A.Lanfranco & Associates Inc.
Environmental Consultants

Prepared for

METRO VANCOUVER

Metrotower III 4730 Kingsway
Burnaby, BC V5H 0C6

WASTE TO ENERGY FACILITY

Appendices of Compliance Emissions Testing Report

February 2019 Survey

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 Exova Labs, Surrey, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N_2O) analysis conducted at Maxxam Analytics, Mississauga, Ont.
- Particulate analysis conducted at A. Lanfranco and Associates Inc., Surrey, BC.
- THC/VOC analysis conducted at ALS Environmental in Simi Valley, California
- Ammonium (for ammonia NH_3) conducted at Exova Labs, Surrey, B.C.
- Chain of Custody protocols followed for all samples.
- Excellent blank values for all sample types. All samples blank corrected.

Sample Type	**Blank Value**		
First Survey 2019	**Unit 1**	**Unit 2**	**Unit 3**
Filter	0.5 mg	0.9 mg	0.5 mg
Front Half Washings	-0.7 mg	-0.8 mg	-0.8 mg
Mercury Front	<0.02 ug	<0.02 ug	<0.02 ug
Mercury Back	<0.25 ug	<0.23 ug	<0.17 ug
Trace Metals Front *	<31.1 ug	<44.3 ug	<34.4 ug
Trace Metals Back*	<27.0 ug	<33.1 ug	<20.0 ug
Fluoride	<1.7 ug	<1.8 ug	<1.8 ug

Sum of all reported elements except Hg*

APPENDIX - B

LABORATORY RESULTS

Exova
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Report Transmission Cover Page

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334427**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Reagent Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381208
Sampled By:		Proj. Acct. code:			
Company:					

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

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

Notes To Clients:

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Exova

Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334427**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Reagent Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381208
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334427-1	1334427-2	1334427-3
Sample Date	Feb 11, 2019	Feb 11, 2019	Feb 11, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	1	2	<1.0	5
Antimony		µg	<0.5	0.5	<0.5	2.5
Arsenic		µg	0.63	<0.2	0.4	1
Cadmium		µg	<0.05	<0.05	<0.05	0.25
Chromium		µg	0.12	0.19	<0.04	0.2
Cobalt		µg	0.2	0.1	0.1	0.25
Copper		µg	0.06	0.4	0.08	0.25
Lead		µg	<0.3	1.5	<0.3	1.5
Manganese		µg	0.06	0.1	<0.05	0.25
Nickel		µg	<0.1	11	<0.1	0.5
Phosphorus		µg	<0.5	<0.5	<0.5	2.5
Selenium		µg	<0.3	<0.3	<0.3	1.5
Tellurium		µg	<0.4	<0.4	<0.4	2
Thallium		µg	<0.3	<0.3	<0.3	1.5
Vanadium		µg	<0.2	<0.2	<0.2	1
Zinc		µg	<0.1	<0.1	<0.1	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	<5	8	10	5
Antimony		µg	<3	4	<2	2.5
Arsenic		µg	<1	<1	<1.0	1
Cadmium		µg	<0.3	<0.3	<0.2	0.25
Chromium		µg	<0.2	0.54	<0.2	0.2
Cobalt		µg	0.3	0.7	<0.2	0.25
Copper		µg	<0.3	<0.3	<0.2	0.25
Lead		µg	<2	2	<1	1.5
Manganese		µg	0.4	0.8	0.4	0.25
Nickel		µg	<0.5	<0.5	<0.5	0.5
Phosphorus		µg	20	20	20	2.5
Selenium		µg	<2	<2	<1	1.5
Tellurium		µg	2.7	4.1	3.5	2
Thallium		µg	<2	<2	6.2	1.5
Vanadium		µg	<1	<1	<1.0	1
Zinc		µg	<0.5	0.8	<0.5	0.5
Volume	Sample	mL	200	198	295	
Volume	aliquot volume	mL	150	148	245	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.08	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	

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Analytical Report

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	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Reagent Blanks	Date Received:	Feb 21, 2019
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Attn:	Missy	P.O.:		Report Number:	2381208
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334427-1	1334427-2	1334427-3
Sample Date	Feb 11, 2019	Feb 11, 2019	Feb 11, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Reagent Blank Unit 1	Reagent Blank Unit 2	Reagent Blank Unit 3
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	0.03	<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	200	198	295	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.08	<0.08	<0.1	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	98	100	98	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.008	<0.008	<0.008	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	257	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	0.06	8.58	3.74	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	3	1	

Approved by:

Mathieu Simoneau
Operations Manager

Data have been validated by Analytical Quality Control and Exova'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	Project ID:		Lot ID:	**1334427**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Reagent Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381208
Sampled By:		Proj. Acct. code:			
Company:					

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 27, 2019	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Mar 5, 2019	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 28, 2019	Exova Surrey
Metals in Stack Samples - Back half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA

Exova

Testing
Advising
Assuring

Lot: 1334427 COC

umber

ıation Sheet

er to proceed with analysis

Billing Address:			Copy of Report To:		Copy of invoice:
Company:	A. Lanfranco and Associates		Company:		Mail invoice to this
Address:	Unit 101 9488 189 St Surrey, BC V4N 4W7	QA/QC Report ☐	Address:		address for approval ☐
		Report Result:			Report Result:
Attention:	Mark Lanfranco	Fax ☐	Attention:		Fax ☐
Phone:	604-881-2582	Mail ☐	Phone:		Mail ☐
Fax:	604-881-2581	Courier ☐	Fax:		Courier ☐
Cell:		e-mail ☐	Cell:		e-mail ☐
e-mail:	mark.lanfranco@alanfranco.com	e-Service ☐	e-mail:		e-Service ☐

Information to be included on Report and Invoice

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

RUSH **Please contact the laboratory to confirm rush dates and times before submitting samples.**

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All Analysis ☐ or As indicated ☐
Date Required: _____
Signature: _____
Exova Authorization: _____

Sample Custody (Please Print)
Sampled by:
Company Signature

I authorize Exova to proceed with the work work indicated on this form:
Date: Initial:

Received by: Sample Temp. 22.2°C
Waybill #: FEB 21 '19 11:45 Date
Company Time

Special Instructions / Comments

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

Please indicate which regulations you are required to meet: _____

FOR LAB USE ONLY
Condiftion of containers/coolers upon arrival at lab

☐ Check here if Exova is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you are testing POTABLE WATER for **HUMAN CONSUMPTION**

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg					
							↓	Enter tests above (✓ relevant samples below)										
1	Reagent Blank Unit 1			11-Feb-19			5	✓	✓	✓	✓	✓	✓					
2																		
3	Reagent Blank Unit 2			11-Feb-19			5	✓	✓	✓	✓	✓	✓					
4																		
5	Reagent Blank Unit 3			11-Feb-19			5	✓	✓	✓	✓	✓	✓					
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

NOTE: All hazardous samples must be labelled according to WHIMIS guidelines.

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Report Transmission Cover Page

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334451**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Filter Reagent Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Feb 28, 2019
Attn:	Missy	P.O.:		Report Number:	2381232
Sampled By:		Proj. Acct. code:			
Company:					

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

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

Notes To Clients:

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334451**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Filter Reagent Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Feb 28, 2019
Attn:	Missy	P.O.:		Report Number:	2381232
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334451-1	1334451-2	1334451-3
Sample Date	Feb 11, 2019	Feb 11, 2019	Feb 11, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Reagent Blank Unit 1 Container 1 (filter)	Reagent Blank Unit 2 Container 1 (filter)	Reagent Blank Unit 3 Container 1 (filter)
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	1	<1.0	1	5
Antimony		µg	<0.5	<0.5	<0.5	2.5
Arsenic		µg	<0.2	0.2	<0.2	1
Cadmium		µg	<0.05	<0.05	<0.05	0.25
Chromium		µg	0.085	<0.04	<0.04	0.2
Cobalt		µg	0.1	0.2	0.2	0.25
Copper		µg	<0.05	<0.05	<0.05	0.25
Lead		µg	<0.3	<0.3	<0.3	1.5
Manganese		µg	<0.05	<0.05	<0.05	0.25
Nickel		µg	<0.1	<0.1	<0.1	0.5
Phosphorus		µg	25	24	25	2.5
Selenium		µg	1.2	<0.3	<0.3	1.5
Tellurium		µg	<0.4	<0.4	<0.4	2
Thallium		µg	<0.3	<0.3	<0.3	1.5
Vanadium		µg	<0.2	<0.2	<0.2	1
Zinc		µg	<0.1	<0.1	0.3	0.5
Mercury by CVAA						
Mercury	As Tested	µg/L	<0.05	0.33	0.68	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 1B	µg/sample	<0.02	0.1	0.2	

Approved by:

Mathieu Simoneau
Operations Manager

Data have been validated by Analytical Quality Control and Exova'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	Project ID:		Lot ID:	**1334451**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Filter Reagent Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Feb 28, 2019
Attn:	Missy	P.O.:		Report Number:	2381232
Sampled By:		Proj. Acct. code:			
Company:					

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA

Please direct any inquiries regarding this report to our Client Services Group or to the Operations Manager at the coordinates indicated at the top left of this page.
Results relate only to samples as submitted.

Exova

Testing
Advising
Assuring

Lot: 1334451 COC

mber

ation Sheet

r to proceed with analysis

Billing Address:			Copy of Report To:		Copy of invoice:
Company:	A. Lanfranco and Associates		Company:		Mail invoice to this
Address:	Unit 101 9488 189 St Surrey, BC V4N 4W7	QA/QC Report ☐	Address:		address for approval ☐
		Report Result:			Report Result:
Attention:	Mark Lanfranco	Fax ☐	Attention:		Fax ☐
Phone:	604-881-2582	Mail ☐	Phone:		Mail ☐
Fax:	604-881-2581	Courier ☐	Fax:		Courier ☐
Cell:		e-mail ☐	Cell:		e-mail ☐
e-mail:	mark.lanfranco@alanfranco.com	e-Service ☐	e-mail:		e-Service ☐

Information to be included on Report and Invoice

Project ID:
Project Name: Metro Vancouver WTE
Project Location: Filter Reagent Blanks
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID:

RUSH **Please contact the laboratory to confirm rush dates and times before submitting samples.**

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All Analysis ☐ or As indicated ☐

Date Required: _____

Signature: _____

Exova Authorization: _____

Sample Custody (Please Print)

Sampled by:

Company Signature

I authorize Exova to proceed with the work work indicated on this form:

Date: Initial:

Received by:	Sample Temp. 22.2°C
Waybill #:	Date
Company FEB 21 '19 12:06	Time

Special Instructions / Comments

* Please report ug/sample

Please indicate which regulations you are required to meet: _____

FOR LAB USE ONLY

Condiftion of containers/coolers upon arrival at lab

☐ Check here if Exova is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you are testing POTABLE WATER for **HUMAN CONSUMPTION**

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Enter tests above (✓ relevant samples below) ICAP	Hg								
1	Reagent Blank Unit 1 Container 1(filter)			11-Feb-19			1	✓	✓								
2																	
3	Reagent Blank Unit 2 Container 1 (filter)			11-Feb-19			1	✓	✓								
4																	
5	Reagent Blank Unit 3 Container 1 (filter)			11-Feb-19			1	✓	✓								
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

NOTE: All hazardous samples must be labelled according to WHIMIS guidelines.

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Report Transmission Cover Page

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334447**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Field Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381229
Sampled By:		Proj. Acct. code:			
Company:					

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

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Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334447**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Field Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381229
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334447-1	1334447-2	1334447-3
Sample Date	Feb 13, 2019	Feb 14, 2019	Feb 15, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Field Blank Unit 1 (Beaker (MV Unit 1 Blank) + 4 Bottles)	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 4 Bottles)
Matrix	Stack Samples	Stack Samples	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Front Half Metals Fraction 1A						
Aluminum		µg	2	14	2	5
Antimony		µg	<0.5	<0.5	<0.5	2.5
Arsenic		µg	<0.2	0.3	0.3	1
Cadmium		µg	<0.05	<0.05	<0.05	0.25
Chromium		µg	0.098	<0.04	0.05	0.2
Cobalt		µg	0.06	0.1	<0.05	0.25
Copper		µg	<0.05	<0.05	<0.05	0.25
Lead		µg	<0.3	<0.3	<0.3	1.5
Manganese		µg	<0.05	0.05	<0.05	0.25
Nickel		µg	<0.1	<0.1	<0.1	0.5
Phosphorus		µg	29	30	32	2.5
Selenium		µg	<0.3	<0.3	<0.3	1.5
Tellurium		µg	<0.4	<0.4	<0.4	2
Thallium		µg	<0.3	<0.3	<0.3	1.5
Vanadium		µg	<0.2	<0.2	<0.2	1
Zinc		µg	0.2	0.2	0.2	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	7	9	<5	5
Antimony		µg	<2	<2	<2	2.5
Arsenic		µg	<1.0	3.5	<1.0	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	<0.2	0.62	<0.2	0.2
Cobalt		µg	0.3	<0.2	<0.2	0.25
Copper		µg	<0.2	<0.2	<0.2	0.25
Lead		µg	<1	<1	<1	1.5
Manganese		µg	0.4	0.8	0.4	0.25
Nickel		µg	<0.5	<0.5	<0.5	0.5
Phosphorus		µg	20	20	20	2.5
Selenium		µg	2	<1	1	1.5
Tellurium		µg	2.6	6.0	3.5	2
Thallium		µg	3.1	1	2	1.5
Vanadium		µg	<1.0	<1.0	<1.0	1
Zinc		µg	<0.5	<0.5	<0.5	0.5
Volume	Sample	mL	285	280	282	
Volume	aliquot volume	mL	235	230	232	
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	Project ID:		Lot ID:	**1334447**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Field Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381229
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334447-1	1334447-2	1334447-3
Sample Date	Feb 13, 2019	Feb 14, 2019	Feb 15, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Field Blank Unit 1 (Beaker (MV Unit 1 Blank) + 4 Bottles)	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 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	285	280	282	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.1	<0.1	<0.1	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	164	164	126	
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	0.18	<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	0.1	<0.04	
Mercury	As Tested	µg/L	0.36	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	0.1	<0.02	<0.02	

Approved by:

Mathieu Simoneau
Operations Manager

Data have been validated by Analytical Quality Control and Exova'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	Project ID:		Lot ID:	**1334447**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Field Blanks	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381229
Sampled By:		Proj. Acct. code:			
Company:					

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 27, 2019	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Mar 5, 2019	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 28, 2019	Exova Surrey
Metals in Stack Samples - Back half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA

Exova

Testi
Adv
Assu

Lot: 1334447 COC

Number

mation Sheet

rder to proceed with analysis

Billing Address:		Copy of Report To:		Copy of invoice:
Company:	A. Lanfranco and Associates	Company:		Mail invoice to this
Address:	Unit 101 9488 189 St Surrey, BC V4N 4W7	Address:		address for approval
	QA/QC Report			
	Report Result:			Report Result:
Attention:	Mark Lanfranco	Attention:		
Phone:	604-881-2582	Phone:		
Fax:	604-881-2581	Fax:		
Cell:		Cell:		
e-mail:	mark.lanfranco@alanfranco.com	e-mail:		
	Fax / Mail / Courier / e-mail / e-Service			Fax / Mail / Courier / e-mail / e-Service

Information to be included on Report and Invoice

Project ID:
Project Name: Metro Vancouver WTE
Project Location: Field Blanks
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID:

RUSH **Please contact the laboratory to confirm rush dates and times before submitting samples.**

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All Analysis ☐ or As indicated ☐

Date Required: _____

Signature: _____

Exova Authorization: _____

Sample Custody (Please Print)

Sampled by:

Company Signature

I authorize Exova to proceed with the work work indicated on this form:

Date: Initial:

Received by: Sample Temp. 22.2°C

Waybill #: FEB 21 '19 12:30 Date

Company Time

Special Instructions / Comments

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

Please indicate which regulations you are required to meet: _____

FOR LAB USE ONLY
Condiftion of containers/coolers upon arrival at lab

☐ Check here if Exova is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you are testing POTABLE WATER for HUMAN CONSUMPTION

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg					
							↓	Enter tests above (✓ relevant samples below)										
1	Field Blank Unit 1 (Beaker (MV Unit-1 Blank)+ 4 Bottles)			13-Feb-19			5	✓	✓	✓	✓	✓	✓					
2																		
3	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)			14-Feb-19			5	✓	✓	✓	✓	✓	✓					
4																		
5	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 4 Bottles)			15-Feb-19			5	✓	✓	✓	✓	✓	✓					
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

NOTE: All hazardous samples must be labelled according to WHIMIS guidelines.

