



**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 2018 2nd Survey

Table of Contents

Appendix

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

APPENDIX – A

QUALITY ASSURANCE / QUALITY CONTROL RESULTS

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

Administration:

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

Preparation:

- All glassware cleaned
- Blank samples of reagents collected.

Testing:

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

Analysis:

- Trace Metals and Mercury analysis conducted at Exova Labs, Surrey, B.C.
- Fluoride (HF) analysis conducted at ALS Labs, 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
- 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 2018	Unit 1	Unit 2	Unit 3
Filter	0.9 mg	1.1 mg	0.7 mg
Front Half Washings	-0.3 mg	-0.5 mg	1.0 mg
Mercury Front	<0.02 ug	<0.02 ug	<0.02 ug
Mercury Back	<0.27 ug	<0.27 ug	<0.19 ug
Trace Metals Front *	<163 ug	<173 ug	<160 ug
Trace Metals Back*	<38.6 ug	<22.0 ug	<56.9 ug
Fluoride	<2.6 ug	<2.6 ug	<2.6 ug

Sum of all reported elements except Hg*

APPENDIX - B

LABORATORY RESULTS

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271531
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Filter Reagent Blanks	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: May 29, 2018
Attn: Missy	P.O.:	Report Number: 2287856
Sampled By:	Proj. Acct. code:	
Company:		

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

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

Notes To Clients:

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Analytical Report

Bill To: A. Lanfranco & Associates
 #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: **1271531**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: May 29, 2018
 Report Number: 2287856

Reference Number		1271531-1	1271531-2	1271531-3	
Sample Date		May 07, 2018	May 07, 2018	May 07, 2018	
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	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	0.46	0.31	<0.2	0.2
Cobalt	µg	<0.3	<0.3	0.3	0.25
Copper	µg	<0.3	0.6	<0.3	0.25
Lead	µg	<2	2	2	1.5
Manganese	µg	<0.3	2	1	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	140	140	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	<0.5	<0.5	<0.5	0.5
Mercury by CVAA					
Mercury	As Tested	µg/L	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	
Volume	Sample	mL	250	250	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 Exova's Integrated Data Validation System (IDVS).
 Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.



Methodology and Notes

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271531
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Filter Reagent Blanks	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: May 29, 2018
Attn: Missy	P.O.:	Report Number: 2287856
Sampled By:	Proj. Acct. code:	
Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 23, 2018	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 17, 2018	Exova Surrey

** Reference Method Modified*

References

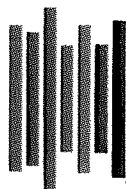
EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

LOT: Control Number

Environmental Sample Information Sheet

Note: 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 ☐ Lot: 1271531 COC Report Result: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐
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Information to be included on Report and Invoice Project ID: Project Name: Metro Vancouver WTE Project Location: Filter Reagent Blanks Legal Location: PO#: Proj. Acct. Code: Agreement ID:	RUSH Please contact the laboratory to confirm rush dates and times before submitting samples. Upon filling out this section, client accepts that surcharges will be attached to this analysis RUSH required on: ☐ All Analysis ☐ or ☐ As indicated Date Required: _____ Signature: _____ Exova Authorization: _____	Sample Custody (Please Print) Sampled by: Company _____ Signature _____ I authorize Exova to proceed with the work work indicated on this form: Date: _____ Initial: _____ Received by: _____ Sample Temp. 22.8°C Waybill #: _____ Date: MAY 16 '18 Company _____ Time: _____
---	--	---

Special Instructions / Comments * 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 IN CM M	Date/Time Sampled	Matrix	Sampling Method	↓	Enter tests above (✓ relevant samples below)									
								ICAP	Hg								
1	Reagent Blank Unit 1 Container 1(filter)			07-May-18			1	✓	✓								
2																	
3	Reagent Blank Unit 2 Container 1 (filter)			07-May-18			1	✓	✓								
4																	
5	Reagent Blank Unit 3 Container 1 (filter)			07-May-18			1	✓	✓								
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	Project ID:	Lot ID: 1271571
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Reagent Blanks	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 14, 2018
Attn: Missy	P.O.:	Report Number: 2287913
Sampled By:	Proj. Acct. code:	
Company:		

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

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / Test Report
Email - Single Report	PDF	COR

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Analytical Report

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271571
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Reagent Blanks	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 14, 2018
Attn: Missy	P.O.:	Report Number: 2287913
Sampled By:	Proj. Acct. code:	
Company:		

		Reference Number	1271571-1	1271571-2	1271571-3
		Sample Date	May 07, 2018	May 07, 2018	May 07, 2018
		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	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	0.30	<0.2	0.27	0.2
Cobalt	µg	0.3	<0.3	0.4	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	2.5	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	<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	7	8	9	5
Antimony	µg	<3	<3	<3	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	<0.2	0.37	0.63	0.2
Cobalt	µg	<0.3	<0.3	<0.3	0.25
Copper	µg	<0.3	<0.3	<0.3	0.25
Lead	µg	<2	<2	<2	1.5
Manganese	µg	<0.3	<0.3	<0.3	0.25
Nickel	µg	<0.5	<0.5	<0.5	0.5
Phosphorus	µg	20	20	20	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	<0.5	<0.5	0.5
Volume	Sample	mL	200	200	200
Volume	aliquot volume	mL	150	150	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:

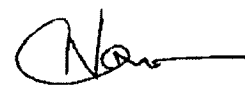
Project ID:
 Project Name: Metro Vancouver WTE
 Project Location: Reagent Blanks
 LSD:
 P.O.:
 Proj. Acct. code:

Lot ID: **1271571**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 14, 2018
 Report Number: 2287913

		Reference Number	1271571-1	1271571-2	1271571-3	
		Sample Date	May 07, 2018	May 07, 2018	May 07, 2018	
		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	0.10	0.06	0.08	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	50	50	50	
Mercury	Fraction 2B	µg/sample	0.2	0.1	0.2	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	100	98	100	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.008	<0.008	<0.008	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	263	254	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	0.13	0.08	0.27	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	0.04	0.03	0.09	

Approved by:

Carol Nam, Dipl. T.
 Quality Officer





Methodology and Notes

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: **1271571**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 14, 2018
 Report Number: 2287913

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 23, 2018	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 22, 2018	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	May 29, 2018	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 13, 2018	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 13, 2018	Exova Surrey
Metals in Stack Samples - Back half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 18, 2018	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 17, 2018	Exova Surrey

* Reference Method Modified

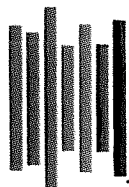
References

EMC Emission Measurement Center of EPA

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Results relate only to samples as submitted.

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Control Number

Note: 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					
QA/QC Report ☐					
Report Result: ☐ Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service					
Attention: Mark Lanfranco					
Phone: 604-881-2582					
Fax: 604-881-2581					
Cell:					
e-mail: mark.lanfranco@alanfranco.com					
Cop					
Lot: 1271571 COC					
Invoice to this address for approval ☐					
May 15 '18 14:52					
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 required on: All Analysis As indicated					
Date Required: _____ or _____					
Signature: _____					
Exova Authorization: _____					
Sample Custody (Please Print)					
Sampled by:					
Company Signature					
I authorize Exova to proceed with the work work indicated on this form:					
Date: Initial:					
Received by: Sample Temp. 22.8 °C					
Waybill #: Date MAY 16 '18 16:52					
Company Time					
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					
FOR LAB USE ONLY					
Condition of containers/coolers upon arrival at lab					
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: _____					
Number of Containers					
Front ICAP Back ICAP Front Hg Back Hg 5A Hg 5B Hg					
Enter tests above (✓ relevant samples below)					
↓					
1 Reagent Blank Unit 1 07-May-18 5 ✓ ✓ ✓ ✓ ✓ ✓					
2 5 ✓ ✓ ✓ ✓ ✓ ✓					
3 Reagent Blank Unit 2 07-May-18 5 ✓ ✓ ✓ ✓ ✓ ✓					
4 5 ✓ ✓ ✓ ✓ ✓ ✓					
5 Reagent Blank Unit 3 07-May-18 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	Project ID:	Lot ID: 1271554
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Field Blanks	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 22, 2018
Attn: Missy	P.O.:	Report Number: 2298285
Sampled By:	Proj. Acct. code:	
Company:		

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

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

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

Notes To Clients:

- Jun 19, 2018 - Samples #1271554-2 and 3: the repeated result for mercury analysis did not differ significantly from the original; it is within expected precision of the test.
- Jun 19, 2018 - Samples #1271554-2 and 3: Mercury analysis was repeated to confirm the original results.
- Jun 22, 2018 - Report was issued to include retest result for Mercury analysis on samples 1271554-2,3 to confirm results. Previous Report 2287888.

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Analytical Report

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

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

Lot ID: **1271554**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 22, 2018
 Report Number: 2298285

Reference Number		1271554-1	1271554-2	1271554-3	
Sample Date		May 10, 2018	May 11, 2018	May 09, 2018	
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	<5	8	6	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	0.26	0.52	<0.2	0.2
Cobalt	µg	<0.3	0.4	<0.3	0.25
Copper	µg	<0.3	0.4	0.6	0.25
Lead	µg	2.8	2	2.9	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	160	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	<0.5	<0.5	<0.5	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	26	10	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	1	2	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.30	<0.2	<0.2	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	1	<0.2	0.5	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	0.3	<0.2	0.4	0.25
Nickel	µg	<0.5	<0.5	1	0.5
Phosphorus	µg	10	10	20	2.5
Selenium	µg	<1	<1	2	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	<0.5	<0.5	13	0.5
Volume	Sample	mL	388	380	340
Volume	aliquot volume	mL	338	330	290
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: **1271554**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 22, 2018
 Report Number: 2298285

		Reference Number	1271554-1	1271554-2	1271554-3	
		Sample Date	May 10, 2018	May 11, 2018	May 09, 2018	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	Field Blank Unit 1 (Beaker (MV Unit-1 Blank) + 4 Bottles)	Field Blank Unit 2 (Beaker (MV Unit 2 Blank) + 4 Bottles)	Field Blank Unit 3 (Beaker (MV Unit 3 Blank) + 4 Bottles)	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA - Continued						
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 1B	µg/sample	<0.02	<0.02	<0.02	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	388	380	340	
Volume	aliquot volume	mL	5	5	5	
Volume	Final	mL	40	40	40	
Mercury	Fraction 2B	µg/sample	<0.2	<0.2	<0.1	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	186	180	155	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3A	µg/sample	<0.01	<0.01	<0.01	
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	500	500	500	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3B	µg/sample	<0.04	<0.04	<0.04	
Mercury	As Tested	µg/L	<0.05	0.06	<0.05	0.05
Dilution Factor	As Tested		1	1	1	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25	25	25	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	µg/sample	<0.02	0.02	<0.02	

Approved by: 
 Mathieu Simoneau
 Operations Manager

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

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

Terms and Conditions: <https://www.exova.com/media/1232/exova-canada-inc-standard-conditions-of-contract-short-form.pdf>



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: 1271554 Control Number: Date Received: May 16, 2018 Date Reported: Jun 22, 2018 Report Number: 2298285
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 23, 2018	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 22, 2018	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 19, 2018	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	May 29, 2018	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 13, 2018	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 13, 2018	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 19, 2018	Exova Surrey
Metals in Stack Samples - Back half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 18, 2018	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 17, 2018	Exova Surrey

** Reference Method Modified*

References

EMC Emission Measurement Center of EPA

Comments:

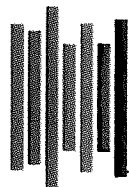
- Jun 19, 2018 - Samples #1271554-2 and 3: the repeated result for mercury analysis did not differ significantly from the original; it is within expected precision of the test.
- Jun 19, 2018 - Samples #1271554-2 and 3: Mercury analysis was repeated to confirm the original results.
- Jun 22, 2018 - Report was issued to include retest result for Mercury analysis on samples 1271554-2,3 to confirm results. Previous Report 2287888.

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

LOT: Control Number

Environmental Sample Information Sheet

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

Billing Address:		Copy of Report To:		Copy of invoice:	
Company: A. Lanfranco and Associates		Company:		Mail invoice to this	
Address: Unit 101 9488 189 St		Address:		address for approval	
Surrey, BC V4N 4W7					
QA/QC Report ☐					
Attention: Mark Lanfranco		Lot: 1271554 COC		Report Result:	
Phone: 604-881-2582				Fax	
Fax: 604-881-2581				Mail	
Cell:				Courier	
e-mail: mark.lanfranco@alanfranco.com				e-mail	
				e-Service	
Report Result:		Attention:			
Fax		Phone:			
Mail		Fax:			
Courier		Cell:			
e-mail		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 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: _____ Sample Temp. 22.8°C Date _____ Waybill #: _____ Company: MAY 16 18 15:09	

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)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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1	Field Blank Unit 1 (Beaker (MV Unit-1 Blank)+ 4 Bottles)					10-May-18			5	✓	✓	✓	✓	✓	✓																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

Report Transmission Cover Page

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271592
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Metals and Hg	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 14, 2018
Attn: Missy	P.O.:	Report Number: 2287937
Sampled By:	Proj. Acct. code:	
Company:		

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

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

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Analytical Report

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271592
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Metals and Hg	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 14, 2018
Attn: Missy	P.O.:	Report Number: 2287937
Sampled By:	Proj. Acct. code:	
Company:		

		Reference Number	1271592-1	1271592-2	1271592-3
		Sample Date	May 08, 2018	May 10, 2018	May 11, 2018
		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	10	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	1.0	1.3	5.11	0.2
Cobalt	µg	<0.3	<0.3	0.5	0.25
Copper	µg	0.7	6.7	0.9	0.25
Lead	µg	2	4.4	2	1.5
Manganese	µg	2	2	4.4	0.25
Nickel	µg	0.6	1	2.4	0.5
Phosphorus	µg	160	160	150	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	3.0	<2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	<0.5	4.2	2.9	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	34	24	30	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<0.8	<0.9	1	1
Cadmium	µg	0.2	<0.2	0.2	0.25
Chromium	µg	0.56	0.2	0.90	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	1	0.5	2	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	1	0.4	2.7	0.25
Nickel	µg	<0.4	0.5	2	0.5
Phosphorus	µg	10	10	20	2.5
Selenium	µg	<1	<1	<1	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<0.8	<0.9	<0.8	1
Zinc	µg	4.2	<0.4	9.4	0.5
Volume	Sample	mL	868	790	880
Volume	aliquot volume	mL	818	740	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: **1271592**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 14, 2018
 Report Number: 2287937

		Reference Number	1271592-1	1271592-2	1271592-3	Nominal Detection Limit
		Sample Date	May 08, 2018	May 10, 2018	May 11, 2018	
		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 0.23	0.12	0.11	0.05	
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL 868	790	880		
Volume	aliquot volume	mL 5	5	5		
Volume	Final	mL 40	40	40		
Mercury	Fraction 2B	µg/sample 2	0.8	0.8		
Mercury	As Tested	µg/L <0.05	0.06	<0.05	0.05	
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL 164	154	195		
Volume	aliquot volume	mL 25	25	25		
Volume	Final	mL 40	40	40		
Mercury	Fraction 3A	µg/sample <0.01	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 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 0.05	0.06	0.13	0.05	
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL 200	200	200		
Volume	aliquot volume	mL 25	25	25		
Volume	Final	mL 40	40	40		
Mercury	Fraction 3C	µg/sample 0.02	0.02	0.04		

Analytical Report

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271592
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Metals and Hg	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 14, 2018
Attn: Missy	P.O.:	Report Number: 2287937
Sampled By:	Proj. Acct. code:	
Company:		

		Reference Number	1271592-4	1271592-5	1271592-6
		Sample Date	May 10, 2018	May 11, 2018	May 11, 2018
		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	75	20	20	5
Antimony	µg	<2	<2	3	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	0.4	<0.3	<0.3	0.25
Chromium	µg	11.4	5.53	8.21	0.2
Cobalt	µg	0.4	<0.3	<0.3	0.25
Copper	µg	4.9	2	2	0.25
Lead	µg	9.0	5.3	6.5	1.5
Manganese	µg	3.0	2	3.5	0.25
Nickel	µg	8.8	9.0	2	0.5
Phosphorus	µg	180	160	160	2.5
Selenium	µg	<2	<2	<2	1.5
Tellurium	µg	2.7	2	<2	2
Thallium	µg	<2	<2	<2	1.5
Vanadium	µg	<1	<1	<1	1
Zinc	µg	54.3	27.9	23	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	25	10	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	1	<0.9	<0.8	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	0.64	1.1	0.81	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	0.5	0.7	<0.2	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	0.3	<0.2	0.5	0.25
Nickel	µg	0.6	2.4	0.9	0.5
Phosphorus	µg	20	10	10	2.5
Selenium	µg	<1	<1	3.8	1.5
Tellurium	µg	<2	<2	<2	2
Thallium	µg	<1	<1	<1	1.5
Vanadium	µg	<0.8	<0.9	<0.8	1
Zinc	µg	2.2	<0.4	6.0	0.5
Volume	Sample	mL	878	820	872
Volume	aliquot volume	mL	828	770	822
Mercury by CVAA					
Mercury	As Tested	µg/L	0.06	<0.05	<0.05

Analytical Report

Bill To: A. Lanfranco & Associates	Project ID:	Lot ID: 1271592
#101, 9488 - 189 Street	Project Name: Metro Vancouver WTE	Control Number:
Surrey, BC, Canada	Project Location: Metals and Hg	Date Received: May 16, 2018
V4N 4W7	LSD:	Date Reported: Jun 14, 2018
Attn: Missy	P.O.:	Report Number: 2287937
Sampled By:	Proj. Acct. code:	
Company:		

