN NO: *Metals / Particulate - PM*
 DATE: *Aug. 14, 2001*
 OPERATOR: *AB*
 CONTROL UNIT: *AV15*
 Y: *1.0195*
 ΔH@: *1.775*
 BAROMETRIC PRESSURE, IN. Hg: *30.02*
 ASSUMED MOISTURE, Bw: *14%*

NOZZLE: *G-3072* DIAMETER, IN.: *0.3073*
 PROBE: *718* Cp: *0.8412*

POROSITY LENGTH
 STATIC PRESSURE, IN. H₂O: *-19.5"*
 STACK DIAMETER: *40.9"*
 STACK HEIGHT: *30.0'*

INITIAL LEAK TEST: *0.003 @ 15"*
 FINAL LEAK TEST: *0.004 @ 15"*

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F				Impinger Exit	Pump Vac. IN. Hg	Fyrites		TOTAL GAIN (mL)
					Dry Gas Outlet	Stack	Probe	Box			CO ₂ Vol. %	O ₂ Vol. %	
1	0835	628.054	0.59	3.72	295	295	282	239	62	5	11.0	8.7	
2	10	639.92	0.56	3.66	296	296	255	257	58	5			
3		647.66	0.47	2.44	303	303							
4	20	647.99	0.52	2.73	307	307							
5		646.53	0.51	2.67	305	305	251	253	55	6			
6	30	651.04	0.44	2.34	308	308							
7		655.24	0.37	1.64	304	304	247	250	54	5			
8	40	658.84	0.32	1.65	300	300							
9		662.39	0.32	1.70	302	302	250	250	55	5	11.0	8.0	
10	50	665.98	0.30	1.70	304	304							
11		669.49	0.29	1.55	296	296	251	249	59	5			
12	60	672.94	0.27	1.45	292	292							
1		680.94	0.52	2.81	291	291	250	249	56	5	11.5	7.8	
2	10	685.44	0.49	2.62	301	301							
3		689.28	0.36	1.92	302	302	250	250	57	5			
4	20	692.73	0.26	1.35	306	306							
5		695.68	0.26	1.38	306	306	251	252	52	5			
6	30	699.60	0.32	1.70	305	305							
7		704.95	0.64	3.47	302	302	252	250	55	6			
8	40	709.92	0.62	3.47	302	302							
9		714.92	0.62	3.47	299	299	250	250	52	7	12.0	7.1	
10	50	719.63	0.52	2.81	296	296							
11		724.16	0.47	2.66	292	292	248	246	55	7			
12	1037	728.60	0.47	2.56	284	284							

✓

16.45 5.64 Δt

CLIENT	MVRD	NOZZLE	MV01	DIAMETER, IN.	3.50	IMPINGING	INITIAL	FINAL	TOTAL GAIN
SOURCE	Unit #1	PROBE	TC	Qp	0.846	VOLUMES	(mL)	(mL)	(mL)
PARAMETER / RUN No	Unit #1	PORT LENGTH				Imp. #1	0	226	226
DATE	Aug 2/21	STATIC PRESSURE, IN. H2O	-19.50			Imp. #2	100	246	146
OPERATOR	AGC/C	STACK DIAMETER	10.9"			Imp. #3	100	124	24
CONTROL UNIT	FE-18	STACK HEIGHT	30.1"			Imp. #4	0	1	1
			Y 1.00 to ΔH@			Imp. #5	100	102	2
						Imp. #6	100	101	1
BAROMETRIC PRESSURE, IN. Hg	30.02	INITIAL LEAK TEST	0.002	0.15"		Upstream Diameters			
ASSUMED MOISTURE, Bw	1.52	FINAL LEAK TEST	0.002	0.15"		Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft ³	Pilot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F			Impinger Exit	Pump Vac. IN. Hg	Fyrites	
					Dry Gas Outlet	Stack	Probe			Box	CO ₂ Vol. %
1	11:45	887.100	1.00	1.00	10	10	250	68	8	10.0	10.0
2		890.97	1.00	1.00	10	10	250	66	8		
3		894.74	1.00	1.00	10	10	250	64	8		
4		898.51	1.00	1.00	10	10	250	60	8	10.5	10.0
5		902.28	1.00	1.00	10	10	250	58	10		
6		906.05	1.00	1.00	10	10	250	60	12	10.5	10.0
7		909.82	1.00	1.00	10	10	250	58	10		
8		913.59	1.00	1.00	10	10	250	57	10		
9		917.36	1.00	1.00	10	10	250	56	10	10.5	10.0
10		921.13	1.00	1.00	10	10	250	56	10		
11		924.90	1.00	1.00	10	10	250	54	10		
12		928.67	1.00	1.00	10	10	250	52	10	10.5	10.0
13	13:50	932.44	1.00	1.00	10	10	250				
14		936.21	1.00	1.00	10	10	250				
15		940.00	1.00	1.00	10	10	250				

