A.Lanfranco & Associates Inc.
Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III
4515 Central Boulevard
Burnaby, BC V5H 0C6

WASTE-TO-ENERGY FACILITY

Appendices of Emissions Testing Report July and September 2022 Survey

Third Quarter 2022

Table of Contents

APPENDIX – A

QUALITY ASSURANCE / QUALITY CONTROL RESULTS

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

Administration:

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

Preparation:

- All glassware cleaned
- Blank samples of reagents collected.

Testing:

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

Analysis:

- Trace Metals and Mercury analysis conducted at Element Labs, Surrey, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N_2O) analysis conducted with portable analyzer by A. Lanfranco and Associates.
- Particulate analysis conducted at A. Lanfranco and Associates Inc., Surrey, BC.
- Chain of Custody protocols followed for all samples.
- Acceptable blank values for all sample types. All samples blank corrected.

Sample Type	**Blank Value**		
Third Quarter 2022	**Unit 1**	**Unit 2**	**Unit 3**
Filter	0.3 mg	0.1 mg	0.4 mg
Front Half Washings	-0.9 mg	-0.6 mg	0.4 mg
Mercury Front	<0.02 ug	<0.02 ug	<0.02 ug
Mercury Back	<0.21 ug	<0.28 ug	<0.17 ug
Trace Metals Front *	<43.7 ug	<60.7 ug	<54.7 ug
Trace Metals Back*	<34.0 ug	<33.8 ug	<43.6 ug
Ammonia	81.1 ug	8.10 ug	52.2 ug
Fluoride	<5.0 ug	<5.0 ug	<5.0 ug

APPENDIX - B

LABORATORY RESULTS

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Report Transmission Cover Page

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: **1589876**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774284

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 Deliverables	PDF	COC / Test Report
Email - Multiple Deliverables By	PDF	COA
Email - Single Deliverable	PDF	COR

Notes To Clients:

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Analytical Report

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Company:

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

Lot ID: **1589876**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774284

Reference Number	1589876-1	1589876-2
Sample Date	Jul 18, 2022	Jul 18, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	Reagent Blank Unit 1 Container 1 (filter)	Reagent Blank Unit 2 Container 1 (filter)
Matrix	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	8	<5		5
Antimony		µg	<2	<2		2.5
Arsenic		µg	<1	<1		1
Cadmium		µg	<0.3	0.3		0.25
Chromium		µg	0.44	1.5		0.2
Cobalt		µg	<0.3	<0.3		0.25
Copper		µg	1	0.8		0.25
Lead		µg	4.3	<2		1.5
Manganese		µg	0.5	<0.3		0.25
Nickel		µg	1	1.0		0.5
Phosphorus		µg	30	28		2.5
Selenium		µg	2	<2		1.5
Tellurium		µg	5.1	<2		2
Thallium		µg	3.7	2.8		1.5
Vanadium		µg	<1	<1		1
Zinc		µg	2.6	1		0.5
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05		0.05
Dilution Factor	As Tested		1	1		
Volume	Sample	mL	250	250		
Volume	aliquot volume	mL	25	25		
Volume	Final	mL	40	40		
Mercury	Fraction 1B	µg/sample	<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.

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Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 11, 2022	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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Results relate only to samples as submitted.

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

Lot ID: **1599356**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787726

Contact	Company	Address
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Delivery	Format	Deliverables
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Proj. Acct. code:

Lot ID: **1599356**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787726

Reference Number	1599356-1
Sample Date	Sep 06, 2022
Sample Time	NA
Sample Location	
Sample Description	Reagent Blank Unit 3 Container 1 (filter) / 21.2°C
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	20			5
Antimony		µg	<2			2.5
Arsenic		µg	<1			1
Cadmium		µg	<0.3			0.25
Chromium		µg	<0.2			0.2
Cobalt		µg	<0.3			0.25
Copper		µg	1			0.25
Lead		µg	<2			1.5
Manganese		µg	6.1			0.25
Nickel		µg	<0.5			0.5
Phosphorus		µg	29			2.5
Selenium		µg	2			1.5
Tellurium		µg	<2			2
Thallium		µg	<2			1.5
Vanadium		µg	<1			1
Zinc		µg	2.8			0.5
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05			0.05
Dilution Factor	As Tested		1			
Volume	Sample	mL	250			
Volume	aliquot volume	mL	25			
Volume	Final	mL	40			
Mercury	Fraction 1B	µg/sample	<0.02			

Approved by:

Abhishek Suryawanshi
Operations Manager

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Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1599356**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787726

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Sep 15, 2022	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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Company:

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

Lot ID: **1589869**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774278

Contact	Company	Address
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Email - Single Deliverable	PDF	COR

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V4N 4W7
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Company:

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

Lot ID: **1589869**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774278

Reference Number	1589869-1	1589869-2	
Sample Date	Jul 18, 2022	Jul 18, 2022	
Sample Time	NA	NA	
Sample Location			
Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	
Matrix	Stack Samples	Stack Samples	

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	44	<5		5
Antimony		µg	<2	<2		2.5
Arsenic		µg	<1	<1		1
Cadmium		µg	<0.3	<0.3		0.25
Chromium		µg	0.48	1.3		0.2
Cobalt		µg	<0.3	<0.3		0.25
Copper		µg	2	<0.3		0.25
Lead		µg	2	<2		1.5
Manganese		µg	<0.3	<0.3		0.25
Nickel		µg	<0.5	<0.5		0.5
Phosphorus		µg	<2	<2		2.5
Selenium		µg	<2	<2		1.5
Tellurium		µg	3.6	<2		2
Thallium		µg	<2	2.6		1.5
Vanadium		µg	<1	<1		1
Zinc		µg	2.9	1		0.5
Back Half Metals Fraction 2A						
Aluminum		µg	<5	<5		5
Antimony		µg	<3	<3		2.5
Arsenic		µg	5.0	<1		1
Cadmium		µg	<0.3	<0.3		0.25
Chromium		µg	<0.2	<0.2		0.2
Cobalt		µg	<0.3	0.3		0.25
Copper		µg	4.3	4.7		0.25
Lead		µg	3.5	2		1.5
Manganese		µg	<0.3	0.3		0.25
Nickel		µg	<0.5	<0.5		0.5
Phosphorus		µg	30	20		2.5
Selenium		µg	<2	<2		1.5
Tellurium		µg	<2	<2		2
Thallium		µg	<2	<2		1.5
Vanadium		µg	<1	<1		1
Zinc		µg	2	1		0.5
Volume	Sample	mL	220	220		
Volume	aliquot volume	mL	170	170		
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05		0.05
Dilution Factor	As Tested		1	1		
Volume	Sample	mL	250	250		

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Analytical Report

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Attn: Missy
Sampled By:
Company:

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

Lot ID: **1589869**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774278

Reference Number	1589869-1	1589869-2
Sample Date	Jul 18, 2022	Jul 18, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2
Matrix	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Volume	aliquot volume	mL	25	25		
Volume	Final	mL	40	40		
Mercury	Fraction 1B	µg/sample	<0.02	<0.02		
Mercury	As Tested	µg/L	<0.05	<0.05		0.05
Dilution Factor	As Tested		1	1		
Volume	Sample	mL	220	220		
Volume	aliquot volume	mL	5.0	5.0		
Volume	Final	mL	50	50		
Mercury	Fraction 2B	µg/sample	<0.1	<0.1		
Mercury	As Tested	µg/L	<0.05	<0.05		0.05
Dilution Factor	As Tested		1	1		
Volume	Sample	mL	100	105		
Volume	aliquot volume	mL	25	25		
Volume	Final	mL	40	40		
Mercury	Fraction 3A	µg/sample	<0.008	<0.008		
Mercury	As Tested	µg/L	<0.05	<0.05		0.05
Dilution Factor	As Tested		1	1		
Volume	Sample	mL	500	500		
Volume	aliquot volume	mL	25	25		
Volume	Final	mL	40	40		
Mercury	Fraction 3B	µg/sample	<0.04	<0.04		
Mercury	As Tested	µg/L	<0.05	0.12		0.05
Dilution Factor	As Tested		1	1		
Volume	Sample	mL	200	200		
Volume	aliquot volume	mL	25	25		
Volume	Final	mL	40	40		
Mercury	Fraction 3C	µg/sample	<0.02	0.037		

Approved by:

Max Hewitt
Operations Manager

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Lot ID: **1589869**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774278

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 22, 2022	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 22, 2022	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 11, 2022	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 11, 2022	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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

Lot ID: **1599363**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787734

Contact	Company	Address
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Lot ID: **1599363**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787734

Reference Number	1599363-1
Sample Date	Sep 06, 2022
Sample Time	NA
Sample Location	
Sample Description	Reagent Blank Unit 3 / 21.2°C
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	30			5
Antimony		µg	<2			2.5
Arsenic		µg	<1			1
Cadmium		µg	<0.3			0.25
Chromium		µg	<0.2			0.2
Cobalt		µg	<0.3			0.25
Copper		µg	2			0.25
Lead		µg	<2			1.5
Manganese		µg	<0.3			0.25
Nickel		µg	1			0.5
Phosphorus		µg	<2			2.5
Selenium		µg	7.5			1.5
Tellurium		µg	<2			2
Thallium		µg	<2			1.5
Vanadium		µg	<1			1
Zinc		µg	3.0			0.5
Back Half Metals Fraction 2A						
Aluminum		µg	8			5
Antimony		µg	<3			2.5
Arsenic		µg	4.3			1
Cadmium		µg	<0.3			0.25
Chromium		µg	<0.2			0.2
Cobalt		µg	0.4			0.25
Copper		µg	<0.3			0.25
Lead		µg	<2			1.5
Manganese		µg	0.5			0.25
Nickel		µg	<0.5			0.5
Phosphorus		µg	20			2.5
Selenium		µg	<2			1.5
Tellurium		µg	4.1			2
Thallium		µg	<2			1.5
Vanadium		µg	<1			1
Zinc		µg	2			0.5
Volume	Sample	mL	210			
Volume	aliquot volume	mL	160			
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05			0.05
Dilution Factor	As Tested		1			

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Sample Date	Sep 06, 2022
Sample Time	NA
Sample Location	
Sample Description	Reagent Blank Unit 3 / 21.2°C
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Volume	Sample	mL	250			
Volume	aliquot volume	mL	25			
Volume	Final	mL	40			
Mercury	Fraction 1B	µg/sample	<0.02			
Mercury	As Tested	µg/L	<0.05			0.05
Dilution Factor	As Tested		1			
Volume	Sample	mL	210			
Volume	aliquot volume	mL	5.0			
Volume	Final	mL	45			
Mercury	Fraction 2B	µg/sample	<0.09			
Mercury	As Tested	µg/L	<0.05			0.05
Dilution Factor	As Tested		1			
Volume	Sample	mL	100			
Volume	aliquot volume	mL	25			
Volume	Final	mL	40			
Mercury	Fraction 3A	µg/sample	<0.008			
Mercury	As Tested	µg/L	<0.05			0.05
Dilution Factor	As Tested		1			
Volume	Sample	mL	500			
Volume	aliquot volume	mL	25			
Volume	Final	mL	40			
Mercury	Fraction 3B	µg/sample	<0.04			
Mercury	As Tested	µg/L	0.06			0.05
Dilution Factor	As Tested		1			
Volume	Sample	mL	200			
Volume	aliquot volume	mL	25			
Volume	Final	mL	40			
Mercury	Fraction 3C	µg/sample	0.02			

Approved by:

Abhishek Suryawanshi
Operations Manager

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

Bill To: A. Lanfranco & Associates
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Attn: Missy
Sampled By:
Company:

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

Lot ID: **1599363**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787734

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 4, 2022	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 4, 2022	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Sep 15, 2022	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Sep 15, 2022	Element Vancouver

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA

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Report Transmission Cover Page

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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: **1589843**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774292

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
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Email - Single Deliverable	PDF	COR

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Analytical Report

Bill To: A. Lanfranco & Associates
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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: **1589843**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774292

Reference Number	1589843-1	1589843-2	1589843-3
Sample Date	Jul 28, 2022	Jul 29, 2022	Jul 29, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 1 Run 1 (Unit 1 R-1 + 4 Bottles)	Unit 1 Run 2 (MV Unit 1 R-2 +4 Bottles)	Unit 1 Run 3 (MV Unit 1 R-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	7	20	10	5
Antimony		µg	<2	3	<2	2.5
Arsenic		µg	<1	<1	<1	1
Cadmium		µg	<0.3	<0.3	<0.3	0.25
Chromium		µg	3.99	1.9	3.13	0.2
Cobalt		µg	<0.3	<0.3	<0.3	0.25
Copper		µg	2	4.1	3.1	0.25
Lead		µg	4.1	3.7	<2	1.5
Manganese		µg	2	0.9	2	0.25
Nickel		µg	6.2	3.1	6.4	0.5
Phosphorus		µg	42	37	34	2.5
Selenium		µg	<2	2	<2	1.5
Tellurium		µg	4.4	2	7.1	2
Thallium		µg	<2	5.2	<2	1.5
Vanadium		µg	<1	<1	<1	1
Zinc		µg	13	13	8.6	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	38	44	10	5
Antimony		µg	3	<2	<2	2.5
Arsenic		µg	<0.9	<0.8	<0.9	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	2.0	0.68	<0.2	0.2
Cobalt		µg	<0.2	<0.2	0.6	0.25
Copper		µg	3.2	4.5	2.2	0.25
Lead		µg	<1	3.4	4.5	1.5
Manganese		µg	2.4	1	1	0.25
Nickel		µg	0.8	2	0.5	0.5
Phosphorus		µg	22	26	23	2.5
Selenium		µg	<1	2.8	<1	1.5
Tellurium		µg	<2	<2	<2	2
Thallium		µg	<1	<1	1	1.5
Vanadium		µg	<0.9	<0.8	<0.9	1
Zinc		µg	6.8	9.9	4.2	0.5
Volume	Sample	mL	780	860	810	
Volume	aliquot volume	mL	730	810	760	
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05

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Analytical Report

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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: **1589843**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774292

Reference Number	1589843-1	1589843-2	1589843-3
Sample Date	Jul 28, 2022	Jul 29, 2022	Jul 29, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 1 Run 1 (Unit 1 R-1 + 4 Bottles)	Unit 1 Run 2 (MV Unit 1 R-2 +4 Bottles)	Unit 1 Run 3 (MV Unit 1 R-3 + 4 Bottles)
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	780	860	810	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.3	<0.3	<0.3	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	145	155	175	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<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	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	<0.05	0.19	<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	0.062	<0.02	

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Analytical Report

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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: **1589843**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774292

Reference Number	1589843-4	1589843-5	1589843-6
Sample Date	Jul 18, 2022	Jul 19, 2022	Jul 19, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 2 Run 1 (MV Unit 2 Run-1 + 4 Bottles)	Unit 2 Run 2 (Unit 1 Run-2 + 4 Bottles)	Unit 2 Run 3 (MV Unit 2 Run-3 + 4 Bottles)
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	<5	<5	50	5
Antimony		µg	3	<2	<2	2.5
Arsenic		µg	1	5.1	1	1
Cadmium		µg	0.4	<0.3	0.3	0.25
Chromium		µg	6.89	1.2	1.8	0.2
Cobalt		µg	<0.3	<0.3	<0.3	0.25
Copper		µg	3.0	<0.3	3.0	0.25
Lead		µg	11	3.1	3.0	1.5
Manganese		µg	1	0.8	1	0.25
Nickel		µg	9.4	2	2	0.5
Phosphorus		µg	33	29	36	2.5
Selenium		µg	<2	<2	<2	1.5
Tellurium		µg	6.7	<2	<2	2
Thallium		µg	<2	<2	<2	1.5
Vanadium		µg	<1	<1	<1	1
Zinc		µg	4.2	17	6.6	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	20	36	9	5
Antimony		µg	<2	<2	<2	2.5
Arsenic		µg	<0.9	2.8	<0.9	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	1.6	3.25	0.22	0.2
Cobalt		µg	<0.2	<0.2	0.5	0.25
Copper		µg	4.3	0.8	<0.2	0.25
Lead		µg	6.9	2.3	<1	1.5
Manganese		µg	1	2	0.7	0.25
Nickel		µg	1.0	2	<0.4	0.5
Phosphorus		µg	26	26	25	2.5
Selenium		µg	<1	<1	<1	1.5
Tellurium		µg	<2	<2	3.1	2
Thallium		µg	<1	<1	<1	1.5
Vanadium		µg	<0.9	<0.9	<0.9	1
Zinc		µg	5.7	5.5	3.2	0.5
Volume	Sample	mL	780	780	780	
Volume	aliquot volume	mL	730	730	730	
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05

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Analytical Report

Bill To: A. Lanfranco & Associates
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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: **1589843**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774292

Reference Number	1589843-4	1589843-5	1589843-6
Sample Date	Jul 18, 2022	Jul 19, 2022	Jul 19, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 2 Run 1 (MV Unit 2 Run-1 + 4 Bottles)	Unit 2 Run 2 (Unit 1 Run-2 + 4 Bottles)	Unit 2 Run 3 (MV Unit 2 Run-3 + 4 Bottles)
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	780	780	780	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.3	<0.3	<0.3	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	155	175	155	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<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	1000	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.04	<0.04	
Mercury	As Tested	µg/L	<0.05	0.17	<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	0.054	<0.02	

Approved by:

Max Hewitt
Operations Manager

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

Bill To: A. Lanfranco & Associates
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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: **1589843**
Control Number:
Date Received: Aug 4, 2022
Date Reported: Aug 25, 2022
Report Number: 2774292