		Reference Number	1271592-4	1271592-5	1271592-6		
		Sample Date	May 10, 2018	May 11, 2018	May 11, 2018		
		Sample Time	NA	NA	NA		
		Sample Location					
		Sample Description	Unit 2 Run 1 (beaker (MV Unit 2 R-1) + 4 bottles)	Unit 2 Run 2 (beaker (MV Unit 2 R-2) + 4 bottles)	Unit 2 Run 3 (beaker (MV Unit 2 R-3) + 4 bottles)		
		Matrix	Stack Samples	Stack Samples	Stack Samples		
Analyte		Units	Results	Results	Results	Nominal Detection Limit	
Mercury by CVAA - Continued							
Dilution Factor	As Tested		1	1	1		
Volume	Sample	mL	250	250	250		
Volume	aliquot volume	mL	25	25	25		
Volume	Final	mL	40	40	40		
Mercury	Fraction 1B	µg/sample	0.02	<0.02	<0.02		
Mercury	As Tested	µg/L	0.45	0.33	0.27	0.05	
Dilution Factor	As Tested		1	1	1		
Volume	Sample	mL	878	820	872		
Volume	aliquot volume	mL	5	5	5		
Volume	Final	mL	40	40	40		
Mercury	Fraction 2B	µg/sample	3	2	2		
Mercury	As Tested	µg/L	<0.05	<0.05	<0.05	0.05	
Dilution Factor	As Tested		1	1	1		
Volume	Sample	mL	194	160	208		
Volume	aliquot volume	mL	25	25	25		
Volume	Final	mL	40	40	40		
Mercury	Fraction 3A	µg/sample	<0.02	<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	0.09	0.07	0.07	0.05	
Dilution Factor	As Tested		1	1	1		
Volume	Sample	mL	214	200	200		
Volume	aliquot volume	mL	25	25	25		
Volume	Final	mL	40	40	40		
Mercury	Fraction 3C	µg/sample	0.03	0.02	0.02		

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: **1271592**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 14, 2018
 Report Number: 2287937

		Reference Number	1271592-7	1271592-8	1271592-9
		Sample Date	May 09, 2018	May 09, 2018	May 09, 2018
		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	10	20	20	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<1	<1	<1	1
Cadmium	µg	<0.3	<0.3	<0.3	0.25
Chromium	µg	1.1	30.3	1.6	0.2
Cobalt	µg	<0.3	0.6	<0.3	0.25
Copper	µg	0.8	1	<0.3	0.25
Lead	µg	2.6	<2	2.6	1.5
Manganese	µg	2	9.0	4.4	0.25
Nickel	µg	<0.5	17	0.8	0.5
Phosphorus	µg	160	160	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	3.7	4.3	5.0	0.5
Back Half Metals Fraction 2A					
Aluminum	µg	38	23	24	5
Antimony	µg	<2	<2	<2	2.5
Arsenic	µg	<0.9	<0.9	<0.9	1
Cadmium	µg	<0.2	<0.2	<0.2	0.25
Chromium	µg	1.4	0.36	0.54	0.2
Cobalt	µg	<0.2	<0.2	<0.2	0.25
Copper	µg	2	0.5	0.9	0.25
Lead	µg	<1	<1	<1	1.5
Manganese	µg	2	0.7	0.8	0.25
Nickel	µg	0.9	0.7	0.5	0.5
Phosphorus	µg	20	20	20	2.5
Selenium	µg	<1	<1	<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	15	9.5	8.5	0.5
Volume	Sample	mL	820	748	798
Volume	aliquot volume	mL	770	698	698
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: **1271592**
 Control Number:
 Date Received: May 16, 2018
 Date Reported: Jun 14, 2018
 Report Number: 2287937

		Reference Number	1271592-7	1271592-8	1271592-9	Nominal Detection Limit
		Sample Date	May 09, 2018	May 09, 2018	May 09, 2018	
		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 <0.02	<0.02	<0.02		
Mercury	As Tested	µg/L 0.98	0.40	0.26	0.05	
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL 820	748	798		
Volume	aliquot volume	mL 5	5	5		
Volume	Final	mL 40	40	40		
Mercury	Fraction 2B	µg/sample 6	2	2		
Mercury	As Tested	µg/L <0.05	<0.05	<0.05	0.05	
Dilution Factor	As Tested	1	1	1		
Volume	Sample	mL 176	158	154		
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	100	1000		
Volume	aliquot volume	mL 25	25	25		
Volume	Final	mL 40	40	40		
Mercury	Fraction 3B	µg/sample <0.08	<0.008	<0.08		
Mercury	As Tested	µg/L 0.34	0.11	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 0.1	0.03	0.04		

Approved by:

Carol Nam, Dipl. T.
 Quality Officer

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

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: 1271592 Control Number: Date Received: May 16, 2018 Date Reported: Jun 14, 2018 Report Number: 2287937
Attn: Missy Sampled By: Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 23, 2018	Exova Surrey
Mercury in Air (Surrey) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	May 24, 2018	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	May 22, 2018	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	May 29, 2018	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	Jun 13, 2018	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	Jun 13, 2018	Exova Surrey
Metals in Stack Samples - Back half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 18, 2018	Exova Surrey
Metals in Stack Samples - Front half (Surrey)	EMC	* Metals Emissions from Stationary Sources, 29	May 17, 2018	Exova Surrey

* Reference Method Modified

References

EMC Emission Measurement Center of EPA

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

Results relate only to samples as submitted.

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

Exova



Testing
Advising
Assuring

LOT: Control Number

Environmental Sample Information Sheet

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

Billing Address: Company: A. Lanfranco and Associates Address: Unit 101 9486 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 ☐ Lot: 1271592 COC Report Result: Fax Mail Courier e-mail e-Service
QA/QC Report ☐			

Information to be included on Report and Invoice Project ID: Project Name: Metro Vancouver WTE Project Location: Metals and Hg Legal Location: PO#: Proj. Accl. 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 indicated on this form. Date: _____ Initial: _____ Sample Temp: 22.8 °C Waybill # MAY 16 2018 Company: _____

Special Instructions / Comments *Front end 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	Number of Containers	Enter tests above (✓ relevant samples below)							
			IN	CM	M					Front ICAP	Back ICAP	Front Hg	Back Hg	SA Hg	SB Hg		
1	Unit 1 Run 1 (Beaker (MV Unit 1 R-1) + 4 Bottles)					08-May-18			5	✓	✓	✓	✓	✓	✓		
2	Unit 1 Run 2 (Beaker (MV Unit 1 R-2) + 4 Bottles)					10-May-18			5	✓	✓	✓	✓	✓	✓		
3	Unit 1 Run 3 (Beaker (MV Unit 1 R-3) + 4 Bottles)					11-May-18			5	✓	✓	✓	✓	✓	✓		
4																	
5	Unit 2 Run 1 (Beaker (MV Unit 2 R-1) + 4 Bottles)					10-May-18			5	✓	✓	✓	✓	✓	✓		
6	Unit 2 Run 2 (Beaker (MV Unit 2 R-2) + 4 Bottles)					11-May-18			5	✓	✓	✓	✓	✓	✓		
7	Unit 2 Run 3 (Beaker (MV Unit 2 R-3) + 4 Bottles)					11-May-18			5	✓	✓	✓	✓	✓	✓		
8																	
9	Unit 3 Run 1 Beaker (MV Unit 3 R-1) + 4 Bottles)					09-May-18			5	✓	✓	✓	✓	✓	✓		
10	Unit 3 Run 2 Beaker (MV Unit 3 R-2) + 4 Bottles)					09-May-18			5	✓	✓	✓	✓	✓	✓		
11	Unit 3 Run 3 Beaker (MV Unit 3 R-3) + 4 Bottles)					09-May-18			5	✓	✓	✓	✓	✓	✓		
12																	
13																	
14																	
15																	



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

Date Received: 14-MAY-18
Report Date: 22-MAY-18 17:55 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2094018
Project P.O. #: NOT SUBMITTED
Job Reference:
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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2094018-1 Water 10-MAY-18 UNIT 1 HF BLANK	L2094018-2 Water 11-MAY-18 UNIT 2 HF BLANK	L2094018-3 Water 09-MAY-18 UNIT 3 HF BLANK		
Grouping	Analyte					
STACK						
Anions and Nutrients	Fluoride (F) (ug/sample)	<2.6	<2.6	<2.6		
	Volume (Anions) (mL)	260	258	264		

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.



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

Date Received: 14-MAY-18
Report Date: 22-MAY-18 17:52 (MT)
Version: FINAL

Client Phone: 604-881-2582

Certificate of Analysis

Lab Work Order #: L2094017
Project P.O. #: NOT SUBMITTED
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	L2094017-1	L2094017-2	L2094017-3	L2094017-4	L2094017-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	10-MAY-18	10-MAY-18	10-MAY-18	11-MAY-18	11-MAY-18
		Sampled Time					
		Client ID	UNIT 1 HF RUN 1	UNIT 1 HF RUN 2	UNIT 1 HF RUN 3	UNIT 2 HF RUN 1	UNIT 2 HF RUN 2
Grouping	Analyte						
STACK							
Anions and Nutrients	Fluoride (F) (ug/sample)		<19 ^{DLDS}	<3.8	<4.5	<36 ^{DLDS}	<17 ^{DLDS}
	Volume (Anions) (mL)		385	380	450	358	345

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2094017-6	L2094017-7	L2094017-8	L2094017-9	
		Description	Water	Water	Water	Water	
		Sampled Date	11-MAY-18	09-MAY-18	09-MAY-18	09-MAY-18	
		Sampled Time					
		Client ID	UNIT 2 HF RUN 3	UNIT 3 HF RUN 1	UNIT 3 HF RUN 2	UNIT 3 HF RUN 3	
Grouping	Analyte						
STACK							
Anions and Nutrients	Fluoride (F) (ug/sample)		<18 ^{DLDS}	<19 ^{DLDS}	<15 ^{DLDS}	<71 ^{DLDS}	
	Volume (Anions) (mL)		360	378	295	357	

* 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.

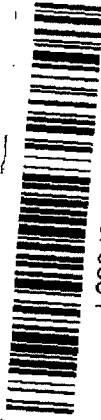
Test results reported relate only to the samples as received by the laboratory.

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.



ALS Environmental



L2094017-COFC

COC #

Page 1 of 1

Company: A. Lanfranco and Associates	
Contact: Mark Lanfranco	
Address: Unit 101 9488 189 St Surrey BC V4N 4W7	
Phone: 604-881-2582	Fax: 604-881-2581
Invoice To Same as Report?	
Hardcopy of Invoice with Report?	
Company:	
Contact:	☒ Yes ☐ No
Address:	☒ Yes ☐ No
Phone:	
Lab Work Order # (lab use only)	

Sample Identification (This description will appear on the report)		ALS Contact: Brent Mack		Sampler: A. Lanfranco and		Number of Containers
Sample #		Date (dd-mm-yy)	Time (hh:mm)	Sample Type		
	Unit 1 HF Run 1	10-May-18		Water	X	1
	Unit 1 HF Run 2	10-May-18		Water	X	1
	Unit 1 HF Run 3	10-May-18		Water	X	1
	Unit 2 HF Run 1	11-May-18		Water	X	1
	Unit 2 HF Run 2	11-May-18		Water	X	1
	Unit 2 HF Run 3	11-May-18		Water	X	1
	Unit 3 HF Run 1	09-May-18		Water	X	1
	Unit 3 HF Run 2	09-May-18		Water	X	1
	Unit 3 HF Run 3	09-May-18		Water	X	1

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

Please report ug/sample

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

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

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

SHIPMENT RELEASE (client use)		SHIPMENT VERIFICATION (lab use only)	
Released by:	Date (dd-mm-yy)	Received by:	Date:
	Time (hh-mm)	Temperature:	Time:
		25 °C	2:15p
		Verified by: HA	Observations: Yes / No ? If Yes add SIF
			2:15p



2655 Park Center Dr., Suite A
Simi Valley, CA 93065
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F: +1 805 526 7270
www.alsglobal.com

LABORATORY REPORT

May 31, 2018

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

RE: Metro Vancouver WTE

Dear Mark:

Enclosed are the results of the samples submitted to our laboratory on May 15-16, 2018. For your reference, these analyses have been assigned our service request number P1802483.

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

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

Respectfully submitted,

ALS | Environmental

Kate Kaneko

By Kate Kaneko at 4:12 pm, 05/31/18

Kate Kaneko
Project Manager



2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
www.alsglobal.com

Client: A. Lanfranco and Associates Inc.
Project: Metro Vancouver WTE

Service Request No: P1802483

CASE NARRATIVE

The samples were received intact under chain of custody on May 15-16, 2018 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Methane, Ethene, Ethane, Acetylene and C3 through C6+ Hydrocarbons Analysis

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

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

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



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www.alsglobal.com

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2016036
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1347317
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-005
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-17-8
Utah DOH (NELAP)	http://health.utah.gov/lab/environmental-lab-certification/	CA016272017-8
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

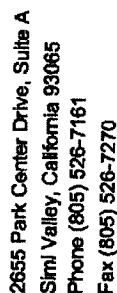
DETAIL SUMMARY REPORT

Client: A. Lanfranco and Associates Inc.
Project ID: Metro Vancouver WTE

Service Request: P1802483

Date Received: 5/15/2018
Time Received: 09:30

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	TO-3 Modified - C1C6+ Can	TO-3 Modified - MEEPP Can
Metro Van WTE Unit 1 Run 1	P1802483-001	Air	5/10/2018	10:07	SC00310	-2.25	3.53	X	X
Metro Van WTE Unit 1 Run 2	P1802483-002	Air	5/10/2018	11:16	SC02239	-2.51	3.53	X	X
Metro Van WTE Unit 1 Run 3	P1802483-003	Air	5/10/2018	12:29	SC02234	-2.20	3.56	X	X
Metro Van WTE Unit 2 Run 1	P1802483-004	Air	5/11/2018	11:08	SC01727	-8.80	3.51	X	X
Metro Van WTE Unit 2 Run 2	P1802483-005	Air	5/11/2018	12:42	SC00142	-4.36	3.71	X	X
Metro Van WTE Unit 2 Run 3	P1802483-006	Air	5/11/2018	13:54	SC00817	-2.73	3.96	X	X
Metro Van WTE Unit 3 Run 1	P1802483-007	Air	5/9/2018	11:10	SC00927	-2.15	3.55	X	X
Metro Van WTE Unit 3 Run 2	P1802483-008	Air	5/9/2018	12:32	SC02163	-2.68	3.70	X	X
Metro Van WTE Unit 3 Run 3	P1802483-009	Air	5/9/2018	13:48	SC02036	-2.70	3.76	X	X



Company Name & Address (Reporting Information) A. Lanfranco and Associates Inc. Project Manager: Mark Lanfranco Phone: 604 881 2582 Email Address for Result Reporting: mark.lanfranco@alanfranco.com		Project Name Metro Vancouver WTE		Requested Turnaround Time in Business Days (Surcharges) please circle 1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard*		ALS Project No. P1802485		
		Project Number		ALS Contact:		Analysis Method		
P.O. # / Billing Information Turn around time 10 Day-Standard		Sampler (Print & Sign)		EPA TO-3 (list on file)		Comments e.g. Actual Preservative or specific instructions		
Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure *Hg	Canister End Pressure *Hg/paig	Sample Volume
Metro Van WTE Unit 1 Run 1	1	10-May-18	09:07-10:07	SC00310	OA00705	-29	-6	x
Metro Van WTE Unit 1 Run 2	2	10-May-18	10:16-11:16	SC02239	OA01141	-29	-6	x
Metro Van WTE Unit 1 Run 3	3	10-May-18	11:29-12:29	SC02234	OA02170	-25	-5	x
Metro Van WTE Unit 2 Run 1	4	11-May-18	10:08-11:08	SC01727	OA01141	-29	-19	x
Metro Van WTE Unit 2 Run 2	5	11-May-18	11:42-12:42	SC00142	OA00672	-28.5	-9	x
Metro Van WTE Unit 2 Run 3	6	11-May-18	12:54-13:54	SC00817	OA00765	-29	-7	x
Metro Van WTE Unit 3 Run 1	7	9-May-18	10:10-11:10	SC00927	OA00818	-31	-7	x
Metro Van WTE Unit 3 Run 2	8	9-May-18	11:32-12:32	SC02183	OA00672	-29	-6	x
Metro Van WTE Unit 3 Run 3	9	9-May-18	12:48-13:48	SC02036	OA01736	-28	-7	x
Report Tier Levels - please select Tier I - Results (Default if not specified) _____ Tier II (Results + QC Summaries) _____ Tier III (Results + QC & Calibration Summaries) _____ Tier IV (Data Validation Package) 10% Surcharge _____								
Relinquished by: (Signature) _____				Received by: (Signature) _____		Date: _____		Time: _____
Relinquished by: (Signature) _____				Received by: (Signature) _____		Date: _____		Time: _____
Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT				EDD required Yes / No _____ Units: _____		Project Requirements (MRLs, QA/QP)		Cooler / Blank Temperature °C

ALS Environmental
Sample Acceptance Check Form

Client: A. Lanfranco and Associates Inc. Work order: P1802483
Project: Metro Vancouver WTE
Sample(s) received on: 5/15 - 16/2018 Date opened: 5/15 - 16/2018 by: ADAVID

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

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

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1802483-001.01	6.0 L Source Can					
P1802483-002.01	6.0 L Source Can					
P1802483-003.01	6.0 L Source Can					
P1802483-004.01	6.0 L Source Can					
P1802483-005.01	6.0 L Source Can					
P1802483-006.01	6.0 L Source Can					
P1802483-007.01	6.0 L Source Can					
P1802483-008.01	6.0 L Source Can					Received 5/16/18
P1802483-009.01	6.0 L Source Can					Received 5/16/18