Page _____ of _____

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Report Transmission Cover Page

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

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

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Agreement	PDF	COA
Email - Single Report	PDF	COR

Notes To Clients:

- Feb 28, 2019 - Sample 1334430-4; 6502397: Reduction of analytical volume was necessary for mercury analysis to bring results within the analytical range for sample. Detection limits are adjusted accordingly.

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334430-1	1334430-2	1334430-3
Sample Date	Feb 11, 2019	Feb 13, 2019	Feb 13, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 1 Run 1 (beaker (MV Unit 1 R-1) + 4 bottles)	Unit 1 Run 2 (beaker (MV Unit 1 R-2) + 4 bottles)	Unit 1 Run 3 (beaker (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	6.9	7.7	3	5
Antimony		µg	<0.5	0.6	0.6	2.5
Arsenic		µg	<0.2	0.4	<0.2	1
Cadmium		µg	0.06	0.06	<0.05	0.25
Chromium		µg	0.32	0.17	0.50	0.2
Cobalt		µg	0.2	0.05	0.2	0.25
Copper		µg	0.53	0.3	0.1	0.25
Lead		µg	3.4	0.4	0.5	1.5
Manganese		µg	0.4	0.3	0.2	0.25
Nickel		µg	0.3	0.2	0.71	0.5
Phosphorus		µg	34	28	29	2.5
Selenium		µg	<0.3	<0.3	<0.3	1.5
Tellurium		µg	<0.4	<0.4	<0.4	2
Thallium		µg	<0.3	<0.3	<0.3	1.5
Vanadium		µg	<0.2	<0.2	<0.2	1
Zinc		µg	6.0	5.6	3.9	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	39	20	9	5
Antimony		µg	2	<2	3	2.5
Arsenic		µg	<0.9	<0.9	<0.9	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	0.59	0.98	0.61	0.2
Cobalt		µg	0.5	<0.2	0.3	0.25
Copper		µg	0.8	<0.2	<0.2	0.25
Lead		µg	<1	<1	<1	1.5
Manganese		µg	11	1	1	0.25
Nickel		µg	<0.4	0.5	<0.4	0.5
Phosphorus		µg	25	23	20	2.5
Selenium		µg	6.6	<1	<1	1.5
Tellurium		µg	2	3.5	2.9	2
Thallium		µg	<1	2	<1	1.5
Vanadium		µg	<0.9	<0.9	<0.9	1
Zinc		µg	4.0	9.3	2	0.5
Volume	Sample	mL	722	685	710	
Volume	aliquot volume	mL	672	635	660	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.55	0.44	0.17	0.05

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334430-1	1334430-2	1334430-3
Sample Date	Feb 11, 2019	Feb 13, 2019	Feb 13, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 1 Run 1 (beaker (MV Unit 1 R-1) + 4 bottles)	Unit 1 Run 2 (beaker (MV Unit 1 R-2) + 4 bottles)	Unit 1 Run 3 (beaker (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	0.2	0.2	0.07	
Mercury	As Tested	µg/L	1.26	1.12	0.50	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	722	685	710	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	7	6	3	
Mercury	As Tested	µg/L	0.48	1.80	0.34	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	180	122	140	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	0.1	0.4	0.08	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	1000	1000	1000	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.08	<0.08	
Mercury	As Tested	µg/L	1.48	2.27	0.52	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	0.5	0.7	0.2	

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334430-4	1334430-5	1334430-6
Sample Date	Feb 13, 2019	Feb 14, 2019	Feb 14, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 2 Run 1 (beaker (MV Unit 2 R-1) + 4 bottles)	Unit 2 Run 2 (beaker (MV Unit 2 R-2) + 4 bottles)	Unit 2 Run 3 (beaker (MV Unit 2 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	2	2	4	5
Antimony		µg	<0.5	<0.5	<0.5	2.5
Arsenic		µg	0.58	<0.2	<0.2	1
Cadmium		µg	<0.05	0.05	<0.05	0.25
Chromium		µg	0.46	0.36	0.39	0.2
Cobalt		µg	0.2	0.08	0.1	0.25
Copper		µg	0.09	<0.05	0.1	0.25
Lead		µg	<0.3	<0.3	<0.3	1.5
Manganese		µg	0.1	0.2	0.4	0.25
Nickel		µg	0.4	0.50	1.2	0.5
Phosphorus		µg	31	31	31	2.5
Selenium		µg	<0.3	<0.3	<0.3	1.5
Tellurium		µg	<0.4	<0.4	<0.4	2
Thallium		µg	<0.3	<0.3	<0.3	1.5
Vanadium		µg	<0.2	<0.2	<0.2	1
Zinc		µg	1.1	1.1	3.6	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	44	10	20	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	2.44	0.78	0.88	0.2
Cobalt		µg	<0.2	<0.2	<0.2	0.25
Copper		µg	<0.2	<0.2	1	0.25
Lead		µg	2	1	<1	1.5
Manganese		µg	14	1	5.4	0.25
Nickel		µg	1	<0.4	<0.4	0.5
Phosphorus		µg	20	20	23	2.5
Selenium		µg	<1	<1	<1	1.5
Tellurium		µg	6.3	2	2.2	2
Thallium		µg	<1	<1	6.1	1.5
Vanadium		µg	<0.9	<0.9	<0.9	1
Zinc		µg	15	2.1	10	0.5
Volume	Sample	mL	735	740	835	
Volume	aliquot volume	mL	685	690	785	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.08	0.13	0.18	0.05

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	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334430-4	1334430-5	1334430-6
Sample Date	Feb 13, 2019	Feb 14, 2019	Feb 14, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 2 Run 1 (beaker (MV Unit 2 R-1) + 4 bottles)	Unit 2 Run 2 (beaker (MV Unit 2 R-2) + 4 bottles)	Unit 2 Run 3 (beaker (MV Unit 2 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	0.03	0.05	0.07	
Mercury	As Tested	µg/L	1.20	0.46	0.41	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	735	740	835	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	7	3	3	
Mercury	As Tested	µg/L	73.5	0.21	1.09	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	152	190	158	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	2	0.06	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	1000	1000	1000	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	0.08	<0.08	<0.08	
Mercury	As Tested	µg/L	17.9	0.24	<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	0.6	0.08	<0.02	

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334430-7	1334430-8	1334430-9
Sample Date	Feb 14, 2019	Feb 15, 2019	Feb 15, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 3 Run 1 (beaker (MV Unit 3 R-1) + 4 bottles)	Unit 3 Run 2 (beaker (MV Unit 3 R-2) + 4 bottles)	Unit 3 Run 3 (beaker (MV Unit 3 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	6.6	2	3	5
Antimony		µg	<0.5	<0.5	0.5	2.5
Arsenic		µg	<0.2	<0.2	0.4	1
Cadmium		µg	<0.05	<0.05	0.05	0.25
Chromium		µg	0.51	0.24	0.23	0.2
Cobalt		µg	0.10	0.1	0.1	0.25
Copper		µg	0.08	0.2	0.2	0.25
Lead		µg	<0.3	<0.3	<0.3	1.5
Manganese		µg	0.2	0.1	0.2	0.25
Nickel		µg	0.4	0.2	0.4	0.5
Phosphorus		µg	34	28	35	2.5
Selenium		µg	<0.3	0.3	0.3	1.5
Tellurium		µg	<0.4	<0.4	<0.4	2
Thallium		µg	<0.3	<0.3	<0.3	1.5
Vanadium		µg	<0.2	<0.2	<0.2	1
Zinc		µg	2.3	1.4	1.4	0.5
Back Half Metals Fraction 2A						
Aluminum		µg	10	20	20	5
Antimony		µg	<2	<2	<2	2.5
Arsenic		µg	<0.9	<0.9	2	1
Cadmium		µg	<0.2	<0.2	<0.2	0.25
Chromium		µg	0.42	<0.2	0.50	0.2
Cobalt		µg	<0.2	0.3	<0.2	0.25
Copper		µg	<0.2	2.7	<0.2	0.25
Lead		µg	<1	2.2	2.3	1.5
Manganese		µg	0.8	1	6.0	0.25
Nickel		µg	<0.4	5.0	0.9	0.5
Phosphorus		µg	20	20	24	2.5
Selenium		µg	<1	<1	<1	1.5
Tellurium		µg	3.2	3.6	4.1	2
Thallium		µg	<1	2	2	1.5
Vanadium		µg	<0.9	<0.9	<0.9	1
Zinc		µg	3.8	8.5	5.3	0.5
Volume	Sample	mL	840	755	820	
Volume	aliquot volume	mL	790	705	770	
Mercury by CVAA						
Mercury	As Tested	µg/L	0.23	0.06	<0.05	0.05

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: Surrey@exova.com
W: www.exova.com

Analytical Report

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Reference Number	1334430-7	1334430-8	1334430-9
Sample Date	Feb 14, 2019	Feb 15, 2019	Feb 15, 2019
Sample Time	NA	NA	NA
Sample Location			
Sample Description	Unit 3 Run 1 (beaker (MV Unit 3 R-1) + 4 bottles)	Unit 3 Run 2 (beaker (MV Unit 3 R-2) + 4 bottles)	Unit 3 Run 3 (beaker (MV Unit 3 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	0.09	0.02	<0.02	
Mercury	As Tested	µg/L	0.94	1.12	0.47	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	740	755	820	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	6	7	3	
Mercury	As Tested	µg/L	0.20	0.23	0.90	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	172	178	188	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	0.06	0.07	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	1000	1000	1000	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.08	<0.08	
Mercury	As Tested	µg/L	0.24	0.51	<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	0.08	0.2	<0.02	

Approved by:

Mathieu Simoneau
Operations Manager

Data have been validated by Analytical Quality Control and Exova'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.

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

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F: +1 (604) 514-3323
E: Surrey@exova.com
W: www.exova.com

Methodology and Notes

Bill To:	A. Lanfranco & Associates	Project ID:		Lot ID:	**1334430**
	#101, 9488 - 189 Street	Project Name:	Metro Vancouver WTE	Control Number:	
	Surrey, BC, Canada	Project Location:	Metals and Hg	Date Received:	Feb 21, 2019
	V4N 4W7	LSD:		Date Reported:	Mar 6, 2019
Attn:	Missy	P.O.:		Report Number:	2381210
Sampled By:		Proj. Acct. code:			
Company:					

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 26, 2019	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 27, 2019	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	*	Metals Emissions from Stationary Sources, 29	Mar 5, 2019	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 28, 2019	Exova Surrey
Metals in Stack Samples - Back half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	*	Metals Emissions from Stationary Sources, 29	Feb 22, 2019	Exova Surrey

** Reference Method Modified*

References

EMC	Emission Measurement Center of EPA

Comments:

- Feb 28, 2019 - Sample 1334430-4; 6502397: Reduction of analytical volume was necessary for mercury analysis to bring results within the analytical range for sample. Detection limits are adjusted accordingly.

Exova Testing Advising Assuring

Lot: 1334430 COC ıber

ıtion Sheet

to proceed with analysis

Billing Address:		Copy of Report To:		Copy of invoice:
Company:	A. Lanfranco and Associates	Company:		Mail invoice to this
Address:	Unit 101 9488 189 St Surrey, BC V4N 4W7	Address:		address for approval ☐
	QA/QC Report ☐			
	Report Result:			Report Result:
Attention:	Mark Lanfranco	Attention:		Fax ☐
Phone:	604-881-2582	Phone:		Mail ☐
Fax:	604-881-2581	Fax:		Courier ☐
Cell:		Cell:		e-mail ☐
e-mail:	mark.lanfranco@alanfranco.com	e-mail:		e-Service ☐
	e-Service ☐			

Information to be included on Report and Invoice

Project ID:
Project Name: Metro Vancouver WTE
Project Location: Metals and Hg
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID:

RUSH **Please contact the laboratory to confirm rush dates and times before submitting samples.**

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All Analysis ☐ or As indicated ☐
Date Required: _____
Signature: _____
Exova Authorization: _____

Sample Custody (Please Print)
Sampled by:
Company Signature
I authorize Exova to proceed with the work work indicated on this form:
Date: Initial:
Received by: Sample Temp. 22.2°C
Waybill #: FEB 21 '19 11:36 Date
Company Time

Special Instructions / Comments

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

Please indicate which regulations you are required to meet: _____

FOR LAB USE ONLY
Condiftion of containers/coolers upon arrival at lab

☐ Check here if Exova is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you are testing POTABLE WATER for **HUMAN CONSUMPTION**

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg						
							↓	Enter tests above (✓ relevant samples below)											
1	Unit 1 Run 1 (Beaker (MV Unit 1 R-1) + 4 Bottles)			11-Feb-18			5	✓	✓	✓	✓	✓	✓						
2	Unit 1 Run 2 (Beaker (MV Unit 1 R-2) + 4 Bottles)			13-Feb-19			5	✓	✓	✓	✓	✓	✓						
3	Unit 1 Run 3 (Beaker (MV Unit 1 R-3) + 4 Bottles)			13-Feb-19			5	✓	✓	✓	✓	✓	✓						
4																			
5	Unit 2 Run 1 (Beaker (MV Unit 2 R-1) + 4 Bottles)			13-Feb-19			5	✓	✓	✓	✓	✓	✓						
6	Unit 2 Run 2 (Beaker (MV Unit 2 R-2) + 4 Bottles)			14-Feb-19			5	✓	✓	✓	✓	✓	✓						
7	Unit 2 Run 3 (Beaker (MV Unit 2 R-3) + 4 Bottles)			14-Feb-19			5	✓	✓	✓	✓	✓	✓						
8																			
9	Unit 3 Run 1 Beaker (MV Unit 3 R-1) + 4 Bottles)			14-Feb-19			5	✓	✓	✓	✓	✓	✓						
10	Unit 3 Run 2 Beaker (MV Unit 3 R-2) + 4 Bottles)			15-Feb-19			5	✓	✓	✓	✓	✓	✓						
11	Unit 3 Run 3 Beaker (MV Unit 3 R-3) + 4 Bottles)			15-Feb-19			5	✓	✓	✓	✓	✓	✓						
12																			
13																			
14																			
15																			

NOTE: All hazardous samples must be labelled according to WHIMIS guidelines.