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 23, 2022	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 22, 2022	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 22, 2022	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 11, 2022	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Aug 11, 2022	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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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: **1599349**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787719

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 - Multiple Deliverables By Lot	PDF	COC / COA
Email - Multiple Deliverables By Lot	PDF	COC / Test Report

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Analytical Report

Bill To: A. Lanfranco & Associates
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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: **1599349**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787719

Reference Number	1599349-1	1599349-2	1599349-3
Sample Date	Sep 07, 2022	Sep 08, 2022	Sep 08, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 3 Run 1 (Mf Unit 3 R-1 + 4 Bottles) / 21.6°C	Unit 3 Run 2 (Mf Unit 3 R-2 + 4 Bottles) / 21.6°C	Unit 3 Run 3 (Mf Unit 3 R-3 + 4 Bottles) / 21.6°C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	33	31	20	5
Antimony		µg	6	8	4	2.5
Arsenic		µg	<1	<1	<1	1
Cadmium		µg	2.6	3.0	3.1	0.25
Chromium		µg	69.1	19.4	14.6	0.2
Cobalt		µg	1	0.7	0.7	0.25
Copper		µg	10	7.6	13	0.25
Lead		µg	20	20	23	1.5
Manganese		µg	6.6	2	2.5	0.25
Nickel		µg	33.5	12	11	0.5
Phosphorus		µg	46	63	45	2.5
Selenium		µg	6.7	<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	160	152	277	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	34	225	10	5
Antimony		µg	<2	<2	<2	2.5
Arsenic		µg	<0.9	<0.9	<0.9	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	1.1	1.1	<0.2	0.2
Cobalt		µg	<0.2	0.4	0.9	0.25
Copper		µg	<0.2	<0.2	2	0.25
Lead		µg	2	2	<1	1.5
Manganese		µg	1	0.9	7.7	0.25
Nickel		µg	1	1	1	0.5
Phosphorus		µg	26	31	20	2.5
Selenium		µg	<1	<1	3.0	1.5
Tellurium		µg	<2	<2	<2	2
Thallium		µg	<1	<1	<1	1.5
Vanadium		µg	<0.9	<0.9	<0.9	1
Zinc		µg	4.9	9.5	3.4	0.5
Volume	Sample	mL	790	725	700	
Volume	aliquot volume	mL	740	675	650	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.12	0.06	0.11	0.05

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Analytical Report

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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: **1599349**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787719

Reference Number	1599349-1	1599349-2	1599349-3
Sample Date	Sep 07, 2022	Sep 08, 2022	Sep 08, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 3 Run 1 (Mf Unit 3 R-1 + 4 Bottles) / 21.6°C	Unit 3 Run 2 (Mf Unit 3 R-2 + 4 Bottles) / 21.6°C	Unit 3 Run 3 (Mf Unit 3 R-3 + 4 Bottles) / 21.6°C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.046	0.02	0.044	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	790	725	700	
Volume	aliquot volume	mL	5.0	5.0	5.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.3	<0.3	<0.3	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	180	165	190	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<0.01	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	0.17	<0.05	0.23	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	0.054	<0.02	0.074	

Approved by:

Abhishek Suryawanshi
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.

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

Lot ID: **1599349**
Control Number:
Date Received: Sep 15, 2022
Date Reported: Oct 6, 2022
Report Number: 2787719

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 5, 2022	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 4, 2022	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Oct 4, 2022	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Sep 15, 2022	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	*	Metals Emissions from Stationary Sources, 29	Sep 15, 2022	Element Vancouver

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8958**	Page	: 1 of 3
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 BC Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 15-Aug-2022 13:20
PO	: HF	Date Analysis Commenced	: 18-Aug-2022
C-O-C number	: ----	Issue Date	: 21-Aug-2022 15:08
Sampler	: AL		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

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.

Signatories	*Position*	*Laboratory Department*
Tracy Harley	Supervisor - Water Quality Instrumentation	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.

Qualifiers

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

Analytical Results

Sub-Matrix: **Impinger** (Matrix: **Air**)				*Client sample ID*	**Unit 1 HF Run 1**	**Unit 1 HF Run 2**	**Unit 1 HF Run 3**	**----**	**----**
				Client sampling date / time	29-Jul-2022	29-Jul-2022	29-Jul-2022	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**VA22B8958-001**	**VA22B8958-002**	**VA22B8958-003**	**--------**	**--------**
					Result	Result	Result	----	----
Field Tests									
volume, impinger	----	EP248	0.1	mL	442	438	398	----	----
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<22.1 DLDS	<5.0	<5.0	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8958**	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	: 15-Aug-2022 13:20
PO	: HF	Issue Date	: 21-Aug-2022 15:08
C-O-C number	: ----		
Sampler	: AL		
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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 1 HF Run 1	E248.F	29-Jul-2022	18-Aug-2022	----	----		18-Aug-2022	28 days	20 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 1 HF Run 2	E248.F	29-Jul-2022	18-Aug-2022	----	----		18-Aug-2022	28 days	20 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 1 HF Run 3	E248.F	29-Jul-2022	18-Aug-2022	----	----		18-Aug-2022	28 days	20 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B8958**	Page	: 1 of 3
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	: 15-Aug-2022 13:20
PO	: HF	Date Analysis Commenced	: 18-Aug-2022
C-O-C number	: ----	Issue Date	: 21-Aug-2022 15:08
Sampler	: AL		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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*
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver 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 Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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: 607498)											
VA22B8958-001	Unit 1 HF Run 1	fluoride	16984-48-8	E248.F	0.0221	mg/sample	<22.1	<0.0221	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	µg/sample 442	442		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 (QCLot: 607498)						
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: 607498)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	102	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	Qualifier
Anions and Nutrients (QCLot: 607498)										
VA22B8958-002	Unit 1 HF Run 2	fluoride	16984-48-8	E248.F	0.415 mg/sample	0.438 mg/sample	94.8	75.0	125	----
		volume, impinger	----	EP248		mL		0	0	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B6983**	Page	: 1 of 2
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 BC Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 22-Jul-2022 11:20
PO	: HF	Date Analysis Commenced	: 24-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Aug-2022 10:10
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

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.

Signatories	*Position*	*Laboratory Department*
Craig Peters	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	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**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**Unit 2 HF Run 1**	**Unit 2 HF Run 2**	**Unit 2 HF Run 3**	**----**	**----**
					Client sampling date / time	19-Jul-2022	19-Jul-2022	19-Jul-2022	----	----
						VA22B6983-001	**VA22B6983-002**	**VA22B6983-003**	**--------**	**--------**
						Result	Result	Result	----	----
Field Tests										
volume, impinger	----	EP248	0.1	mL		295	300	340	----	----
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	: **VA22B6983**	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	: 22-Jul-2022 11:20
PO	: HF	Issue Date	: 05-Aug-2022 10:10
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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 2 HF Run 1	E248.F	19-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 2 HF Run 2	E248.F	19-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	28 days	6 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 2 HF Run 3	E248.F	19-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	28 days	6 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B6983**	Page	: 1 of 3
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	: 22-Jul-2022 11:20
PO	: HF	Date Analysis Commenced	: 24-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Aug-2022 10:10
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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*
Craig Peters	Laboratory Analyst	Vancouver Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver 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 Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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: 575201)											
VA22B6982-001	Anonymous	fluoride	16984-48-8	E248.F	0.0050	mg/sample	<5.0 µg/sample	<0.0050	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	320	320		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 (QCLot: 575201)						
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: 575201)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	96.9	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	Qualifier
Anions and Nutrients (QCLot: 575201)										
VA22B6983-001	Unit 2 HF Run 1	fluoride	16984-48-8	E248.F	0.300 mg/sample	0.295 mg/sample	102	75.0	125	----
		volume, impinger	----	EP248		mL		0	0	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C1691**	Page	: 1 of 3
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 BC Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 12-Sep-2022 11:20
PO	: HF	Date Analysis Commenced	: 17-Sep-2022
C-O-C number	: ----	Issue Date	: 21-Sep-2022 09:50
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

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.

Signatories	*Position*	*Laboratory Department*
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.

Qualifiers

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

Analytical Results

Sub-Matrix: **Impinger** (Matrix: **Air**)				*Client sample ID*	**Unit 3 HF Run 1**	**Unit 3 HF Run 2**	**Unit 3 HF Run 3**	**----**	**----**
				Client sampling date / time	08-Sep-2022	08-Sep-2022	08-Sep-2022	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**VA22C1691-001**	**VA22C1691-002**	**VA22C1691-003**	**--------**	**--------**
					Result	Result	Result	----	----
Field Tests									
volume, impinger	----	EP248	0.1	mL	370	350	335	----	----
Anions and Nutrients									
fluoride	16984-48-8	E248.F	5.0	µg/sample	<18.5 DLDS	<17.5 DLDS	<16.8 DLDS	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C1691**	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	: 12-Sep-2022 11:20
PO	: HF	Issue Date	: 21-Sep-2022 09:51
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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 3 HF Run 1	E248.F	08-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 3 HF Run 2	E248.F	08-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 3 HF Run 3	E248.F	08-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	10 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22C1691**	Page	: 1 of 3
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	: 12-Sep-2022 11:20
PO	: HF	Date Analysis Commenced	: 17-Sep-2022
C-O-C number	: ----	Issue Date	: 21-Sep-2022 09:50
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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	Vancouver 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 Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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: 652439)											
VA22C1691-001	Unit 3 HF Run 1	fluoride	16984-48-8	E248.F	0.0185	mg/sample	<18.5 µg/sample	<0.0185	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	370	370		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 (QCLot: 652439)						
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: 652439)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	97.8	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	Qualifier
Anions and Nutrients (QCLot: 652439)										
VA22C1691-002	Unit 3 HF Run 2	fluoride	16984-48-8	E248.F	1.80 mg/sample	1.75 mg/sample	103	75.0	125	----
		volume, impinger	----	EP248		mL		0	0	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8959**	Page	: 1 of 2
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 BC Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 15-Aug-2022 13:20
PO	: HF	Date Analysis Commenced	: 18-Aug-2022
C-O-C number	: ----	Issue Date	: 21-Aug-2022 15:08
Sampler	: AL		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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.

Signatories	*Position*	*Laboratory Department*
Tracy Harley	Supervisor - Water Quality Instrumentation	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**	**----**	**----**	**----**	**----**
					Client sampling date / time	29-Jul-2022	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**VA22B8959-001**	**--------**	**--------**	**--------**	**--------**
						Result	----	----	----	----
Field Tests										
volume, impinger	----	EP248	0.1	mL		288	----	----	----	----
Anions and Nutrients										
fluoride	16984-48-8	E248.F	5.0	µg/sample		<5.0	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8959**	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	: 15-Aug-2022 13:20
PO	: HF	Issue Date	: 21-Aug-2022 15:08
C-O-C number	: ----		
Sampler	: AL		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 1 HF Blank	E248.F	29-Jul-2022	18-Aug-2022	----	----		18-Aug-2022	28 days	20 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	607498	1	4	25.0	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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22B8959**	Page	: 1 of 3
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	: 15-Aug-2022 13:20
PO	: HF	Date Analysis Commenced	: 18-Aug-2022
C-O-C number	: ----	Issue Date	: 21-Aug-2022 15:08
Sampler	: AL		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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*
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver 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 Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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: 607498)											
VA22B8958-001	Anonymous	fluoride	16984-48-8	E248.F	0.0221	mg/sample	<22.1 µg/sample	<0.0221	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	442	442		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 (QCLot: 607498)						
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: 607498)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	102	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	Qualifier
Anions and Nutrients (QCLot: 607498)										
VA22B8958-002	Anonymous	fluoride	16984-48-8	E248.F	0.415 mg/sample	0.438 mg/sample	94.8	75.0	125	----
		volume, impinger	----	EP248		mL		0	0	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B6982**	Page	: 1 of 2
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 BC Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 22-Jul-2022 11:20
PO	: HF	Date Analysis Commenced	: 24-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Aug-2022 10:10
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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.

Signatories	*Position*	*Laboratory Department*
Craig Peters	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	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 2 HF Blank**	**----**	**----**	**----**	**----**
					Client sampling date / time	19-Jul-2022	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**VA22B6982-001**	--------	--------	--------	--------
						Result	----	----	----	----
Field Tests										
volume, impinger	----	EP248	0.1	mL		320	----	----	----	----
Anions and Nutrients										
fluoride	16984-48-8	E248.F	5.0	µg/sample		<5.0	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B6982**	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	: 22-Jul-2022 11:20
PO	: HF	Issue Date	: 05-Aug-2022 10:10
C-O-C number	: ----		
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 2 HF Blank	E248.F	19-Jul-2022	24-Jul-2022	----	----		24-Jul-2022	28 days	6 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	575201	1	4	25.0	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	: **VA22B6982**	Page	: 1 of 3
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	: 22-Jul-2022 11:20
PO	: HF	Date Analysis Commenced	: 24-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Aug-2022 10:10
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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*
Craig Peters	Laboratory Analyst	Vancouver Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver 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 Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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: 575201)											
VA22B6982-001	Unit 2 HF Blank	fluoride	16984-48-8	E248.F	0.0050	mg/sample	<5.0 µg/sample	<0.0050	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	320	320		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 (QCLot: 575201)						
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: 575201)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	96.9	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	Qualifier
Anions and Nutrients (QCLot: 575201)										
VA22B6983-001	Anonymous	fluoride	16984-48-8	E248.F	0.300 mg/sample	0.295 mg/sample	102	75.0	125	----
		volume, impinger	----	EP248		mL		0	0	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C1692**	Page	: 1 of 2
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 BC Canada V5A 1W9
Telephone	: 604 881 2582	Telephone	: 778-370-3279
Project	: Metro Vancouver WTE	Date Samples Received	: 12-Sep-2022 11:20
PO	: HF	Date Analysis Commenced	: 17-Sep-2022
C-O-C number	: ----	Issue Date	: 21-Sep-2022 09:51
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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.

Signatories	*Position*	*Laboratory Department*
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**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**Unit 3 HF Blank**	**----**	**----**	**----**	**----**
					Client sampling date / time	08-Sep-2022	----	----	----	----
						VA22C1692-001	**--------**	**--------**	**--------**	**--------**
						Result	----	----	----	----
Field Tests										
volume, impinger	----	EP248	0.1	mL		155	----	----	----	----
Anions and Nutrients										
fluoride	16984-48-8	E248.F	5.0	µg/sample		<5.0	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C1692**	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	: 12-Sep-2022 11:20
PO	: HF	Issue Date	: 21-Sep-2022 09:51
C-O-C number	: ----		
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride by IC (Impinger, mg/sample)										
HDPE										
Unit 3 HF Blank	E248.F	08-Sep-2022	17-Sep-2022	----	----		17-Sep-2022	28 days	10 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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	5.0	✓
Laboratory Control Samples (LCS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	5.0	✓
Method Blanks (MB)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	5.0	✓
Matrix Spikes (MS)							
Fluoride by IC (Impinger, mg/sample)	E248.F	652439	1	4	25.0	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	: **VA22C1692**	Page	: 1 of 3
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	: 12-Sep-2022 11:20
PO	: HF	Date Analysis Commenced	: 17-Sep-2022
C-O-C number	: ----	Issue Date	: 21-Sep-2022 09:51
Sampler	: A. Lanfranco		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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	Vancouver 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 Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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: 652439)											
VA22C1691-001	Anonymous	fluoride	16984-48-8	E248.F	0.0185	mg/sample	<18.5 µg/sample	<0.0185	0	Diff <2x LOR	----
		volume, impinger	----	EP248	0.1	mL	370	370		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 (QCLot: 652439)						
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: 652439)									
fluoride	16984-48-8	E248.F	0.005	mg/sample	0.5 mg/sample	97.8	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	Qualifier
Anions and Nutrients (QCLot: 652439)										
VA22C1691-002	Anonymous	fluoride	16984-48-8	E248.F	1.80 mg/sample	1.75 mg/sample	103	75.0	125	----
		volume, impinger	----	EP248		mL		0	0	----

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Report Transmission Cover Page

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

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

Lot ID: **1592055**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777443

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 Deliverables	PDF	COC / Test Report
Email - Multiple Deliverables By	PDF	COA
Email - Single Deliverable	PDF	COR

Notes To Clients:

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Report Transmission Cover Page

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Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1592055**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777443

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
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Email - Multiple Deliverables By	PDF	COA
Email - Single Deliverable	PDF	COR

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Analytical Report

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Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1592055**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777443

Reference Number	1592055-1	1592055-2	1592055-3
Sample Date	Jul 29, 2022	Jul 29, 2022	Jul 29, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 1 NH3 Run 1	Unit 1 NH3 Run 2	Unit 1 NH3 Run 3
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Ammonium - N	As Tested	µg/L	1750	2380	1120	25
Dilution Factor	As Tested		1.00	1.00	1.00	
Sample Volume	Sample volume	mL	358	398	386	
Ammonium - N		µg/sample	627	948	434	

Approved by:

Carol Nam, Dipl. T.
Quality Assurance Coordinator

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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Methodology and Notes

Bill To: A. Lanfranco & Associates
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Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1592055**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777443

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	*	Automated Phenate Method, 4500-NH3 G	Aug 17, 2022	Element Edmonton - Roper Road

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.

element
www.Element.com

Project Information

Project ID:	Metro Vancouver WTE
Project Name:	NH_3 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:	SAME
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

- [x] Email
- [ ] QA/QC
- [ ] Online
- [x] PDF
- [ ] Fax
- [ ] Excel

Requirements

- [ ] HCDWORG
- [ ] SPIGEC
- [ ] AB Tier 1
- [ ] BCCSR

Other (list below)

Turnaround Time

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

Date Required

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.