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

Acetylene

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister(s)
Test Notes:

Date(s) Collected: 5/9 - 5/11/18
Date Received: 5/15 - 5/16/18
Date Analyzed: 5/23/18

Client Sample ID	ALS Sample ID	Injection Volume ml(s)	Container Dilution Factor	Result ppmV	MRL ppmV	Data Qualifier
Metro Van WTE Unit 1 Run 1	P1802483-001	0.50	1.46	ND	0.37	
Metro Van WTE Unit 1 Run 2	P1802483-002	0.50	1.50	ND	0.38	
Metro Van WTE Unit 1 Run 3	P1802483-003	0.50	1.46	ND	0.37	
Metro Van WTE Unit 2 Run 1	P1802483-004	0.50	3.09	ND	0.77	
Metro Van WTE Unit 2 Run 2	P1802483-005	0.50	1.78	ND	0.45	
Metro Van WTE Unit 2 Run 3	P1802483-006	0.50	1.56	ND	0.39	
Metro Van WTE Unit 3 Run 1	P1802483-007	0.50	1.45	ND	0.36	
Metro Van WTE Unit 3 Run 2	P1802483-008	0.50	1.53	ND	0.38	
Metro Van WTE Unit 3 Run 3	P1802483-009	0.50	1.54	ND	0.39	
Method Blank	P180523-MB	0.50	1.00	ND	0.25	

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

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

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P180523-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 5/23/18

Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS Acceptance Limits	Data Qualifier
74-86-2	Acetylene	1.50	1.40	93	70-130	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 1 Run 1

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-001

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00310

Date Collected: 5/10/18

Date Received: 5/15/18

Date Analyzed: 5/23/18

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.25

Final Pressure (psig): 3.53

Container Dilution Factor: 1.46

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	1.5	1.5	
74-85-1	Ethene	ND	0.37	
74-84-0	Ethane	ND	0.37	

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

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 1 Run 2

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-002

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02239

Date Collected: 5/10/18

Date Received: 5/15/18

Date Analyzed: 5/23/18

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.51

Final Pressure (psig): 3.53

Container Dilution Factor: 1.50

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.5	
74-85-1	Ethene	ND	0.38	
74-84-0	Ethane	ND	0.38	

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

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 1 Run 3
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-003

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02234

Date Collected: 5/10/18
Date Received: 5/15/18
Date Analyzed: 5/23/18
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.20 **Final Pressure (psig):** 3.56

Container Dilution Factor: 1.46

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.5	
74-85-1	Ethene	ND	0.37	
74-84-0	Ethane	ND	0.37	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 2 Run 1
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-004

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC01727

Date Collected: 5/11/18
Date Received: 5/15/18
Date Analyzed: 5/23/18
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -8.80 **Final Pressure (psig):** 3.51

Container Dilution Factor: 3.09

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	3.1	
74-85-1	Ethene	ND	0.77	
74-84-0	Ethane	ND	0.77	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 2 Run 2
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-005

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00142

Date Collected: 5/11/18
Date Received: 5/15/18
Date Analyzed: 5/23/18
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -4.36 **Final Pressure (psig):** 3.71

Container Dilution Factor: 1.78

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.8	
74-85-1	Ethene	ND	0.45	
74-84-0	Ethane	ND	0.45	

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

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 2 Run 3

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-006

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00817

Date Collected: 5/11/18

Date Received: 5/15/18

Date Analyzed: 5/23/18

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.73

Final Pressure (psig): 3.96

Container Dilution Factor: 1.56

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.6	
74-85-1	Ethene	ND	0.39	
74-84-0	Ethane	ND	0.39	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 3 Run 1
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-007

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00927

Date Collected: 5/9/18
Date Received: 5/15/18
Date Analyzed: 5/23/18
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.15 **Final Pressure (psig):** 3.55

Container Dilution Factor: 1.45

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.5	
74-85-1	Ethene	ND	0.36	
74-84-0	Ethane	ND	0.36	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 3 Run 2
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-008

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02163

Date Collected: 5/9/18
Date Received: 5/16/18
Date Analyzed: 5/23/18
Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.68 **Final Pressure (psig):** 3.70

Container Dilution Factor: 1.53

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	2.0	1.5	
74-85-1	Ethene	ND	0.38	
74-84-0	Ethane	ND	0.38	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 3 Run 3

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-009

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02036

Date Collected: 5/9/18

Date Received: 5/16/18

Date Analyzed: 5/23/18

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.70

Final Pressure (psig): 3.76

Container Dilution Factor: 1.54

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	1.5	
74-85-1	Ethene	ND	0.39	
74-84-0	Ethane	ND	0.39	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Method Blank
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P180523-MB

Test Code: EPA TO-3 Modified
Instrument ID: HP5890A/GC10/FID
Analyst: Wade Henton
Sampling Media: 6.0 L Summa Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/23/18
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result ppmV	MRL ppmV	Data Qualifier
74-82-8	Methane	ND	0.50	
74-85-1	Ethene	ND	0.13	
74-84-0	Ethane	ND	0.13	

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

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

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P180523-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 5/23/18

Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
74-82-8	Methane	1.50	1.72	115	70-130	
74-85-1	Ethene	1.50	1.48	99	70-130	
74-84-0	Ethane	1.50	1.16	77	70-130	

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 3 Run 3

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-009DUP

Test Code: EPA TO-3 Modified

Instrument ID: HP5890A/GC10/FID

Analyst: Wade Henton

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC02036

Date Collected: 5/9/18

Date Received: 5/16/18

Date Analyzed: 5/23/18

Volume(s) Analyzed: 0.50 ml(s)

Initial Pressure (psig): -2.70

Final Pressure (psig): 3.76

Container Dilution Factor: 1.54

CAS #	Compound	Duplicate		Average	% RPD	RPD Limit	Data Qualifier
		Sample Result ppmV	Sample Result ppmV				
74-82-8	Methane	ND	ND	-	-	15	
74-85-1	Ethene	ND	ND	-	-	15	
74-84-0	Ethane	ND	ND	-	-	15	

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 1 Run 1
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-001

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00310

Date Collected: 5/10/18
Date Received: 5/15/18
Date Analyzed: 5/17/18
Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.25 **Final Pressure (psig):** 3.53

Container Dilution Factor: 1.46

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.73	
C ₄ as n-Butane	ND	0.73	
C ₅ as n-Pentane	ND	0.73	
C ₆ as n-Hexane	ND	0.73	
C ₆ + as n-Hexane	ND	1.5	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 1 Run 2
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-002

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02239

Date Collected: 5/10/18
Date Received: 5/15/18
Date Analyzed: 5/17/18
Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.51 **Final Pressure (psig):** 3.53

Container Dilution Factor: 1.50

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

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 1 Run 3
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
 ALS Sample ID: P1802483-003

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02234

Date Collected: 5/10/18
Date Received: 5/15/18
Date Analyzed: 5/17/18
Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.20 **Final Pressure (psig):** 3.56

Container Dilution Factor: 1.46

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.73	
C ₄ as n-Butane	ND	0.73	
C ₅ as n-Pentane	ND	0.73	
C ₆ as n-Hexane	ND	0.73	
C ₆ + as n-Hexane	ND	1.5	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 2 Run 1

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-004

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Gilbert Gutierrez

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC01727

Date Collected: 5/11/18

Date Received: 5/15/18

Date Analyzed: 5/17/18

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -8.80

Final Pressure (psig): 3.51

Container Dilution Factor: 3.09

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	1.5	
C ₄ as n-Butane	ND	1.5	
C ₅ as n-Pentane	ND	1.5	
C ₆ as n-Hexane	ND	1.5	
C ₆ + as n-Hexane	ND	3.1	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 2 Run 2
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
 ALS Sample ID: P1802483-005

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC00142

Date Collected: 5/11/18
Date Received: 5/15/18
Date Analyzed: 5/17/18
Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -4.36 **Final Pressure (psig):** 3.71

Container Dilution Factor: 1.78

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.89	
C ₄ as n-Butane	ND	0.89	
C ₅ as n-Pentane	ND	0.89	
C ₆ as n-Hexane	ND	0.89	
C ₆ ⁺ as n-Hexane	ND	1.8	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 2 Run 3

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-006

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Gilbert Gutierrez

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00817

Date Collected: 5/11/18

Date Received: 5/15/18

Date Analyzed: 5/18/18

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.73

Final Pressure (psig): 3.96

Container Dilution Factor: 1.56

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.78	
C ₄ as n-Butane	ND	0.78	
C ₅ as n-Pentane	ND	0.78	
C ₆ as n-Hexane	ND	0.78	
C ₆ ⁺ as n-Hexane	ND	1.6	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Metro Van WTE Unit 3 Run 1

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P1802483-007

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Gilbert Gutierrez

Sampling Media: 6.0 L Summa Canister

Test Notes:

Container ID: SC00927

Date Collected: 5/9/18

Date Received: 5/15/18

Date Analyzed: 5/18/18

Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.15

Final Pressure (psig): 3.55

Container Dilution Factor: 1.45

Compound	Result ppmV	MRL ppmV	Data Qualifier
C ₃ as Propane	ND	0.73	
C ₄ as n-Butane	ND	0.73	
C ₅ as n-Pentane	ND	0.73	
C ₆ as n-Hexane	ND	0.73	
C ₆ + as n-Hexane	ND	1.5	

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 3 Run 2
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-008

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02163

Date Collected: 5/9/18
Date Received: 5/16/18
Date Analyzed: 5/18/18
Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.68 **Final Pressure (psig):** 3.70

Container Dilution Factor: 1.53

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

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Metro Van WTE Unit 3 Run 3
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P1802483-009

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:
Container ID: SC02036

Date Collected: 5/9/18
Date Received: 5/16/18
Date Analyzed: 5/18/18
Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.70 **Final Pressure (psig):** 3.76

Container Dilution Factor: 1.54

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

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Method Blank
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P180517-MB

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/17/18
Volume(s) Analyzed: 1.0 ml(s)

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

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

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

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: A. Lanfranco and Associates Inc.
Client Sample ID: Method Blank
Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483
ALS Sample ID: P180518-MB

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Gilbert Gutierrez
Sampling Media: 6.0 L Summa Canister
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/18/18
Volume(s) Analyzed: 1.0 ml(s)

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

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

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

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P180517-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Gilbert Gutierrez

Sampling Media: 6.0 L Summa Canister

Test Notes: -

Date Collected: NA

Date Received: NA

Date Analyzed: 5/17/18

Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS	Data Qualifier
				Acceptance Limits	
Propane	1,000	1,090	109	95-118	
n-Butane	1,000	1,080	108	93-119	
n-Pentane	1,000	1,040	104	90-115	
n-Hexane	1,000	1,090	109	95-125	

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: A. Lanfranco and Associates Inc.

Client Sample ID: Lab Control Sample

Client Project ID: Metro Vancouver WTE

ALS Project ID: P1802483

ALS Sample ID: P180518-LCS

Test Code: EPA TO-3 Modified

Instrument ID: HP5890 II/GC8/FID

Analyst: Gilbert Gutierrez

Sampling Media: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 5/18/18

Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS	Data Qualifier
				Acceptance Limits	
Propane	1,000	1,100	110	95-118	
n-Butane	1,000	1,080	108	93-119	
n-Pentane	1,000	1,050	105	90-115	
n-Hexane	1,000	1,100	110	95-125	

Your Project #: METRO VAN WTE[B834880]
Site Location: BURNABY B.C.
Your C.O.C. #: B834880-ONTV-01-01

Attention: Tanya Eugene

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

Report Date: 2018/05/23
Report #: R5165623
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8A9137

Received: 2018/05/10, 11:39

Sample Matrix: Tedlar Bag
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Nitrous Oxide (1)	5	N/A	2018/05/17	CAM SOP-00203	GC/ECD

Remarks:

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

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

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.

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.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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.

Encryption Key



Jade Browne
Project Manager Assistant - Air
23 May 2018 11:52:31

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) 817-5700

=====

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.

Maxxam Job #: B8B3171
Report Date: 2018/05/22

Maxxam Analytics
Client Project #: M.V. WTE
Site Location: B836192

COMPRESSED GAS PARAMETERS (AIR)

Maxxam ID		GRR458	GRR458	GRR459	GRR460		
Sampling Date		2018/05/11	2018/05/11	2018/05/11	2018/05/11		
COC Number		b836192-ontv-01-01	b836192-ontv-01-01	b836192-ontv-01-01	b836192-ontv-01-01		
	UNITS	TK5345-UNIT-2 R-1	TK5345-UNIT-2 R-1 Lab-Dup	TK5346-UNIT-2 R-2	TK5347-UNIT-2 R-3	RDL	QC Batch
Nitrous Oxide	ppmv	3.6	3.7	6.3	3.8	0.1	5535788
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							

Maxxam ID		GRR461		
Sampling Date		2018/05/11		
COC Number		b836192-ontv-01-01		
	UNITS	TK5348-UNIT-3 R-2	RDL	QC Batch
Nitrous Oxide	ppmv	7.5	0.1	5535788
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

Maxxam Job #: B8B3171
Report Date: 2018/05/22

Maxxam Analytics
Client Project #: M.V. WTE
Site Location: B836192

TEST SUMMARY

Maxxam ID: GRR458
Sample ID: TK5345-UNIT-2 R-1
Matrix: AIR

Collected: 2018/05/11
Shipped:
Received: 2018/05/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535788	N/A	2018/05/15	Satvinder Bhathal

Maxxam ID: GRR458 Dup
Sample ID: TK5345-UNIT-2 R-1
Matrix: AIR

Collected: 2018/05/11
Shipped:
Received: 2018/05/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535788	N/A	2018/05/15	Satvinder Bhathal

Maxxam ID: GRR459
Sample ID: TK5346-UNIT-2 R-2
Matrix: AIR

Collected: 2018/05/11
Shipped:
Received: 2018/05/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535788	N/A	2018/05/15	Satvinder Bhathal

Maxxam ID: GRR460
Sample ID: TK5347-UNIT-2 R-3
Matrix: AIR

Collected: 2018/05/11
Shipped:
Received: 2018/05/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535788	N/A	2018/05/15	Satvinder Bhathal

Maxxam ID: GRR461
Sample ID: TK5348-UNIT-3 R-2
Matrix: AIR

Collected: 2018/05/11
Shipped:
Received: 2018/05/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535788	N/A	2018/05/15	Satvinder Bhathal

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.

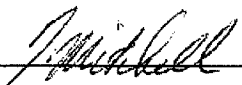
QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: M.V. WTE
Site Location: B836192

QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
5535788	Nitrous Oxide	2018/05/15	<0.1	ppmv	NC	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.						
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference $\leq 2 \times$ RDL).						

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.

Your Project #: M.V. WTE
Site#: B836192
Site Location: B836192
Your C.O.C. #: b836192-ontv-01-01

Attention: Tanya Eugene

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

Report Date: 2018/05/22
Report #: R5164052
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B3171

Received: 2018/05/15, 09:03

Sample Matrix: AIR
Samples Received: 4

Analyses	Date		Date Analyzed	Laboratory Method	Reference
	Quantity	Extracted			
Nitrous Oxide (1)	4	N/A	2018/05/15	CAM SOP-00203	GC/ECD

Remarks:

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

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

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.

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.

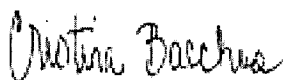
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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.

Encryption Key



Cristina (Maria) Bacchus
Project Manager
22 May 2018 14:46:36

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) 817-5700

=====

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COMPRESSED GAS PARAMETERS (TEDLAR BAG)

Maxxam ID		GQV207	GQV208	GQV209	GQV213		
Sampling Date		2018/05/08	2018/05/08	2018/05/08	2018/05/08		
COC Number		B834880-ONTV-01-01	B834880-ONTV-01-01	B834880-ONTV-01-01	B834880-ONTV-01-01		
	UNITS	TJ9084-UNIT-1 RUN 1	TJ9085-UNIT-1 RUN 2	TJ9086-UNIT-1 RUN 3	TJ9090-UNIT-3 RUN 1	RDL	QC Batch
Nitrous Oxide	ppmv	5.8	5.0	6.2	2.0	0.1	5535823
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							

Maxxam ID		GQV213	GQV216		
Sampling Date		2018/05/08	2018/05/08		
COC Number		B834880-ONTV-01-01	B834880-ONTV-01-01		
	UNITS	TJ9090-UNIT-3 RUN 1 Lab-Dup	TJ9092-UNIT-3 RUN 3	RDL	QC Batch
Nitrous Oxide	ppmv	2.5	6.8	0.1	5535823
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate					

Maxxam Job #: B8A9137
Report Date: 2018/05/23

Maxxam Analytics
Client Project #: METRO VAN WTE[B834880]
Site Location: BURNABY B.C.