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

Date Received: 19-FEB-19
Report Date: 26-FEB-19 12:10 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2234202

Project P.O. #: HF
Job Reference: METRO VANCOUVER WTE
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2234202-1	L2234202-2	L2234202-3		
	Description	Water	Water	Water		
	Sampled Date	13-FEB-19	14-FEB-19	15-FEB-19		
	Sampled Time					
	Client ID	UNIT 1 HF BLANK	UNIT 2 HF BLANK	UNIT 3 HF BLANK		
Grouping	**Analyte**					
STACK						
Anions and Nutrients	Fluoride (F) (ug/sample)	<1.7	<1.8	<1.8		
	Volume (Anions) (mL)	170	175	175		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F-IMP-UG-VA	Stack	Fluoride in Water from Impinger	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Company:	A. Lanfranco and Associates	**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Contact:	Mark Lanfranco	☑ Standard ☐ Other	◉ Regular (Standard Turnaround)
Address:	Unit 101 9488 189 St	Email 1: mark.lanfranco@alanfranco.com ☑ PDF ☐ Excel	☐ Digital ☐ Fax ○ Priority (2-4 Business Days) - 5
	Surrey BC V4N 4W7	Email 2:	○ Emergency (1-2 Bus. Days) - 1
Phone:	604-881-2582 Fax: 604-881-2581	Email 3:	**Analysis Request**
Invoice To	Same as Report ?	**Client / Project Information**	Please indicate below Filtered, Pr... Same Day or Weekend Emerge
Hardcopy of Invoice with Report?		Job #: Metro Vancouver WTE	
Company:	☑ Yes ☐ No	PO / AFE: HF	
Contact:	☑ Yes ☐ No	LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Brent Mack	**Sampler:** A. Lanfranco and

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	H										Number of Containers
	Unit 1 HF Blank	13-Feb-19		Water		X									1
	Unit 2 HF Blank	14-Feb-19		Water		X									1
	Unit 3 HF Blank	15-Feb-19		Water		X									1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Please report ug/sample

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			CW	Feb 19	15:35	15.6 °C				

GENF 20.00 Front

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

Date Received: 19-FEB-19
Report Date: 26-FEB-19 12:09 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2234201

Project P.O. #: HF
Job Reference: METRO VANCOUVER WTE
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2234201-1	L2234201-2	L2234201-3	L2234201-4	L2234201-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-FEB-19	13-FEB-19	13-FEB-19	14-FEB-19	14-FEB-19
	Sampled Time					
	Client ID	UNIT 1 HF RUN 1	UNIT 1 HF RUN 2	UNIT 1 HF RUN 3	UNIT 2 HF RUN 1	UNIT 2 HF RUN 2
Grouping	**Analyte**					
STACK						
Anions and Nutrients	Fluoride (F) (ug/sample)	105	58	37.5	10.4	22
	Volume (Anions) (mL)	315	225	260	310	255

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2234201-6 Water 14-FEB-19 UNIT 2 HF RUN 3	L2234201-7 Water 15-FEB-19 UNIT 3 HF RUN 1	L2234201-8 Water 15-FEB-19 UNIT 3 HF RUN 2	L2234201-9 Water 15-FEB-19 UNIT 3 HF RUN 3	
Sample ID **Description** **Sampled Date** **Sampled Time** **Client ID**						
STACK						
Anions and Nutrients	Fluoride (F) (ug/sample)	8.7	<34 DLDS	<18 DLDS	<33 DLDS	
	Volume (Anions) (mL)	325	335	365	330	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F-IMP-UG-VA	Stack	Fluoride in Water from Impinger	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

L2234201-COFC

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Company:	A. Lanfranco and Associates	**Report Format / Distribution**	**Service Requested** (Rush for routine analysis subject to availability)
Contact:	Mark Lanfranco	☑ Standard ☐ Other	◉ Regular (Standard Turnaround
Address:	Unit 101 9488 189 St	Email 1: mark.lanfranco@alanfranco.com	☐ Digital ☐ Fax ○ Priority (2-4 Business Days) - 5
	Surrey BC V4N 4W7	☑ PDF ☐ Excel	○ Emergency (1-2 Bus. Days) - 1
Phone:	604-881-2582 Fax: 604-881-2581	Email 2:	**Analysis Request**
Invoice To	Same as Report ?	Email 3:	○ Same Day or Weekend Emerge
Hardcopy of Invoice with Report?		**Client / Project Information**	Please indicate below Filtered, Pr… and/or Hold, …
Company:	☑ Yes ☐ No	Job #: Metro Vancouver WTE	
Contact:	☑ Yes ☐ No	PO / AFE: HF	
Address:		LSD:	
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		**ALS Contact:** Brent Mack	**Sampler:** A. Lanfranco and

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F.	Number of Containers
	Unit 1 HF Run 1	13-Feb-19		Water	X	1
	Unit 1 HF Run 2	13-Feb-19		Water	X	1
	Unit 1 HF Run 3	13-Feb-19		Water	X	1
	Unit 2 HF Run 1	14-Feb-19		Water	X	1
	Unit 2 HF Run 2	14-Feb-19		Water	X	1
	Unit 2 HF Run 3	14-Feb-19		Water	X	1
	Unit 3 HF Run 1	15-Feb-19		Water	X	1
	Unit 3 HF Run 2	15-Feb-19		Water	X	1
	Unit 3 HF Run 3	15-Feb-19		Water	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Please report ug/sample

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by: CW	Date: Feb 19	Time: 15:35	Temperature: 16.9 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

GENF 20.00 Front

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: METRO-VAN WTE
Site Location: BURNABY B.C.
Your C.O.C. #: G126817

Attention: Mark Lanfranco

A. LANFRANCO & ASSOCIATES INC.
#101, 9488 - 189th STREET
SURREY, BC
Canada V4N 4W7

Report Date: 2019/02/22
Report #: R2688640
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B910991
Received: 2019/02/13, 15:15

Sample Matrix: Air
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Nitrous Oxide (1)	9	N/A	2019/02/19	CAM SOP-00203	GC/ECD

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Ontario (From Burnaby)

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: METRO-VAN WTE
Site Location: BURNABY B.C.
Your C.O.C. #: G126817

Attention: Mark Lanfranco

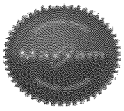
A. LANFRANCO & ASSOCIATES INC.
#101, 9488 - 189th STREET
SURREY, BC
Canada V4N 4W7

Report Date: 2019/02/22
Report #: R2688640
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B910991
Received: 2019/02/13, 15:15

Encryption Key



Maxxam
22 Feb 2019 14:22:42

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Tanya Eugine, M.Sc., Project Manager
Email: TEugine@maxxam.ca
Phone# (604)639-2609

==========

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Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B910991
Report Date: 2019/02/22

A. LANFRANCO & ASSOCIATES INC.
Client Project #: METRO-VAN WTE
Site Location: BURNABY B.C.

COMPRESSED GAS PARAMETERS (AIR)

Maxxam ID		VF5995	VF5996	VF5997	VF5998	VF5999	VF6000	VF6001		
Sampling Date		2019/02/13 09:55	2019/02/13 10:57	2019/02/13 12:00	2019/02/13 09:30	2019/02/13 10:31	2019/02/13 11:32	2019/02/13 09:01		
COC Number		G126817	G126817	G126817	G126817	G126817	G126817	G126817		
	UNITS	**UNIT #1 R-1**	**UNIT #1 R-2**	**UNIT #1 R-3**	**UNIT #2 R-1**	**UNIT #2 R-2**	**UNIT #2 R-3**	**UNIT #3 R-1**	**RDL**	**QC Batch**
GAS										
Nitrous Oxide	ppm v/v	4.5	0.8	0.8	0.6	3.0	0.4	6.4	0.1	9329906
RDL = Reportable Detection Limit										

Maxxam ID		VF6002	VF6003		
Sampling Date		2019/02/13 10:10	2019/02/13 11:12		
COC Number		G126817	G126817		
	UNITS	**UNIT #3 R-2**	**UNIT #3 R-3**	**RDL**	**QC Batch**
GAS					
Nitrous Oxide	ppm v/v	5.2	9.7	0.1	9329906
RDL = Reportable Detection Limit					

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A. LANFRANCO & ASSOCIATES INC.
Client Project #: METRO-VAN WTE
Site Location: BURNABY B.C.

GENERAL COMMENTS

Sample VF5995 [UNIT #1 R-1] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF5996 [UNIT #1 R-2] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF5997 [UNIT #1 R-3] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF5998 [UNIT #2 R-1] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF5999 [UNIT #2 R-2] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF6000 [UNIT #2 R-3] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF6001 [UNIT #3 R-1] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF6002 [UNIT #3 R-2] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Sample VF6003 [UNIT #3 R-3] : The sample was analysed 6 days after the date of sampling. The recommended holding time is 2 days.

Results relate only to the items tested.

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Maxxam Job #: B910991
Report Date: 2019/02/22

QUALITY ASSURANCE REPORT

A. LANFRANCO & ASSOCIATES INC.
Client Project #: METRO-VAN WTE
Site Location: BURNABY B.C.

			Method Blank		RPD	
QC Batch	Parameter	Date	Value	UNITS	Value (%)	QC Limits
9329906	Nitrous Oxide	2019/02/19	<0.1	ppm v/v	6.3	N/A

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Maxxam Job #: B910991
Report Date: 2019/02/22

A. LANFRANCO & ASSOCIATES INC.
Client Project #: METRO-VAN WTE
Site Location: BURNABY B.C.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

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MaxXam
A Bureau Veritas Group Company

CHAIN OF CUSTODY RECORD

G126817
BBY FCD-00077/07

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5. Toll Free (800) 665-8566

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: A.Lanfranco + Assoc	Company Name:	Quotation #:	☑ Regular TAT 5 days (Most analyses)
Contact Name: Mark Lanfranco	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 101-9488 189th St. Surrey BC V4N-4W7	Address:	Project #: Metro-Van WTE	Rush TAT (Surcharges will be applied)
Phone: 604-881-2582	PC:	Site Location: Burnaby B.C.	☐ Same Day ☐ 2 Days
Email: mark.lanfranco@alanfranco.com	Phone:	Site #:	☐ 1 Day ☐ 3 Days
	Email:	Sampled By:	Date Required:

Regulatory Criteria	Special Instructions
☐ BC CSR Soil ☐ BC CSR Water	☐ Return Cooler
☐ YK CSR Soil ☐ YK CSR Water	☐ Ship Sample Bottles (Please Specify)
☐ CCME (Specify) ☐ Other (Specify)	
☐ Drinking Water ☐ BC Water Quality	

Rush Confirmation #:

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

	Sample Identification		Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	BTEX / VPH	BTEX / F1	PAH	EPH	Dissolved Metals	Dissolved Mercury	Total Metals	Total Mercury	Chloride	TSS	pH	Nitrate	No CPM	# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE	COMMENTS
1	Unit #1 1	R-1	Feb 13,19	9:55	10:55													✓			Report units in PPM
2		R-2	19,02,13	10:57	11:57													✓			WCB Method 1101
3		R-3	19,02,13	12:00	1:00pm													✓			Please return bags
4	Unit #2	R-1	19,02,13	9:30	10:30													✓			to our Surrey office
5		R-2	19,02,13	10:31	11:31													✓			
6		R-3	19,02,13	11:32	12:32													✓			
7	Unit #3	R-1	19,02,13	9:09	10:09													✓			
8		R-2	19,02,13	10:10	11:10													✓			
9		R-3	19,02,13	11:12	12:12													✓			
10																					

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
N/A		N/A

COOLING MEDIA PRESENT Y / N

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Michael Coors Michael Coors	FEB-13-19 (15:15)	15:15	Pedro Tack	2019/02/13	15:15

B910991_COC

COC-1020 1281

APPENDIX - C

COMPUTER GENERATED RESULTS

Client:	Metro Vancouver	**Date:**	11-Feb-19
Jobsite:	WTE (Burnaby, BC)	**Run:**	1 - Particulate / Metals
Source:	Unit 1	**Run Time:**	12:25 - 14:28

Concentrations:

Particulate	9.38	mg/dscm	0.00410	gr/dscf
	5.80	mg/Acm	0.00254	gr/Acf
	8.62	mg/dscm (@ 11% O2)	0.00377	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.709	Kg/hr	1.563	lb/hr

Flue Gas Characteristics:

Flow	1260	dscm/min	44501	dscf/min
	21.00	dscm/sec	742	dscf/sec
	2037	Acm/min	71938	Acf/min
Velocity	13.329	m/sec	43.73	f/sec
Temperature	151.2	oC	304.2	oF
Moisture	14.1	%		
Gas Analysis	10.1	% O2		
	10.1	% CO2		
	30.019	Mol. Wt (g/gmole) Dry		
	28.322	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.6547	dscm	93.751	dscf
Sample Time	120.0	minutes		
Isokineticity	95.0	%		

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

Client:	Metro Vancouver	**Date:**	11-Feb-19
Jobsite:	WTE (Burnaby, BC)	**Run:**	1 - Particulate / Metals
Source:	Unit 1	**Run Time:**	12:25 - 14:28

Control Unit (Y)	1.0232
Nozzle Diameter (in.)	0.3048
Pitot Factor	0.8660
Baro. Press. (in. Hg)	29.80
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)	0.00050
Washings (grams)	0.02440
Total (grams)	**0.02490**

Gas Analysis (Vol. %):		
	CO2	O2
Traverse 1	10.00	10.25
Traverse 2	10.17	10.00
	10.09	**10.13**

Condensate Collection:	
Impinger 1	142.0
Impinger 2	100.0
Impinger 3	55.0
Impinger 4	10.0
Impinger 5	5.0
Impinger 6	3.0
Gel	12.5
Gain (grams)	**327.5**

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	886.252								
1	5.0	889.890	0.40	1.95	42	42	4	300	1.5	95.5
2	10.0	893.620	0.42	2.05	43	43	4	300	4.7	95.3
3	15.0	897.350	0.42	2.05	43	43	4	303	8.4	95.5
4	20.0	900.990	0.40	1.95	44	44	4	305	12.5	95.4
5	25.0	904.860	0.45	2.19	44	44	4	305	17.7	95.7
6	30.0	908.820	0.47	2.29	46	46	4	306	25.2	95.5
7	35.0	913.010	0.53	2.58	46	46	6	308	45.6	95.4
8	40.0	917.090	0.50	2.44	47	47	6	308	53.2	95.4
9	45.0	920.920	0.44	2.14	46	46	6	307	58.3	95.5
10	50.0	924.470	0.38	1.85	47	47	6	308	62.5	95.1
11	55.0	927.880	0.35	1.70	46	46	7	300	66.1	94.8
12	60.0	931.190	0.33	1.61	47	47	7	295	69.4	94.3
Traverse 2	0.0	931.190								
1	5.0	934.640	0.36	1.75	47	47	6	308	1.5	94.9
2	10.0	938.280	0.40	1.95	47	47	6	308	4.7	95.1
3	15.0	941.690	0.35	1.70	47	47	6	310	8.4	95.3
4	20.0	945.100	0.35	1.70	48	48	6	312	12.5	95.2
5	25.0	948.090	0.27	1.31	48	48	6	307	17.7	94.6
6	30.0	951.080	0.27	1.31	48	48	6	307	25.2	94.6
7	35.0	955.120	0.49	2.39	48	48	6	306	45.6	95.1
8	40.0	959.270	0.52	2.53	48	48	6	306	53.2	94.9
9	45.0	963.340	0.50	2.44	49	49	6	304	58.3	94.6
10	50.0	967.420	0.50	2.44	49	49	6	302	62.5	94.7
11	55.0	970.840	0.35	1.70	49	49	6	295	66.1	94.2
12	60.0	974.090	0.32	1.56	50	50	6	290	69.4	93.1
Average:			0.407	1.983	46.6	46.6	5.6	304.2		95.0