CLIENT	NOZZLE	DIAMETER, IN.	IMPINGER, 'INITIAL	FINAL	TOTAL GAIN
MVRD	7C	3.50	(mL)	(mL)	
SOURCE	PROBE	Cp	VOLUMES		
			Imp. #1	148	48
			Imp. #2	228	128
			Imp. #3	142	42
			Imp. #4	12	12
			Imp. #5	4	4
			Imp. #6	2	2
			Upstream Diameters		
			Downstream Diameters		
PARAMETER / RUN No	PORT LENGTH				
DATE	STATIC PRESSURE, IN. H2O	19.50			
OPERATOR:	STACK DIAMETER	30.5			
CONTROL UNIT	STACK HEIGHT	30			
		Y 1.0040			
		ΔH@			
BAROMETRIC PRESSURE, IN. Hg	INITIAL LEAK TEST	0.005 @ 15"			
ASSUMED MOISTURE, Bw	FINAL LEAK TEST	0.002 @ 15"			

[illegible]

16.45 5.645H

A. Lanfranco and Associates Inc.

CLIENT		MURD		NOZZLE		DIAMETER, IN.		IMPINGER		INITIAL		FINAL		TOTAL GAIN	
SOURCE		Unit #1		PROBE		Cp		VOLUMES		(mL)		(mL)		(mL)	
PARAMETER / RUN NO		3 Metals/Partic		PORT LENGTH				Imp. #1						200	
DATE		Aug 18/21		STATIC PRESSURE, IN. H2O		-19.50		Imp. #2		100		224		124	
OPERATOR:		C.L.		STACK DIAMETER		20.9		Imp. #3		100		136		36	
CONTROL UNIT		PK 18 Y 1.0040		STACK HEIGHT		30.1		Imp. #4		0		14		14	
								Imp. #5		100		102		2	
								Imp. #6		100		102		2	
BAROMETRIC PRESSURE, IN. Hg		30.10		INITIAL LEAK TEST		0.002 @ 15"		Upstream Diameters							
ASSUMED MOISTURE, Bw		32		FINAL LEAK TEST		0.002 @ 15"		Downstream Diameters							

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature °F				Impinger Exit	Pump Vac. IN. Hg	Fyrites	
					Dry Gas Outlet	Stack	Probe	Box			CO ₂ Vol. %	O ₂ Vol. %
1	12:06	91.100	40	2.26	250	250	250	250	68	6	10.0	10.0
2		95.18	42	2.37	250	250	250	250	66	8		
3		99.36	45	2.71	250	250	250	250	66	8		
4		103.83	48	2.82	250	250	250	250	66	8		
5		108.39	50	2.93	250	250	250	250	66	8		
6		113.04	52	3.03	250	250	250	250	64	8	10.0	10.0
7		117.61	54	3.14	250	250	250	250	64	10		
8		122.37	57	3.24	250	250	250	250	64	10		
9		126.77	59	3.34	250	250	250	250	62	10		
10		131.10	61	3.44	250	250	250	250	62	10		
11		135.18	64	3.54	250	250	250	250	62	10		
12		139.02	67	3.64	250	250	250	250	62	10		
13		143.02	70	3.74	250	250	250	250	62	10		
14		146.57	73	3.84	250	250	250	250	62	10	10.0	10.0
15		150.33	76	3.94	250	250	250	250	60	8		
16		154.04	79	4.04	250	250	250	250	60	10		
17		157.54	82	4.14	250	250	250	250	60	10	10.0	10.0
18		161.50	85	4.24	250	250	250	250	60	10		
19		165.26	88	4.34	250	250	250	250	60	10		
20		169.07	91	4.44	250	250	250	250	60	10		
21		172.94	94	4.54	250	250	250	250	60	10		
22		176.52	97	4.64	250	250	250	250	60	10		
23		180.15	100	4.74	250	250	250	250	60	10		
24	14:08	183.45	104	4.84	250	250	250	250	60	10	10.0	10.0

G-280.