TEST SUMMARY

Maxxam ID: GQV207
Sample ID: TJ9084-UNIT-1 RUN 1
Matrix: Tedlar Bag

Collected: 2018/05/08
Shipped:
Received: 2018/05/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535823	N/A	2018/05/17	Satvinder Bhathal

Maxxam ID: GQV208
Sample ID: TJ9085-UNIT-1 RUN 2
Matrix: Tedlar Bag

Collected: 2018/05/08
Shipped:
Received: 2018/05/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535823	N/A	2018/05/17	Satvinder Bhathal

Maxxam ID: GQV209
Sample ID: TJ9086-UNIT-1 RUN 3
Matrix: Tedlar Bag

Collected: 2018/05/08
Shipped:
Received: 2018/05/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535823	N/A	2018/05/17	Satvinder Bhathal

Maxxam ID: GQV213
Sample ID: TJ9090-UNIT-3 RUN 1
Matrix: Tedlar Bag

Collected: 2018/05/08
Shipped:
Received: 2018/05/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535823	N/A	2018/05/17	Satvinder Bhathal

Maxxam ID: GQV213 Dup
Sample ID: TJ9090-UNIT-3 RUN 1
Matrix: Tedlar Bag

Collected: 2018/05/08
Shipped:
Received: 2018/05/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535823	N/A	2018/05/17	Satvinder Bhathal

Maxxam ID: GQV216
Sample ID: TJ9092-UNIT-3 RUN 3
Matrix: Tedlar Bag

Collected: 2018/05/08
Shipped:
Received: 2018/05/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrous Oxide	GC/ECD	5535823	N/A	2018/05/17	Satvinder Bhathal

GENERAL COMMENTS

Results relate only to the items tested.

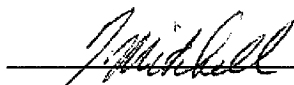
QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: METRO VAN WTE[B834880]
Site Location: BURNABY B.C.

QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
5535823	Nitrous Oxide	2018/05/17	<0.1	ppmv	21	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 B - Particulate Analysis

Filter Collection:

Test #	Initial (grams)	Final (grams)	Net Difference (grams)	Blank Adjusted (grams)
Unit 1 Blank	0.4657	0.4666	0.0009	
Unit 1 Run 1	0.4670	0.4657	-0.0013	ND
Unit 1 Run 2	0.4642	0.4635	-0.0007	ND
Unit 1 Run 3	0.4625	0.4617	-0.0008	ND
Unit 2 Blank	0.4641	0.4652	0.0011	
Unit 2 Run 1	0.4684	0.4691	0.0007	ND
Unit 2 Run 2	0.4661	0.4671	0.0010	ND
Unit 2 Run 3	0.4614	0.4612	-0.0002	ND
Unit 3 Blank	0.4692	0.4699	0.0007	
Unit 3 Run 1	0.4659	0.4650	-0.0009	ND
Unit 3 Run 2	0.4714	0.4708	-0.0006	ND
Unit 3 Run 3	0.4669	0.4663	-0.0006	ND

Front Half Washings:

Test #	Initial (grams)	Final (grams)	Net Difference (grams)	Blank Adjusted (grams)
Unit 1 Blank	120.6055	120.6052	-0.0003	
Unit 1 Run 1	119.9539	119.9545	0.0006	0.0009
Unit 1 Run 2	98.1587	98.1586	-0.0001	0.0002
Unit 1 Run 3	113.6710	113.6709	-0.0001	0.0002
Unit 2 Blank	111.7494	111.7489	-0.0005	
Unit 2 Run 1	114.8080	114.8118	0.0038	0.0043
Unit 2 Run 2	126.7466	126.7464	-0.0002	0.0003
Unit 2 Run 3	113.0771	113.0778	0.0007	0.0012
Unit 3 Blank	99.1303	99.1313	0.0010	
Unit 3 Run 1	113.2633	113.2639	0.0006	ND
Unit 3 Run 2	119.4878	119.4886	0.0008	ND
Unit 3 Run 3	117.0939	117.0948	0.0009	ND

APPENDIX - C

COMPUTER GENERATED RESULTS

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

Date: 8-May-18
Run: 1 - Particulate / Metals
Run Time: 11:00 - 13:03

Concentrations:

Particulate	0.35 mg/dscm	0.00015 gr/dscf
	0.20 mg/Acm	0.00009 gr/Acf
	0.32 mg/dscm (@ 11% O2)	0.00014 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.025 Kg/hr	0.056 lb/hr
--------------------	-------------	-------------

Flue Gas Characteristics:

Flow	1191 dscm/min	42059 dscf/min
	19.85 dscm/sec	701 dscf/sec
	2057 Acm/min	72652 Acf/min

Velocity	13.462 m/sec	44.16 f/sec
-----------------	--------------	-------------

Temperature	145.3 oC	293.6 oF
--------------------	----------	----------

Moisture	14.9 %
-----------------	--------

Gas Analysis	9.9 % O2
	10.3 % CO2

30.049 Mol. Wt (g/gmole) Dry
28.256 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.6834 dscm	94.763 dscf
Sample Time	120.0 minutes	
Isokineticity	100.4 %	

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

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

Date: 8-May-18
Run: 1 - Particulate / Metals
Run Time: 11:00 - 13:03

Control Unit (Y) 1.0097
Nozzle Diameter (in.) 0.3067
Pitot Factor 0.8520
Baro. Press. (in. Hg) 30.50
Static Press. (in. H2O) -19.75
Stack Height (ft) 30
Stack Diameter (in.) 70.90
Stack Area (sq.ft.) 27.417
Minutes Per Reading 5.0
Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00090
Total (grams) 0.00095

Gas Analysis (Vol. %):

	CO2	O2
Traverse 1	10.50	9.75
Traverse 2	10.17	10.00

10.34 9.88

Condensate Collection:

Impinger 1	201.0
Impinger 2	96.0
Impinger 3	21.0
Impinger 4	10.0
Impinger 5	4.0
Impinger 6	2.0
Gel	18.0

Gain (grams) 352.0

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										
1	0.0	56.700								
2	5.0	59.780	0.25	1.19	75	75	3	288	1.5	100.6
3	10.0	62.860	0.25	1.19	75	75	3	288	4.7	100.6
4	15.0	65.940	0.25	1.19	75	75	3	288	8.4	100.6
5	20.0	69.080	0.26	1.24	76	76	3	289	12.5	100.4
6	25.0	72.220	0.26	1.24	76	76	3	290	17.7	100.5
7	30.0	75.370	0.26	1.24	76	76	3	290	25.2	100.8
8	35.0	79.590	0.47	2.23	76	76	3	290	45.6	100.7
9	40.0	83.940	0.50	2.38	77	77	3	290	53.2	100.5
10	45.0	88.360	0.52	2.47	78	78	3	290	58.3	99.9
11	50.0	92.790	0.52	2.47	78	78	3	292	62.5	100.3
12	55.0	97.370	0.55	2.61	78	78	3	293	66.1	100.9
12	60.0	101.940	0.55	2.61	79	79	3	293	69.4	100.5
Traverse 2										
1	0.0	101.940								
2	5.0	105.930	0.42	2.00	80	80	3	295	1.5	100.2
3	10.0	109.920	0.42	2.00	80	80	3	296	4.7	100.3
4	15.0	113.810	0.40	1.90	80	80	3	296	8.4	100.2
5	20.0	117.940	0.45	2.14	81	81	3	296	12.5	100.1
6	25.0	122.170	0.47	2.23	81	81	3	298	17.7	100.5
7	30.0	126.390	0.47	2.23	82	82	4	298	25.2	100.1
8	35.0	130.610	0.47	2.23	81	81	4	298	45.6	100.3
9	40.0	134.740	0.45	2.14	82	82	4	298	53.2	100.1
10	45.0	138.730	0.42	2.00	82	82	4	298	58.3	100.1
11	50.0	142.620	0.40	1.90	81	81	4	297	62.5	100.1
12	55.0	146.410	0.38	1.81	80	80	3	297	66.1	100.2
12	60.0	150.200	0.38	1.81	80	80	3	298	69.4	100.2
Average:										
			0.407	1.935	78.7	78.7	3.2	293.6		100.4

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

Date: 10-May-18
Run: 2 - Particulate / Metals
Run Time: 09:01 - 11:05

Concentrations:

Particulate	0.11 mg/dscm	0.00005 gr/dscf
	0.06 mg/Acm	0.00003 gr/Acf
	0.09 mg/dscm (@ 11% O2)	0.00004 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.007 Kg/hr	0.017 lb/hr
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Flue Gas Characteristics:

Flow	1188 dscm/min	41966 dscf/min
	19.81 dscm/sec	699 dscf/sec
	2054 Acn/min	72553 Acf/min

Velocity	13.443 m/sec	44.10 f/sec
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Temperature	143.7 oC	290.6 oF
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Moisture	14.0 %
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Gas Analysis	9.8 % O2
	10.8 % CO2

30.110 Mol. Wt (g/gmole) Dry
28.417 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.3774 dscm	83.958 dscf
Sample Time	120.0 minutes	
Isokineticity	102.3 %	

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

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

Date: 10-May-18
 Run: 2 - Particulate / Metals
 Run Time: 09:01 - 11:05

Control Unit (Y) 1.0097
 Nozzle Diameter (in.) 0.2862
 Pitot Factor 0.8520
 Baro. Press. (in. Hg) 30.06
 Static Press. (in. H2O) -19.75
 Stack Height (ft) 30
 Stack Diameter (in.) 70.90
 Stack Area (sq.ft.) 27.417
 Minutes Per Reading 5.0
 Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00020
 Total (grams) 0.00025

Gas Analysis (Vol. %):
 CO2 O2
 Traverse 1 10.75 9.75
 Traverse 2 10.75 9.75
 10.75 9.75

Condensate Collection:
 Impinger 1 102.0
 Impinger 2 106.0
 Impinger 3 46.0
 Impinger 4 18.0
 Impinger 5 3.0
 Impinger 6 1.0
 Gel 14.0
 Gain (grams) 290.0

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	150.500								
1	5.0	153.250	0.26	1.04	61	61	3	294	1.5	102.7
2	10.0	155.950	0.26	1.05	61	61	3	292	4.7	100.7
3	15.0	158.800	0.28	1.13	61	61	3	290	8.4	102.3
4	20.0	161.660	0.28	1.13	62	62	3	290	12.5	102.5
5	25.0	164.370	0.25	1.01	62	62	3	288	17.7	102.6
6	30.0	167.290	0.29	1.17	62	62	3	289	25.2	102.7
7	35.0	170.950	0.46	1.87	63	63	3	288	45.6	102.2
8	40.0	174.690	0.48	1.95	64	64	4	289	53.2	102.1
9	45.0	178.420	0.48	1.95	66	66	4	290	58.3	101.5
10	50.0	182.110	0.46	1.87	67	67	4	291	62.5	102.4
11	55.0	185.550	0.40	1.63	68	68	4	290	66.1	102.1
12	60.0	188.980	0.40	1.63	68	68	4	291	69.4	101.8
Traverse 2	0.0	188.980								
1	5.0	192.350	0.38	1.55	67	67	6	288	1.5	102.6
2	10.0	196.090	0.47	1.92	65	65	6	286	4.7	102.8
3	15.0	199.880	0.48	1.96	66	66	6	286	8.4	102.9
4	20.0	203.790	0.52	2.12	68	68	6	292	12.5	102.0
5	25.0	207.830	0.55	2.24	68	68	6	292	17.7	102.5
6	30.0	211.940	0.57	2.33	69	69	6	290	25.2	102.1
7	35.0	215.610	0.45	1.83	70	70	6	295	45.6	102.7
8	40.0	219.150	0.42	1.71	71	71	6	295	53.2	102.3
9	45.0	222.700	0.42	1.72	71	71	6	294	58.3	102.5
10	50.0	226.150	0.40	1.64	70	70	6	289	62.5	101.9
11	55.0	229.420	0.36	1.47	70	70	6	292	66.1	102.0
12	60.0	232.660	0.35	1.43	70	70	6	294	69.4	102.6
Average:			0.403	1.640	66.3	66.3	4.7	290.6		102.3

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

Date: 11-May-18
Run: 3 - Particulate / Metals
Run Time: 10:41 - 12:43

Concentrations:

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

Emission Rates:

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

Flow	1093 dscm/min	38602 dscf/min
	18.22 dscm/sec	643 dscf/sec
	1910 Acn/min	67460 Acf/min

Velocity	12.500 m/sec	41.01 f/sec
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Temperature	145.1 oC	293.3 oF
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Moisture	15.1 %
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Gas Analysis	9.5 % O2
	10.4 % CO2

30.046 Mol. Wt (g/gmole) Dry
28.230 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.5068 dscm	88.529 dscf
Sample Time	120.0 minutes	
Isokineticity	102.1 %	

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

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

Date: 11-May-18
 Run: 3 - Particulate / Metals
 Run Time: 10:41 - 12:43

Control Unit (Y) 1.0164
 Nozzle Diameter (in.) 0.3067
 Pitot Factor 0.8520
 Baro. Press. (in. Hg) 30.20
 Static Press. (in. H2O) -19.50
 Stack Height (ft) 30
 Stack Diameter (in.) 70.90
 Stack Area (sq.ft.) 27.417
 Minutes Per Reading 5.0
 Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00020
 Total (grams) 0.00025

Traverse 1
 Traverse 2

Gas Analysis (Vol. %):

CO2	O2
10.33	9.67
10.50	9.33

Condensate Collection:

Impinger 1	216.0
Impinger 2	62.0
Impinger 3	27.0
Impinger 4	11.0
Impinger 5	2.0
Impinger 6	1.0
Gel	15.0
Gain (grams)	334.0

10.42	9.50
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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	690.551								
1	5.0	693.760	0.27	1.38	65	65	3	294	1.5	103.6
2	10.0	696.970	0.27	1.38	66	66	3	294	4.7	103.4
3	15.0	700.050	0.25	1.28	66	66	3	295	8.4	103.1
4	20.0	703.150	0.25	1.28	66	66	3	294	12.5	103.7
5	25.0	706.240	0.25	1.28	67	67	3	293	17.7	103.1
6	30.0	709.450	0.27	1.38	66	66	3	293	25.2	103.3
7	35.0	713.590	0.45	2.30	69	69	6	292	45.6	102.8
8	40.0	718.040	0.52	2.65	69	69	6	293	53.2	102.9
9	45.0	722.490	0.52	2.65	70	70	6	293	58.3	102.8
10	50.0	726.670	0.46	2.35	72	72	6	293	62.5	102.2
11	55.0	730.760	0.44	2.24	72	72	6	293	66.1	102.2
12	60.0	734.780	0.42	2.14	73	73	6	294	69.4	102.6
Traverse 2	0.0	734.780								
1	5.0	737.800	0.24	1.22	74	74	5	294	1.5	101.6
2	10.0	740.820	0.24	1.22	75	75	5	294	4.7	101.4
3	15.0	744.330	0.32	1.63	76	76	5	293	8.4	101.9
4	20.0	747.820	0.32	1.63	77	77	5	293	12.5	101.1
5	25.0	751.200	0.30	1.53	77	77	5	293	17.7	101.1
6	30.0	754.690	0.32	1.63	78	78	5	293	25.2	100.9
7	35.0	758.600	0.40	2.04	77	77	5	292	45.6	101.4
8	40.0	762.360	0.37	1.89	77	77	5	293	53.2	101.4
9	45.0	766.270	0.40	2.04	77	77	5	293	58.3	101.4
10	50.0	770.020	0.37	1.89	78	78	5	293	62.5	100.9
11	55.0	773.670	0.35	1.79	78	78	5	293	66.1	101.0
12	60.0	777.220	0.33	1.68	77	77	5	293	69.4	101.3
Average:			0.347	1.771	72.6	72.6	4.8	293.3		102.1

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

Date: 10-May-18
Run: 1 - Particulate / Metals
Run Time: 12:19 - 14:21

Concentrations:

Particulate	1.6 mg/dscm	0.0007 gr/dscf
	0.9 mg/Acm	0.0004 gr/Acf
	1.5 mg/dscm (@ 11% O2)	0.0006 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.114 Kg/hr	0.251 lb/hr
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Flue Gas Characteristics:

Flow	1165 dscm/min	41134 dscf/min
	19.41 dscm/sec	686 dscf/sec
	2116 Acn/min	74730 Acf/min

Velocity	13.847 m/sec	45.43 f/sec
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Temperature	150.6 oC	303.1 oF
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Moisture	16.4 %
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Gas Analysis	10.0 % O2
	10.3 % CO2

30.053 Mol. Wt (g/gmole) Dry
28.076 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.6754 dscm	94.482 dscf
Sample Time	120.0 minutes	
Isokineticity	102.0 %	

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

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

Date: 10-May-18
Run: 1 - Particulate / Metals
Run Time: 12:19 - 14:21

Control Unit (Y) 1.0049
Nozzle Diameter (in.) 0.3067
Pitot Factor 0.8520
Baro. Press. (in. Hg) 29.95
Static Press. (in. H2O) -20.00
Stack Height (ft) 30
Stack Diameter (in.) 70.90
Stack Area (sq.ft.) 27.417
Minutes Per Reading 5.0
Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00430
Total (grams) 0.00435

Gas Analysis (Vol. %):

CO2	O2
10.33	10.00
10.33	10.00

Condensate Collection:

Impinger 1	210.0
Impinger 2	118.0
Impinger 3	26.0
Impinger 4	13.0
Impinger 5	8.0
Impinger 6	3.0
Gel	16.0
Gain (grams)	394.0