Client:	Metro Vancouver	**Date:**	13-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 1	**Run Time:**	09:40 - 11:44

Concentrations:

Particulate	5.28	mg/dscm	0.00231	gr/dscf
	2.94	mg/Acm	0.00129	gr/Acf
	4.98	mg/dscm (@ 11% O2)	0.00218	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.401	Kg/hr	0.885	lb/hr

Flue Gas Characteristics:

Flow	1268	dscm/min	44775	dscf/min
	21.13	dscm/sec	746	dscf/sec
	2271	Acm/min	80215	Acf/min
Velocity	14.863	m/sec	48.76	f/sec
Temperature	149.3	oC	300.7	oF
Moisture	14.9	%		
Gas Analysis	10.4	% O2		
	10.0	% CO2		
	30.017	Mol. Wt (g/gmole) Dry		
	28.225	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.7867	dscm	98.411	dscf
Sample Time	120.0	minutes		
Isokineticity	99.1	%		

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

Client:	Metro Vancouver	**Date:**	13-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 1	**Run Time:**	09:40 - 11:44

Control Unit (Y)	1.0232
Nozzle Diameter (in.)	0.3048
Pitot Factor	0.8660
Baro. Press. (in. Hg)	29.70
Static Press. (in. H20)	-19.25
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)	0.00030
Washings (grams)	0.01440
Total (grams)	**0.01470**

Gas Analysis (Vol. %):	CO2	O2
Traverse 1	10.00	10.50
Traverse 2	10.00	10.33
	10.00	**10.42**

Condensate Collection:	
Impinger 1	150.0
Impinger 2	130.0
Impinger 3	44.0
Impinger 4	16.0
Impinger 5	12.0
Impinger 6	4.0
Gel	10.5
Gain (grams)	**366.5**

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	992.150								
1	5.0	995.460	0.33	1.61	48	48	4	299	1.5	99.5
2	10.0	998.720	0.32	1.56	49	49	4	298	4.7	99.2
3	15.0	1002.040	0.33	1.61	49	49	4	300	8.4	99.7
4	20.0	1005.290	0.32	1.56	48	48	4	300	12.5	99.3
5	25.0	1008.780	0.37	1.80	48	48	6	301	17.7	99.3
6	30.0	1012.430	0.40	1.95	48	48	6	302	25.2	99.9
7	35.0	1016.620	0.53	2.58	48	48	6	303	45.6	99.9
8	40.0	1020.890	0.55	2.68	49	49	6	303	53.2	99.8
9	45.0	1025.310	0.59	2.87	49	49	6	303	58.3	99.7
10	50.0	1029.840	0.62	3.02	50	50	6	303	62.5	99.6
11	55.0	1034.370	0.62	3.02	50	50	6	303	66.1	99.6
12	60.0	1038.720	0.57	2.78	51	51	6	304	69.4	99.5
Traverse 2	0.0	1038.720								
1	5.0	1042.660	0.47	2.29	51	51	6	299	1.5	98.8
2	10.0	1046.480	0.44	2.14	52	52	6	299	4.7	98.8
3	15.0	1050.220	0.42	2.05	52	52	6	300	8.4	99.0
4	20.0	1054.200	0.48	2.34	52	52	6	299	12.5	98.6
5	25.0	1058.350	0.52	2.53	52	52	6	300	17.7	98.9
6	30.0	1062.500	0.52	2.53	53	53	6	302	25.2	98.8
7	35.0	1066.570	0.50	2.44	53	53	6	302	45.6	98.8
8	40.0	1070.540	0.48	2.34	53	53	6	300	53.2	98.2
9	45.0	1074.470	0.46	2.24	53	53	6	299	58.3	99.2
10	50.0	1078.210	0.42	2.05	54	54	6	298	62.5	98.5
11	55.0	1081.850	0.40	1.95	54	54	6	300	66.1	98.4
12	60.0	1085.380	0.38	1.85	55	55	6	300	69.4	97.7
								.		
Average:			0.460	2.241	50.9	50.9	5.7	300.7		99.1

Client:	Metro Vancouver	**Date:**	13-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 1	**Run Time:**	12:05 - 14:07

Concentrations:

Particulate	0.9	mg/dscm	0.0004	gr/dscf
	0.5	mg/Acm	0.0002	gr/Acf
	0.8	mg/dscm (@ 11% O2)	0.0004	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.066	Kg/hr	0.146	lb/hr

Flue Gas Characteristics:

Flow	1248	dscm/min	44072	dscf/min
	20.80	dscm/sec	735	dscf/sec
	2284	Acm/min	80646	Acf/min
Velocity	14.943	m/sec	49.02	f/sec
Temperature	151.7	oC	305.1	oF
Moisture	16.2	%		
Gas Analysis	10.3	% O2		
	10.1	% CO2		
	30.027	Mol. Wt (g/gmole) Dry		
	28.077	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.7717	dscm	97.882	dscf
Sample Time	120.0	minutes		
Isokineticity	100.1	%		

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

Client:	Metro Vancouver	**Date:**	13-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 1	**Run Time:**	12:05 - 14:07

Control Unit (Y)	1.0232
Nozzle Diameter (in.)	0.3048
Pitot Factor	0.8660
Baro. Press. (in. Hg)	29.70
Static Press. (in. H20)	-19.25
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)	0.00240
Total (grams)	**0.00245**

Gas Analysis (Vol. %):		
	CO2	O2
Traverse 1	10.00	10.50
Traverse 2	10.17	10.17
	10.09	**10.34**

Condensate Collection:	
Impinger 1	198.0
Impinger 2	136.0
Impinger 3	28.0
Impinger 4	14.0
Impinger 5	10.0
Impinger 6	4.0
Gel	12.5
Gain (grams)	**402.5**

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	87.201								
1	5.0	91.140	0.47	2.29	52	52	4	306	1.5	100.3
2	10.0	94.990	0.45	2.19	52	52	4	305	4.7	100.1
3	15.0	99.020	0.49	2.39	53	53	4	305	8.4	100.3
4	20.0	102.880	0.45	2.19	52	52	4	305	12.5	100.4
5	25.0	106.700	0.44	2.14	52	52	5	304	17.7	100.4
6	30.0	110.520	0.44	2.14	52	52	5	304	25.2	100.4
7	35.0	114.500	0.48	2.34	52	52	5	301	45.6	100.0
8	40.0	118.690	0.53	2.58	52	52	5	303	53.2	100.4
9	45.0	122.760	0.50	2.44	53	53	6	304	58.3	100.2
10	50.0	126.830	0.50	2.44	53	53	6	306	62.5	100.4
11	55.0	130.770	0.47	2.29	53	53	6	306	66.1	100.2
12	60.0	134.590	0.44	2.14	54	54	6	306	69.4	100.1
Traverse 2	0.0	134.590								
1	5.0	138.230	0.40	1.95	54	54	6	305	1.5	100.0
2	10.0	141.740	0.37	1.80	55	55	6	306	4.7	100.1
3	15.0	145.390	0.40	1.95	54	54	6	306	8.4	100.3
4	20.0	149.040	0.40	1.95	55	55	6	306	12.5	100.1
5	25.0	152.490	0.36	1.75	54	54	6	306	17.7	99.9
6	30.0	155.800	0.33	1.61	54	54	6	306	25.2	100.1
7	35.0	159.960	0.52	2.53	54	54	5	306	45.6	100.4
8	40.0	164.190	0.54	2.63	55	55	5	307	53.2	100.1
9	45.0	168.260	0.50	2.44	55	55	6	306	58.3	100.0
10	50.0	172.220	0.47	2.29	56	56	6	305	62.5	100.0
11	55.0	176.370	0.52	2.53	56	56	6	305	66.1	99.7
12	60.0	180.440	0.50	2.44	56	56	6	304	69.4	99.6
Average:			0.457	2.227	53.7	53.7	5.4	305.1		100.1

Client:	Metro Vancouver	**Date:**	13-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 2	**Run Time:**	12:20 - 14:22

Concentrations:

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

Emission Rates:

Particulate	0.017	Kg/hr	0.037	lb/hr

Flue Gas Characteristics:

Flow	1136	dscm/min	40133	dscf/min
	18.94	dscm/sec	669	dscf/sec
	2075	Acm/min	73289	Acf/min
Velocity	13.580	m/sec	44.55	f/sec
Temperature	157.4	oC	315.3	oF
Moisture	15.0	%		
Gas Analysis	9.3	% O2		
	10.8	% CO2		
	30.090	Mol. Wt (g/gmole) Dry		
	28.282	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.6414	dscm	93.280	dscf
Sample Time	120.0	minutes		
Isokineticity	101.8	%		

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

Client:	Metro Vancouver	**Date:**	13-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 2	**Run Time:**	12:20 - 14:22

Control Unit (Y)	0.9870
Nozzle Diameter (in.)	0.3092
Pitot Factor	0.8480
Baro. Press. (in. Hg)	29.69
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	10.75	9.50
Traverse 2	10.75	9.00
	10.75	**9.25**

Condensate Collection:	
Impinger 1	82.0
Impinger 2	126.0
Impinger 3	78.0
Impinger 4	38.0
Impinger 5	8.0
Impinger 6	4.0
Gel	12.5
Gain (grams)	**348.5**

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	987.000								
1	5.0	991.410	0.53	2.70	44	44	7	308	1.5	101.9
2	10.0	995.860	0.54	2.74	44	44	7	310	4.7	102.0
3	15.0	1000.010	0.47	2.38	44	44	7	311	8.4	101.9
4	20.0	1004.370	0.52	2.64	44	44	7	311	12.5	101.9
5	25.0	1008.730	0.52	2.63	44	44	7	312	17.7	102.0
6	30.0	1012.970	0.49	2.48	45	45	12	314	25.2	102.0
7	35.0	1016.340	0.31	1.57	45	45	12	315	45.6	101.8
8	40.0	1019.540	0.28	1.42	45	45	12	315	53.2	101.7
9	45.0	1022.630	0.26	1.32	45	45	14	313	58.3	101.7
10	50.0	1025.720	0.26	1.32	46	46	14	314	62.5	101.6
11	55.0	1028.630	0.23	1.17	46	46	14	313	66.1	101.6
12	60.0	1031.490	0.22	1.12	47	47	14	311	69.4	101.8
Traverse 2	0.0	1031.490								
1	5.0	1035.200	0.37	1.89	48	48	10	311	1.5	101.8
2	10.0	1038.740	0.34	1.72	48	48	10	319	4.7	101.8
3	15.0	1042.130	0.31	1.57	49	49	10	319	8.4	101.9
4	20.0	1045.290	0.27	1.37	49	49	10	321	12.5	101.8
5	25.0	1048.500	0.28	1.42	49	49	11	321	17.7	101.6
6	30.0	1051.940	0.32	1.62	49	49	11	320	25.2	101.8
7	35.0	1056.640	0.60	3.03	49	49	11	321	45.6	102.0
8	40.0	1061.390	0.61	3.09	50	50	8	321	53.2	102.1
9	45.0	1066.110	0.60	3.04	50	50	8	320	58.3	102.2
10	50.0	1070.300	0.47	2.40	51	51	7	316	62.5	101.9
11	55.0	1074.300	0.43	2.19	51	51	7	319	66.1	101.8
12	60.0	1078.030	0.37	1.90	51	51	7	312	69.4	101.8
Average:			0.400	2.030	47.2	47.2	9.9	315.3		101.8

Client:	Metro Vancouver	**Date:**	14-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 2	**Run Time:**	09:35 - 11:37

Concentrations:

Particulate	1.00	mg/dscm	0.00044	gr/dscf
	0.54	mg/Acm	0.00024	gr/Acf
	0.91	mg/dscm (@ 11% O2)	0.00040	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.068	Kg/hr	0.150	lb/hr

Flue Gas Characteristics:

Flow	1135	dscm/min	40067	dscf/min
	18.91	dscm/sec	668	dscf/sec
	2087	Acm/min	73715	Acf/min
Velocity	13.659	m/sec	44.81	f/sec
Temperature	150.4	oC	302.8	oF
Moisture	15.6	%		
Gas Analysis	10.0	% O2		
	10.3	% CO2		
	30.046	Mol. Wt (g/gmole) Dry		
	28.165	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.4448	dscm	86.338	dscf
Sample Time	120.0	minutes		
Isokineticity	101.1	%		

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

Client:	Metro Vancouver	**Date:**	14-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 2	**Run Time:**	09:35 - 11:37

Control Unit (Y)	0.9870
Nozzle Diameter (in.)	0.3048
Pitot Factor	0.8660
Baro. Press. (in. Hg)	29.28
Static Press. (in. H20)	-19.50
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)	0.00240
Total (grams)	**0.00245**

Gas Analysis (Vol. %):		
	CO2	O2
Traverse 1	10.33	10.00
Traverse 2	10.25	10.00
	10.29	**10.00**

Condensate Collection:	
Impinger 1	146.0
Impinger 2	132.0
Impinger 3	24.0
Impinger 4	14.0
Impinger 5	6.0
Impinger 6	2.0
Gel	15.5
Gain (grams)	**339.5**

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	108.100								
1	5.0	112.150	0.45	2.19	40	40	4	299	1.5	102.4
2	10.0	116.280	0.47	2.29	42	42	4	299	4.7	101.8
3	15.0	120.540	0.50	2.48	42	42	4	303	8.4	102.1
4	20.0	124.800	0.50	2.48	42	42	4	309	12.5	102.5
5	25.0	128.930	0.47	2.29	43	43	4	305	17.7	102.0
6	30.0	132.340	0.32	1.59	43	43	5	304	25.2	101.8
7	35.0	135.530	0.28	1.39	44	44	5	300	45.6	101.3
8	40.0	138.550	0.25	1.24	45	45	5	298	53.2	101.1
9	45.0	141.390	0.22	1.09	45	45	7	299	58.3	101.4
10	50.0	144.910	0.34	1.69	46	46	7	300	62.5	101.1
11	55.0	148.110	0.28	1.39	47	47	8	304	66.1	101.3
12	60.0	151.190	0.26	1.29	48	48	8	304	69.4	101.0
Traverse 2	0.0	151.190								
1	5.0	154.600	0.32	1.59	48	48	8	296	1.5	100.3
2	10.0	158.170	0.35	1.74	49	49	8	299	4.7	100.4
3	15.0	161.300	0.27	1.34	49	49	8	303	8.4	100.4
4	20.0	164.490	0.28	1.39	50	50	8	308	12.5	100.6
5	25.0	167.680	0.28	1.39	49	49	8	308	17.7	100.8
6	30.0	170.990	0.30	1.49	50	50	8	309	25.2	101.0
7	35.0	175.340	0.52	2.58	50	50	8	307	45.6	100.9
8	40.0	180.170	0.64	3.17	52	52	6	307	53.2	100.8
9	45.0	184.840	0.60	2.98	52	52	6	303	58.3	100.3
10	50.0	189.020	0.48	2.38	52	52	6	302	62.5	100.2
11	55.0	193.070	0.45	2.23	53	53	4	300	66.1	99.9
12	60.0	196.980	0.42	2.08	54	54	4	300	69.4	99.6
Average:			0.385	1.907	47.3	47.3	6.1	302.8		101.1