0.2797

CLIENT	Metco Vang - WTE		NOZZLE	DIAMETER, IN.	IMPINGER	INITIAL	FINAL	TOTAL GAIN					
SOURCE	Unit	3	PROBE	Cp	VOLUMES	(mL)	(mL)	(mL)					
PARAMETER / RUN No	CC 6+ - Run 1				Imp. #1	150	145						
DATE	Aug 16, 2021				Imp. #2	75	305						
OPERATOR	CA 52C				Imp. #3	75	80						
CONTROL UNIT	CAF AL1				Imp. #4	0	0						
	Y 0.9885				Imp. #5	621							
	ΔH@ 1.879				Imp. #6								
BAROMETRIC PRESSURE, IN. Hg	29.84				Upstream Diameters								
ASSUMED MOISTURE, Bw	10%				Downstream Diameters								
Point	Clock Time	Dry Gas Meter ft ³	Pilot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO ₂ Vol. %	O ₂ Vol. %	
1	1010	299.301	0.53	2.33	72	316	N/A	N/A	61	6			
2		303.48	0.56	2.25	73	318			57	6	10	10.3	
3		307.59	0.61	2.45	74	319			57	7			
4		311.86	0.55	2.22	76	318			58	7	10	10.0	
5		315.97	0.54	2.19	77	318			59	7			
6		320.03	0.57	2.07	77	317			59	7	9.7	10.5	
7		323.98	0.30	1.22	77	316			59	7			
8		327.01	0.27	1.10	77	315			59	7			
9		329.89	0.25	1.02	77	315			59	7			
10		332.66	0.23	0.93	77	315			59	7			
11		335.32	0.21	0.85	77	315			59	7			
12		337.86	0.21	0.86	78	315			59	7			
		340.40											
1		343.50	0.31	1.27	78	313	N/A	N/A	57	6			
2		346.69	0.33	1.35	79	315			55	6	10	10.2	
3		350.07	0.37	1.51	79	315			55	6			
4		353.41	0.36	1.47	79	315			55	6			
5		356.84	0.37	1.55	79	315			54	6	9.5	10.4	
6		360.22	0.37	1.51	79	316			54	8			
7		364.35	0.35	2.23	80	317			54	9			
8		368.55	0.57	2.32	80	318			55	9	10	10.0	
9		372.92	0.59	2.40	80	318			55	9			
10		377.05	0.58	2.36	81	317			55	9			
11		381.26	0.57	2.33	81	318							
12	1212	385.47	0.57	2.33	81	318							

Test

CLIENT	Metro Van W T F	NOZZLE	G280	DIAMETER, IN.	0.2797	IMPINGING	INITIAL	FINAL	TOTAL GAIN
SOURCE	Unit 3	PROBE	ALPARDI	Cp	0.8450	VOLUMES	(mL)	(mL)	(mL)
PARAMETER / RUN No	Ca64 - Run 2	PORT LENGTH				Imp. #1	159	148	
DATE	Aug 16, 2021	STATIC PRESSURE, IN. H2O	-18.9			Imp. #2	73	348	
OPERATOR	CAF JC	STACK DIAMETER				Imp. #3	75	108	
CONTROL UNIT	CAF A-1	STACK HEIGHT				Imp. #4	0	0	
	Y 0.9895					Imp. #5	0.1	0	
	ΔH@ 1.079					Imp. #6			
BAROMETRIC PRESSURE, IN. Hg	29.84	INITIAL LEAK TEST	0.0090 @ 15"			Upstream Diameters			
ASSUMED MOISTURE, Bw	14.0%	FINAL LEAK TEST	0.0070 @ 15"			Downstream Diameters			

A. Lanfranco and Associates Inc.

ML

A. Lanfranco and Associates Inc.

Client ML Corbanta Y LMU-D(1.0133)
 Source Unit #1 Cp
 Parameter HF Pbar 30.1 Static
 Date 10-AUG-2021 Operator Michael Leach

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. H₂O		
			DGM Outlet	Stack		R1	R2	R3
1	0930	038.6660	72	-	200			
	1050	030.9630	72	-	304			
2	1104	030.2760	95	-	200			
	1204	031.7812	104	-	354			
3	1217	031.7920	97	-	200			
	1317	033.3811	106	-	337			

Client ML Corbanta Y LMU-D(1.0133)
 Source Unit #2 Cp
 Parameter HF Pbar 30.8 Static
 Date 11-AUG-2021 Operator Michael Leach

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. H₂O		
			DGM Outlet	Stack		R1	R2	R3
1	0900	033.6076	70	-	200			
	1000	035.2990	92	-	414			
2	1014	035.3124	83	-	200			
	1114	036.8320	91	-	340			
3	1149	036.8492	90	-	200			
	1249	038.1818	95	-	983			

ML

A. Lanfranco and Associates Inc.

Client MV COVANTA Y LMU-D(1.0135)
 Source Unit #3 Cp
 Parameter HIF Pbar 29.99 Static
 Date 12-AUG-21 Operator Michael Woods

Client _____ Y _____
 Source _____ Cp _____
 Parameter _____ Pbar _____ Static _____
 Date _____ Operator _____

Leak Check	Run 1	Run 2	Run 3
Initial	0.0001	0.0001	0.0001
Final	0.0001	0.0002	0.0001