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	15.700								
1	5.0	19.890	0.45	2.67	66	66	5	302	1.5	105.3
2	10.0	24.170	0.47	2.79	67	67	5	304	4.7	105.2
3	15.0	28.680	0.52	3.08	69	69	6	304	8.4	105.0
4	20.0	33.010	0.48	2.85	70	70	6	302	12.5	104.6
5	25.0	37.340	0.48	2.85	68	68	6	302	17.7	105.0
6	30.0	41.530	0.45	2.67	68	68	6	300	25.2	104.7
7	35.0	45.070	0.32	1.90	69	69	8	301	45.6	104.6
8	40.0	48.380	0.28	1.66	70	70	8	300	53.2	104.2
9	45.0	51.560	0.26	1.54	70	70	6	299	58.3	103.8
10	50.0	54.690	0.25	1.48	71	71	6	296	62.5	103.8
11	55.0	57.770	0.24	1.42	72	72	6	295	66.1	103.9
12	60.0	60.700	0.22	1.30	73	73	6	298	69.4	103.3
Traverse 2	0.0	60.700								
1	5.0	64.000	0.28	1.66	73	73	6	303	1.5	103.5
2	10.0	67.420	0.30	1.78	74	74	6	304	4.7	103.5
3	15.0	69.170	0.28	1.66	74	74	6	304	8.4	54.8
4	20.0	72.240	0.24	1.42	75	75	6	305	12.5	103.7
5	25.0	75.560	0.28	1.66	76	76	6	305	17.7	103.7
6	30.0	79.150	0.33	1.96	76	76	6	305	25.2	103.4
7	35.0	84.070	0.62	3.68	77	77	6	305	45.6	103.6
8	40.0	89.490	0.75	4.45	78	78	6	307	53.2	103.9
9	45.0	95.000	0.78	4.63	78	78	8	308	58.3	103.7
10	50.0	100.150	0.68	4.03	78	78	8	309	62.5	103.7
11	55.0	105.170	0.64	3.80	79	79	10	309	66.1	103.9
12	60.0	109.920	0.58	3.44	79	79	10	308	69.4	103.2
Average:			0.424	2.516	72.9	72.9	6.6	303.1		102.0

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

Date: 11-May-18
Run: 2 - Particulate / Metals
Run Time: 09:30 - 11:33

Concentrations:

Particulate	0.17 mg/dscm	0.00008 gr/dscf
	0.10 mg/Acm	0.00004 gr/Acf
	0.14 mg/dscm (@ 11% O2)	0.00006 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.011 Kg/hr	0.024 lb/hr
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Flue Gas Characteristics:

Flow	1035 dscm/min	36536 dscf/min
	17.24 dscm/sec	609 dscf/sec
	1858 Acfm/min	65632 Acf/min

Velocity	12.161 m/sec	39.90 f/sec
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Temperature	144.2 oC	291.6 oF
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Moisture	17.5 %
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Gas Analysis	9.0 % O2
	11.3 % CO2

30.160 Mol. Wt (g/gmole) Dry
28.027 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.0108 dscm	71.011 dscf
Sample Time	120.0 minutes	
Isokineticity	106.1 %	

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

Client:	Metro Vancouver	Date:	11-May-18
Jobsite:	WTE (Burnaby, B.C)	Run:	2 - Particulate / Metals
Source:	Unit 2	Run Time:	09:30 - 11:33

Control Unit (Y)	1.0049	Collection:	Gas Analysis (Vol. %):		Condensate Collection:		
Nozzle Diameter (in.)	0.2828	Filter (grams) 0.00005	CO2	O2	Impinger 1	188.0	
Pitot Factor	0.8565	Washings (grams) 0.00030	Traverse 1	11.25	9.00	Impinger 2	66.0
Baro. Press. (in. Hg)	30.23		Traverse 2	11.25	9.00	Impinger 3	29.0
Static Press. (in. H2O)	-20.00	Total (grams) 0.00035				Impinger 4	20.0
Stack Height (ft)	30					Impinger 5	2.0
Stack Diameter (in.)	70.90					Impinger 6	1.0
Stack Area (sq.ft.)	27.417					Gel	15.0
Minutes Per Reading	5.0		11.25	9.00		Gain (grams)	321.0
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	111.057								
1	5.0	114.350	0.38	1.68	65	65	5	287	1.5	106.0
2	10.0	117.630	0.38	1.67	64	64	5	294	4.7	106.3
3	15.0	120.810	0.36	1.58	65	65	5	294	8.4	105.7
4	20.0	123.950	0.35	1.54	65	65	5	295	12.5	105.9
5	25.0	127.390	0.42	1.86	66	66	5	293	17.7	105.6
6	30.0	130.950	0.44	1.94	66	66	5	293	25.2	106.8
7	35.0	133.630	0.25	1.11	68	68	6	293	45.6	106.1
8	40.0	136.450	0.27	1.20	68	68	6	292	53.2	107.3
9	45.0	139.070	0.24	1.06	68	68	6	293	58.3	105.8
10	50.0	141.490	0.20	0.89	70	70	6	289	62.5	106.3
11	55.0	143.780	0.18	0.81	69	69	6	282	66.1	105.7
12	60.0	145.880	0.15	0.67	69	69	6	285	69.4	106.4
Traverse 2	0.0	145.880								
1	5.0	148.770	0.28	1.23	70	70	5	283	1.5	107.0
2	10.0	151.480	0.25	1.13	70	70	5	287	4.7	106.4
3	15.0	154.050	0.23	1.02	70	70	5	293	8.4	105.6
4	20.0	156.380	0.19	0.85	71	71	5	294	12.5	105.2
5	25.0	158.960	0.23	1.03	71	71	5	294	17.7	105.9
6	30.0	161.660	0.25	1.11	71	71	5	295	25.2	106.4
7	35.0	165.380	0.48	2.14	72	72	8	295	45.6	105.8
8	40.0	169.390	0.56	2.49	71	71	8	296	53.2	106.0
9	45.0	173.270	0.52	2.32	73	73	8	295	58.3	105.9
10	50.0	176.890	0.45	2.01	73	73	8	296	62.5	106.2
11	55.0	180.390	0.42	1.89	74	74	8	291	66.1	105.7
12	60.0	183.810	0.40	1.80	74	74	8	290	69.4	105.8
Average:			0.328	1.460	69.3	69.3	6.0	291.6		106.1

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

Date: 11-May-18
Run: 3 - Particulate / Metals
Run Time: 12:15 - 14:18

Concentrations:

Particulate	0.6 mg/dscm	0.0003 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	0.085 lb/hr
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Flue Gas Characteristics:

Flow	1061 dscm/min	37469 dscf/min
	17.68 dscm/sec	624 dscf/sec
	1877 Acf/min	66284 Acf/min

Velocity	12.282 m/sec	40.29 f/sec
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Temperature	146.8 oC	296.3 oF
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Moisture	15.8 %
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Gas Analysis	8.8 % O2
	11.5 % CO2

30.190 Mol. Wt (g/gmole) Dry
28.270 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.0667 dscm	72.985 dscf
Sample Time	120.0 minutes	
Isokineticity	103.9 %	

*** 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: 11-May-18
Run: 3 - Particulate / Metals
Run Time: 12:15 - 14:18

Control Unit (Y) 1.0049
 Nozzle Diameter (in.) 0.2802
 Pitot Factor 0.8489
 Baro. Press. (in. Hg) 30.23
 Static Press. (in. H2O) -20.00
 Stack Height (ft) 30
 Stack Diameter (in.) 70.90
 Stack Area (sq.ft.) 27.417
 Minutes Per Reading 5.0
 Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00120
Total (grams) 0.0012

Gas Analysis (Vol. %):
 CO2 O2
 Traverse 1 11.50 8.50
 Traverse 2 11.50 9.00
11.50 8.75

Condensate Collection:
 Impinger 1 164.0
 Impinger 2 72.0
 Impinger 3 18.0
 Impinger 4 12.0
 Impinger 5 3.0
 Impinger 6 2.0
Gel 19.0
Gain (grams) 290.0

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	184.559								
1	5.0	187.210	0.25	1.07	76	76	4	293	1.5	104.4
2	10.0	189.750	0.23	1.98	76	76	4	294	4.7	104.6
3	15.0	192.290	0.23	0.98	76	76	4	294	8.4	104.3
4	20.0	194.860	0.24	1.02	75	75	4	293	12.5	103.5
5	25.0	197.450	0.24	1.02	75	75	4	292	17.7	104.2
6	30.0	200.190	0.27	1.15	75	75	4	292	25.2	104.0
7	35.0	203.690	0.44	1.87	76	76	6	295	45.6	104.2
8	40.0	207.340	0.48	2.04	77	77	6	295	53.2	103.9
9	45.0	211.070	0.50	2.13	77	77	6	296	58.3	104.1
10	50.0	214.980	0.55	2.34	78	78	6	296	62.5	104.0
11	55.0	218.630	0.48	2.05	78	78	6	296	66.1	103.8
12	60.0	222.060	0.42	1.79	79	79	6	298	69.4	104.2
Traverse 2	0.0	222.060								
1	5.0	225.410	0.40	1.72	80	80	5	294	1.5	103.8
2	10.0	228.820	0.41	1.76	80	80	5	294	4.7	104.3
3	15.0	232.240	0.41	1.76	81	81	5	296	8.4	104.6
4	20.0	235.743	0.44	1.89	81	81	5	295	12.5	103.4
5	25.0	239.350	0.46	1.98	81	81	5	292	17.7	103.9
6	30.0	242.700	0.40	1.71	81	81	5	298	25.2	103.8
7	35.0	245.620	0.30	1.28	83	83	4	302	45.6	104.3
8	40.0	248.380	0.27	1.16	83	83	4	301	53.2	103.8
9	45.0	250.990	0.24	1.03	84	84	4	302	58.3	104.0
10	50.0	253.480	0.22	0.94	83	83	4	302	62.5	103.8
11	55.0	255.640	0.17	0.73	84	84	4	300	66.1	101.1
12	60.0	257.720	0.15	0.64	85	85	4	300	69.4	104.4
Average:			0.342	1.502	79.3	79.3	3.0	296.3		103.9

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

Date: 9-May-18
Run: 1 - Particulate / Metals
Run Time: 10:06 - 12:08

Concentrations:

Particulate	0.05 mg/dscm	0.00002 gr/dscf
	0.03 mg/Acm	0.00001 gr/Acf
	0.04 mg/dscm (@ 11% O2)	0.00002 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.003 Kg/hr	0.006 lb/hr
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Flue Gas Characteristics:

Flow	940 dscm/min	33203 dscf/min
	15.67 dscm/sec	553 dscf/sec
	1674 Acmm/min	59134 Acf/min

Velocity	10.957 m/sec	35.95 f/sec
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Temperature	144.9 oC	292.8 oF
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Moisture	15.8 %
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Gas Analysis	10.0 % O2
	10.1 % CO2

30.014 Mol. Wt (g/gmole) Dry
28.110 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	2.1519 dscm	75.995 dscf
Sample Time	120.0 minutes	
Isokineticity	101.9 %	

*** 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 3

Date: 9-May-18
Run: 1 - Particulate / Metals
Run Time: 10:06 - 12:08

Control Unit (Y) 1.0049
 Nozzle Diameter (in.) 0.3067
 Pitot Factor 0.8520
 Baro. Press. (in. Hg) 29.90
 Static Press. (in. H2O) -19.50
 Stack Height (ft) 30
 Stack Diameter (in.) 70.90
 Stack Area (sq.ft.) 27.417
 Minutes Per Reading 5.0
 Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00005
Total (grams) 0.00010

Gas Analysis (Vol. %):

	CO2	O2
Traverse 1	10.00	10.00
Traverse 2	10.17	10.00

Condensate Collection:

Impinger 1	178.0
Impinger 2	84.0
Impinger 3	18.0
Impinger 4	8.0
Impinger 5	2.0
Impinger 6	1.0
Gel	13.0
Gain (grams)	304.0

10.09 10.00

Traverse / Point	Time (min.)	Dry Gas Meter (l3)	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	800.950								
1	5.0	804.590	0.34	2.02	69	69	5	292	1.5	103.0
2	10.0	808.280	0.35	2.08	70	70	5	291	4.7	102.6
3	15.0	812.020	0.36	2.13	70	70	6	291	8.4	102.6
4	20.0	815.920	0.39	2.31	70	70	6	291	12.5	102.8
5	25.0	819.770	0.38	2.25	70	70	6	290	17.7	102.7
6	30.0	823.310	0.32	1.90	71	71	6	290	25.2	102.7
7	35.0	826.030	0.19	1.13	72	72	6	290	45.6	102.0
8	40.0	828.450	0.15	0.89	72	72	6	290	53.2	102.1
9	45.0	830.620	0.12	0.71	72	72	5	290	58.3	102.3
10	50.0	832.780	0.12	0.71	73	73	5	290	62.5	101.6
11	55.0	834.750	0.10	0.59	73	73	4	290	66.1	101.5
12	60.0	836.720	0.10	0.59	74	74	4	290	69.4	101.3
Traverse 2	0.0	836.720								
1	5.0	839.780	0.24	1.42	76	76	5	294	1.5	101.7
2	10.0	842.710	0.22	1.30	76	76	5	295	4.7	101.7
3	15.0	845.360	0.18	1.07	76	76	5	295	8.4	101.6
4	20.0	847.870	0.16	0.95	77	77	5	295	12.5	101.9
5	25.0	850.370	0.16	0.95	78	78	3	295	17.7	101.3
6	30.0	852.710	0.14	0.83	78	78	3	296	25.2	101.4
7	35.0	856.620	0.39	2.31	78	78	3	295	45.6	101.8
8	40.0	860.720	0.43	2.55	78	78	3	296	53.2	101.8
9	45.0	864.770	0.42	2.49	79	79	7	295	58.3	101.5
10	50.0	868.920	0.44	2.61	80	80	7	295	62.5	101.4
11	55.0	873.070	0.44	2.61	79	79	8	295	66.1	101.6
12	60.0	877.270	0.45	2.67	80	80	8	296	69.4	101.6
Average:			0.275	1.628	74.6	74.6	5.3	292.8		101.9

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

Date: 9-May-18
Run: 2 - Particulate / Metals
Run Time: 09:20 - 11:22

Concentrations:

Particulate	0.05 mg/dscm	0.00002 gr/dscf
	0.03 mg/Acm	0.00001 gr/Acf
	0.05 mg/dscm (@ 11% O2)	0.00002 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.003 Kg/hr	0.007 lb/hr
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Flue Gas Characteristics:

Flow	958 dscm/min	33830 dscf/min
	15.97 dscm/sec	564 dscf/sec
	1720 Acn/min	60757 Acf/min

Velocity	11.258 m/sec	36.93 f/sec
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Temperature	144.6 oC	292.3 oF
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Moisture	16.6 %
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Gas Analysis	10.0 % O2
	10.3 % CO2

30.040 Mol. Wt (g/gmole) Dry
28.042 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	1.8481 dscm	65.265 dscf
Sample Time	120.0 minutes	
Isokineticity	101.1 %	

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

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

Date: 9-May-18
Run: 2 - Particulate / Metals
Run Time: 09:20 - 11:22

Control Unit (Y) 1.0049
 Nozzle Diameter (in.) 0.2828
 Pitot Factor 0.8565
 Baro. Press. (in. Hg) 29.90
 Static Press. (in. H2O) -19.50
 Stack Height (ft) 30
 Stack Diameter (in.) 70.90
 Stack Area (sq.ft.) 27.417
 Minutes Per Reading 5.0
 Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00005
Total (grams) 0.00010

Gas Analysis (Vol. %):
 CO2 O2
 Traverse 1 10.50 10.00
 Traverse 2 10.00 10.00
10.25 10.00

Condensate Collection:
 Impinger 1 140.0
 Impinger 2 88.0
 Impinger 3 20.0
 Impinger 4 12.0
 Impinger 5 3.0
 Impinger 6 2.0
 Gel 11.0
Gain (grams) 276.0

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	877.800								
1	5.0	880.370	0.23	1.00	80	80	3	293	1.5	101.9
2	10.0	882.760	0.20	0.87	81	81	3	293	4.7	101.4
3	15.0	885.150	0.20	0.87	81	81	3	293	8.4	101.4
4	20.0	887.540	0.20	0.87	82	82	3	293	12.5	101.2
5	25.0	889.750	0.17	0.74	80	80	3	294	17.7	101.9
6	30.0	891.940	0.17	0.74	81	81	3	294	25.2	100.8
7	35.0	895.190	0.37	1.61	81	81	4	294	45.6	101.6
8	40.0	898.660	0.42	1.82	82	82	4	293	53.2	101.7
9	45.0	902.280	0.46	2.00	82	82	4	294	58.3	101.4
10	50.0	905.820	0.44	1.91	83	83	4	295	62.5	101.3
11	55.0	909.440	0.46	2.00	83	83	5	295	66.1	101.3
12	60.0	913.040	0.46	2.00	84	84	5	296	69.4	100.6
Traverse 2	0.0	913.040								
1	5.0	916.450	0.40	1.74	83	83	6	293	1.5	102.2
2	10.0	919.830	0.40	1.74	84	84	6	294	4.7	101.1
3	15.0	922.940	0.34	1.48	84	84	6	295	8.4	100.9
4	20.0	926.160	0.36	1.56	85	85	6	295	12.5	101.4
5	25.0	929.370	0.36	1.56	85	85	5	296	17.7	101.1
6	30.0	932.660	0.38	1.65	85	85	5	294	25.2	100.8
7	35.0	935.050	0.20	0.87	84	84	5	290	45.6	100.7
8	40.0	937.190	0.16	0.69	85	85	5	289	53.2	100.5
9	45.0	939.040	0.12	0.52	85	85	5	288	58.3	100.2
10	50.0	940.890	0.12	0.52	84	84	5	286	62.5	100.2
11	55.0	942.750	0.12	0.52	84	84	3	284	66.1	100.6
12	60.0	944.440	0.10	0.43	85	85	3	284	69.4	100.0
Average:			0.285	1.238	83.0	83.0	4.3	292.3		101.1

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

Date: 9-May-18
Run: 3 - Particulate / Metals
Run Time: 14:35 - 16:37

Concentrations:

Particulate	0.05 mg/dscm	0.00002 gr/dscf
	0.03 mg/Acm	0.00001 gr/Acf
	0.05 mg/dscm (@ 11% O2)	0.00002 gr/dscf (@ 11% O2)