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

Please report µg/sample and volumes +/- 1 mL

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers	NH_3
1		Unit 1 NH_3 Run 1			29-Jul-22			1	✓
2		Unit 1 NH_3 Run 2			29-Jul-22			1	✓
3		Unit 1 NH_3 Run 3			29-Jul-22			1	✓
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

12 AUG 22 15:38

Enter tests above (✓ relevant samples below)

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

Indicate lot # on coolers

Lot: 1592055 COC

Temp. received: 22.1 °C

Date/Time stamp:

Delivery Method:

Waybill:

Received by: LC

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Analytical Report

Bill To: A. Lanfranco & Associates
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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1586771**
Control Number:
Date Received: Jul 21, 2022
Date Reported: Jul 27, 2022
Report Number: 2769980

Reference Number	1586771-1	1586771-2	1586771-3
Sample Date	Jul 19, 2022	Jul 19, 2022	Jul 19, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 2 NH3 Run 1 / 25.3 °C	Unit 2 NH3 Run 2 / 25.3 °C	Unit 2 NH3 Run 3 / 25.3 °C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Ammonium - N	As Tested	µg/L	111	446	298	25
Dilution Factor	As Tested		1.00	1.00	1.00	
Sample Volume	Sample volume	mL	277	288	300	
Ammonium - N		µg/sample	30.7	128	89.4	

Approved by:

Max Hewitt
Operations Manager

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

Bill To: A. Lanfranco & Associates
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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1586771**
Control Number:
Date Received: Jul 21, 2022
Date Reported: Jul 27, 2022
Report Number: 2769980

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	*	Automated Phenate Method, 4500-NH3 G	Jul 22, 2022	Element Edmonton - Roper Road

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater

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Attn: Missy
Sampled By:
Company:

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

Lot ID: **1598454**
Control Number:
Date Received: Sep 12, 2022
Date Reported: Sep 16, 2022
Report Number: 2786409

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 - Multiple Deliverables By Lot	PDF	COC / COA
Email - Multiple Deliverables By Lot	PDF	COC / Test Report

Notes To Clients:

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Analytical Report

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Attn: Missy
Sampled By:
Company:

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

Lot ID: **1598454**
Control Number:
Date Received: Sep 12, 2022
Date Reported: Sep 16, 2022
Report Number: 2786409

Reference Number	1598454-1	1598454-2	1598454-3
Sample Date	Sep 08, 2022	Sep 08, 2022	Sep 08, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 3 NH3 Run 1 / 23.1 °C	Unit 3 NH3 Run 2 / 23.1 °C	Unit 3 NH3 Run 3 / 23.1 °C
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Ammonium - N	As Tested	µg/L	3280	3480	3200	25
Dilution Factor	As Tested		1.00	1.00	1.00	
Sample Volume	Sample volume	mL	352	346	302	
Ammonium - N		µg/sample	1160	1200	967	

Approved by:

Abhishek Suryawanshi
Operations Manager

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Methodology and Notes

Bill To: A. Lanfranco & Associates
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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1598454**
Control Number:
Date Received: Sep 12, 2022
Date Reported: Sep 16, 2022
Report Number: 2786409

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	*	Automated Phenate Method, 4500-NH3 G	Sep 16, 2022	Element Edmonton - Roper Road

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater

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Report Transmission Cover Page

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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1592056**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777444

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 Deliverables	PDF	COC / Test Report
Email - Multiple Deliverables By	PDF	COA
Email - Single Deliverable	PDF	COR

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: NH3 Blanks
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1592056**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777444

Reference Number	1592056-1
Sample Date	Jul 29, 2022
Sample Time	NA
Sample Location	
Sample Description	Unit 1 NH3 Blank
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Ammonium - N	As Tested	µg/L	305			25
Dilution Factor	As Tested		1.00			
Sample Volume	Sample volume	mL	266			
Ammonium - N		µg/sample	81.1			

Approved by:

Carol Nam, Dipl. T.
Quality Assurance Coordinator

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Methodology and Notes

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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1592056**
Control Number:
Date Received: Aug 12, 2022
Date Reported: Aug 18, 2022
Report Number: 2777444

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	*	Automated Phenate Method, 4500-NH3 G	Aug 17, 2022	Element Edmonton - Roper Road

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater

Element
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Report Transmission Cover Page

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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1586774**
Control Number:
Date Received: Jul 21, 2022
Date Reported: Jul 27, 2022
Report Number: 2769983

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 Deliverables	PDF	COC / Test Report
Email - Multiple Deliverables By	PDF	COA
Email - Single Deliverable	PDF	COR

Notes To Clients:

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Analytical Report

Bill To: A. Lanfranco & Associates
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Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1586774**
Control Number:
Date Received: Jul 21, 2022
Date Reported: Jul 27, 2022
Report Number: 2769983

Reference Number	1586774-1
Sample Date	Jul 19, 2022
Sample Time	NA
Sample Location	
Sample Description	Unit 2 NH3 Blank / 25.3 °C
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Ammonium - N	As Tested	µg/L	27			25
Dilution Factor	As Tested		1.00			
Sample Volume	Sample volume	mL	300			
Ammonium - N		µg/sample	8.1			

Approved by:

Max Hewitt
Operations Manager

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

Bill To: A. Lanfranco & Associates
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V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1586774**
Control Number:
Date Received: Jul 21, 2022
Date Reported: Jul 27, 2022
Report Number: 2769983

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	*	Automated Phenate Method, 4500-NH3 G	Jul 22, 2022	Element Edmonton - Roper Road

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater

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Attn: Missy
Sampled By:
Company:

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

Lot ID: **1598457**
Control Number:
Date Received: Sep 12, 2022
Date Reported: Sep 16, 2022
Report Number: 2786412

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 - Multiple Deliverables By Lot	PDF	COC / COA
Email - Multiple Deliverables By Lot	PDF	COC / Test Report

Notes To Clients:

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Analytical Report

Bill To: A. Lanfranco & Associates
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Surrey, BC, Canada
V4N 4W7
Attn: Missy
Sampled By:
Company:

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

Lot ID: **1598457**
Control Number:
Date Received: Sep 12, 2022
Date Reported: Sep 16, 2022
Report Number: 2786412

Reference Number	1598457-1
Sample Date	Sep 08, 2022
Sample Time	NA
Sample Location	
Sample Description	Unit 3 NH3 Blank / 23.1 °C
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Air Quality						
Ammonium - N	As Tested	µg/L	246			25
Dilution Factor	As Tested		1.00			
Sample Volume	Sample volume	mL	212			
Ammonium - N		µg/sample	52.2			

Approved by:

Abhishek Suryawanshi
Operations Manager

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

Bill To: A. Lanfranco & Associates
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Project ID: Metro Vancouver WTE
Project Name: NH3 Blank
Project Location:
LSD:
P.O.:
Proj. Acct. code:

Lot ID: **1598457**
Control Number:
Date Received: Sep 12, 2022
Date Reported: Sep 16, 2022
Report Number: 2786412

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Ammonium in Impingers (VAN)	APHA	*	Automated Phenate Method, 4500-NH3 G	Sep 16, 2022	Element Edmonton - Roper Road

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater

APPENDIX - C

COMPUTER GENERATED RESULTS

Client:	Metro Vancouver	**Date:**	28-Jul-22
Jobsite:	WTE (Burnaby, BC)	**Run:**	1 - Particulate / Metals
Source:	Unit 1	**Run Time:**	09:26 - 11:28

Concentrations:

Particulate	0.24	mg/dscm	0.00010	gr/dscf
	0.13	mg/Acm	0.00006	gr/Acf
	0.22	mg/dscm (@ 11% O2)	0.00010	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.017	Kg/hr	0.038	lb/hr

Flue Gas Characteristics:

Flow	1215	dscm/min	42899	dscf/min
	20.25	dscm/sec	715	dscf/sec
	2145	Acm/min	75766	Acf/min
Velocity	14.039	m/sec	46.06	f/sec
Temperature	154.1	oC	309.4	oF
Moisture	13.7	%		
Gas Analysis	10.3	% O2		
	9.8	% CO2		
	29.970	Mol. Wt (g/gmole) Dry		
	28.333	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.7592	dscm	97.443	dscf
Sample Time	120.0	minutes		
Isokineticity	102.1	%		

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

Client:	Metro Vancouver	**Date:**	28-Jul-22
Jobsite:	WTE (Burnaby, BC)	**Run:**	1 - Particulate / Metals
Source:	Unit 1	**Run Time:**	11:10 - 13:15

Control Unit (Y)	1.0555
Nozzle Diameter (in.)	0.3053
Pitot Factor	0.8511
Baro. Press. (in. Hg)	30.00
Static Press. (in. H20)	-19.00
Stack Height (ft)	30
Stack Diameter (in.)	70.90
Stack Area (sq.ft.)	27.417
Minutes Per Reading	5.0
Minutes Per Point	5.0

Collection:

Filter (grams)	0.00005
Washings (grams)	0.00060
Total (grams)	**0.00065**

Gas Analysis (Vol. %):

	CO2	O2
Traverse 1	9.75	10.25
Traverse 2	9.75	10.25
	9.75	**10.25**

Condensate Collection:

Impinger 1	164.0
Impinger 2	110.0
Impinger 3	24.0
Impinger 4	8.0
Impinger 5	3.0
Impinger 6	2.0
Gel	17.0
Gain (grams)	**328.0**

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	234.350								
1	5.0	238.060	0.36	1.93	93	93	5	310	1.5	102.6
2	10.0	241.880	0.38	2.03	94	94	5	308	4.7	102.5
3	15.0	245.690	0.38	2.03	92	92	5	310	8.4	102.8
4	20.0	249.390	0.36	1.93	93	93	5	310	12.5	102.3
5	25.0	253.300	0.40	2.14	92	92	6	310	17.7	102.8
6	30.0	257.270	0.42	2.25	93	93	6	308	25.2	101.6
7	35.0	261.290	0.42	2.25	93	93	6	310	45.6	103.0
8	40.0	265.380	0.44	2.35	94	94	6	310	53.2	102.2
9	45.0	269.390	0.42	2.25	94	94	7	310	58.3	102.6
10	50.0	273.260	0.40	2.14	95	95	7	311	62.5	101.3
11	55.0	277.410	0.45	2.41	95	95	7	308	66.1	102.3
12	60.0	281.460	0.43	2.30	96	96	7	305	69.4	101.7
Traverse 2	0.0	281.460								
1	5.0	284.950	0.32	1.71	96	96	7	310	1.5	101.8
2	10.0	288.570	0.34	1.82	97	97	7	312	4.7	102.4
3	15.0	292.060	0.32	1.71	97	97	7	312	8.4	101.7
4	20.0	295.550	0.32	1.71	97	97	7	312	12.5	101.7
5	25.0	299.360	0.38	2.03	98	98	7	312	17.7	101.8
6	30.0	303.280	0.40	2.14	98	98	7	310	25.2	102.0
7	35.0	307.700	0.50	2.78	98	98	7	310	45.6	103.0
8	40.0	312.260	0.54	2.89	99	99	7	310	53.2	102.1
9	45.0	316.840	0.55	2.94	98	98	8	308	58.3	101.7
10	50.0	321.420	0.55	2.94	99	99	8	308	62.5	101.5
11	55.0	326.080	0.57	3.05	99	99	8	307	66.1	101.4
12	60.0	330.740	0.57	3.05	100	100	8	305	69.4	101.1
Average:			0.426	2.283	95.8	95.8	6.7	309.4		102.1

Client:	Metro Vancouver	**Date:**	28-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 1	**Run Time:**	12:22 - 14:24

Concentrations:

Particulate	0.31	mg/dscm	0.00013	gr/dscf
	0.17	mg/Acm	0.00008	gr/Acf
	0.28	mg/dscm (@ 11% O2)	0.00012	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.023	Kg/hr	0.050	lb/hr

Flue Gas Characteristics:

Flow	1220	dscm/min	43095	dscf/min
	20.34	dscm/sec	718	dscf/sec
	2154	Acm/min	76074	Acf/min
Velocity	14.096	m/sec	46.24	f/sec
Temperature	153.6	oC	308.5	oF
Moisture	13.7	%		
Gas Analysis	10.1	% O2		
	9.6	% CO2		
	29.945	Mol. Wt (g/gmole) Dry		
	28.305	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.7539	dscm	97.253	dscf
Sample Time	120.0	minutes		
Isokineticity	101.4	%		

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

Client:	Metro Vancouver	**Date:**	28-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 1	**Run Time:**	12:22 - 14:24

Control Unit (Y)	1.0555	**Collection:**			**Gas Analysis (Vol. %):**			**Condensate Collection:**	
Nozzle Diameter (in.)	0.3053	Filter (grams)	0.00005		CO2	O2		Impinger 1	194.0
Pitot Factor	0.8511	Washings (grams)	0.00080	Traverse 1	9.75	10.00		Impinger 2	91.0
Baro. Press. (in. Hg)	30.00			Traverse 2	9.50	10.25		Impinger 3	18.0
Static Press. (in. H20)	-19.00	**Total (grams)**	**0.00085**					Impinger 4	6.0
Stack Height (ft)	30							Impinger 5	3.0
Stack Diameter (in.)	70.90							Impinger 6	2.0
Stack Area (sq.ft.)	27.417							Gel	15.0
Minutes Per Reading	5.0				**9.63**	**10.13**		**Gain (grams)**	**329.0**
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)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	331.400								
1	5.0	334.890	0.32	1.71	94	94	6	309	1.5	102.1
2	10.0	338.540	0.35	1.87	94	94	6	310	4.7	102.2
3	15.0	342.460	0.40	2.14	95	95	6	310	8.4	102.5
4	20.0	346.460	0.42	2.25	96	96	6	309	12.5	101.9
5	25.0	350.380	0.40	2.14	95	95	7	309	17.7	102.5
6	30.0	354.290	0.40	2.14	96	96	7	309	25.2	102.0
7	35.0	358.320	0.42	2.25	96	96	7	308	45.6	102.6
8	40.0	362.300	0.42	2.25	97	97	7	308	53.2	101.1
9	45.0	366.440	0.45	2.41	97	97	7	307	58.3	101.6
10	50.0	370.670	0.47	2.51	98	98	7	307	62.5	101.4
11	55.0	374.590	0.40	2.14	98	98	6	306	66.1	101.7
12	60.0	378.400	0.38	2.03	99	99	6	306	69.4	101.2
Traverse 2	0.0	378.400								
1	5.0	382.380	0.42	2.25	99	99	5	308	1.5	100.8
2	10.0	386.360	0.42	2.25	99	99	5	308	4.7	100.8
3	15.0	390.270	0.40	2.14	100	100	5	310	8.4	101.4
4	20.0	394.050	0.38	2.03	100	100	5	310	12.5	100.5
5	25.0	397.720	0.35	1.87	100	100	5	309	17.7	101.6
6	30.0	401.220	0.32	1.71	101	101	5	310	25.2	101.2
7	35.0	405.590	0.50	2.68	101	101	6	310	45.6	101.3
8	40.0	410.210	0.56	3.00	102	102	6	310	53.2	101.1
9	45.0	414.920	0.58	3.10	102	102	6	309	58.3	101.2
10	50.0	419.740	0.61	3.26	103	103	6	309	62.5	100.9
11	55.0	424.100	0.50	2.68	103	103	6	308	66.1	100.6
12	60.0	428.090	0.42	2.25	103	103	6	305	69.4	100.1
								.		
Average:			0.429	2.294	98.7	98.7	6.0	308.5		101.4

Client:	Metro Vancouver	**Date:**	29-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 1	**Run Time:**	08:50 - 10:53

Concentrations:

Particulate	0.2	mg/dscm	0.0001	gr/dscf
	0.1	mg/Acm	0.0000	gr/Acf
	0.2	mg/dscm (@ 11% O2)	0.0001	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.013	Kg/hr	0.029	lb/hr

Flue Gas Characteristics:

Flow	1247	dscm/min	44025	dscf/min
	20.78	dscm/sec	734	dscf/sec
	2235	Acm/min	78934	Acf/min
Velocity	14.626	m/sec	47.98	f/sec
Temperature	155.9	oC	312.7	oF
Moisture	14.5	%		
Gas Analysis	10.0	% O2		
	9.8	% CO2		
	29.960	Mol. Wt (g/gmole) Dry		
	28.220	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.8577	dscm	100.919	dscf
Sample Time	120.0	minutes		
Isokineticity	103.0	%		

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

Client:	Metro Vancouver	**Date:**	29-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 1	**Run Time:**	08:50 - 10:53