Client:	Metro Vancouver	**Date:**	14-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 2	**Run Time:**	11:50 - 13:52

Concentrations:

Particulate	1.2	mg/dscm	0.0005	gr/dscf
	0.6	mg/Acm	0.0003	gr/Acf
	1.1	mg/dscm (@ 11% O2)	0.0005	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.08	Kg/hr	0.186	lb/hr

Flue Gas Characteristics:

Flow	1177	dscm/min	41572	dscf/min
	19.62	dscm/sec	693	dscf/sec
	2216	Acm/min	78251	Acf/min
Velocity	14.499	m/sec	47.57	f/sec
Temperature	154.8	oC	310.7	oF
Moisture	16.7	%		
Gas Analysis	10.0	% O2		
	10.3	% CO2		
	30.040	Mol. Wt (g/gmole) Dry		
	28.034	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.6429	dscm	93.335	dscf
Sample Time	120.0	minutes		
Isokineticity	101.3	%		

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

Client:	Metro Vancouver	**Date:**	14-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 2	**Run Time:**	11:50 - 13:52

Control Unit (Y)	0.9870
Nozzle Diameter (in.)	0.3048
Pitot Factor	0.8660
Baro. Press. (in. Hg)	29.28
Static Press. (in. H20)	-19.50
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)	0.00310
Total (grams)	**0.0032**

Gas Analysis (Vol. %):	CO2	O2
Traverse 1	10.33	10.00
Traverse 2	10.17	10.00
	10.25	**10.00**

Condensate Collection:	
Impinger 1	152.0
Impinger 2	129.0
Impinger 3	66.0
Impinger 4	22.0
Impinger 5	8.0
Impinger 6	3.0
Gel	16.5
Gain (grams)	**396.5**

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	197.450								
1	5.0	200.860	0.32	1.59	53	53	6	303	1.5	100.8
2	10.0	204.270	0.32	1.59	54	54	6	305	4.7	100.7
3	15.0	207.690	0.32	1.59	53	53	6	307	8.4	101.4
4	20.0	210.880	0.28	1.39	54	54	6	308	12.5	100.9
5	25.0	214.070	0.28	1.39	53	53	5	310	17.7	101.2
6	30.0	217.490	0.32	1.59	54	54	5	310	25.2	101.4
7	35.0	222.160	0.60	2.98	54	54	5	310	45.6	101.4
8	40.0	227.250	0.71	3.52	54	54	4	310	53.2	101.8
9	45.0	232.460	0.75	3.72	55	55	4	312	58.3	101.3
10	50.0	237.430	0.68	3.37	55	55	4	311	62.5	101.4
11	55.0	242.340	0.66	3.27	56	56	4	310	66.1	101.4
12	60.0	247.090	0.62	3.08	55	55	4	312	69.4	101.4
Traverse 2	0.0	247.090								
1	5.0	251.480	0.53	2.63	55	55	4	314	1.5	101.4
2	10.0	256.040	0.57	2.83	56	56	4	314	4.7	101.4
3	15.0	260.720	0.60	2.98	55	55	4	315	8.4	101.8
4	20.0	265.270	0.57	2.83	55	55	4	315	12.5	101.5
5	25.0	269.820	0.57	2.83	56	56	4	314	17.7	101.2
6	30.0	273.990	0.48	2.38	55	55	4	315	25.2	101.2
7	35.0	277.410	0.32	1.59	55	55	6	313	45.6	101.4
8	40.0	280.430	0.25	1.24	54	54	6	312	53.2	101.3
9	45.0	283.270	0.22	1.09	56	56	6	312	58.3	101.1
10	50.0	285.990	0.20	0.99	55	55	6	310	62.5	101.6
11	55.0	288.560	0.18	0.89	55	55	7	309	66.1	101.1
12	60.0	291.120	0.18	0.89	54	54	7	306	69.4	100.7
Average:			0.439	2.177	54.6	54.6	3.0	310.7		101.3

Client:	Metro Vancouver	**Date:**	14-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 3	**Run Time:**	12:04 - 14:06

Concentrations:

Particulate	1.62	mg/dscm	0.00071	gr/dscf
	0.87	mg/Acm	0.00038	gr/Acf
	1.43	mg/dscm (@ 11% O2)	0.00062	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.110	Kg/hr	0.241	lb/hr

Flue Gas Characteristics:

Flow	1124	dscm/min	39681	dscf/min
	18.73	dscm/sec	661	dscf/sec
	2099	Acm/min	74132	Acf/min
Velocity	13.736	m/sec	45.06	f/sec
Temperature	153.6	oC	308.5	oF
Moisture	16.2	%		
Gas Analysis	9.6	% O2		
	10.4	% CO2		
	30.045	Mol. Wt (g/gmole) Dry		
	28.098	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.3701	dscm	83.702	dscf
Sample Time	120.0	minutes		
Isokineticity	103.4	%		

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

Client:	Metro Vancouver	**Date:**	14-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	1 - Particulate / Metals
Source:	Unit 3	**Run Time:**	12:04 - 14:06

Control Unit (Y)	0.9986
Nozzle Diameter (in.)	0.2923
Pitot Factor	0.8480
Baro. Press. (in. Hg)	29.28
Static Press. (in. H20)	-20.00
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)	0.00380
Total (grams)	**0.00385**

Gas Analysis (Vol. %):		
	CO2	O2
Traverse 1	9.75	10.25
Traverse 2	11.00	9.00
	10.38	**9.63**

Condensate Collection:	
Impinger 1	218.0
Impinger 2	84.0
Impinger 3	14.0
Impinger 4	6.0
Impinger 5	4.0
Impinger 6	2.0
Gel	15.0
Gain (grams)	**343.0**

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	957.305								
1	5.0	961.010	0.47	1.89	44	44	8	309	1.5	103.4
2	10.0	964.880	0.51	2.05	44	44	8	307	4.7	103.6
3	15.0	968.830	0.53	2.14	44	44	8	306	8.4	103.7
4	20.0	972.670	0.50	2.02	45	45	8	307	12.5	103.6
5	25.0	976.590	0.52	2.10	46	46	8	308	17.7	103.6
6	30.0	980.330	0.47	1.91	48	48	9	308	25.2	103.5
7	35.0	983.220	0.28	1.14	49	49	9	307	45.6	103.1
8	40.0	986.260	0.31	1.26	50	50	9	308	53.2	103.0
9	45.0	988.710	0.20	0.81	50	50	5	309	58.3	103.3
10	50.0	991.340	0.23	0.94	51	51	5	307	62.5	103.1
11	55.0	993.920	0.22	0.90	52	52	5	307	66.1	103.2
12	60.0	996.380	0.20	0.82	52	52	5	307	69.4	103.2
Traverse 2	0.0	996.380								
1	5.0	999.510	0.32	1.32	54	54	5	306	1.5	103.4
2	10.0	1002.540	0.30	1.23	54	54	5	307	4.7	103.5
3	15.0	1005.710	0.33	1.35	55	55	5	309	8.4	103.2
4	20.0	1008.890	0.33	1.36	56	56	5	310	12.5	103.4
5	25.0	1011.770	0.27	1.11	57	57	5	310	17.7	103.2
6	30.0	1014.810	0.30	1.24	57	57	5	309	25.2	103.3
7	35.0	1018.820	0.52	2.14	58	58	5	310	45.6	103.6
8	40.0	1022.860	0.53	2.19	58	58	7	310	53.2	103.4
9	45.0	1027.410	0.67	2.76	58	58	7	310	58.3	103.8
10	50.0	1031.580	0.56	2.32	59	59	7	309	62.5	103.6
11	55.0	1035.860	0.59	2.44	60	60	7	311	66.1	103.6
12	60.0	1040.102	0.58	2.39	60	60	7	312	69.4	103.6
Average:			0.406	1.660	52.5	52.5	6.5	308.5		103.4

Client:	Metro Vancouver	**Date:**	15-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 3	**Run Time:**	09:15 - 11:17

Concentrations:

Particulate	0.29	mg/dscm	0.00013	gr/dscf
	0.16	mg/Acm	0.00007	gr/Acf
	0.26	mg/dscm (@ 11% O2)	0.00011	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.020	Kg/hr	0.043	lb/hr

Flue Gas Characteristics:

Flow	1115	dscm/min	39361	dscf/min
	18.58	dscm/sec	656	dscf/sec
	2022	Acm/min	71400	Acf/min
Velocity	13.230	m/sec	43.40	f/sec
Temperature	151.4	oC	304.5	oF
Moisture	15.1	%		
Gas Analysis	9.5	% O2		
	10.5	% CO2		
	30.060	Mol. Wt (g/gmole) Dry		
	28.239	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.5442	dscm	89.849	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:**	15-Feb-19
Jobsite:	WTE (Burnaby, B.C)	**Run:**	2 - Particulate / Metals
Source:	Unit 3	**Run Time:**	09:15 - 11:17

Control Unit (Y)	0.9986
Nozzle Diameter (in.)	0.3060
Pitot Factor	0.8480
Baro. Press. (in. Hg)	29.53
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)	0.00070
Total (grams)	**0.00075**

Gas Analysis (Vol. %):		
	CO2	O2
Traverse 1	10.50	9.50
Traverse 2	10.50	9.50
	10.50	**9.50**

Condensate Collection:	
Impinger 1	164.0
Impinger 2	122.0
Impinger 3	18.0
Impinger 4	12.0
Impinger 5	5.0
Impinger 6	3.0
Gel	15.5
Gain (grams)	**339.5**

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	41.005								
1	5.0	45.160	0.49	2.38	46	46	5	306	1.5	102.4
2	10.0	49.480	0.53	2.59	46	46	5	304	4.7	102.3
3	15.0	54.090	0.60	2.94	47	47	5	303	8.4	102.4
4	20.0	58.350	0.51	2.50	48	48	5	303	12.5	102.3
5	25.0	62.780	0.55	2.70	49	49	12	303	17.7	102.3
6	30.0	66.840	0.46	2.26	50	50	12	304	25.2	102.3
7	35.0	70.010	0.28	1.38	51	51	12	305	45.6	102.0
8	40.0	73.070	0.26	1.28	51	51	12	305	53.2	102.1
9	45.0	75.890	0.22	1.09	52	52	12	304	58.3	102.0
10	50.0	78.780	0.23	1.14	53	53	10	302	62.5	101.9
11	55.0	81.540	0.21	1.04	53	53	10	302	66.1	101.8
12	60.0	84.300	0.21	1.04	53	53	10	302	69.4	101.8
Traverse 2	0.0	84.300								
1	5.0	87.820	0.34	1.69	55	55	9	305	1.5	102.0
2	10.0	91.190	0.31	1.54	56	56	9	306	4.7	102.1
3	15.0	94.670	0.33	1.64	57	57	9	305	8.4	102.0
4	20.0	97.820	0.27	1.34	57	57	9	307	12.5	102.1
5	25.0	100.970	0.27	1.34	57	57	9	306	17.7	102.1
6	30.0	104.070	0.26	1.30	58	58	9	305	25.2	102.1
7	35.0	107.960	0.41	2.04	58	58	9	306	45.6	102.3
8	40.0	112.170	0.48	2.39	58	58	6	305	53.2	102.3
9	45.0	116.470	0.50	2.49	59	59	6	306	58.3	102.3
10	50.0	120.860	0.52	2.60	59	59	6	305	62.5	102.3
11	55.0	125.130	0.49	2.46	60	60	6	304	66.1	102.2
12	60.0	129.311	0.47	2.36	60	60	6	304	69.4	102.2
Average:			0.383	1.897	53.9	53.9	8.5	304.5		102.1

Client:	Metro Vancouver	**Date:**	15-Feb-19
Jobsite:	WTE(Burnaby,B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 3	**Run Time:**	11:39 - 13:42

Concentrations:

Particulate	0.65	mg/dscm	0.00028	gr/dscf
	0.36	mg/Acm	0.00016	gr/Acf
	0.56	mg/dscm (@ 11% O2)	0.00024	gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.043	Kg/hr	0.095	lb/hr

Flue Gas Characteristics:

Flow	1101	dscm/min	38885	dscf/min
	18.35	dscm/sec	648	dscf/sec
	2014	Acm/min	71133	Acf/min
Velocity	13.180	m/sec	43.24	f/sec
Temperature	151.1	oC	304.0	oF
Moisture	15.9	%		
Gas Analysis	9.4	% O2		
	10.6	% CO2		
	30.075	Mol. Wt (g/gmole) Dry		
	28.159	Mol. Wt (g/gmole) Wet		

Sample Parameters:

Sample Volume	2.5335	dscm	89.471	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:**	15-Feb-19
Jobsite:	WTE(Burnaby,B.C)	**Run:**	3 - Particulate / Metals
Source:	Unit 3	**Run Time:**	11:39 - 13:42

Control Unit (Y)	0.9986
Nozzle Diameter (in.)	0.3060
Pitot Factor	0.8480
Baro. Press. (in. Hg)	29.53
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)	0.00160
Total (grams)	**0.00165**

Gas Analysis (Vol. %):	CO2	O2
Traverse 1	10.50	9.50
Traverse 2	10.75	9.25
	10.63	**9.38**

Condensate Collection:	
Impinger 1	158.0
Impinger 2	114.0
Impinger 3	44.0
Impinger 4	20.0
Impinger 5	7.0
Impinger 6	2.0
Gel	13.5
Gain (grams)	**358.5**

