



**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

May 2019 Survey

Table of Contents

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

APPENDIX – A

QUALITY ASSURANCE / QUALITY CONTROL RESULTS

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

Administration:

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

Preparation:

- All glassware cleaned
- Blank samples of reagents collected.

Testing:

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

Analysis:

- Trace Metals and Mercury analysis conducted at Elements Labs, Surrey, B.C.
- Fluoride (HF) analysis conducted at ALS Environmental in Burnaby, B.C.
- Nitrous Oxide (N₂O) 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 NH₃) conducted at Elements 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		
Second Survey 2019	Unit 1	Unit 2	Unit 3
Filter	-0.1 mg	0.0 mg	-0.2 mg
Front Half Washings	0.4 mg	0.3 mg	0.1 mg
Mercury Front	0.00 ug	0.00 ug	0.00 ug
Mercury Back	0.03 ug	0.02 ug	0.04 ug
Trace Metals Front *	<218 ug	<158 ug	<34.4 ug
Trace Metals Back*	<27.0 ug	<23.1 ug	<20.0 ug
Fluoride	<4.0 ug	<4.2 ug	<4.1 ug

Sum of all reported elements except Hg*

APPENDIX - B

LABORATORY RESULTS

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Filter Reagent Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1351472 Control Number: Date Received: May 16, 2019 Date Reported: May 30, 2019 Report Number: 2406760
Attn: Missy Sampled By: Company:		

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

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

Notes To Clients:

Analytical Report

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

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

Lot ID: **1351472**
Control Number:
Date Received: May 16, 2019
Date Reported: May 30, 2019
Report Number: 2406760

		Reference Number	1351472-1	1351472-2	1351472-3
		Sample Date	May 06, 2019	May 06, 2019	May 06, 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	<5	<5	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	1	2.5	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	<0.2	<0.2	0.2
Cobalt	µg	<0.3	0.4	0.3	0.25
Copper	µg	0.5	0.3	0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	<0.3	<0.3	<0.3	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	150	160	140	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2.6	4.5	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	1	2	1	0.5
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250
Volume	aliquot volume	mL	25	25	25
Volume	Final	mL	40	40	40
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02

Approved by: 
Mathieu Simoneau
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Filter Reagent Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1351472 Control Number: Date Received: May 16, 2019 Date Reported: May 30, 2019 Report Number: 2406760
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 28, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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



Lot: 1351472 ^{COC}



roceed with analysis

MAY 16 '19 16:05

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	All Analysis	As indicated
------	--------------	--------------

required on: ☐ or ☐

Date Required:

Signature: _____

Exova Authorization:

Sampled by:

Company	Signature
---------	-----------

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

Date: Initial:

Received by: <u>HAND RO</u>	Sample Temp. <u>23.6°C</u>
-----------------------------	----------------------------

Waybill #:	Date
------------	------

Company	Time
---------	------

FOR LAB USE ONLY

Condition 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

Please indicate which regulations you are required to meet:

[illegible]

Page of

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Reagent Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1351457 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406743
Attn: Missy Sampled By: Company:		

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

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

Notes To Clients:

Analytical Report

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

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

Lot ID: **1351457**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406743

		Reference Number	1351457-1	1351457-2	1351457-3
		Sample Date	May 06, 2019	May 06, 2019	May 06, 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	<5	<5	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	2	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	<0.2	<0.2	0.2
Cobalt	µg	0.4	<0.3	0.5	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	<0.3	<0.3	<0.3	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	<2	<2	<2	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2.9	2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	<0.5	<0.5	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	<5	<5	<5	5
Antimony	µg	<3	<3	<3	2.5
Arsenic	µg	2.8	<1	<1	1
Cadmium	µg	<0.3	0.3	<0.3	0.25
Chromium	µg	0.37	<0.2	0.2	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	0.5	0.3	2	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	<0.3	<0.3	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	3.3	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	2	2.8	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	<0.5	1	0.5
Volume	Sample	mL	200	195	200
Volume	aliquot volume	mL	150	145	150
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	250	250	250

Analytical Report

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

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

Lot ID: **1351457**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406743

		Reference Number	1351457-1	1351457-2	1351457-3
		Sample Date	May 06, 2019	May 06, 2019	May 06, 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	<0.02	<0.02	<0.02
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	200	195	200
Volume	aliquot volume	mL	25.0	25.0	25.0
Volume	Final	mL	40	40	40
Mercury	Fraction 2B	µg/sample	<0.02	<0.02	<0.02
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	100	100	102
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
Dilution Factor	As Tested		1	1	1
Volume	Sample	mL	200	250	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	0.19	0.32	0.27
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	0.061	0.10	0.085

Approved by:



Mathieu Simoneau
Operations Manager

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Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Reagent Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1351457 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406743
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 28, 2019	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

LC

Lot: 1351457 COC



on Sheet

Proceed with analysis

Billing Address:

Company: A. Lanfranco and Associates
Address: Unit 101 9488 189 St
Surrey, BC V4N 4W7

QA/QC Report ☐

Attention: Mark Lanfranco
Phone: 604-881-2582
Fax: 604-881-2581
Cell:
e-mail: mark.lanfranco@alanfranco.com

Report Result:

Fax ☐
Mail ☐
Courier ☐
e-mail ☐
e-Service ☐

Copy of Report to:

Company:
Address:

Mail invoice to this
address for approval ☐

MAY 16 '19 16:02

Report Result:

Fax ☐
Mail ☐
Courier ☐
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 All Analysis As indicated

required on: ☐ or ☐

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: Hand Sample Temp: 23.6°C

Waybill #: 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

FOR LAB USE ONLY

Condition of containers/coolers
upon arrival at lab

Please indicate which regulations you are required to meet: _____

☐ 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

Number of Containers	Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg								

	Sample Identification	Location	Depth			Date/Time Sampled	Matrix	Sampling Method	↓	Enter tests above (✓ relevant samples below)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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1	Reagent Blank Unit 1					06-May-19			5	✓	✓	✓	✓	✓	✓																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			</

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

Page ____ of ____

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Field Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1351449 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406734
Attn: Missy Sampled By: Company:		

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

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

Notes To Clients:

Analytical Report

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

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

Lot ID: **1351449**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406734

		Reference Number	1351449-1	1351449-2	1351449-3
		Sample Date	May 07, 2019	May 07, 2019	May 07, 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	58	7	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	1	<1	1
Cadmium	µg	0.4	<0.3	<0.3	0.25
Chromium	µg	<0.2	<0.2	<0.2	0.2
Cobalt	µg	0.4	0.3	<0.3	0.25
Copper	µg	0.5	<0.3	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	0.3	<0.3	<0.3	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	160	150	170	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	2	<2	<2	2
Thallium	µg	2	2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	11	2.8	3.8	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	7	<5	<5	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<0.9	3.1	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	<0.2	<0.2	0.2	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	0.4	0.3	<0.2	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	1	0.6	<0.2	0.25
Nickel	µg	<0.5	<0.5	0.6	0.5
Phosphorus	µg	20	20	20	2.5
Selenium	µg	2.7	<1	3.1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	5.3	<0.5	<0.5	0.5
Volume	Sample	mL	420	410	
Volume	aliquot volume	mL	370	360	
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05

Analytical Report

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

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

Lot ID: **1351449**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406734

		Reference Number	1351449-1	1351449-2	1351449-3	Nominal Detection Limit
		Sample Date	May 07, 2019	May 07, 2019	May 07, 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	
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	420	410	410	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.03	<0.03	<0.03	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	132	124	124	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<0.010	<0.010	
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	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.08	<0.08	<0.04	
Mercury	As Tested	µg/L	0.08	0.06	0.14	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	0.03	0.02	0.044	

Approved by: 
Mathieu Simoneau
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Field Blanks LSD: P.O.: Proj. Acct. code:	Lot ID: 1351449 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406734
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 28, 2019	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Lot: 1351449 ^{COC}



☐ Control Number

Information Sheet

Assuring: Proper completion of this form is required in order to proceed with analysis

Billing Address: Company: A. Lanfranco and Associates Address: Unit 101 9488 189 St Surrey, BC V4N 4W7 Attention: Mark Lanfranco Phone: 604-881-2582 Fax: 604-881-2581 Cell: e-mail: mark.lanfranco@alanfranco.com		Copy of Report To: Company: Address: Attention: Phone: Fax: Cell: e-mail:	Copy of invoice: Mail invoice to this address for approval ☐ MAY 16 '19 16:02
QA/QC Report ☐ Report Result: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐		Report Result: 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: <u>Hand</u> <u>Red</u> Sample Temp. <u>23.6°C</u> Waybill #: _____ Date _____ Company _____ Time _____
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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 Condition 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		Date/Time Sampled	Matrix	Sampling Method	↓	Enter tests above (✓ relevant samples below)									
			IN	M					CM	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	Field Blank Unit 1 (Beaker (MV Unit-1 Blank)+ 4 Bottles)				07-May-19			5	✓	✓	✓	✓	✓	✓				
2																		
3	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)				08-May-19			5	✓	✓	✓	✓	✓	✓				
4																		
5	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 4 Bottles)				09-May-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 ____

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg LSD: P.O.: Proj. Acct. code:	Lot ID: 1351466 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406754
Attn: Missy Sampled By: Company:		

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

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

Notes To Clients:

Analytical Report

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg LSD: P.O.: Proj. Acct. code:	Lot ID: 1351466 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406754
Attn: Missy		
Sampled By:		
Company:		

		Reference Number	1351466-1	1351466-2	1351466-3
		Sample Date	May 06, 2019	May 07, 2019	May 07, 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	20	10	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	<1	1	1
Cadmium	µg	<0.3	0.3	<0.3	0.25
Chromium	µg	4.53	<0.2	6.71	0.2
Cobalt	µg	0.4	0.5	0.3	0.25
Copper	µg	1	<0.3	<0.3	0.25
Lead	µg	4.5	<2	<2	1.5
Manganese	µg	5.9	0.5	1	0.25
Nickel	µg	2	0.6	2	0.5
Phosphorus	µg	160	150	150	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	13	2.9	8.2	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	30	20	34	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	1	2.2	1	1
Cadmium	µg	<0.2	<0.2	0.3	0.25
Chromium	µg	0.75	0.64	0.66	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	2.2	2.5	<0.2	0.25
Lead	µg	3.4	<1	<1	1.5
Manganese	µg	2	1	2	0.25
Nickel	µg	0.7	<0.4	0.7	0.5
Phosphorus	µg	22	20	20	2.5
Selenium	µg	2.6	2.6	2.8	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	2	<1	2	1.5
Vanadium	µg	<0.9	<0.9	<0.8	1
Zinc	µg	14	23.3	11	0.5
Volume	Sample	mL	785	735	880
Volume	aliquot volume	mL	735	685	830
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05

Analytical Report

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

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

Lot ID: **1351466**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406754

		Reference Number	1351466-1	1351466-2	1351466-3	Nominal Detection Limit
		Sample Date	May 06, 2019	May 07, 2019	May 07, 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		
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	0.32	0.24	0.10	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	785	735	880	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	0.41	0.28	0.1	
Mercury	As Tested	µg/L	<0.05	<0.05	0.07	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	120	176	156	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.010	<0.01	0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	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	0.34	0.32	0.12	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	0.11	0.10	0.038	

Analytical Report

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg LSD: P.O.: Proj. Acct. code:	Lot ID: 1351466 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406754
Attn: Missy		
Sampled By:		
Company:		