Control Unit (Y)	1.0555	**Collection:**			**Gas Analysis (Vol. %):**			**Condensate Collection:**	
Nozzle Diameter (in.)	0.3053	Filter (grams)	0.00000		CO2	O2		Impinger 1	186.0
Pitot Factor	0.8511	Washings (grams)	0.00050	Traverse 1	9.50	10.25		Impinger 2	120.0
Baro. Press. (in. Hg)	30.00			Traverse 2	10.00	9.75		Impinger 3	26.0
Static Press. (in. H20)	-19.25	**Total (grams)**	**0.00050**					Impinger 4	6.0
Stack Height (ft)	30							Impinger 5	4.0
Stack Diameter (in.)	70.90							Impinger 6	2.0
Stack Area (sq.ft.)	27.417							Gel	21.0
Minutes Per Reading	5.0				**9.75**	**10.00**		**Gain (grams)**	**365.0**
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)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	428.900								
1	5.0	432.500	0.34	1.30	90	90	5	312	1.5	103.9
2	10.0	436.320	0.38	2.03	92	92	5	310	4.7	103.9
3	15.0	439.940	0.34	1.82	92	92	5	310	8.4	104.0
4	20.0	443.660	0.36	1.93	93	93	5	311	12.5	103.8
5	25.0	447.370	0.36	1.30	93	93	5	310	17.7	103.3
6	30.0	451.190	0.38	2.03	94	94	5	310	25.2	103.5
7	35.0	456.060	0.62	3.32	95	95	5	312	45.6	103.6
8	40.0	460.990	0.64	3.42	96	96	5	312	53.2	103.1
9	45.0	466.000	0.66	3.53	96	96	6	313	58.3	103.2
10	50.0	470.940	0.64	3.42	96	96	6	313	62.5	103.3
11	55.0	475.660	0.58	3.10	96	96	6	314	66.1	103.7
12	60.0	479.890	0.47	2.51	97	97	6	314	69.4	102.9
Traverse 2	0.0	479.890								
1	5.0	484.120	0.47	2.51	97	97	6	314	1.5	102.9
2	10.0	488.440	0.49	2.62	98	98	6	315	4.7	102.9
3	15.0	492.620	0.46	2.46	98	98	6	315	8.4	102.7
4	20.0	496.790	0.44	2.35	98	98	6	315	12.5	104.7
5	25.0	500.800	0.44	2.35	98	98	6	315	17.7	100.7
6	30.0	504.890	0.44	2.35	99	99	6	315	25.2	102.5
7	35.0	509.260	0.50	2.68	99	99	6	314	45.6	102.8
8	40.0	513.770	0.53	2.84	100	100	6	314	53.2	102.9
9	45.0	517.790	0.42	2.25	100	100	6	313	58.3	102.8
10	50.0	521.580	0.38	2.03	101	101	6	312	62.5	101.6
11	55.0	525.290	0.36	1.93	100	100	6	312	66.1	102.3
12	60.0	528.840	0.33	1.77	101	101	6	310	69.4	101.9
Average:			0.460	2.410	96.6	96.6	5.7	312.7		103.0

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		29-Jul-22	29-Jul-22	29-Jul-22
Test Time		09:24 - 10:24	10:42 - 11:42	11:54 - 12:54
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.84	29.84	29.84
DGM Factor	(Y)	1.0167	1.0167	1.0167
Initial Reading	(m^3)	65.139	66.459	67.775
Final Reading	(m^3)	66.447	67.767	69.209
Temp. Outlet	(Avg. oF)	94.0	108.0	116.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	1.27	1.23	1.33
HF	(mg)	0.012	0.003	0.003
Oxygen	(Vol. %)	10.1	10.1	10.0
HF	**(mg/Sm^3)**	**0.009**	**0.002**	**0.002**
HF	**(mg/Sm^3 @ 11% O2)**	**0.008**	**0.002**	**0.002**
Moisture	**(Vol. %)**	13.7	13.7	14.5

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

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

Sample Type: NH_3

Parameter		Test 1	Test 2	Test 3
Test Date		29-Jul-22	29-Jul-22	29-Jul-22
Test Time		09:24 - 10:24	10:42 - 11:42	11:54 - 12:54
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.84	29.84	29.84
DGM Factor	(Y)	1.0275	1.0275 275	1.0275
Initial Reading	(m^3)	216.954	217.297	217.780
Final Reading	(m^3)	217.292	217.775	218.248
Temp. Outlet	(Avg. oF)	91.0	105.0	113.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.33	0.46	0.44
NH_3	(mg)	0.8	1.2	0.5
Oxygen	(Vol. %)	10.1	10.1	10.0
NH_3	**(mg/Sm^3)**	**2.3**	**2.5**	**1.2**
NH_3	**(mg/Sm^3 @ 11% O2)**	**2.1**	**2.3**	**1.1**
Moisture	**(Vol. %)**	13.7	13.7	14.5

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

Client:	Metro Vancouver	**Date:**	18-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 2	**Run Time:**	12:25 - 14:28

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	0.003	Kg/hr	0.006	lb/hr

Flue Gas Characteristics:

Flow	1202	dscm/min	42445	dscf/min
	20.03	dscm/sec	707	dscf/sec
	2088	Acm/min	73724	Acf/min
Velocity	13.660	m/sec	44.82	f/sec
Temperature	145.7	oC	294.3	oF
Moisture	14.1	%		
Gas Analysis	10.4	% O2		
	9.9	% CO2		
	29.999	Mol. Wt (g/gmole) Dry		
	28.303	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.6892	dscm	94.970	dscf
Sample Time	120.0	minutes		
Isokineticity	100.6	%		

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

Client:	Metro Vancouver	**Date:**	18-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 2	**Run Time:**	12:25 - 14:28

Control Unit (Y)	0.9883	**Collection:**			**Gas Analysis (Vol. %):**			**Condensate Collection:**	
Nozzle Diameter (in.)	0.3053	Filter (grams)	0.00005		CO2	O2		Impinger 1	140.0
Pitot Factor	0.8511	Washings (grams)	0.00005	Traverse 1	10.00	10.25		Impinger 2	115.0
Baro. Press. (in. Hg)	30.10			Traverse 2	9.80	10.50		Impinger 3	30.0
Static Press. (in. H20)	-19.50	**Total (grams)**	**0.00010**					Impinger 4	16.0
Stack Height (ft)	30							Impinger 5	6.0
Stack Diameter (in.)	70.90							Impinger 6	4.0
Stack Area (sq.ft.)	27.417							Gel	21.3
Minutes Per Reading	5.0				**9.90**	**10.38**		**Gain (grams)**	**332.3**
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	393.332								
1	5.0	397.550	0.45	2.40	70	70	4	298	1.5	102.0
2	10.0	401.910	0.48	2.56	71	71	4	299	4.7	102.0
3	15.0	406.090	0.44	2.35	72	72	4	300	8.4	101.9
4	20.0	409.920	0.37	1.98	72	72	4	300	12.5	101.8
5	25.0	413.590	0.34	1.82	72	72	4	298	17.7	101.5
6	30.0	417.260	0.34	1.82	73	73	4	298	25.2	101.3
7	35.0	421.240	0.40	2.14	74	74	4	295	45.6	101.0
8	40.0	425.120	0.38	2.03	75	75	4	294	53.2	100.8
9	45.0	428.990	0.38	2.03	75	75	4	294	58.3	100.5
10	50.0	432.970	0.40	2.14	76	76	4	293	62.5	100.5
11	55.0	436.850	0.38	2.03	77	77	4	293	66.1	100.3
12	60.0	440.620	0.36	1.92	78	78	4	290	69.4	99.7
Traverse 2	0.0	440.620								
1	5.0	444.500	0.38	2.03	77	77	4	290	1.5	100.1
2	10.0	448.230	0.35	1.87	78	78	4	292	4.7	100.2
3	15.0	451.840	0.33	1.76	78	78	4	291	8.4	99.8
4	20.0	455.290	0.30	1.60	78	78	4	290	12.5	99.9
5	25.0	458.750	0.30	1.60	78	78	4	294	17.7	100.5
6	30.0	462.080	0.28	1.49	79	79	4	294	25.2	99.9
7	35.0	466.300	0.45	2.40	79	79	4	294	45.6	100.0
8	40.0	471.060	0.57	3.04	79	79	4	295	53.2	100.5
9	45.0	475.940	0.60	3.20	80	80	4	295	58.3	100.3
10	50.0	480.600	0.55	2.94	80	80	4	294	62.5	99.9
11	55.0	485.260	0.55	2.94	80	80	4	292	66.1	99.7
12	60.0	489.840	0.53	2.83	81	81	4	290	69.4	99.5
Average:			0.413	2.205	76.3	76.3	4.0	294.3		100.6

Client:	Metro Vancouver	**Date:**	19-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 2	**Run Time:**	09:15 - 11:18

Concentrations:

Particulate	0.34	mg/dscm	0.00015	gr/dscf
	0.20	mg/Acm	0.00009	gr/Acf
	0.33	mg/dscm (@ 11% O2)	0.00014	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.024	Kg/hr	0.054	lb/hr

Flue Gas Characteristics:

Flow	1204	dscm/min	42504	dscf/min
	20.06	dscm/sec	708	dscf/sec
	2063	Acm/min	72849	Acf/min
Velocity	13.498	m/sec	44.28	f/sec
Temperature	137.5	oC	279.6	oF
Moisture	14.9	%		
Gas Analysis	10.6	% O2		
	9.0	% CO2		
	29.865	Mol. Wt (g/gmole) Dry		
	28.102	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.5144	dscm	88.795	dscf
Sample Time	120.0	minutes		
Isokineticity	99.7	%		

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

Client:	Metro Vancouver	**Date:**	19-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 2	**Run Time:**	09:15 - 11:18

Control Unit (Y)	0.9883	**Collection:**			**Gas Analysis (Vol. %):**			**Condensate Collection:**	
Nozzle Diameter (in.)	0.3053	Filter (grams)	0.00005		CO2	O2		Impinger 1	194.0
Pitot Factor	0.8511	Washings (grams)	0.00080	Traverse 1	9.25	10.25		Impinger 2	84.0
Baro. Press. (in. Hg)	30.12			Traverse 2	8.75	11.00		Impinger 3	22.0
Static Press. (in. H20)	-19.00	**Total (grams)**	**0.00085**					Impinger 4	8.0
Stack Height (ft)	30.16							Impinger 5	3.0
Stack Diameter (in.)	70.90							Impinger 6	2.0
Stack Area (sq.ft.)	27.417							Gel	16.2
Minutes Per Reading	5.0				**9.00**	**10.63**		**Gain (grams)**	**329.2**
Minutes Per Point	5.0								

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	490.489								
1	5.0	493.890	0.30	1.56	72	72	8	285	1.5	99.7
2	10.0	497.560	0.35	1.82	72	72	8	287	4.7	99.8
3	15.0	501.010	0.31	1.61	72	72	8	287	8.4	99.6
4	20.0	504.170	0.26	1.35	72	72	8	287	12.5	99.6
5	25.0	507.390	0.27	1.40	72	72	7	288	17.7	99.7
6	30.0	510.610	0.27	1.40	73	73	7	289	25.2	99.5
7	35.0	514.630	0.42	2.18	73	73	5	289	45.6	99.8
8	40.0	518.800	0.45	2.34	74	74	5	289	53.2	99.9
9	45.0	523.280	0.52	2.70	75	75	7	290	58.3	99.8
10	50.0	527.980	0.57	2.96	76	76	7	292	62.5	100.0
11	55.0	532.590	0.55	2.86	76	76	8	292	66.1	99.8
12	60.0	536.780	0.45	2.35	78	78	8	292	69.4	99.8
Traverse 2	0.0	536.780								
1	5.0	540.920	0.44	2.29	79	79	5	294	1.5	99.7
2	10.0	545.330	0.50	2.59	80	80	5	300	4.7	99.9
3	15.0	549.570	0.46	2.39	81	81	6	299	8.4	99.8
4	20.0	553.480	0.39	2.03	81	81	6	297	12.5	99.8
5	25.0	557.140	0.34	1.78	82	82	5	296	17.7	99.7
6	30.0	560.800	0.34	1.78	82	82	5	294	25.2	99.6
7	35.0	564.470	0.34	1.79	82	82	5	291	45.6	99.6
8	40.0	568.620	0.44	2.32	83	83	5	291	53.2	99.0
9	45.0	572.910	0.46	2.43	83	83	6	290	58.3	100.0
10	50.0	577.050	0.43	2.27	83	83	6	290	62.5	99.8
11	55.0	581.280	0.45	2.38	83	83	6	290	66.1	99.7
12	60.0	585.070	0.36	1.90	83	83	6	290	69.4	99.8
								0		
Average:			0.403	2.103	77.8	77.8	6.3	279.6		99.7

Client:	Metro Vancouver	**Date:**	19-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 2	**Run Time:**	11:55 - 13:57

Concentrations:

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

Emission Rates:

Particulate	0.02	Kg/hr	0.051	lb/hr

Flue Gas Characteristics:

Flow	1175	dscm/min	41495	dscf/min
	19.58	dscm/sec	692	dscf/sec
	2011	Acm/min	71034	Acf/min
Velocity	13.162	m/sec	43.18	f/sec
Temperature	144.4	oC	292.0	oF
Moisture	13.3	%		
Gas Analysis	11.0	% O2		
	8.8	% CO2		
	29.840	Mol. Wt (g/gmole) Dry		
	28.263	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.5679	dscm	90.686	dscf
Sample Time	120.0	minutes		
Isokineticity	98.2	%		

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

Client:	Metro Vancouver	**Date:**	19-Jul-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 2	**Run Time:**	11:55 - 13:57

Control Unit (Y)	0.9883	**Collection:**			**Gas Analysis (Vol. %):**			**Condensate Collection:**	
Nozzle Diameter (in.)	0.3053	Filter (grams)	0.00005		CO2	O2		Impinger 1	186.0
Pitot Factor	0.8511	Washings (grams)	0.00080	Traverse 1	8.75	11.25		Impinger 2	70.0
Baro. Press. (in. Hg)	30.12			Traverse 2	8.75	10.75		Impinger 3	16.0
Static Press. (in. H20)	-19.00	**Total (grams)**	**0.0008**					Impinger 4	5.0
Stack Height (ft)	30							Impinger 5	2.0
Stack Diameter (in.)	70.90							Impinger 6	1.0
Stack Area (sq.ft.)	27.417							Gel	16.2
Minutes Per Reading	5.0				**8.75**	**11.00**		**Gain (grams)**	**296.2**
Minutes Per Point	5.0								

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	585.935								
1	5.0	589.320	0.29	1.53	79	79	5	285	1.5	98.1
2	10.0	592.860	0.32	2.13	79	79	6	291	4.7	98.2
3	15.0	596.510	0.34	1.67	79	79	6	293	8.4	98.3
4	20.0	600.320	0.37	1.77	79	79	6	292	12.5	98.3
5	25.0	604.030	0.35	1.93	80	80	6	292	17.7	98.3
6	30.0	607.790	0.36	1.83	80	80	6	293	25.2	98.2
7	35.0	611.760	0.40	1.88	81	81	6	291	45.6	98.1
8	40.0	616.020	0.46	2.10	81	81	6	291	53.2	98.2
9	45.0	620.640	0.54	2.42	82	82	7	292	58.3	98.3
10	50.0	625.280	0.54	2.84	83	83	7	293	62.5	98.7
11	55.0	629.950	0.55	2.89	83	83	8	294	66.1	98.5
12	60.0	634.310	0.48	2.52	83	83	8	294	69.4	98.3
Traverse 2	0.0	634.310								
1	5.0	637.470	0.25	1.32	84	84	5	290	1.5	98.0
2	10.0	641.090	0.33	1.73	84	84	5	296	4.7	98.2
3	15.0	644.590	0.31	1.62	84	84	6	297	8.4	98.0
4	20.0	647.800	0.26	1.36	84	84	6	296	12.5	98.0
5	25.0	650.820	0.23	1.21	84	84	5	295	17.7	98.0
6	30.0	653.710	0.21	1.10	84	84	5	295	25.2	98.1
7	35.0	657.440	0.35	1.84	84	84	6	294	45.6	98.2
8	40.0	661.440	0.40	2.12	84	84	6	290	53.2	98.3
9	45.0	665.640	0.44	2.32	85	85	6	292	58.3	98.4
10	50.0	670.030	0.49	2.61	85	85	6	287	62.5	97.2
11	55.0	674.610	0.52	2.77	85	85	6	287	66.1	98.5
12	60.0	679.140	0.51	2.71	85	85	6	287	69.4	98.3
Average:			0.388	2.009	82.5	82.5	3.0	292.0		98.2

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		19-Jul-22	19-Jul-22	19-Jul-22
Test Time		10:23 - 11:23	11:45 - 12:45	13:02 - 14:02
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.00	30.00	30.00
DGM Factor	(Y)	1.0305	1.0305	1.0305
Initial Reading	(m^3)	96.213	96.687	97.253
Final Reading	(m^3)	96.683	97.248	97.724
Temp. Outlet	(Avg. oF)	75.0	83.0	86.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.48057	0.56473	0.47199
HF	(mg)	0.003	0.003	0.003
Oxygen	(Vol. %)	10.6	11.0	11.0
HF	**(mg/Sm^3)**	**0.005**	**0.005**	**0.006**
HF	**(mg/Sm^3 @ 11% O2)**	**0.005**	**0.005**	**0.006**
Moisture (isokinetic)	**(Vol. %)**	14.9	14.9	13.3

*Wet Basis Calculated on moisture from isokinetic tests
Tstd. (oF) 68 Pstd. (in. Hg) 29.92

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

Sample Type: NH_3

Parameter		Test 1	Test 2	Test 3
Test Date		19-Jul-22	19-Jul-22	19-Jul-22
Test Time		10:23 - 11:23	11:45 - 12:45	13:02 - 14:02
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.00	30.00	30.00
DGM Factor	(Y)	1.0275	1.0275	1.0275
Initial Reading	(m^3)	215.527	216.019	216.513
Final Reading	(m^3)	216.015	216.509	216.928
Temp. Outlet	(Avg. oF)	74.0	83.0	87.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.49721	0.49167	0.41360
NH_3	(mg)	0.0	0.2	0.1
Oxygen	(Vol. %)	10.6	11.0	11.0
NH_3	**(mg/Sm^3)**	**0.1**	**0.3**	**0.3**
NH_3	**(mg/Sm^3 @ 11% O2)**	**0.1**	**0.3**	**0.3**
Moisture (isokinetic)	**(Vol. %)**	14.9	14.9	13.3