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	132.405								
1	5.0	135.630	0.28	1.40	59	59	4	303	1.5	102.8
2	10.0	139.070	0.32	1.60	59	59	4	305	4.7	102.8
3	15.0	142.460	0.31	1.55	59	59	4	306	8.4	102.9
4	20.0	145.740	0.29	1.45	59	59	4	306	12.5	103.0
5	25.0	148.840	0.26	1.30	59	59	4	306	17.7	102.7
6	30.0	152.060	0.28	1.40	59	59	4	306	25.2	102.8
7	35.0	156.010	0.42	2.10	59	59	4	305	45.6	103.1
8	40.0	160.400	0.52	2.60	59	59	4	305	53.2	103.1
9	45.0	165.200	0.62	3.10	60	60	4	306	58.3	103.3
10	50.0	169.930	0.60	3.01	60	60	5	304	62.5	103.3
11	55.0	174.370	0.53	2.66	60	60	5	304	66.1	103.1
12	60.0	178.770	0.52	2.61	60	60	5	304	69.4	103.1
Traverse 2	0.0	178.770								
1	5.0	182.740	0.42	2.11	61	61	4	302	1.5	103.0
2	10.0	186.750	0.43	2.16	61	61	4	305	4.7	103.1
3	15.0	190.980	0.48	2.41	61	61	4	305	8.4	103.0
4	20.0	195.080	0.45	2.26	61	61	4	304	12.5	103.0
5	25.0	199.490	0.52	2.61	61	61	4	305	17.7	103.2
6	30.0	203.940	0.53	2.65	61	61	4	306	25.2	103.2
7	35.0	207.460	0.33	1.66	62	62	5	302	45.6	102.8
8	40.0	210.460	0.24	1.21	61	61	5	302	53.2	102.8
9	45.0	213.200	0.20	1.01	61	61	5	300	58.3	102.6
10	50.0	215.870	0.19	0.96	61	61	4	301	62.5	102.7
11	55.0	218.680	0.21	1.06	61	61	4	301	66.1	102.8
12	60.0	221.420	0.20	1.01	61	61	4	302	69.4	102.8
Average:			0.381	1.912	60.2	60.2	4.3	304.0		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		13-Feb-19	13-Feb-19	13-Feb-19
Test Time		09:58 - 10:58	11:25 - 12:25	12:42 - 13:42
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.80	29.80	29.80
DGM Factor	(Y)	0.9446	0.9446	0.9446
Initial Reading	(m^3)	293.810	294.620	295.528
Final Reading	(m^3)	294.598	295.501	296.394
Temp. Outlet	(Avg. oF)	50.5	51.3	56.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.77	0.86	0.83
HF	(mg)	0.111	0.061	0.039
Oxygen	(Vol. %)	10.4	10.4	10.3
HF	**(mg/Sm^3)**	**0.144**	**0.071**	**0.047**
HF	**(mg/Sm^3 @ 11% O2)**	**0.136**	**0.067**	**0.044**
Moisture	**(Vol. %)**	14.9	14.9	16.2

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

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

Sample Type: HF

Parameter		**Test 1**	**Test 2**	**Test 3**
Test Date		14-Feb-19	14-Feb-19	14-Feb-19
Test Time		09:58 - 10:58	11:03 - 12:03	12:10 - 13:10
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.69	29.69	29.69
DGM Factor	(Y)	0.9446	0.9446	0.9446
Initial Reading	(Cubic Feet)	296.415	297.168	297.992
Final Reading	(Cubic Feet)	297.161	297.983	298.746
Temp. Outlet	(Avg. oF)	48.4	59.3	60.0
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.72674	0.77770	0.71890
HF	(mg)	0.011	0.023	0.009
Oxygen	(Vol. %)	10.0	10.0	10.0
HF	**(mg/Sm^3)**	**0.015**	**0.030**	**0.013**
HF	**(mg/Sm^3 @ 11% O2)**	**0.014**	**0.027**	**0.012**
Moisture (isokinetic)	**(Vol. %)**	15.6	15.6	16.7

*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: HF

Parameter		**Test 1**	**Test 2**	**Test 3**
Test Date		15-Feb-19	15-Feb-19	15-Feb-19
Test Time		09:35 - 10:35	10:46 - 11:46	11:57 - 12:57
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.53	29.53	29.53
DGM Factor	(Y)	0.9446	0.9446	0.9446
Initial Reading	(Cubic Feet)	298.750	299.584	300.407
Final Reading	(Cubic Feet)	299.576	300.398	301.228
Temp. Outlet	(Avg. oF)	52.7	54.0	55.5
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm^3)	0.79373	0.78054	0.78486
HF	(mg)	0.017	0.009	0.017
Oxygen	(Vol. %)	9.5	9.5	9.4
HF	**(mg/Sm^3)**	**0.022**	**0.012**	**0.022**
HF	**(mg/Sm^3 @ 11% O2)**	**0.019**	**0.010**	**0.019**
Moisture (isokinetic)	**(Vol. %)**	15.1	15.1	15.9

*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	N_2O	N_2O
			ppm	mg/Sm^3	mg/Sm^3 @ 11% O_2
Unit 1 Run 1	13-Feb-19	09:55-10:55	4.50	8.24	7.88
Unit 1 Run 2	13-Feb-19	10:57-11:57	0.80	1.46	1.40
Unit 1 Run 3	13-Feb-19	12:00-13:00	0.80	1.46	1.40
Average					3.56
Unit 2 Run 1	13-Feb-19	09:30-10:30	0.60	1.10	1.02
Unit 2 Run 2	13-Feb-19	10:31-11:31	3.00	5.49	5.09
Unit 2 Run 3	13-Feb-19	11:32-12:32	0.40	0.73	0.68
Average					2.26
Unit 3 Run 1	13-Feb-19	09:09-10:09	6.40	11.71	10.1
Unit 3 Run 2	13-Feb-19	10:10-11:10	5.20	9.52	8.18
Unit 3 Run 3	13-Feb-19	11:12-12:12	9.70	17.75	15.3
Average					11.2

APPENDIX - D

FIELD DATA SHEETS

$\sqrt{5.75}$ 4.87 ΔH

A. Lanfranco and Associates Inc.

CLIENT	MVRD
SOURCE	Unit #1
PARAMETER / RUN No	1 Metals / Partic
DATE	Feb. 11/19
OPERATOR:	C.L.
CONTROL UNIT	AO 13
Y	1.0232
ΔH@	
BAROMETRIC PRESSURE, IN. Hg	29.80
ASSUMED MOISTURE, Bw	16%

NOZZLE	MV 02
DIAMETER, IN.	.3048
PROBE	AL GVED
Cp	.8660
PORT LENGTH	
STATIC PRESSURE, IN. H2O	-19.00
STACK DIAMETER	70.90"
STACK HEIGHT	30'
INITIAL LEAK TEST	0.001 @ 15"
FINAL LEAK TEST	0.001 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	142	142
Imp. #2	100	200	100
Imp. #3	100	155	55
Imp. #4	0	10	10
Imp. #5	100	105	5
Imp. #6	100	103	3
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. %
	12:25	886.252										
1		889.80	.40	1.95	42	300	250	250	42	4		
2		893.62	.42	2.05	43	300					10.0	10.5
3		897.35	.42	2.05	43	303	250	250	42	4		
4		900.99	.40	1.95	44	305						
5		904.86	.45	2.19	44	305	250	250	45	4		
6		908.82	.47	2.29	46	306						
7		913.01	.53	2.58	46	308	250	250	50	4		
8		917.09	.50	2.44	47	308						
9		920.92	.44	2.14	46	307	250	250	52	6	10.0	10.0
10		924.47	.38	1.85	47	308						
11		927.88	.32	1.70	46	300	250	250	52	6		
12		931.19	.33	1.61	47	295						
						292						
1		934.64	.36	1.75	47	308	250	250	49	6		
2		938.28	.40	1.95	47	308						
3		941.69	.35	1.70	47	310	250	250	50	6		
4		945.10	.35	1.70	48	312					10.5	9.5
5		948.09	.27	1.31	48	307	250	250	49	6		
6		951.08	.27	1.31	48	307						
7		955.12	.49	2.39	48	306	250	250	48	5		
8		959.27	.52	2.53	48	306						
9		963.34	.50	2.44	49	304	250	250	48	5	10.0	10.0
10		967.42	.50	2.44	49	302						
11		970.84	.32	1.70	49	295	250	250	50	5		
12	14:28	974.09	.32	1.56	50	290						
											10.0	10.5

A. Lanfranco and Associates Inc.

$\sqrt{5.75}$ 4.87 ΔH

CLIENT	MVRD	NOZZLE IN 02 DIAMETER, IN.	.3048
SOURCE	Unit #1	PROBE AL (2WPD Cp	.8660
PARAMETER / RUN No	2 M-1&5 / Part 1C	PORT LENGTH	
DATE	Feb. 13/19	STATIC PRESSURE, IN. H2O	-19.25
OPERATOR:	C.L	STACK DIAMETER	70.90
CONTROL UNIT	AP 15 Y 1.0232	STACK HEIGHT	30'
	ΔH@		
BAROMETRIC PRESSURE, IN. Hg	29.70	INITIAL LEAK TEST	0.001 @ 15"
ASSUMED MOISTURE, Bw	16	FINAL LEAK TEST	0.001 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	150	150
Imp. #2	100	230	130
Imp. #3	100	144	44
Imp. #4	0	16	16
Imp. #5	100	102	2
Imp. #6	100	104	4
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. %	Fyrites: O_2 Vol. %
	09:40	992.150										
1		995.46	.33	1.61	48	299	250	250	44	4		
2		998.72	.32	1.56	49	298						
3		1002.04	.33	1.61	49	300	250	250	46	4	10.0	10.5
4		1005.29	.32	1.56	48	300						
5		1008.78	.37	1.80	48	301	250	250	48	4		
6		1012.43	.40	1.96	48	302						
7		1016.62	.53	2.58	48	303	250	250	48	4		
8		1020.89	.55	2.68	49	303						
9		1025.31	.59	2.87	49	303	250	250	48	6	10.0	10.5
10		1029.84	.62	3.02	50	303						
11		1034.37	.65	3.22	50	303	250	250	50	6		
12		1038.72	.57	2.78	51	304						
1		1042.66	.47	2.29	51	299	250	250	47	6		
2		1046.48	.44	2.14	52	299						
3		1050.22	.42	2.05	52	300	250	250	48	6	10.0	10.5
4		1054.20	.48	2.34	52	299						
5		1058.35	.53	2.53	52	300	250	250	48	6		
6		1062.50	.52	2.53	53	302						
7		1066.57	.50	2.44	53	302	250	250	47	6		
8		1070.54	.46	2.24	53	299					10.0	10.0
9		1074.44	.46	2.24	53	299	250	250	47	6		
10		1078.21	.42	2.05	54	298						
11		1081.85	.48	1.95	54	300	250	250	46	6		
12	11:44	1085.38	.38	1.85	55	300					10.0	10.5

A. Lanfranco and Associates Inc.

$\sqrt{5.75}$ 4.872H

CLIENT	MRO	NOZZLE MW 02 DIAMETER, IN. .3018	
SOURCE	Unit #1	PROBE HL GVRD Cp .8660	
PARAMETER / RUN No	3 Metals/Plastic	PORT LENGTH	
DATE	Feb 13/19	STATIC PRESSURE, IN. H2O -1.25	
OPERATOR:	CL	STACK DIAMETER 19.99	
CONTROL UNIT	AV 15 Y 1.0232	STACK HEIGHT 30	
	ΔH@		
BAROMETRIC PRESSURE, IN. Hg	29.70	INITIAL LEAK TEST 0.001 @ 15"	
ASSUMED MOISTURE, Bw	16	FINAL LEAK TEST 0.001 @ 15"	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	198	198
Imp. #2	100	236	136
Imp. #3	100	228	128
Imp. #4	0	14	14
Imp. #5	100	110	10
Imp. #6	100	104	4
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. %	Fyrites O_2 Vol. %
1	12:05	87.2005										
2		91.14	.47	2.29	52	306	250	250	49	6		
3		94.99	.45	2.19	53	305						
4		98.82	.49	2.37	53	305	250	250	48	6	10.0	10.5
5		102.88	.45	2.19	53	304						
6		106.70	.44	2.14	52	304	250	250	49	6		
7		110.52	.44	2.14	52	304						
8		114.50	.48	2.34	52	301	250	250	49	6		
9		118.69	.53	2.58	52	303						
10		122.76	.50	2.44	53	304	250	250	50	6	10.0	10.5
11		126.83	.50	2.44	53	306						
12		130.77	.47	2.29	53	306	250	250	52	6		
1		134.59	.44	2.14	54	306						
2		138.23	.40	1.95	54	305	250	250	50	6		
3		141.74	.37	1.80	55	306					10.0	10.0
4		145.39	.40	1.95	54	306	250	250	52	6		
5		149.04	.40	1.95	55	306						
6		152.49	.36	1.75	54	306	250	250	52	6		
7		155.89	.33	1.61	54	306						
8		159.96	.53	2.53	54	306	250	250	48	6	10.0	10.5
9		164.19	.54	2.63	55	307						
10		168.26	.50	2.44	55	306	250	250	48	6		
11		172.32	.47	2.29	56	305						
12	14:07	176.34	.52	2.53	56	305	250	250		6	10.5	10.0
					56	304						

A Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.

SOURCE UNIT #2
PARAMETER / RUN No Metals/Portia RUN #1
DATE Feb 13, 2019
OPERATOR: SF
CONTROL UNIT STACK 2 Y 0.9870
ΔH@ 1.848
BAROMETRIC PRESSURE, IN. Hg 29.69
ASSUMED MOISTURE, Bw 16%

NOZZLE ~~AV-02~~ G-309 DIAMETER, IN. 0.3092
PROBE ~~TRACURA~~ Cp ~~0.8543~~ 0.8480
PORT LENGTH 7C
STATIC PRESSURE, IN. H2O -14.0
STACK DIAMETER
STACK HEIGHT
INITIAL LEAK TEST 0.008 @ 15"
FINAL LEAK TEST 0.003 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	~~#0~~	82	82
Imp. #2	100	226	126
Imp. #3	100	178	78
Imp. #4	0	38	38
Imp. #5	100	108	8
Imp. #6	100	104	4
Imp. #7	GEL		
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 15 Vol. %	Fyrites: O_2 8.5 Vol. %		
1	5	991.41	0.53	2.70	44	308	251	251	45	10				
2	10	995.86	0.54	2.74	44	310								
3	15	1000.01	0.47	2.38	44	311	251	249	50	10.5				
4	20	1004.37	0.52	2.64	44	311					11	9		
5	25	1008.73	0.52	2.63	44	312	250	250	56	10.5				
6	30	1013.97	0.49	2.48	45	314								
7	35	1016.34	0.31	1.59	45	315	250	250	60	7.5				
8	40	1019.54	0.28	1.42	45	315					10.5	10		
9	45	1022.63	0.26	1.32	45	313	249	250	61	6.5				
10	50	1025.72	0.26	1.32	46	314								
11	55	1028.63	0.23	1.17	46	313	251	252	62	6				
12	60	1031.49	0.22	1.12	49	311								
1	5	1035.20	0.37	1.89	48	311	249	250	61	8				
2	10	1038.74	0.34	1.72	48	319								
3	15	1042.13	0.31	1.57	49	319	251	250	63	7.5				
4	20	1045.29	0.27	1.37	49	321					11.5	8		
5	25	1048.50	0.28	1.42	49	321	249	250	60	6.5				
6	30	1051.94	0.32	1.62	49	320								
7	35	1056.64	0.60	3.03	49	321	249	250	59	11				
8	40	1061.39	0.61	3.09	50	321					10	10		
9	45	1066.11	0.60	3.04	50	320	249	250	60	12				
10	50	1070.30	0.47	2.40	51	316								
11	55	1074.30	0.43	2.19	51	319	250	249	60	9				
12	60	1078.03	0.37	1.90	51	312								
END	14:22													

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$\sqrt{5.75}$ 4.87 ΔH
-6.03 4.96 -