Leak Check	Run 1	Run 2	Run 3
Initial			
Final			

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m ³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	0846	038.1970	72	-	200			
	0946	039.0650	97	-	305			
2	1000	039.0706	97	-	200			
	1100	039.8786	104	-	260			
3	1153	039.8956	92	-	200			
	1253	040.8278	107	-	312			

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m ³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1								
2								
3								

Paused
1010
Resumed
10:47

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

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: **7-Jul-21**
Barometric Pressure: **29.92** (in. Hg)
Theoretical Critical Vacuum: **14.11** (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)
3.65	18.00	906.300	925.290	18.990	76.0	76.0	77.0	77.0	73	0.8185	17.0	75.0	72.0	73.5
1.95	15.00	925.600	937.072	11.472	77.0	77.0	77.0	77.0	63	0.5956	20.0	77.0	78.0	77.5
1.20	20.00	937.400	949.355	11.955	77.0	77.0	77.0	77.0	55	0.4606	21.5	74.0	79.0	76.5
0.63	21.00	949.500	959.075	9.575	77.0	77.0	77.0	77.0	48	0.3560	23.0	78.0	79.0	78.5
0.30	18.00	959.200	964.825	5.625	77.0	77.0	77.0	77.0	40	0.2408	24.0	78.0	80.0	79.0

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)	CALIBRATION FACTOR dH@ Value (in H2O)	CALIBRATION FACTOR dH@ Value (mm H2O)	CALIBRATION FACTOR dH@ Variation (in H2O)	CALIBRATION FACTOR dH@ Ko (value)				
18.849	533.8	19.085	540.5	19.291	1.012	-0.002	1.797	45.65	0.023	0.715				
11.329	320.8	11.530	326.5	11.742	1.018	0.003	1.825	46.36	0.051	0.707				
11.785	333.7	11.900	337.0	12.096	1.010	-0.005	1.875	47.62	0.100	0.704				
9.425	266.9	9.639	273.0	9.835	1.023	0.008	1.654	42.01	-0.121	0.741				
5.533	156.7	5.586	158.2	5.705	1.010	-0.005	1.723	43.76	-0.052	0.735				
Average Y----->					1.0145	Average dH@----->	1.775	45.1	Average Ko----->	0.720				

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: Scott Ferguson

Signature:



Date: July 7, 2021

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: 29-Jun-21
Barometric Pressure: 29.63 (in. Hg)
Theoretical Critical Vacuum: 13.98 (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	30.00	554.900	587.654	32.754	86.0	86.0	88.0	88.0	73	0.8185	18.0	81.0	93.0	87.0
1.90	31.00	588.300	612.913	24.613	88.0	88.0	90.0	90.0	63	0.5956	20.5	91.0	86.0	88.5
1.20	24.00	613.200	628.140	14.940	90.0	90.0	91.0	91.0	55	0.4606	22.0	89.0	90.0	89.5
0.68	41.00	628.400	647.782	19.382	91.0	91.0	91.0	91.0	48	0.3560	24.0	92.0	92.0	92.0
0.35	29.00	648.000	657.411	9.411	91.0	91.0	91.0	91.0	40	0.2408	25.0	95.0	93.0	94.0

***** 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)	Y Variation (number)	dH@							
						Value (in H2O)	Variation (mm H2O)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)				Ko (value)	
31.589	894.6		31.108	881.0	32.556	0.985	-0.004	1.875	47.63	-0.003				0.701	
23.543	666.7		23.359	661.5	24.514	0.992	0.004	1.793	45.53	-0.086				0.713	
14.227	402.9		13.973	395.7	14.690	0.982	-0.006	1.891	48.04	0.013				0.702	
18.417	521.6		18.408	521.3	19.440	1.000	0.011	1.801	45.74	-0.078				0.708	
8.935	253.0		8.791	249.0	9.318	0.984	-0.005	2.033	51.64	0.154				0.677	
Average Y----->						0.9885		Average dH@----->		1.879		47.7	Average Ko----->		0.700

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: Scott Ferguson

Signature:



Date: June 29, 2021

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: 29-Jun-21
Barometric Pressure: 29.63 (in. Hg)
Theoretical Critical Vacuum: 13.98 (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)	
3.65	15.00	134.000	150.350	16.350	86.0	86.0	86.0	86.0	73	0.8185	16.0	86.0	85.0	85.5	
1.85	15.00	151.000	162.784	11.784	86.0	86.0	87.0	87.0	63	0.5956	19.0	87.0	89.0	88.0	
1.20	17.00	163.700	174.165	10.465	87.0	87.0	89.0	89.0	55	0.4606	20.0	89.0	98.0	93.5	
0.64	16.00	174.600	182.105	7.505	89.0	89.0	90.0	90.0	48	0.3560	21.5	94.0	99.0	96.5	
0.34	21.00	182.300	189.085	6.785	90.0	90.0	91.0	91.0	40	0.2408	23.0	92.0	94.0	93.0	