*Wet Basis Calculated on moisture from isokinetic tests
Tstd. (oF) 68 Pstd. (in. Hg) 29.92

Client:	Metro Vancouver	**Date:**	7-Sep-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 3	**Run Time:**	11:34 - 13:37

Concentrations:

Particulate	4.66	mg/dscm	0.00204	gr/dscf
	2.59	mg/Acm	0.00113	gr/Acf
	4.08	mg/dscm (@ 11% O2)	0.00178	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.300	Kg/hr	0.662	lb/hr

Flue Gas Characteristics:

Flow	1073	dscm/min	37883	dscf/min
	17.88	dscm/sec	631	dscf/sec
	1932	Acm/min	68212	Acf/min
Velocity	12.639	m/sec	41.47	f/sec
Temperature	150.9	oC	303.7	oF
Moisture	16.2	%		
Gas Analysis	9.6	% O2		
	9.4	% CO2		
	29.883	Mol. Wt (g/gmole) Dry		
	27.958	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	1.9578	dscm	69.140	dscf
Sample Time	120.0	minutes		
Isokineticity	91.7	%		

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

Client:	Metro Vancouver	**Date:**	7-Sep-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 3	**Run Time:**	11:34 - 13:37

Control Unit (Y)	0.9962
Nozzle Diameter (in.)	0.2887
Pitot Factor	0.8511
Baro. Press. (in. Hg)	30.01
Static Press. (in. H20)	-18.00
Stack Height (ft)	30
Stack Diameter (in.)	70.90
Stack Area (sq.ft.)	27.417
Minutes Per Reading	5.0
Minutes Per Point	5.0

Collection:	
Filter (grams)	0.00803
Washings (grams)	0.00110
Total (grams)	**0.00913**

Gas Analysis (Vol. %):	CO2	O2
Traverse 1	9.40	9.60
Traverse 2	9.35	9.55
	9.38	**9.58**

Condensate Collection:	
Impinger 1	182.0
Impinger 2	56.0
Impinger 3	24.0
Impinger 4	6.0
Impinger 5	2.0
Impinger 6	1.0
Gel	13.0
Gain (grams)	**284.0**

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	534.660								
1	5.0	538.170	0.48	2.39	77	77	7	301	1.5	93.0
2	10.0	541.710	0.49	2.44	77	77	7	302	4.7	92.9
3	15.0	545.180	0.47	2.34	77	77	6	302	8.4	92.9
4	20.0	548.690	0.48	2.39	78	78	6	303	12.5	92.9
5	25.0	552.090	0.45	2.24	78	78	6	302	17.7	92.8
6	30.0	555.370	0.42	2.09	78	78	6	303	25.2	92.7
7	35.0	558.100	0.29	1.44	78	78	6	304	45.6	92.8
8	40.0	560.580	0.24	1.19	78	78	6	304	53.2	92.6
9	45.0	562.910	0.21	1.05	79	79	5	303	58.3	92.8
10	50.0	565.290	0.22	1.10	79	79	5	302	62.5	92.5
11	55.0	567.500	0.19	0.95	79	79	5	303	66.1	92.5
12	60.0	569.590	0.17	0.85	79	79	5	303	69.4	92.4
Traverse 2	0.0	569.590								
1	5.0	572.180	0.26	1.30	80	80	5	304	1.5	92.6
2	10.0	574.720	0.25	1.25	80	80	5	305	4.7	92.7
3	15.0	577.360	0.27	1.31	80	80	5	306	8.4	92.8
4	20.0	579.850	0.24	1.19	80	80	5	306	12.5	92.8
5	25.0	582.340	0.24	1.20	81	81	5	307	17.7	92.7
6	30.0	584.980	0.27	1.34	81	81	5	307	25.2	92.7
7	35.0	588.510	0.48	2.40	82	82	6	305	45.6	92.9
8	40.0	592.320	0.56	2.80	82	82	6	305	53.2	92.9
9	45.0	595.820	0.47	2.35	82	82	6	304	58.3	93.0
10	50.0	599.430	0.50	2.51	83	83	6	304	62.5	92.8
11	55.0	602.820	0.44	2.21	83	83	6	302	66.1	92.7
12	60.0	605.093	0.36	1.81	83	83	6	302	69.4	68.7
Average:			0.352	1.756	79.8	79.8	5.7	303.7		91.7

Client:	Metro Vancouver	**Date:**	8-Sep-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 3	**Run Time:**	08:20 - 10:23

Concentrations:

Particulate	5.66	mg/dscm	0.00247	gr/dscf
	3.04	mg/Acm	0.00133	gr/Acf
	5.23	mg/dscm (@ 11% O2)	0.00228	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.350	Kg/hr	0.771	lb/hr

Flue Gas Characteristics:

Flow	1029	dscm/min	36347	dscf/min
	17.15	dscm/sec	606	dscf/sec
	1920	Acm/min	67800	Acf/min
Velocity	12.563	m/sec	41.22	f/sec
Temperature	151.1	oC	304.0	oF
Moisture	19.6	%		
Gas Analysis	10.2	% O2		
	9.5	% CO2		
	29.923	Mol. Wt (g/gmole) Dry		
	27.592	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	1.9670	dscm	69.463	dscf
Sample Time	120.0	minutes		
Isokineticity	96.2	%		

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

Client:	Metro Vancouver	**Date:**	8-Sep-22
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 3	**Run Time:**	08:20 - 10:23

Control Unit (Y)	0.9962	**Collection:**			**Gas Analysis (Vol. %):**		**Condensate Collection:**	
Nozzle Diameter (in.)	0.2887	Filter (grams)	0.01084		CO2	O2	Impinger 1	192.0
Pitot Factor	0.8511	Washings (grams)	0.00030	Traverse 1	9.45	10.25	Impinger 2	122.0
Baro. Press. (in. Hg)	30.18			Traverse 2	9.50	10.10	Impinger 3	24.0
Static Press. (in. H20)	-18.00	**Total (grams)**	**0.01114**				Impinger 4	6.0
Stack Height (ft)	30						Impinger 5	3.0
Stack Diameter (in.)	70.90						Impinger 6	1.0
Stack Area (sq.ft.)	27.417						Gel	10.7
Minutes Per Reading	5.0				**9.48**	**10.18**	**Gain (grams)**	**358.7**
Minutes Per Point	5.0							

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	605.721								
1	5.0	608.330	0.26	1.26	64	64	9	305	1.5	99.8
2	10.0	610.790	0.27	1.31	65	65	9	306	4.7	92.2
3	15.0	613.620	0.33	1.59	65	65	9.5	307	8.4	96.1
4	20.0	616.540	0.35	1.69	65	65	9.5	307	12.5	96.3
5	25.0	619.420	0.34	1.65	66	66	8	306	17.7	96.1
6	30.0	622.430	0.37	1.80	67	67	8	306	25.2	96.2
7	35.0	626.180	0.57	2.77	68	68	6	306	45.6	96.6
8	40.0	629.960	0.58	2.82	69	69	6	308	53.2	96.5
9	45.0	633.890	0.62	3.03	71	71	6	307	58.3	96.6
10	50.0	637.350	0.48	2.35	72	72	6	306	62.5	96.3
11	55.0	640.690	0.44	2.18	75	75	5.5	303	66.1	96.3
12	60.0	643.620	0.34	1.68	75	75	5.5	304	69.4	96.0
Traverse 2	0.0	643.620								
1	5.0	646.470	0.32	1.59	75	75	6.5	301	1.5	96.1
2	10.0	649.370	0.33	1.64	75	75	6.5	302	4.7	96.3
3	15.0	652.630	0.42	2.08	75	75	6.5	303	8.4	96.2
4	20.0	655.780	0.39	1.93	77	77	6.5	305	12.5	96.2
5	25.0	658.900	0.38	1.88	78	78	6	306	17.7	96.4
6	30.0	662.100	0.40	1.99	79	79	6	305	25.2	96.1
7	35.0	664.590	0.24	1.20	79	79	8	302	45.6	96.2
8	40.0	666.870	0.20	1.00	80	80	8	301	53.2	96.2
9	45.0	669.030	0.18	0.90	80	80	9	301	58.3	96.0
10	50.0	671.070	0.16	0.80	80	80	9	300	62.5	96.1
11	55.0	673.170	0.17	0.85	81	81	9.5	300	66.1	95.8
12	60.0	675.270	0.17	0.85	81	81	9.5	300	69.4	95.8
Average:			0.346	1.702	73.4	73.4	7.5	304.0		96.2

Client:	Metro Vancouver	**Date:**	8-Sep-22
Jobsite:	WTE(Burnaby,B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 3	**Run Time:**	10:45 - 12:48

Concentrations:

Particulate	5.52	mg/dscm	0.00241	gr/dscf
	2.93	mg/Acm	0.00128	gr/Acf
	4.86	mg/dscm (@ 11% O2)	0.00212	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.338	Kg/hr	0.744	lb/hr

Flue Gas Characteristics:

Flow	1019	dscm/min	35998	dscf/min
	16.99	dscm/sec	600	dscf/sec
	1919	Acm/min	67761	Acf/min
Velocity	12.555	m/sec	41.19	f/sec
Temperature	154.2	oC	309.5	oF
Moisture	19.7	%		
Gas Analysis	9.7	% O2		
	10.1	% CO2		
	30.002	Mol. Wt (g/gmole) Dry		
	27.637	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	1.9562	dscm	69.084	dscf
Sample Time	120.0	minutes		
Isokineticity	96.4	%		

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

Client:	Metro Vancouver	**Date:**	8-Sep-22
Jobsite:	WTE(Burnaby,B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 3	**Run Time:**	10:45 - 12:48

Control Unit (Y)	0.9962	**Collection:**			**Gas Analysis (Vol. %):**			**Condensate Collection:**	
Nozzle Diameter (in.)	0.2887	Filter (grams)	0.01020		CO2	O2		Impinger 1	262.0
Pitot Factor	0.8511	Washings (grams)	0.00060	Traverse 1	9.45	10.20		Impinger 2	62.0
Baro. Press. (in. Hg)	30.18			Traverse 2	10.75	9.10		Impinger 3	16.0
Static Press. (in. H20)	-18.00	**Total (grams)**	**0.01080**					Impinger 4	5.0
Stack Height (ft)	30							Impinger 5	3.0
Stack Diameter (in.)	70.90							Impinger 6	2.0
Stack Area (sq.ft.)	27.417							Gel	10.2
Minutes Per Reading	5.0				**10.10**	**9.65**		**Gain (grams)**	**360.2**
Minutes Per Point	5.0								

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	675.894								
1	5.0	678.770	0.32	1.60	81	81	5	303	1.5	96.3
2	10.0	681.720	0.34	1.69	80	80	5	308	4.7	96.3
3	15.0	684.590	0.32	1.59	81	81	6	310	8.4	96.5
4	20.0	687.800	0.40	1.98	81	81	6	310	12.5	96.6
5	25.0	690.930	0.38	1.88	81	81	6	310	17.7	96.7
6	30.0	694.140	0.40	1.99	81	81	6	310	25.2	96.6
7	35.0	696.680	0.25	1.24	82	82	7.5	310	45.6	96.4
8	40.0	698.950	0.20	0.99	82	82	7.5	310	53.2	96.2
9	45.0	701.170	0.19	0.95	83	83	8	310	58.3	96.4
10	50.0	703.260	0.17	0.84	82	82	8	311	62.5	96.1
11	55.0	705.350	0.17	0.84	82	82	8	311	66.1	96.1
12	60.0	707.380	0.16	0.80	82	82	8	310	69.4	96.2
Traverse 2	0.0	707.380								
1	5.0	709.920	0.25	1.24	82	82	5	310	1.5	96.4
2	10.0	712.510	0.26	1.29	82	82	5	309	4.7	96.3
3	15.0	715.390	0.32	1.60	83	83	5	309	8.4	96.4
4	20.0	718.400	0.35	1.74	83	83	5	309	12.5	96.4
5	25.0	721.410	0.35	1.74	83	83	5	309	17.7	96.4
6	30.0	724.460	0.36	1.79	83	83	5	309	25.2	96.3
7	35.0	728.340	0.58	2.89	83	83	4.5	309	45.6	96.8
8	40.0	732.220	0.58	2.89	84	84	4.5	310	53.2	96.7
9	45.0	736.230	0.62	3.09	84	84	4.5	310	58.3	96.7
10	50.0	739.830	0.50	2.49	84	84	4.5	310	62.5	96.5
11	55.0	743.210	0.44	2.19	84	84	4	311	66.1	96.6
12	60.0	746.224	0.35	1.74	84	84	4	311	69.4	96.5
Average:			0.344	1.712	82.4	82.4	5.7	309.5		96.4

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		8-Sep-22	8-Sep-22	8-Sep-22
Test Time		09:07-10:07	10:31-11:31	11:42-12:42
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.18	30.18	30.18
DGM Factor	(Y)	1.0013	1.0013	1.0013
Initial Reading	(m^3)	535.437	536.002	536.615
Final Reading	(m^3)	535.993	536.610	537.147
Temp. Outlet	(Avg. oF)	76.0	84.7	84.7
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.55345	0.59636	0.52186
HF	(mg)	0.010	0.009	0.009
Oxygen	(Vol. %)	10.2	10.2	9.7
HF	**(mg/Sm^3)**	**0.017**	**0.015**	**0.017**
HF	**(mg/Sm^3 @ 11% O2)**	**0.016**	**0.014**	**0.015**
Moisture (isokinetic)	**(Vol. %)**	19.6	19.6	19.7

*Wet Basis Calculated on moisture from isokinetic tests
Tstd. (oF) 68 Pstd. (in. Hg) 29.92

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

Sample Type: NH_3

Parameter		Test 1	Test 2	Test 3
Test Date		8-Sep-22	8-Sep-22	8-Sep-22
Test Time		09:07-10:07	10:31-11:31	11:42-12:42
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.13	30.13	30.13
DGM Factor	(Y)	1.0275	1.0275	1.0275
Initial Reading	(m^3)	221.273	221.747	222.249
Final Reading	(m^3)	221.742	222.245	222.742
Temp. Outlet	(Avg. oF)	76.3	84.0	85.3
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.47781	0.50070	0.49449
NH_3	(mg)	1.4	1.5	1.2
Oxygen	(Vol. %)	10.2	10.2	9.7
NH_3	**(mg/Sm^3)**	**3.0**	**2.9**	**2.4**
NH_3	**(mg/Sm^3 @ 11% O2)**	**2.7**	**2.7**	**2.1**
Moisture (isokinetic)	**(Vol. %)**	19.6	19.6	19.7

*Wet Basis Calculated on moisture from isokinetic tests
Tstd. (oF) 68 Pstd. (in. Hg) 29.92

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

Parameter: N_2O

Molecular Weight: 44.00 grams/mol
Lab Detection Limit: 0.1 ppm
Reportable Detection Limit: 0.18 mg/Sm^3

Sample ID	Date	Time	N_2O ppm	N_2O mg/Sm^3	N_2O mg/Sm^3 @ 11% O_2
Unit 1 - Run 1	2022/07/19	09:20-10:20	0.9	1.6	1.6
Unit 1 - Run 2	2022/07/19	10:30-11:30	0.6	1.1	1.1
Unit 1 - Run 3	2022/07/19	11:35-12:35	1.5	2.7	2.7
Average					**1.8**
Unit 1 - Run 1	2022/07/28	09:40-10:40	1.4	2.6	2.7
Unit 2 - Run 2	2022/07/28	10:42-11:42	0.8	1.5	1.4
Unit 2 - Run 3	2022/07/28	11:45-12:45	1.0	1.8	1.6
Average					**1.9**
Unit 3 - Run 1	2022/09/08	09:00-10:00	1.3	2.4	2.5
Unit 3 - Run 2	2022/09/08	10:05-11:05	1.2	2.2	2.1
Unit 3 - Run 3	2022/09/08	11:10-12:10	1.2	2.2	2.3
Average					**2.3**

Appendix B - Particulate Analysis

Filter Collection:

Test #	Initial (grams)	Final (grams)	Net Diference (grams)	Blank Adjusted (grams)
Unit 1 Blank	0.4414	0.4417	0.0003	
Unit 1 Run 1	0.4508	0.4506	-0.0002	ND
Unit 1 Run 2	0.4436	0.4434	-0.0002	ND
Unit 1 Run 3	0.4470	0.4473	0.0003	0.0000
Unit 2 Blank	0.4475	0.4476	0.0001	
Unit 2 Run 1	0.4429	0.4425	-0.0004	ND
Unit 2 Run 2	0.4524	0.4518	-0.0006	ND
Unit 2 Run 3	0.4497	0.4491	-0.0006	ND
Unit 3 Blank	0.4407	0.4411	0.0004	
Unit 3 Run 1	0.4451	0.4536	0.0084	0.0080
Unit 3 Run 2	0.4430	0.4542	0.0112	0.0108
Unit 3 Run 3	0.4453	0.4559	0.0106	0.0102

Front Half Washings:

Test #	Initial (grams)	Final (grams)	Net Diference (grams)	Blank Adjusted (grams)
Unit 1 Blank	121.3324	121.3315	-0.0009	
Unit 1 Run 1	102.5393	102.5390	-0.0003	0.0006
Unit 1 Run 2	119.7641	119.7640	-0.0001	0.0008
Unit 1 Run 3	97.5825	97.5821	-0.0004	0.0005
Unit 2 Blank	115.3448	115.3442	-0.0006	
Unit 2 Run 1	119.9510	119.9500	-0.0010	ND
Unit 2 Run 2	92.7527	92.7529	0.0002	0.0008
Unit 2 Run 3	117.7450	117.7452	0.0002	0.0008
Unit 3 Blank	110.2556	110.2560	0.0004	
Unit 3 Run 1	102.6495	102.6510	0.0015	0.0011
Unit 3 Run 2	122.5593	122.5600	0.0007	0.0003
Unit 3 Run 3	110.7388	110.7398	0.0010	0.0006

APPENDIX - D

FIELD DATA SHEETS

$\sqrt{6.17}$ 5.35 ΔH

SH

CLIENT	MURD	NOZZLE MW01	DIAMETER, IN. .3053
SOURCE	Unit #1	PROBE 7C	Cp .8511
PARAMETER / RUN No	1 Metals/Partic	PORT LENGTH	
DATE	July 28/22	STATIC PRESSURE, IN. H2O	-19.00
OPERATOR:	CL	STACK DIAMETER	70.90
CONTROL UNIT	5099 Y 1.0555 ΔH@	STACK HEIGHT	30'
BAROMETRIC PRESSURE, IN. Hg	30.00	INITIAL LEAK TEST	0.008 @ 15"
ASSUMED MOISTURE, Bw	15%	FINAL LEAK TEST	0.002 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	164	164
Imp. #2	100	210	110
Imp. #3	100	124	24
Imp. #4	0	8	8
Imp. #5	100	103	3
Imp. #6	100	102	2
Upstream Diameters			
Downstream Diameters			

5 MIN Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Dry Gas Outlet °F	Stack °F	Probe °F	Box °F	Impinger Exit °F	Pump Vac. IN. Hg	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
	09:26	234.350										
1		238.06	.36	1.93	93	310	250	250	68	5		
2		241.88	.38	2.03	94	308					10.0	10.0
3		245.69	.38	2.03	92	310	250	250	68	5		
4		249.39	.36	1.93	93	310						
5		253.30	.40	2.14	92	310	250	250	68	6		
6		257.27	.42	2.25	93	308						
7		261.29	.42	2.25	93	310	250	250	66	6		
8		265.30	.44	2.35	94	310					9.5	10.5
9		269.39	.42	2.25	94	310	250	250	66	7		
10		273.26	.40	2.14	95	311						
11		277.41	.45	2.41	95	308	250	250	66	7		
12		281.46	.43	2.30	96	305						
1		284.95	.32	1.71	96	310	250	250	67	7		
2		288.57	.34	1.82	97	312						
3		292.06	.32	1.71	97	312	250	250	68	7	9.5	10.5
4		295.55	.32	1.71	97	312						
5		299.36	.38	2.03	98	312	250	250	66	7		
6		303.25	.40	2.14	98	310						
7		307.75	.52	2.78	98	310	250	250	64	7		
8		312.26	.54	2.89	99	310						
9		316.89	.55	2.94	98	308	250	250	66	8	10.0	10.0
10		321.42	.55	2.94	99	308						
11		326.08	.57	3.05	99	307	250	250	66	8		
12	11:28	330.74	.57	3.05	100	305						

A. Lanfranco and Associates Inc.

√6.17 5.35ΔH S/A

CLIENT MVRD	NOZZLE MV01 DIAMETER, IN. .3053	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
SOURCE Unit #1	PROBE 7C Cp .851	Imp. #1	0 / 194 / 194
PARAMETER / RUN No 2 Metals/PartC		Imp. #2	100 / 190 / 90
DATE July 28/22	PORT LENGTH	Imp. #3	100 / 118 / 18
OPERATOR: EC	STATIC PRESSURE, IN. H2O 19.00	Imp. #4	0 / 6 / 6
CONTROL UNIT SO99 Y 1.0555 ΔH@	STACK DIAMETER 90	Imp. #5	100 / 103 / 3
BAROMETRIC PRESSURE, IN. Hg 30.00	STACK HEIGHT 30	Imp. #6	100 / 102 / 2
ASSUMED MOISTURE, Bw 15%	INITIAL LEAK TEST .005 @ 15"	Upstream Diameters	
	FINAL LEAK TEST .002 @ 15"	Downstream Diameters	

5MIN Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites: CO_2 Vol. %	Fyrites: O_2 Vol. %		
1	12:22	331.400	.32	1.71	94	309	250	250	68	6				
2		333.89	.35	1.87	94	310					10.0	10.0		
3		336.54	.40	2.14	95	310	250	250	68	6				
4		342.46	.42	2.25	96	309								
5		346.46	.40	2.14	95	309	250	250	67	6				
6		350.38	.40	2.14	96	309								
7		354.29	.40	2.14	96	308	250	250	66	6				
8		358.32	.42	2.25	97	308					9.5	10.0		
9		362.30	.42	2.25	97	307	250	250	64	6				
10		366.44	.45	2.41	98	307								
11		370.65	.47	2.51	98	306	250	250	62	6				
12		374.59	.40	2.14	99	306								
		378.40	.38	2.03										
1		382.38	.42	2.25	99	308	250	250	62	7				
2		386.36	.42	2.25	99	308								
3		390.27	.40	2.14	100	310	250	250	64	7				
4		394.05	.38	2.03	100	310					9.5	10.5		
5		397.72	.35	1.87	100	309	250	250	64	7				
6		401.32	.32	1.71	101	310								
7		405.59	.50	2.68	101	310	250	250	60	6				
8		410.21	.56	3.00	102	310								
9		414.90	.58	3.10	102	309	250	250	59	8				
10		419.71	.61	3.26	103	309					9.5	10.0		
11		424.68	.58	3.10	103	308	250	250	61	8				
12	14:24	428.69	.42	2.25	103	305								

A. Lanfranco and Associates Inc.

√6.17 5.35 ΔH J.H

CLIENT MVRD	NOZZLE (NVO) DIAMETER, IN. .3053	IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
SOURCE Unit #1	PROBE 7C Cp .8511	Imp. #1	0	186	186
PARAMETER / RUN No 3 Metals/Particle	PORT LENGTH	Imp. #2	100	220	120
DATE 5/16.29/22	STATIC PRESSURE, IN. H2O -01.25	Imp. #3	100	126	26
OPERATOR: CL	STACK DIAMETER 70.90	Imp. #4	0	6	6
CONTROL UNIT 5099 Y 1.0555 ΔH@	STACK HEIGHT 30'	Imp. #5	100	104	4
BAROMETRIC PRESSURE, IN. Hg 30.00		Imp. #6	100	102	2
ASSUMED MOISTURE, Bw 15%	INITIAL LEAK TEST 0.004 @ 15"	Upstream Diameters			
	FINAL LEAK TEST 0.002 @ 15"	Downstream Diameters			

Sampling Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites: CO_2 Vol. %	Fyrites: O_2 Vol. %		
	08:50	428.900												
1		432.50	.31	1.82	90	312	250	250	68	5				
2		436.32	.38	2.23	92	310								
3		439.94	.34	1.93	92	310	250	250	68	5	9.5	10.5		
4		443.66	.36	1.93	93	311								
5		447.37	.36	1.93	93	310	250	250	66	5				
6		451.10	.38	2.03	94	310								
7		456.06	.62	3.32	95	312	250	250	68	5				
8		460.09	.64	3.42	96	312								
9		466.00	.66	3.53	96	313	250	250	68	6				
10		470.04	.64	3.42	96	313					9.5	10.0		
11		475.68	.58	3.19	96	314	250	250	68	6				
12		479.89	.47	2.51	97	314								
1		484.12	.47	2.51	97	314	250	250	68	6				
2		488.44	.49	2.62	98	314								
3		492.62	.46	2.46	98	315	250	250	66	6	10.0	9.5		
4		496.71	.44	2.35	99	315								
5		500.80	.44	2.35	99	315	250	250	64	6				
6		504.89	.44	2.35	99	315								
7		509.26	.50	2.66	99	314	250	250	62	6				
8		513.77	.53	2.81	100	314								
9		517.70	.42	2.25	100	313	250	250	62	6	10.0	10.0		
10		521.58	.38	2.03	101	312								
11		525.29	.36	1.93	100	312	250	250	62	6				
12	10:55	528.84	.33	1.77	101	310								

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Client	MWTE	Y	LMV-D 1.0167		
Source	Unit 1	Cp	N/A		
Parameter	HF	Pbar	29.84	Static	
Date	Jul. 29, 2022	Operator	Justin/Chris		

Leak Check	Run 1	Run 2	Run 3
Initial	0.000	0.000	0.000
Final	0.000	0.000	0.000

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m^3)	Temperature (°F) DGM Outlet	Temperature (°F) Stack	Imp. Vol. (mL)	ΔP IN. H_2O R1	ΔP IN. H_2O R2	ΔP IN. H_2O R3
1	924	65.1385	90					
	1024	66.4473	108					
2	1042	66.4588	101					
	1142	67.7673	115					
3	1154	67.[illegible]7745	112					
	1254	69.2087	120					

Client	MWTE	Y	LMV-B 1.0275		
Source	Unit 1	Cp	N/A		
Parameter	NH_3	Pbar	29.84	Static	
Date	Jul. 29, 2022	Operator	Justin/Chris		

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) / (m^3)	Temperature (°F) DGM Outlet	Temperature (°F) Stack	Imp. Vol. (mL)	ΔP IN. H_2O R1	ΔP IN. H_2O R2	ΔP IN. H_2O R3
1	924	216.9539	90	90				
	1024	217.2915	102					
2	1042	217.2969	100					
	1142	217.7748	110					
3	1154	217.7797	108					
	1254	218.2483	118					

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$\sqrt{6.29}$ 5.34ΔH

S.H.

CLIENT	MVRD	NOZZLE	MWO1
SOURCE	Unit #2	DIAMETER, IN.	.3053
PARAMETER / RUN No	1 metals/Partic	PROBE	7C
DATE	July 18/22	Cp	.8561
OPERATOR:	C.L	PORT LENGTH	
CONTROL UNIT	ALI	STATIC PRESSURE, IN. H2O	-19.50
Y	.9883	STACK DIAMETER	70.90"
ΔH@		STACK HEIGHT	30'
BAROMETRIC PRESSURE, IN. Hg	30.10	INITIAL LEAK TEST	0.002 @ 15"
ASSUMED MOISTURE, Bw	15%	FINAL LEAK TEST	0.002 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	140	140
Imp. #2	100	215	115
Imp. #3	100	130	30
Imp. #4	0	16	16
Imp. #5	100	106	6
Imp. #6	100	104	4
Upstream Diameters			
Downstream Diameters			

Point	Clock Time 12:25	Dry Gas Meter ft³ 393.332	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO_2 Vol. %	O_2 Vol. %		
1		397.55	.45	2.40	70	298	250	250	64	4				
2 .5		401.91	.48	2.56	71	299								
3 .10		406.09	.44	2.35	72	300	250	250	66	4	10.0	10.5		
4 .15		409.92	.37	1.98	72	300								
5 .20		413.59	.34	1.82	72	298	250	250	65	4				
6		417.26	.34	1.82	73	298								
7		421.24	.40	2.14	74	295	250	250	64	4				
8		425.12	.38	2.03	75	294								
9		428.99	.38	2.03	75	294	250	250	66	4	10.0	10.0		
10		432.97	.40	2.14	76	293								
11		436.85	.38	2.03	77	293	250	250	68	4				
12		440.62	.36	1.92	78	290								
1		444.50	.38	2.03	77	290	250	250	64	4				
2		448.23	.35	1.87	78	292								
3		451.84	.33	1.76	78	291	250	250	66	4	9.5	10.5		
4		455.29	.30	1.60	78	290								
5		458.75	.30	1.60	78	294	250	250	64	4				
6		462.08	.28	1.49	79	294								
7		466.30	.45	2.40	79	294	250	250	65	4	10.0	10.5		
8		471.06	.57	3.04	79	295								
9		475.94	.60	3.20	80	295	250	250	66	4				
10		480.60	.55	2.94	80	294								
11		485.26	.55	2.94	80	292	250	250	64	4				
12	14:28	489.84	.53	2.83	81	290					10.0	10.5		

S.H.

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CLIENT Covanta WTE	NOZZLE MV-01	DIAMETER, IN. .3053	
	PROBE 7C	Cp .8511	
SOURCE Unit 2			
PARAMETER / RUN No Metals / PM R-2	PORT LENGTH		
DATE Jul-19-22	STATIC PRESSURE, IN. H2O -19"		
OPERATOR: MG	STACK DIAMETER 70.9"		
CONTROL UNIT CAE ALI	Y .9883	STACK HEIGHT 30'	
	ΔH@ 1.889		
BAROMETRIC PRESSURE, IN. Hg 30.12	INITIAL LEAK TEST 0.002@15"		
ASSUMED MOISTURE, Bw 18%	FINAL LEAK TEST 0.002@15"		

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	194	194
Imp. #2	100	184	84
Imp. #3	100	122	22
Imp. #4	0	8	8
Imp. #5	100	103	3
Imp. #6	100	102	2
Upstream Diameters			
Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO_2 Vol. %	O_2 Vol. %		
	0915	490.489												
1		493.89	.30	1.56	72	285	252	251	57	8	9.5	10		
2		497.56	.35	1.82	72	287								
3		501.01	.31	1.61	72	287	253	251	57	8				
4		504.17	.26	1.35	72	287								
5		507.39	.27	1.4	72	288	252	251	57	7				
6		510.61	.27	1.4	73	289								
7		514.63	.42	2.18	73	289	254	252	59	5				
8		518.8	.45	2.34	74	289					9	10.5		
9		523.28	.52	2.7	75	290	252	251	57	7				
10		527.98	.57	2.96	76	292								
11		532.59	.55	2.86	76	292	253	252	57	7.5				
12		536.78	.45	2.35	78	292								
1		540.92	.44	2.29	79	294	253	252	59	5				
2		545.35	.50	2.59	80	300								
3		549.57	.46	2.39	81	299	253	252	58	6	9	11		
4		553.48	.39	2.03	81	297								
5		557.14	.34	1.78	82	296	254	252	59	5				
6		560.8	.34	1.78	82	294								
7		564.47	.34	1.79	82	291	253	251	59	5				
8		568.62	.44	2.32	83	291								
9		572.91	.46	2.43	83	290	253	251	58	6	8.5	11		
10		577.05	.43	2.27	83	290								
11		581.28	.45	2.38	83	290	253	251	58	6				
12	1118	585.07	.36	1.9	83	290								

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J-H

CLIENT Covanta CWTE	NOZZLE MV-01 DIAMETER, IN. .3053	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
SOURCE Unit 2	PROBE 7C Cp .854	Imp. #1	0 / 186 / 186
PARAMETER / RUN No Metals 1 Pt1 R3	PORT LENGTH	Imp. #2	100 / 170 / 70
DATE 7-1-19-22	STATIC PRESSURE, IN. H2O -19"	Imp. #3	100 / 116 / 16
OPERATOR: MG	STACK DIAMETER 70.9"	Imp. #4	0 / 5 / 5
CONTROL UNIT CAE 4C1 Y .9883	STACK HEIGHT 30'	Imp. #5	100 / 102 / 2
ΔH@ 1.884		Imp. #6	100 / 101 / 1
BAROMETRIC PRESSURE, IN. Hg 30.12	INITIAL LEAK TEST 0.003@15"	Upstream Diameters	
ASSUMED MOISTURE, Bw	FINAL LEAK TEST 0.003@15"	Downstream Diameters	

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F					Pump Vac. IN. Hg	Fyrites			
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit		CO_2 Vol. %	O_2 Vol. %		
	1155	585.935												
1		589.32	.29	1.53	79	285	250	251	60	5	8.5	11.5		
2		592.86	.32	1.67	79	291								
3		596.51	.34	1.77	79	293	251	251	60	5.5				
4		600.32	.37	1.93	79	292								
5		604.03	.35	1.83	80	292	251	251	60	6				
6		607.79	.36	1.88	80	293								
7		611.76	.40	2.1	81	291	251	252	58	6				
8		616.02	.46	2.42	81	291								
9		620.64	.54	2.84	82	292	250	252	58	7	9	11		
10		625.28	.54	2.84	83	293								
11		629.95	.55	2.89	83	294	251	252	58	8				
12		634.31	.48	2.52	83	294								
1		637.47	.25	1.32	84	290	250	251	60	5				
2		641.09	.33	1.73	84	296								
3		644.59	.31	1.62	84	297	251	251	59	5.5				
4		647.8	.26	1.36	84	296								
5		650.82	.23	1.21	84	295	251	250	60	5	8.5	11		
6		653.71	.21	1.1	84	295								
7		657.44	.35	1.84	84	294	250	250	61	5.5				
8		661.44	.40	2.12	84	290								
9		665.64	.44	2.32	85	292	251	251	60	6				
10		670.03	.49	2.61	85	287					9	10.5		
11		674.61	.52	2.77	85	287	250	252	60	6				
12	1357	679.14	.51	2.71	85	287								

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Client	MWTE	Y	LMV-B 1.0275	Client	MWTE
Source	Unit 2	Cp	N/A	Source	Unit 2
Parameter	NH_3	Pbar	30.00 Static	Parameter	HF
Date	July 19, 2022	Operator	Justin/Christian	Date	July 19, 2022

				Y	LMV-C 1.0305
				Cp	N/A
				Pbar	30.00 Static
				Operator	Justin/Christian

Leak Check	Run 1	Run 2	Run 3
Initial	0.000	0.000	0.000
Final	0.000	0.000	0.000

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m^3)	Temperature (°F) DGM Outlet	Temperature (°F) Stack	Imp. Vol. (mL)	ΔP IN. H_2O R1	ΔP IN. H_2O R2	ΔP IN. H_2O R3
1	1023	215.5272	86					
	1123	216.0147	82					
2	1145	216.0185	78					
	1245	216.5087	88					
3	1302	216.5128	86					
	1402	216.9782	88					

Leak Check	Run 1	Run 2	Run 3
Initial	0.000	0.000	0.000
Final	0.000	0.000	0.000

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m^3)	Temperature (°F) DGM Outlet	Temperature (°F) Stack	Imp. Vol. (mL)	ΔP IN. H_2O R1	ΔP IN. H_2O R2	ΔP IN. H_2O R3
1	1077	96.2127	68					
	1123	96.6834	82					
2	1145	96.6869	79					
	1245	97.2483	87					
3	1302	97.2525	84					
	1402	97.7243	88					

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METRO VANCOUVER WTE - BURNABY B.C.