CLIENT	MVRD	NOZZLE MW 02 DIAMETER, IN. .3018	
SOURCE	Unit #2	PROBE AL CVRD Cp .8660	
PARAMETER / RUN No	2 Metals / Pactic	PORT LENGTH	
DATE	Feb 14/19	STATIC PRESSURE, IN. H2O -19.50	
OPERATOR:	CL	STACK DIAMETER 20.90"	
CONTROL UNIT	ST CAE 2 Y .9870	STACK HEIGHT 30'	
	ΔH@		
BAROMETRIC PRESSURE, IN. Hg	29.28	INITIAL LEAK TEST 0.001 @ 15"	
ASSUMED MOISTURE, Bw	16%	FINAL LEAK TEST 0.001 @ 15"	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	146	146
Imp. #2	100	232	132
Imp. #3	100	124	24
Imp. #4	0	14	14
Imp. #5	100	106	6
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. %	Fyrites: O_2 Vol. %
	09:35	108.100										
1		112.15	.45	2.19	40	299	250	250	45	4		
2		116.28	.47	2.29	42	299					10.0	10.0
3		120.54	.50	2.43	42	303	250	250	46	4		
4		124.89	.50	2.48	42	309						
5		129.13	.47	2.29	43	325	250	250	48	5	10.5	10.0
6		133.24	.32	1.59	43	321						
7		137.53	.28	1.39	44	300	250	250	48	5		
8		141.50	.25	1.24	45	298						
9		145.39	.22	1.09	45	299	250	250	46	4		
10		149.41	.24	1.20	46	300					10.5	10.0
11		153.44	.28	1.39	47	304	250	250	46	4		
12		157.49	.26	1.29	48	304						
1		161.60	.32	1.59	48	296	250	250	45	4		
2		165.77	.35	1.74	49	299						
3		170.00	.27	1.34	49	303	250	250	46	4		
4		174.19	.28	1.39	50	308					10.5	10.0
5		178.38	.28	1.39	49	308	250	250	46	4		
6		182.69	.30	1.49	50	309						
7		187.34	.54	2.68	50	307	250	250	48	4		
8		191.74	.64	3.17	52	307						
9		196.04	.60	2.98	52	303	250	250	46	4	10.0	10.0
10		200.22	.48	2.38	52	302						
11		204.28	.45	2.23	53	300	250	250	47	4		
12	11:37	208.28	.42	2.08	54	300						

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$\sqrt{6.03}$ 4.96 ΔH

CLIENT	MVRD	NOZZLE	MV 02	DIAMETER, IN.	.3048		
SOURCE	Unit #2	PROBE	AL GVRD	Cp	.8660		
PARAMETER / RUN No	3 Metals/ Plastic						
DATE	Feb. 14 / 19	PORT LENGTH					
OPERATOR:	CL	STATIC PRESSURE, IN. H2O	-19.50				
CONTROL UNIT	ST CAE 2	Y	.9870	STACK DIAMETER	70.90"		
		ΔH@		STACK HEIGHT	30'		
BAROMETRIC PRESSURE, IN. Hg	29.28	INITIAL LEAK TEST	0.001 @ 15"				
ASSUMED MOISTURE, Bw	16%	FINAL LEAK TEST	0.001 @ 15"				

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	152	152
Imp. #2	100	229	129
Imp. #3	100	166	66
Imp. #4	0	22	22
Imp. #5	100	108	8
Imp. #6	100	103	3
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. %
	11:50	197.450										
1		200.86	.32	1.59	53	303	250	250	48	5		
2	5	204.27	.32	1.59	54	305					10.5	10.0
3		207.69	.32	1.59	53	307	250	250	50	5		
4		210.88	.28	1.39	54	308						
5		214.07	.28	1.39	53	310	250	250	50	5		
6		217.49	.32	1.59	54	310						
7		222.16	.60	2.98	54	310	250	250	52	5	10.0	10.0
8		227.25	.71	3.52	54	310						
9		232.46	.75	3.72	55	312	250	250	52	8		
10		237.43	.68	3.37	55	311						
11		242.34	.66	3.27	56	310	250	250	54	10	10.5	10.0
12		247.09	.62	3.08	55	312						
1		251.48	.53	2.63	55	314	250	250	56	7		
2		256.04	.57	2.83	56	314						
3		260.72	.60	2.98	55	315	250	250	58	7	10.0	10.0
4		265.27	.57	2.83	55	315						
5		269.86	.57	2.83	56	314	250	250	60	8		
6		273.99	.48	2.38	55	315						
7		277.41	.32	1.59	55	313	250	250	55	8	10.5	10.0
8		280.45	.25	1.24	54	312						
9		283.27	.22	1.09	56	312	250	250	54	6		
10		285.90	.20	0.99	55	310						
11		288.56	.18	0.89	55	309	250	250	52	5	10.0	10.0
12	13:52	291.12	.18	0.89	54	306						

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METRO VANCOUVER WTE - BURNABY B.C.

SOURCE UNIT #3
PARAMETER / RUN No METALS/PARTIC RUN #1
DATE 02/14/19
OPERATOR: JF
CONTROL UNIT G105 Y 0.9986
ΔH@ 1.830
BAROMETRIC PRESSURE, IN. Hg 29.28
ASSUMED MOISTURE, Bw 16%

NOZZLE G-~~300~~ DIAMETER, IN. 0.2923
PROBE 7C Cp 0.8480
PORT LENGTH
STATIC PRESSURE, IN. H2O -~~30~~.0
STACK DIAMETER
STACK HEIGHT
INITIAL LEAK TEST 0.004 @ 15"
FINAL LEAK TEST 0.005 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	218	218
Imp. #2	100	184	84
Imp. #3	100	114	14
Imp. #4	0	6	6
Imp. #5	100	104	4
Imp. #6	100	102	2
Imp. #7	GEL		
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: 9.5 CO_2 Vol. %	Fyrites: O_2 10.5 Vol. %		
	12:04	957.305												
1	5	961.01	0.49	1.89	44	309	250	251	45	8				
2	10	964.88	0.51	2.05	44	307								
3	15	968.83	0.53	2.14	44	306	250	250	47	8.5				
4	20	972.67	0.50	2.02	45	307					9.5	10.5		
5	25	976.59	0.52	2.10	46	308	250	251	51	8.5				
6	30	980.33	0.47	1.91	48	308								
7	35	983.22	0.28	1.14	49	307	250	251	51	6.5				
8	40	986.26	0.31	1.26	50	308					10	10		
9	45	988.71	0.20	0.81	50	309	250	250	52	5				
10	50	991.34	0.23	0.94	51	307								
11	55	993.92	0.22	0.90	52	307	250	249	51	5				
12	60	996.38	0.20	0.82	52	307								
1	5	999.51	0.32	1.32	54	306	250	251	51	5				
2	10	1002.54	0.30	1.23	54	307								
3	15	1005.71	0.33	1.35	55	309	250	249	52	6.5				
4	20	1008.89	0.33	1.36	56	310					11	9		
5	25	1011.77	0.27	1.11	57	310	250	250	51	6				
6	30	1014.81	0.30	1.24	57	309								
7	35	1018.82	0.52	2.14	58	310	250	250	57	9				
8	40	1022.86	0.53	2.19	58	310					11	9		
9	45	1027.41	0.67	2.76	58	310	250	250	51	11.5				
10	50	1031.58	0.56	2.32	59	309								
11	55	1035.86	0.59	2.44	60	311	250	250	51	10.5				
12	60	1040.102	0.58	2.39	60	312								
END	14:06													

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METRO VANCOUVER WTE - BURNABY B.C.

SOURCE UNIT #3
PARAMETER / RUN No PARTIC/METALS RUN #2
DATE Feb. 15/19
OPERATOR: SF
CONTROL UNIT 6105 Y 0.9986
ΔH@ 1.830
BAROMETRIC PRESSURE, IN. Hg 29.53
ASSUMED MOISTURE, Bw 16%

NOZZLE PN-01 DIAMETER, IN. 0.3060
PROBE 7C Cp 0.8480
PORT LENGTH
STATIC PRESSURE, IN. H2O -19.0
STACK DIAMETER
STACK HEIGHT
INITIAL LEAK TEST 0.003 @ 15"
FINAL LEAK TEST 0.006 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	164	164
Imp. #2	100	222	122
Imp. #3	100	118	18
Imp. #4	0	12	12
Imp. #5	100	105	5
Imp. #6	100	103	3
Imp. #7	GEL		
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. %
	09:15	41.005										
1	5	45.16	0.49	2.38	46	306	250	250	49	3		
2	10	49.48	0.53	2.59	46	304						
3	15	54.09	0.60	2.94	49	303	250	250	52	4		
4	20	58.35	0.51	2.50	48	303					10.5	9.5
5	25	62.78	0.55	2.70	49	305	250	250	54	4		
6	30	66.84	0.46	2.26	50	304						
7	35	70.01	0.28	1.38	51	305	250	251	53	3		
8	40	73.07	0.26	1.28	51	305					10.5	9.5
9	45	75.89	0.22	1.09	52	304	250	250	52	3		
10	50	78.78	0.23	1.14	53	302						
11	55	81.54	0.21	1.04	53	302	250	251	50	3		
12	60	84.30	0.21	1.04	53	302						
1	5	87.82	0.34	1.69	55	305	250	250	50	3		
2	10	91.19	0.31	1.54	56	306						
3	15	94.67	0.33	1.64	57	305	250	250	52	3		
4	20	97.82	0.27	1.34	57	307					10	10
5	25	100.97	0.27	1.34	57	306	250	250	53	3		
6	30	104.07	0.26	1.30	58	305						
7	35	107.96	0.41	2.04	58	306	250	250	53	3.5		
8	40	112.17	0.48	2.39	58	305					11	9
9	45	116.47	0.50	2.49	59	306	250	250	55	4		
10	50	120.86	0.52	2.60	59	305						
11	55	125.13	0.49	2.46	60	304	250	250	56	4		
12	60	129.311	0.47	2.36	60	304						
END	11:17											

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METRO VANCOUVER WTE - BURNABY B.C.

SOURCE UNIT #3
PARAMETER / RUN No METALS/PARTIC RUN #3
DATE 02/15/19
OPERATOR: SF
CONTROL UNIT G105 Y 0.9986
ΔH@ 1.8630
BAROMETRIC PRESSURE, IN. Hg 29.53
ASSUMED MOISTURE, Bw 16%

NOZZLE MJ-01 DIAMETER, IN. 0.3060
PROBE TC Cp 0.8480
PORT LENGTH
STATIC PRESSURE, IN. H2O -19.0
STACK DIAMETER
STACK HEIGHT
INITIAL LEAK TEST 0.009 @ 15"
FINAL LEAK TEST 0.010 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1	0	158	158
Imp. #2	100	214	114
Imp. #3	100	144	44
Imp. #4	0	20	20
Imp. #5	100	107	7
Imp. #6	100	102	2
Imp. #7	GEL		
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. %		
	11:39	132.405												
1	5	135.63	0.38	1.40	59	303	251	250	53	3.5				
2	10	139.07	0.32	1.60	59	305								
3	15	142.46	0.31	1.55	59	306	250	250	51	3.5				
4	20	145.74	0.29	1.45	59	306					10.5	9.5		
5	25	148.84	0.26	1.30	59	306	250	250	50	3.5				
6	30	152.06	0.28	1.40	59	306								
7	35	156.01	0.42	2.10	59	305	250	250	49	4				
8	40	160.40	0.52	2.60	59	305					10.5	9.5		
9	45	165.20	0.62	3.10	60	306	250	250	50	5.5				
10	50	169.93	0.60	3.01	60	304								
11	55	174.37	0.53	2.66	60	304	250	252	52	5				
12	60	178.77	0.52	2.61	60	304								
1	5	182.74	0.42	2.11	61	302	250	249	51	4				
2	10	186.75	0.43	2.16	61	305								
3	15	190.98	0.48	2.41	61	305	250	249	51	4				
4	20	195.08	0.45	2.26	61	304					10.5	9.5		
5	25	199.49	0.52	2.61	61	305	250	250	50	4.5				
6	30	203.94	0.53	2.65	61	306								
7	35	207.46	0.33	1.66	62	302	250	249	51	4.0				
8	40	210.46	0.24	1.21	64	302					10.0	9.0		
9	45	213.20	0.20	1.01	61	300	250	251	51	4.0				
10	50	215.67	0.19	0.96	61	301								
11	55	218.66	0.21	1.06	61	301	250	249	50	4.0				
12	60	221.42	0.20	1.01	61	302								
END	1342													

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CLIENT	MVRD
SOURCE	Unit #1
PARAMETER / RUN No	~~[illegible]~~/HF 1-3
DATE	Feb. 13/19
OPERATOR:	
CONTROL UNIT	LMU A Y .9446 ΔH@
BAROMETRIC PRESSURE, IN. Hg	
ASSUMED MOISTURE, Bw	29.80

NOZZLE	DIAMETER, IN.	
PROBE	Cp	
PORT LENGTH		
STATIC PRESSURE, IN. H2O		
STACK DIAMETER		
STACK HEIGHT	@15"	
	1 / 2 / 3	
INITIAL LEAK TEST	0.0002 / 0.0001 / 0.0001	
FINAL LEAK TEST	0.0001 / 0.0001 / 0.0001	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. #1			
Imp. #2			
Imp. #3			
Imp. #4			
Imp. #5			
Imp. #6			
Upstream Diameters			
Downstream Diameters			

Point	Clock Time	Dry Gas Meter ft^3	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. %		
	09:58	293.8104												
1					48									
2					50									
3					50									
4					51									
5					53									
6	10:58	294.5982			52									
	11:25	294.6200												
1					48									
2					48									
3					49									
4					53									
5					54									
6	12:25	295.5008			56									
	12:42	295.5280												
1					53									
2					54									
3					56									
4					56									
5					57									
6	13:42	296.3942			58									

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Client	COVANTA	Y	LMU-A(.9446)
Source	UNIT 2	Cp	
Parameter	HF	Pbar	29.69 Static
Date	2/14/19	Operator	M. Cecil

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

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	0958	296.4152	38					
			41					
			46					
	1028	296.8314	48					
			50					
			57					
	1058	297.1608	59					
2	1103	297.1682	55					
	1133	297.6080	59					
	1203	297.9832	64					
3	1216	297.9918	59					
	1240	298.4240	64					
	1310	298.7462	65					

Client	COVANTA	Y	LMU-A(.9446)
Source	UNIT 3	Cp	
Parameter	HF	Pbar	29.53 Static
Date	2/15/19	Operator	M. Cecil

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

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	0935	298.7504	51					
	1005	299.0624	52					
	1035	299.5760	55					
2	1046	299.5842	52					
	1116							
	1146	300.3982	56					
3	1157	300.4070	54					
	1257	301.2279	57					

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

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

Date: 07-Jan-19
Barometric Pressure: 30.01 (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 ----------									-CRITICAL ORIFICE READINGS-					
					Initial Temps.		Final Temps.					-- Ambient Temperature --		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
3.50	15.00	475.500	491.040	15.540	67.0	67.0	67.0	67.0	73	0.8185	15.5	67.0	67.0	67.0
1.84	15.00	527.700	538.988	11.288	70.0	70.0	71.0	71.0	63	0.5956	17.5	77.0	79.0	78.0
1.05	15.00	541.300	550.134	8.834	72.0	72.0	72.0	72.0	55	0.4606	19.0	73.0	80.0	76.5
0.61	15.00	551.900	558.647	6.747	72.0	72.0	72.0	72.0	48	0.3560	20.0	78.0	79.0	78.5
0.29	15.00	559.400	563.934	4.534	71.0	71.0	71.0	71.0	40	0.2408	21.0	76.0	82.0	79.0