		Reference Number	1351466-4	1351466-5	1351466-6
		Sample Date	May 07, 2019	May 08, 2019	May 08, 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	10	10	10	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	<1	2	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	9.46	1.4	0.52	0.2
Cobalt	µg	0.5	0.3	<0.3	0.25
Copper	µg	2	2	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	2	0.7	2	0.25
Nickel	µg	15	2	2	0.5
Phosphorus	µg	150	170	160	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	2	<2	<2	2
Thallium	µg	<2	<2	4.5	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	5.5	5.7	8.8	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	7	9	9	5
Antimony	µg	<2	<2	2	2.5
Arsenic	µg	<0.9	2.5	2	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.69	0.56	0.26	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	0.7	1	1	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	2	1	0.9	0.25
Nickel	µg	0.5	<0.4	<0.4	0.5
Phosphorus	µg	22	20	20	2.5
Selenium	µg	2.8	2	1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	1	<1	3.7	1.5
Vanadium	µg	<0.9	<0.9	<0.9	1
Zinc	µg	3.1	4.7	5.2	0.5
Volume	Sample	mL	835	820	850
Volume	aliquot volume	mL	785	770	800
Mercury by CVAA					
Mercury	As Tested	µg/L	0.14	<0.05	0.07
					0.05

Analytical Report

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

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

Lot ID: **1351466**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406754

		Reference Number	1351466-4	1351466-5	1351466-6	Nominal Detection Limit
		Sample Date	May 07, 2019	May 08, 2019	May 08, 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		
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	0.056	<0.02	0.03	
Mercury	As Tested	µg/L	2.58	0.78	0.93	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	835	820	850	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	3.4	1.0	1.3	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	150	148	170	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<0.01	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	1000	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	0.65	0.25	0.44	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	0.21	0.081	0.14	

Analytical Report

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg LSD: P.O.: Proj. Acct. code:	Lot ID: 1351466 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406754
Attn: Missy		
Sampled By:		
Company:		

		Reference Number	1351466-7	1351466-8	1351466-9
		Sample Date	May 08, 2019	May 09, 2019	May 09, 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	7	10	7	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	0.81	5.20	0.72	0.2
Cobalt	µg	0.5	0.4	0.3	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	<2	2	1.5
Manganese	µg	0.6	0.6	0.3	0.25
Nickel	µg	1	3.3	<0.5	0.5
Phosphorus	µg	150	170	180	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	2	<2	2
Thallium	µg	2	4.8	5.0	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	5.1	8.1	4.2	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	9	7	6	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	2	2.9	<0.9	1
Cadmium	µg	<0.2	0.3	<0.2	0.25
Chromium	µg	0.46	0.64	2.1	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	1	2.2	2.6	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	2	2	1	0.25
Nickel	µg	<0.4	<0.4	1	0.5
Phosphorus	µg	20	23	20	2.5
Selenium	µg	<1	1	3.7	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	1	4.1	1.5
Vanadium	µg	<0.9	<0.8	<0.9	1
Zinc	µg	1	4.1	2	0.5
Volume	Sample	mL	820	880	840
Volume	aliquot volume	mL	770	830	790
Mercury by CVAA					
Mercury	As Tested	µg/L	0.38	<0.05	<0.05

Analytical Report

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

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

Lot ID: **1351466**
Control Number:
Date Received: May 16, 2019
Date Reported: Jun 6, 2019
Report Number: 2406754

		Reference Number	1351466-7	1351466-8	1351466-9	Nominal Detection Limit
		Sample Date	May 08, 2019	May 09, 2019	May 09, 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		
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	0.15	<0.02	<0.02	
Mercury	As Tested	µg/L	0.25	0.24	0.29	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	820	880	840	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	0.33	0.34	0.39	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	164	176	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	<0.05	<0.05	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	1000	1000	1010	
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	0.26	0.13	0.23	0.05
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	0.083	0.041	0.075	

Approved by: 
Mathieu Simoneau
Operations Manager

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

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

Methodology and Notes

Bill To: A. Lanfranco & Associates #101, 9488 - 189 Street Surrey, BC, Canada V4N 4W7	Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg LSD: P.O.: Proj. Acct. code:	Lot ID: 1351466 Control Number: Date Received: May 16, 2019 Date Reported: Jun 6, 2019 Report Number: 2406754
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (VAN) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 28, 2019	Element Vancouver
Mercury in Air (VAN) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver
Mercury in Air (VAN) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Mercury in Air (VAN) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Mercury in Air (VAN) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 4, 2019	Element Vancouver
Metals in Stack Samples - Back half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver
Metals in Stack Samples - Front half (VAN)	EMC	* Metals Emissions from Stationary Sources, 29	May 21, 2019	Element Vancouver

* Reference Method Modified

References

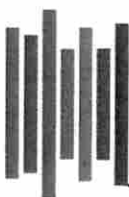
EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

Lot: 1351466 COC



on Sheet

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	Address:		address for approval	
	Surrey, BC V4N 4W7				
QA/QC Report ☐		Report Result:		Report Result:	
Attention:	Mark Lanfranco	Fax	☐	Fax	☐
Phone:	604-881-2582	Mail	☐	Mail	☐
Fax:	604-881-2581	Courier	☐	Courier	☐
Cell:		e-mail	☐	e-mail	☐
e-mail:	mark.lanfranco@alanfranco.com	e-Service	☐	e-Service	☐

Information to be included on Report and Invoice	RUSH	Please contact the laboratory to confirm rush dates and times before submitting samples.	Sample Custody (Please Print)
	Upon filling out this section, client accepts that surcharges will be attached to this analysis		Sampled by:
Project ID:			Company
Project Name:	Metro Vancouver WTE		Signature
Project Location:	Metals and Hg		I authorize Exova to proceed with the work
Legal Location:			work indicated on this form:
PO#:			Date:
Proj. Acct. Code:			Initial:
Agreement ID:			Received by:
			Temp. 23.6°C
			Waybill #:
			Date
			Company
			Time

Special Instructions / Comments	FOR LAB USE ONLY Condition 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 <u>POTABLE</u> WATER for <u>HUMAN CONSUMPTION</u>	
*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:			

	Sample Identification	Location	Depth			Date/Time Sampled	Matrix	Sampling Method	Number of Containers	Enter tests above (✓ relevant samples below)									
			IN	CM	M					Front ICAP	Back ICAP	Front Hg	Back Hg	5A Hg	5B Hg				
1	Unit 1 Run 1 (Beaker (Unit 1 R-1) + 4 Bottles)					06-May-19			5	✓	✓	✓	✓	✓	✓				
2	Unit 1 Run 2 (Beaker (Unit 1 R-2) + 4 Bottles)					07-May-19			5	✓	✓	✓	✓	✓	✓				
3	Unit 1 Run 3 (Beaker (Unit 1 R-3) + 4 Bottles)					07-May-19			5	✓	✓	✓	✓	✓	✓				
4																			
5	Unit 2 Run 1 (Beaker (Unit 2 R-1) + 4 Bottles)					07-May-19			5	✓	✓	✓	✓	✓	✓				
6	Unit 2 Run 2 (Beaker (Unit 2 R-2) + 4 Bottles)					08-May-19			5	✓	✓	✓	✓	✓	✓				
7	Unit 2 Run 3 (Beaker (Unit 2 R-3) + 4 Bottles)					08-May-19			5	✓	✓	✓	✓	✓	✓				
8																			
9	Unit 3 Run 1 Beaker (Unit 3 R-1) + 4 Bottles)					08-May-19			5	✓	✓	✓	✓	✓	✓				
10	Unit 3 Run 2 Beaker (Unit 3 R-2) + 4 Bottles)					09-May-19			5	✓	✓	✓	✓	✓	✓				
11	Unit 3 Run 3 Beaker (Unit 3 R-3) + 4 Bottles)					09-May-19			5	✓	✓	✓	✓	✓	✓				
12																			
13																			
14																			
15																			



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

Date Received: 10-MAY-19
Report Date: 21-MAY-19 11:39 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2271520

Project P.O. #: HF

Job Reference: METRO VANCOUVER WTE

C of C Numbers:

Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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

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

		Sample ID Description Sampled Date Sampled Time Client ID	L2271520-1 Water 07-MAY-19 UNIT 1 HF BLANK	L2271520-2 Water 08-MAY-19 UNIT 2 HF BLANK	L2271520-3 Water 08-MAY-19 UNIT 3 HF BLANK		
Grouping	Analyte						
STACK							
Anions and Nutrients	Fluoride (F) (ug/sample)		<4.0	<4.2	<4.1		
	Volume (Anions) (mL)		400	415	410		

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



L2271520-COFC

Page 1 of 1

GENF 20.00 Front



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

Date Received: 10-MAY-19
Report Date: 21-MAY-19 11:55 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2271521

Project P.O. #: HF

Job Reference: METRO VANCOUVER WTE

C of C Numbers:

Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2271521-1 Water 07-MAY-19 UNIT 1 HF RUN 1	L2271521-2 Water 07-MAY-19 UNIT 1 HF RUN 2	L2271521-3 Water 07-MAY-19 UNIT 1 HF RUN 3	L2271521-4 Water 08-MAY-19 UNIT 2 HF RUN 1	L2271521-5 Water 08-MAY-19 UNIT 2 HF RUN 2
Grouping	Analyte					
STACK						
Anions and Nutrients	Fluoride (F) (ug/sample)	<25 ^{DLDS}	<19 ^{DLDS}	<21 ^{DLDS}	<20 ^{DLDS}	<38 ^{DLDS}
	Volume (Anions) (mL)	500	385	415	395	380

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2271521-6 Water 08-MAY-19 UNIT 2 HF RUN 3	L2271521-7 Water 09-MAY-19 UNIT 3 HF RUN 1	L2271521-8 Water 09-MAY-19 UNIT 3 HF RUN 2	L2271521-9 Water 09-MAY-19 UNIT 3 HF RUN 3	
Grouping	Analyte					
STACK						
Anions and Nutrients	Fluoride (F) (ug/sample)	<79 ^{DLDS}	<19 ^{DLDS}	<20 ^{DLDS}	8.9	
	Volume (Anions) (mL)	395	385	400	430	

* 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.			

** 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 ww - milligrams per kilogram based on wet weight of sample.

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

mg/L - milligrams per litre.

< - Less than.

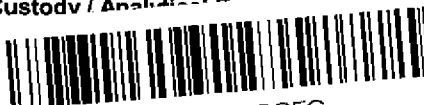
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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

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

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

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



L2271521-COFC

[illegible]

Your Project #: UNITS 1,2,3
Site#: B933614
Site Location: BURNABY, BC
Your C.O.C. #: B933614-ONTV-01-01

Attention: Customer Solutions

Maxxam Analytics
4606 Canada Way
Burnaby, BC
CANADA V5G 1K5

Report Date: 2019/05/16
Report #: R5713862
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9C3335

Received: 2019/05/09, 08:41

Sample Matrix: Tedlar Bag
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Nitrous Oxide (1)	9	N/A	2019/05/10	CAM SOP-00203	GC/ECD

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025 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.

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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) Date Analyzed is the date the analytical batch was created. Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard, where applicable.