***** RESULTS *****

--- DRY GAS METER ---				----- ORIFICE -----		-- DRY GAS METER --				----- ORIFICE -----				
VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL		CALIBRATION FACTOR		CALIBRATION FACTOR		dH@		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)		Value (in H2O)	Ko (value)	
15.793	447.3	15.576	441.1	16.256		0.986	-0.006	1.824	46.32	-0.012		1.824	0.712	
11.322	320.6	11.308	320.2	11.856		0.999	0.007	1.752	44.50	-0.083		1.752	0.719	
10.011	283.5	9.862	279.3	10.443		0.985	-0.007	1.914	48.61	0.079		1.914	0.698	
7.150	202.5	7.154	202.6	7.617		1.001	0.009	1.713	43.52	-0.122		1.713	0.727	
6.447	182.6	6.372	180.4	6.741		0.988	-0.004	1.973	50.12	0.138		1.973	0.686	
Average Y----->						0.9918		Average dH@---->		1.835		46.6	Average Ko---->	0.709

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: Scott Ferguson

Signature:



Date: June 29, 2021

A.Lanfranco & Associates inc.

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

Model #: FE 18
Serial #: 0028-020118-1

Date: 28-Jun-21
Barometric Pressure: 29.65 (in. Hg)
Theoretical Critical Vacuum: 13.99 (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 (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	15.00	635.100	651.301	16.201	84.0	84.0	84.0	84.0	73	0.8185	16.0	80.0	83.0	81.5
1.90	25.00	661.800	681.051	19.251	85.0	85.0	88.0	88.0	63	0.5956	17.0	90.0	90.0	90.0
1.20	15.00	652.000	661.148	9.148	84.0	84.0	86.0	86.0	55	0.4606	18.0	85.0	85.0	85.0
0.70	15.00	681.500	688.480	6.980	89.0	89.0	89.0	89.0	48	0.3560	20.0	89.0	91.0	90.0
0.34	17.00	688.600	694.022	5.422	89.0	89.0	89.0	89.0	40	0.2408	21.5	91.0	96.0	93.5

***** 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)		
15.721	445.2		15.644	443.0	16.196	0.995	-0.009		1.865	47.38	-0.014	0.707		
18.511	524.2		18.825	533.1	19.796	1.017	0.013		1.805	45.84	-0.074	0.705		
8.805	249.4		8.775	248.5	9.144	0.997	-0.007		1.894	48.10	0.015	0.703		
6.661	188.6		6.751	191.2	7.099	1.014	0.010		1.852	47.05	-0.027	0.699		
5.170	146.4		5.159	146.1	5.460	0.998	-0.006		1.979	50.27	0.100	0.687		
Average Y----->						1.0040		Average dH@----->	1.879	47.7		Average Ko----->	0.700	

TEMPERATURE CALIBRATION				
Calibration Standard ----->		Omega Model CL23A S/N:T-218768		
Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Variation (deg F)	Results Percent of Absolute	
32	32	0	0.00%	
100	100	0	0.00%	
300	300	0	0.00%	
500	500	0	0.00%	
1000	1000	0	0.00%	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 dm 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: Scott Ferguson

Signature: 

Date: June 28, 2021

A. Lanfranco & Associates inc.

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

Model #: **LMU-D**
Serial #: **Wizit 4618**

Date: **05-Jul-21**
Barometric Pressure: **29.94** (in. Hg)
Theoretical Critical Vacuum: **14.12** (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 (m ³)	Volume Final (m ³)	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	26.00	26.990	27.327	11.901	77.0	77.0	78.0	78.0	48	0.3560	20.0	86.0	86.0	86.0
0.00	15.00	27.330	27.525	6.886	78.0	78.0	78.0	78.0	48	0.3560	20.0	86.0	87.0	86.5
0.00	21.00	27.530	27.803	9.641	79.0	79.0	80.0	80.0	48	0.3560	20.0	87.0	87.0	87.0

***** RESULTS *****										
--- DRY GAS METER ---		----- ORIFICE -----			-- DRY GAS METER --		----- ORIFICE -----			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
					Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	
11.694	331.2	11.860	335.9	12.261	1.014	0.001	0.000	0.00	0.000	
6.760	191.4	6.839	193.7	7.077	1.012	-0.002	0.000	0.00	0.000	
9.438	267.3	9.570	271.0	9.912	1.014	0.001	0.000	0.00	0.000	
Average Y----->					1.0133	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: Scott Ferguson