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

--- DRY GAS METER ---		--------- ORIFICE ---------			-- DRY GAS METER --		--------- ORIFICE ---------			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
15.744	445.9	16.050	454.5	15.978	1.019	-0.004	1.728	43.89	0.046	0.731
11.315	320.4	11.559	327.4	11.747	1.022	-0.002	1.740	44.19	0.058	0.728
8.813	249.6	8.952	253.5	9.072	1.016	-0.007	1.651	41.93	-0.031	0.752
6.724	190.4	6.906	195.6	7.025	1.027	0.004	1.611	40.93	-0.070	0.754
4.523	128.1	4.669	132.2	4.754	1.032	0.009	1.679	42.65	-0.003	0.735
				Average Y---------->	**1.0232**		**Average dH@----->**	**1.682**	**42.7**	**Average Ko----->**	**0.740**

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: January 7, 2019

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: 15-Jan-19
Barometric Pressure: 29.80 (in. Hg)
Theoretical Critical Vacuum: 14.06 (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)
3.70	16.00	710.500	727.584	17.084	71.0	71.0	71.0	71.0
1.90	31.00	686.300	710.357	24.057	72.0	72.0	71.0	71.0
1.15	25.00	641.400	656.520	15.120	76.0	76.0	74.0	74.0
0.66	64.00	656.600	686.246	29.646	74.0	74.0	72.0	72.0
0.35	17.00	728.000	733.358	5.358	71.0	71.0	69.0	69.0

-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	15.0	71.0	62.0	66.5
63	0.5956	18.0	76.0	63.0	69.5
55	0.4606	19.5	68.0	75.0	71.5
48	0.3560	21.0	75.0	76.0	75.5
40	0.2408	22.0	72.0	70.0	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)
17.067	483.3	17.008	481.7	17.035	0.997	-0.002	1.824	46.33	-0.006	0.710
23.905	677.0	23.911	677.2	24.085	1.000	0.002	1.777	45.15	-0.053	0.718
14.899	421.9	14.884	421.5	15.049	0.999	0.000	1.794	45.56	-0.037	0.716
29.286	829.4	29.340	830.9	29.889	1.002	0.003	1.743	44.27	-0.088	0.725
5.319	150.6	5.294	149.9	5.348	0.995	-0.003	2.014	51.17	0.184	0.679
				Average Y--------->	**0.9986**		**Average dH@----->**	**1.830**	**46.5**	**Average Ko----->**	**0.710**

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: January 15, 2019

A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: ST CAE2
Serial #: 0028-072911-1

Date: 08-Jan-19
Barometric Pressure: 29.89 (in. Hg)
Theoretical Critical Vacuum: 14.10 (in. Hg)

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

---------- DRY GAS METER READINGS ----------									-CRITICAL ORIFICE READINGS-					
					Initial Temps.		Final Temps.					-- Ambient Temperature --		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
3.70	15.00	651.400	667.417	16.017	68.0	68.0	70.0	70.0	73	0.8185	13.0	73.0	79.0	76.0
1.95	15.00	634.800	646.537	11.737	66.0	66.0	68.0	68.0	63	0.5956	17.1	68.0	72.0	70.0
1.15	15.00	669.700	678.825	9.125	70.0	70.0	70.0	70.0	55	0.4606	17.6	72.0	78.0	75.0
0.69	15.00	679.400	686.359	6.959	71.0	71.0	71.0	71.0	48	0.3560	18.5	78.0	72.0	75.0
0.33	15.00	686.500	691.239	4.739	70.0	70.0	71.0	71.0	40	0.2408	19.5	75.0	75.0	75.0

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

--- DRY GAS METER ---		--------- ORIFICE ---------			-- DRY GAS METER --		--------- ORIFICE ---------			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
16.110	456.2	15.851	448.9	16.114	0.984	-0.003	1.858	47.20	0.011	0.704
11.799	334.2	11.599	328.5	11.660	0.983	-0.004	1.836	46.63	-0.012	0.710
9.103	257.8	8.928	252.8	9.059	0.981	-0.006	1.817	46.16	-0.031	0.716
6.922	196.0	6.901	195.4	7.002	0.997	0.010	1.822	46.27	-0.026	0.704
4.714	133.5	4.668	132.2	4.736	0.990	0.003	1.906	48.41	0.058	0.694
				Average Y---------->	**0.9870**	**Average dH@----->**	**1.848**	**46.9**	**Average Ko----->**	**0.706**

TEMPERATURE CALIBRATION

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

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	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: January 8, 2019

A. Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: LMU-A

Serial #: Kimmon 186

Date: 10-Jan-19

Barometric Pressure: 30.01 (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	16.00	288.3510	288.5002	5.269	64.0	64.0	65.0	65.0
0.00	18.00	288.5100	288.6789	5.965	65.0	65.0	65.0	65.0
0.00	15.00	288.6830	288.8228	4.937	65.0	65.0	66.0	66.0

-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)
40	0.2408	20.0	69.0	69.0	69.0
40	0.2408	20.0	69.0	68.0	68.5
40	0.2408	20.0	68.0	70.0	69.0

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

--- DRY GAS METER ---

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)
5.318	150.6
6.014	170.3
4.973	140.8

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

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)
5.027	142.4	5.023
5.658	160.2	5.649
4.713	133.5	4.710

-- DRY GAS METER --

CALIBRATION FACTOR Y Value (number)	Variation (number)
0.945	0.001
0.941	-0.004
0.948	0.003

--------- 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---------> 0.9446 **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: Scott Ferguson Signature:  Date: January 10, 2019

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Michael Goods
Date: Jan 7th 2019

Signature: 

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft^2)
A	0.1250	0.1240	0.1245	0.0010	0.1245	0.0000845
G-165	0.1640	0.1655	0.1660	0.0020	0.1652	0.0001488
P-20	0.1855	0.1865	0.1835	0.0030	0.1852	0.0001870
J	0.1880	0.1880	0.1880	0.0000	0.1880	0.0001928
E	0.1880	0.1895	0.1882	0.0015	0.1886	0.0001939
L	0.2112	0.2120	0.2105	0.0015	0.2112	0.0002434
G-215	0.2160	0.2150	0.2130	0.0030	0.2147	0.0002513
Q	0.2190	0.2170	0.2185	0.0020	0.2182	0.0002596
G-222	0.2215	0.2220	0.2215	0.0005	0.2217	0.0002680
G-225	0.2245	0.2250	0.2240	0.0010	0.2245	0.0002749
P-18	0.2375	0.2370	0.2380	0.0010	0.2375	0.0003076
V-07	0.2447	0.2450	0.2445	0.0005	0.2447	0.0003267
G-250	0.2500	0.2505	0.2510	0.0010	0.2505	0.0003422
G-252	0.2525	0.2520	0.2530	0.0010	0.2525	0.0003477
P	0.2580	0.2570	0.2575	0.0010	0.2575	0.0003616
G-278	0.2775	0.2785	0.2790	0.0015	0.2783	0.0004225
P-2	0.2787	0.2790	0.2785	0.0005	0.2787	0.0004237
G-292	0.2922	0.2920	0.2926	0.0006	0.2923	0.0004659
MV-02	0.3050	0.3040	0.3055	0.0015	0.3048	0.0005068
MV-01	0.3060	0.3065	0.3055	0.0010	0.3060	0.0005107
G-309	0.3095	0.3095	0.3085	0.0010	0.3092	0.0005213
V-06	0.3200	0.3210	0.3210	0.0010	0.3207	0.0005608
G-330	0.3295	0.3300	0.3305	0.0010	0.3300	0.0005940
G-337	0.3380	0.3355	0.3365	0.0025	0.3367	0.0006182
P-27	0.3387	0.3385	0.3390	0.0005	0.3387	0.0006258
G-343	0.3435	0.3430	0.3435	0.0005	0.3433	0.0006429
G-349	0.3490	0.3495	0.3495	0.0005	0.3493	0.0006656
P-9	0.3648	0.3650	0.3645	0.0005	0.3648	0.0007257
G-372	0.3710	0.3730	0.3740	0.0030	0.3727	0.0007575
I	0.3785	0.3785	0.3785	0.0000	0.3785	0.0007814
P-14	0.3910	0.3935	0.3920	0.0025	0.3922	0.0008388
P-17	0.4070	0.4075	0.4065	0.0010	0.4070	0.0009035
C	0.4255	0.4225	0.4235	0.0030	0.4238	0.0009798
G-437	0.4350	0.4345	0.4355	0.0010	0.4350	0.0010321
P-29	0.4680	0.4680	0.4690	0.0010	0.4683	0.0011963
G468	0.4677	0.4670	0.4670	0.0007	0.4672	0.0011907
P-7	0.4965	0.4940	0.4930	0.0035	0.4945	0.0013337
B	0.5015	0.5030	0.5025	0.0015	0.5023	0.0013763
G-540	0.5405	0.5400	0.5405	0.0005	0.5403	0.0015924

Where:

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

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

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

Pitot Tube Calibration

Date: 14-Jan-19 Temp (R): 530
Pbar (in.Hg): 29.69 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)
0.350	0.510	39.3	0.8201	0.0039
0.460	0.670	45.1	0.8203	0.0038
0.530	0.770	48.4	0.8213	0.0027
0.640	0.910	53.2	0.8302	0.0062
0.700	1.000	55.6	0.8283	0.0042
		Average :	0.8241	0.0042

Pitot ID:

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		Average :	#DIV/0!	#DIV/0!

Pitot ID: **7B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.360	0.490	39.9	0.8486	0.0082
0.480	0.640	46.0	0.8574	0.0006
0.570	0.760	50.2	0.8574	0.0006
0.640	0.850	53.2	0.8590	0.0022
0.750	0.990	57.6	0.8617	0.0049
		Average :	0.8568	0.0033

Pitot ID:

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		0.0	#DIV/0!	#DIV/0!
		Average :	#DIV/0!	#DIV/0!

Pitot ID: **AL GVRD 1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.100	0.130	21.0	0.8683	0.0023
0.200	0.260	29.7	0.8683	0.0023
0.350	0.460	39.3	0.8636	0.0024
0.540	0.700	48.8	0.8695	0.0035
0.740	0.980	57.2	0.8603	0.0057
		Average :	0.8660	0.0033

Pitot ID:

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

Pitot ID: **7C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.030	0.040	11.5	0.8574	0.0094
0.160	0.220	26.6	0.8443	0.0037
0.280	0.390	35.2	0.8388	0.0092
0.490	0.670	46.5	0.8466	0.0014
0.720	0.970	56.4	0.8529	0.0049
		Average :	0.8480	0.0057

Pitot ID:

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

* Average absolute deviation must not exceed 0.01.

Calibrated by: Jeremy Gibbs Signature: _____ Date: January 14, 2019

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	July 17, 2018	101.6	30.01	29.90	29.97	0.04
DS	July 17, 2018	101.6	30.01	29.91	29.98	0.03
CL	July 17, 2018	101.6	30.01	29.89	29.96	0.05
ML	July 17, 2018	101.6	30.01	29.90	29.97	0.04
MH	July 17, 2018	101.6	30.01	29.91	29.98	0.03
SH	July 17, 2018	101.6	30.01	29.91	29.98	0.03
JB	July 17, 2018	101.6	30.01	29.97	30.04	-0.03
SF	July 17, 2018	101.6	30.01	29.99	30.06	-0.05
JG	July 17, 2018	101.6	30.01	29.89	29.96	0.05
SB	July 17, 2018	101.6	30.01	29.89	29.96	0.05

Calibrated by: Daryl Sampson Signature: _____ Date: July 17, 2018

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.

http://www.weatheroffice.gc.ca/city/pages/bc-74_metric_e.html

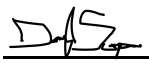
A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Daryl Sampson

Date: January 17, 2019

Signature: 

K-TYPE THERMOCOUPLE CALIBRATIONS

Probe/TC ID	Hg Thermometer Temp (°F)	CL23A Readout (F)		Probe/TC ID	Hg Thermometer Temp (°F)	CL23A Readout (F)
3B	212	211		TC 3-3	211	212
3C	212	212		TC 4-3	211	212
4A	212	212		TC 4-4	210	212
4B	211	212		TC 5-4	212	212
5A	212	212		TC 5-5	n/a	n/a
5B	212	211		TC 5-6	211	213
5C	211	213		TC 6-4	212	212
5D	212	213		TC 10-3	211	211
6A	212	211				
6B	212	212				
6C	212	210				
7C	211	210				
8A	211	211				
8B	211	212				
10A	212	212				
10B	212	213				
11A	211	210				
12A	212	211				
12B	210	210				

* n/a denotes not in service

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Calibrated by: Daryl Sampson

Date: 9-Jan-19

Signature: 

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator			Temperature Settings (degrees F)													
			32		100		200		300		500		800		1700	
Device	**ALA #**	**Serial #**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**	**Reading**	**Variation**
Omega HH11A	3	300132	32	0.00%	100	0.00%	201	0.15%	301	0.13%	498	-0.21%	801	0.08%	1701	0.05%
Omega HH11A	4	200167	33	0.20%	100	0.00%	200	0.00%	300	0.00%	499	-0.10%	799	-0.08%	1698	-0.09%
Omega HH11A	6	600059	33	0.20%	100	0.00%	201	0.15%	300	0.00%	500	0.00%	798	-0.16%	1699	-0.05%
TPI 341K	7	2.0315E+10	32	0.00%	101	0.18%	200	0.00%	299	-0.13%	500	0.00%	797	-0.24%	1696	-0.19%
TPI 341K	8	2.0313E+10	32	0.00%	99	-0.18%	199	-0.15%	299	-0.13%	499	-0.10%	799	-0.08%	1696	-0.19%
Cont Cmpny	10	102008464	32	0.00%	101	0.18%	200	0.00%	300	0.00%	498	-0.21%	798	-0.16%	1698	-0.09%
Omega HH11	14	409426	32	0.00%	100	0.00%	201	0.15%	301	0.13%	499	-0.10%	800	0.00%	1698	-0.09%
TPI 341K	16	400120029	31	-0.20%	98	-0.36%	199	-0.15%	299	-0.13%	501	0.10%	800	0.00%	1701	0.05%
TPI 341K	17	2.0329E+10	30	-0.41%	98	-0.36%	198	-0.30%	298	-0.26%	497	-0.31%	797	-0.24%	1696	-0.19%
TPI 341K	18	2.0329E+10	32	0.00%	100	0.00%	200	0.00%	300	0.00%	499	-0.10%	797	-0.24%	1698	-0.09%
TPI 341K	19	2.0329E+10	30	-0.41%	98	-0.36%	198	-0.30%	298	-0.26%	497	-0.31%	797	-0.24%	1695	-0.23%
TPI 341K	20	2.0329E+10	33	0.20%	99	-0.18%	199	-0.15%	299	-0.13%	498	-0.21%	799	-0.08%	1699	-0.05%
Reference device is a NIST certified digital thermocouple calibrator																
Variation expressed as a percentage of the absolute temperature must be within 1.5 %																

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Faculty of Continuing Education and Extension

Scott Ferguson

has successfully completed

Stack Sampling

2016

May 16, 2016

Date

Dean
Faculty of Continuing Education and Extension

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Carter Lanfranco

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May 2009

Date

Norma D MacDonald

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Faculty of Continuing Education and Extension

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