Your Project #: UNITS 1,2,3
Site#: B933614
Site Location: BURNABY, BC
Your C.O.C. #: B933614-ONTV-01-01

Attention: Customer Solutions

Maxxam Analytics
4606 Canada Way
Burnaby, BC
CANADA V5G 1K5

Report Date: 2019/05/16
Report #: R5713862
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9C3335

Received: 2019/05/09, 08:41

Encryption Key



Jade Browne
Project Manager Assistant - Air
22 May 2019 15:42:47

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jade Browne, Project Manager Assistant - Air

Email: jbrown@maxxam.ca

Phone# (905)817-5831

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

COMPRESSED GAS PARAMETERS (TEDLAR BAG)

Maxxam ID		JQX021	JQX022	JQX023	JQX024			
Sampling Date		2019/05/06 10:15	2019/05/06 11:20	2019/05/06 12:25	2019/05/06 09:40			
COC Number		B933614-ONTV-01-01	B933614-ONTV-01-01	B933614-ONTV-01-01	B933614-ONTV-01-01			
	UNITS	VQ0455-UNIT-1 R-1	VQ0456-UNIT-1 R-2	VQ0457-UNIT-1 R-3	VQ0458-UNIT-2 R-1	RDL	QC Batch	MDL
Nitrous Oxide	ppmv	0.4	0.9	1.2	8.3	0.1	6118130	0.02
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam ID		JQX025	JQX026	JQX027	JQX028			
Sampling Date		2019/05/06 10:42	2019/05/06 11:44	2019/05/06 10:50	2019/05/06 11:55			
COC Number		B933614-ONTV-01-01	B933614-ONTV-01-01	B933614-ONTV-01-01	B933614-ONTV-01-01			
	UNITS	VQ0459-UNIT-2 R-2	VQ0460-UNIT-2 R-3	VQ0461-UNIT-3 R-1	VQ0462-UNIT-3 R-2	RDL	QC Batch	MDL
Nitrous Oxide	ppmv	9.4	7.0	8.8	9.7	0.1	6118130	0.02
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam ID		JQX029	JQX029			
Sampling Date		2019/05/06 13:00	2019/05/06 13:00			
COC Number		B933614-ONTV-01-01	B933614-ONTV-01-01			
	UNITS	VQ0463-UNIT-3 R-3	VQ0463-UNIT-3 R-3 Lab-Dup	RDL	QC Batch	MDL
Nitrous Oxide	ppmv	4.7	4.3	0.1	6118130	0.02
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate						

TEST SUMMARY

Maxxam ID: JQX021
Sample ID: VQ0455-UNIT-1 R-1
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX022
Sample ID: VQ0456-UNIT-1 R-2
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX023
Sample ID: VQ0457-UNIT-1 R3
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX024
Sample ID: VQ0458-UNIT-2 R-1
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX025
Sample ID: VQ0459-UNIT-2 R-2
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX026
Sample ID: VQ0460-UNIT-2 R-3
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX027
Sample ID: VQ0461-UNIT-3 R-1
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

TEST SUMMARY

Maxxam ID: JQX028
Sample ID: VQ0462-UNIT-3 R-2
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX029
Sample ID: VQ0463-UNIT-3 R-3
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

Maxxam ID: JQX029 Dup
Sample ID: VQ0463-UNIT-3 R-3
Matrix: Tedlar Bag

Collected: 2019/05/06
Shipped:
Received: 2019/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	6118130	N/A	2019/05/10	Vasan Thiagarajah

GENERAL COMMENTS

The sample was analysed 4 days after the date of sampling. The recommended holding time is 2 days.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: UNITS 1,2,3
Site Location: BURNABY, BC

QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
6118130	Nitrous Oxide	2019/05/10	<0.1	ppmv	8.2	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.						

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

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

APPENDIX - C

COMPUTER GENERATED RESULTS

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

Date: 6-May-19
Run: 1 - Particulate / Metals
Run Time: 12:00 - 14:03

Concentrations:

Particulate	1.03 mg/dscm	0.00045 gr/dscf
	0.57 mg/Acm	0.00025 gr/Acf
	0.92 mg/dscm (@ 11% O2)	0.00040 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.076 Kg/hr	0.167 lb/hr
--------------------	-------------	-------------

Flue Gas Characteristics:

Flow	1220 dscm/min	43074 dscf/min
	20.33 dscm/sec	718 dscf/sec
	2194 Acm/min	77495 Acf/min

Velocity	14.359 m/sec	47.11 f/sec
-----------------	--------------	-------------

Temperature	151.3 oC	304.3 oF
--------------------	----------	----------

Moisture	15.8 %
-----------------	--------

Gas Analysis	9.8 % O2
	10.7 % CO2

30.100 Mol. Wt (g/gmole) Dry
28.186 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.8575 dscm	100.913 dscf
Sample Time	120.0 minutes	
Isokineticity	104.8 %	

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

Date: 6-May-19
Run: 1 - Particulate / Metals
Run Time: 12:00 - 14:03

Traverse / Point	Time (min.)	Dry Gas Meter	Pitot ^P	Orifice ^H (in. H2O)	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
		(ft3)	(in. H2O)		Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	750.732								
1	5.0	754.450	0.35	1.84	72	72	4	300	1.5	104.8
2	10.0	758.220	0.36	1.89	72	72	4	300	4.7	104.7
3	15.0	761.940	0.35	1.84	72	72	4	301	8.4	104.9
4	20.0	765.610	0.34	1.79	73	73	4	301	12.5	104.8
5	25.0	769.280	0.34	1.79	73	73	4	301	17.7	104.8
6	30.0	773.060	0.36	1.89	73	73	4	301	25.2	104.9
7	35.0	777.510	0.50	2.62	74	74	4	301	45.6	104.8
8	40.0	782.100	0.53	2.79	75	75	4	300	53.2	104.7
9	45.0	786.830	0.56	2.95	76	76	5	300	58.3	104.9
10	50.0	791.600	0.57	3.00	76	76	5	301	62.5	104.9
11	55.0	796.380	0.57	3.01	77	77	5	301	66.1	104.9
12	60.0	800.990	0.53	2.80	78	78	5	300	69.4	104.6
Traverse 2	0.0	800.990								
1	5.0	804.700	0.34	1.80	79	79	5	304	1.5	104.9
2	10.0	808.600	0.38	1.99	78	78	5	306	4.7	104.7
3	15.0	812.700	0.42	2.20	78	78	5	306	8.4	104.8
4	20.0	816.950	0.45	2.37	79	79	5	306	12.5	104.8
5	25.0	821.290	0.47	2.47	79	79	5	308	17.7	104.9
6	30.0	825.950	0.54	2.84	80	80	5	308	25.2	104.9
7	35.0	830.650	0.55	2.89	80	80	5	308	45.6	104.9
8	40.0	835.390	0.56	2.94	80	80	5	308	53.2	104.8
9	45.0	839.780	0.48	2.52	80	80	6	309	58.3	104.8
10	50.0	843.980	0.44	2.31	81	81	6	311	62.5	104.7
11	55.0	848.090	0.42	2.21	81	81	6	310	66.1	104.7
12	60.0	852.000	0.38	2.00	82	82	6	311	69.4	104.6
Average:			0.450	2.365	77.0	77.0	4.8	304.3		104.8

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

Date: 7-May-19
Run: 2 - Particulate / Metals
Run Time: 09:05 - 11:07

Concentrations:

Particulate	0.46 mg/dscm	0.00020 gr/dscf
	0.26 mg/Acm	0.00011 gr/Acf
	0.41 mg/dscm (@ 11% O2)	0.00018 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.032 Kg/hr	0.071 lb/hr
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Flue Gas Characteristics:

Flow	1149 dscm/min	40565 dscf/min
	19.14 dscm/sec	676 dscf/sec
	2032 Acm/min	71743 Acf/min
Velocity	13.293 m/sec	43.61 f/sec
Temperature	145.0 oC	293.0 oF
Moisture	15.9 %	
Gas Analysis	9.6 % O2	
	10.4 % CO2	
	30.050 Mol. Wt (g/gmole) Dry	
	28.139 Mol. Wt (g/gmole) Wet	

Sample Parameters:

Sample Volume	2.6887 dscm	94.950 dscf
Sample Time	120.0 minutes	
Isokineticity	104.7 %	

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

Client:	Metro Vancouver	Date:	7-May-19
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 1	Run Time:	09:05 - 11:07

Control Unit (Y)	1.0063	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.3060	Filter (grams) 0.00005	CO2 O2	Impinger 1 224.0
Pitot Factor	0.8480	Washings (grams) 0.00120	10.67 9.33	Impinger 2 108.0
Baro. Press. (in. Hg)	30.04		10.17 9.83	Impinger 3 22.0
Static Press. (in. H2O)	-18.50	Total (grams) 0.00125		Impinger 4 12.0
Stack Height (ft)	30			Impinger 5 2.0
Stack Diameter (in.)	70.90			Impinger 6 2.0
Stack Area (sq.ft.)	27.417			Gel 10.3
Minutes Per Reading	5.0		10.42 9.58	Gain (grams) 380.3
Minutes Per Point	5.0			

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ΔP (in. H2O)	Orifice ΔH (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	852.530								
1	5.0	856.010	0.31	1.63	68	68	4	292	1.5	104.5
2	10.0	859.550	0.32	1.68	68	68	4	293	4.7	104.7
3	15.0	862.980	0.30	1.58	68	68	4	293	8.4	104.7
4	20.0	866.410	0.30	1.58	68	68	4	292	12.5	104.7
5	25.0	869.890	0.31	1.63	68	68	4	292	17.7	104.5
6	30.0	873.320	0.30	1.58	68	68	4	292	25.2	104.7
7	35.0	877.660	0.48	2.53	69	69	5	292	45.6	104.7
8	40.0	882.230	0.53	2.80	69	69	5	291	53.2	104.9
9	45.0	886.670	0.50	2.64	70	70	5	292	58.3	104.8
10	50.0	891.060	0.49	2.59	70	70	5	293	62.5	104.7
11	55.0	895.370	0.47	2.49	71	71	5	293	66.1	104.8
12	60.0	899.590	0.45	2.38	71	71	5	294	69.4	104.9
Traverse 2	0.0	899.590								
1	5.0	903.160	0.32	1.70	72	72	5	292	1.5	104.7
2	10.0	906.560	0.29	1.54	73	73	5	291	4.7	104.4
3	15.0	910.410	0.37	1.97	73	73	5	290	8.4	104.7
4	20.0	914.210	0.36	1.92	73	73	5	290	12.5	104.8
5	25.0	918.110	0.38	2.02	73	73	5	291	17.7	104.8
6	30.0	922.300	0.44	2.34	73	73	5	293	25.2	104.8
7	35.0	926.710	0.49	2.59	73	73	6	295	45.6	104.8
8	40.0	931.040	0.47	2.49	74	74	6	296	53.2	104.9
9	45.0	935.030	0.40	2.12	74	74	6	297	58.3	104.7
10	50.0	938.970	0.39	2.07	74	74	6	296	62.5	104.6
11	55.0	942.820	0.37	1.96	75	75	5	296	66.1	104.8
12	60.0	946.610	0.36	1.91	75	75	5	296	69.4	104.5
Average:			0.392	2.073	71.3	71.3	4.9	293.0		104.7

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

Date: 7-May-19
Run: 3 - Particulate / Metals
Run Time: 11:36 - 13:39

Concentrations:

Particulate	0.6 mg/dscm	0.0002 gr/dscf
	0.3 mg/Acm	0.0001 gr/Acf
	0.5 mg/dscm (@ 11% O2)	0.0002 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.037 Kg/hr	0.082 lb/hr
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Flue Gas Characteristics:

Flow	1105 dscm/min	39010 dscf/min
	18.41 dscm/sec	650 dscf/sec
	1941 Acm/min	68536 Acf/min

Velocity	12.699 m/sec	41.66 f/sec
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Temperature	144.9 oC	292.9 oF
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Moisture	15.3 %
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Gas Analysis	9.3 % O2
	10.6 % CO2

30.067 Mol. Wt (g/gmole) Dry
28.219 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5722 dscm	90.838 dscf
Sample Time	120.0 minutes	
Isokineticity	104.2 %	

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

Client:	Metro Vancouver	Date:	7-May-19
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 1	Run Time:	11:36 - 13:39

Control Unit (Y)	1.0063	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3060	Filter (grams)	0.00005	CO2	O2	Impinger 1	222.0
Pitot Factor	0.8480	Washings (grams)	0.00140	10.67	9.17	Impinger 2	88.0
Baro. Press. (in. Hg)	30.04			10.50	9.50	Impinger 3	12.0
Static Press. (in. H2O)	-18.50	Total (grams)	0.00145			Impinger 4	11.0
Stack Height (ft)	30					Impinger 5	3.0
Stack Diameter (in.)	70.90					Impinger 6	1.0
Stack Area (sq.ft.)	27.417					Gel	12.0
Minutes Per Reading	5.0			10.58	9.33	Gain (grams)	349.0
Minutes Per Point	5.0						