Signature: 

Date: July 5, 2021

Pitot Tube Calibration

Date: 07-Jul-21
Pbar (in.Hg): 29.92

Temp (R): 530
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	15.5	0.8478	0.0017
0.125	0.170	23.4	0.8489	0.0028
0.250	0.340	33.1	0.8489	0.0028
0.450	0.620	44.4	0.8434	0.0027
0.650	0.900	53.4	0.8413	0.0047
Average :			0.8461	0.0030

Pitot ID: **ST 8A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.085	0.115	19.3	0.8511	0.0078
0.120	0.165	22.9	0.8443	0.0010
0.175	0.240	27.7	0.8454	0.0021
0.430	0.600	43.4	0.8381	0.0052
0.680	0.950	54.6	0.8376	0.0057
Average :			0.8433	0.0044

Pitot ID: **7A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.050	0.070	14.8	0.8367	0.0045
0.125	0.170	23.4	0.8489	0.0078
0.300	0.420	36.3	0.8367	0.0045
0.490	0.680	46.3	0.8404	0.0008
0.660	0.910	53.8	0.8431	0.0019
Average :			0.8412	0.0039

Pitot ID: **ST 8B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.040	0.055	13.2	0.8443	0.0037
0.105	0.145	21.5	0.8425	0.0019
0.150	0.210	25.6	0.8367	0.0039
0.330	0.450	38.0	0.8478	0.0072
0.480	0.680	45.9	0.8318	0.0088
Average :			0.8406	0.0051

Pitot ID: **AL GVRD 1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.040	0.055	13.2	0.8443	0.0007
0.125	0.170	23.4	0.8489	0.0039
0.250	0.340	33.1	0.8489	0.0039
0.360	0.500	39.7	0.8400	0.0050
0.580	0.800	50.4	0.8430	0.0021
Average :			0.8450	0.0031

Pitot ID: **ST 8C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.065	0.090	16.9	0.8413	0.0027
0.150	0.210	25.6	0.8367	0.0019
0.270	0.370	34.4	0.8457	0.0071
0.465	0.650	45.1	0.8373	0.0013
0.650	0.920	53.4	0.8321	0.0065
Average :			0.8386	0.0039

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	13.2	0.8443	0.0019
0.130	0.180	23.9	0.8413	0.0048
0.250	0.345	33.1	0.8427	0.0034
0.450	0.620	44.4	0.8434	0.0027
0.670	0.890	54.2	0.8590	0.0128
Average :			0.8461	0.0051

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: Michael Goods

Signature: 

Date:

July 7, 2021

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Justin Ching
Date: June 28, 2021

Signature: 

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft ²)
A	0.1250	0.1240	0.1245	0.0010	0.1245	0.0000845
G-165	0.1640	0.1655	0.1660	0.0020	0.1652	0.0001488
G-178	0.1780	0.1780	0.1790	0.0010	0.1783	0.0001735
J	0.1880	0.1880	0.1880	0.0000	0.1880	0.0001928
E	0.1880	0.1895	0.1882	0.0015	0.1886	0.0001939
Q	0.2070	0.2050	0.2060	0.0020	0.2060	0.0002315
L	0.2112	0.2120	0.2105	0.0015	0.2112	0.0002434
G-218	0.2180	0.2175	0.2190	0.0015	0.2182	0.0002596
G-223	0.2220	0.2230	0.2225	0.0010	0.2225	0.0002700
G-2231	0.2230	0.2230	0.2225	0.0005	0.2228	0.0002708
G-225	0.2245	0.2250	0.2240	0.0010	0.2245	0.0002749
G-2251	0.2230	0.2260	0.2245	0.0030	0.2245	0.0002749
P-18	0.2375	0.2370	0.2380	0.0010	0.2375	0.0003076
G-245	0.2440	0.2450	0.2450	0.0010	0.2447	0.0003265
G-247	0.2450	0.2470	0.2470	0.0020	0.2463	0.0003310
G-253	0.2525	0.2520	0.2525	0.0005	0.2523	0.0003473
P	0.2580	0.2570	0.2575	0.0010	0.2575	0.0003616
P-2	0.2787	0.2790	0.2785	0.0005	0.2787	0.0004237
G-280	0.2780	0.2800	0.2810	0.0030	0.2797	0.0004266
G-282	0.2810	0.2820	0.2840	0.0030	0.2823	0.0004348
G-287	0.2870	0.2880	0.2860	0.0020	0.2870	0.0004493
G-292	0.2922	0.2920	0.2926	0.0006	0.2923	0.0004659
G-304	0.3040	0.3050	0.3040	0.0010	0.3043	0.0005052
MV-01	0.3050	0.3045	0.3055	0.0010	0.3050	0.0005074
G-3072	0.3070	0.3070	0.3080	0.0010	0.3073	0.0005152
G-309	0.3110	0.3080	0.3080	0.0030	0.3090	0.0005208
G-310	0.3090	0.3105	0.3095	0.0015	0.3097	0.0005230
G-311	0.3120	0.3100	0.3110	0.0020	0.3110	0.0005275
G-316	0.3160	0.3160	0.3170	0.0010	0.3163	0.0005458
V-06	0.3200	0.3210	0.3210	0.0010	0.3207	0.0005608
P-27	0.3387	0.3385	0.3390	0.0005	0.3387	0.0006258
G-344	0.3440	0.3450	0.3440	0.0010	0.3443	0.0006467
G-345	0.3450	0.3450	0.3450	0.0000	0.3450	0.0006492
G-346	0.3450	0.3460	0.3460	0.0010	0.3457	0.0006517
G-366	0.3650	0.3670	0.3650	0.0020	0.3657	0.0007293
G-367	0.3675	0.3650	0.3670	0.0025	0.3665	0.0007326
P-14	0.3910	0.3935	0.3920	0.0025	0.3922	0.0008388
G-437	0.4350	0.4345	0.4355	0.0010	0.4350	0.0010321
G-468	0.4677	0.4670	0.4670	0.0007	0.4672	0.0011907
P-29	0.4680	0.4680	0.4690	0.0010	0.4683	0.0011963
P-7	0.4965	0.4940	0.4930	0.0035	0.4945	0.0013337
B	0.5015	0.5030	0.5025	0.0015	0.5023	0.0013763
G-540	0.5405	0.5400	0.5405	0.0005	0.5403	0.0015924