SOURCE Unit #3
PARAMETER / RUN No Partic / metals R2
DATE 9-8-22
OPERATOR: SG + LF + JC
CONTROL UNIT CAE G10 Y ,9962 ΔH@ 1,733
BAROMETRIC PRESSURE, IN. Hg 30.18
ASSUMED MOISTURE, Bw 15%

NOZZLE G-282 DIAMETER, IN. ,2887
PROBE Fc Cp ,8511
PORT LENGTH
STATIC PRESSURE, IN. H2O -18.00
STACK DIAMETER 90.90
STACK HEIGHT 30.0
INITIAL LEAK TEST ,0004@15"
FINAL LEAK TEST 1000@15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	140	140
Imp. #2	100	186	86
Imp. #3	100	122	22
Imp. #4	0	10	10
Imp. #5	100	104	4
Imp. #6	100	102	2
Imp. #7	661		
Imp. #8			

tests #2

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites: CO_2 Vol. %	Fyrites: O_2 Vol. %		
1	8:20	605.721	.26	1.26	64	305	256	253	59	4.5				
2	10	608.73	.27	1.31	65	306								
3		610.79	.33	1.59	65	307	252	252	59	4.0	9.4	10.2		
4	20	613.62	.35	1.69	65	307								
5		616.54	.34	1.65	64	306	251	253	59	3.5				
6	30	619.42	.37	1.80	67	306								
7		622.43	.37	1.77	68	306	253	255	59	4.5				
8	40	626.18	.36	1.82	69	308								
9		629.96	.32	2.03	71	307	255	254	59	5.0				
10	50	633.84	.28	2.35	72	306					9.5	10.3		
11		637.35	.24	2.18	75	303	252	251	59	5.0				
12	60	640.67	.24	1.68	75	304								
		643.62												
1		646.47	.32	1.59	75	301	250	253	59	3.5	9.5	10.1		
2	10	649.37	.33	1.64	75	302								
3		652.63	.42	2.08	75	303	253	251	59	3.5				
4	20	655.78	.39	1.93	77	305								
5		658.90	.38	1.88	78	306	255	250	58	4				
6	30	662.10	0.40	1.99	79	305					9.5	10.1		
7		665.59	0.24	1.20	79	302	254	252	58	4				
8	40	666.87	0.20	1.00	80	301								
9		669.03	0.18	0.90	80	301	255	252	59	3.5				
10	50	671.07	0.16	0.80	80	300								
11		673.17	0.17	0.85	81	300	255	249	58	3				
12		675.27	0.17	0.85	81	300								
	10:23	END test												

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CLIENT	Metro VAN	NOZZLE G-232	DIAMETER, IN. .287
SOURCE	UNIT #3	PROBE K	Cp .8511
PARAMETER / RUN No	PM10 / Metals 123		
DATE	9-8-22	PORT LENGTH	
OPERATOR:	JG / LE / JG	STATIC PRESSURE, IN. H2O	-18.00
CONTROL UNIT	CAE 610 Y .9962	STACK DIAMETER	72.90
	ΔH@ 1.733	STACK HEIGHT	30.0
BAROMETRIC PRESSURE, IN. Hg	30.18		
ASSUMED MOISTURE, Bw	15%	INITIAL LEAK TEST	.000 @ 15"
		FINAL LEAK TEST	.000 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1		136	136
Imp. #2	100	174	74
Imp. #3	120	158	38
Imp. #4	0	7	7
Imp. #5	100	102	2
Imp. #6	100	102	2
Upstream Diameters			
Downstream Diameters			
testo #2			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites: CO_2 Vol. %	Fyrites: O_2 Vol. %
	10:45	675.894										
1		678.77	.32	1.60	81	303	250	255	57	5.0		
2	10	681.72	.34	1.69	80	306						
3		684.50	.32	1.59	81	310					9.4	10.3
4	20	687.80	.40	1.98	81	310	255	253	58	5.0		
5		690.93	.38	1.88	81	310						
6	30	694.14	.40	1.98	81	310	255	251	58	4		
7		696.68	.25	1.24	82	310						
8	40	698.95	.20	0.99	82	310	255	252	57	4	9.5	10.1
9		701.17	.19	0.95	83	310						
10	50	703.26	.17	0.84	82	311	254	252	57	4		
11		705.35	.17	0.84	82	311						
12	60	707.38	.16	0.80	82	310	255	250	58	4		
1		709.92	0.25	1.24	82	310	256	252	58	4		
2	10	713.51	0.26	1.29	82	309						
3		715.39	0.32	1.60	83	309	255	249	57	5	10.5	10.2
4	20	718.40	0.35	1.74	83	309						
5		721.41	0.35	1.74	83	309	255	250	57	5		9.0
6	30	724.46	0.36	1.79	83	309						
7		728.34	0.58	2.89	83	309	255	250	57	7		
8	40	732.22	0.58	2.89	84	310						
9		736.23	0.62	3.09	84	310	255	251	57	7	11.0	9.0
10	50	739.83	0.50	2.49	84	310						
11		743.21	0.44	2.19	84	311	255	251	57	6		
12	60	746.224	0.35	1.74	84	311						
	12:48	END test										

A. Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.

SOURCE Unit #3
PARAMETER / RUN No Particle/Metals R1
DATE 9-7-22
OPERATOR: 367 LE 73C
CONTROL UNIT CAE G108 Y .9962 ΔH@ 1.733
BAROMETRIC PRESSURE, IN. Hg 30.01
ASSUMED MOISTURE, Bw 15%

NOZZLE [illegible] DIAMETER, IN. .257
PROBE [illegible] Cp .8521
PORT LENGTH
STATIC PRESSURE, IN. H2O -18.00
STACK DIAMETER 70.90
STACK HEIGHT 30.0
INITIAL LEAK TEST .000 @ 15"
FINAL LEAK TEST .000 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	[illegible]	182	182
Imp. #2	100	136	36
Imp. #3	[illegible]	104	4
Imp. #4	[illegible]	6	6
Imp. #5	100	102	2
Imp. #6	[illegible]	101	1
Imp. #7	[illegible]		
Imp. #8			

Point	Clock Time	Dry Gas Meter ft³	Pitot ΔP IN. H_2O	Orifice ΔH IN. H_2O	Temperature °F: Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites: CO_2 Vol. %	Fyrites: O_2 Vol. %		
1	[illegible]	534.660												
2	10	538.17	.48	2.39	77	301	255	250	58	7.0				
3		541.71	.49	2.44	77	302								
4	20	545.13	.47	2.34	77	302	250	253	58	6.0	9.6	9.1		
5		548.69	.48	2.39	78	303								
6	30	552.09	.45	2.24	75	302	251	253	58	6.0				
7		555.37	.42	2.09	78	303								
8	40	558.10	.29	1.44	78	304	250	252	58	5.5				
9		560.58	.24	1.19	78	304								
10	50	562.91	.21	1.05	79	303	251	254	58	4.5	9.2	10.1		
11		565.29	.22	1.10	79	302								
12	60	567.50	.19	.95	79	303	250	257	58	4.8				
		569.59	.17	.85	79	303								
1		572.18	.26	1.30	80	304	250	257	58	5.0				
2	10	574.72	.25	1.25	80	305								
3		577.36	.27	1.34	80	306	251	252	58	5.0				
4	20	579.85	.24	1.19	80	306								
5		582.34	.24	1.20	81	307	252	253	58	5.0	9.5	9.3		
6	30	584.98	.27	1.34	81	307								
7		588.51	.48	2.46	82	305	250	254	57	6.0				
8	40	592.32	.56	2.80	82	305								
9		595.82	.47	2.35	82	304	253	252	57	6.0				
10	50	599.43	.50	2.51	83	304					9.2	9.8		
11		602.82	.44	2.21	83	307	251	252	57	6.0				
12		605.993	.36	1.81	83	302								
	13:37	END test												

A. Lanfranco and Associates Inc.

RH

Client COVANTA
Source Unit 3
Parameter NH_3
Date Sept 8, 2022

Y LMU-B (1.0275)
Cp
Pbar 30.18 Static
Operator Liam/Justin

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

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m^3)	Temperature (°F) DGM Outlet	Temperature (°F) Stack	Imp. Vol. (mL)	ΔP IN. H_2O R1	ΔP IN. H_2O R2	ΔP IN. H_2O R3
1	0907	221.2730	64	304	200			
			80	300				
	1007	221.7415	85	300	269			
2	1031	221.7465	82	305	200			
			84	310				
	1131	222.2445	86	310	258			
3	1142	222.2488	83	310	200			
			86	311				
	1242	222.7418	87	310	256			

Client COVANTA
Source Unit 3
Parameter HF
Date Sept 8, 2022

Y LMU-A (1.0013)
Cp
Pbar 30.18 Static
Operator Liam/Justin

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) / (m^3)	Temperature (°F) DGM Outlet	Temperature (°F) Stack	Imp. Vol. (mL)	ΔP IN. H_2O R1	ΔP IN. H_2O R2	ΔP IN. H_2O R3
1	0907	535.4372	64	304	200			
			80	300				
	1007	535.9928	84	300				
2	1031	536.0018	83	305				
			85	310				
	1131	536.6102	86	310				
3	1142	536.6148	82	310				
			85	311				
	1242	537.1472	87	310				

CEM FIELD DATA SHEET

Client: Metro Van
Source: Units 1-2-3
Date: July 22/22

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

	N_2O	N_2O	1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	O_2	Comb Air	Low Meth	Mid Meth	High Meth
Cylinder #	284	315										
Pressure (psi)												
Expiry Date												
O_2 (%)												
CO_2 (%)												
CO (ppm)												
THC (ppm)												
SO_2 (ppm)												
NOx (ppm)	92.2	41.1										

Analyzer Range	O_2	CO_2	CO	THC	SO_2	NOx

CEM READINGS

Time	Source	O_2	CO_2	CO	THC	SO_2	NOx	Response Time (sec)
	Unit 2	July 22	* analyzed					O_2 Up
								O_2 Dn
	N2						0	CO_2 Up
	mid						41	CO_2 Dn
	high						91.9	CO Up
								CO Dn
	Run 1 0920-1020						1.4	THC Up
July 19	2 1030-1130						0.8	THC Dn
	3 1135-1235						1	SO_2 Up
								SO_2 Dn
	N2						0.1	NOx Up
	mid						41	NOx Dn
	Unit 1	July 28						
	N2						0.2	
	mid						41.6	
	high						92	
	Run 1 0940-1040						0.9	
	2 1042-1142						0.6	
	3 1145-1245						1.5	

CEM FIELD DATA SHEET

Client: Metro Van
Source: Unit 3
Date: Sept 8/22

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

	N_2	H_2	1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	O_2	Comb Air	Low Meth	Mid Meth	High Meth
Cylinder #												
Pressure (psi)												
Expiry Date												
O_2 (%)												
CO_2 (%)												
CO (ppm)												
THC (ppm)												
SO_2 (ppm)												
NOx (ppm)												

Analyzer Range	O_2	CO_2	CO	THC	SO_2	NOx

CEM READINGS

Time	Source	O_2	CO_2	CO	THC	SO_2	NOx	Response Time (sec)
	N2						0	O_2 Up
	mid						42	O_2 Dn
	high						93	CO_2 Up
								CO_2 Dn
Sept 8	Run 1	0900-1000					1.3	CO Up
	2	1005-1105					1.2	CO Dn
	3	1110-1210					1.2	THC Up
								THC Dn
	N2						0.6	SO_2 Up
	mid						42.1	SO_2 Dn
								NOx Up
								NOx Dn

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada (kPa)	Pbar Env Canada (inches of Hg)	Device (inches of Hg) Reading	Device (inches of Hg) Elevation Corrected	Difference (Env Can - Elv Corr)
LA	1-Jul-22	102.1	30.16	30.06	30.13	0.02
DS	1-Jul-22	102.1	30.16	30.04	30.11	0.04
CL	1-Jul-22	102.1	30.16	30.03	30.10	0.05
ML	1-Jul-22	102.1	30.16	30.14	30.21	-0.06
SB	1-Jul-22	102.1	30.16	30.15	30.22	-0.07
SH	1-Jul-22	102.1	30.16	30.15	30.22	-0.07
MG	1-Jul-22	102.1	30.16	30.15	30.22	-0.07
SF	1-Jul-22	102.1	30.16	30.16	30.23	-0.08
JG	1-Jul-22	102.1	30.16	30.12	30.19	-0.04
JC	1-Jul-22	102.1	30.16	30.15	30.22	-0.07
LF	1-Jul-22	102.1	30.16	30.15	30.22	-0.07

Calibrated by: Jeremy Gibbs Signature: Jeremy Gibbs Date: 01-Jul-22

Performance Specification is

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

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

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

A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

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

Date: 05-Jul-22
Barometric Pressure: 29.88 (in. Hg)
Theoretical Critical Vacuum: 14.09 (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 ----------

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
3.50	15.00	356.655	372.859	16.204	79.0	79.0	82.0	82.0
1.80	18.00	342.552	356.565	14.013	75.0	75.0	78.0	78.0
1.10	18.00	331.600	342.499	10.899	73.0	73.0	75.0	75.0
0.64	22.00	321.430	331.548	10.118	71.0	71.0	72.0	72.0
0.32	17.00	316.000	321.395	5.395	71.0	71.0	71.0	71.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
73	0.8185	15.5	79.0	72.0	75.5
63	0.5956	18.5	75.0	80.0	77.5
55	0.4606	20.0	76.0	78.0	77.0
48	0.3560	21.5	75.0	77.0	76.0
40	0.2408	22.5	70.0	72.0	71.0

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

--- DRY GAS METER --- VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	--------- ORIFICE --------- VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	-- DRY GAS METER -- CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)	--------- ORIFICE --------- CALIBRATION FACTOR dH@ Value (in H2O)	CALIBRATION FACTOR dH@ Value (mm H2O)	CALIBRATION FACTOR dH@ Variation (in H2O)	Ko (value)
15.938	451.4	15.853	449.0	16.106	0.995	-0.002	1.719	43.68	-0.014	0.731
13.828	391.6	13.817	391.3	14.090	0.999	0.003	1.689	42.90	-0.044	0.736
10.787	305.5	10.690	302.7	10.891	0.991	-0.005	1.732	44.00	-0.001	0.733
10.050	284.6	10.108	286.3	10.279	1.006	0.010	1.692	42.97	-0.041	0.731
5.359	151.8	5.308	150.3	5.348	0.990	-0.006	1.833	46.57	0.100	0.714
				Average Y--------->	**0.9962**		**Average dH@----->**	**1.733**	**44.0**	**Average Ko----->** **0.729**

TEMPERATURE CALIBRATION

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

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

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

Calibrated by: Scott Ferguson Signature: _____ Date: July 5, 2022

MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Carter Lanfranco

has successfully completed

Stack Sampling

May 2009

Date

Norma D. MacDonald

Dean
Faculty of Continuing Education and Extension

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

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

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

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

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

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

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

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

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

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

Declaration

I 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

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

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

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

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 professionals[1], 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 Michael Goods

   Title Environmental Technician

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

   Name of Association: _____ Registration # _____

3. Brief description of professional services:

   Environmental Technician - specialising in air and atmospheric sciences

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

Declaration

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

Signature: Witnessed by:

X MGoods **X**

Print Name: Michael Goods Print Name: Scott Ferguson

Date signed: 11/23/2020

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

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

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Declaration of Competency

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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

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 Shawn Harrington

Print Name: Shawn Harrington

Witnessed by:

x

Print Name: Mark Lanfranco

Date signed: November 26, 2020

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

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

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

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 professionals[1], 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 LanFranco

   Title Chief operations officer / owner

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 LanFranco

Witnessed by:

x Shawn Harrington

Print Name: Shawn Harrington

Date signed: Dec. 7/2020

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

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

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

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 professionals[1], 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 Jeremy Gibbs

   Title Environmental technician

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

   Name of Association: _____ Registration # _____

3. Brief description of professional services:
   Environmental Consultant Specialize in air and atmospheric sciences

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

Declaration

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

Signature:

X _____

Print Name: Jeremy Gibbs

Witnessed by:

X _____

Print Name: Connor Laan

Date signed: Nov 1, 2020

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

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

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

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Scott Ferguson
Date: July 5, 2022