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ΔP (in. H2O)	Orifice ΔH (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	946.988								
1	5.0	950.380	0.29	1.54	72	72	5	293	1.5	104.0
2	10.0	953.830	0.30	1.59	72	72	5	295	4.7	104.2
3	15.0	957.340	0.31	1.64	72	72	5	294	8.4	104.2
4	20.0	961.060	0.35	1.85	71	71	5	294	12.5	104.2
5	25.0	964.730	0.34	1.80	72	72	5	293	17.7	104.0
6	30.0	968.240	0.31	1.65	72	72	5	292	25.2	104.0
7	35.0	972.020	0.36	1.91	72	72	5	292	45.6	104.0
8	40.0	975.860	0.37	1.97	72	72	5	291	53.2	104.2
9	45.0	979.800	0.39	2.07	72	72	5	291	58.3	104.2
10	50.0	983.380	0.32	1.70	73	73	5	292	62.5	104.3
11	55.0	986.840	0.30	1.59	73	73	5	293	66.1	104.1
12	60.0	990.240	0.29	1.54	73	73	5	293	69.4	104.1
Traverse 2	0.0	990.240								
1	5.0	993.710	0.30	1.60	74	74	5	291	1.5	104.1
2	10.0	997.230	0.31	1.65	74	74	5	292	4.7	104.0
3	15.0	1000.750	0.31	1.65	74	74	5	292	8.4	104.0
4	20.0	1004.330	0.32	1.71	75	75	5	293	12.5	104.0
5	25.0	1008.030	0.34	1.81	75	75	5	292	17.7	104.2
6	30.0	1011.670	0.33	1.76	75	75	5	292	25.2	104.0
7	35.0	1016.060	0.48	2.56	75	75	6	292	45.6	104.2
8	40.0	1020.590	0.51	2.72	75	75	6	293	53.2	104.4
9	45.0	1024.940	0.47	2.51	76	76	6	293	58.3	104.2
10	50.0	1029.200	0.45	2.40	76	76	6	294	62.5	104.4
11	55.0	1033.360	0.43	2.30	76	76	6	295	66.1	104.3
12	60.0	1037.440	0.41	2.20	77	77	6	297	69.4	104.7
Average:			0.358	1.905	73.7	73.7	5.3	292.9		104.2

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

Date: 7-May-19
Run: 1 - Particulate / Metals
Run Time: 12:30 - 14:31

Concentrations:

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

Emission Rates:

Particulate	0.055 Kg/hr	0.121 lb/hr
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Flue Gas Characteristics:

Flow	1179 dscm/min	41644 dscf/min
	19.65 dscm/sec	694 dscf/sec
	2122 Acmm/min	74925 Acf/min

Velocity	13.883 m/sec	45.55 f/sec
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Temperature	157.3 oC	315.1 oF
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Moisture	14.7 %
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Gas Analysis	10.1 % O2
	9.8 % CO2

29.965 Mol. Wt (g/gmole) Dry
28.203 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.7654 dscm	97.662 dscf
Sample Time	120.0 minutes	
Isokineticity	105.9 %	

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

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

Date: 7-May-19
Run: 1 - Particulate / Metals
Run Time: 12:30 - 14:31

Control Unit (Y)	1.0232	Collection:		Gas Analysis (Vol. %):		Condensate Collection:	
Nozzle Diameter (in.)	0.3048	Filter (grams)	0.00005	CO2	O2	Impinger 1	236.0
Pitot Factor	0.8241	Washings (grams)	0.00210	9.67	10.20	Impinger 2	81.0
Baro. Press. (in. Hg)	30.07			9.83	10.07	Impinger 3	24.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.00215				Impinger 4	5.0
Stack Height (ft)	30					Impinger 5	1.0
Stack Diameter (in.)	70.90					Impinger 6	0.0
Stack Area (sq.ft.)	27.417					Cel	11.5
Minutes Per Reading	5.0			9.75	10.13	Gain (grams)	358.5
Minutes Per Point	5.0						

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	824.295								
1	5.0	827.920	0.36	1.70	68	68	6	299	1.5	105.9
2	10.0	831.480	0.35	1.64	67	67	6	306	4.7	106.1
3	15.0	835.150	0.38	1.75	67	67	7	318	8.4	105.9
4	20.0	838.980	0.42	1.93	68	68	7	321	12.5	105.1
5	25.0	842.300	0.31	1.42	69	69	6.5	322	17.7	105.8
6	30.0	845.730	0.33	1.52	70	70	6.5	325	25.2	106.0
7	35.0	850.550	0.66	3.03	70	70	9	325	45.6	105.7
8	40.0	855.550	0.70	3.22	71	71	9	324	53.2	106.2
9	45.0	860.440	0.67	3.09	71	71	9.5	322	58.3	106.0
10	50.0	864.690	0.49	2.32	72	72	9.5	302	62.5	106.0
11	55.0	869.220	0.56	2.65	73	73	8	306	66.1	105.8
12	60.0	873.260	0.44	2.10	73	73	8	300	69.4	105.9
Traverse 2	0.0	873.260								
1	5.0	877.600	0.52	2.42	74	74	8	320	1.5	105.9
2	10.0	882.020	0.54	2.50	75	75	8	324	4.7	105.9
3	15.0	886.650	0.59	2.74	74	74	8	322	8.4	106.3
4	20.0	891.200	0.57	2.64	76	76	8	325	12.5	106.1
5	25.0	895.870	0.60	2.78	76	76	8	326	17.7	106.2
6	30.0	900.330	0.55	2.55	76	76	8	326	25.2	105.9
7	35.0	903.820	0.33	1.55	77	77	6	316	45.6	105.8
8	40.0	907.200	0.31	1.44	79	79	6	328	53.2	106.1
9	45.0	910.440	0.28	1.34	78	78	5.5	306	58.3	105.7
10	50.0	913.580	0.26	1.25	78	78	5.5	302	62.5	106.0
11	55.0	916.660	0.25	1.20	79	79	5	300	66.1	105.7
12	60.0	919.740	0.25	1.21	79	79	5	298	69.4	105.6
Average:			0.447	2.083	73.3	73.3	7.2	315.1		105.9

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

Date: 8-May-19
Run: 2 - Particulate / Metals
Run Time: 09:08 - 11:10

Concentrations:

Particulate	0.36 mg/dscm	0.00016 gr/dscf
	0.20 mg/Acm	0.00009 gr/Acf
	0.31 mg/dscm (@ 11% O2)	0.00014 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.023 Kg/hr	0.051 lb/hr
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Flue Gas Characteristics:

Flow	1068 dscm/min	37710 dscf/min
	17.80 dscm/sec	628 dscf/sec
	1906 Acfm/min	67316 Acf/min

Velocity	12.473 m/sec	40.92 f/sec
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Temperature	152.5 oC	306.6 oF
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Moisture	15.2 %
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Gas Analysis	9.5 % O2
	10.4 % CO2

30.047 Mol. Wt (g/gmole) Dry
28.211 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.3527 dscm	83.086 dscf
Sample Time	120.0 minutes	
Isokineticity	103.2 %	

*** Standard Conditions:**

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

Date: 8-May-19
Run: 2 - Particulate / Metals
Run Time: 09:08 - 11:10

Traverse / Point	Time (min.)	Dry Gas Meter	Pitot ΔP	Orifice ΔH	Dry Gas Temperature		Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
		(ft3)	(in. H2O)	(in. H2O)	Inlet (oF)	Outlet (oF)				
Traverse 1	0.0	919.784								
1	5.0	923.170	0.34	1.50	68	68	6	310	1.5	103.2
2	10.0	926.600	0.35	1.54	68	68	6	310	4.7	103.1
3	15.0	930.320	0.41	1.80	69	69	6	310	8.4	103.1
4	20.0	934.390	0.49	2.16	69	69	6	311	12.5	103.4
5	25.0	938.380	0.47	2.07	70	70	6	311	17.7	103.3
6	30.0	942.330	0.46	2.03	70	70	6	310	25.2	103.3
7	35.0	945.590	0.31	1.37	72	72	6	310	45.6	103.3
8	40.0	948.800	0.30	1.33	72	72	6	309	53.2	103.3
9	45.0	951.850	0.27	1.20	72	72	6	307	58.3	103.3
10	50.0	954.850	0.26	1.16	72	72	6	303	62.5	103.2
11	55.0	957.790	0.25	1.12	73	73	6	302	66.1	102.9
12	60.0	960.680	0.24	1.08	73	73	6	300	69.4	103.1
Traverse 2	0.0	960.680								
1	5.0	963.810	0.28	1.26	74	74	6	300	1.5	103.2
2	10.0	966.890	0.27	1.22	75	75	6	299	4.7	103.2
3	15.0	970.120	0.30	1.35	75	75	6	305	8.4	103.1
4	20.0	973.350	0.30	1.34	76	76	6	308	12.5	103.1
5	25.0	976.700	0.32	1.44	77	77	6	307	17.7	103.3
6	30.0	979.990	0.31	1.39	77	77	6	307	25.2	103.0
7	35.0	984.260	0.52	2.34	78	78	8	307	45.6	103.3
8	40.0	988.600	0.54	2.42	78	78	8	306	53.2	103.0
9	45.0	992.660	0.47	2.12	78	78	9	307	58.3	103.3
10	50.0	996.600	0.44	1.99	79	79	9	306	62.5	103.3
11	55.0	1000.360	0.40	1.81	79	79	8	306	66.1	103.3
12	60.0	1004.080	0.39	1.76	80	80	8	307	69.4	103.4
Average:			0.362	1.617	73.9	73.9	6.6	306.6		103.2

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

Date: 8-May-19
Run: 3 - Particulate / Metals
Run Time: 11:39 - 13:41

Concentrations:

Particulate	0.5 mg/dscm	0.0002 gr/dscf
	0.3 mg/Acm	0.0001 gr/Acf
	0.5 mg/dscm (@ 11% O2)	0.0002 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.04 Kg/hr	0.078 lb/hr
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Flue Gas Characteristics:

Flow	1080 dscm/min	38143 dscf/min
	18.00 dscm/sec	636 dscf/sec
	1949 Acm/min	68814 Acf/min
Velocity	12.751 m/sec	41.83 f/sec
Temperature	156.4 oC	313.5 oF
Moisture	15.4 %	
Gas Analysis	9.7 % O2	
	10.2 % CO2	
	30.015 Mol. Wt (g/gmole) Dry	
	28.167 Mol. Wt (g/gmole) Wet	

Sample Parameters:

Sample Volume	2.4739 dscm	87.367 dscf
Sample Time	120.0 minutes	
Isokineticity	103.2 %	

*** Standard Conditions:**

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

Client:	Metro Vancouver	Date:	8-May-19
Jobsite:	WTE (Burnaby, B.C)	Run:	3 - Particulate / Metals
Source:	Unit 2	Run Time:	11:39 - 13:41

Control Unit (Y)	1.0232	Collection:		Gas Analysis (Vol. %):		Condensate Collection:			
Nozzle Diameter (in.)	0.3048		Filter (grams)	0.00005	CO2	O2	Impinger 1	228.0	
Pitot Factor	0.8241		Washings (grams)	0.00130	Traverse 1	9.83	9.93	Impinger 2	66.0
Baro. Press. (in. Hg)	30.15				Traverse 2	10.50	9.50	Impinger 3	14.0
Static Press. (in. H2O)	-19.50		Total (grams) 0.0014					Impinger 4	10.0
Stack Height (ft)	30						Impinger 5	2.0	
Stack Diameter (in.)	70.90						Impinger 6	2.0	
Stack Area (sq.ft.)	27.417						Gel	15.5	
Minutes Per Reading	5.0				10.17	9.72	Gain (grams)	337.5	
Minutes Per Point	5.0								