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

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	29-Jun-21	100.7	29.74	29.61	29.68	0.06
DS	29-Jun-21	100.7	29.74	29.62	29.69	0.05
CL	29-Jun-21	100.7	29.74	29.63	29.70	0.04
ML	29-Jun-21	100.7	29.74	29.60	29.67	0.07
SB	29-Jun-21	100.7	29.74	29.62	29.69	0.05
SH	29-Jun-21	100.7	29.74	29.60	29.67	0.07
MG	29-Jun-21	100.7	29.74	29.65	29.72	0.02
SF	29-Jun-21	100.7	29.74	29.60	29.67	0.07
JG	29-Jun-21	100.7	29.74	29.65	29.72	0.02
JC	29-Jun-21	100.7	29.74	29.62	29.69	0.05
LF		101.8	30.07	30.08	30.15	-0.09

Calibrated by: Jeremy Gibbs

Signature:



Date:

29-Jun-21

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

TEMPERATURE CALIBRATION FORM

Signature:

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	32.3	0.06%	99.3	-0.13%	200	0.00%	301	0.13%	498	-0.21%	798	-0.16%	1698	-0.09%
Omega HH11A	4	200167		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
Omega HH11A	6	600059	33.1	0.22%	100	0.00%	202	0.30%	302	0.26%	499	-0.10%	798	-0.16%	1697	-0.14%
TPI 341K	7	2.0315E+10	30.5	-0.31%	98.3	-0.30%	198.1	-0.29%	298	-0.26%	497	-0.31%	796.4	-0.29%	1693	-0.32%
TPI 341K	8	2.0313E+10	32.1	0.02%	99.3	-0.13%	200.5	0.08%	299.9	-0.01%	499.3	-0.07%	798.7	-0.10%	1696	-0.19%
Cont Cmpny	10	102008464	30.2	-0.37%	97.5	-0.45%	197.8	-0.33%	297.7	-0.30%	497.7	-0.24%	795.9	-0.33%	1693.8	-0.29%
Omega HH11	14	409426		-6.51%		-17.87%		-30.32%		-39.49%		-52.10%		-63.51%		-78.72%
TPI 341K	16	400120029	30.7	-0.26%	99	-0.18%	199.4	-0.09%	299.2	-0.11%	499.6	-0.04%	800.2	0.02%	1703	0.14%
TPI 341K	18	2.0329E+10	31	-0.20%	98.9	-0.20%	198.9	-0.17%	298.7	-0.17%	498.5	-0.16%	798.4	-0.13%	1698	-0.09%
TPI 341K	20	2.0329E+10	30	-0.41%	98.2	-0.32%	198.1	-0.29%	297.7	-0.30%	497.2	-0.29%	797.1	-0.23%	1696	-0.19%
TPI 341K	22	2.0329E+10	30.5	-0.31%	98.6	-0.25%	198.5	-0.23%	298.3	-0.22%	497.7	-0.24%	797.4	-0.21%	1696	-0.19%
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-Aug-21
Calibrated by: Louis Agassiz
Authorizing Signature: 