Emission Rates:

Particulate	0.003 Kg/hr	0.007 lb/hr
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Flue Gas Characteristics:

Flow	962 dscm/min	33964 dscf/min
	16.03 dscm/sec	566 dscf/sec
	1699 Acm/min	59997 Acf/min

Velocity	11.117 m/sec	36.47 f/sec
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Temperature	143.5 oC	290.3 oF
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Moisture	15.7 %
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Gas Analysis	10.3 % O2
	10.3 % CO2

30.050 Mol. Wt (g/gmole) Dry
28.155 Mol. Wt (g/gmole) Wet

Sample Parameters:

Sample Volume	1.9491 dscm	68.832 dscf
Sample Time	120.0 minutes	
Isokineticity	103.6 %	

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

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

Date: 9-May-18
 Run: 3 - Particulate / Metals
 Run Time: 14:35 - 16:37

Control Unit (Y) 1.0049
 Nozzle Diameter (in.) 0.2862
 Pitot Factor 0.8520
 Baro. Press. (in. Hg) 30.00
 Static Press. (in. H2O) -19.50
 Stack Height (ft) 30
 Stack Diameter (in.) 70.90
 Stack Area (sq.ft.) 27.417
 Minutes Per Reading 5.0
 Minutes Per Point 5.0

Collection:
 Filter (grams) 0.00005
 Washings (grams) 0.00005
Total (grams) 0.00010

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

Condensate Collection:
 Impinger 1 172.0
 Impinger 2 64.0
 Impinger 3 8.0
 Impinger 4 14.0
 Impinger 5 2.0
 Impinger 6 1.0
 Gel 12.0
Gain (grams) 273.0

10.25 10.25

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	944.989								
1	5.0	948.490	0.39	1.84	84	84	9	296	1.5	103.6
2	10.0	951.870	0.36	1.71	85	85	9	289	4.7	103.4
3	15.0	955.130	0.34	1.62	85	85	9	288	8.4	102.5
4	20.0	958.610	0.38	1.80	83	83	9	288	12.5	103.9
5	25.0	961.890	0.34	1.62	84	84	12	289	17.7	103.4
6	30.0	965.100	0.32	1.52	84	84	12	290	25.2	104.4
7	35.0	967.940	0.25	1.19	84	84	12	288	45.6	104.2
8	40.0	970.470	0.20	0.96	85	85	12	286	53.2	103.4
9	45.0	972.850	0.18	0.86	85	85	9	286	58.3	102.5
10	50.0	975.040	0.15	0.71	85	85	9	291	62.5	103.7
11	55.0	977.090	0.13	0.62	86	86	9	290	66.1	103.9
12	60.0	979.120	0.13	0.62	87	87	9	291	69.4	102.8
Traverse 2	0.0	979.120								
1	5.0	981.510	0.18	0.86	85	85	9	290	1.5	103.2
2	10.0	983.760	0.16	0.76	85	85	9	290	4.7	103.1
3	15.0	986.030	0.16	0.76	85	85	9	291	8.4	104.0
4	20.0	988.510	0.20	0.95	87	87	9	293	12.5	101.5
5	25.0	991.170	0.21	1.00	88	88	9	295	17.7	106.2
6	30.0	993.780	0.21	1.00	89	89	9	293	25.2	103.9
7	35.0	997.150	0.36	1.71	86	86	9	293	45.6	103.2
8	40.0	1000.650	0.38	1.81	87	87	13	292	53.2	104.1
9	45.0	1004.220	0.40	1.88	86	86	13	292	58.3	104.3
10	50.0	1007.920	0.42	2.00	87	87	13	291	62.5	104.6
11	55.0	1011.580	0.42	2.01	86	86	13	285	66.1	103.3
12	60.0	1015.350	0.44	2.10	86	86	13	290	69.4	104.3
Average:			0.279	1.330	85.6	85.6	10.3	290.3		103.6

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

Sample Type: HF				
Parameter		Test 1	Test 2	Test 3
Test Date		10-May-18	10-May-18	10-May-18
Test Time		09:07-10:07	10:16-11:16	11:29-12:29
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.06	30.06	30.06
DGM Factor	(Y)	1.0170	1.0170	1.0170
Initial Reading	(Cubic Feet)	181.716	182.337	183.028
Final Reading	(Cubic Feet)	182.331	183.020	183.670
Temp. Outlet	(Avg. oF)	70.8	75.7	76.5
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.63	0.69	0.65
HF	(mg)	0.010	0.002	0.002
Oxygen	(Vol. %)	9.8	9.8	9.8
HF	(mg/Sm ³)	0.016	0.003	0.004
HF	(mg/Sm ³ @ 11% O2)	0.014	0.003	0.003
Moisture	(Vol. %)	14.0	14.0	14.0
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		11-May-18	11-May-18	11-May-18
Test Time		10:08-11:08	11:42-12:42	12:54-13:54
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	30.17	30.17	30.17
DGM Factor	(Y)	1.0170	1.0170	1.0170
Initial Reading	(Cubic Feet)	183.680	184.311	184.884
Final Reading	(Cubic Feet)	184.297	184.877	185.458
Temp. Outlet	(Avg. oF)	66.5	72.7	78.5
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.63562	0.57601	0.57806
HF	(mg)	0.019	0.009	0.009
Oxygen	(Vol. %)	9.0	9.0	9.0
HF	(mg/Sm³)	0.030	0.016	0.016
HF	(mg/Sm³ @ 11% O2)	0.025	0.013	0.014
Moisture (isokinetic)	(Vol. %)	16.4	17.5	17.5
*Wet Basis Calculated on moisture from isokinetic tests				
	Tstd. (oF)	68	Pstd. (in. Hg)	29.92

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

Sample Type:	HF			
Parameter		Test 1	Test 2	Test 3
Test Date		9-May-18	9-May-18	9-May-18
Test Time		10:10-11:10	11:32-12:32	12:48-13:48
Test Duration	(min.)	60	60	60
Baro. Press.	(in. Hg)	29.90	29.90	29.90
DGM Factor	(Y)	1.0170	1.0170	1.0170
Initial Reading	(Cubic Feet)	180.001	180.501	181.203
Final Reading	(Cubic Feet)	180.492	181.198	181.701
Temp. Outlet	(Avg. oF)	73.1	79.8	82.3
Orifice Press.	(ΔH in.H2O)	0.50	0.50	0.50
Gas Volume	(Sm ³)	0.49474	0.69363	0.49338
HF	(mg)	0.010	0.008	0.037
Oxygen	(Vol. %)	10.0	10.0	10.0
HF	(mg/Sm³)	0.020	0.011	0.074
HF	(mg/Sm³ @ 11% O2)	0.018	0.010	0.067
Moisture (isokinetic)	(Vol. %)	15.8	15.8	16.6

*Wet Basis Calculated on moisture from isokinetic tests

Tstd. (oF) 68

Pstd. (in. Hg)

29.92

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

Parameter: N₂O

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

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	8-May-18	09:45-10:45	5.80	10.62	10.2
Unit 1 Run 2	8-May-18	10:48-11:48	5.00	9.15	8.8
Unit 1 Run 3	8-May-18	12:00-13:00	6.20	11.35	10.9
Average					9.9
Unit 2 Run 1	11-May-18	09:36-10:36	3.60	6.59	6.1
Unit 2 Run 2	11-May-18	10:42-11:42	6.30	11.53	10.7
Unit 2 Run 3	11-May-18	11:46-12:46	3.80	6.95	6.4
Average					7.7
Unit 3 Run 1	8-May-18	09:40-10:40	2.00	3.66	3.1
Unit 3 Run 2	11-May-18	09:02-10:02	7.50	13.73	11.8
Unit 3 Run 3	8-May-18	10:50-11:50	6.80	12.45	10.7
Average					8.5

Date:

10-May-18

11-May-18

9-May-18

Test Times:

	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Acetylene	09:07-10:07	10:16-11:16	11:29-12:29	10:08-11:08	11:42-12:42	12:54-13:54	10:10-11:10	11:32-12:32	12:48-13:48
Methane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethane	1.50	ND	ND	ND	ND	ND	ND	2.00	ND
Ethene	ND	ND	ND	ND	ND	ND	ND	0.38	ND
C3 as Propane	ND	ND	ND	ND	ND	ND	ND	0.38	ND
C4 as n-Butane	ND	ND	ND	ND	ND	ND	ND	ND	ND
C5 as n-Pentane	ND	ND	ND	ND	ND	ND	ND	ND	ND
C6 as n-Hexane	ND	ND	ND	ND	ND	ND	ND	ND	ND
C6+ as n-Hexane	ND	ND	ND	ND	ND	ND	ND	ND	ND

Detection Limits:

Acetylene	0.37	0.38	0.37	0.77	0.45	0.39	0.36	0.38	0.39
Methane	1.5	1.5	1.5	3.1	1.8	1.6	1.5	1.7	1.5
Ethane	0.37	0.38	0.37	0.77	0.45	0.39	0.36	0.43	0.39
Ethene	0.37	0.38	0.37	0.77	0.45	0.39	0.38	0.43	0.39
C3 as Propane	0.73	0.75	0.73	1.5	0.89	0.78	0.73	0.77	0.77
C4 as n-Butane	0.73	0.75	0.73	1.5	0.89	0.78	0.73	0.77	0.77
C5 as n-Pentane	0.73	0.75	0.73	1.5	0.89	0.78	0.73	0.77	0.77
C6 as n-Hexane	0.73	0.75	0.73	1.5	0.89	0.78	0.73	0.77	0.77
C6+	1.5	1.5	1.5	3.1	1.8	1.6	1.5	1.5	1.5

Using 1/2 DL Convention

Date:

10-May-18

11-May-18

9-May-18

Test Times:

	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Acetylene (ppm)	09:07-10:07	10:16-11:16	11:29-12:29	10:08-11:08	11:42-12:42	12:54-13:54	10:10-11:10	11:32-12:32	12:48-13:48
Methane (ppm)	0.19	0.19	0.19	0.39	0.23	0.20	0.18	0.19	0.20
Ethane (ppm)	1.50	0.75	0.75	1.55	0.90	0.80	0.75	2.00	0.75
Ethene (ppm)	0.19	0.19	0.19	0.39	0.23	0.20	0.18	0.38	0.20
C3 as Propane (ppm)	0.19	0.19	0.19	0.39	0.23	0.20	0.19	0.38	0.20
C4 as n-Butane (ppm)	0.37	0.38	0.37	0.75	0.45	0.39	0.37	0.39	0.39
C5 as n-Pentane (ppm)	0.37	0.38	0.37	0.75	0.45	0.39	0.37	0.39	0.39
C6 as n-Hexane (ppm)	0.37	0.38	0.37	0.75	0.45	0.39	0.37	0.39	0.39
C6+ as n-Hexane (ppm)	0.75	0.75	0.75	1.55	0.90	0.80	0.75	0.75	0.75

Acetylene (mg/m³ as CH₄)

Methane (mg/m ³ as CH ₄)	0.12	0.13	0.12	0.26	0.15	0.13	0.12	0.13	0.13
Ethane (mg/m ³ as CH ₄)	1.00	0.50	0.50	1.03	0.60	0.53	0.50	1.33	0.50
Ethene (mg/m ³ as CH ₄)	0.12	0.13	0.12	0.26	0.15	0.13	0.12	0.25	0.13
C3 as Propane (mg/m ³ as CH ₄)	0.12	0.13	0.12	0.26	0.15	0.13	0.13	0.25	0.13
C4 as n-Butane (mg/m ³ as CH ₄)	0.24	0.25	0.24	0.50	0.30	0.26	0.24	0.26	0.26
C5 as n-Pentane (mg/m ³ as CH ₄)	0.24	0.25	0.24	0.50	0.30	0.26	0.24	0.26	0.26
C6 as n-Hexane (mg/m ³ as CH ₄)	0.24	0.25	0.24	0.50	0.30	0.26	0.24	0.26	0.26
C6+ as n-Hexane (mg/m ³ as CH ₄)	0.50	0.50	0.50	1.03	0.60	0.53	0.50	0.50	0.50

Total mg/Sm³ @11% O₂ as CH₄

	2.11	1.83	1.77	3.56	2.28	2.05	1.55	2.57	1.74
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APPENDIX - D

FIELD DATA SHEETS

SH

A. Lanfranco and Associates Inc.

6.5 4.75 AH

CLIENT	M.V.V.R.D		NOZZLE MW	307	DIAMETER, IN.	3067	IMPINGER	INITIAL	FINAL	TOTAL GAIN			
SOURCE	Unit #1		PROBE	7C	Cp	8520	VOLUMES	(mL)	(mL)	(mL)			
PARAMETER / RUN No	1 Partic / Metals		PORT LENGTH										
DATE	May. 8/18		STATIC PRESSURE, IN. H2O										
OPERATOR:	C.L. & J.G.		30.94"										
CONTROL UNIT	FF18		STACK DIAMETER										
	Y 1.0097		STACK HEIGHT										
	ΔH@												
BAROMETRIC PRESSURE, IN. Hg	30.50		INITIAL LEAK TEST										
ASSUMED MOISTURE, Bw	15.3		FINAL LEAK TEST										
			0.001 e 15"										
			0.001 e 15"										
			Downstream Diameters										
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	CO ₂ Vol. %	O ₂ Vol. %	
1	11:00	56.700	.15	1.9	25	288	250	250	60	3	10.5	10.0	
2		59.78	.15	1.9	25	288	250	250	60	3			
3		62.89	.15	1.9	25	288	250	250	62	3			
4		65.94	.15	1.9	25	288	250	250	60	3			
5		69.03	.15	1.94	25	289	250	250	60	3			
6		72.22	.15	1.24	25	290	250	250	60	3			
7		75.37	.15	1.24	25	290	250	250	58	3	10.5	9.5	
8		78.51	.15	1.33	25	290	250	250	58	3			
9		81.64	.15	1.33	25	290	250	250	58	3			
10		84.79	.15	1.47	25	290	250	250	60	3			
11		87.94	.15	1.47	25	290	250	250	60	3			
12		91.09	.15	1.61	25	293	250	250	60	3			
1		101.94	.15	2.61	25	293	250	250	60	3			
2		105.93	.17	2.00	30	295	250	250	58	3			
3		109.92	.17	2.00	30	296	250	250	58	3	10.5	10.0	
4		113.81	.17	1.90	30	296	250	250	58	3			
5		117.94	.17	1.74	30	296	250	250	56	4			
6		122.17	.17	2.23	30	298	250	250	56	4			
7		126.39	.17	2.23	30	298	250	250	55	4			
8		130.64	.17	2.23	30	298	250	250	55	4	10.0	10.0	
9		134.74	.17	2.14	30	298	250	250	57	4			
10		138.85	.17	2.00	30	298	250	250	57	4			
11		142.64	.17	1.90	30	297	250	250	57	4			
12	13:03	146.41	.38	1.81	30	297	250	250	57	3	10.0	10.0	
		150.20	.38	1.81	30	298	250	250	57	3			
				</									

METRO VANCOUVER WTE - BURNABY B.C.									
NOZZLE 286		DIAMETER, IN. 1.25		IMPINGER, INITIAL (mL)		FINAL (mL)		TOTAL GAIN (mL)	
PROBE 7C		Cp 0.520		Imp. #1		Imp. #2		Imp. #3	
PORT LENGTH		STATIC PRESSURE, IN. H ₂ O 19.75		Imp. #4		Imp. #5		Imp. #6	
STACK DIAMETER		STACK HEIGHT		Imp. #7		Imp. #8			
INITIAL LEAK TEST 00020215		FINAL LEAK TEST 00020215							
1	0101	150.50	2.6	1.04	200	255	250	51	
2	10	153.75	2.6	1.05	200	255	250	51	
3	20	153.80	2.6	1.13	200	255	250	51	
4	30	161.60	2.6	1.13	200	255	250	51	
5	40	164.37	2.6	1.01	200	255	250	51	
6	50	161.29	2.6	1.17	200	255	250	51	
7	60	170.05	2.6	1.07	200	255	250	51	
8	70	174.60	2.6	1.05	200	255	250	51	
9	80	172.47	2.6	1.05	200	255	250	51	
10	90	182.11	2.6	1.07	200	255	250	51	
11	100	185.55	2.6	1.03	200	255	250	51	
12	110	186.00	2.6	1.03	200	255	250	51	
1	120	197.35	2.6	1.55	200	255	250	51	
2	130	196.00	2.6	1.02	200	255	250	51	
3	140	199.00	2.6	1.06	200	255	250	51	
4	150	203.00	2.6	1.11	200	255	250	51	
5	160	207.23	2.6	1.11	200	255	250	51	
6	170	211.20	2.6	1.11	200	255	250	51	
7	180	215.61	2.6	1.11	200	255	250	51	
8	190	219.70	2.6	1.11	200	255	250	51	
9	200	224.15	2.6	1.11	200	255	250	51	
10	210	228.60	2.6	1.11	200	255	250	51	
11	220	232.60	2.6	1.11	200	255	250	51	
12	230	237.00	2.6	1.11	200	255	250	51	