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	4.929								
1	5.0	8.180	0.30	1.36	77	77	5.5	300	1.5	103.1
2	10.0	11.370	0.29	1.30	77	77	5.5	307	4.7	103.4
3	15.0	14.710	0.32	1.43	77	77	6	312	8.4	103.4
4	20.0	17.870	0.29	1.29	76	76	6	315	12.5	103.1
5	25.0	20.980	0.28	1.24	77	77	5.5	316	17.7	103.1
6	30.0	24.250	0.31	1.37	76	76	5.5	317	25.2	103.4
7	35.0	28.840	0.61	2.71	77	77	8	317	45.6	103.6
8	40.0	33.390	0.60	2.66	77	77	8	318	53.2	103.6
9	45.0	37.870	0.58	2.58	77	77	8	316	58.3	103.6
10	50.0	42.190	0.54	2.40	77	77	8	315	62.5	103.4
11	55.0	46.310	0.49	2.18	78	78	8	317	66.1	103.4
12	60.0	50.270	0.45	2.00	78	78	8	315	69.4	103.5
Traverse 2	0.0	50.270								
1	5.0	53.710	0.34	1.51	78	78	6	315	1.5	103.3
2	10.0	57.200	0.35	1.56	78	78	6	316	4.7	103.4
3	15.0	60.970	0.41	1.82	78	78	6.5	316	8.4	103.3
4	20.0	54.880	0.44	1.96	78	78	6.5	316	12.5	-161.1
5	25.0	68.840	0.45	2.00	78	78	7	315	17.7	365.0
6	30.0	72.840	0.46	2.05	79	79	7	316	25.2	103.3
7	35.0	76.140	0.31	1.39	80	80	6	314	45.6	103.3
8	40.0	79.230	0.27	1.22	80	80	6	309	53.2	103.3
9	45.0	82.260	0.26	1.17	80	80	5	309	58.3	103.2
10	50.0	85.170	0.24	1.08	80	80	5	311	62.5	103.3
11	55.0	88.020	0.23	1.03	80	80	5	311	66.1	103.3
12	60.0	90.930	0.24	1.08	81	81	5	310	69.4	103.0
Average:			0.378	1.683	78.1	78.1	3.0	313.5		103.2

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

Date: 8-May-19
Run: 1 - Particulate / Metals
Run Time: 12:30 - 14:34

Concentrations:

Particulate	0.67 mg/dscm	0.00029 gr/dscf
	0.38 mg/Acm	0.00016 gr/Acf
	0.55 mg/dscm (@ 11% O2)	0.00024 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.044 Kg/hr	0.098 lb/hr
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Flue Gas Characteristics:

Flow	1108 dscm/min	39134 dscf/min
	18.47 dscm/sec	652 dscf/sec
	1965 Acm/min	69388 Acf/min

Velocity	12.857 m/sec	42.18 f/sec
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Temperature	151.1 oC	304.0 oF
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Moisture	15.0 %
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Gas Analysis	9.0 % O2
	9.7 % CO2

29.907 Mol. Wt (g/gmole) Dry
28.120 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.3240 dscm	82.074 dscf
Sample Time	120.0 minutes	
Isokineticity	102.9 %	

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

Client:	Metro Vancouver	Date:	8-May-19
Jobsite:	WTE (Burnaby, B.C)	Run:	1 - Particulate / Metals
Source:	Unit 3	Run Time:	12:30 - 14:34

Control Unit (Y)	1.0063	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.2923	Filter (grams) 0.00005	CO2 O2	Impinger 1 208.0
Pitot Factor	0.8480	Washings (grams) 0.00150	9.33 9.33	Impinger 2 42.0
Baro. Press. (in. Hg)	30.17	Traverse 1	10.00 8.67	Impinger 3 28.0
Static Press. (in. H2O)	-19.50	Traverse 2		Impinger 4 11.0
Stack Height (ft)	30			Impinger 5 3.0
Stack Diameter (in.)	70.90			Impinger 6 2.0
Stack Area (sq.ft.)	27.417			Gel 14.0
Minutes Per Reading	5.0			Gain (grams) 308.0
Minutes Per Point	5.0			
			9.67 9.00	

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	38.285								
1	5.0	41.870	0.42	1.76	64	64	7	307	1.5	102.4
2	10.0	45.550	0.44	1.84	65	65	7	311	4.7	102.8
3	15.0	49.340	0.47	1.96	65	65	8	310	8.4	102.4
4	20.0	53.080	0.45	1.89	66	66	8	308	12.5	102.9
5	25.0	56.750	0.43	1.81	66	66	7.5	307	17.7	103.2
6	30.0	60.300	0.40	1.69	67	67	7.5	305	25.2	103.2
7	35.0	63.220	0.27	1.15	68	68	6	298	45.6	102.5
8	40.0	65.980	0.24	1.02	68	68	6	303	53.2	103.1
9	45.0	68.680	0.23	0.98	69	69	5	300	58.3	102.6
10	50.0	71.260	0.21	0.89	70	70	5	303	62.5	102.6
11	55.0	73.780	0.20	0.85	70	70	6	303	66.1	102.6
12	60.0	76.350	0.20	0.86	71	71	6	300	69.4	104.3
Traverse 2	0.0	76.350								
1	5.0	79.080	0.23	0.99	73	73	6	295	1.5	102.6
2	10.0	81.920	0.25	1.07	73	73	6	304	4.7	103.0
3	15.0	84.960	0.29	1.24	73	73	6	304	8.4	102.4
4	20.0	87.900	0.27	1.15	74	74	6	305	12.5	102.5
5	25.0	90.790	0.26	1.11	74	74	6	304	17.7	102.6
6	30.0	93.800	0.28	1.20	75	75	6	303	25.2	102.7
7	35.0	97.900	0.52	2.23	75	75	8	305	45.6	103.1
8	40.0	102.450	0.64	2.75	75	75	8	302	53.2	103.0
9	45.0	106.870	0.60	2.58	76	76	9	303	58.3	103.2
10	50.0	111.120	0.56	2.40	76	76	9	306	62.5	102.9
11	55.0	115.300	0.54	2.31	76	76	9	307	66.1	103.1
12	60.0	119.330	0.50	2.15	77	77	9	304	69.4	102.9
Average:			0.371	1.578	71.1	71.1	7.0	304.0		102.9

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

Date: 9-May-19
Run: 2 - Particulate / Metals
Run Time: 09:05 - 11:08

Concentrations:

Particulate	0.33 mg/dscm	0.00014 gr/dscf
	0.18 mg/Acm	0.00008 gr/Acf
	0.30 mg/dscm (@ 11% O2)	0.00013 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.024 Kg/hr	0.053 lb/hr
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Flue Gas Characteristics:

Flow	1219 dscm/min	43057 dscf/min
	20.32 dscm/sec	718 dscf/sec
	2194 Acfm/min	77480 Acf/min

Velocity	14.356 m/sec	47.10 f/sec
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Temperature	154.5 oC	310.1 oF
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Moisture	15.4 %
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Gas Analysis	9.8 % O2
	9.3 % CO2

29.873 Mol. Wt (g/gmole) Dry
28.050 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5691 dscm	90.726 dscf
Sample Time	120.0 minutes	
Isokineticity	103.3 %	

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

Client:	Metro Vancouver	Date:	9-May-19
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 3	Run Time:	09:05 - 11:08

Control Unit (Y)	1.0063	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.2923	Filter (grams) 0.00005	CO2 O2	Impinger 1 224.0
Pitot Factor	0.8480	Washings (grams) 0.00080	9.33 9.67	Impinger 2 78.0
Baro. Press. (in. Hg)	30.09	Traverse 1	9.17 10.00	Impinger 3 22.0
Static Press. (in. H2O)	-19.50	Traverse 2		Impinger 4 8.0
Stack Height (ft)	30			Impinger 5 2.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 14.7
Minutes Per Reading	5.0			Gain (grams) 349.7
Minutes Per Point	5.0			
			9.25 9.83	

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ΔP (in. H2O)	Orifice ΔH (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	119.586								
1	5.0	123.520	0.50	2.08	63	63	6	307	1.5	103.4
2	10.0	127.560	0.53	2.20	63	63	6	310	4.7	103.4
3	15.0	131.720	0.56	2.33	63	63	7	310	8.4	103.6
4	20.0	135.780	0.53	2.22	65	65	7	309	12.5	103.5
5	25.0	139.820	0.52	2.18	66	66	6.5	308	17.7	103.7
6	30.0	143.620	0.46	1.93	66	66	6.5	308	25.2	103.6
7	35.0	146.940	0.35	1.48	68	68	7	307	45.6	103.2
8	40.0	150.140	0.32	1.36	69	69	7	303	53.2	103.5
9	45.0	153.230	0.30	1.27	70	70	5.5	308	58.3	103.4
10	50.0	156.220	0.28	1.19	71	71	5.5	306	62.5	103.2
11	55.0	159.050	0.25	1.06	72	72	5.5	309	66.1	103.3
12	60.0	161.760	0.23	0.98	72	72	5.5	306	69.4	102.9
Traverse 2	0.0	161.760								
1	5.0	165.060	0.34	1.44	74	74	5	311	1.5	103.2
2	10.0	168.420	0.35	1.48	74	74	5	311	4.7	103.5
3	15.0	171.780	0.35	1.90	75	75	5	311	8.4	103.5
4	20.0	175.180	0.36	1.53	75	75	5	312	12.5	103.2
5	25.0	178.500	0.34	1.45	76	76	5.5	312	17.7	103.5
6	30.0	181.960	0.37	1.57	77	77	5.5	313	25.2	103.3
7	35.0	186.620	0.67	2.85	78	78	8	314	45.6	103.6
8	40.0	191.380	0.70	2.98	78	78	8	309	53.2	103.2
9	45.0	196.020	0.67	2.83	79	79	9	317	58.3	103.1
10	50.0	200.640	0.66	2.80	80	80	9	316	62.5	103.2
11	55.0	205.120	0.62	2.63	80	80	9	316	66.1	103.2
12	60.0	209.540	0.60	2.57	81	81	9	310	69.4	102.9
Average:			0.453	1.930	72.3	72.3	6.6	310.1		103.3

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

Date: 9-May-19
Run: 3 - Particulate / Metals
Run Time: 11:28 - 13:30

Concentrations:

Particulate	0.49 mg/dscm	0.00022 gr/dscf
	0.27 mg/Acm	0.00012 gr/Acf
	0.41 mg/dscm (@ 11% O2)	0.00018 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.035 Kg/hr	0.078 lb/hr
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Flue Gas Characteristics:

Flow	1200 dscm/min	42391 dscf/min
	20.01 dscm/sec	707 dscf/sec
	2186 Acn/min	77211 Acf/min

Velocity	14.306 m/sec	46.94 f/sec
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Temperature	156.9 oC	314.4 oF
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Moisture	15.9 %
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Gas Analysis	9.0 % O2
	10.2 % CO2

29.986 Mol. Wt (g/gmole) Dry
28.078 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5389 dscm	89.660 dscf
Sample Time	120.0 minutes	
Isokineticity	103.7 %	

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

Client:	Metro Vancouver	Date:	9-May-19
Jobsite:	WTE(Burnaby,B.C)	Run:	3 - Particulate / Metals
Source:	Unit 3	Run Time:	11:28 - 13:30