Signature:

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft^2)
A	0.1260	0.1260	0.1270	0.0010	0.1263	0.0000870
G-165	0.1650	0.1640	0.1640	0.0010	0.1643	0.0001473
G-170	0.1700	0.1720	0.1690	0.0030	0.1703	0.0001582
G-178	0.1790	0.1800	0.1820	0.0030	0.1803	0.0001774
J	0.1890	0.1900	0.1890	0.0010	0.1893	0.0001955
E	0.1910	0.1910	0.1900	0.0010	0.1907	0.0001983
Q	0.2060	0.2050	0.2020	0.0040	0.2043	0.0002277
L	0.2090	0.2100	0.2120	0.0030	0.2103	0.0002413
G-215	0.2150	0.2140	0.2140	0.0010	0.2143	0.0002506
G-218	0.2170	0.2190	0.2200	0.0030	0.2187	0.0002608
G-221	0.2210	0.2190	0.2190	0.0020	0.2197	0.0002632
G-2231	0.2310	0.2280	0.2300	0.0030	0.2297	0.0002877
G-2232	0.2240	0.2220	0.2220	0.0020	0.2227	0.0002704
G-225	0.2220	0.2190	0.2200	0.0030	0.2203	0.0002648
G-2501	0.2490	0.2500	0.2510	0.0020	0.2500	0.0003409
P	0.2590	0.2570	0.2580	0.0020	0.2580	0.0003631
G-282	0.2910	0.2870	0.2880	0.0040	0.2887	0.0004545
G-2871	0.2860	0.2870	0.2870	0.0010	0.2867	0.0004482
G-292	0.2905	0.2890	0.2875	0.0030	0.2890	0.0004555
MV-01	0.3060	0.3040	0.3060	0.0020	0.3053	0.0005085
G-3072	0.3080	0.3080	0.3090	0.0010	0.3083	0.0005185
G-309	0.3060	0.3070	0.3070	0.0010	0.3067	0.0005129
G-3121	0.3080	0.3100	0.3110	0.0030	0.3097	0.0005230
G-345	0.3460	0.3440	0.3460	0.0020	0.3453	0.0006504
G-433	0.4320	0.4320	0.4340	0.0020	0.4327	0.0010210
P-29	0.4680	0.4680	0.4690	0.0010	0.4683	0.0011963
P-7	0.4920	0.4890	0.4920	0.0030	0.4910	0.0013149
B	0.5010	0.5020	0.5030	0.0020	0.5020	0.0013745
G-540	0.5390	0.5390	0.5390	0.0000	0.5390	0.0015845

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

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

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

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

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

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

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

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

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

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

Declaration

I Jeremy Gibbs, as a member of **Air and Waste Management Association** declare

Select one of the following:

☒ Absence from conflict of interest

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

☐ Real or perceived conflict of interest

Description and nature of conflict(s):

_____

_____

_____

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

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

_____

_____

_____

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: Jeremy G. Sss

Witnessed by:

X _____

Print name: Mark Lanfranco

Date: Dec.16, 2020

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

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

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

MOUNT ROYAL UNIVERSITY

Faculty of Continuing Education and Extension

Jeremy Shawn Gibbs

has successfully completed

Stack Sampling

35 Hours / 2019

May 22, 2019

Date

Dean
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A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: CAE JO99
Serial #: 0028-022210-1

Date: 4-Jul-22
Barometric Pressure: 29.87 (in. Hg)
Theoretical Critical Vacuum: 14.09 (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 ----------

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
3.50	15.00	361.225	376.500	15.275	92.0	90.0	94.0	92.0
1.90	15.00	406.610	417.990	11.380	92.0	90.0	88.0	86.0
1.10	15.00	394.160	402.750	8.590	84.0	83.0	85.0	84.0
0.68	15.00	404.235	411.000	6.765	85.0	85.0	86.0	85.0
0.33	15.00	377.740	382.300	4.560	88.0	92.0	95.0	98.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
73	0.8185	16.5	92.0	80.0	86.0
63	0.5956	19.5	86.0	87.0	86.5
55	0.4606	21.5	85.0	86.0	85.5
48	0.3560	23.0	86.0	86.0	86.0
40	0.2408	24.5	82.0	78.0	82.5

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

--- DRY GAS METER --- VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	--------- ORIFICE --------- VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	-- DRY GAS METER -- CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)	--------- ORIFICE --------- CALIBRATION FACTOR dH@ Value (in H2O)	CALIBRATION FACTOR dH@ Value (mm H2O)	CALIBRATION FACTOR dH@ Variation (in H2O)	Ko (value)
14.706	416.5	15.695	444.5	16.263	1.0672	0.012	1.720	43.70	-0.050	0.723
10.973	310.8	11.415	323.3	11.840	1.0403	-0.015	1.775	45.09	0.005	0.731
8.343	236.3	8.836	250.2	9.148	1.0591	0.004	1.729	43.93	-0.041	0.728
6.548	185.4	6.826	193.3	7.074	1.0424	-0.013	1.786	45.37	0.016	0.728
4.346	123.1	4.643	131.5	4.758	1.0682	0.013	1.840	46.74	0.070	0.697
				Average Y--------->	**1.0555**		**Average dH@----->**	**1.770**	**45.0**	**Average Ko----->**	**0.721**

TEMPERATURE CALIBRATION

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

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

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

Calibrated by: Liam Forrer Signature: Carter Lanfranco Date: July 4, 2022

A. Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: LMU-A

Serial #: Kimmon 186

Date: 15-Jul-22

Barometric Pressure: 30.02 (in. Hg)

Theoretical Critical Vacuum: 14.16 (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 ----------

dH (in H2O)	Time (min)	Volume Initial (m^3)	Volume Final (m^3)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
0.00	21.00	528.2222	528.5012	9.853	75.0	75.0	77.0	77.0
0.00	118.00	528.5012	530.0773	55.659	77.0	77.0	83.0	83.0
0.00	15.00	530.0773	530.2783	7.098	83.0	83.0	83.0	83.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
48	0.3560	20.0	58.0	58.0	58.0
48	0.3560	20.0	77.0	80.0	78.5
48	0.3560	20.0	80.0	83.0	81.5

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

--- DRY GAS METER ---

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)
9.734	275.7
54.583	1545.8
6.922	196.0

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)
9.861	279.3	9.646
54.344	1539.0	55.262
6.889	195.1	7.044

-- DRY GAS METER --

CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)
1.013	0.012
0.996	-0.006
0.995	-0.006

--------- ORIFICE ---------

CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)
0.000	0.00	0.000
0.000	0.00	0.000
0.000	0.00	0.000

Average Y---------> 1.0013 **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 H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Justin Ching Signature: Justin Ching Date: July 15, 2022

A. Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

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

Date: 12-Jul-22
Barometric Pressure: 29.95 (in. Hg)
Theoretical Critical Vacuum: 14.13 (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 ----------

dH (in H2O)	Time (min)	Volume Initial (m^3)	Volume Final (m^3)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
0.00	24.00	211.5322	211.9365	14.278	79.0	79.0	81.0	81.0
0.00	17.00	211.9365	212.2240	10.153	81.0	81.0	94.0	94.0
0.00	15.00	212.2240	212.4787	8.995	94.0	94.0	95.0	95.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
55	0.4606	20.0	80.0	82.0	81.0
55	0.4606	20.0	82.0	83.0	82.5
55	0.4606	20.0	83.0	84.0	83.5

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

--- DRY GAS METER ---

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)
13.969	395.6
9.797	277.5
8.570	242.7

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)
14.234	403.1	14.576
10.069	285.1	10.339
8.876	251.4	9.131

-- DRY GAS METER --

CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)
1.019	-0.008
1.028	0.000
1.036	0.008

--------- ORIFICE ---------

CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)
0.000	0.00	0.000
0.000	0.00	0.000
0.000	0.00	0.000

Average Y---------> 1.0275 **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 H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Justin Ching Signature: Date: July 12, 2022

A. Lanfranco & Associates Inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: LMU-C

Serial #: Wizit 4615

Date: 05-Jul-22

Barometric Pressure: 29.88 (in. Hg)

Theoretical Critical Vacuum: 14.09 (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 ----------

dH (in H2O)	Time (min)	Volume Initial (m^3)	Volume Final (m^3)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
0.00	16.00	93.590	93.795	7.232	69.0	69.0	71.0	71.0
0.00	23.00	93.796	94.090	10.397	71.0	71.0	73.0	73.0
0.00	18.00	94.092	94.323	8.158	74.0	74.0	78.0	78.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
48	0.3560	20.0	70.0	71.0	70.5
48	0.3560	20.0	70.0	74.0	72.0
48	0.3560	20.0	72.0	73.0	72.5

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

--- DRY GAS METER ---

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)
7.193	203.7
10.301	291.7
8.022	227.2

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)
7.389	209.3	7.437
10.607	300.4	10.706
8.297	235.0	8.383

-- DRY GAS METER --

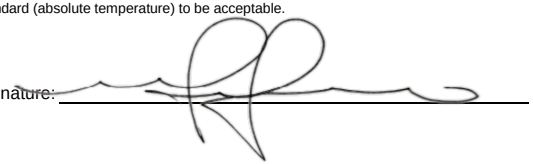
CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)
1.027	-0.003
1.030	-0.001
1.034	0.004

--------- ORIFICE ---------

CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)
0.000	0.00	0.000
0.000	0.00	0.000
0.000	0.00	0.000

Average Y---------> 1.0305 **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 H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Liam Forrer Signature:  Date: July 5, 2022

A. Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: LMU-D

Serial #: Wizit 4618

Date: 5-Jul-22

Barometric Pressure: 29.88 (in. Hg)

Theoretical Critical Vacuum: 14.09 (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 ----------

dH (in H2O)	Time (min)	Volume Initial (m^3)	Volume Final (m^3)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
0.00	27.00	63.825	64.175	12.353	73.0	73.0	74.0	74.0
0.00	18.00	64.176	64.410	8.267	74.0	74.0	76.0	76.0
0.00	25.00	64.412	64.737	11.477	75.0	75.0	78.0	78.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
48	0.3560	20.0	75.0	74.0	74.5
48	0.3560	20.0	74.0	78.0	76.0
48	0.3560	20.0	76.0	80.0	78.0

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

--- DRY GAS METER ---

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)
12.205	345.6
8.145	230.7
11.276	319.3

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)
12.423	351.8	12.598
8.270	234.2	8.410
11.465	324.7	11.703

-- DRY GAS METER --

CALIBRATION FACTOR Y Value (number)	Variation (number)
1.018	0.001
1.015	-0.001
1.017	0.000

--------- ORIFICE ---------

CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)
0.000	0.00	0.000
0.000	0.00	0.000
0.000	0.00	0.000

Average Y---------> 1.0167 **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 H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Liam Forrer Signature: Justin Ching Date: July 5, 2022

MOUNT ROYAL UNIVERSITY

Faculty of Continuing Education and Extension

Michael Eugene Goods

has successfully completed

Stack Sampling

35 Hours / 2019

May 22, 2019

Date

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Faculty of Continuing Education and Extension

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A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

Confidentiality and Impartiality Agreement

Confidentiality is legally enforceable in our client contracts for all projects and ensures that our firm, its personnel, and any outsourced bodies treat all information obtained or created during our scope of work as confidential. Our firm does not disclose information that is not public regarding a client or responsible party to a third party without express consent of that party. Our firm informs the client and responsible party before placing any information in the public domain and will use equipment and facilities to ensure the secure handling of confidential information.

Impartiality Our firm's policies and procedures regarding conflict of interest (COI) and safeguarding impartiality reflects the commitment to act impartially in all activities. Our firm understands that the principles of COI and impartiality are essential to providing independent services. Our team is required to personally declare any potential threat to impartiality or potential COI. Should a potential COI or threat to impartiality be identified, our team will work to determine mitigation measures, if applicable.

This agreement is made by and between

Michael Coats _____ (1st Party)

AND

A. Lanfranco and Associates Inc.
_____ (2nd Party)

As of 24 Nov ,2020

#101 9488 189 St. - Surrey, B.C. Canada - V4N 4W7 - 604 881 2582 - email: mark.lanfranco@alanfranco.com

Pitot Tube Calibration

Date: 5-Jul-22
Pbar (in.Hg): 29.91

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

Pitot ID: **7A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.035	0.050	12.5	0.8283	0.0098
0.130	0.180	24.1	0.8413	0.0032
0.250	0.350	33.4	0.8367	0.0014
0.480	0.660	46.3	0.8443	0.0061
0.720	1.000	56.7	0.8400	0.0019
		Average :	0.8381	0.0045

Pitot ID: **ST 8A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.035	0.050	12.5	0.8283	0.0044
0.140	0.200	25.0	0.8283	0.0044
0.250	0.350	33.4	0.8367	0.0040
0.600	0.850	51.7	0.8318	0.0009
0.710	0.990	56.3	0.8384	0.0057
		Average :	0.8327	0.0039

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.035	0.050	12.5	0.8283	0.0046
0.100	0.140	21.1	0.8367	0.0038
0.230	0.320	32.0	0.8393	0.0064
0.430	0.610	43.8	0.8312	0.0017
0.680	0.970	55.1	0.8289	0.0040
		Average :	0.8329	0.0041

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	13.4	0.8443	0.0032
0.140	0.190	25.0	0.8498	0.0087
0.270	0.380	34.7	0.8345	0.0066
0.500	0.700	47.2	0.8367	0.0044
0.720	1.000	56.7	0.8400	0.0010
		Average :	0.8411	0.0048

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

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.040	0.055	16.3	0.8443	0.0063
0.120	0.160	19.9	0.8574	0.0067
0.200	0.270	25.3	0.8521	0.0014
0.430	0.580	35.8	0.8524	0.0018
0.710	0.970	48.4	0.8470	0.0036
		Average :	0.8506	0.0040

Pitot ID: **ST 8C**

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

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.040	0.055	13.4	0.8443	0.0068
0.130	0.180	16.3	0.8413	0.0098
0.250	0.335	33.4	0.8552	0.0041
0.630	0.840	30.5	0.8574	0.0063
0.690	0.920	47.0	0.8574	0.0063
		Average :	0.8511	0.0066

Pitot ID:

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

* Average absolute deviation must not exceed 0.01.

Calibrated by: Justin Ching Signature: Justin Ching Date: July 5, 2022

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

BCIT

Shawn Harrington

has met the requirements of

Stack Testing for Pollutants

(CHSC 7760)

School of Process, Energy and Natural Resources
Chemical Sciences Program

Endorsed by:

Greater Vancouver Regional District

Environment Canada Environnement Canada

Province of British Columbia
Ministry of Environment, Lands and Parks

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

JUNE 21, 2001
Dated

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Conflict of Interest Disclosure Statement

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

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

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

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

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

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

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

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

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

Declaration

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

Select one of the following:

☒ Absence from conflict of interest

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

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

☐ 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 Shawn Harrington

Print name: Shawn Harrington

Witnessed by:

X

Print name: Mark Lanfranco

Date: Dec.16, 2020

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

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

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

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Daryl Sampson

Date: 30-Jun-22

Signature: Daryl Sampson

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator			Temperature Settings (degrees F)													
			32		100		200		300		500		800		1700	
Device	**ALA #**	**Serial #**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**
Omega HH11A	3	300132	33	0.20%	99.5	-0.09%	201	0.15%	301.5	0.20%	498	-0.21%	798.2	-0.14%	1696	-0.19%
Omega HH11A	4	200167	32	0.00%	98.5	-0.27%	200.5	0.08%	301	0.13%	499	-0.10%	799	-0.08%	1695	-0.23%
Omega HH11A	6	600059	32	0.00%	99.8	-0.04%	201.5	0.23%	301.5	0.20%	498.4	-0.17%	799.5	-0.04%	1696	-0.19%
TPI 341K	7	2.0315E+10	31	-0.20%	99.2	-0.14%	199.6	-0.06%	299.8	-0.03%	499.6	-0.04%	796.4	-0.29%	1695	-0.23%
TPI 341K	8	2.0313E+10	32	0.00%	99.2	-0.14%	200.3	0.05%	300.5	0.07%	490.2	-1.02%	797.6	-0.19%	1695	-0.23%
Cont Cmpny	10	102008464	30.5	-0.31%	98	-0.36%	199.3	-0.11%	298.5	-0.20%	498	-0.21%	796.8	-0.25%	1697	-0.14%
Omega HH11	14	409426	31.5	-0.10%	99.5	-0.09%	199	-0.15%	299	-0.13%	499	-0.10%	797	-0.24%	1698	-0.09%
TPI 341K	16	400120029	31	-0.20%	99	-0.18%	199.1	-0.14%	298.4	-0.21%	501	0.10%	799.8	-0.02%	1700	0.00%
TPI 341K	18	2.0329E+10	31.4	-0.12%	99.4	-0.11%	198.5	-0.23%	299.3	-0.09%	499.5	-0.05%	799.2	-0.06%	1698	-0.09%
TPI 341K	20	2.0329E+10	30.6	-0.28%	98.5	-0.27%	198.2	-0.27%	299.1	-0.12%	498.2	-0.19%	798	-0.16%	1697	-0.14%
TPI 341K	22	2.0329E+10	31.2	-0.16%	99.2	-0.14%	198.5	-0.23%	299	-0.13%	498.4	-0.17%	798	-0.16%	1698	-0.09%
Reference device is a NIST certified digital thermocouple calibrator																
Variation expressed as a percentage of the absolute temperature must be within 1.5 %																