$\sqrt{6.17} \quad 5.10 \Delta H$

CLIENT	M.V.R.D	NOZZLE	MV 307	DIAMETER, IN.	3067	IMPINGER	INITIAL	FINAL	TOTAL GAIN			
SOURCE	Unit #1	PROBE	FC	Cp	8520	VOLUMES	(mL)	(mL)	(mL)			
PARAMETER / RUN NO	Run 3 Metals / Partic	PORT LENGTH				Imp. #1	0	216	216			
DATE	May. 11/18	STATIC PRESSURE, IN. H2O	-19.50			Imp. #2	100	162	92			
OPERATOR:	C.L. + L.A	STACK DIAMETER	30.90"			Imp. #3	100	127	92			
CONTROL UNIT	CAE ALI	STACK HEIGHT	30'			Imp. #4	0	11	1			
	$\Delta H @$					Imp. #5	100	102	1			
						Imp. #6	100	101	1			
BAROMETRIC PRESSURE, IN. Hg	30.20	INITIAL LEAK TEST	0.002 @ 15"			Upstream Diameters						
ASSUMED MOISTURE, Bw	15%	FINAL LEAK TEST	0.002 @ 15"			Downstream Diameters						
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Temperature °F	Box	Impinger Exit	Pump Vac. IN. Hg	Fyrites CO ₂ Vol. %	O ₂ Vol. %
1	10:41	690.551	1.27	1.38	65	294	250	250	54	3	10.5	9.5
2		692.96	1.27	1.38	66	294	250	250	54	3		
3		696.97	1.27	1.38	66	294	250	250	56	3		
4		700.06	1.27	1.38	66	294	250	250	56	3		
5		703.17	1.27	1.38	67	293	250	250	55	3	10.0	10.0
6		706.45	1.27	1.38	67	293	250	250	55	6		
7		709.45	1.27	1.38	69	293	250	250	55	6		
8		713.59	1.27	1.38	69	293	250	250	56	6	10.5	9.5
9		718.96	1.27	1.38	70	293	250	250	56	6		
10		723.11	1.27	1.38	70	293	250	250	58	6		
11		726.67	1.27	1.38	72	293	250	250	58			
12		730.76	1.27	1.38	73	294	250	250	59	5		
1		737.80	1.27	1.38	74	294	250	250	59	5		
2		740.82	1.27	1.38	75	294	250	250	60	5	10.5	9.5
3		744.82	1.27	1.38	76	293	250	250	60	5		
4		747.80	1.27	1.38	77	293	250	250	56	5		
5		751.28	1.27	1.38	77	293	250	250	56	5		
6		754.69	1.27	1.38	78	293	250	250	56	5	10.5	9.5
7		758.60	1.27	1.38	77	293	250	250	56	5		
8		762.28	1.27	1.38	77	293	250	250	56	5		
9		766.27	1.27	1.38	77	293	250	250	56	5		
10		770.02	1.27	1.38	78	293	250	250	55	5		
11		773.67	1.27	1.38	78	293	250	250	55	5	10.5	9.0
12		777.22	1.27	1.38	77	293	250	250	55	5		
	12:43											

$$\sqrt{6.24} \quad 5.93 \Delta H$$

CLIENT	M.V.R.O		NOZZLE	DIAMETER, IN.	IMPINGER, INITIAL	FINAL	TOTAL GAIN
SOURCE	UNIT #2		PROBE	Cp	VOLUMES	(mL)	(mL)
PARAMETER / RUN No	1 Metals / Partic						
DATE	May. 10 / 10						
OPERATOR:	C.L. + S.B						
CONTROL UNIT	JU 14						
	Y 1.0049						
	ΔH@						
BAROMETRIC PRESSURE, IN. Hg	29.95						
ASSUMED MOISTURE, Bw	15.2						

METRO VANCOUVER WTE - BURNABY B.C.									
NOZZLE		DIAMETER, IN.		IMPINGER		INITIAL		FINAL	
PROBE		Cp		VOLUMES		(mL)		(mL)	
PORT LENGTH		STATIC PRESSURE, IN. H ₂ O		IMP. #1		IMP. #2		IMP. #3	
STACK DIAMETER		STACK HEIGHT		IMP. #4		IMP. #5		IMP. #6	
INITIAL LEAK TEST		FINAL LEAK TEST		IMP. #7		IMP. #8		TOTAL GAIN	
SOURCE <u>Van. #1</u>		DATE <u>May 17, 2013</u>		NOZZLE <u>G-203</u>		DIAMETER, IN. <u>2.03</u>		IMPINGER <u>5565</u>	
PARAMETER / RUN No		Y <u>1.00</u>		PROBE <u>1A 5565</u>		Cp <u>5565</u>		IMP. #1 <u>0</u>	
OPERATOR <u>WJ</u>		Y <u>1.00</u>		PORT LENGTH		STATIC PRESSURE, IN. H ₂ O <u>20.0</u>		IMP. #2 <u>100</u>	
CONTROL UNIT <u>1014</u>		Y <u>1.00</u>		STACK DIAMETER <u>71.9</u>		STACK HEIGHT		IMP. #3 <u>100</u>	
BAROMETRIC PRESSURE, IN. Hg <u>30.23</u>		Y <u>1.00</u>		INITIAL LEAK TEST <u>0003015</u>		FINAL LEAK TEST <u>0003015</u>		IMP. #4 <u>0</u>	
ASSUMED MOISTURE, Bw <u>15</u>		Y <u>1.00</u>		IMP. #5 <u>100</u>		IMP. #6 <u>100</u>		IMP. #7 <u>100</u>	
IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>	
IMP. #4 <u>0</u>		IMP. #5 <u>100</u>		IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>		TOTAL GAIN <u>188</u>	
IMP. #1 <u>0</u>		IMP. #2 <u>100</u>		IMP. #3 <u>100</u>		IMP. #4 <u>0</u>		IMP. #5 <u>100</u>	
IMP. #6 <u>100</u>		IMP. #7 <u>100</u>		IMP. #8 <u>100</u>		TOTAL GAIN <u>188</u>			

S.H.

A. Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.												
SOURCE <u>Unit 2</u>		NOZZLE <u>1280</u>		DIAMETER, IN. <u>2802</u>		IMPINGER, INITIAL (mL)		TOTAL GAIN (mL)				
PARAMETER / RUN No. <u>1280</u>		PROBE <u>AL-73</u>		Cp <u>8489</u>		Imp. #1		164				
DATE <u>May 2018</u>		PORT LENGTH				Imp. #2		164				
OPERATOR: <u>WJ</u>		STATIC PRESSURE, IN. H ₂ O <u>-20.0</u>				Imp. #3		164				
CONTROL UNIT <u>2018</u>		STACK DIAMETER <u>70.9</u>				Imp. #4		12				
Y <u>10000</u>		STACK HEIGHT				Imp. #5		100				
ΔH@ <u>2018</u>		INITIAL LEAK TEST <u>0002-0.5</u>				Imp. #6		100				
BAROMETRIC PRESSURE, IN. Hg <u>30.23</u>		FINAL LEAK TEST <u>2018-0.5</u>				Imp. #7		100				
ASSUMED MOISTURE, Bw <u>15.1</u>						Imp. #8						
Point	Clock Time	Dry Gas Meter ft ³	Pitot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac IN Hg	Fyrites CO ₂ Vol. %	O ₂ Vol. %
1	12:15	184.559	1.15	1.07	10	193	157	255	50			
2	10	187.72	1.13	1.06	10	193	155	255	50	3.5	11	9
3		188.75	1.13	1.06	10	193	155	255	50			
4	20	191.20	1.14	1.07	10	193	156	254	56			
5		191.45	1.14	1.07	10	193	156	254	56			
6	30	200.15	1.14	1.07	10	193	156	254	56			
7		203.60	1.14	1.07	10	193	156	254	56			
8	40	207.34	1.14	1.07	10	193	156	254	56			
9		211.07	1.14	1.07	10	193	156	254	56			
10	50	214.80	1.14	1.07	10	193	156	254	56	5.5		
11		218.63	1.14	1.07	10	193	156	254	56			
12	60	222.06	1.14	1.07	10	193	156	254	56			
1		225.41	1.14	1.07	10	193	156	254	56			
2	10	228.92	1.14	1.07	10	193	156	254	56	5	11	9.5
3		232.43	1.14	1.07	10	193	156	254	56			
4	20	235.94	1.14	1.07	10	193	156	254	56			
5		239.45	1.14	1.07	10	193	156	254	56			
6	30	242.96	1.14	1.07	10	193	156	254	56			
7		246.47	1.14	1.07	10	193	156	254	56			
8	40	249.98	1.14	1.07	10	193	156	254	56			
9		253.49	1.14	1.07	10	193	156	254	56			
10	50	257.00	1.14	1.07	10	193	156	254	56	14		
11		260.51	1.14	1.07	10	193	156	254	56			
12	14:18	264.02	1.14	1.07	10	193	156	254	56			

$$\begin{array}{r} 16.15 \\ - 6.24 \\ \hline 9.91 \end{array}$$
[illegible]

5.34 4.34 ΔH

CLIENT	M.V.R.O		NOZZLE	DIAMETER, IN.		IMPINGER	INITIAL	FINAL	TOTAL GAIN			
SOURCE	Unit #3		PROBE	TAL-GARD		VOLUMES	(mL)	(mL)	(mL)			
PARAMETER / RUN NO			PORT LENGTH			Imp. #1						
DATE	May 28 / 18		STATIC PRESSURE, IN. H ₂ O	-11.50		Imp. #2						
OPERATOR	CL & J.G & S.B		STACK DIAMETER	70.9"		Imp. #3						
CONTROL UNIT	32 14		STACK HEIGHT	30'		Imp. #4						
	ΔH@					Imp. #5						
	2190		INITIAL LEAK TEST	0.001 e 15"		Imp. #6						
	153		FINAL LEAK TEST	0.001 e 15"		Upstream Diameters						
			Downstream Diameters									
Point	Clock Time	Dry Gas Meter ft ³	Pilot ΔP IN. H ₂ O	Orifice ΔH IN. H ₂ O	Dry Gas Outlet	Stack	Probe	Box	Impinger Exit	Pump Vac. IN. Hg	CO ₂ Vol. %	O ₂ Vol. %
1	12:18	877.800	.13	1.00	80	213	250	250	62	3	10.5	10.0
2		880.37	.20	0.87	81	213	250	250	64	3		
3		882.76	.20	0.87	81	213	250	250	64	3		
4		885.15	.20	0.87	81	213	250	250	66	3		
5		887.54	.17	0.74	80	214	250	250	66	3		
6		889.94	.17	0.74	81	214	250	250	66	3		
7		891.94	.17	0.74	81	214	250	250	66	3		
8		893.94	.17	0.74	81	214	250	250	66	3		
9		895.94	.17	0.74	81	214	250	250	66	3		
10		897.94	.17	0.74	81	214	250	250	66	3		
11		899.94	.17	0.74	81	214	250	250	66	3		
12		901.94	.17	0.74	81	214	250	250	66	3		
1		916.45	.40	1.74	83	213	250	250	64	6		
2		919.82	.40	1.74	84	214	250	250	64	6		
3		922.94	.34	1.48	84	215	250	250	64	6	10.0	10.0
4		926.16	.36	1.26	85	216	250	250	62	5		
5		929.37	.38	1.06	85	216	250	250	62	5		
6		932.66	.29	0.87	85	216	250	250	62	5	10.0	10.0
7		935.94	.29	0.87	85	216	250	250	62	5		
8		939.16	.16	0.69	85	216	250	250	62	5		
9		942.37	.12	0.52	85	216	250	250	60	5		
10		945.54	.12	0.52	85	216	250	250	60	5		
11		948.76	.12	0.52	85	216	250	250	60	5		
12	14:20	951.94	.10	0.43	85	216	250	250	60	3	10.0	10.0

J.H.

A. Lanfranco and Associates Inc.

METRO VANCOUVER WTE - BURNABY B.C.												
SOURCE Unit #3		NOZZLE 286		DIAMETER, IN. 286		IMPINGER VOLUMES		TOTAL GAIN				
PARAMETER / RUN No		PROBE 7C		Cp 8520		INITIAL (mL)		FINAL (mL)				
DATE May 1, 2018		PORT LENGTH				Imp. #1		Imp. #2				
OPERATOR: Nat		STATIC PRESSURE, IN. H2O -19.30				Imp. #3		Imp. #4				
CONTROL UNIT		STACK DIAMETER 70.9				Imp. #5		Imp. #6				
		STACK HEIGHT				Imp. #7		Imp. #8				
BAROMETRIC PRESSURE, IN. Hg 30.00		INITIAL LEAK TEST 005-015										
ASSUMED MOISTURE, Bw 151		FINAL LEAK TEST 002-015										
105/105												
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	CO ₂ Vol. %	O ₂ Vol. %
1	1435	044.089	1.3	1.84	0.4	246	245	244	55			
2	10	042.40	1.3	1.71	0.5	245	245	244	55			
3	20	051.01	1.3	1.61	0.5	245	254	257	55			
4	30	055.13	1.3	1.61	0.5	245	252	252	53			
5	40	058.01	1.3	1.52	0.5	245	250	250	53			
6	50	061.01	1.3	1.52	0.5	245	250	250	53			
7	60	067.04	1.3	1.52	0.5	245	250	250	53			
8	70	072.04	1.3	1.52	0.5	245	250	250	53			
9	80	077.04	1.3	1.52	0.5	245	250	250	53			
10	90	082.04	1.3	1.52	0.5	245	250	250	53			
11	100	087.04	1.3	1.52	0.5	245	250	250	53			
12	110	092.04	1.3	1.52	0.5	245	250	250	53			
1	1235	091.51	1.3	1.84	0.4	245	245	245	53			
2	10	093.70	1.3	1.71	0.5	245	245	245	53			
3	20	096.03	1.3	1.61	0.5	245	245	245	53			
4	30	098.51	1.3	1.52	0.5	245	245	245	53			
5	40	101.17	1.3	1.52	0.5	245	245	245	53			
6	50	103.70	1.3	1.52	0.5	245	245	245	53			
7	60	106.15	1.3	1.52	0.5	245	245	245	53			
8	70	108.62	1.3	1.52	0.5	245	245	245	53			
9	80	111.15	1.3	1.52	0.5	245	245	245	53			
10	90	113.62	1.3	1.52	0.5	245	245	245	53			
11	100	116.15	1.3	1.52	0.5	245	245	245	53			
12	1131	118.62	1.3	1.52	0.5	245	245	245	53			

Miko Van

Date _____

Phy

Phy

Operator

Colours

Source

Parameter

Date _____

LMU-A 61.070

CC

Phy

Operator

Colours

Source

Parameter

Date _____

Leak Check	Run 1	Run 2	Run 3
Initial	0002	0002	0002
Final	0002	0002	0002

Test No.	Time (hh:mm)	DGM Volume (cu ft) / (m ³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	10:08	183.6801	60					
	10:14							
	10:28							
	10:38	184.0258	66					
	10:48							
	10:58	184.2402	69					
	11:08	184.2474	71					
2	11:02	184.3110	64					
	11:02	184.3110	69.6					
	11:02							
	11:12	184.5660	72					
	11:22	184.6503	72					
	11:32							
pm	12:42	184.8770	77					
3	12:54	184.6840	74					
	1:04							
	1:14							
	1:24							
	1:34							
	1:44							
	1:54	185.1572	83					

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Client Metro VAN Y LMU-A (1.0170)
 Source Unit #3 Cp
 Parameter HF Pbar 29.9 Static
 Date 5-9-18 Operator Jimmy

Leak Check	Run 1	Run 2	Run 3
Initial	0002	0002	0002
Final	0002	0002	0002

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	10:10 ^{am}	180.0010	66					
	10:20 ^{am}	180.1761	69					
	10:30	180.1880	72					
	10:40	180.2199	74					
	10:50	180.3170	75					
	11:00	180.3850	77					
	11:10	180.4919	79					
2	11:32 ^{am}	180.5008	73					
	11:42							
	11:52							
	12:02	180.9240	80					
	12:12							
	12:22	181.1990	82					
3	12:32 ^{pm}	181.1977	84					
	12:48 ^{pm}	181.2028	80					
	12:58							
	1:08							
	1:14	181.5732	81					
	1:28							
	1:38	181.5400	83					
	1:48	181.7008	85					

Client Metro VAN Y LMU-A (1.0170)
 Source Unit #1 Cp
 Parameter HF Pbar 30.06 Static
 Date 5-10-18 Operator Jimmy

Leak Check	Run 1	Run 2	Run 3
Initial	0002	0002	0002
Final	0002	0002	0002

Test No.	Time (hhmm)	DGM Volume (cu ft) / (m³)	Temperature (°F)		Imp. Vol. (mL)	ΔP IN. H ₂ O		
			DGM Outlet	Stack		R1	R2	R3
1	9:07 ^{am}	181.7159	63					
	9:17	181.8540	66					
	9:27							
	9:37	182.1190	72					
	9:47	182.2188	74					
	9:57	182.2830	74					
	10:07	182.3513	76					
2	10:16	182.3371	73					
	10:26	182.3982	73					
	10:36	182.4850	74					
	10:46	182.5940	76					
	10:56	182.7260	77					
	11:06	182.8688	77					
	11:16	183.0200	80					
3	11:29 ^{pm}	183.0276	76					
	11:39							
	11:49	183.2757	76					
	11:59	183.3667	76					
	12:09							
	12:19							
	12:29	183.6702	78					

METRO VANCOUVER WTE - BURNABY BC

Source Unit #3Date 5-9-18

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)	29.9	29.9	29.9		
Canister Number	SC00927	SC02163	SC02036		
Controller Number	DA00818	DA00672	DA01738		
Gauge Number	AV60862	100	N/A		
Initial: Start Time	10:10 am	11:32	12:48 pm		
Flask Vac. (in. Hg)	-31.0	-29.0	-28.0		
Final: End Time	11:10 am	12:32 pm	1:48 pm		
Flask Vac. (in. Hg)	-7.0	-6	-7		