Control Unit (Y)	1.0063	Collection:	Gas Analysis (Vol. %):	Condensate Collection:
Nozzle Diameter (in.)	0.2923	Filter (grams) 0.00005	CO2 O2	Impinger 1 238.0
Pitot Factor	0.8480	Washings (grams) 0.00120	Traverse 1 10.16 8.97	Impinger 2 90.0
Baro. Press. (in. Hg)	30.09		Traverse 2 10.16 9.03	Impinger 3 8.0
Static Press. (in. H2O)	-19.50	Total (grams) 0.00125		Impinger 4 8.0
Stack Height (ft)	30			Impinger 5 2.0
Stack Diameter (in.)	70.90			Impinger 6 1.0
Stack Area (sq.ft.)	27.417			Gel 13.5
Minutes Per Reading	5.0		10.16 9.00	Gain (grams) 360.5
Minutes Per Point	5.0			

Traverse / Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Inlet (oF)	Dry Gas Temperature Outlet (oF)	Vacuum (in. Hg.)	Stack Temp. (oF)	Wall Dist. (in.)	Isokin. (%)
Traverse 1	0.0	209.758								
1	5.0	213.080	0.34	1.45	80	80	6	312	1.5	103.5
2	10.0	216.450	0.35	1.49	80	80	6	313	4.7	103.6
3	15.0	219.720	0.33	1.40	80	80	6	314	8.4	103.5
4	20.0	222.850	0.30	1.28	80	80	6	312	12.5	103.8
5	25.0	225.940	0.29	1.24	81	81	6	310	17.7	103.9
6	30.0	229.220	0.33	1.41	81	81	6	311	25.2	103.5
7	35.0	233.500	0.56	2.40	81	81	8	310	45.6	103.8
8	40.0	238.050	0.63	2.70	81	81	8	308	53.2	104.0
9	45.0	242.740	0.67	2.86	82	82	8	312	58.3	104.1
10	50.0	247.350	0.65	2.78	82	82	8	312	62.5	103.8
11	55.0	251.890	0.63	2.70	82	82	9	311	66.1	103.8
12	60.0	256.500	0.65	2.78	83	83	9	314	69.4	103.8
Traverse 2	0.0	256.500								
1	5.0	260.620	0.52	2.21	83	83	9	318	1.5	103.8
2	10.0	264.850	0.55	2.33	83	83	9	319	4.7	103.7
3	15.0	269.120	0.56	2.38	83	83	9	318	8.4	103.7
4	20.0	273.460	0.58	2.46	83	83	9	320	12.5	103.7
5	25.0	277.950	0.62	2.63	83	83	9	320	17.7	103.9
6	30.0	282.330	0.59	2.50	83	83	9	320	25.2	103.8
7	35.0	285.720	0.35	1.49	83	83	6	317	45.6	103.9
8	40.0	288.950	0.32	1.36	83	83	6	318	53.2	103.5
9	45.0	291.860	0.26	1.11	83	83	6	317	58.3	103.4
10	50.0	294.720	0.25	1.07	83	83	6	316	62.5	103.5
11	55.0	297.540	0.24	1.03	84	84	6	314	66.1	103.8
12	60.0	300.300	0.23	0.99	84	84	6	309	69.4	103.5
Average:			0.450	1.919	82.1	82.1	7.3	314.4		103.7

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

Sample Type: HF

Parameter		Test 1	Test 2	Test 3
Test Date		7-May-19	7-May-19	7-May-19
Test Time		09:22 - 10:22	10:40 - 11:40	11:55 - 12:55
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.05	30.05	30.05
DGM Factor	(Y)	0.9446	0.9446	0.9446
Initial Reading	(m ³)	325.801	326.495	327.116
Final Reading	(m ³)	326.487	327.105	327.722
		0.0		
Temp. Outlet	(Avg. oF)	68.3	73.1	75.3
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.70	0.57	0.57
HF	(mg)	0.013	0.010	0.011
Oxygen	(Vol. %)	9.6	9.6	9.3
HF	(mg/Sm ³)	0.019	0.017	0.019
HF	(mg/Sm ³ @ 11% O2)	0.017	0.015	0.017
Moisture	(Vol. %)	15.9	15.9	15.3
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		8-May-19	8-May-19	8-May-19	
Test Time		09:32 - 10:32	10:48 - 11:48	12:01 - 13:01	
Test Duration	(min.)	60	60	60	
Baro. Press.	(in. Hg)	30.16	30.16	30.16	
DGM Factor	(Y)	0.9446	0.9446	0.9446	
Initial Reading	(m ³)	327.748	328.345	328.953	
Final Reading	(m ³)	328.336	328.946	329.564	
Temp. Outlet	(Avg. oF)	70.0	75.0	73.3	
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50	
Gas Volume	(Sm ³)	0.55845	0.56583	0.57632	
HF	(mg)	0.011	0.020	0.005	
Oxygen	(Vol. %)	9.5	9.7	9.7	
HF	(mg/Sm³)	0.019	0.035	0.008	
HF	(mg/Sm³ @ 11% O₂)	0.016	0.031	0.007	
Moisture (isokinetic)	(Vol. %)	15.2	15.2	15.4	

*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		Test 1	Test 2	Test 3
Parameter				
Test Date		9-May-19	9-May-19	9-May-19
Test Time		09:15 - 10:15	10:43 - 11:43	11:56 - 12:56
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.06	30.06	30.06
DGM Factor	(Y)	0.9446	0.9446	0.9446
Initial Reading	(m ³)	329.604	330.273	330.854
Final Reading	(m ³)	330.266	330.840	331.417
Temp. Outlet	(Avg. oF)	80.5	90.0	92.0
Orifice Press.	(ΔH in.H ₂ O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.61446	0.51755	0.51186
HF	(mg)	0.010	0.010	0.009
Oxygen	(Vol. %)	9.8	9.8	9.0
HF	(mg/Sm ³)	0.016	0.020	0.018
HF	(mg/Sm ³ @ 11% O ₂)	0.014	0.018	0.015
Moisture (isokinetic)	(Vol. %)	15.4	15.4	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: N₂O

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

Sample ID	Date	Time	N ₂ O	N ₂ O	N ₂ O
			ppm	mg/Sm ³	mg/Sm ³ @ 11% O ₂
Unit 1 Run 1	May 6/19	10:15-11:15	0.4	0.7	0.7
Unit 1 Run 2	May 6/19	11:20-12:20	0.9	1.6	1.7
Unit 1 Run 3	May 6/19	12:25-13:25	1.2	2.2	2.3
Average					1.6
Unit 2 Run 1	May 6/19	09:30-10:30	8.3	15.2	14.8
Unit 2 Run 2	May 6/19	10:31-11:31	9.4	17.2	17.9
Unit 2 Run 3	May 6/19	11:32-12:32	7.0	12.8	13.1
Average					15.3
Unit 3 Run 1	May 6/19	09:09-10:09	8.8	16.1	17.7
Unit 3 Run 2	May 6/19	10:10-11:10	9.7	17.8	17.9
Unit 3 Run 3	May 6/19	11:12-12:12	4.7	8.6	9.5
Average					15.0

APPENDIX - D

FIELD DATA SHEETS

CLIENT **MV WFE**

SOURCE **Unit 1**

PARAMETER/RUN No **Metals/Plastic Run 1**

DATE **6 May 2019**

OPERATOR **LA**

CONTROL UNIT **FE-18** Y **1.0063**

$\Delta H @$ **1.793**

BAROMETRIC PRESSURE, IN. Hg **29.96**

ASSUMED MOISTURE, Bw **14.9%**

NOZZLE **MV-01** DIAMETER, IN. **0.3000**

PROBE **7C** Cp **0.8440**

PORT LENGTH

STATIC PRESSURE, IN. H2O **-18.5**

STACK DIAMETER

STACK HEIGHT

INITIAL LEAK TEST **0.004 @ 15"**

FINAL LEAK TEST **0.002 @ 15"**

Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Temperature °F			Impinger Exit	Pump Vac. IN. Hg	Fyrites		TOTAL GAIN (mL)
							Probe	Box	Impinger			CO ₂ Vol. %	O ₂ Vol. %	
1	12:10	750.732	0.35	1.84	72	300	281	249	61	4	10.5	10.0		
2		754.43	0.36	1.89	72	300	250	230	60	4				
3		758.22	0.35	1.84	73	301	230	231	58	4				
4		761.94	0.34	1.79	73	301	230	230	58	4				
5		765.61	0.34	1.79	73	301	230	230	58	4				
6		769.28	0.36	1.89	73	301	230	230	58	4				
7		773.06	0.50	2.62	74	300	230	230	59	5				
8		776.31	0.53	2.79	75	300	230	230	60	5				
9		780.10	0.56	2.95	76	301	230	230	60	5				
10		783.83	0.57	3.00	77	301	230	230	60	5				
11		787.60	0.57	3.01	78	300	230	230	60	5				
12		791.38	0.53	2.80	79	306	230	230	60	5				
1		804.70	0.34	1.80	79	306	230	230	60	5				
2		808.60	0.38	1.99	78	306	230	230	60	5				
3		812.70	0.42	2.20	78	306	230	230	60	5				
4		816.95	0.45	2.37	79	308	230	230	60	5				
5		821.29	0.47	2.47	80	308	230	230	60	5				
6		825.95	0.54	2.84	80	308	230	230	60	5				
7		830.65	0.55	2.89	80	308	230	230	60	5				
8		835.39	0.56	2.94	80	309	230	230	60	5				
9		839.78	0.48	2.32	81	310	230	230	60	5				
10		843.98	0.44	2.31	81	310	230	230	60	5				
11		848.09	0.42	2.21	82	311	230	230	60	5				
12	14:03	852.00	0.38	2.00	82	311	230	230	60	5				

CLIENT		NOZZLE		DIAMETER, IN.		IMPINGER		FINAL		TOTAL GAIN		
MV WTE		MV-01		0.3060		VOLUMES		(mL)		(mL)		
SOURCE Unit 1		7C		0.8480		Imp. #1		224		224		
PARAMETER/RUN No		Metallic Partic Run 3				Imp. #2		208		108		
DATE		7 May 2019				Imp. #3		122		22		
OPERATOR		KA				Imp. #4		13		12		
CONTROL UNIT		FE-18				Imp. #5		100		2		
		Y 1.0063				Imp. #6		100		2		
		ΔH@ 1.793				Upstream Diameters						
BAROMETRIC PRESSURE, IN. Hg		30.24				Downstream Diameters						
ASSUMED MOISTURE, Bw		14.90										
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO ₂ Vol. %	Fyrites O ₂ Vol. %
1	0905	852.530	0.31	1.63	68	292	242	246	54	4	10.5	9.5
2		856.01	0.32	1.68	68	293	247	249	55	4		
3		859.55	0.30	1.58	68	293	247	249	55	4		
4		862.98	0.30	1.58	68	292	246	280	55	4		
5		866.41	0.31	1.63	68	292	246	249	56	5	10.5	9.5
6		869.84	0.30	1.58	68	292	246	249	56	5		
7		873.27	0.48	2.53	69	291	249	250	57	5	11.0	9.0
8		877.66	0.53	2.80	70	290	250	248	59	5		
9		882.23	0.50	2.64	70	293	250	248	59	5		
10		886.67	0.49	2.59	71	293	250	248	59	5		
11		891.06	0.47	2.49	71	294	252	248	59	5		
12		895.37	0.45	2.38	71	294	252	250	60	5		
1		903.16	0.32	1.70	72	292	252	250	60	5	10.5	9.5
2		906.56	0.29	1.54	73	291	253	232	55	5		
3		910.41	0.37	1.87	73	290	253	232	55	5		
4		914.21	0.36	1.92	73	290	252	231	54	5		
5		918.11	0.38	2.02	73	291	252	231	54	5	10.0	10.0
6		922.30	0.44	2.24	73	293	251	230	54	6		
7		926.71	0.49	2.59	74	295	250	249	54	6		
8		931.04	0.47	2.49	74	296	250	249	54	6		
9		935.03	0.40	2.12	74	297	250	249	54	6		
10		938.93	0.39	2.07	74	296	251	230	55	5	10.0	10.0
11		942.82	0.37	1.96	75	296	251	230	55	5		
12	1107	946.61	0.36	1.91	75	296	251	230	55	5		