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

Ambient Conditions: Temperature: 25 °C Barometric Pressure: 101.42 kPa Relative Humidity: 62%
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	0.6	0.60	Pass		0.3	0.30	Pass		0
O ₂	11.5	0.50	Pass		11.5	0.50	Pass		11.00
Ambient	20.9	0.05	Pass		21.0	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	0	0.0%	Pass		0	0.0%	Pass		0
1 Gas	500	6.0%	Fail	Recalibrated w 2, 3, and 4 gas	472	0.1%	Pass		472
2 Gas	1785	6.4%	Fail		1910	0.2%	Pass		1907
3 Gas	1000	0.5%	Pass		995	0.0%	Pass		995
4 Gas	267	11.1%	Fail		240	0.1%	Pass		240

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	452	4.5%	Pass	Recalibrated w 2 and 3 gas	473	0.1%	Pass		473
2 Gas	104	3.6%	Pass		100	0.4%	Pass		100.4
3 Gas	253	0.8%	Pass		255	0.0%	Pass		255
4 Gas	49	7.4%	Fail		46	0.8%	Pass		45.64

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

NIST Traceable Calibration Gases:

Cylinder	Cylinder ID Number	Certification Date	Expiration Date	Cylinder Pressure (PSI)	O ₂ (Vol. %)	CO (ppm)	NO (ppm)
Zero Gas (N ₂)	2735278Y	27-Jul-2020	26-Jul-2025	1000	0	0	0
1 Gas	SG9107852B	6-May-2021	5-May-2024	1780	-	471.5	473.4
2 Gas	XC004912B	10-Jun-2021	11-Jun-2029	1900	-	1907	100.4
3 Gas	DT0017994	10-Mar-2017	10-Mar-2025	300	-	995	255
4 Gas	CC428385	7-Apr-2021	8-Apr-2029	1600	-	240.3	45.64
O ₂ /CO ₂	SX30844	16-Mar-2021	17-Mar-2029	1400	11.00	-	-

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



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

Shawn Harrington

has met the requirements of

Stack Testing for Pollutants
(CHSC 7760)

School of Process, Energy and Natural Resources
Chemical Sciences Program

Endorsed by:

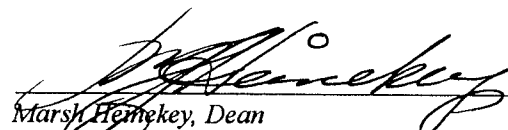


Environment
Canada

Environnement
Canada



Province of
British Columbia
Ministry of
Environment,
Lands and Parks


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

JUNE 21, 2001
Dated



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

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.

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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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Declaration

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

Select one of the following:

- ☒ Absence from conflict of interest

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

Mr. Sajid Barlas

, erring on the side of caution.



☐ Real or perceived conflict of interest

Description and nature of conflict(s):

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

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Signature:

x Shawn Harrington

Print name: Shawn Harrington

Date: Dec. 16, 2020

Witnessed by:

x Mark Lanfranco

Print name: Mark Lanfranco

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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:

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: _____

Carter Lanfanco

Witnessed by: _____

X

Print Name: _____

Shawn Harrington

Date signed: _____

Dec. 7/2020

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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 *Louis Agassiz*

Print Name: Louis Agassiz

Date signed: November 23, 2020

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



Declaration of Competency

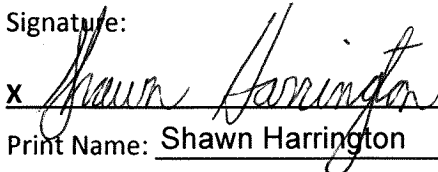
The Ministry of Environment and Climate Change Strategy relies on the work, advice, recommendations and in some cases decision making of qualified professionals¹, under government's professional reliance regime. With this comes an assumption that professionals who undertake work in relation to ministry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

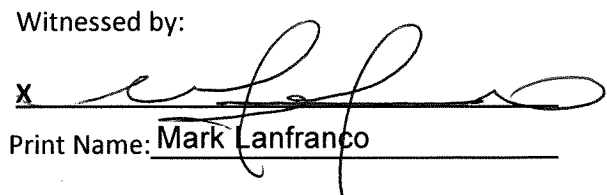
1. Name of Qualified Professional Shawn Harrington
Title Senior Environmental Technician /Project manager
2. Are you a registered member of a professional association in B.C.? ☐ Yes ☒ No
Name of Association: _____ Registration # _____
3. Brief description of professional services:
Environmental consulting ,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: 
Print Name: Shawn Harrington

Witnessed by: 
Print Name: Mark Lanfranco

Date signed: November 26, 2020

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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