Source Unit #1Date 5-10-18

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)	30.06	30.06	30.06		
Canister Number	SC00310	SC02239	SC02234		
Controller Number	DA00705	DA01141	DA02170		
Gauge Number	AV604901	N/A	N/A		
Initial: Start Time	9:07 am	10:16 am	11:29 am		
Flask Vac. (in. Hg)	-29	-29	-25		
Final: End Time	10:07	11:16 am	12:29 pm		
Flask Vac. (in. Hg)	-6	-6	-5		

Source Unit #2Date 5-11-18

	Run 1	Run 2	Run 3	Run 4	Run 5
Pbar (in. Hg)	30.17	30.17	30.17		
Canister Number	SC01727	SC00142	SC00817		
Controller Number	DA01141	DA00672	DA00765		
Gauge Number	N/A	N/A	AV604901		
Initial: Start Time	10:08 am	11:42	12:54 pm		
Flask Vac. (in. Hg)	-29	-28.5	-29		
Final: End Time	11:08 am	12:42 pm	1:54 pm		
Flask Vac. (in. Hg)	-19	-9	-7		

Source _____

Date _____

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

APPENDIX – E

CALIBRATION SHEETS and

TECHNICIAN CERTIFICATES



CleanAir Engineering - Meter Box Full Test Calibration

Client: A.Lanfranco
ID No: N/A
Dept No: N/A
Meter Box Serial No: 0028-020118-1 (FE 18)
Manufacturer Part No: 0028

Reviewed By: R. Redel
Calibrated By: O. Lavrov
Date of Calibration: 02/01/18
Due Date of Calibration: 02/01/19

Calibration Signature: [Signature]
Meter Box Yd: 1.0097
Meter Box $\Delta H @$: 1.8308
Barometer Serial No: W12637
Barometric Pressure: 29.29 in. Hg

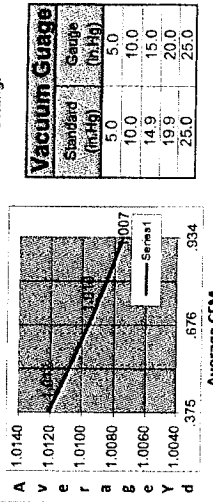
Q	ΔH	ΔP	Standard Meter Gas Volume (ft ³)			Meter Box Gas Volume (ft ³)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
			Initial	Final	Net	Initial	Final	Net	T _{in}	T _{out}	Avg.	T _{in}	T _{out}	Avg.			
0.375	0.50	-1.10	1.0000	5.000	5.000	231.708	236.757	5.049	72.5	72.5	72.50	88.0	84.0	86.00	12.93	Y _d	$\Delta H @$
0.375	0.50	-1.10	1.0000	5.000	5.000	236.757	241.798	5.041	72.5	72.5	72.50	88.0	84.0	86.00	12.93	1.0129	1.8982
0.676	1.50	-1.40	1.0000	10.000	10.000	202.122	212.269	10.147	72.0	72.0	72.00	93.0	84.0	88.50	14.37	1.0087	1.7551
0.676	1.50	-1.40	1.0000	10.000	10.000	212.269	222.407	10.138	72.0	72.0	72.00	93.0	85.0	89.00	14.36	1.0105	1.7494
0.935	3.00	-1.80	1.0000	10.000	10.000	167.327	177.432	10.105	72.0	72.0	72.00	93.0	82.0	87.50	10.39	1.0063	1.8418
0.935	3.00	-1.80	1.0000	11.000	11.000	177.432	188.561	11.129	72.0	72.0	72.00	95.0	84.0	89.50	11.45	1.0087	1.8418

Nomenclature		Equations		Pyrometer Calibration	
P _b	Barometric Pressure (in. Hg)			1 Stack	2 Probe
Q	Flow Rate (cfm)			3 Filter	4 Imp. Outlet
ΔH	Orifice Pressure Differential (in. H ₂ O)			50	50
ΔP	Inlet Pressure Differential (in. H ₂ O)			100	100
V _d	Gas Meter Volume - Dry (ft ³)			150	150
V _{as}	Standard Meter Volume - Dry (ft ³)			200	200
T _a	Average Meter Box Temperature (°F)			250	250
T _b	Outlet Meter Box Temperature (°F)			300	300
T _{ds}	Average Standard Meter Temperature (°F)			350	350
Y _d	Meter Correction Factor (unitless)			400	400
Y _{as}	Standard Meter Correction Factor (unitless)			450	450
$\Delta H @$	Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H ₂ O)			500	500
$\Delta H @ 5 \Delta H @_{avg} \pm 0.2$				550	550
ϕ	Duration of Run (minutes)			600	600

$$Y_d = (Y_{ds}) \left[\frac{V_{ds}}{V_d} \right] \left[\frac{T_d + 460}{T_a + 460} \right] \left[\frac{P_b + \Delta P / 13.6}{P_b + \Delta H / 13.6} \right]$$

$$\Delta H @ = \frac{(0.0319)(\Delta H) \left[\frac{(T_{ds} + 460)(\phi)^2}{(V_{ds})(Y_{ds})} \right]}{P_a(T_a + 460)}$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\phi)}$$



Calibration Reference Information (Pyrometer)

Reference Used: Omega CL23A
Calibrated By: JH Metrology
Calibration Report No: 1000195220
Serial No: R044791
Date Calibrated: 3/23/2017
Calibration Due Date: 3/23/2018

Calibration Reference Information (Standard Meter)

Reference Used: Wet Test Meter
Calibrated By: Marin Vaguero
Percent Error: 0.4375%
Serial No: 11AG9
Date Calibrated: 11/1/2017
Calibration Due Date: 11/1/2018

Meter Box Pre-Calibration Inspection

Positive Leak Check: Pass Electrical Check: Pass
Negative Leak Check: Pass Pyrometer Check: Pass
Vacuum Gauge Check: Pass YD Tolerance: ± 2% of 1 Pass

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

Pressure:	9-Jan-18	(in. Hg)
Critical Vacuum:	29.93	(in. Hg)
	14.12	(in. Hg)

Date: 9-Jan-18
Barometric Pressure: 29.93
Theoretical Critical Vacuum: 14.12

IMPORT
IMPORT
1197411

TEMPERATURE CALIBRATION			
Calibration Standard →	Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results 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%

Notes: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerances of individual values from the average is ± 0.02 . For Calibration Factor d(g), the orifice differential pressure in inches of H₂O that equates to 0.75 cfm of air at 60° F and 20.02 inches of Hg, acceptable tolerance of individual values from the average is ± 0.2 . For Temperature Division, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

Calibrated by: **Mat Harrington**

Date: January 9, 2018

A.Lanfranco & Associates inc.

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

Model #: CAE AL1
Serial #: 0028-070611-1

Date: 9-Jan-18
Barometric Pressure: 29.53 (in. Hg)
Theoretical Critical Vacuum: 13.93 (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, (ft³/s(deg R)(in Hg)(min)).

----- DRY GAS METER READINGS -----									
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temp. Inlet (deg F)	Initial Temp. Outlet (deg F)	Final Temp. Inlet (deg F)	Final Temp. Outlet (deg F)	Average (deg F)
3.50	11.00	772.000	783.316	11.316	61.0	61.0	62.0	62.0	61.5
1.85	13.00	784.000	793.856	9.856	62.0	62.0	63.0	63.0	62.5
1.08	15.00	794.100	802.937	8.837	64.0	64.0	65.0	65.0	64.5
0.63	15.00	803.500	810.169	6.669	65.0	65.0	66.0	66.0	65.5
0.32	15.00	810.400	814.964	4.564	66.0	66.0	67.0	67.0	66.5

----- CRITICAL ORIFICE READINGS -----									
Orifice Size (number)	K Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial Temp. (deg F)	Final Temp. (deg F)	Average Temp. (deg F)				
73	0.8185	15.7	68.0	71.0	69.5				
63	0.5956	18.4	68.0	71.0	69.5				
55	0.4606	20.2	68.0	70.0	69.0				
48	0.3500	23.0	71.0	73.0	72.0				
40	0.2408	25.0	73.0	74.0	73.5				

***** RESULTS *****										
-- DRY GAS METER --					-- ORIFICE --					
VOLUME CORRECTED Vini (cu ft)	VOLUME CORRECTED Vmi (cu ft)	VOLUME CORRECTED Vmi (cu ft)	VOLUME NOMINAL Vcr (cu ft)	VARIATION Y (number)	Value (in H2O)	Value (in H2O)	VARIATION (in H2O)	Value dh@ (mm H2O)	Value Kd (value)	
9.871	11.405	323.0	11.405	-0.003	1.013	1.834	46.58	0.052	0.709	
8.800	249.2	261.2	9.008	-0.008	1.009	1.777	45.12	-0.005	0.728	
8.621	187.5	193.6	8.992	0.016	1.033	1.726	43.84	-0.056	0.737	
4.519	128.0	130.8	4.730	0.005	1.022	1.862	42.87	-0.090	0.727	
						1.880	47.75	0.068	0.697	
Average Y----->				1.0164	Average dh@----->				1.782	45.3
									Average Kd----->	0.719

TEMPERATURE CALIBRATION				
Reference Temperature (deg F)	Temperature Device Reading (deg F)	Results Variation (deg F)	Percent of Absolute	Results
32	37	0	0.00%	0
100	100	0	0.00%	0
300	300	0	0.00%	0
500	500	0	0.00%	0
1000	1000	0	0.00%	0

Note: For Calibration Factor Y, the rate of the reading of the calibration meter is the dry gas meter, acceptable tolerance of individual values from the average is +0.01
For Orifice Calibration Factor K, the critical orifice coefficient is in ft³/s(deg R)(in Hg)(min) and 20.42 inches of Hg, acceptable tolerance of individual values from the average is +0.2
For Temperature Devices, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable

Calibrated by: Mat Harrington

Signature:

Date: January 9, 2018

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-18
Barometric Pressure: 29.88 (in. Hg)
Theoretical Critical Vacuum: 14.09 (in. Hg)

!!!!!!!
IMPORTANT
!!!!!!!

For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
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 (m ³)	Volume Final (m ³)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.00	16.00	170.3030	170.4445	4.997	69.8	69.8	77.0	77.0	40	0.2408	14.0	66.0	67.0	66.5
0.00	15.00	170.4460	170.5797	4.722	77.0	77.0	80.7	80.7	40	0.2408	14.0	67.1	69.2	68.2
0.00	15.00	170.5840	170.7187	4.757	81.2	81.2	83.6	83.6	40	0.2408	14.0	65.9	66.2	66.1

***** RESULTS *****										
--- DRY GAS METER ---					- DRY GAS METER --					
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Variation (in H2O)	dh@	
4.938	139.8	5.017	142.1	5.012	1.016	-0.001	0.000	0.000	Value	
4.618	130.8	4.696	133.0	4.706	1.017	0.000	0.000	0.000	Value	
4.623	130.9	4.706	133.3	4.696	1.018	0.001	0.000	0.000	Value	
Average Y----->					Average dh@----->					0.00
Average Y----->					Average dh@----->					0.0001

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

Signature: 

Calibrated by: Mat Harrington

Date: January 10, 2018

Pitot Tube Calibration

Date: 11-Jan-18
Pbar (in.Hg): 29.69

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

Pitot ID: 7A-1

Reference Pitot (in H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	Deviation (absolute)
0.110	0.150	22.0	0.8478	0.0052
0.160	0.220	26.6	0.8443	0.0017
0.260	0.370	33.9	0.8299	0.0127
0.510	0.700	47.5	0.8450	0.0025
0.635	0.870	53.0	0.8458	0.0032
Average :			0.8426	0.0051

Pitot ID:

Reference Pitot (in H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	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 H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	Deviation (absolute)
0.140	0.190	24.9	0.8498	0.0009
0.205	0.280	30.1	0.8471	0.0018
0.285	0.390	35.5	0.8463	0.0026
0.505	0.690	47.2	0.8469	0.0020
0.730	0.980	56.8	0.8544	0.0055
Average :			0.8489	0.0026

Pitot ID:

Reference Pitot (in H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	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 H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	Deviation (absolute)
0.135	0.180	24.4	0.8574	0.0009
0.260	0.350	33.9	0.8533	0.0032
0.370	0.495	40.4	0.8559	0.0006
0.560	0.750	49.7	0.8555	0.0010
0.710	0.940	56.0	0.8604	0.0039
Average :			0.8565	0.0019

Pitot ID:

Reference Pitot (in H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	Deviation (absolute)
Average :				

Pitot ID: 7C

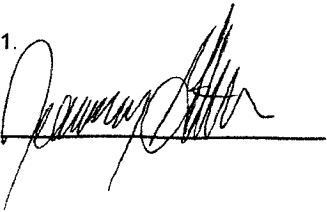
Reference Pitot (in H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	Deviation (absolute)
0.110	0.150	22.0	0.8478	0.0042
0.170	0.230	27.4	0.8511	0.0009
0.265	0.360	34.2	0.8494	0.0026
0.480	0.640	46.0	0.8574	0.0054
0.700	0.940	55.6	0.8543	0.0023
Average :			0.8520	0.0031

Pitot ID:

Reference Pitot (in H ₂ O)	S-Type Pitot (in H ₂ O)	Air Velocity (ft/s)	Pitot Coeff. C _p	Deviation (absolute)
Average :				

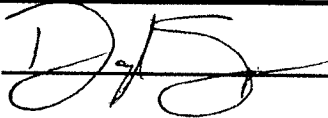
* Average absolute deviation must not exceed 0.01.

Calibrated by: Jeremy Gibbs

Signature: 

Date: January 11, 2018

BAROMETER CALIBRATION FORM						
Device	Cal Date	Pbar Env Canada		Device (inches of Hg)		Difference (Env Can - Elv Corr)
		(kPa)	(inches of Hg)	Reading	Elevation Corrected	
LA	January 17, 2018	100.6	29.71	29.60	29.67	0.04
DS	January 17, 2018	100.6	29.71	29.60	29.67	0.04
CL	January 17, 2018	100.6	29.71	29.66	29.66	0.05
ML	January 17, 2018	100.6	29.71	29.60	29.67	0.04
MH	January 17, 2018	100.3	29.71	29.60	29.67	0.04
SH	January 17, 2018	100.6	29.71	29.60	29.67	0.04
JZ	January 17, 2018	100.6	29.71	29.60	29.67	0.04
JB	January 17, 2018	100.6	29.71	29.66	29.73	-0.02
SF	February 19, 2018	102.5	30.27	30.20	30.27	0.00
JG	February 16, 2018	102.3	29.71	29.66	29.73	-0.02

Calibrated by: Daryl Sampson Signature:  Date: January 17, 2018

Performance Specification is
Device Corrected for Elevation must be +/- 0.1 " Hg of ENV CANADA SEA-LEVEL Pbar
 Enter Environment Canada Pressure from their website for Vancouver (link below)
 and the reading from your barometer on the ground floor of the office.

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

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

GLASS NOZZLE DIAMETER CALIBRATION FORM

Calibrated by: Jeff Zywicki
Date: January 8, 2018

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
P-22	0.1910	0.1890	0.1900	0.0020	0.1900	0.0001969
P-13	0.2070	0.2080	0.2075	0.0010	0.2075	0.0002348
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
P-24	0.2515	0.2525	0.2540	0.0025	0.2527	0.0003482
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
G-283	0.2820	0.2835	0.2830	0.0015	0.2828	0.0004363
G-306	0.3060	0.3060	0.3065	0.0005	0.3062	0.0005113
V-06	0.3200	0.3210	0.3210	0.0010	0.3207	0.0005608
G-337	0.3380	0.3355	0.3365	0.0025	0.3367	0.0006182
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
O	0.3910	0.3915	0.3905	0.0010	0.3910	0.0008338
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
#21	0.4305	0.4325	0.4315	0.0020	0.4315	0.0010155
G-434	0.4345	0.4335	0.4350	0.0015	0.4343	0.0010289
P-29	0.4680	0.4680	0.4690	0.0010	0.4683	0.0011963
P-7	0.4965	0.4940	0.4930	0.0035	0.4945	0.0013337
B	0.5015	0.5030	0.5025	0.0015	0.5023	0.0013763
G-540	0.5405	0.5400	0.5405	0.0005	0.5403	0.0015924
MV-248	0.2485	0.2490	0.2485	0.0005	0.2487	0.0003373
MV-280	0.2800	0.2795	0.2810	0.0015	0.2802	0.0004281
MV-281	0.2805	0.2805	0.2805	0.0000	0.2805	0.0004291
MV-286	0.2865	0.2855	0.2865	0.0010	0.2862	0.0004466
MV 2	0.3040	0.3070	0.3040	0.0030	0.3050	0.0005074
MV-307	0.3055	0.3075	0.3070	0.0020	0.3067	0.0005129
MV-346	0.3445	0.3460	0.3465	0.0020	0.3457	0.0006517

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



Shawn Harrington

has met the requirements of

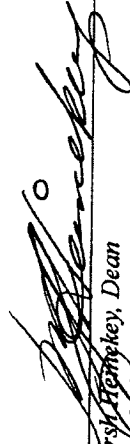
Stack Testing for Pollutants
(CHSC 7760)

School of Process, Energy and Natural Resources
Chemical Sciences Program

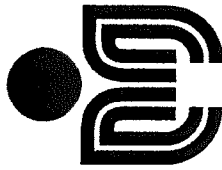
Endorsed by:



Environment
Canada


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

JUNE 21, 2001
Dated



MOUNT ROYAL COLLEGE

Faculty of Continuing Education and Extension

Carter Lanfranco

has successfully completed

Stack Sampling

May 2009

Date

Norma MacDonald

Dean

Faculty of Continuing Education and Extension

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