4

PLANT	M.U.	W.T.E.	PROBE TIP DIAMETER, IN.	N.V. 0.2 / 0.3048	IMPINGER	INITIAL	FINAL	TOTAL GAIN					
RUN No	1 - Metals / Particulate		PROBE LENGTH, FT / Cp	70 - 1 / 0.8480	VOLUMES	(mL)	(mL)	(mL)					
LOCATION	Unit #2		FILTER NUMBER	0.8241	Imp. #1	0	236	236					
DATE	May 7 2019		STATIC PRESSURE, IN. H ₂ O	70.9" - 19.5"	Imp. #2	100	181	81					
OPERATOR:	Dary Sampson + JG		STACK DIAMETER	70.9"	Imp. #3	100	124	29					
CONTROL UNIT / Y	AV15 / 1.0232		STACK HEIGHT	30.0'	Imp. #4	0	5	5					
BAROMETRIC PRESSURE, IN. Hg	30.07		INITIAL LEAK TEST	0.012 @ 15"		100	100	0					
ASSUMED MOISTURE, Bw	15%		FINAL LEAK TEST	0.010 @ 15"		100	100	0					
5	Point	Clock Time	Dry Gas Meter Ft ³	Orifice ΔH IN. H ₂ O	Dry Gas Temp. Outlet °F	Stack	Probe	Temperature °F	Box	Impinger Exit	Pump Vac. IN. Hg Gauge	CO ₂ Vol. %	O ₂ Vol. %
1	1	12:30	824.295	0.36	68	299	291	259	55	6	9.5	10.3	
2	2		837.77	0.35	67	306	240	257	56	7	9.5	10.2	
3	3		831.48	0.38	67	318	239	250	55	6.5	9.5	10.2	
4	4		835.15	0.42	68	321	237	244	52	9.5	10.0	10.1	
5	5		838.98	0.31	69	322	240	248	57	8.0	10.0	10.1	
6	6		842.30	0.33	70	323	246	250	58	8.0	9.5	10.2	
7	7		845.73	0.66	70	325	245	251	59	8.0	10.0	9.9	
8	8		850.55	0.74	71	324	242	250	60	8.0	10.0	9.9	
9	9		855.55	0.69	71	322	241	245	52	6.0	10.0	9.9	
10	10		860.44	0.49	72	302	239	247	55	5.5	10.0	10.1	
11	11		864.69	0.44	73	306	240	248	57	8.0	10.0	10.1	
12	12		869.22	0.56	73	300	246	250	58	8.0	9.5	10.2	
1	1		873.26	0.44	73	300	245	251	59	8.0	10.0	9.9	
2	2		877.60	0.52	74	320	242	250	60	8.0	10.0	9.9	
3	3		882.02	0.54	75	324	241	245	52	6.0	10.0	9.9	
4	4		886.65	0.59	74	322	239	247	55	5.5	10.0	10.1	
5	5		891.20	0.57	76	325	241	248	56	5	10.0	10.1	
6	6		895.87	0.60	76	326	241	248	56	5	10.0	10.1	
7	7		900.33	0.55	77	316	239	247	55	5.5	10.0	10.1	
8	8		903.87	0.33	77	328	241	248	56	5	10.0	10.1	
9	9		907.20	0.31	78	306	241	248	56	5	10.0	10.1	
10	10		910.44	0.28	78	302	241	248	56	5	10.0	10.1	
11	11		913.58	0.26	79	300	241	248	56	5	10.0	10.1	
12	12	14:31	916.66	0.25	79	298	241	248	56	5	10.0	10.1	
1	1		919.74	0.25	79	298	241	248	56	5	10.0	10.1	

CLIENT	MV WTE	NOZZLE	MV-02	DIAMETER, IN.	1.3048	IMPINGER	INITIAL	FINAL	TOTAL GAIN
SOURCE	Unit 2	PROBE	TA-1	Cp	1.8241	VOLUMES	(mL)	(mL)	(mL)
PARAMETER / RUN No	Metals / Partic Run 2	PORT LENGTH				Imp. #1	0	214	214
DATE	8 May 2019	STATIC PRESSURE, IN. H2O	-19.5			Imp. #2	100	108	68
OPERATOR	LA	STACK DIAMETER				Imp. #3	100	115	15
CONTROL UNIT	AA15	STACK HEIGHT				Imp. #4	0	4	4
	Y 10232					Imp. #5	100	102	2
	ΔH@ 1.682					Imp. #6	100	101	1
BAROMETRIC PRESSURE, IN. Hg	30.15	INITIAL LEAK TEST	0.022@15"			Upstream Diameters			
ASSUMED MOISTURE, Bw	15.08	FINAL LEAK TEST	0.033@15"			Downstream Diameters			
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Temperature of			Fyrites	
					Dry Gas Outlet	Stack	Probe	Box	Impinger Exit
1	09:09	919.794	1.34	1.50	68	310	249	253	64
2		922.17	1.35	1.54	68	310			
3		926.60	0.47	1.80	64	310	248	254	63
4		930.32	0.49	2.16	64	311			
5		934.39	0.47	2.17	70	311	247	252	57
6		938.38	0.48	2.13	70	310	248	250	56
7		942.33	0.31	1.37	72	309			
8		945.59	0.30	1.33	72	307	249	250	55
9		948.80	0.27	1.20	72	307			
10		951.85	0.26	1.16	72	303	248	251	55
11		954.85	0.25	1.12	72	302			
12		957.79	0.25	1.12	73	300			
		960.68	0.24	1.08					
1		963.81	0.28	1.26	74	300	249	250	55
2		966.89	0.27	1.22	75	299			
3		970.12	0.30	1.33	75	305	250	249	55
4		973.33	0.30	1.34	76	308	249	250	56
5		976.70	0.32	1.44	77	307			
6		979.79	0.31	1.39	77	307	248	251	57
7		984.26	0.32	2.34	78	307			
8		989.60	0.54	2.48	78	306	249	250	58
9		992.66	0.47	2.12	78	307			
10		996.60	0.44	1.99	79	306	250	249	59
11		1000.36	0.40	1.81	79	306			
12	11:10	1004.08	0.39	1.76	80	307			

CLIENT	NOZZLE		DIAMETER, IN.		IMPINGER	INITIAL	FINAL	TOTAL GAIN
SOURCE	PROBE	CP	Imp. #1	Imp. #2	Imp. #3	Imp. #4	Imp. #5	Imp. #6
MV WTE	MV-02	0.3248	0	100	100	10	102	102
Unit 2	7A-1	0.8241						
PARAMETER/RUN No	PORT LENGTH							
DATE	STATIC PRESSURE, IN. H2O							
OPERATOR	STACK DIAMETER							
CONTROL UNIT	STACK HEIGHT							
	INITIAL LEAK TEST							
	FINAL LEAK TEST							
	Temperature °F							
	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac IN Hg	CO ₂ Vol %	O ₂ Vol %
Point								
1	11:39	4.929	0.30	1.36	37	5.5	10.0	10.0
2		8.18	0.29	1.30	37	6		
3		11.37	0.28	1.43	37			
4		14.77	0.29	1.29	37			
5		20.98	0.28	1.24	37	5.5	9.5	9.5
6		24.25	0.31	1.37	37	8.0		
7		28.84	0.61	2.71	37			
8		33.39	0.60	3.66	37	8		
9		37.87	0.58	3.58	37			
10		42.19	0.54	3.40	37	8	10.0	10.0
11		46.31	0.49	3.18	37			
12		50.27	0.45	3.00	37			
1		53.71	0.35	1.51	37	6		
2		57.20	0.35	1.55	37	6.5	10.5	9.5
3		60.97	0.41	1.82	37			
4		64.83	0.44	1.96	37	7		
5		68.84	0.45	2.00	37			
6		72.84	0.46	2.05	37	6	10.5	9.5
7		76.14	0.51	1.39	37			
8		79.83	0.27	1.22	37	5		
9		82.26	0.26	1.17	37			
10		85.17	0.24	1.08	37	5	10.5	9.5
11		88.23	0.23	1.03	37			
12	13:41	90.93	0.24	1.08	37			

LA ✓

PLANT	Metacoal W.T.E.										PROBE TIP DIAMETER, IN.	G-292/0.2723										INITIAL	FINAL	TOTAL GAIN
RUN No	1- Metals/Particulate										PROBE LENGTH, FT / Cp	7-C / 0.8480										(mL)	(mL)	(mL)
LOCATION	Unit #3										FILTER NUMBER											Imp. #1	Imp. #2	Imp. #3
DATE	Mar. 8. 2019										STATIC PRESSURE, IN. H ₂ O	-19.5"										Imp. #4	Imp. #5	Imp. #6
OPERATOR	Daryl Sampson + JC										STACK DIAMETER	70.9"										Imp. #7	Imp. #8	Imp. #9
CONTROL UNIT / Y	Feb. 18. 2019 1.0083										STACK HEIGHT	30.0'										Imp. #10	Imp. #11	Imp. #12
BAROMETRIC PRESSURE, IN. Hg	30.14										INITIAL LEAK TEST	0.002 @ 15"										Upstream Diameters	Downstream Diameters	
ASSUMED MOISTURE, Bw	15%										FINAL LEAK TEST	0.002 @ 15"										Upstream Diameters	Downstream Diameters	
S Point	Clock Time	Dry Gas Meter Ft ³	Pitot IN. H ₂ O ΔP	Orifice ΔH IN. H ₂ O	Dry Gas Temp. °F	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg Gauge	CO ₂ Vol. %	O ₂ Vol. %												
1	12:30	38.285	0.42	1.46	64	307	232	229	63	7	9.5	9.5												
2		41.87	0.44	1.84	65	311	256	238	55	8														
3		45.55	0.47	1.96	65	310	256	238	55	8														
4		49.34	0.45	1.89	66	308	257	256	54	7.5														
5		53.08	0.43	1.81	66	307	253	243	55	6	9.0	9.5												
6		56.75	0.40	1.69	67	308	253	259	55	5														
7		60.30	0.27	1.15	68	303	251	256	56	6	9.5	9.0												
8		63.22	0.24	1.02	68	303	251	256	56	6	9.5	9.0												
9		65.98	0.23	0.98	69	303	251	256	56	6	9.5	9.0												
10		68.68	0.21	0.87	70	303	251	256	56	6	9.5	9.0												
11		71.26	0.20	0.87	70	303	251	256	56	6	9.5	9.0												
12		73.78	0.20	0.87	71	300	251	256	56	6	9.5	9.0												
		76.35																						
1		79.08	0.23	0.99	73	295	251	250	57	6														
2		81.92	0.25	1.07	73	304	250	249	56	6	10.0	8.5												
3		84.96	0.29	1.24	73	304	250	249	56	6														
4		87.90	0.27	1.15	74	305	249	250	55	6														
5		90.79	0.26	1.11	74	304	251	250	55	6														
6		93.80	0.28	1.20	75	303	251	251	54	8	10.0	9.0												
7		97.80	0.52	2.23	75	305	250	250	56	9														
8		102.45	0.64	2.75	76	302	250	250	56	9														
9		106.87	0.60	2.58	76	303	250	249	55	9														
10		111.12	0.56	2.40	76	306	250	249	55	9	10.0	8.5												
11		115.30	0.54	2.31	76	307	250	249	55	9														
12	14:34	119.33	0.50	2.15	77	304	250	249	55	9														

LA ✓

PLANT	M.W. W.T.E.				PROBE TIP DIAMETER, IN.	G-292 / 0.1923		IMPINGER	INITIAL	FINAL	TOTAL GAIN									
RUN No	2 - Metals / particulate				PROBE LENGTH, FT / Cp	7-C / 0.8480		VOLUMES	(mL)	(mL)	(mL)									
LOCATION	Unit #3				FILTER NUMBER			Imp. # 1	0	224	224									
DATE	May 9, 2019				STATIC PRESSURE, IN. H ₂ O	19.5"		Imp. # 2	100	178	78									
OPERATOR: Daryl Sampson					STACK DIAMETER	70.9"		Imp. # 3	100	122	22									
CONTROL UNIT / Y	FE 18 / 1.0053				STACK HEIGHT	30.0'		Imp. # 4	0	8	8									
BAROMETRIC PRESSURE, IN. Hg	30.09				INITIAL LEAK TEST	0.00' @ 15"		Cell 200g												
ASSUMED MOISTURE, Bw	15%				FINAL LEAK TEST	0.00' @ 15"		Upstream Diameters												
S Point	Clock Time	Dry Gas Meter Ft ³	Pitot IN. H ₂ O ΔP	Orifice ΔH IN. H ₂ O	Dry Gas Temp. Outlet °F	Stack	Temperature °F		Impinger Exit	Pump Vac. IN. Hg Gauge	Fyhtcs									
							Probe	Box			CO ₂ Vol. %	O ₂ Vol. %								
							9:05	119.586			0.50	2.08	63	307	256	248	58	6	9.0	10.3
							123.52	0.53			2.20	63	310	259	255	59	7			
							127.56	0.56			2.33	63	310	252	252	60	6.5			
							131.72	0.53			2.22	65	308	249	251	61	6	10.0	8.8	
							135.78	0.52			2.18	66	308	250	250	61	5.5			
							139.82	0.46			1.93	66	308	250	251	62	5.5			
							143.62	0.35			1.48	68	307	250	251	62	5.5			
							146.94	0.32			1.39	69	303	250	251	62	5.5			
							150.14	0.30			1.27	70	308	250	251	62	5.5			
							153.23	0.28			1.19	71	306	250	251	62	5.5			
156.22	0.25	1.06	72	309	250	251	62	5.5												
159.05	0.23	0.98	72	306	250	251	62	5.5												
161.76	0.23	0.98	72	306	250	251	62	5.5												
1		165.06	0.34	1.44	74	311	253	250	62	5										
2		168.42	0.35	1.48	74	311	252	251	60	5	9.0 10.1									
3		171.78	0.35	1.49	75	311	250	251	58	5.5										
4		175.18	0.36	1.53	75	312	251	250	59	8	9.0 10.0									
5		178.50	0.34	1.45	77	313	251	250	59	9										
6		181.96	0.37	1.57	77	314	251	249	59	9	9.5 9.9									
7		186.82	0.67	2.85	78	309	244	248	60	9										
8		191.38	0.70	2.98	79	317	244	248	60	9										
9		196.02	0.67	2.83	80	316	244	248	60	9										
10		200.64	0.66	2.80	80	316	244	248	60	9										
11		205.12	0.62	2.63	80	316	244	248	60	9										
12	11:08	209.54	0.60	2.57	81	310	244	248	60	9										

(Test - 2)

Client MV Y LMU-A 0.9446
 Source Unit #1 Cp
 Parameter HF Pbar 30.05 Static
 Date May 7/19 Operator Simon Baker

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

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m ³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	9:22	325.8010	63.0					
	9:42	326.0340	66.9					
	10:22	326.4874	75					
2	10:40	326.4950	71.3					
	11:00	326.7010	73.0					
	11:40	327.1650	75					
3	11:55	327.1164	71					
	12:10	327.3500	74					
	12:55	327.7220	81					

Client Metro Van Y LMU-A 0.9446
 Source Unit #2 Cp
 Parameter HF Pbar 30.16 Static
 Date May 08/19 Operator

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

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m ³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	9:32	327.7480	63					
	9:52	327.9050	69					
	10:32	328.3360	78					
2	10:48	328.3446	73					
	11:16	328.6350						
	11:48	328.9460	77					
3	12:01	328.9530	73					
	12:16	329.1220	72					
	1:01	329.5686	75					

A. Lanfranco and Associates Inc.

Client Metro Van Y LMU-A 09446
 Source Unit #3 Cp
 Parameter HF Pbar 30.06 Static
 Date May, 09/19 Operator Simon Baker

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

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

Leak Check	Run 1	Run 2	Run 3
Initial			
Final			

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m ³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	9:15	329.6040	71		200			
	10:15	330.2660	70		303			
2	10:43	330.2714	87		200			
	10:13	330.4950	88					
3	11:43	330.8400	95		301			
	11:56	330.8538	92		200			
	12:51	331.4170	92		300			

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

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada		Device (inches of Hg)		Difference
		(kPa)	(inches of Hg)	Reading	Elevation Corrected	(Env Can - Elv Corr)
LA	January 17, 2019	99.9	29.51	29.43	29.50	0.00
DS	January 17, 2019	99.9	29.51	29.44	29.51	-0.01
CL	January 17, 2019	99.9	29.51	29.45	29.52	-0.02
ML	January 17, 2019	99.9	29.51	29.42	29.49	0.01
SB	January 17, 2019	99.9	29.51	29.43	29.50	0.00
SH	January 17, 2019	99.9	29.51	29.40	29.47	0.03
MG	January 7, 2019	101.2	29.89	29.80	29.87	0.02
JB	January 17, 2019	99.9	29.51	29.42	29.49	0.01
SF	January 7, 2019	101.2	29.89	29.86	29.93	-0.04
JG	January 17, 2019	99.9	29.51	29.4	29.47	0.03

Calibrated by: Daryl Sampson

Signature: 

Date: January 17, 2019

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 & 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)²(min)).
!!!!!!!

----- DRY GAS METER READINGS -----										-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.			Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)					Initial (deg F)	Final (deg F)	Average (deg F)
3.50	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 -----					
VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL		CALIBRATION FACTOR				CALIBRATION FACTOR					
Vm(std) (cu ft)	Vm(std) (liters)	Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)		Value (number)	Variation (number)	Y		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	Temperature Device	Results		
Set-Point (deg F)	Reading (deg F)	Variation (deg F)	Percent of Absolute	
32	32	0	0.00%	
100	100	0	0.00%	
300	300	0	0.00%	
500	500	0	0.00%	
1000	1000	0	0.00%	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +0.2.
For Temperature Device, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Scott Ferguson

Signature: 

Date: January 7, 2019

A.Lanfranco & Associates inc.

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

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

Date: 08-Jan-19
Barometric Pressure: 29.97 (in. Hg)
Theoretical Critical Vacuum: 14.14 (in. Hg)

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

----- DRY GAS METER READINGS -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
3.62	15.00	288.600	304.363	15.763	70.0	70.0	72.0	72.0	73	0.8185	17.3	77.0	76.0	76.5
1.90	15.00	249.300	260.716	11.416	64.0	64.0	66.0	66.0	63	0.5956	18.0	68.0	73.0	70.5
1.10	15.00	262.400	271.288	8.888	66.0	66.0	67.0	67.0	55	0.4606	19.0	74.0	79.0	76.5
0.66	15.00	272.200	278.978	6.778	68.0	68.0	69.0	69.0	48	0.3560	20.5	76.0	84.0	80.0
0.32	17.00	279.600	284.853	5.253	69.0	69.0	70.0	70.0	40	0.2408	21.5	77.0	77.0	77.0

***** RESULTS *****														
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y Value (number)	Variation (number)	CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)				
15.833	448.4	15.886	449.9	16.121	1.003	-0.003	1.808	45.93	0.015	0.714				
11.549	327.1	11.625	329.2	11.665	1.007	0.000	1.793	45.53	-0.001	0.716				
8.949	253.4	8.940	253.2	9.072	0.999	-0.007	1.750	44.45	-0.043	0.731				
6.791	192.3	6.887	195.0	7.035	1.014	0.008	1.762	44.76	-0.031	0.718				
5.249	148.6	5.294	149.9	5.378	1.009	0.002	1.854	47.08	0.060	0.704				
Average Y----->					1.0063	Average dH@----->	1.793	45.6	Average Ko----->	0.716				

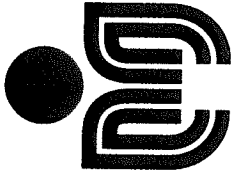
TEMPERATURE CALIBRATION				
Calibration Standard ----->		Omega Model CL23A S/N:T-218768		
Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results		
		Variation (degF)	Percent of Absolute	
32	32	0	0.00%	
100	100	0	0.00%	
300	300	0	0.00%	
500	500	0	0.00%	
1000	1000	0	0.00%	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +0.2.
For Temperature Device, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Scott Ferguson

Signature: 

Date: January 8, 2019



MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Daryl Sampson

has successfully completed

The program of studies and is awarded the certificate in

STACK SAMPLING

May 2005

Date

Donna Spaulding

Dean

Faculty of Continuing Education and Extension

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 -----									-CRITICAL ORIFICE READINGS-					
dH (in H2O)	Time (min)	Volume Initial (m³)	Volume Final (m³)	Volume Total (cu ft)	Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature --		
					Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
0.00	16.00	288.3510	288.5002	5.269	64.0	64.0	65.0	65.0	40	0.2408	20.0	69.0	69.0	69.0
0.00	18.00	288.5100	288.6789	5.965	65.0	65.0	65.0	65.0	40	0.2408	20.0	69.0	68.0	68.5
0.00	15.00	288.6830	288.8228	4.937	65.0	65.0	66.0	66.0	40	0.2408	20.0	68.0	70.0	69.0

***** RESULTS *****											
--- DRY GAS METER ---			----- ORIFICE -----			-- DRY GAS METER --			----- ORIFICE -----		
VOLUME CORRECTED	VOLUME CORRECTED		VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR			CALIBRATION FACTOR		
Vm(std) (cu ft)	Vm(std) (liters)		Vcr(std) (cu ft)	Vcr(std) (liters)	Vcr (cu ft)	Value (number)	Variation (number)		Value (in H2O)	Value (mm H2O)	Variation (in H2O)
5.318	150.6		5.027	142.4	5.023	0.945	0.001		0.000	0.00	0.000
6.014	170.3		5.658	160.2	5.649	0.941	-0.004		0.000	0.00	0.000
4.973	140.8		4.713	133.5	4.710	0.948	0.003		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 H2O that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: Scott Ferguson

Signature: 

Date: January 10, 2019

Walter Smith & Associates, Inc.

is hereby granted to:

Louis Agassiz

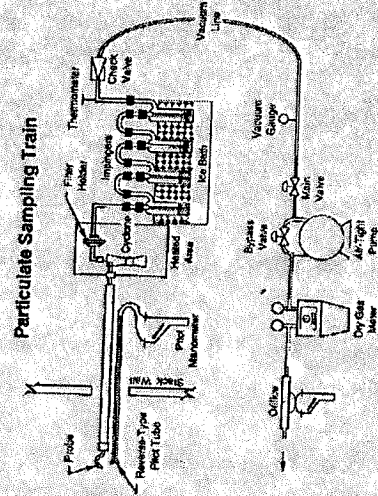
to certify that they have completed to satisfaction

Source Sampling & CEMS Workshop

Granted: March 11, 2011

Walter S. Smith

Walter S. Smith, PE, DEE 3.5 CEU



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
Pbar (in.Hg): 29.69

Temp (R): 530
Dn (in.): 0.25

Pitot ID: **7A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.350	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	0.135	21.0	0.8521	0.0023
0.200	0.270	29.7	0.8521	0.0023
0.350	0.470	39.3	0.8543	0.0000
0.540	0.720	48.8	0.8574	0.0030
0.740	0.990	57.2	0.8559	0.0016
Average :			0.8543	0.0018

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